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Magnificent stand of White Mountain Ash, *Eucalyptus regnans*, in the Marysville State Forest

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F.N.C.V.

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Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

Stencils and prints of hands are among the commonest motifs used by the Australian aborigines to decorate the walls of their rock shelters. This example was photographed, twenty years ago, by Mr Lindsay Black of Leeton, in a shelter on Glenlyon Station, about sixty miles north-east of Broken Hill. The picture and the original report of the native picture gallery appeared in the *Naturalist* in November 1943 (Vol. 60, pp. 103-104).

Random Notes from the Kulkyne

By Victor Jacobs

Ant-lions

Having read of the abundance of wildlife in the Kulkyne, it was with great anticipation that we pitched camp on the shore of Lake Hattah on Tuesday, January 15, 1963. The first move was to look for the ant-lions which were stated by J. R. Garnet to be abundant there. (See *Vict. Nat.*, Vol. 76, page 315, April 1960.) I had not watched their predatory antics since leaving the Western Desert of North Africa in 1944, and the family wanted to know if Dad's memory was accurate.

Unfortunately for Dad's prestige, not one pit could be found, though we looked each day. However, on the Thursday afternoon I discovered one, while bending down to examine a beetle. Then we found that they were as abundant as Garnet had indicated. Apparently the statewide heavy rains of the previous Sunday night and early Monday morning had washed in their pits, and conditions had not improved to their liking until that Thursday afternoon.

Soon, ants were being sacrificed, and it was noted that those half an inch in length, and even quarter-inch ants of great agility, could easily escape from the pits. The ant-lions themselves did not appear to be on the alert continuously, as many an ant landed hard at the bottom of the pit without being attacked by the resident ant-lion. Only when dislodged sand rolled to the bottom while the ant was climbing the side of the pit was there any reaction. Then came a sharp attack, consisting of small jets of sand being hurled in the general direction of the would-be escapee.

We were not able to determine the ant-lion's method of projecting the sand,* but its efficiency in dislodging the ant and tumbling it to the bottom of the pit was about 50 per cent. Sometimes an alert ant-lion would seize an ant at its first attempt, and pull it underneath the surface, but quite often the ant was able to commence its climb for safety while the pit owner made ineffectual grabs at empty space.

On the whole, we were rather amazed at these creatures. We saw them from Hattah to Mildura, from Wentworth to Broken Hill, and then about Lake Menindee. Their distribution and abundance seemed so out of proportion to their hazardous way of life.

Floods and Droughts

The photograph of Lake Hattah, on page 316 of the April 1960 *Naturalist*, led us to expect a full lake; but the sight that greeted our eyes was something completely different. How-

*The method is by a sharp upward and backward movement of the head, for the ant-lion's "neck" is so versatile that the head can be laid back along the thorax. The same technique is used when a pit is being dug: the insect backs along just beneath the surface, flicking sand away, in gradually decreasing circles as the excavation proceeds.—*Editor.*

The receding lake with its fringe of gums and zones of vegetation.

ever, the lack of water was to be an advantage. Since 1960, no flood waters have come down Chalka Creek, and normal evaporation, coupled with pumping operations, have caused a great fall in water level. Water is pumped to the railway station at Hattah itself, for use by the Victorian Railways. Some railway men were at the lake for a short time, looking at their pump and the then almost useless channel dug to bring water from the receding lake to the pump's inlet pipe. They intimated that another season with no flood waters would see the lake completely dry.

We pitched the tent just above the large River Red Gum (*Eucalyptus camaldulensis*) which is prominent in that picture; but, whereas the photograph shows its roots being lapped by the lake, we could see at least ninety feet of dry ground between those roots and the water's edge. Round the lake, this margin varied in width according to the slope of the ground. The rate of recession of the water could be deduced from the well-marked concentric zones of differently aged vegetation.

There were five zones, which may be referred to by the letters A (at the parent red gums which mark the highest lake level) to E (round the water's edge).

Zone A had no plant life, probably due to pedestrian and vehicular traffic, for that belt is used as a track. Zone B was about twelve feet wide and was densely vegetated, its most noticeable feature being an abundance of robust young red gums about two feet high. Zone C was about as wide as B; it was thinly vegetated and completely lacking in eucalypts. Zone D was as

wide as B and C together; its vegetation was similar to that of B, even to a scattering of red gum seedlings about two inches in height.

Moving into Zone E, we saw an expanding area with only an occasional plant pioneering the newly acquired terrestrial environment. Close to the water's edge, Zone E was still damp and would not bear our weight. Foot-prints and tail-marks of kangaroos, and emu tracks, showed that animals had been seeking water. Back towards Zone D, the sun's heat had dried the mud and cracked it into an irregular mosaic. Farther back, the surface of each unit of the mosaic had become distorted into scrolls and twists which crumbled to dust under our shoes.

The new growths of red gums poses some questions. Were different seeding years responsible for the seedlings in Zones B and D? Or did one good year supply all the seeds but some other factor take them to their present sites once they dropped on the lake?

An indication of past events, and possibly of future ones, is seen in the scattered tree-trunks in Zone B. They are dead now and measure from one to two inches in diameter. Evidently they were young red gums that drowned when the lake filled after a dry period. Is this the fate in store for the young trees now in Zone B? Only time can answer that question.

"Scrubbers"

Each dawn and dusk of our short stay at Lake Hattah, kangaroos came out of the Porcupine Grass and Mallee scrub to feed on the succulent herbage around the lake. Later, we found that the locals called these dark grey, black-tailed animals "scrubbers", and on searching Troughton's *Furred Animals of Australia* we were sure we had seen the Black-faced or Mallee Kangaroo (*Macropus major melanops*). So few visitors enter the sanctuary that these animals moved about without seeming unduly nervous, yet they were not so tame

as to detract from our enjoyment in seeing them truly native.

One evening, on leaving the tent, I came face to face with a trio of them, and watched them retreat hastily up the hill and through the ex-ranger's deserted plantation. David and I cautiously followed them. They were a half-grown joey and his parents. We were able to watch them feeding from a distance of twenty yards. Any closer approach resulted in their leisurely movement to the south, on all fours as is their habit when feeding. We then decided to "surround" them, and towards this end began to move apart. We were separated by barely ten yards when the "old man" turned east and, with a dozen or so vigorous bounds, left his family fifty yards behind. We ran towards the remaining two, but they, as if previously instructed how to behave in an emergency, followed his bee-line and together they disappeared from view. We turned towards home in the half light, applauding the kangaroo's intuition and wondering if he knew that we meant them no harm.

Bird Life

The shrinking lake offered another facet of natural history to delight the observer. It was different from Lake Menindee, where there are about fifty square miles of water and some forty miles of shore-line; the birds were varied but well scattered, and much foot-slogging was done. Lake Hattah had about 400 acres of water and a mile of shore, and the birds were compressed into a dense population that did not sheer off on our arrival but continued with their various tasks.

Large flotillas of pelicans (*Pelecanus conspicillatus*) manoeuvred on the lake until, like children who were tired of playing ships and wanted to be aeroplanes, they took to the air and soared effortlessly against the blue sky.

Investigating the clamour of some Noisy Miners (*Myzantha melanocephala*), we came on a group of them ceaselessly swooping a Boobook Owl (*Ninox novae-seelandiae*), high in a red gum. We felt like intervening, but the owl's prestige was apparently high, for the marauders did not actually touch it, though I doubt very much whether it had its normal sleep that day.

Floating, swimming and wading in the lake, were unidentified ducks, Black Swans (*Cygnus atratus*), four species of cormorant: Black, Little Black, Pied and Little Pied (*Phalacrocorax carbo, P. sulcirostris, P. varius* and *P. melanoleucus*), White-faced Heron (*Notophoyx novae-hollandiae*), White-necked Heron (*N. pacifica*), Straw-necked and White Ibises (*Threskiornis spinicollis* and *T. molucca*) and some Red-kneed Dotterels (*Erythrogonys cinctus*).

On our first tour of the lake, the mournful whistles of a flock of White-winged Choughs (*Corcorax melanorhamphus*) drew our attention to those gregarious birds. There was a squawking mass of large white birds, and our binoculars picked out the naked blue skin around the

eyes, the short beak and the lack of a prominent crest; then we knew we were meeting Little Corellas (*Kakatoe sanguinea*).

Daily visitors to the lake were mudlarks (*Grallina cyanoleuca*), Black-backed Magpies (*Gymnorhina tibicen*), Kookaburras (*Dacelo gigas*), Ring-neck Parrots (*Barnardius barnardi*), Willie-wagtail (*Rhipidura leucophrys*), Yellow Rosellas (*Platycercus flaveolus*) and "crows" (*Corvus coronoides*).

An early morning walk into the Mallee forest south of the lake was rewarded by the observation of a pair of Mulga Parrots (*Psephotus varius*) with a young one, taking their breakfast of grass seeds from the ground. We had no doubt that we identified them correctly. Nor were we less certain with a cockatiel (*Leptolophus hollandicus*), some Crested Pigeons (*Ocyphaps lophotes*), and a Pink Cockatoo (*Kakatoe leadbeateri*). Nevertheless, many quite distinctive birds perched near enough and long enough for us to make copious notes about them, and yet we still could not unravel them from Leach's *Bird Book*. It was rather frustrating.

At another time, a walk eastwards from the lake took us into the sand-hills, where long, scantily vegetated dunes alternate with belts of Black Box (*Eucalyptus largiflorens*). Bird life was rich there, too. Many of the birds previously noted were seen again, but our best record was of a Hooded Robin (*Melanodryas cucullata*), which sat and watched us from a few yards away.

Pradu Tree

By W. L. Williams

I have made the acquaintance of the *pradu* tree, and I transcribe its name in Roman letters as nearly as I can from the word spoken to me by my Thai friends. One should pronounce it *prah-doo*, with a little more stress on the first syllable than on the second. For months now, since the dry season began, I have parked my car on working days beneath one beautiful specimen—a tall, shady mound of green about seventy or eighty feet high, the shelter of which allows me to open the car door without burning my fingers and then to drive without a couple of handkerchiefs held between the steering wheel and my bare hands. I have a great regard for that *pradu* tree, and also for the lovely rain-trees that are its neighbours.

On the afternoon of Sunday, March 31, I parked under it, not because I wanted to spend the day in my office, but because my wife and I wanted to visit a splendid Buddhist temple that is immediately opposite. I pointed out to her the deep shade and the branchlets bearing alternate leaves, or leaflets, individually something like the leaves of our kurrajong. The tree was quite green, and a wonderful relief to the eye. Round 5 p.m. we went home and left it thus.

In the night a miracle happened. When I arrived at work at 7.15 a.m. on the morning of April 1, the tree was a complete mass of golden bloom — pea-shaped flowers with tissue-like standards and keels—which had come out during the night. The flowers were clustered irregularly round drooping flower-stems that sprang from the axils of the branchlets; some blossoms seemed to be alternate, others opposite, and still others in whorls of four or five. I have never seen a complete flowering so sudden and so unexpected.

The Thais were as excited as could be. They say that all *pradu* trees burst into flower at the same moment each year throughout the whole country, and indeed I could distinguish about a dozen golden piles, some near, some far, where I am certain there had been no golden piles the day before.

The Thais laughed and picked sprays, and held them for me to smell. There was a strange, half-sweet, powerful perfume. The *pradu*, they told me, is the symbol of the Royal Thai Navy, though why it was chosen I am not quite sure. Let that pass.

Before the day was out, the flowers were falling freely. My green car, like the tree, turned golden—and just as fast. Within thirty-six hours of the miracle scarcely a trace of the glory was to be seen. It all came and went just as quickly as that. Today is April 3. As I parked under the *pradu* tree this morning, it appeared almost exactly as it had been on March 31. On the ground lay a withered brown "chaff", the former golden flowers, together with what I take to be millions of small green fruit (at

any rate, they are calyces) shaped rather like the buds of our *Eucalyptus camaldulensis*, except that the "beak" is at the stem end.

I didn't have my camera with me on April 1. There's always tomorrow! Or is there? Not with the *pradu*, it seems. It April-fooled me completely.

[*Note*: *Pradu* means "priest-like", and anyone who has seen the tree "take the yellow robe" will recognize the appropriateness of the name among Buddhist peoples.]

F.N.C.V. Excursion to Beechworth

The 1962 Easter excursion to Beechworth, that delightful town of golden poplars, in the midst of the old gold-mining country of north-eastern Victoria, was an occasion that will long remain in the minds of the over forty field naturalists who took part. We travelled by chartered coach, as is usual with these trips, lunching beside the Acheron River near Taggerty. A brief stop was made during the afternoon at Seven Creek in the Strathbogie Ranges.

During the first evening, at Beechworth, we made the acquaintance of our guide for the excursion, Mrs Frances Gladstone; and she and her husband showed us a selection of gem stones that had been found in the district.

Beechworth is a town with an interesting history. A hint of past days is found in the old court house and prison cells, and in the "golden horseshoe" statue with its reminder of the political candidate who rode a horse shod with shoes of gold. An evening visit to the museum added to our picture of life in days gone by.

The ruins of the one-time hospital are surrounded by a variety of old trees: big specimens of *Sequoia*, Bunya Bunya pine, horse chestnuts, and others. Currawongs were constantly amongst them, uttering their familiar calls.

A most impressive part of Beechworth is its gorge, a mile and a half long; and the party spent a most enjoyable morning investigating it. This gorge is very old, representing millions of years of the eroding work of running water. The Devil's Slide was promptly climbed by a couple of members when the coach stopped for a while in its vicinity. Falls are a characteristic feature of the topography, and many photographs were taken of those in the gorge.

That afternoon we set out to make our fortune in the Woolshed Valley. It was a sight worth seeing; field naturalists squatting on the ground digging for gem stones; others, clustered around Mr Gladstone, learning how to pan for gold with a prospector's dish. Less mercenary members went bird-watching by a large waterhole and had a rewarding afternoon. A few of the birds seen were the Fairy Martin, Yellow-tufted Honeyeater and Hooded Robin.

On another afternoon we visited the Wallaby gold mine. All that remains today is an enormous hole in the hillside with a great pile of quartz fragments outside. Down in the creek bed were the remains of the old crushing plant. In spite of much cracking of quartz with our hammers, no gold was found.

A whole day was spent about Mount Pilot, a granite range reaching 1760 feet in height. The granite tors were a distinctive feature of the landscape there, as in much of the Beechworth area. In one place, where the rocks formed a shelter, we were shown some faded aboriginal paintings. With a careful look we could see a kangaroo, and an aborigine with a spear. These are believed to have been painted on the rock by aborigines using red ochre and goanna fat.

Two reptiles were seen: a goanna high up a rock face, and a Copper-tailed Skink, the latter being a lizard with a coppery tip to its tail.

The species of Cypress Pine growing on the range caused considerable speculation. It was finally identified as the Black Cypress Pine (*Callitris endlicheri*). Typical eucalypts were

Red Box and Yellow Box (*Eucalyptus polyanthemos* and *E. melliodora*). Amongst the birds seen were Wedge-tailed Eagle, Whistling Eagles and a Mistletoe Bird.

Late in the afternoon we had a quick visit to the Woolshed Falls below the junction of Reid's and Wooragee Creeks. The height of the rock face was most impressive, even without much water flowing over. In the creek bed above the falls, plants (*Callistemon* and others) were growing in narrow crevices in the polished granite. As usual, once the field naturalists were out of the coach it was hard to get them back into it.

Another day trip was to Mount Stanley. On the way we visited Lake Kerford, a delightful spot and the source of Beechworth's water supply. We walked around the lake, bird-watching and botanizing, then joined up with members of the Benalla Field Naturalists Club and drove on through orchard country to Mount Stanley. As at Mount Pilot, the rock is granite, though shale outcrops on the slopes of Mount Stanley. The mountain is nearly two thousand feet higher than Mount Pilot and has a heavier rainfall. This was reflected in the vegetation of the area. White Sallee (*Eucalyptus pauciflora*)—with the parallel veins of the Snow Gum group—was identified on the summit, and Blue Gum (*E. bicostata*) was growing a little lower down.

A thick vein of quartz was discovered running through the granite near the summit, and several keen geologists spent some time breaking up samples. They were rewarded with a number of quartz crystals, mostly fairly small. The quartz contained some molybdenite, a soft, flaky mineral, lead-grey in colour, which is quite characteristic of quartz veins in granite. Pyrites was also found.

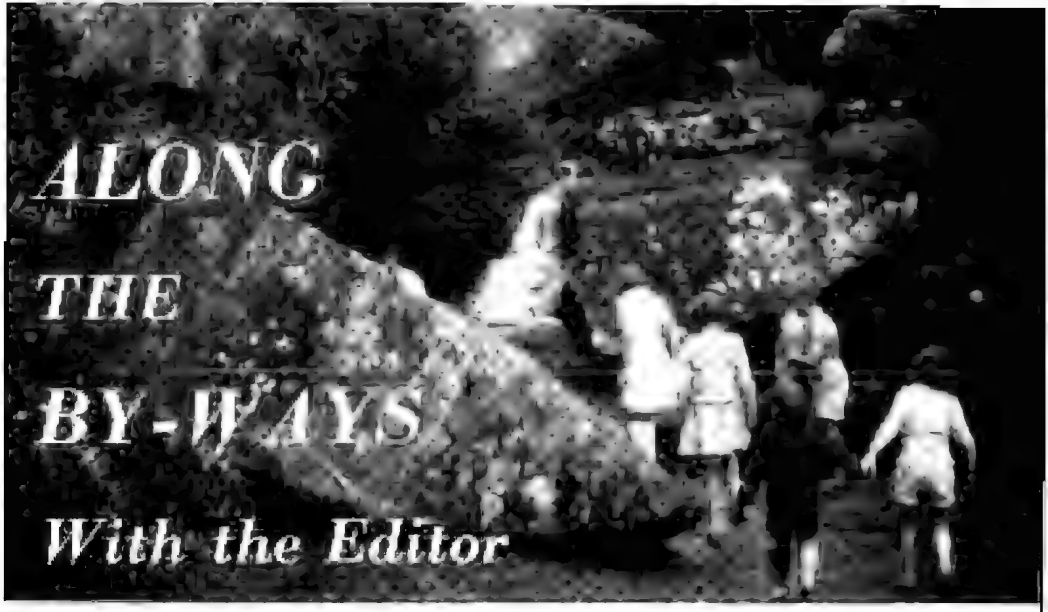
Donkey Hill, in the plain country between Chiltern and Rutherglen, provided a contrast with the granite landscape of Beechworth. The rock was a sedimentary shale. The vegetation reflected the change in soil, rainfall and altitude. The characteristic tree was the Red Ironbark (*Eucalyptus sideroxylon*), with a thick undergrowth of Woolly Grevillea (*Grevillea lanigera*) and some Urn Heath (*Melichrus urceolatus*). The Silver Wattle (*Acacia dealbata*), which was found everywhere else on our excursions, was replaced there by the Golden Wattle (*A. pycnantha*).

Returning towards Beechworth from Donkey Hill, we stopped and walked for about a mile along Black Sands Creek. The great attraction here was quartz crystals in the creek bed. Along the bank we found boulders of aplite and granite. Blue Wrens and Scarlet Robins were plentiful beside the water.

The success of our excursion to Beechworth was largely due to the enthusiastic leadership of a local member, Mrs Gladstone. We hope she shares our happy memories of this holiday.

B. C. HOOKE

Reid's Falls, Beechworth.
Photo: E. Swarbreck



These columns are available each month for your nature notes and queries. Address your correspondence to the Editor, "Victorian Naturalist", P.O. Box 21, Noble Park, Victoria.

Mallee Mouse Spider

These notes are from Mr Evan Rowlands who, until quite recently, was stationed at Robinvale in north-western Victoria:

At various times at Robinvale, high school pupils used to bring to me female specimens of the "Mouse" spider, *Missulena occatoria* Walck. This is a large spider with a broad, shiny cephalothorax, hairy abdomen and sturdy legs, usually dug up from a hole in the ground. We were always amazed at the ferocity of the "lady" when annoyed. When in a jar, she frequently adopted a rearing attitude of aggression and would strike downward and forward at a pencil thrust in the bottle, with almost incredibly swift movements. I'm glad that is one specimen that never escaped from bottles on my desk in the staff room! Oddly enough, K. C. McKeown in *Australian Spiders* (1952), on page 211, describes this female as "slow and sluggish . . . in a dopey or almost torpid condition". It is evident that there are two sides to the nature of this lady!

At a certain time of the year around Robinvale, there occurs almost a plague of the male of this species. (I was never certain that they were not males of *Missulena insigne*; the males of *occatoria* and *insigne* are separated on the basis of microscopic differences in anatomy.) Unlike his wife, the male is small, but with a similarly shaped though bright scarlet cephalothorax. He has the same aggressive nature and willingness to use a very business-like pair of fangs. At the right time of the year, it was quite usual to find these in the schoolyard, and to have as many as half a dozen different specimens brought in by children from the district. This emergence of the males is obviously part of a life cycle about which almost nothing is known. Where have the males been? Do they emerge to mate? To where do they disappear?

It is an interesting fact that the male and female of this species were not recognized as such until 1943 although the female, described in 1805, was probably one of the first

spiders collected from Australia. This is another case where sexual dimorphism, differing habits and lack of observational data, have confused the systematist.

For an illustration of the "rearing attitude of aggression", and the "business-like pair of fangs", readers may refer to an illustration in the *Naturalist* of April 1958 (Vol. 74, page 176). The picture is of specimens of the Sydney Funnel-web (*Atrax robustus*) which had been found in eastern Victoria. Both *Missulena* and *Atrax* belong to the sub-order Mygalomorphae, and females of these genera are similar in general appearance.

Autumn is the season when males of the group are usually observed. They wander about at night and are likely to be seen on paths, verandahs and even on the floors of buildings. Probably most have matured from the broods of young which one finds in burrows with adult females in summer, but it is likely too that some survive from one mating season to the next.

Manna from Eucalypts

Miss Jean Galbraith, of Tyers, has written these comments on the production of different types of manna by various eucalypts:

For as long as I can remember, little white exudations of manna have appeared where a soft juvenile leaf or stem of Apple Box (*Eucalyptus bridgesiana*) has been broken, on the young trees along the road near our home. They usually appear during February and March, in hot weather, quite often where an insect has pierced the epidermis. The manna is sweet and delicately flavoured. On many occasions I have collected manna from breaks I had made in leaf surfaces a couple of days before, for that very purpose. However, the appearance of manna does not always follow a break in the epidermis. Presumably it is most likely to be exuded when the plant is growing strongly and the sap carries much sugar. I have picked up manna under the real Manna Gum (*E. viminalis*) once, and often from beneath Candle-bark Gum (*E. rubida*), but have never seen it on any foliage except the juvenile leaves of Apple Box.

This comparison of Manna Gum and Candle-bark Gum supports the comments which were made in these columns in June 1961 (*Vict. Nat.*, Vol. 78, pages 36-37), when "Trees that Animals Like" were discussed. Besides these two and the Apple Box, Swamp Gum (*E. ovata*) and White Box (*E. albens*) were noted as species that yield sugary food for certain birds and mammals.

Rufous Fantail at Botanic Gardens

On Wednesday, March 27, 1963, a visit was made, with a group of teacher trainees, to the Royal Botanic Gardens, mainly for the purpose of studying the water-birds on the lake. Having accomplished this, we moved to the "Australian border", to see what honeyeaters and other native birds might be interesting themselves in the trees and shrubs there.

The time was about 11 o'clock, and we were watching a Grey Fantail performing its aerial acrobatics twenty feet above the path, when a flash of unusual colour focussed attention on a "stranger" in one of the dense shrubs. The latter moved out into the open soon after,

and we had an excellent view of a beautiful little Rufous Fantail.

The Rufous Fantail, *Rhipidura rufifrons*, comes south into Victoria in about November each year; it nests in our forest gullies, then returns north by mid-autumn. Details of the 2000-mile migratory flight, and other interesting data about the bird, are set out by R. Wheeler, in an article entitled "Saga of the Rufous Fantail", in the September 1955 *Victorian Naturalist* (Vol. 72, pp. 66-69).

It would be interesting to have readers' notes of unusual appearances of the species since that article was written.

Incidentally, an Eastern Shrike-tit, *Falcunculus leucogaster*, was about the Gardens that same morning; one flew past the group as we were crossing a lawn, and its plaintive whistle was heard soon after.

P.O.A. Awards of Merit

Following recommendations by Sir Mark Oliphant, the Professional Officers' Association recently made two awards of merit, the recipients being Dr Irene Crespin, just retired from the position of Commonwealth Palaeontologist, Bureau of Mineral Resources, and Mr R. H. Patterson, Senior Arboriculturist, Department of Works.

Dr Crespin was for many years assistant to the late Dr Frederick Chapman, first at the National Museum, Melbourne and, from 1927, when the latter moved to Canberra as Commonwealth Palaeontologist, in the national capital. She collaborated with him in joint papers published in the *Proceedings of the Royal Society of Victoria* and other scientific journals. She specialized in micropalaeontology, and made original contributions in the identification of time sequences in sedimentary rocks, knowledge which is being put to use in economic geology (oil search, etc.). Dr Crespin made a detailed study of the comparatively rapid evolutionary changes in Foraminifera, and in 1959 was made an Honorary Fellow of the Royal Microscopical Society. Colleagues both in Australia and overseas have honoured her in the bestowal of generic and specific names to fossils.

Dr Crespin was educated at Mansfield High School and the University of Melbourne. The medallion was presented to her in Canberra. She was honoured by the Royal Society of New South Wales by being awarded the Clarke Memorial Medal in 1957, and in contributing a paper entitled "Microfossils in Australian and New Guinea Stratigraphy" to their David Memorial Volume in 1959.

Mr Patterson has made a wonderful success of the arboricultural and vegetative development of the Weapons Research Establishment at Woomera. In this hot arid zone of red sandy soil, covered in bluebush and saltbush, he began his arduous task in 1947, and now it can be truly said: "He made the desert bloom". With a strictly limited supply of fresh water, he has, as the result of observation, experimentation, analysis, selection, planting and supervision, created a livable environment for nearly five thousand people, who have the benefit of over 30,000 trees, of lawns, bowling greens and sports grounds.

Mr Patterson's reports on his achievement are in demand in many countries with aridity problems. He is now living in retirement in Adelaide, where his medallion was presented.

The above is a summary of more detailed accounts published in the P.O.A. Chronicle.

—J. A. BAINES

Presumed Migration Flight of Small Bats

By K. G. Simpson

Banding experiments in recent years have amply demonstrated that many species of bats migrate, at times for quite long distances.

Regular desertions and reoccupations of caves, and other bat roosts, are well documented. The number of occasions, however, on which actual migratory flights of bats have been observed, is very small. The word "migration" is used here in its most commonly accepted sense: the movement, frequently *en masse*, of a population in response to a major, generally recurring environmental stimulus. In this instance, therefore, migration is considered to be distinct from observations of bats emerging from caves, trees, buildings or camps (fruit-bats) on their way to regular feeding or drinking sites, or during such foraging flights. There have been a number of observations of migratory flights among both Megachiroptera (fruit-bats or "flying foxes") (Africa) and the Microchiroptera (principally insectivorous bats) (North and Central America, North Africa, and Europe). Many of these records are summarized by Allen (1940). Observations of the migratory flight of Australian Microchiroptera have rarely, if ever, been recorded.

Although the species involved cannot be identified, the observation recorded here is considered of sufficient importance to be placed on permanent record, and to warrant some further discussion as to its significance.

The information came in two letters from Mr V. Lowe, Mystic Park, via Swan Hill, Victoria, and concerned an observation of his brother Tom. The first was addressed to Mr R. Wheeler (Bird Observers Club, Melbourne) and the second to me.

The observation was made at the west side of Lake Kangaroo, Mystic Park, Victoria (Lat. 35° 35', Long. 143° 44'). The relevant extract from the first letter (January 20, 1962) is:

> We don't see many bats here; only the usual half-dozen or so at dusk some evenings, but as Tom stood looking to the lighter western sky on January 16, 1962, the evening following the worst bushfire day, he saw a long dribble of bats steadily flying north. The lowest were little above the orange-tree tops. He didn't make an actual count, but thought there would be about two hundred. We wondered if the occurrence was normal as to number and season, or if the southern fires had anything to do with it. The following evening we watched again until late, but no bats were seen.

In the second letter (May 1, 1962) further information is given in response to questions:

> They were the usual small insectivorous kind.
>
> No calls were heard from the bats.
>
> Time of day not recorded exactly — late dusk.
>
> Tom says his field of vision was clear for at least two hundred yards, and he had no suspicion that any of the bats were doubling back and recrossing his field of view. He had from five to ten bats in sight at any one time, during an estimated period of thirty minutes plus, and the bats

seemed to be about two hundred plus in number. They all flew in similar manner, with some zig-zag and up and down movement (sufficient to suggest some feeding) but the general movement was very definitely a uniform line from south to north.

The letter concludes with the following quote from the observer's comments:

' At the end of half an hour's observation, I could see bats quite clearly, still coming along in similar numbers —I was driven inside by mosquitoes and lack of light. If I had thought it important, I would have watched them longer and could have attempted to pick them up by torchlight—for all I know they could have continued coming all night.

The flight described could almost be a word for word description of some of the best known records of similar type from North America and Africa. Other interesting points are references to the type of bat, and to either bushfires or the season of the year being the possible cause of the movement.

In North America, three normally forest-inhabiting species of Microchiroptera have been witnessed on rare occasions during migrational flight. The Red Bat (*Lasiurus borealis*) has been observed at times in very large numbers, and once a movement was recorded passing a point over a period of three days. Diurnal migrations of this bat have also occasionally been seen at sea. The Larger Hoary Bat (*L. cinereus*) and the Silver-haired Bat (*Lasionycterus noctivagans*) have also been recorded during migration. Allen cites a number of detailed descriptions of the migratory flights of these species. On rare occasions only, mixed groups of bats of two or all of the above-mentioned species have been seen flying together on diurnal migration. In Europe, bats and swallows have been witnessed together on diurnal migration, in one instance the bats continuing to pass as night fell, although the flight of swallows ceased. (Finkenstein and Schaeffer, 1934.)

Large evening flights of the Yellow Fruit-bat (*Eidolon helvum*, Megachiroptera) were seen in the East Belgian Congo in September 1913, and again in May and July 1914. (Chapin, 1917, see Allen, 1940, p. 261.)

In Australia, the annual migration southward from Queensland into northern and central New South Wales of the Grey-headed Fruit-bat (*Pteropus poliocephalus* — Megachiroptera) and (to a less extent) the Little Red Fruit-bat (*P. scapulatus*) is well known. Ratcliffe (1931), summarized details of this migration in his work on the biology and economic importance of the genus. However, no records comparable with those of the Yellow Fruit-bat in Africa have been made in this country. No distinction between the foraging flights of the Australian species and their migration flights can be made, since the bats forage during their southern movement in spring and on their return a few months later.

The salient features recurring in each description are:

(*a*) Migration flight rarely witnessed; assumed to occur generally at night.

(*b*) Migration very occasionally by day, usually early morning or late afternoon and on

into the dusk; a few records of flights continuing throughout the day.

(c) The manner of flight as observed — straggling lines of single individuals or small groups; steady flight, generally not erratic, little deviation from the flight line; bats often glide or sail short distances.

With reference to Tom Lowe's query as to whether the southern bushfires were responsible in any way for the migration flight he saw, it can simply be stated that the major fires burning in Victoria from January 12-16, 1962, were those in the Dandenong Ranges, Healesville district, Daylesford area, Clear Lake in the southern Wimmera, Wye River near Lorne, Mansfield and Yallourn. With the exception of those at Daylesford, Mansfield and Clear Lake (120 to 170 miles from Mystic Park), there were no major fires north of the Great Dividing Range. During the same period, there were many small fires widely spread throughout Victoria, although not of any duration or size. (Country Fire Authority, Victoria, June 19, 1962, *in litt.*) It could not be established whether any bushfires were responsible for the northward movement of the bats.

The identity of the species involved must also remain undetermined, since the majority of Microchiroptera recorded from Victoria and New South Wales are in general small, with wingspans ranging from nine to fifteen inches approximately, and there are at least twelve species recorded from the two states that fall in this size range. These comprise two general groups—species inhabiting caves and species that frequent forests.

Most of the caves in Victoria are in basalt areas or hilly regions, and there are no caves known to me any closer to the Swan Hill district than those in the Victorian Grampians. The nearest caves known in New South Wales are a few tiny ones in rocky ranges near Griffith. The flood plain of the Murray - Murrumbidgee river system supports no deep mining activities in the Swan Hill district; the nearest mine-shafts are about fifty miles to the south, near Donald and Charlton, Victoria. Bats may, however, use artificial caves—culverts, underground pipe-line tunnels, bridges, etc.—as resting places.

If the ones observed were a large colony of forest frequenting bats, they would normally rest in hollows or behind loose bark of trees, of which there are plenty in the Swan Hill district. However, certain species of forest bats at times form quite large colonies in suitable buildings.

ACKNOWLEDGEMENT

I wish to acknowledge the assistance of Mr J. H. Calaby, C.S.I.R.O., Division of Wildlife Research, Canberra, A.C.T., for his constructive criticism of the manuscript.

REFERENCES

Allen, G. M. 1940. *Bats.* Harvard University Press. pp. 253-256.

Finckenstein, Graf Finck von, and Helmut Schaeffer. 1934. Fledermauszug am tage. *Zool. Anzeiger, 106*: 46-48.

Ratcliffe, F.N. 1931. The flying fox (*Pteropus*) in Australia. *C.S.I.R. Bull. No. 53*: 24-33.

Book Review:

"Journal of a Voyage to New South Wales"

[By John White (edited by Alec H. Chisholm), 9¼in. x 6in., 282 pp., illustrated; Angus & Robertson, Sydney, 1962. Price 57/6.]

To satisfy an ever-growing demand for important, but now rare or unprocurable, old scientific works, many publishing houses abroad are bringing out modern facsimiles. For example, the Ray Society in London recently (1957-59) duplicated the two indispensable volumes of *Species Plantarum* (1753) by Carl Linnaeus, word for word and replete with an excellent historical introduction. Original publications, narrating the first-hand experiences of Australia's earliest white residents, are now so scarce that the average inquirer has little hope of consulting them—even in well-stocked central libraries.

The Royal Australian Historical Society has risen nobly to this challenge by sponsoring a series of journals (or "narratives") written by five members of the First Fleet. These accounts were all published originally in London, between 1789 and 1798, and we have just witnessed the successful re-publication of Captain W. Tench's book—under a new title, *Sydney's First Four Years*. Now, the second monograph is available, in attractive green cloth, and it is of peculiar interest to all Australian nature lovers. Editorship by Mr A. H. Chisholm, who piloted our *Victorian Naturalist* through nine difficult years (1939-48), is a sure guarantee of literary excellence and scrupulous attention to accurate detail.

Here is the story of a faithful observer and painstaking recorder who spent seven years as Surgeon-General to the infant colony at Port Jackson. But John White became much more than a medical man, for on almost every page in the latter half of his account are notes about the unfamiliar fish, fowls, mammals, reptiles, insects, vegetation and habits of the native people that he met. He may justly claim the distinction of "Australia's first resident naturalist", and it was entirely through White's early dispatches to England that plants of eastern Australia were first described and delineated in British botanical works. A curious deficiency in the journal is his failure to comment on any bird-calls, even the loud notes of the kookaburras, cockatoos, currawongs and crows, which are described. Was the observant surgeon tone deaf?

Events are related in lively fashion and, once having opened this book, the reader is loath indeed to lay it down. References to the agonies of the convicts, under a brutal punitory system, are shocking and heart-rending; by way of some relief, however, there is also a sprinkling of humour. We chuckle over the discomfort that White and Lieutenant Ball must have endured at Teneriffe during a long holy procession on Corpus Christi Day: as the Host approached, they knelt in accord with the devout islanders, but soon found the posture on hard pebbly ground "so exceedingly painful" that they dared raise one knee at a time "to procure a momentary ease". A holy father soon detected this lack of ceremonial etiquette, and he did not hesitate to wither the heretics with a resentful frown!

"Journal of a *Voyage*" is rather a misleading title. The sailing time of eight months, via Cape Town, occupies barely half of White's narrative, while the far more exciting remainder is concerned with life and explorations around Sydney over a period of nearly ten months (January 26-November 11, 1788).

Three different introductions precede the actual diary account in this new presentation, and they cover 34 pages; the journal itself occupies 133 pages—less than half the volume—while appendices, reference notes, bibliography and index take up the concluding 111 pages. If any adverse criticism is to be levelled, it would surely be that John White's log is

submerged under a mass of explanatory notes. Personally, I find the latter very useful, especially the appended "Reference Notes", listed chapter by chapter. Rex Rienits's "Biographical Introduction" is almost an essential background. After all, the people most likely to derive benefit from the John White monograph will be students of history and local naturalists, rather than the casual dabbler in travelogues.

This occasion must not pass without a word of praise for the many excellent illustrations; there are two in full colour, and all 37 black-and-white plates follow the original sequence of the 1790 edition, although they are reduced in size and two drawings often appear on the single block, for economy—there were 65 plates in the original *Journal*. Presumably, one must thank White's friend, Thomas Wilson of London, for preparing such attractive sketches. The portrayal of White-jointed Spider (Plate 32) is remarkable for clarity and precision, so are the drawings of banksia cones on Plates 14 and 15. To the Royal Australian Historical Society, the Editor, his various collaborators, the Sydney Halstead Press and, last but not least, to Angus and Robertson, we offer congratulations for a very fine piece of literature.

—J. H. Willis

Field Naturalists Club of Victoria

General Meeting—April 8, 1963

Mr M. K. Houghton presided, and about one hundred and fifty members and friends were present.

The death was announced of Mr S. R. Mitchell, and members stood for a minute in silence in respect to his memory. Mr H. C. E. Stewart spoke of Mr Mitchell's work, his service to the F.N.C.V. and other natural history bodies, and his standing in the field of ethnology. It is proposed to publish biographical details of Mr Mitchell's career in the *Victorian Naturalist* shortly.

The subject for the evening was "Victorian Heathlands", by Professor J. S. Turner. With the aid of colour slides, he outlined the characteristic features of heathlands, including types of plants, soil and locality, mentioning similar systems in other parts of the world. Heaths were contrasted with dune communities. Some lines of research being carried out on Wilson's Promontory, and puzzling problems for solution, were indicated. The effects of burning and its ultimate benefits on heathlands were explained. Professor Turner pointed out that as a result of soil research and treatment with superphosphate and trace element fertilizers and the planting of leguminous plants to provide nitrogen compounds, much heathland country is being transformed to farmland. Need for conservation of sufficient coastal heathlands is urgent. The president thanked Professor Turner for the most interesting and instructive talk.

The secretary announced that Lerderderg Gorge had been made a Forest Reserve, and that Mr R. R. Dodds had been nominated as F.N.C.V. representative on the committee of management. Mr Coghill also thanked Mr J. A. Baines for undertaking to look after the bookstall at general meetings.

Mr J. R. Garnet exhibited plants from Wyperfeld, including *Santalum acuminatum* (Sweet Quandong), *Anthocercis myostidea* (Small-leaf Rayflower), *Codonocarpus cotinifolius* (Bell-fruit), *Halgania cyanea* (Rough Halgania), *Olearia lepidophylla* (Club-moss Daisy-bush) and Red Correa.

Several members brought along insect specimens of various kinds; and Mr D. E. McInnes exhibited living *Galeolaria*, *Plumatella* and *Vorticella*, viewed with the new "club microscope". This instrument is now available at low cost.

Eight new members whose names appear in the April *Naturalist* were elected.

Microscopical Group — February 20, 1963

Mr E. LeMaistre chaired the group meeting, which was attended by seventeen members, including one from Ballarat. Mr LeMaistre was re-elected as chairman for the ensuing year, and Mr P. Genery as secretary.

The evening was a "members' night", devoted to the description of exhibits. Eleven microscopes were in use, and items shown and discussed included: Desmids (*Micrasterias denticulata*) in an unusual filamentous form (E. LeMaistre); a sample of water taken from Albert Park Lake on February 20 to demonstrate scarcity of life (A. Scott); fore-leg of water-beetle (*Dytiscus*) showing modification of three joints to form cupule-covered disc, and a higher magnification of a single cupule (P. Genery); diatoms (*Triceratium articulatum*) from California (H. B. Barrett); and a live scallop, under binocular microscope, showing encirclement of eyes (D. E. McInnes).

Entomology and Marine Biology Group—March 4, 1963

The meeting was attended by twenty-three members, with Mr M. Houghton in the chair. He welcomed Mr J. Meade (back after an illness) and a new member, Mr P. Kelly.

The speaker for the evening was Mr P. Genery, whose subject was "Eyes of Insects". He showed microscope slides of parts of insect eyes, among which were the compound eye lens of a water beetle and the telescopic eyes of a jumping spider. Members showed their interest by asking many questions.

Mr D. McInnes had an interesting exhibit. He showed the simple eye of a scallop under microscopic low power.

An excursion was arranged to Altona Beach on March 31 because of the good low tide at 3 p.m. on that date.

Geology Group—April 3, 1963

Twenty-four members were present, with Mr L. Angior in the chair. Mr D. McInnes gave a report on the excursion to Werribee Gorge and the Bacchus Marsh basin on Sunday, March 17, when members from the Bendigo Club attended. Mr R. Dodds reported on a weekend trip to Heathcote, Bendigo, Colbinabbin Ranges, Rushworth and Whroo. Mr T. Sault mentioned the washing of "flour" gold from the conglomerates at the top of Arthur's Seat.

The subject for the evening was a lecture by Mr J. Douglas (Department of Mines) on "Fossils". As the speaker specializes in palaeobotany, the subject matter was concerned mostly with plant remains. The development of plants from the Ordovician through to the end of the Tertiary was explained with the aid of specimens. The importance of present day research into micro-fossils was stressed, and slides of these were shown. Mr R. Davidson moved a vote of thanks to Mr Douglas.

Other exhibits included fossil wood from Anglesea (K. Cheslin); quartz crystals and silicified wood from King's Gate, Glen Innes, N.S.W. (T. Sault); aragonite from India, for cutting and polishing by members (L. Bairstow); antimony, micro-granite, magnesite, chert and talc from Heathcote and Whroo (L. Angior); jasper from copper mine in South Australia (A. Cobbett); glaciated pebble, showing many-sided ground faces, from Werribee Gorge (D. McInnes).

Fauna Survey Group—April 4, 1963

About a dozen members attended, with Mr N. A. Wakefield in the chair. Mr W. King and Mr H. E. Wilkinson both reported observations of various native mammals in the Marysville-Warburton district, and the meeting discussed factors responsible for their distribution.

Mr Wakefield outlined some work which is planned during Easter—the processing and collecting of further bone deposit material from the Mubel Cave at East Buchan. The group discussed several mammal papers which are being prepared by members for publication shortly in the *Naturalist*.

Plans were made for printing and fixing metal tags, with serial numbers, to the group's cage traps; and the attributes of various kinds of spot-light batteries were discussed.

Mrs J. Seecamp exhibited a set of the issues to date of the recently inaugurated magazine, *Animals*, and members perused also the 1963 *Victorian Year Book* which contains an illustrated chapter on Victorian mammals.

Bairnsdale F.N. Club

This Club reports an active year with meetings well attended and excursions of great interest. One of the highlights of the year was the visit of the F.N.C.V. between Christmas and New Year.

Mr C. Bowden is president, and Mr E. V. Barton the new secretary.

At Suggan Buggan, a metal F.N.C.V. badge was found, and it finally came to Mr E. H. Coghill, who would be pleased to hear from the owner.

F.N.C.V. Diary of Coming Events

GENERAL MEETINGS

Monday, May 13, 1963—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, reports, announcements, correspondence.
2. Subject for evening: "Bairnsdale Excursion" (Members' Night).
3. Election of Members:

Ordinary Members:

Mr Bruce J. W. Hird, 15 Forster Street, Mitcham. Introduced by Mr N. Blake.
Miss Rosemary R. Darvall, 56 The Eyrie, Eaglemont.
Mr Paul Dubont, 43 Fourth Street, Black Rock, S.9. Proposed by E. Swarbreck.
Mr Ian Grant, 5 Badge Court, Laverton. Introduced by Mr D. L. Bowrey. Interest: Birds.
Mr Karl Kleinecke, 8 Oliver Street, Ashburton, S.E.11. Interest: Botany.
Miss Eileen E. Lawton, 1 Maitland Avenue, E. Kew.
Mr A. D. McKay, 104 Willis Street, Hampton, S.7. Interest: Geology.
Mrs Kathleen Palmer, 424 Auburn Road, Hawthorn. Introduced by Mr E. Swarbreck. Interests: Geology, botany.
Mrs Deryl Trigellis-Smith, 67 Leura Grove, Hawthorn East. Introduced by Dr W. Gerce. Interests: Birds, botany.
Miss Flora H. McDonald, 1 Rae Street, Hawthorn, E.2. Introduced by Miss M. F. Bland. Interest: Botany.
Dr David McCredie, 11 Uvadale Grove, Kew, E.4. Introduced by Dr H. N. B. Wettenhall. Interests: Fauna and flora.

Junior Members:

Miss Merrilyn Gould, 14 Alpha Street, Balwyn North. Introduced by Mr M. K. Houghton. Interests: Geology, marine biology, entomology.
John Coleman, 189 Shelbourne Road, Montmorency.
Miss Jennifer Tudehope, 22 St. James Avenue, Mont Albert, E.10. Introduced by Mr M. K. Houghton. Interests: Geology, marine biology, entomology.

4. Nominations for membership.
5. General business.
6. Nature notes and exhibits.
7. Conversazione.

Monday, June 10—Annual General Meeting. President's Address.

GROUP MEETINGS, ETC.

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

Wednesday, May 15—Microscopical Group. "Chemicals and rock sections as seen by the polaroid projection microscope", by Mr E. Snell.

Friday, May 31—Hawthorn Juniors at Hawthorn Town Hall. "Sea Stars, Sea Urchins, etc.", by Mrs M. van Rompeay.

Monday, June 3—Entomology and Marine Biology Group. This group meets at Mr. Strong's rooms in Parliament House. Enter through private entrance at south end of house.

Wednesday, June 5—Geology Group. Discussion on Earthquakes, Volcanoes, Lavas and Igneous Activity, by Members.

Thursday, June 6—Fauna Survey Group. At Fisheries and Wildlife Department, commencing 7.45 p.m.

Thursday, June 13—Botany Group.

F.N.C.V. EXCURSIONS

Sunday, May 19—You Yangs. Leader Mr E. S. Hanks. The coach will leave Batman Avenue at 9 a.m.; fare, 14/-. Bookings with excursion secretary. Bring two meals.

PRELIMINARY NOTICE

August 31-September 22—Western Australia. The arrangements are to leave Melbourne on Saturday, August 31, and travel via Port Augusta, Port Lincoln, Ceduna, Norseman, Esperance, Albany, Pemberton, Perth to Kalgoorlie, catching the train to Melbourne on Friday, September 20, arriving in Melbourne on Sunday, September 22. Members will need camping gear and will be responsible for their own meals, but the trip will be arranged to enable them to obtain dinner at a cafe most days, and food can be bought on the way, so there will be no need to carry large amounts. Luggage will be limited to 60 lb. per person, and lists of suggested equipment will be issued later. The bus company will supply a Porta-gas barbecue for use by the party.

Accommodation has been booked for the first two nights, at Murray Bridge and Port Augusta, for three nights in Perth, and for the final night in Kalgoorlie. Members will pay for accommodation individually but the deposits already paid will be added to the bus fare. The maximum bus fare will be £40, and this, less deposit already paid, should be forwarded to the excursion secretary by the end of June, accompanied by £2 hotel deposits, and, where required, £16/1/- rail fare Kalgoorlie to Melbourne.

On Friday, May 24, at 8 p.m. in the National Herbarium, there will be a meeting of members going on this trip, when details will be discussed and some slides shown of what may be seen on the excursion. Anyone wishing to join this excursion should check whether there is a vacancy before sending money.

F.N.C.V. Library Booklist No. 6

Details of library facilities are given elsewhere in this issue.

Items are arranged according to the Universal Decimal Classification, and include recent additions to library stock.

548: Mineralogy; crystallography

548/Au
The Australian Amateur Mineralogist. 2 vols. 1955-7; 1958-60. (Ceased publication.)

548/Da
Dana's Manual of Mineralogy. 17th ed., 1959 (1961 reprint). 609 pp. ills.

55: Geology; palaeontology

55/Gl
Principles of Geology. J. Gilluly *et al*, 1959. 534 pp. ills.

551-8/Oa
The succession of life through geological times. K. P. Oakley, H. M. Muir-Wood. 1962. 94 pp. ills.

551-8/Sw
Fossil birds. W. E. Swinton. 1958. 85 pp. ills.

551-8/Wo
Palaeontology — invertebrata. H. Woods. 1946 (1961 reprint). 477 pp. ills.

551-8:572/Cl
History of the primates. W. le G. Clark. 1960. 119 pp. ills.

552/Ha
Petrology for students: an introduction to the study of rocks under the microscope. 8th ed. rev. A. Harker. 1960. 283 pp. ills.

58: Botany

582/Ja
The wonderful life of flowers. P. Jaeger. 1961. 195 pp. ills.

582.3/.5(945)/Wi
A handbook to plants in Victoria. Vol. 1; Ferns, conifers, monocotyledons. J. H. Willis. 1962. 448 pp.

582.61:635/Me
Flowering trees of the world for tropics and warm climates. E. A. Menninger. 1962. ills.

59: Zoology

594(410)/Fr
British prosobranch molluscs. V. Fretter; A. Graham. 1962. 755 pp. ills.

594(945)/Ma
Marine molluscs of Victoria. J. H. MacPherson; C. J. Gabriel. 1962. 475 pp. ills.

Amendment of By-laws

(Adopted by Council, January 29, 1963)

(a) For By-law 4(i) substitute:
"4(i) A nomination for membership shall be submitted on an Application for Membership Form, on which shall appear a summary of the objects of the Club, the name and address of the applicant, the category of membership to which the application refers, and reference to the particular branch (if any) of natural history in which the applicant is interested, and"

(b) In By-law 4(ii) for "next birthday" substitute "last birthday".

(c) Add a new By-law:
"4(iii) Council, if it thinks fit, may accept applications which do not comply in all respects with these requirements."

(d) For By-law 5 substitute:
"5. A member introducing an applicant for membership shall sign the form in a space to be provided for the purpose."

(e) For By-law 24(iii) substitute:
"24(iii) Application for affiliation by an eligible organisation shall be in writing and shall be subject to endorsement by a majority vote of members present at a general meeting of the Club, after the application has been approved by Council, and notice of the resolution for affiliation shall be published in the *Naturalist* before the general meeting at which the application is considered."

WANTED

Information, Bulbs, Seeds and Specimens

Plants with random spiral twist. That is, half the population turning one way and half the population turning the other way.

Annual vine producing large seed pods and having spiral like left hand screw thread. Vine crosses in front of support from lower right to upper left.

Give details, quantity and cost in first letter.

GROTE REBER

C.S.I.R.O., STOWELL AVE., HOBART, TASMANIA

The Victorian Naturalist

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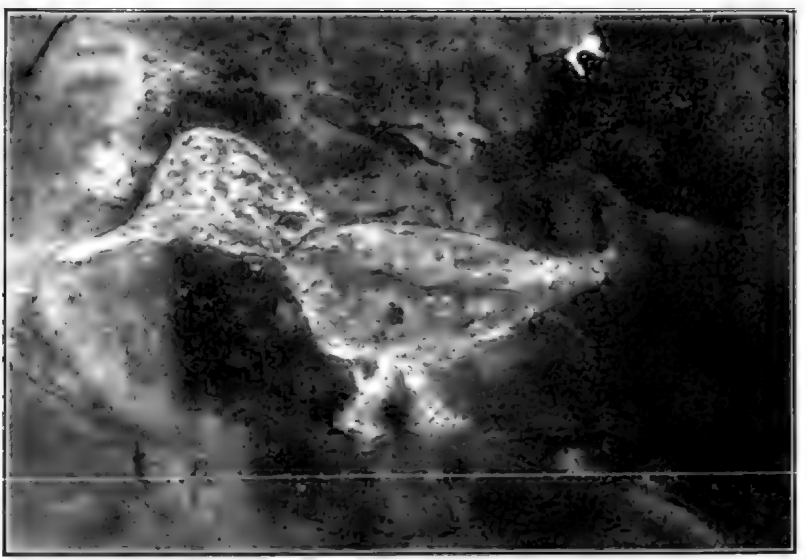

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Powerful Owl (*Ninox strenua*)

Photo: David Fleay

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Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

This is an aboriginal artist's representation of a wild duck, and it was photographed in the Glenlyon shelter near Broken Hill, near the "hands" which appeared on the cover of last month's *Naturalist.*

Sea Lions on Macquarie Island

By S. E. Csordas*

Macquarie Island has two kinds of seals as permanent inhabitants — the southern elephant seal and the New Zealand fur seal. Leopard seals are regular winter and spring visitors in some numbers. But there is a rare visitor — the Hooker's sea lion, *Phocarctos hookeri* (Grey).

Though the fur seal and the sea lion both have the typical characteristics of an eared seal, even a very superficial observer can easily distinguish them. Both have external ears and can use all the flippers for terrestrial locomotion; but the sea lion is bulkier and heavier, with broad shoulders and a short strong neck, roundish head and short nose. Its coat when dry has a velvety appearance, and adult males have a mane of longer hairs over their shoulders. The fur seal is slimmer, with a dog-like head, narrow skull and pointed nose, and its coat looks coarse. Fur seals prefer the rugged, rocky part of the island, and are very seldom seen on sandy or shingle beaches. The sea lion always lands on smooth beaches and sometimes moves deep inland. I have seen a sea lion 40-50 yards above the sea on a tussock covered hillside.

The breeding grounds of the sea lions are the New Zealand subantarctic islands: Campbell, Snares and Auckland Islands. There is no evidence that sea lions were present or breeding at Macquarie Island, which is about 500 miles from Campbell Island, when it was discovered in 1810. They were first sighted and identified in 1949 by the members of the Australian National Antarctic Research Expedition, who thought that three or four individuals were present. One of them, a young male, later known as "Blackie", continued to visit the island in all seasons until 1952. Although it has been reported from other islands that sea lions live mainly on fish, octopuses and crabs, at Macquarie "Blackie" and his friends were killing and eating large numbers of Gentoo penguins. Gwynn (1953) observed and described their method of catching penguins:

> He would patrol close inshore till he spotted a penguin landing on the beach when he would come ashore after it. If the penguin turned for the sea before "Blackie" got close, the intended victim sometimes escaped, but more often the penguin fled up the beach. When it reached the steep slope at the top of the beach, it would turn in a half circle and make for the sea again. . . .
>
> When the penguin reached the water's edge, it would flop exhausted into a retreating wave and wait for the next to float it off. With a few quick bounds "Blackie" would reach his victim and seize it by the back of the neck. After a pause for breath "Blackie" would then swim out to sea

* Medical Officer with Australian National Antarctic Research Expedition at Macquarie Island in 1958, 1957, 1959.

and there, with powerful jerks of his head, tear his victim to pieces, while the gulls gathered overhead for titbits. . . .

He was never seen to pay any attention to penguins in the water, even when they passed quite close to him.

In 1952 Blackie disappeared and there are no records of sea lions until 1954, when on one or two occasions one was seen chasing penguins. In 1955 another young male appeared not far from the ANARE station. This fellow, after several appearances, received the name "Mr Brown". Until 1960 he appeared about the same time in July every year and stayed for four to five months. I met Mr Brown in 1955, 1957 and 1959 and could identify him by a small scar on his neck. He grew steadily, and in 1959 had the characteristic mane of the adult male (see photos). There were a few other young seals in 1957 and 1959, but they never stayed longer than one day.

Both sea lions, Blackie and Mr Brown, used the north end of the island as their permanent base. Blackie was more mobile and was sighted for short periods in other parts of the island. The records also show that Blackie preferred the east coast but Mr Brown the west coast.

Blackie has been described as aggressive and very active. He chased penguins and expedition members, and disturbed elephant seals. Mr Brown was better tempered. When he came ashore, he wanted only to rest. Of course, if too many expedition members tried to photograph him at the same time, he did not like it and launched several dangerous looking attacks until the disturbers hurriedly disappeared. A sea lion can run fast and, as an example of his

"Mr Brown", 1957

When unmolested, seals are naturally friendly to man, and they show a dog-like aptitude for human society. After living for a week in the rookery on Pearson Island, during the breeding season, every member of the expedition could approach the seals in familiarity and pat them on the head as they lay on the beaches.

enormous strength, Blackie was seen to pick up a 400-500 pounds elephant seal pup and throw it over his shoulder. We soon learned to leave him alone, and he also got used to seeing us around. In 1955, after several short meetings, I could photograph Mr Brown for half an hour and get several close up pictures. He growled when I went too close to him but otherwise did not move. In 1959, after he had been in contact with human beings for four years, some courageous people could even pat him on the back, which is not unusual with eared seals. It has been reported from Campbell Island (unpublished Biological and Botanical Notes 1956-1960) that,

A female sea lion has been camped at the Technical building for the past week: it appears to like human company.

Jones (1925) writes of the Australian sea lion:

Mr Brown also got along quite well with the elephant seals. During their breeding season, he was often seen resting near or even in the middle of a harem. If bull elephant seals tried to disturb him, he first sat up and roared then, if this did not help, he trotted a few yards and went to sleep again. I once saw him resting peacefully among a large group of elephant seal pups.

It was interesting to watch Mr Brown during the "landing ceremony", which is very characteristic of all eared seals. After reaching the water's edge he would sit down for a second, then slowly move up to a safe, dry spot and shake himself like a wet dog. Then he would start grooming his head, neck and chest with the hind flippers, and rubbing his sides with the fore flippers. After several minutes' scratching, rubbing and yawning, he would roll on his back a few times, then lie down and, after a careful glance around, go to sleep. Fur seals and sea lions nearly always sleep on their belly or side.

Sea lions are gregarious and sedentary animals. It is only exceptional individuals that can first make the 500 mile journey from the breeding islands to Macquarie Island, and then turn

to a penguin diet in order to exploit the lack of competition there. We must assume that the sea lion's normal food is unobtainable at Macquarie, which would explain why there is no breeding herd there and why visiting individuals prey on penguins instead. Blackie was seen at all times of year, but Mr Brown only in winter and spring. The latter left Macquarie Island at the end of November, at the height of the sea lions' breeding season. Did he return towards the breeding islands to try and fight his way ashore? How typical is his annual routine of young sea lions at the breeding islands? Until the species is studied in detail, these questions must remain unanswered.

Acknowledgement

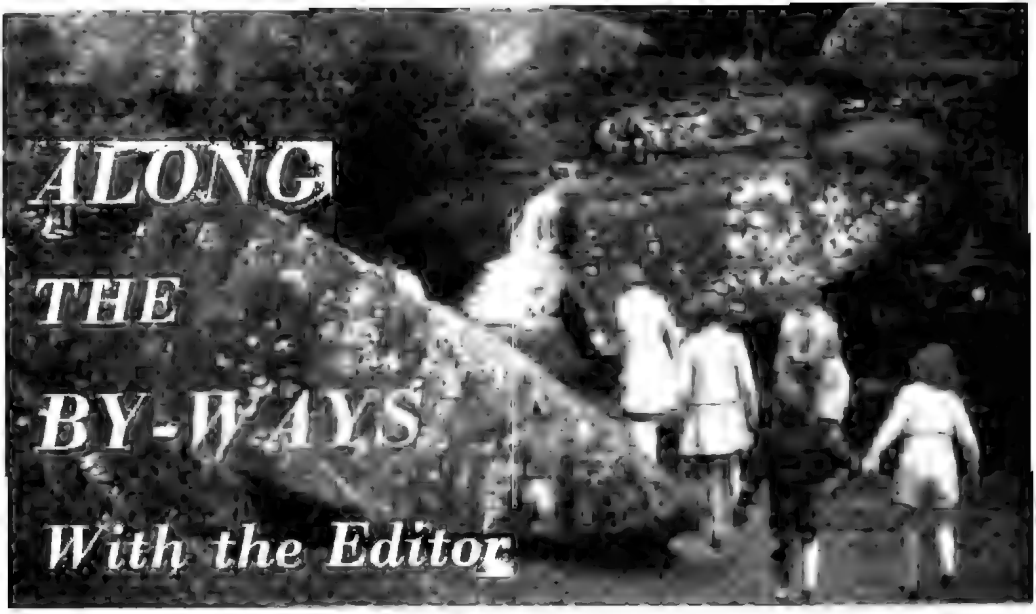
My thanks are due to Miss S. E. Ingham, C.S.I.R.O. Division of Wildlife Research, for her valuable advice and for correcting my manuscript.

References

Gwynn, A. M. (1953) Notes on the Fur Seals at Macquarie and Heard Islands. *ANARE Interim Report No. 4.*

Jones, Frederic Wood (1925) *The Mammals of South Australia. Part III. The Monodelphia.* Government Printer, Adelaide.

"Mr Brown" in 1959. He was then an adult.



These columns are available each month for your nature notes and queries. Address your correspondence to the Editor, "Victorian Naturalist", P.O. Box 21, Noble Park, Victoria.

Dusky Gliders

The largest of our glider possums, *Schoinobates volans*, is quite abundant in the mountain forests of the eastern half of Victoria, but it does not occur anywhere west of Port Phillip Bay. Here are some recent observations of the species, made by Mr J. Hyett of Croydon:

On the night of January 19, 1963, ten Greater Gliders were seen at Myers Creek, several miles north of Healesville, on trees along the main road. Most were very high in the eucalypts, but one was seen at twenty feet on a mass of Twining Silkpod (*Parsonsia straminea*). Its body was well spread as it climbed over the plant, so that the gliding membranes could be seen easily, joining the forelimbs at the elbows. It was observed to eat several leaves of the silkpod.

At Yellingbo, a Powerful Owl was perched in a Black Wattle (*Acacia mearnsii*) overhanging the stream. Gripped in its talons was a Greater Glider whose head had been eaten. The owl regurgitated a pellet as we were watching it. This was recovered and found to contain glider fur, small fragments of skull bones, and the wing covers of two species of longicorn beetles.

In David Fleay's *Gliders of the Gum Trees*, we read on page 33 of the Dusky Glider's "one consistent enemy—the Powerful Owl", and there follows over a page of detail of that great bird's predation on the beautiful glider. The frontispiece of this issue of the *Naturalist* is a reproduction of one of Fleay's photographs of the Powerful Owl.

Schoinobates is still popularly referred to as the "Greater Glider", a title complementary to the one-time use of "Lesser Glider" for *Petaurus breviceps*. But we have *five* glider species, not just these two! Nowadays, "Sugar Glider" is well established for the *Petaurus*, and it would be an excellent idea if Fleay's suggested "Dusky

Glider" were universally adopted for the *Schoinobates*, despite the occasional white specimen.

Bat Notes from Warrnambool Area

Last year, a letter came from Mr R. John Edge of Allansford, near Warrnambool, with this information:

On Friday, May 27, I received a phone call that a Nirranda resident had a large bat in his possession. I inspected this and identified it as the Grey-headed Fruit-bat, *Pteropus poliocephalus*. It was observed at 10 a.m., coming in from over the sea at the Bay of Islands. Alighting in some low scrub, it was captured.

I now have the bat in my possession. It seems very quiet and has a prodigious appetite with a marked preference for bananas.

During 1948, a camp of approximately forty similar bats was observed at Timboon. But, to my knowledge, there has been no record of any in the area since that time.

That fruit-bat was eventually brought to Melbourne. It had signs of an old injury to the side of the head, and perhaps that explains why it strayed so far from its normal areas. Kept at the National Museum and the Fisheries and Wildlife Department for some months, its prodigious appetite remained with it, though apples were preferred to bananas. The method of eating was to chew a piece of apple to pulp, swallow the juice, then eject the remainder.

Normally, fruit-bats come south each summer into far-eastern Victoria, where they cause havoc among the apples of domestic orchard plots. They rarely come west of Bairnsdale, though flocks have been seen near Melbourne. Stragglers occasionally reach western Victoria, and the species has been recorded even in Tasmania.

Another bat observation came from Mr Edge quite recently (May 1963), this time referring to one of the small insectivorous bats:

One night, a few weeks ago, on hearing a slight bump on the front of his car, a friend found a bat in the grill. It had a C.S.I.R.O. band on its wing. The band was one that I had placed on a Bent-wing Bat, *Miniopterus schreibersi*, some two years before, in a cave near Allansford. Perhaps the band was not unexpected, for my assistant, Mr F. Sherriff of Warrnambool, and I have handed over 4000 bent-wings in various caves in the district.

The C.S.I.R.O. bat-banding scheme is organized from Canberra, and it is producing much valuable data on movement of bats from area to area.

Fantails at Ballarat

In these columns last month, we published the observation of a Rufous Fantail (*Rhipidura rufifrons*) in Melbourne's Royal Botanic Gardens. At about the same time, by coincidence, the following note came to hand from Mrs B. Strange of Ballarat:

Last season (1962) I found Rufous Fantails nesting a few miles from Ballarat, which was considered a very interesting discovery. Occasional birds had been noted before; but despite the fact that a number of people were on the alert for possible nests, none had previously been recorded, and it was thought that the birds seen had only been passing through.

According to what I could find in general bird books, the nest is likened to a wine-glass without a base. However, the nest mentioned, of which I have photographs, did not feature the tail-piece. Is this unusual?

Oddly enough I found a similar nest within a hundred yards, containing eggs (pale buff with reddish brown spots) identical with those in

the nest which I knew to be of the Rufous Fantail; but the bird which I saw leave the nest was a Grey Fantail.

Apparently the eggs of Grey Fantails vary considerably, as those in other nests which I have been able to examine were greyish white with dull brown spots.

To my surprise, one of the eggs hatched while I was looking, and ants, which had not been noticeable before, made straight to the nest; but the mother bird, more than once, left her perch on a nearby branch and quickly despatched them, right under my nose, as it were.

This is only the second time that I have seen a Grey Fantail's nest minus the tail-piece, and these birds are quite common in the district.

On a later visit Grey Fantail youngsters were being fed by their parents in the near vicinity, and three young Rufous Fantails were also being successfully reared.

General Meeting of Western Victoria Association of Field Naturalists Clubs

The suggestion to hold the first general meeting of the association at Hamilton came from the Portland club. Although notice was short, Hamilton naturalists were able to co-operate with the executive of the association in working out a suitable programme for the week-end March 23-24.

Starting on the Saturday afternoon with a short excursion to Grange Creek, the visitors were taken to three points of interest: the fossil-soil area, the "Natural Bridge", and "Forsyth's Bank". Hamilton members explained a little of the geology of the area. Apparently the visitors had the "seeing eye", because the results of less than an hour's fossicking included two whale ear-bones, one erectile fish-spine and one phosphatized bone. The last will be forwarded to Mr E. D. Gill at the National Museum for study.

In opening the business meeting in the evening, the president, Mr I. R. McCann, welcomed more than fifty naturalists from the Stawell, Horsham, Portland, Warrnambool, Colac and Hamilton clubs. He pointed out that the next general meeting, in September, which would be a camp-out at Hattah Lakes, would be more convenient for the clubs of the north and north-west.

At 8.30 p.m. the Hamilton club took over and provided a varied programme for the remainder of the evening. Mr M. Gibson gave a short talk on the geology of the Grange Creek. Mr M. Gunn followed with a description of the bird life of the Hamilton district. This energetic and painstaking worker is mainly responsible for a list of 160 species within a twenty-mile radius in a little over one year. Mr K. Walker showed scenic slides of the Grampians and of rock paintings and shelters in the Victoria Range. Mr E. Tucker, vice-president, Hamilton club, described rock paintings at Mootwingee and Gundabooka and illustrated his remarks with a series of colour slides of the paintings and the arid but colourful region in which they occur. Mr L. Elmore, secretary, Hamilton club, showed a series of slides of trees of the district and the flora of the swamp-lands and open plains.

At the conclusion of the evening Mr C. Beauglehole, Portland, moved a vote of thanks to the Hamilton club for their organization and hospitality.

Not all visitors were able to stay overnight, but on the Sunday morning, eight cars made the excursion to Mount Eccles National Park, where numerous improvements were commented upon. The party visited the cave and, after a picnic lunch at the shelter shed overlooking Lake Surprise, inspected the natural bridge and the open vent.

By late afternoon the last of the car parties had departed for their various destinations, with the feeling that here is an organization which has passed through its first difficult years and is moving towards objectives which many naturalists have long hoped for.

—L. K. M. ELMORE, secretary, Hamilton F.N.C.

Mammal Sub-Fossils from near Portland, Victoria

By N. A. WAKEFIELD*

In July 1962, Mr and Mrs A. C. Beauglehole of Gorae West, made a collection of bones from a small cave in the far south-western corner of Victoria. The site is known locally as the Fern Cave. It is near the junction of Moleside Creek and Little Moleside Creek, approximately 25 miles north-west of Portland and 2½ miles south-east of Keegans Bend, Glenelg River.

The formation is dune limestone and the body of the cave is about 66 feet long and 45 feet wide. The floor has a slope of about 1 in 3, and is up to 18 feet below ground level. Access is gained by an opening, 15 feet by 10 feet, in the roof (figure 1), and there are three small chimneys as well. Below the main opening there is a rock fall on which grow numerous ferns: Tender Brake (*Pteris tremula*), Shining Wood-fern (*Lastreopsis shepherdi*) and Lance Water-fern (*Blechnum aggregatum*), while along ledges of the wall there is Common Spleenwort (*Asplenium trichomanes*). This fernery gives the cave its name.

Mammal Census

Table 1 provides a list of the native mammal species which have been identified in the Fern Cave collection with, in each case, the minimum number of individuals represented in the deposit. The figures are based on counts of dentaries (lower jaw-bones). Besides these there were remains of rabbits and an unidentified ruminant.

Modes of Deposition

In a letter describing the deposit, Beauglehole reported that nearly every square foot of the cave floor had some bones but there were definite rich patches, particularly near the western wall (see figure 2). Many of the larger bones were at the lowest (southern) end of the cave.

Primarily, the Fern Cave is a death-trap, similar in operation to the Mount Hamilton lava cave (Wakefield, 1963). Each place yielded both variety and abundance of macropod remains, and, in each, a species of bandicoot (Peramelidae) was most prominent numerically and large members of the Dasyuridae were well represented. Besides these groups, the remains of the larger possums (*Trichosurus*, *Pseudocheirus*), wombat, dingo, and the introduced mammals, were present in the Fern Cave because of its death-trap nature.

Troughton (1957) describes the facility with which "marsupial-mice" (*Antechinus*) "run swiftly upside-down over the roofs of caves", and other insectivorous dasyurids (*Sminthopsis*, *Phascogale*) as well as small phalangers (*Acrobates*, *Cercartetus*, *Petaurus*) are equally agile. The Fern Cave was not a death-trap for these groups. The abundance of their remains as well as those of the small murids (*Rattus*, *Pseudomys*, *Thetomys*, *Gyomys*, *Mastacomys*) indicates that part of the deposit is a

* Department of Zoology and Comparative Physiology, Monash University, Clayton, Victoria.

TABLE 1

Mammal Species and Approximate Numbers of Individuals Represented in Fern Cave

Dasyuridae	
Sminthopsis crassicaudata (Fat-tailed Dunnart)	30
Sminthopsis leucopus (White-footed Dunnart)*	63
Antechinus swainsonii (Dusky Phascogale)	79
Antechinus stuartii (Brown Phascogale)†	46
Phascogale tapoatafa (Tuan)	7
Dasyurus quoll (Quoll)	22
Dasyurops maculatus (Tiger-cat)	19
Sarchophilus harrisii (Tasmanian Devil)	2
Peramelidae	
Isoodon obesulus (Short-nosed Bandicoot)	250
Perameles nasuta (Long-nosed Bandicoot)	7
Perameles gunnii (Barred Bandicoot)	11
Phalangeridae	
Acrobates pygmaeus (Feathertail)	14
Cercartetus nanus (Pigmy Possum)	18
Petaurus breviceps (Sugar Glider)	15
Pseudocheirus peregrinus (Ringtail)	6
Trichosurus vulpecula (Silver-grey Possum)	21
Phascolomidae	
Phascolomys mitchelli (Wombat)	1
Macropodidae	
Bettongia gaimardi (Bettong)	4
Aepyprymnus rufescens (Rufous Rat-kangaroo)	1
Potorous tridactylus (Potoroo)	47
Lagorchestes leporides (Brown Hare-wallaby)	3
Thylogale billardieri (Red-bellied Pademelon)	15
Protemnodon bicolor (Black Wallaby)	2
Protemnodon rufogrisea (Brush Wallaby)	33
Macropus major (Grey Kangaroo)	4
Muridae	
Hydromys chrysogaster (Water-rat)	3
Rattus greyii (Grey's Rat)	157
Rattus lutreolus (Swamp-rat)	189
Pseudomys auritus (Long-eared Pseudo-rat)‡	125
Thetomys c.f. *gracilicaudatus* (Queensland Thetomys)‡	72
Gyomys c.f. *novaehollandiae* (New-Holland Mouse)†	34
Mastacomys fuscus (Broad-toothed Rat)	209
Conilurus albipes (White-footed Rabbit-rat)	43
Vespertilionidae	
Miniopterus schreibersi (Bent-wing Bat)	6
Canidae	
Canis familiaris dingo (Dingo)	5

* This material possibly includes also some *Sminthopsis murina*, which species has been recorded in literature for Victoria apparently without confirmatory specimens.

† The identity, distribution and other data of this species comprise part of a paper which is being prepared for publication

‡ The murid material from the Fern Cave has been sorted and counted by J. A. Mahoney of Sydney University, who is currently investigating the taxonomy of *Pseudomys* and allied groups. The generic and specific names used here for the three species indicated are as in Troughton (1957), and are not necessarily those that will be adopted eventually by Mahoney.

Figure 1. Within the Fern Cave, showing main entrance in roof.

predator accumulation of the kind described from eastern Victoria and attributed to owls of the genus *Tyto* (Wakefield, 1960). Specific identification of these predators is made according to the maximum size of prey but, because of the mixed deposit, the species of owl which inhabited the Fern Cave cannot be determined. Different cave deposits, attributed to Barn Owl (*T. alba*) and to Masked Owl (*T. novae-hollandiae*) respectively, have recently been found in south-western Victoria (unpublished data).

In the ceiling of the cave there is a recess about five feet wide and eight feet deep, where bats habitually roost. Natural mortality in these would have contributed the remains of *Miniopterus* in the deposit. This is the only species known to occupy caves in western Victoria.

Present Habitat and Modern Fauna

The Fern Cave is about 200 yards from Moleside Creek, towards the top of a ridge which has limestone outcropping occasionally. The forest is park-like, with scattered Manna Gum (*Eucalyptus viminalis*) and sparse bracken (*Pteridium esculentum*) as well as an abundance of fireweed (*Senecio* spp.) and some tussocky grass (figure 3).

Thickets of tea-tree (*Leptospermum, Melaleuca*) line the creek.

The locality is at about the middle of several hundred square miles of light to medium forest, dominated by Brown Stringybark (*Eucalyptus baxteri*) and stretching from Mount Clay in the east to the South Australian border, near Nelson, in the west. These extremities are about 12 miles NE and 40 miles WNW of Portland. The rainfall averages about 30 inches per annum.

Brown Phascogale, Short-nosed Bandicoot, Brush Wallaby, Grey Kangaroo and Grey's Rat are in general abundance through the forest. White-footed Dunnart, Dusky Phascogale, Tuan, Wombat, Potoroo, Water-rat and Swamp-rat have each been recorded during the present decade either from within the forest or about its margins. Likewise, all five possums (Phalangeridae) are extant in the district. A "tiger-cat" was caught recently at Tyrendarra, near Mount Clay.

The Black Wallaby does not occur in the district now but, according to local report, was present about sixty years ago. The dingo probably has a similar local history. Quoll, bettong and pademelon were all present in Victoria — and presumably in the Glenelg area — during the early days of white settlement.

Possible Changes in Vegetation

The Fat-tailed Dunnart inhabits open country of northern and western Victoria, and the Barred Bandicoot is restricted to the Basalt Plains of the Western District. From what little is known of them, the Brown Hare-wallaby and four of the murids (*Pseudomys, Thetomys, Gyomys novaehollandiae, Conilurus*) also occupied fairly open country.

Some or all the species of this group may have occurred in the Moleside Creek area at the time of the early Portland settlement (1834). Since that date, continual burning of the countryside has converted much of the state's grassy parkland into scrubby forest.

Alternatively, the presence of this group in what is now a forested area, may point to a period of drier climate and more open vegetation than are associated with south-western Victoria in modern times.

On the other hand, the Long-nosed Bandicoot and Broad-toothed Rat are animals of higher rainfall areas. Neither of them has been recorded as a living animal in the Portland district, but each is known from the Otway Ranges. These two, and the Tasmanian Devil, probably belong to the earliest element of the Fern Cave deposit and they may indicate a period of higher rainfall and denser vegetation.

The paucity of *Sarcophilus* material in the Fern Cave, and the fact that the complete fauna is of modern species, indicate that the period of deposition may be no more than the past few hundred years.

Distribution Data

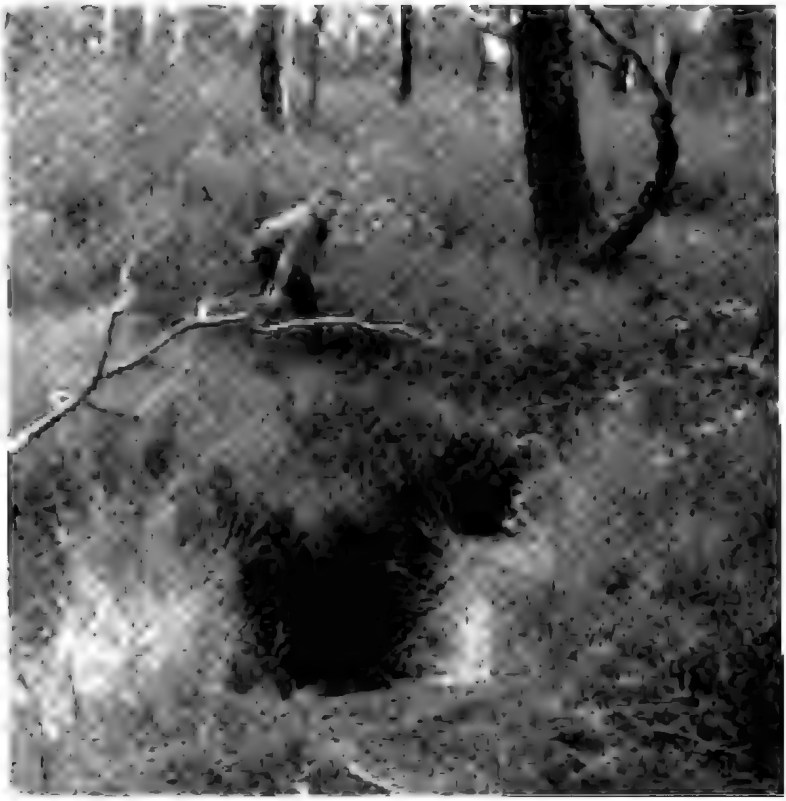
The Fern Cave deposit provides records which extend the known range of several species of native mammals:

Perameles nasuta. The specimens demonstrate that it extended over a hundred miles west of its previously known limit. The material is more pigmented than most bones in the deposit, indicating that this extension into south-western Victoria occurred before modern times. Jones (1924) states that the species does not occur in South Australia.

Bettongia gaimardi. The occurrence of this bettong in the Glenelg forest area was apparently quite modern for, besides the several dentaries, there was a well-preserved skull in the Fern Cave deposit. This constitutes a considerable western extension to the known modern range of the species; as a living animal it was recorded from eastern New South Wales and central Victoria.

Aepyprymnus rufescens. The remains of a single individual in the Fern Cave prove that the Rufous Rat-kangaroo did extend at some time into the extreme south-west of Victoria; but there is no indication of when this may have been. There is no record of it, as a living animal, closer than north-central Victoria, over 200 miles from Portland, though it is recorded as a sub-fossil at Mount Hamilton (Wakefield, 1963).

Lagorchestes leporides. There is no authenticated record of the Brown Hare-wallaby as a modern Victorian animal. In the National Museum of Victoria



there is a specimen collected by Blandowski in 1857 from the "junction of the Murray and Darling Rivers" (probably from New South Wales), and it was known as a modern animal in the Murray River district of South Australia (Jones, 1924). A sub-fossil specimen was collected at Mount Hamilton (see "Correction", p. 45).

Pseudomys auritus. This has been recorded as a living animal only from Lake Albert, South Australia, where it was collected in 1853 (Troughton, 1957). It is the smaller species of *Pseudomys* recorded from the Mount Hamilton deposit (Wakefield, 1963). Several sub-fossil records show that the animal was once widespread in western Victoria.

Thetomys cf. *gracilicaudatus*. As well as in the Fern Cave, there are remains of this small rat in several deposits in south-western Victoria. It was evidently quite plentiful as a modern animal in the Hamilton-Portland-Nelson area. The material in hand cannot be distinguished, on features present, from *T. gracilicaudatus*. But that species is known as a living animal only from Queensland (Troughton, 1957), and no sub-fossil cranium has been found complete enough to establish with certainty the identity of the southern population.

Gyomys cf. *novaehollandiae*. Although the New Holland Mouse has never been recorded as a living animal in Victoria, it is one of the most recent components of owl pellet deposits from the east of the state, near Buchan (Wakefield, 1960). There has been no fossil record of it from central Victoria, and comparable material from the Fern Cave and several other sites in south-western Victoria has not yielded specimens complete enough for certain identification.

ACKNOWLEDGEMENTS

For the use of facilities and of comparative material for the identification of specimens, I wish to thank Directors and staff members of the Australian Museum, Sydney, National Museum of Victoria, Victorian Fisheries and Wildlife Department, and C.S.I.R.O. Wildlife Research Division, Canberra.

Some expenses in connexion with the research have been met by the C.S.I.R.O. Science and Industry Endowment Fund.

I wish to acknowledge particularly the work done by Mr and Mrs A. C. Beauglehole who together devoted about one hundred man-hours to the working of the Fern Cave deposit.

LITERATURE CITED

Jones, Frederick Wood, 1924. *The Mammals of South Australia, Part II*, Government Printer, Adelaide.

Troughton, Ellis, 1957. *Furred Animals of Australia*, Sixth edition, Angus and Robertson, Sydney.

Wakefield, N., 1960. Recent mammal bones in the Buchan district—2. *Vict. Nat. 77 (8)*: 227-240.

———, 1963. Sub-fossils from Mount Hamilton, Victoria. *Vict. Nat. 79 (11)*: 323-330.

CORRECTION

Ref. "Sub-fossils from Mount Hamilton, Victoria", (*Vict. Nat.* 79 (11): 323-330—March 1963):

The specimen referred to as "*Thylogale billardieri*" is in fact a fragment of *Lagorchestes leporides*.

On page 326, the name should be corrected and the text deleted from "and the teeth . . ." to ". . . Australian mainland."

Also, delete "*Thylogale billardieri*" from page 329.

Book Review:

A Booklet on "The Baron"

Oxford University Press earns high marks for producing, late last year, a series of attractive and very readable booklets (7¼" x 5") entitled *Great Australians*. Explorer, pioneer settler, missionary, statesman, administrator, scientist, soldier, airman, writer, singer and manufacturer are all represented in the 28 selected personalities who have made outstanding contributions toward the development of our nation, both culturally and economically. Each account was entrusted to a different biographer, competent and sympathetic toward his subject.

It is gratifying to note the name of *Baron Ferdinand von Mueller* among these "Great Australians", and Mr Alec H. Chisholm is to be complimented on presenting to us Australia's doyen of plantsmen. The story is told simply and enthusiastically in 30 pages, accompanied by six text photographs, without omitting any significant facet of Mueller's amazing exploratory work throughout Australia, the botanical establishments he founded, his incredible literary activity, his efforts to acclimatize and disseminate useful plants, the heavy administrative burden or the quaint mannerisms that endeared him to a very wide circle of fellow scientists and devoted friends. Five shillings is a trifle to pay for this excellent account of our greatest Victorian naturalist, whose memory deserves to be kept perennially green.

—J. H. WILLIS

FIELD NATURALISTS CLUB OF VICTORIA : FINANCIAL STATEMENTS, 1962-63

BALANCE SHEET AS AT APRIL 30, 1963

(Figures adjusted to nearest £1)

Liabilities			Assets		
Subscriptions paid in advance		£381	Current Assets—		
Sundry Creditors		11	Bank Current Account and Petty Cash	£1,230	
Members' deposits, Perth trip		365	Sundry Debtors	76	
M. A. Ingram Trust Grant—Amount in hand		80	Arrears of Subscriptions, estimated	30	
Special Funds and Accounts—			Badges on hand, at cost	48	
Building Fund	£1,572		Microscope Project account	78	
Publications Fund	1,481		Stock of books on hand for sale, at cost	42	
Library Fund	50				£1,504
Club Improvement Account	99		Library, Furniture and Equipment, at cost		1,738
Excursion Account	100		Investments of Funds—		
Legacy from Estate Marion Wright	200		Building Fund—		
		3,502	Commonwealth Bonds at cost	950	
Surplus of Assets over Liabilities		2,026	Inscribed Stock at cost—		
			S.E.C. £500 3¼% 1965	420	
			M.M.B.W. £100 3½% 1963	90	
			E. S. & A. Bank, No. 2 Account	112	
					1,572
			Publications Fund—		
			Commonwealth Special Bonds, at cost	900	
			Stocks valued at cost—		
			Victorian Ferns	311	
			Victorian Toadstools	35	
			E. S. & A. Bank, No. 3 Account	235	
					1,481
			Library Fund—		
			Commonwealth Bonds at cost		50
			Cosstick Reserve, Maryborough, at cost		20
		£6,365			£6,365

GENERAL ACCOUNT

STATEMENT OF RECEIPTS AND PAYMENTS FOR 12 MONTHS ENDED APRIL 30, 1963

(Figures adjusted to nearest £1)

Receipts			Payments			
Subscriptions received—			*Victorian Naturalist*—			
Arrears	£61		Printing		£1,676	
Current	1,600		Illustrating	£331		
Supporting Members	72		Less from Ingram Trust Grant	97		
		£1,733			234	
Sales of *Victorian Naturalist*		249	Despatching		166	
Advertisements in *Victorian Naturalist*		289	Editorial Expenses		13	
Interest received—						£2,089
Library Fund	3					
Bank Account	30					
		33	Working Expenses—			
Surplus from excursions		98	Postage and Telephone		63	
Sale of Club Badges		16	Printing and Stationery		27	
Sale of List of Members		3	Library Expenses		45	
Amount transferred from Building Fund Account for payment of rent		51	General Expenses		12	
			Donations, Subscriptions and Affiliation Fees		21	
			Typing and clerical assistance		129	
			Natural History Medallion		10	
			Fauna Group		71	
					378	
			Less Ingram Trust Grant on account of Fauna Group		71	
						307
			Rent of Hall and Library			51
						2,447
			Surplus for the year			25
		£2,472				£2,472

BUILDING FUND

Amount of Fund at April 30, 1962	£1,554
Interest on Investments and from Bank Account	69
	1,623
Less amount transferred to General Account for payment of Rent	51
Amount of Fund at April 30, 1963, as per Balance Sheet	£1,572

PUBLICATIONS FUND

Amount of Fund at April 30, 1962	£1,410
Surplus for year from—	
Wildflowers of Victoria	12
Ferns of Victoria and Tasmania	9
Victorian Toadstools and Mushrooms	1
Other publications	8
Interest on Special Bonds and on Bank Account	41
Amount of Fund at April 30, 1963, as per Balance Sheet	£1,481

CLUB IMPROVEMENT ACCOUNT

Amount of Account at April 30, 1962	£110
Donations received during year	11
Commission earned on sale of Books at Meetings and Shows	13
	134
Cost of new books purchased for Library	35
Amount of Account at April 30, 1963, as per Balance Sheet	£99

Audited and found correct.
W. P. J. EVANS, Hon. Auditor

Treasurer's Comments:

It is pleasing to be able to finish the year with a surplus on the General Account of £25, after a budget forecast of a loss in the region of £150. The improvement is due mainly to better income than expected from subscriptions, sales of back numbers of the *Naturalist*, and advertisements. The possibility of a Government grant is being followed up, as revenue from sales of the journal is a diminishing item, while clerical assistance is likely to be a growing expense in view of the steadily increasing membership. Continued support from the M. A. Ingram Trust is gratefully acknowledged, helping again to defray costs of field work of the Fauna Survey Group and of illustrations to articles in the *Naturalist* describing results of their operations. The circulation of the *Naturalist* continues to extend, and it is now being sent regularly to more than fifteen overseas countries.

Club Publications.—Sales of both the Fern and Toadstool books have been well maintained. As stocks of the latter are nearly exhausted a new edition is being prepared, and should be published during the present year.

F.N.C.V. : EIGHTY-THIRD ANNUAL REPORT, 1962-63

The club continues on its way, the steady progress of previous years being maintained.

Membership. This continues to grow, and with it the circulation of the *Naturalist*. Ordinary membership has increased from 471 to 504, country from 306 to 325, junior dropped from 48 to 45, while there are 27 life members. Taking into account subscriptions (132) and exchanges, of the 1250 copies of the *Naturalist* printed each month, about a thousand are mailed, copies being sent to every continent and to both sides of the iron and bamboo curtains. Of the remainder, some are sold in book shops, the balance being kept as a reserve.

During the year, Mr H. P. Dickins was elected an honorary member, in recognition of his long and devoted service to this club, to the Hawthorn Juniors, and to botany and nature study generally.

A club the size of ours must expect its regular toll of losses, and during the year under review several valued members passed away, including Mr Walter Hanks, the Rev. A. J. Maher, Mr S. R. Mitchell, Dr R. T. Patton and Dr R. M. Wishart.

Shows. This year's nature show was held in the Lower Melbourne Town Hall on September 10-12, 1962, in conjunction with the Society for Growing Australian Plants. It was reasonably successful, but not to the same extent as last year. It made a profit of about £100 of which £35 was donated to the S.G.A.P. Once again, it was made the occasion for the publication of a pamphlet in English, French and German, paid for by the Ingram Trust, advocating wildlife protection. This year's pamphlet dealt with the ibis.

As suggested by the S.G.A.P., we applied for an earlier booking in 1963, but had to be content with corresponding dates, September 9-11, 1963.

Affiliated Bodies. This year, two more clubs have affiliated with the F.N.C.V., Ringwood and Roblyvale F.N. Clubs, bringing the total of affiliated clubs to 25.

In the last report, we expressed fear that the death of Mr P. Fisch and the advancing age of Mr Dickins might make it difficult to continue the Hawthorn Juniors. However, Mr D. McInnes flung himself into the breach with his usual energy, and the Hawthorn Juniors are flourishing.

We had a preliminary report of a Horsham Junior Club but no recent reports of its progress.

Attendance of individual members of country clubs continues to thrill us and there have been several combined excursions, notably a week at Horsham and the Christmas excursion to Bairnsdale, on each of which we were welcomed and shown the sights of the district in question by members of the local club.

But the combined clubs week-end has not been a success. The usual familiar Melbourne faces were seen at the functions on October 20-21, but hardly any country people.

This year, therefore, we are not arranging any special functions but hope to see some country friends at our usual excursion on October 20.

Parks and Reserves. The effort to have part of the Labertouche Forest reserved has finally succeeded, largely owing to the efforts of Councillor Bloye of Drouin. Three blocks totalling 250 acres of the lovely and interesting area we saw a year or two ago have been set aside. The Forests Commission has also set aside the Lerderderg Gorge Forest Reserve and has appointed a committee to manage it, to which we have nominated Mr R. Dodds.

The "Organ Pipes" area, the gift of which to the state was recorded in last report, has been augmented by the gift of a further hundred acres, and the area containing the famous "Den of Nargun" has also been presented to the state by Australian Paper Mills.

During the year, the question of the proper function of Wilson's Promontory has agitated us. Clearly, we do not advocate the complete exclusion of all humans, or even the prohibition of any further improvements whatever, though some of the statements made suggest that that is the view of a substantial segment of opinion. On the other hand, the Chief Secretary,

Mr Rylah, assures us that he does not wish to establish another Frankston. Where to draw the line between these two extremes is of course the problem. A "Wilson's Promontory Protection Committee" has been formed, and we expect it to take over the routine work of keeping a watch on future moves in the area.

Readers of the *Naturalist* will recall articles on wave erosion in the Gippsland Lakes. Mr J. Béchervaise and a party of schoolboys have endeavoured to control this process along the lake-side shores of the Lakes National Park. Council wrote to thank them and wish success to the project.

Wildlife Protection. The subject of reserves shades naturally into that of wildlife protection, as it is no use trying to protect a species unless there is somewhere for it to live and reproduce. We work in friendly collaboration with the Native Plants Preservation Society, but are rather concerned to find that there are now two societies concerned with animal protection—the Fauna Protection Council and the National Fauna Conservation Society. There is plenty of work for both societies, but we feel it would be better if they could come together.

Kangaroos. At present the most important issue is the kangaroo trade. To your council, it seems that the obvious aim is to de-commercialize the kangaroo, by prohibiting the sale of kangaroo meat and skins.

Wombats. We realize that wombats are very expensive to farmers but feel that it is not necessary to list them as vermin and pay a bonus for their destruction.

Birds. We feel that the outcry against the British Museum ornithological expedition, though rather exaggerated in the case of such a venerable institution, served a useful purpose in reminding the authorities of the strength of the feeling in favour of conservation.

The campaign to preserve the last few acres of the habitat of the Helmeted Honeyeater continues. This bird has always been restricted to a very small area, and seems doomed as creeks are cleared and roads made, but we hope for the best. A few creek frontages in the Yellingbo area might be sufficient, and we are backing a campaign to save them.

In connexion with fauna protection generally, we feel strongly that not enough is known about the factors involved, and continue to press for the appointment of a Conservation Research Officer in the Fisheries and Wildlife Department.

Flora. Our action in pressing for the protection of Common Heath was apparently well timed, and it has now been proclaimed. All that is required now is an attempt to enforce the Act.

In other respects we have had very welcome co-operation from the authorities. Suggestions that a roadside patch of dock-orchids near Bairnsdale should be protected were most carefully noted, as was a complaint that roadside signs, drawing attention to the desirability of protecting plants and animals, were inadequate, and both the Forests Commission and the Country Roads Board are considering the matter.

Miscellaneous. The Barrier F.N.C., based in Broken Hill, is concerning itself with preserving several trees marked by early explorers, especially the famous "dig" tree on Cooper Creek, associated with the Burke and Wills expedition. The F.N.C.V. president was one of a party who visited that tree to help restore it, and he will deal with this in his presidential address.

There is much talk of establishing an aquarium in Melbourne, with a stronger scientific side than the old one, destroyed by fire some years ago. We are keeping in touch with this movement.

Council has had a look at our admission procedure, and has dropped the requirement that applicants for membership should find a proposer and seconder. At the same time, it used the opportunity to streamline the procedure for affiliation.

Finance. During the year, it seemed that the club's expenses might exceed its receipts to such an extent that an increase in subscriptions might be required. The question was referred to a general meeting and discussed, and also mentioned in the *Naturalist*. As a result, many worthwhile suggestions were received, including one that it should seek a government

grant. However, the financial stringency expected did not develop.

The Victorian Naturalist. This continues to be our principal service to most of our members, and council desires to thank the editor and assistant editor, and the numerous contributors who have helped to maintain its high standards.

Meetings. The standard of lectures during the year was also very high, and club members who attended had an interesting year, learning something about many things from building stones and frog songs to East African animals and Victorian heath-land. The secretary would like to thank the honorary talent scouts who have kept him informed of likely speakers.

Library. Our energetic librarian, Miss M. E. Argo, reports that in spite of difficulties with regard to assistance and equipment, progress has continued during the past year in the reorganization of the library and extension of facilities. The assistant librarian, Mr J. J. Meade, was unfortunately forced to relinquish office on account of continuing ill-health, and the position is still vacant. Deputy librarians have been reappointed for the study groups. Increasing use is being made of the library facilities, particularly as regards loans of books and periodicals at meetings, and to country and interstate members.

At present, the library stock comprises over one thousand books, and over seven hundred bound volumes of periodicals, together with a large collection of unbound periodicals, reports, pamphlets and separates. Expenditure during the year was approximately £67 for books and periodicals, and about £19 for other purposes.

The library was responsible for the organization of the publications stands at the 1962 F.N.C.V.-S.G.A.P. nature show, and at the 1963 Victoria nature festival which was held during Moomba week. During the past year, the library also organized the sales of publications at meetings, featuring not only F.N.C.V. publications but also a wide selection of books and pamphlets on natural history topics.

Excursions. Excursions continue to be well attended. This year, besides the usual monthly and group outings the club had two extended excursions, both under the auspices of country clubs. In August, Horsham was visited, with calls at Maryborough and Ballarat en route. Besides being entertained and guided by the clubs at these three centres, a visit to the Grampians was led by members of the Ararat and Stawell clubs. On the other major excursion, to Bairnsdale between December 26 and January 1, we were guided by the Bairnsdale F.N.C.

Other excursions worthy of special mention were those associated with the combined week-end in October, and the president's picnic to the Wallan East district on Cup Day.

The usual excursion in November was adapted to suit the Girl Guides Association, who wished potential leaders to be taught something of botany. This excursion was to Anglesea.

Microscopical Group. The year was a very active one for this group. In addition to an excellent series of lectures, visits and demonstrations, Mr D. McInnes suggested that it would be possible to do something to help young people begin their study of natural history with something better than the usual "Japanese" microscope which was no more functional than a toy. He suggested that it might be possible to have manufactured in some simple form, a stand which would take conventional oculars and objectives. Following considerable discussion and co-operation between Mr W. Woollard and Mr McInnes and with the full support of the club, the first of such microscopes has been completed and it will be known as the F.N.C.V. microscope. Orders for it in various designs are coming in freely.

Marine Biology and Entomology. The attendance of members to this group is still increasing, and has been averaging twenty members for the past few months.

During this year the group has been fortunate in obtaining a greater number of speakers from outside the club, including Mr Irvine, Chief Entomologist of the Forests Commission, and Mr A. J. Gilmour, fisheries biologist of the Fisheries and Wildlife Department.

A considerable number of marine and entomological specimens are being

brought to the meetings. This feature is a popular one among members. There are usually three or four microscopes for use by those who have something of microscopic interest to demonstrate.

Three group field days have been held this year. It is felt by members that these should be augmented, although it is realized that for marine biology, a difficulty arises over low tides at suitable times and days.

Botany Group. The group continued with its series of lectures on fundamental botany. In addition, there were several members' nights featuring colour slides, Mr R. Morrison being a regular outstanding contributor.

Excursions were made to Seaford, Antonio Park, Clematis, Kallista, etc.

The group's exhibit at the Nature Show was on floral emblems.

The group decided to compile a colour slide library, and a beginning has been made in the project.

Average attendance at group meetings was 20, including one memorable evening when 33 attended.

The group looks forward to another year of thoroughly interesting indoor and outdoor activity.

Fauna Survey Group.—The group has undertaken to collate data from country clubs on the mammals of their respective districts. Field work continued in the far eastern and far south-western corners of the state, and one excursion was made as far afield as Waterhouse Island off north-eastern Tasmania. A special effort was made in conjunction with the Cave Exploration Society to remove all accessible bone material from the Mount Hamilton lava tunnels.

The results of some of this work have already appeared in recent issues of the *Naturalist*, and other papers are being prepared for publication in the near future.

Some of the expenses in connection with Fauna Group field work and equipment have been defrayed by a generous grant from the M. A. Ingram Trust. The Fisheries and Wildlife Department continues to provide facilities for meetings.

Field Naturalists Club of Victoria

General Meeting—May 13, 1963

Approximately one hundred and fifty members were present. The president, Mr M. K. Houghton, welcomed several interstate visitors.

The death of Dr R. M. Wishart was announced, and Mr E. J. Le Maistre spoke of his fine medical career, his leadership in the Microscopical Society, and his authority on ethnology and on Diatomaceae. Members stood in silence for one minute as a mark of respect.

Mr J. Webb, a visitor from the Barrier F.N. Club, thanked members of the club for native plants sent to Broken Hill for the local nature show. The secretary announced that the next A.N.Z.A.A.S. Conference is to be held in Canberra during January, 1964.

A further appeal for funds to purchase the Cuthbertson property came from the Geelong F.N. Club.

The subject for the evening was "The Bairnsdale Excursion". With the aid of a map and many colour slides taken by members, Miss F. Forster and Mrs E. Bennett explained various features of the topography and vegetation studied in various East Gippsland areas. (A full report of the excursion is to be published shortly in the *Naturalist*.) The speakers were thanked by the president for their account of the excursion.

Miss Jean Galbraith was presented with a club microscope in recognition of her work. She thanked the club for the gift, and those members responsible for its construction.

Mr J. R. Garnet showed slides of the "crater" wall in the Little Desert—once thought to be due to a meteorite but now believed to be a limestone sink-hole. He exhibited sandstone similar to that in this area from Wyperfeld, 80 miles north, fossil wood from Lake Albacutya, brown phasmids and eggs from Timbertop and a native snail from Trentham Falls. Other exhibits included a collection of marine specimens from one mile offshore at Cape Woolamai (Mr M. Harrison), Sturt's Desert Pea grown from seed (Mrs E. Bennett), and Parasol fungus, *Lepiota* sp. (Mr R. W. Parnell).

Mr J. H. Quirk urged the council to examine the effects of 1080 poison and to make representations to the Lands Department to cease using it because of the fatal effects on native birds and mammals. A resolution supporting this was carried by the meeting.

Fourteen members, whose names appear in the May *Naturalist*, were elected to the Club

Microscopical Group—April 17, 1963

Eighteen members attended the meeting, which was chaired by Mr E. LeMaistre.

The talk for the evening was on "The Ultra Structure of Cells", by Dr G. Christie. He described most ably the internal structure of the living cell and discussed the known functions of the various components, illustrated with slides of diagrams and electron photo-micrographs.

He explained how chemical changes which took place in a living cell were the result of series of chemical steps, each of which is initiated by the presence of a special group attached to a molecular chain. The speaker went on to describe in detail such things as the reproduction of viruses and the formation of chromosomes.

Question time was very lively and Dr Christie had to stand up to quite a barrage of queries in diverse aspects of the subject.

Geology Group—May 1, 1963

Twenty-five members were present with Mr L. Angior in the chair. Visitors, including some junior members, were cordially welcomed. The secretary reported on the beginners' excursion to Royal Park on Saturday, April 6, when the Silurian, Tertiary and Older Basalt were examined. Marine fossils were obtained from the Tertiary ironstone. Brief mention was made by the secretary of a visit with Mr D. McInnes to Mount Blackwood, Greendale Fault, and the Werribee Gorge near "The Island". Mr Angior directed the attention of members to an excavation on the site of Scott's Hotel, showing sections of basalt. Mrs S.

Stubbs mentioned the reason for squeaking sands, given by the late P. C. Morrison.

The secretary paid a tribute to the memory of Mr S. R. Mitchell and Dr Wishart, who had recently passed away.

A lecture followed by Mr A. Cobbett on "Radio-active Minerals". The speaker traced the history of the discovery of radio-activity from Newton's first experiments with light, to Herschell's work with the infra-red and ultra-violet light sections. A demonstration with a Geiger Counter and ultra-violet light as a means of discovery and evaluating the minerals followed. With the help of specimens, various types of sands and ores were explained. An interesting discussion closed the lecture.

Exhibits: A variety of radio-active minerals (A. Cobbett); beryl crystals, lazurite, amethysts, charnocite, salt crystals, kyanite, epidote and magnesite from West Pakistan (L. Bairstow); graptolite from Werribee Gorge, for identification (T. Sault); arragonite cut for polishing, for distribution amongst members (A. Cobbett).

Botany Group—April 9, 1963

There was a good attendance of members, who gained much from the talk by Mr T. B. Muir (of the National Herbarium staff) on "Using a Botanical Key". The speaker had a number of different keys on view, and spoke of the methods adopted by botanical systematists in drawing up such keys. Many members had brought their copies of J. H. Willis's *Handbook to Plants in Victoria*, and a number of specimens were identified or "keyed out" with the assistance of Mr Muir. This practice exemplified the need for a good lens or, sometimes, a microscope when studying minute parts, to avoid following false trails.

It was decided that at each meeting of the Botany Group one member should deal with a "flower of the month", using colour slides. The first of these brief talks was given by Miss M. Lester, who showed and discussed five species of banksias, including *B. ornata*, the Desert Banksia.

The chairman (Mr J. A. Baines) suggested that the group should assist the Visual Education Centre of the Education Department in its plan to prepare colour slides of Victorian wildflowers for use in schools. Lists of such flowers will be discussed at the next meeting. It was decided to begin a Botany Group slide collection, with donations by members of spares and duplicates. The club president (Mr M. Houghton) commended this idea as likely to be adopted by other groups, especially entomology group.

The library sub-committee is examining Dr Nancy Burbidge's *Dictionary of Australian Plant Genera*, just published.

Fauna Survey Group—April 4, 1963

Twelve members attended the meeting, with Mr N. Wakefield in the chair. He reported recent observations of colour variation in Bentwing Bats (*Miniopterus schreibersi*).

Popular names of various native mammals were discussed, and it was decided to attempt co-ordination in this regard between the group and interested bodies interstate.

Mr W. King told of mammal observations at Warrenbayne, near Benalla, and he showed colour slides of several possums.

Entomology and Marine Biology Group—April 1, 1963

Mr M. Harrison chaired a meeting, which was attended by twenty-three members. He reported on the group excursion at Altona on March 31, a rather windy and cold day, but members obtained many marine specimens. Among these were egg-masses of a log-worm (shown under the microscope), some hydroids shaped like a banjo (with a miniature "banjo" attached) and the tube-worm *Galeolaria*.

Many of these specimens were viewed under an adaptation of the "club microscope" of Messrs McInnes and Woollard. This versatile instrument can be placed over a large basin containing marine life under water, and moved around to view the different specimens.

Mrs McInnes displayed a box of Victorian and northern Australian shells. Mr R. Condron showed a collection of butterflies of the Lycaenidae family, also some cicadas and dragonflies.

The speaker for the evening was

Mr A. J. Gilmour, of the Fisheries and Wildlife Department, his subject being "The Work of a Marine Biologist". Amply illustrated with colour slides, the talk was of great interest to all members. Mr McInnes, after thanking Mr Gilmour, suggested that more publicity should be given to the good work being done by marine biologists of the department.

Botany Group—May 9, 1963

There was a good attendance for members' night, and the chairman, Mr J. A. Baines, extended a special welcome to Miss Jean Galbraith.

Miss M. Lester gave an excellent talk on Wheat Rust (*Puccinia graminis*), a fungus with spores of several different forms. Miss E. Pearce spoke on the flora of south-western Tasmania, and exhibited many pressed specimens collected during a holiday in the rugged and lonely Port Davey area. Mr R. Morrison showed some excellent colour slides of wildflowers of the Flinders Ranges; while the "Flower of the Month" section was by Mr M. K. Houghton, who showed slides of nine species of grevilleas.

Mr Houghton presented some slides as the first contribution to the group's collection. An excursion to Monbulk and Emerald for fungi was planned.

Nominations for Office-bearers and Council for 1963-64

President—Mr M. K. Houghton.
Vice-presidents—Mr E. Byrne, Mr J. H. Quirk.
Treasurer—Mr A. G. Hooke.
Assistant Treasurer—Miss M. Butchart.
Secretary—Mr E. H. Coghill.
Assistant Secretary — Mr J. R. Hudson.
Editor—Mr N. A. Wakefield.
Assistant Editor — Mr R. H. J. McQueen.
Librarian—Miss M. E. Argo.
Excursion Secretary — Miss M. Allender.
Council—Mr J. R. Garnet, Dr W. Geroe, Mr E. R. Allan, Mr R. R. Dodds, Mr A. J. H. Fairhill.

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

ANNUAL GENERAL MEETING

Monday, June 10, 1963—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements, Correspondence.
2. Report of Council.
3. Report of Treasurer.
4. Report of Auditors.
5. Election of Office-bearers and Members of Council.
6. Appointment of Auditors.
7. Election of Members:

Ordinary Members:

Mr Robin A. Bailey, 15 Riverside Road, Ivanhoe.
Mrs Lorraine Bright, 16 Kathine Avenue, Murrumbeena. Interests: Botany, Entomology.
Mrs Alice M. Keating, 47 Devon Street, Heidelberg.
Miss Eileen E. Lawton, 1 Maitland Avenue, East Kew.
Mr William J. Murfet, Box 73, Heidelberg.
Mr Edward Nimmervoll, 58 Lower Dandenong Road, Mordialloc.
Miss Beryl Schumer, 1875 Malvern Road, East Malvern. Interests: Wildflowers. Geology.
Mr John W. Shilton, 7 Centennial Street, West Footscray. Introduced by Mr R. McCarthy. Interest: Fauna.
Miss Elspeth Stewart, 83 Alto Avenue, Croydon. Interests: Botany, Geology.

Country Members:

Mr A. E. Creelman, Railway Residence, Woodend. Interest: Lepidoptera.
Mr William Greenslerves, 65 Gorman's Hill Road, Bathurst, N.S.W. Interest: Orchids.
Mrs Mary Hogan, 1152 Oxley Road, Oxley, Brisbane, Queensland.
Mrs Elizabeth Learmonth, "Carramar", Tyrendarra.

Joint Country Members:

Mrs A. E. Creelman, Railway Residence, Woodend.
Mr Douglas Gladstone, Box 30, Beechworth.
Mr A. G. Wood, Nicol Street, Yarram.

8. Nominations for Membership.
9. Address: Excursion to the DIG Tree", by Mr M. K. Houghton.
10. General Business.
11. Nature Notes and Exhibits.
12. Conversazione.

Monday, July 8—"The Aborigines as They Were", by Mr A. Massola.

F.N.C.V. EXCURSIONS

Sunday, June 16—Coimadai and district. The coach will leave Batman Avenue at 9 a.m. Fare, 14/-. Bookings with the excursion secretary. Bring one meal.

GROUP MEETINGS

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

Thursday, June 13—Botany Group. Miss H. Aston of the National Herbarium will speak on "Aquatic Plants".

Wednesday, June 19—Microscopical Group. "Slide Making", by Messrs. W. Black and E. Snell.

Friday, June 28—Hawthorn Junior Club, at the Hawthorn Town Hall at 8 p.m. Mr A. J. Swaby will speak on "Looking into Flowers".

Monday, July 1—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.

The Victorian Naturalist

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In which is incorporated the Microscopical Society of Victoria

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2/6

Magnificent stand of White Mountain Ash, *Eucalyptus regnans*, in the Marysville State Forest

FORESTS COMMISSION VICTORIA

. . . . . preserving the beauty of our forests for your enjoyment.

Vol. 80. No. 3 July 4, 1963

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

The Red-necked Wallaby (*Protemnodon rufogrisea*) of naturalists is known to many country people as "brush wallaby"; Gippslanders call it "red wallaby", and in Tasmania it is "kangaroo". This doe and her large joey were photographed in the bush in the upper Cann River valley of eastern Victoria. She has complete freedom but habitually comes down to a farm-house to be fed. An interesting feature of the mother is the faint but definite banding on the tail. (*Photo: N. A. Wakefield.*)

Visit to Moroka Glen

By N. A. WAKEFIELD

The Moroka River has its source near Mount Wellington, in the eastern highlands of Victoria. It flows easterly, then in a general north-westerly direction, past Mount Kent, and finally joins the Wonnangatta River to the north of Snowy Bluff. The lower tract of the river is through Moroka Glen, and last year I visited the area in the company of Mr G. C. Hodge of Boisdale.

Our interest in the Glen stemmed from a report by the late C. E. Bryant, that in 1923 he "saw a number of rock-wallabies at the foot of the Snowy Bluff by the Moroka River not far from its confluence with the Wonnangatta". This was noted in the *Victorian Naturalist* in March 1954, in an article on the rediscovery in Victoria of the Brush-tailed Rock-wallaby, *Petrogale penicillata* (Vol. 70, pages 202-206).

A decade or so ago, the Moroka was one of those remote places, difficult of access and a challenge to the bushwalker. Now, however, a well-made Forests Commission access road ascends the Wellington Valley from Licola, skirts Mount Tamboritha and Mount Arbuckle, and reaches Doolan's Plain, some ten miles north of Mount Wellington. Jeep tracks go further.

We took advantage of these roads and, on November 10, drove from Boisdale, via Glenmaggie, to Licola, and thence ten miles up the Wellington River valley. The road is an exposition of good engineering as it climbs towards Mount Tamboritha, with two or three spectacular box cuttings through narrow spurs. During the ascent, The Crinoline is conspicuous a few miles to the west, and the massive Wellington escarpment—the Gable End—provides an imposing background to the valley, a dozen miles to the south-east.

As the top country is reached, the road passes through an area of soft greenish serpentine, and thereafter the traverse of the plateau is without great interest.

When the formed road ended, at Doolan's Plain, we took the Landrover along a rough track, lunched beside a tiny spring, and then went on foot to explore the rugged outcrops where the plateau breaks away towards Surveyors Creek and the Carey River. After joining forces, the waters of these two streams make their way to the Moroka.

Above the cliffs, the forest was mainly of White Sallee or Snow Gum (*Eucalyptus pauciflora*), with considerable ground shrubbery. Runways of native rats were apparent amongst the dense tussocky growth of grass and sedge, in an area of soakage under a thicket of tea-tree; and as we scrambled over a jumble of scrub-covered rocks a ringtail possum (*Pseudocheirus peregrinus*) was seen, making its way up a small tree. One does not normally see a possum in

broad daylight, but apparently we had distributed this one from its hiding place.

Here and there, in open glades, there were extensive mats of Rosy Heath-myrtle (*Baeckea ramosissima*). In places the tiny five-petalled flowers almost obscured the foliage.

From the edge of the scarp, the view was magnificent. Sixteen miles to the north-west was Mount Howitt, 5715 feet elevation, and further north the spurs and peaks of the Barry Mountains rose beyond the valley of the upper Wonnangatta.

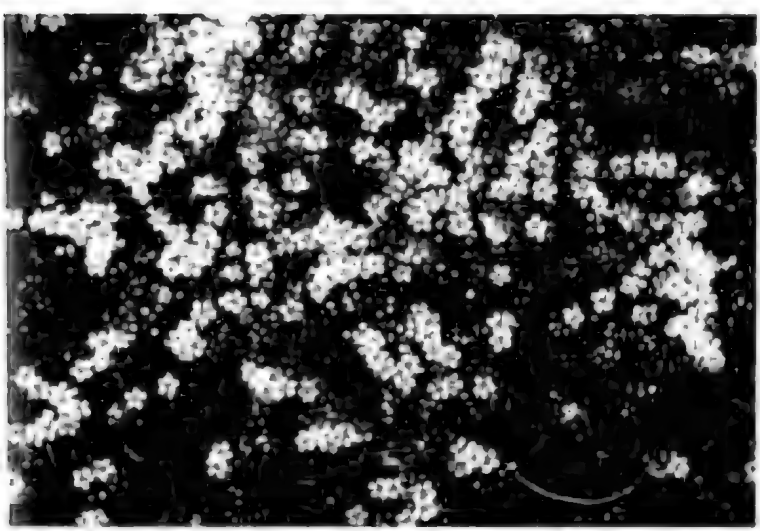
We worked our way north-easterly about the cliffs and tors until they terminated, with the country falling away steeply to Moroka Glen, far below, and then rising abruptly again to the buttresses of Snowy Bluff, high against the eastern sky.

In many places there were formations seemingly ideal for rock wallabies, but no sign could be found of their dens or runways, nor was there any indication that the animals had ever lived there.

Some interesting shrubs grew about the rock outcrops. Oval-leaf Grevillea (*G. miqueliana*) was abundant, forming compact domes several feet high, decorated with spidery clusters of red blossom. Equally shapely were the clumps of Ovate Phebalium (*P. ovatifolium*), and this shrub bore typical groups of star-like white flowers.

About the higher outcrops, and in the marginal plateau forest, there was an abundance of Tingaringy Gum (*Eucalyptus glaucescens*), its slender copper-coloured trunks forming mallee-like thickets, just as it grows on the mountain-sides above the Suggan Buggan valley in north-eastern Gippsland.

On the way back through the trees, we found a remarkable formation, where an outgrowth from the trunk of a Snow Gum had made a perfect basin. This contained a half-pint of water



Tingaringy Gum, *Eucalyptus glaucescens* 10 miles north of Mount Wellington.

and was probably a drinking place of bush birds. Hodge called it a fairies' swimming pool. Readers may look at the picture and judge for themselves.

We spent the night in Kelly's Hut, by Homes Plain, north-west of Mount Arbuckle, and a few cage traps were put out amongst the dense growth on a nearby *Sphagnum* moss bed. Morning revealed the catch, a healthy specimen of bush rat, which was identified as *Rattus assimilis* and then released.

A Japanese Snipe was flushed from the moss bed, and there was a pair of Satin Flycatchers in the gums above the hut. The skull of a horse was hanging on an iron spike which had been driven into an upright of the chimney. Part of the cranium had broken away on the inner side of one eye socket, and in the brain-case was the nest of a Flame Robin, with one egg.

That second day, we took the Landrover down a very steep track, from Doolan's Plain almost to the bottom of Moroka Glen. The river was reached after a walk of a few hundred yards down through a forest of Red Stringybark (*Eucalyptus macrorrhyncha*). The ground shrubbery included showy masses of pink-eye (*Tetratheca pilosa*) and acres of Heathy Bush-pea (*Pultenaea procumbens*) in full bloom. There was a scattering of grasstrees (*Xanthorrhoea australis*), and orchids were well represented. The latter included Fringed Spider-orchid (*Caladenia dilatata*), Musky Caladenia (*C. angustata*), Tiger Orchid (*Diuris sulphurea*), Large Waxlip (*Glossodia major*), Slender Sun-orchid (*Thelymitra pauciflora*) and Scented Sun-orchid (*T. aristata*).

The Moroka was picturesque, with gravel beds alternating with cliffy sections. And the riparian shrubs included the Oval-leaf Grevillea again, and some very floriferous bitter-peas (*Daviesia corymbosa*).

Upstream, the Glen opened out into a parkland which is perhaps as attractive as any spot in the state. The scattered trees were Long-leaf Box (*Eucalyptus elaeophora*) and Brittle Gum (*E. maculosa*), the trunks grey in one and milk-white in the other. There was a loose lawn of short Kangaroo Grass (*The-*

meda australis), and here and there shapely specimens of Rosemary Grevillea (*G. rosmarinifolia*) or clumps of Mountain Mirbelia (*M. oxyloboides*) flowering profusely. In the background, the low rises were clothed with areas of the Heathy Bush-pea again, a wealth of golden blossom.

We walked some distance through this natural park, to the first outcrops of the sandstone beds of Snowy Bluff. There too was an outstanding display of flowering shrubs. Fringe-myrtle (*Calytrix tetragona*) was the show-piece in this case, the massed flowers varying on different bushes from white to rich pink.

Remarkably enough there were no signs of kangaroos. Hodge said they did not inhabit the Glen, as it would be impossible to elude dingoes in the steep-walled valley. There was abundant evidence of these wild dogs, on the plateau, along the track down, and in the valley. We found the remains of one of their kills—some limb bones, ribs and the skull of a sub-adult Black Wallaby (*Protemnodon bicolor*). It had been cornered in a ravine at the foot of a fall, along Snowy Bluff Creek.

Again we found no evidence of present or past occupancy by rock-wallabies.

Brumbies do not frequent the Glen either, though there are families of them from above Snowy Bluff to the upper Maroka Valley, as well as about the Dolodrock River south-west of Mount Wellington.

In the parkland, there were wallows of the introduced Indian Sambur. According to Hodge, these large deer appeared in the locality, probably from the Baw Baws area, after the 1939 bushfires, and have now spread as far east as the Dargo-Wentworth River area.

We left Maroka Glen late in the afternoon, took the Landrover up again to Doolan's Plain before nightfall, and then made the long run down to Licola and back to Boisdale.

As a result of the excursion, we doubt that there are rock-wallabies about the Moroka. But one possible habitat remains to be examined—a cliffy tract still further downstream than the area we explored. That is a task for another day.

A Record of the Beaked Whale *(Mesoplodon layardii)* in Victorian Waters

By R. M. WARNEKE*

On June 23, 1962, Mr F. B. O'Brien, a Fisheries and Wildlife Officer stationed at Port Fairy, reported that a small whale had been found at Light House Bay, Griffith Island, near the township of Port Fairy. It was dead when first discovered, but as blood was still seeping from the mouth and from wounds on the head, it is likely that it had died shortly before it was washed onto the beach. School children from the nearby township soon mutilated the body, hacking off the tip of the right tail-fluke and cutting into the belly. Fortunately Mr W. Murphy, Head Teacher of the Port Fairy Consolidated School, obtained several 35 mm. colour photographs of the specimen before it was disturbed. It was then lying on its left side in a slight depression in the sand where it had been left by the tide.

As the locality is only a short distance from the township, the local Harbour Authorities disposed of the carcase by burying it where it lay. This prompt action had the secondary effect of protecting the specimen from further mutilation.

Descriptions furnished by Miss G. Bowker and Mr F. B. O'Brien indicated that the whale was seventeen feet in length and dark grey in colour. The fore-part of the head was long, narrow and tapering. The mouth was closely examined for teeth, but none were found in either jaw. Miss Bowker suggested that it was a beaked whale and this was subsequently confirmed by the photographs.

On July 31, in company with Mr O'Brien and Mr F. T. Baum of the Fisheries and Wildlife Department, I visited the locality and exhumed the fore-part of the specimen. Decomposition had not proceeded as far as expected and the carcase was found to be relatively intact. It was, however, impossible to obtain accurate flesh measurements so the head was removed and defleshed on the spot by boiling.

When the skull had been cleaned, the anterior portion of the rostrum and mandible were found to be badly damaged and the right ramus was broken transversely about half-way along its length. A single pair of teeth were found embedded in the lower jaw, slightly forward of the posterior margin of the mandibular symphysis. Their form and position, as shown in Figure 2, are typical of an adult female Layard's beaked whale,

* Fisheries and Wildlife Department, Victoria.

Mesoplodon layardii (Gray), (McCann, 1962).

The whale had suffered some superficial cuts about the head, as noted previously. These injuries may have been caused by the body washing over rocks or have been the result of an accident which killed the animal. The severe injuries to the extremity of the skull and mandible suggest a head-on collision of some force and, as the body wounds are confined to the head, the latter explanation is likely. Hale (1931) suggested that the stranding of two specimens near Victor Harbour, South Australia, occurred after they were fouled by rocks.

External Characters

As the total length was the only precise information given in the descriptions, the photographs taken by Mr W. Murphy are the only record of the external features. In size and form it compares closely with a female specimen cast up at Victor Harbour (Hale, 1931). Of interest is the rather distinct pattern of light and dark grey (Fig. 1) which is very similar to that shown on a drawing of the species figured by Pearson (1936). However, as Hale (1959) records that the life colouration of a specimen stranded on Kangaroo Island altered immediately after death, it is of doubtful significance.

Skull

The skull is similar to, though proportionately larger than, an example of unknown sex from Port Victoria, South Australia, figured by Hale (1931), (S.A. Mus. Reg. No. M.2853). In proportion the beak of the Port Fairy specimen is considerably longer. Fortunately sufficient pieces of the damaged rostrum were recovered to enable almost complete reconstruction; however no fragments of the anterior portion of the mandible were found. The skull is in the National Museum of Victoria, Melbourne, Reg. No. C.3758.

The foramen magnum is

Figure 1.

The whale (*Mesoplodon layardii*) as found on a beach near Port Fairy.

The inset shows the shape of the tail fluke and the position of the dorsal fin.

(*Photos: W. Murphy*)

slightly asymmetrical with the vertical axis inclined slightly to the right. The mesorostral groove is filled with light, cancellous bone for approximately two-thirds of its length. In this groove the vomer originates at a point 208 mm. from the tip of the rostrum but it is not obvious as it appears to have been squeezed into a very narrow plate by thickening of the premaxillae. Ventrally, the visible portion appears 225 mm. from the tip of the rostrum, is 325 mm. in length and is fusiform in shape. As in the Port Victoria example, the premaxillary foramina are almost in line and are in advance of the maxillary foramina. The rami of the mandible are firmly joined by cartilage but the symphysis shows no sign of ossification. The mandibular teeth are deeply socketed, with the triangular denticles showing slightly forward of the posterior margin of the symphysis. On both teeth the denticle projects outwards and slightly downwards (Figs. 2 and 3).

Dimensions of Teeth

	Right	Left
Length of base	89 mm.	90 mm.
Greatest depth	51	50
Greatest width	10.5	10.5
Weight	37 gm.	36 gm.

Dimensions of Skull*

	mm.
†Total length (condylobasal)	1050
Height from vertex to inferior border of pterygoids	400
†Tip of rostrum to level of antorbital notches	725
†Tip of rostrum to posterior border of pterygoids	910
Greatest depth of rostrum	101
Breadth between orbits	415
Breadth between antorbital tubercles	274
Breadth of premaxillae in front of nares	161
Greatest breadth of anterior nares	57
Length of tympanic bullae	42
Breadth of tympanic bullae	29
Height of supra-occipital (from upper margin of foramen magnum)	217
Width of foramen magnum	48
Width of condyles	142
Height of condyles	92
Greatest depth of mandible	146
Length from coronoid to posterior margin of symphysis	610

* Terms, after Hale (1931).
† Subject to error through reconstruction of damaged portions.

Measurement of length of mandible and length of symphysis were not possible.

Remarks

Mesoplodon layardii is one of a group of small to medium-sized whales which comprise the family Ziphiidae. The five genera in this family; *Ziphius, Berardius, Hyperoodon, Mesoplodon* and *Tasmacetus*, include some of the least known species in the order Cetacea. As they are not sought after commercially, most of the available information on the group has been gleaned from the relatively few specimens cast up on inhabited coasts. For this reason many species are regarded as rare but, as beaked whales appear to prefer open waters, the infrequency of records is not surprising. When commenting on Australian strandings, Hale (1959) expressed the opinion that—

> In all probability the smaller whales occurring off our coasts are by no means as rare as would appear from published records. It is certain that many strandings are not observed as whales surely must be cast up from time to time on uninhabited portions of the vast coastline of Australia.

The peculiar bird-like shape of the head is characteristic of the Ziphiidae and is especially well developed in the genus *Mesoplodon*. In the flesh, males are readily distinguished from females by the presence of one or two pairs of prominent teeth in the anterior portion of the lower jaw. Females possess the corresponding teeth but they remain undeveloped and hidden below the gums* (McCann, 1962). Rudimentary teeth may be found in some specimens (Hale, 1932, p. 493), either in the lower or upper jaw or both, but they are merely embedded in the gums and are usually shed or eventually worn away. The one exception, *Tasmacetus*, retains long rows of small functional teeth in both jaws in addition to a larger pair corresponding to those found in related genera.

The size, shape and position of the mandibular teeth are characteristic of each species (Flower, 1878. McCann, 1962). In males their function is that of offence as the bodies of old specimens frequently carry scars, probably inflicted by rivals during the mating season (Kellogg, 1940. McCann, 1962). There is little need of such teeth for feeding as squid and other cuttlefish form the major portion of the diet.

* In *Berardius* both sexes possess functional teeth.

Figure 2.

Right: Anterior portion of the mandible showing the position of the teeth.

Left: Left tooth extracted.

(Photos: J. Cooper, Fisheries and Wildlife Department).

In *M. layardii*, males are distinguished by a pair of strap-like, flattened tusks which angle backward and curve over the top of the upper jaw. In aged examples these teeth often meet or even cross above the rostrum so that the jaw movement is restricted and feeding must become a problem (Sutton, 1885). The triangular denticles (Fig. 2) are present near the extremity but are usually worn down in old specimens. The teeth are such a striking feature of the species that it is often referred to as the Strap-toothed Whale.

Of the Ziphioid whales occurring in Australian waters, *M. layardii* is the species most frequently recorded. It is known to occur from Queensland to Tasmania and Western Australia (its occurrence in Western Australia has been noted recently by Hale, personal communication). The Port Fairy specimen constitutes the first Victorian record of the species.

There are only two other records of Ziphioid whales in Victorian waters:

(1) A skull of a young example of the Southern Beaked Whale, *Mesoplodon grayi* Haast, was found near Cape Schanck on July 9, 1931 by Miss E. Battersby. It is in the National Museum, Melbourne, Reg. No. R.13590. This example compares closely with a skull figured by Hale (1932) from Younghusband Peninsula, South Australia.

(2) A Ziphioid whale eighteen feet in length was washed on to rocks at Cape Bridgewater in western Victoria in 1950. Two photographs were reproduced in *Wild Life* (see References) and it was tentatively identified as *M. grayi*. However, the shape of the head (partly obscured in the photographs) is suggestive of the Bottle-nosed Whale, *Hyperoodon planifrons* Flower. The latter species was recorded from Port Victoria, South Australia, by Hale (1931).

ACKNOWLEDGEMENTS

I am indebted to Mr C. McCann of the Dominion Museum, Wellington, New Zealand, for his identification of the Port Fairy whale from the mandibular teeth; to Mr R. M. Ryan of the National Museum of Victoria for the opportunity of examining the Cape Schanck specimen; and to Mr W. Murphy for his kind permission to publish his photographs. Thanks are also due to Miss G. Bowker and Mr F. B. O'Brien for their notes on the Port Fairy specimen.

REFERENCES

Flower, W. H. (1878). A further contribution to the knowledge of existing Ziphioid whales. Genus *Mesoplodon*. *Trans. Zool. Soc. Lond., 10*: 415-437.

Forbes, H. O. (1893). Observations on the development of the rostrum in the Cetacean genus *Mesoplodon*, with remarks on some of the species. *Proc. Zool. Soc. Lond., 1893*, pp. 216-236.

Glauert, L. (1947). The genus *Mesoplodon* in Western Australian seas. *Austr. Zool., 11 (2)*: 73-75.

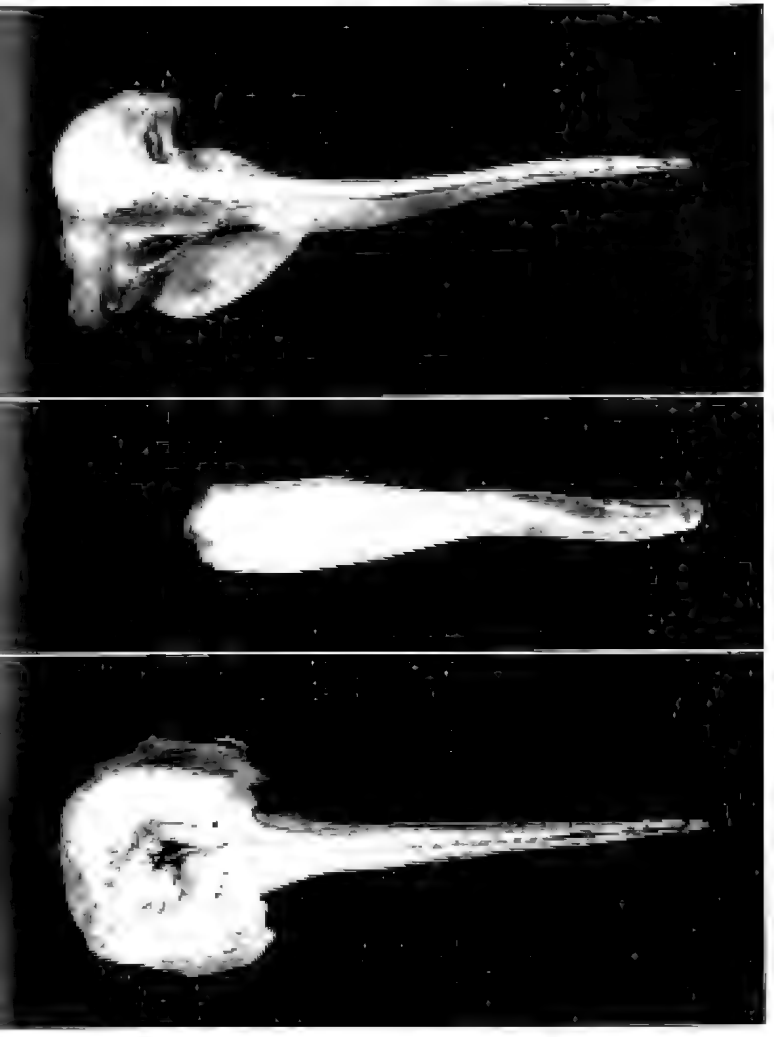
Hale, H. M. (1931). Beaked whales—*Hyperoodon planifrons* and *Mesoplodon layardii*—from South Australia. *Rec. S. Aust. Mus., 4 (3)*: 291-311.

Hale, H. M. (1932). The New Zealand Scamperdown Whale (*Mesoplodon grayi*) in South Australian waters. *Rec. S. Aust. Mus., 4 (4)*:489-496.

Hale, H. M. (1959). The Pigmy Sperm Whale on South Australian coasts—continued. (Part 2). *Rec. S. Aust. Mus., 13 (3)*: 333-338.

Hale, H. M. (1962). Occurrence of the whale *Berardius arnuxi* in South Australia. *Rec. S. Aust. Mus., 14 (2)*: 231-243.

Harmer, Sir Sydney F. (1924). On *Mesoplodon* and other beaked whales. *Proc. Zool. Soc. Lond., 1924*, pp. 541-587.



Kellogg, R. (1940). Whales, Giants of the Sea. *Nat. Geogr. Mag., 77 (1)*: 35-90.

McCann, C. (1962). Key to the family Ziphiidae—Beaked Whales. *Tuatara, 10 (1)*: 13-18.

Oliver, W. R. B. (1922). A review of the Cetacea of the New Zealand seas—part 1. *Proc. Zool. Soc. Lond., 1922*, pp. 557-585.

Pearson, J. (1936). The whales and dolphins of Tasmania. Part 1— External characters and habits. *Proc. Roy. Soc. Tas., 1935*, pp. 163-192.

Scott, H. H., and Lord, C. (1927). Studies in Tasmanian Cetacea. Part 5—*Mesoplodon layardi* Gray. *Proc. Roy. Soc. Tas., 1926*, pp. 87-90.

Sutton, J. B. (1885). On hypertrophy and its value in evolution. *Proc. Zool. Soc. Lond., 1885*, p. 440.

Waite, E. R. (1922). Two Ziphioid whales not previously recorded from South Australia. *Rec. S. Aust. Mus., 2 (2)*: 209-214.

Wild Life, Australian Nature Magazine, 12 (8): 373 (August, 1950).

These columns are available each month for your nature notes and queries. Address your correspondence to the Editor, "Victorian Naturalist", P.O. Box 21, Noble Park, Victoria.

Letter from Leongatha

We sometimes wonder how the *Naturalist*, particularly in its format of recent years, is received by the general membership of our club, and the question arises too whether the material which is presented in this "By-ways" feature is in line with most readers' interests. Here is comment on the subject from Mrs E. Lyndon of Leongatha:

To country members not often in personal contact with the Field Naturalists Club, the *Naturalist* is something looked forward to each month. It is our "mail from home", as it were, and we like to read of our fellow-members' adventures, experiences and observations in the field of nature.

In our house we always turn first to the members' notes in "Along the By-ways", the pages that tell of the little everyday things that are happening right under our very noses. They are things, alas, that we seldom notice unless our attention is thus drawn to them. Even more seldom do we write down and send in what we see, even if the discovery is our own.

Every so often comes an editorial warning that material for these pages is running out. Are nature observations really running out, in a club devoted to the study of nature, boasting a steadily growing membership of over 900? Why do we not hear from more members? Nature is as busy in their gardens or farms, along the country roadsides or the street nature-strips, as it is in the more remote parts of the bush.

We heartily endorse the points touched upon in Mrs Lyndon's third paragraph.

The production of monthly issues of the *Naturalist* is virtually the sole direct service this club renders to the great majority of its members. We are therefore most interested in comments and suggestions from readers, especially those in the country. Criticism of a constructive nature is particularly appreciated.

Swarms of Shade Midges

Mrs Lyndon's letter went on with these observations:

Inspiration can often be found by browsing through back numbers of the *Naturalist*. In the issue of May 1962, an East Gippsland reader remarked on the swarming of black winged insects on branches of manuka scrub. This brought back to me something I had seen quite recently.

We had gone over to Moss Vale Park on Anzac Day to enjoy the lovely autumn colour in the old trees. On the shady side of a plane tree the twigs were weighed down by a black substance that proved to be swarms of tiny flies, some still flying in and out of the main swarms that were several inches thick in places and extended up the twigs for a foot or more. They were rather unpleasant-looking objects and I did not feel much curiosity about them, nor did I take a sample. It was a fortnight before I came across the note in the *Naturalist*, and I wondered if the insects would still be there. There had been no rain and little wind in the meantime. It was worth taking a look.

The leaves on the trees were almost shed and the bulk of the insects indeed gone, but on one of the globular seed-balls of the tree a black swarm still survived, enough fortunately, for identification purposes.

The specimens which Mrs Lyndon sent along were identified by Mr A. Neboiss of the National Museum as a species of the family Mycetophilidae, of the order Diptera. They belong to the subfamily Sciarinae.

Reference to Froggatt's *Australian Insects*, page 287, tells us that this group comprises the typical "Shade midges", which infest forest country, their larvae—slender, cylindrical, semi-translucent maggots—living under dead bark or decomposing leaves.

The insects from Moss Vale Park were about an eighth-inch long, from antennae to wing-tips, and, though the literature makes no reference to swarming or clustering, Mrs Lyndon is probably correct in linking her observation with that made a year earlier by Mr K. C. Rogers in north-eastern Gippsland.

Tree Crickets

Two letters are to hand from Mr R. John Edge of Allansford, south-western Victoria. The first, written in May, contains these comments:

This must be the time of year when the tree crickets (*Paragryllacris combusta*) are active, for I have had several brought to me for identification.

Recently I cut open a piece of wood, and revealed a male cricket with at least a hundred small eggs. I now have him and the eggs, and he is always close to them when observed. Perhaps this is another case of the poor man having to do the house work.

This apparently was not so, for a little later the mail brought this report:

I regret to say that the gentleman (?) has consumed his offspring, and is looking very contented. I believe the species is carnivorous, and no doubt that is the reason for his action.

It appears that the association of the male cricket and the eggs was purely coincidental. Probably the female had lived in the same retreat but had disappeared from the scene for some reason. The male cricket would not have been actively caring for the eggs, and his action in eating them was almost certainly due to being kept in captivity.

Readers who do not know the tree cricket may recognize it by the strong biting jaws and extremely long antennae.

Two New Butterfly Records for Victoria

By A. N. Burns*

Late last summer, I received more information and specimens of butterflies from Mr A. May of Noorinbee, near Cann River in far-eastern Victoria. Amongst them were two very interesting and new records of "skippers" (Family Hesperidae, Rhopalocera-Lepidoptera) for Victoria.

However, it was not surprising that one of these species should turn up in the far east of the state, because it has a wide range from southern coastal New South Wales right to Queensland. This species is *Telicota kreffti ancilla* H. Sch., of the Sub-family Erynninae, Family Hesperidae. The typical form, *Telicota kreffti kreffti* Macl. ranges from Cape York and the islands of Torres Strait southward about as far as Mackay in Queensland. The race *ancilla* then ranges southwards, mainly along the coast, to well south of Sydney.

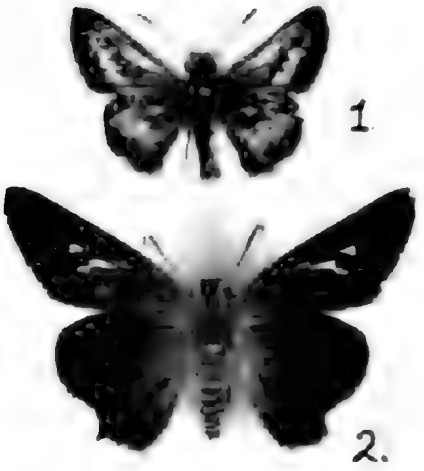
Telicota kreffti ancilla is commonly known as "The Greenish Darter" on account of a definite greenish suffusion on the underside of most specimens. Individuals, especially females, vary in the degree of suffusion.

The sexes are similar in appearance; females have slightly less angular wings and stouter bodies than males. The specimen taken at Noorinbee was a male, so a description of that sex will be given. The upper-side of the wings are dark brown with orange markings, and each forewing has a long orange spot in the cell, three small subapical spots, and a broad discal orange marking close to the termen. The sex-mark is broad, silky brownish-black, and extends from vein 4 to vein 1a. The hindwings have an orange cellular spot and a broad orange discal band. The under-side is orange with the dorsum of each forewing black and the other markings as on the upper-side. The apices of both fore and hindwings are often suffused greenish. The female has no sex-mark, the orange markings are more restricted, and the under-side usually more greenish.

I have not seen the egg of this butterfly. The larva is pale greenish yellow with a darker green dorsal line, the head hard and brown with darker brown markings on the front. The pupa is brown and inclined to be hairy and its head is rounded; it is enclosed within the pre-pupal shelter made by the larva in some position remote from the food plant, Blady Grass (*Imperata arundinacea*).

The other species, *Badhamia exclamationis* Fabr, is really a far more interesting record for Victoria. It normally ranges through the islands of Torres Strait, the Northern Territory, Queensland, and through northern New South Wales and very rarely as far south as Sydney. Up to 1932 the late Dr G. A. Waterhouse in his book *What Butterfly is That?* mentions that five specimens only had been caught in Sydney.

* Assistant Director, National Museum of Victoria



1. *Telicota kreffti ancilla* H. Sch. Male.
2. *Badhamia exclamationis* Fab. Female.

This insect is commonly called the "Brown Awl" or "Migratory Skipper", the latter name being given because in Queensland there are two regular flights each year. The first, in early summer, consists of great numbers of the butterflies flying in a southerly direction, and the butterflies of the late summer flight travel northwards. When living at Westwood, 32 miles west of Rockhampton, I noted many hundreds of the butterflies stopping to deposit their eggs on the leaves of a tree locally known as Boxwood. In a very short time these trees became defoliated by the larvae which, when fully grown, pupated between folded leaves of other shrubs and even on fence posts and similar objects. Just how much farther south than Westwood (which is on the Tropic of Capricorn) the food trees grow is hard to estimate, but it is quite probable that they extend as far south as the latitude of Maryborough (inland) or even a little further.

In *Badhamia exclamationis* the sexes are quite similar, females are slightly larger than males with the wings a little more rounded and the markings slightly larger and more clearly defined. The Victorian specimen is a female, so a description of that sex will be given. The wings are brown, and the forewings have a small semi-hyaline creamy spot in the cell and a pair of slightly larger similar spots in areas 2 and 3. The under-side is similar to the upper-side but paler in colour and the semi-hyaline creamy spots clearly defined. The hindwings are brown with the cilia (fringes) greyish white. The male has the markings considerably reduced, and very often the semi-hyaline creamy spot in the cell is quite absent.

Unfortunately I have not a description of the egg of this butterfly. Its larva has a smooth body, yellowish in colour, with a median dorsal line, and broad black lateral line; each segment is ornamented with fine black vertical lines; the head is hard and roughened, bright yellow with two broad black bands; and the extent of the head markings as well as body colour and markings vary considerably in different specimens. The pupa is brown with darker patches and is covered all over with a whitish powder; it is rather short and stout, the thorax is humped and the head carries a short stout projection. It is enclosed within a shelter of a few leaves drawn together with silken threads. There are several food plants, mostly species of *Terminalia*, besides the Boxwood of the Rockhampton district.

Book Review:

"The Eucalypts"

(Botany, Chemistry, Cultivation and Utilization)

A. R. Penfold and J. L. Willis

World Crop Series. Leonard Hill (Books) Limited, London. 1961. 550 pages, illustrated. 80/-.

As stated in the preface, the authors aimed to produce, primarily for the layman, a simple survey of the "botany, chemistry, cultivation and utilization" of the eucalypts. . . . "with an emphasis on practical information in preference to theoretical aspects or exhaustive detail". The task was a difficult one because of the vast quantity of information which has been written on the eucalypts. It would indeed be a wonder if no omissions had been made in a book of this kind.

The Eucalypts is a mine of information on many subjects, but the depth of treatment of individual chapters varies. For instance the chapter on "Essential Oils" is particularly inclusive and contains a comprehensive list of the oil yield and constituents of about 250 species and varieties. On the other hand very little information is given of the growth and timber yield of important species either in Australia or overseas.

Chapters devoted to botanical characteristics, timber, trees for shade shelter and ornament, honey flora, miscellaneous uses and eucalypts as exotics, leave the reader in no doubt as to the diversity in habit, adaptability and usefulness of this intriguing genus. It is possible, too, to realize the extraordinarily aesthetic, economic and protective potential of the group both in Australia and overseas.

Historical facts about the discovery, description and utilization of eucalypts are recorded in appropriate places and problems of classification and nomenclature indicate some of the reasons why the genus has often been referred to as a "difficult" one. The difficulty has been perpetuated by the use of the unmodified form of classification presented by Blakeley (in his *Key to the Eucalypts*) in this volume. It is indeed unfortunate that an improved system of classification had not been devised before a work of this kind was published.

The layman will be disappointed by the omission of the familiar common names of his favourite eucalypts. In the text, vernacular names are given to some well-known groups, e.g. "ashes", "peppermints", but not to particular species, except in one or two exceptional cases and in a list of "standard trade common names" which includes 47 timber trees. If vernacular names had been used it may be that jarrah (*Eucalyptus marginata*) would not have been quoted as one of the tallest eucalypts, on pages 1 and 2.

Short accounts are given of the methods of propagation of eucalypts and of insect, fungal and other natural enemies and their control.

The book is illustrated by 22 photographs (1 in colour), 28 figures and 5 maps. In addition, reproductions of 39 plates of beautiful botanical drawings from Maiden's *Critical Revision* enrich the publication and lose but little in their reduction (13 x 11 cm.).

About 150 species are described briefly in one chapter (138 pp.), reference being made to the habit, leaves, inflorescence, fruit and usefulness of each. Very approximate areas of natural occurrence are found by plotting latitude and longitude details on appended maps. All other described species and varieties are given mention in this chapter.

The authors have produced a compendium of information and the book will prove to be a valuable reference and stimulant for people interested in the eucalypts. To have combined under one cover so much material from so many sources is in itself an achievement.

—C. D. HAMILTON

Excursion to Bairnsdale—December, 1962

By J. A. BAINES

Many members of the F.N.C.V. look forward to the club's annual Christmas excursion, and last year's trip proved no exception to the rule of congenial education in natural history. On that occasion the party numbered thirty-eight, including some members of country clubs, and their experiences and observations are told here in diary form.

Aboriginal canoe tree, near Myrtlebank. (*Photo: F. G. Hosking*).

Wednesday, December 26—When the coach reached Myrtlebank, on the Maffra road, Mrs T. Jeffrey of Sale took the party to the home of Mr D. Johns, a farmer on whose property stand a number of "canoe trees". Near a drained swamp, behind the homestead, are seven Forest Red Gums (*Eucalyptus tereticornis*), on the trunks of which are scars where aborigines long ago removed bark for canoes and shields. One of the trees is still living. The swamp, which still fills in flood time, used to be crossed by blacks of the Kurnai tribe, and the canoes would be discarded on the other side. Comparisons were made with canoe trees near Melbourne, and discussion ensued as to why the base of each scar should be about six feet from the ground.

Mrs Jeffrey showed some of her collection of aboriginal artefacts from local and distant camp sites. However, she is a self-appointed guardian against spoilation of the known local camps.

On arrival in Bairnsdale the party was met by officials of the Bairnsdale F.N.C., and the future daily itinerary was discussed.

Thursday, December 27—The party proceeded by road, via Eagle Point to Paynesville, thence by motor launch across Lake Victoria, to the Lakes National Park on Sperm Whale

Head. Members were landed at Trapper Point, and enjoyed a ramble along a track over Murphy's Hill to the deserted house formerly occupied by the park ranger.

The predominant trees were *Eucalyptus viminalis* var. *racemosa* ("rough-barked manna gum") and two species of banksia, while the Dotted Heath-myrtle (*Thryptomene micrantha*), confined in Victoria to southern Gippsland, was prominent in the shrubbery though not flowering. While many plant species were listed, it was disappointing to find so much ground almost monopolized by bracken (*Pteridium*). About forty kangaroos are known to inhabit the park, but only one was sighted by members, although there were tracks, a carcase and other evidence of their presence.

After lunch, the party was taken to Ocean Grange, where some time was spent on the Ninety Mile Beach. An interesting feature there was the "new" sand dunes, which are rapidly encroaching on the foreshore tea-tree belt (see "Landform Changes at Lakes Entrance", *Vict. Nat.*, September 1961).

That night, colour slides were shown by Bairnsdale club members, and district wildflowers were exhibited. Mr D. McInnes demonstrated the F.N.C.V. "club microscope", with the help of many specimens on slides.

Mr L. Fell presented visiting members with a number of native plants which he had propagated at Metung.

Friday, December 28—Mr F. Johnston, a local club member, led the party to "Fairy Dell", via Wiseleigh, near Bruthen. The route was first across paddocks, then through a difficult area of scrub. Progress was further slowed by the many interesting plants to be investigated.

Not being as accessible as it once was, Fairy Dell is rarely visited nowadays, but the Bairnsdale F.N.C. has recommended it to Government authority for preservation. At present it is in reserved State Forest, and Forests Commission access roads reach it from the north and west, but these are rather rough.

Elaeocarpus cyaneus (Blueberry Ash), of tree stature among the ferns, was blooming profusely, and as Fairy Dell was reached—a cool, sun-filtered spot—the ground became quite covered with small ferns. Tall Lilly-pilly trees (*Eugenia smithii*), kanookas (*Tristania laurina*), pittosporums (*P. undulatum*) and yellow-woods (*Acronychia laevis*), as well as jungle vines, emphasized the sub-tropical nature of the vegetation.

A large goanna, on the trunk of a lilly-pilly, was much photographed, and several birds' nests were found, including those of the Golden Whistler and Yellow Robin.

After lunch in the bush, a visit was made to the large garden of Mr and Mrs Johnston of Bruthen, who have grown and propagated many Australian and overseas plants. Sweet cumquats were sampled, and the ferns, hothouse plants and succulents were greatly admired.

The return to Bairnsdale was via Tambo Upper, to view the well-known fossil cliffs of Miocene limestone.

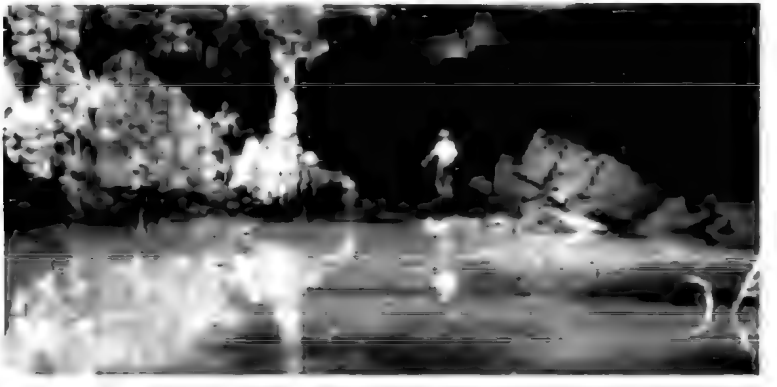
Saturday, December 29—Led by two local naturalists, Messrs V. Barton and A. McDonald, the party proceeded via Lindenow, Walpa and Iguana Creek, to Deadcock Creek and its famous "Den of Nargun". Over the past fifty-odd years this place has been described several times in the *Naturalist*, the most comprehensive account appearing in August 1923 (Vol. 40, pp. 77-82). The area has recently been proclaimed a national park.

To reach Deadcock Creek, there was a walk through a wilderness of Burgan scrub (*Leptospermum ericoides*). Lunch was eaten among rocks overlooking the spectacular valley, and the different nature of this most westerly occurrence of the East Gippsland sub-tropical flora was made obvious by the colour and form of the vegetation far below.

To reach the Den of Nargun itself from the lower cave, it was necessary to clamber around and over rock masses for the whole distance. Nevertheless, the acrobatic test was rewarded by the unusual sight, in the middle of the creek bed, of venerable-looking ancient kanookas, with great, gnarled boles covered in jungle creepers. The latter comprised Wombat Berry (*Eustrephus latifolius*), Scrambling Lily (*Geitonoplesium cymosum*), Austral Sarsaparilla (*Smilax australis*), Stalked Doubah (*Marsdenia rostrata*) and Twining Silkpod (*Parsonsia straminea*). Silvergrey lichen (*Usnea angulata*) covered branches and hung in large festoons, reminding one somewhat of Spanish moss on trees in Florida. Yellow-woods were prominent, bearing many of their typical white four-celled fruit.

The Den of Nargun, with its stalactites and stalagmites, was duly explored, and the pool below gave opportunities for photographers. A five-inch lizard and a four-inch frog disappeared from rocks nearby, oblivious of their capture for posterity on colour slides. No sign was seen however of the Eastern Water-dragon (*Physignathus*).

Despite a drenching thundershower, some members were able to see the mouth of Deadcock Creek and the picturesque banks and rushing rapids of the Mitchell River. One member found his way to the adjoining Bull Creek gorge, and had a glimpse



Den of Nargun, with its limestone formations and pool. (*Photo: F. G. Hosking*).

of a lyrebird. The Bairnsdale club is to be complimented on its production of a leaflet with a brief description of the Den of Nargun and a plan of the route to it.

That evening the geologists inspected a large number of mineral specimens, exhibited by Mr L. Lees, a member of the Bairnsdale club. Others walked along the beautiful town reach of the Mitchell River, with its eucalypts, silver poplars and willows.

Sunday, December 30—Early morning walks included bird-watching on McLeod's Morass, inspection and photography of a magnificent Illawarra Flame Tree (*Brachychiton acerifolium*) and Jacaranda in an East Bairnsdale garden, and inspection of the lovely gardens in Bairnsdale's Main Street.

The trip that day was to Freestone Creek, towards Briagolong; and the leader was Mr M. Elliott.

At "Wandana" cottage, on the banks of Freestone Creek, the party met Mr H. Jorgensen, the guide in a climb up Moornappa Hill. After lunch on the saddle, a further rather steep section led to the site of the Crystal Reef mine. This was started by Mr Jorgensen's father and uncle; then the See-it-out Company (a local syndicate) continued operations for eighteen months, but mining ceased in 1882.

In spite of another thundershower, some of the party completed the schedule by going down to Gladstone Creek for an attempt at gold washing. A dozen members had remained at Freestone Creek, a quietly beautiful spot, some botanizing successfully and others photographing wasps' nests under the verandah of a deserted house.

Return to Bairnsdale was via Briagolong, Stratford and Providence Ponds, where a halt was made to observe about five hundred Small Duck-orchids (*Caleana minor*) and a solitary Large Duck-orchid (*C. major*) on bare ground among eucalypts by the roadside.

Monday, December 31—A halt was made at Jemmy's Point, overlooking Lakes Entrance; then the route lay through Nowa Nowa to Buchan. There followed a very scenic drive around the hills, past many sink-holes in the limestone, to Murrindal. There rendezvous was made with Mr K. Rogers of Wulgulmerang, who was to lead the party to The Pyramids, and Mr and Mrs F. Robbins of the Bairnsdale F.N.C. Lunch was taken in a delightful rural setting, on the bank of the Murrindal River alongside the old Murrindal homestead, built of blocks of local limestone.

Mr A. McRae ran a shuttle-service with his Landrover, over the three-mile track from his home to The Pyramids, while private cars also carried augmented loads. Another goanna was observed near the end of the route, which led to an attractive, grassy, poplar-lined vale, with the group of limestone monoliths dominating the skyline.

It was a surprise to find a great sink-hole among those large residuals. The warm air trapped in this amphitheatre seemed to be relished by sub-tropical vegetation, including many Sweet Pittosporums. There

the river flows under the mountain for half a mile, emerging near the cliff recesses where recent discoveries of mammalian bones have been made (see *Vict. Nat. 77:* 164-78, 227-40, Oct. and Dec. 1960).

A curious sight was a kurrajong, five feet high and with a trunk diameter of four inches, growing near the top of one of the "pyramids", with not enough depth of soil for fuller development. One tiny seedling kurrajong was higher still, on the very top.

Mr Rogers, surrounded by resting climbers, gave an interesting talk, drawing on his great fund of local knowledge, both botanical and geological.

Tuesday, January 1, 1963—The party was farewelled from Bairnsdale by Messrs Barton and Nicholson. Another stop was made at Providence Ponds, for botanizing in the area of the duck-orchids. Mrs Z. Lee photographed a Spiny Spider attacking a fly in its web, and many watched a small insect trying to escape from an ant-lion's ingenious sand-trap.

The route back was via Stratford, Maffra, Tinambra, Heyfield and Glengarry, to Tyers, where the group lunched by a huge spreading oak, at the home of Miss Jean Galbraith. She proved a gracious hostess, and lovingly discussed many native plants in her garden. Mr W. Cane, well-known Maffra nurseryman, was there to give an interesting talk on his methods of striking eucalypt cuttings. It was pleasant, too, to renew acquaintances with Mr and Mrs D. Lyndon, who had motored from Leongatha for the occasion.

Field Naturalists Club of Victoria

Annual General Meeting—June 10, 1963

About one hundred members attended and Mr M. K. Houghton was in the chair.

The secretary announced that the new Governor of Victoria (Sir Rohan Delacombe) was pleased to become a patron of the F.N.C.V.

Nominations for delegates to the A.N.Z.A.A.S. conference in Sydney, January 20-24, 1964, were invited.

Mr E. H Coghill read a letter to the Vermin Destruction Board commending them on their promise to inquire into the dangers of 1080 poison killing native animals.

He then presented the annual report, which is printed in the June *Naturalist*. The report was adopted.

The treasurer, Mr A. G. Hooke, gave the financial report, also printed in the June *Naturalist*. The president thanked Mr Hooke for his work for the club.

Office-bearers and council members, whose names are set out on page 56 of the June *Naturalist*, were elected for 1963-64. Mr P. Kelly was elected assistant librarian, Miss A. Hooke was appointed to act as assistant secretary during the absence of Mr J. R. Hudson, and Mr W. P. J. Evans was re-appointed auditor.

The meeting carried a vote of thanks to the council for its splendid work during 1962-63.

The subject for the evening was the presidential address by Mr Houghton, "Excursion to the DIC tree". He outlined the heroic and tragic story of the Burke and Wills expedition of 1860-1861, centred around the Coolabah tree (*Eucalyptus coolabah*) on Cooper's Creek. He told of recent damage to the tree by campers' fires and termite infection, the decision of the Barrier F.N. Club to endeavour to preserve it, and of his part in the eventual air journey to Cooper's Creek and of work on the tree.

A fine map of the areas concerned, excellent colour photographs of the DIC tree, and trees and shrubs and the surrounding country (some taken of the arid landscape from the air) illustrated the talk, which was enthusiastically applauded by an appreciative audience.

Exhibits included White Stringybark (*Eucalyptus sealyna*), Forest Red Gum (*E. terraticornis*) and *Peziza aurantia* (a cup fungus), by Mr A. G. Hooke; *Amanita muscaria* (Fly Agaric) and a coral fungus, by Mr F. Zirkler; a large collection of fungi from Shoreham, by Miss M. Elder; a hermit crab from McCrae, by Mr E. R. Allan; and Mr. D. E. McInnes showed basalt road metal under polarized light, moss peristomes with dark ground illumination, and cheese mites —all seen with new club microscopes.

Mr McInnes appealed for someone with a truck to help convey material from the Brisbane Ranges to the September nature show.

Seventeen new members were elected. Their names appear in the June *Naturalist*, but two corrections are to be noted, namely, Mr William Brinsley (not Greensleeves) of Bathurst, and Mrs Mary Hogan of Brisbane.

Geology Group—June 5, 1963

Twenty-nine members were present, with Mr L. Angior in the chair. Mr R. Dodds reported on the excursion to the geology section of the National Museum on Saturday afternoon, May 5, when fifteen members attended. Mrs M. Salau outlined plans for the group's exhibit at the forthcoming nature show, when it is intended to feature the building stones of Melbourne. Mr R. Hemmy informed members that he was to conduct an excursion on the building stones of Melbourne, for the Frankston Field Naturalists Club on Saturday, June 29.

The subject for the evening was a discussion on earthquakes, volcanoes and igneous activity, by members. Mr R. Davidson opened the proceedings with a short talk on volcanoes, followed by Mr T. Sault who dealt with earthquakes. Miss P. Carolin then showed a collection of colour slides connected with the subject, most of them of Victorian localities. An interesting discussion followed aided by specimens and book illustrations.

Exhibits. Perlite, obsidian, leucite, pumice, pitchstone, stilbite, olivine in volcanic bombs, bomb with granite enclosed (A. Cobbett); flint from

Port McDonnell, scoria, polished arragonite (R. Davidson); graptolites from Gisborne area, limburgite, iddingsite, diopside, spinel (N. McLaurin); agates as collected and then polished (D. Jeffrey).

Microscopical Group—May 15, 1963

Nineteen members attended the meeting, which was chaired by Mr D. McInnes.

Mr McInnes informed the group that Dr R. Wishart had passed away during the month. The group felt his loss most acutely, as he was one of its most experienced microscopists of very long standing. As a mark of respect, the group observed one minute silence.

Mr W. Evans reported that those members who attended the meeting of the Ballarat F.N.C. were made most welcome and had a very enjoyable weekend.

The speaker for the evening, Mr E. Snell, by way of experiment set up his micro-projector using polaroid light and projected a great number of members' slides, the effect being both colourful and instructive. The first group were rock sections which Mr McInnes described, pointing out features such as crystal twinning. The second lot were chemical crystals which showed up with beautiful effect. Those of Mr W. Black, made with hippuric acid as well as some made with tartaric acid and sodium bicarbonate, were most attractive.

Mr. Snell was congratulated, and it was pointed out that this method of using the microprojector had great possibilities, especially for rock sections.

Entomology and Marine Biology Group—May 6, 1963

The meeting, which was chaired by Mr A. R. Lee, was attended by twenty-five members.

Mr J. C. Le Souef, president of the Entomological Society of Victoria, who has been an ardent collector of butterflies for many years, was the speaker for the evening. He enthralled members with a detailed account of his experiences on a butterfly collecting expedition to North Queensland last year. Some of the specimens taken were exhibited at the meeting, as well as moths and beetles collected on the same trip.

After his talk, Mr Le Souef an-

swered many questions from members, who will benefit by the advice he gave on the collecting and setting of butterflies.

Exhibits: A fine collection of marine specimens obtained by Mr M. Harrison on a recent dredging trip to San Remo, including a slate pencil urchin, starfish, various molluscs and some small fish.

Entomology and Marine Biology Group—June 3, 1963

Seventeen members attended the meeting, which was chaired by Mr M. K. Houghton. Mr R. Condron was elected chairman and Mr Strong was re-elected secretary for the ensuing year.

The speaker for the evening was Miss E. Macfie, her subject being "Minute Shells". She gave a very interesting talk on these, and many specimens were shown under microscopes with low power, among them being a beautiful little pheasant shell, the smallest of its family. At the conclusion of the talk, Miss Macfie answered many questions and was thanked by members.

Some preliminary discussion took place on the group exhibits for the September nature show. Mrs Z. Lee suggested a model of the foreshore with microscopes showing marine material.

Exhibits: Miss L. M. White had a basin of marine life which was viewed under a club microscope. This included *Galeolaria*, an assortment of small live molluscs, a small sponge, a species of marine worm and some very minute crustaceans.

Botany Group—June 13, 1963

The club president (Mr M. K. Houghton) took the chair and installed the officers for the ensuing year: Miss M. Lester (chairman), Mr V. S. Marshall (secretary) and Mrs M. Salau (programme steward).

The subject for the evening was "Aquatic Plants", by Miss H. Aston, whose talk proved to be one of the highlights of the year. Many species were on display, the speaker dealing with those plants wholly submerged and with the floating kinds. Informative books on the subject were exhibited and discussed, and many questions were answered.

Mr A. Morrison showed slides of the "Flower of the Month", several species of *Tetratheca*.

An excursion to Cranbourne was planned to study the heathland flora.

Fauna Survey Group—June 6, 1963.

Eighteen members and friends were present at the meeting, which was chaired by Mr N. A. Wakefield.

Labels for group equipment and markers for traps were discussed, samples of material were examined, and details decided upon so that these could be prepared.

Mr Wakefield told the group that several items had been recovered from amongst bone material at one of the levels in the Mabel Cave at East Buchan, which indicated that aborigines had used the place as a shelter.

Mr R. McCarthy reported observations near Kyneton, where he noted an increase in the kangaroo population but a decrease in possums.

Mr W. King commented on animals seen during a recent trip to the Yellingbo-Beenac area, with several members of the Ringwood club.

Two specimens of phascogale were received. They had been picked up, dead, along the track to Jacksons Crossing, on the Snowy River, north-east of Buchan, by Mr K. C. Rogers of Wulgulmerang.

Mr Wakefield reported on his recent visits to South and Western Australia and work done in museums there.

Reports from Affiliated Clubs

Maryborough F.N.C.

This club's annual report is to hand. The president for the coming year is Mr M. L. Courtney, and the secretary, Miss E. M. Thompson.

Regular meetings and excursions have been held, the visit of the F.N.C.V. being of special interest. In addition, this club continues to interest itself in local reserves, especially in association with the Western Victoria Association of Field Naturalists Clubs. It keeps a watchful eye on the Gosstick Reserve, and reports it to be in good shape though very dry at the time of writing.

Geelong F.N.C.

This young and flourishing club has forwarded its second annual report, recalling a year of great interest and progress, with good meetings and interesting excursions.

One of the highlights of the year was its association with the Geelong Trade Fair. The exhibit it prepared was praised on all sides.

This club has produced a membership badge based on the extremely rare Small Ant Blue Butterfly, found on the Cuthbertson block at Ocean Grove.

Mr T. Pescott continues as president, and Miss V. Boardman as secretary.

Latrobe Valley F.N.C.

An annual report is also to hand from this club, which is based in one of the state's most progressive districts.

The club is going through a period of development and has several important projects in hand, including an arboretum, beautifying an S.E.C. area, and there are schemes for several other reserves.

We notice that several of the year's excursions were held with other clubs, notably Bairnsdale F.N.C.

Mr K. Eldridge is the new president and Mr J. Belgrader of Moe the incoming secretary. We wish them an interesting and successful year.

Ouyen District F.N.C.

This club reports as follows:

We continue to make progress, with the addition of four new members at last month's meeting. Our secretary has resigned, following her marriage, and the new secretary is Mrs A. Eggleton of Hattah.

Our library continues to grow, with quite a good collection of reference books, covering many subjects. Some time ago we joined the film lending library, and our projectionist is always on hand.

We had an enjoyable outing on May 5, 1963, to a private aviary and sanctuary at Lascelles. There were numerous species of birds, many of which had been bred in captivity. It was an education, and it helped members to become acquainted with birds they otherwise would not encounter.

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

GENERAL MEETINGS

Monday, July 8, 1963—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, reports, announcements, correspondence.
2. Subject for Evening: "The Aborigines as they were", by A. Massola.
3. Election of Members:

Ordinary Members:

Mr David R. Collyer, 6 Nelson Street, South Caulfield. (Introduced by Mrs F. Curtis.)
Mr Edwin J. Dawes, 52 Outer Crescent, Brighton. (Interests: Botany, Microscopy.)
Miss Valerie Dickson, 8 View Point, North Kew.
Mr Donald A. Hall, 37 O'Heir's Road, Coburg. (Interest: Geology.)
Dr D. H. S. Horn, 10 Murray Drive, Burwood.
Mrs Patricia Sinclair, 22 Haldane Street, Beaumaris. (Interest: Geology.)

Country Members:

Mr Stanley S. Harris, Tarnook, via Daddaginnie. (Introduced by Messrs F. Harrison and H. A. Dade.)

Junior Members:

Peter A. Barton, 239 Somerville Road, West Footscray, W.7. (Interests: Birds, Mammals.)
Helen Pitman, 457 Whitehorse Road, Mitcham

4. Nominations for Membership.
5. General Business.
6. Nature Notes and Exhibits.
7. Conversazione.

Monday, August 12—"A Year in Antarctica", by M. Freeman.

F.N.C.V. EXCURSIONS

Sunday, July 21—King's Falls, Rosebud. Leader: Mr T. Sault. The coach will leave Batman Avenue at 9 a.m. Fare, 14/-. Bring one meal and a snack. Bookings with excursion secretary.

GROUP MEETINGS, ETC.

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

Thursday, July 11—Botany Group. Mr R. V. Smith: "Compositae".
Wednesday, July 17—Microscopical Group. "Yeasts", by Mr C. Sims.
Friday, July 26—Hawthorn Juniors. Hawthorn Town Hall, at 8 p.m. "Spiders", by Mr E. Swarbreck.
Thursday, August 1—Fauna Survey Group. At Fisheries and Wildlife Department, commencing at 7.45 p.m.
Monday, August 5—Marine Biology and Entomology Group. This group meets at 8 p.m. in Mr Strong's rooms at Parliament House. Enter through private entrance at south end of house.
Wednesday, August 7—Geology Group. Discussion by members: "Build of Australia".
Thursday, August 8—Botany Group. Mr A. B. Court: "Acacias", Part 2.

PRELIMINARY NOTICES

August 31-September 22—Western Australia. The coach will leave McKenzie's Depot, 53 Barker's Rd, Kew, at 7 a.m. on Saturday, August 31, and Flinders St, opposite Gas and Fuel Corporation at approximately 7.20 a.m. The main luggage should be left at McKenzie's on Thursday, August 29, and a small overnight bag containing necessities for the first two nights and three picnic meals should be brought on Saturday. Luggage is limited to 60 lb. and members are requested to avoid unnecessary bulk. Anyone who has not paid the full fare should do so immediately.

December 26-January 1—Mount Buller. Accommodation has been booked at Mount Buller for this period. Further details are to appear in the next *Naturalist*.

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2/6

September 1963, and the Nature Show

Both are almost here!

On Monday, Tuesday and Wednesday, September 9, 10 and 11, in the Lower Melbourne Town Hall there will be many fascinating exhibits of Natural History and a splendid display of Wildflowers and Shrubs from all over Australia, garden-grown by members of the Society for Growing Australian Plants. This Society is again co-operating with the F.N.C.V. in staging a particularly interesting Show, and features of their exhibit will be a comprehensive display from Maranoa Gardens, and a special exhibit by the Cultivar Committee.

The main display of the F.N.C.V. will be a scene from the open dry forest area, and of particular interest will be songs of the birds of this area, recorded by Mr Peter Bruce. Emphasis will be placed on the protection and preservation of members of the kangaroo family found in these areas, and the printed leaflet will deal with this aspect.

A special feature of the Show will be an exhibit of the F.N.C.V. Microscopes, showing **live** marine, pond and insect life, slides of all kinds and rock sections under polarized light.

The Botany Group is staging an exhibit on Acacias of Victoria. The geology exhibit will feature "Building Stones of Victoria", there will be a display by the Entomological Society of Victoria, others on "Tidal Zones", "Shells", "Nature's Odds and Ends", and the ever-popular show of **live** snakes, lizards and spiders.

We have an excellent selection of Nature films from the State Film Centre this year, and these will again be shown **free** to all attending the Show.

Members are asked to help the Show Committee by advertising the Show, and also by helping with the setting up and supervision. At the August General Meeting of the Club, forms will be handed around to be filled in by members, indicating at what times they will be able to help. The S.G.A.P. will staff the Show on the Monday night and the F.N.C.V. will do the same on the Tuesday night, thus avoiding the monthly meetings of the respective Clubs.

Our new Patron, His Excellency the Governor, Sir Rohan Delacombe, will visit the Show on Wednesday, September 11, at 2 p.m. It is hoped that there will be a very good attendance to give him a warm welcome.

Vol. 80, No. 4 August 8, 1963

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

This is a family of Pigmy-possums (*Cercartetus nanus*), that was found at Yackandandah, in north-eastern Victoria, in January 1963, when the young ones were still in the mother's pouch. The record is mentioned on page 105 of this issue of the *Naturalist*. (Photograph by courtesy, Fisheries and Wildlife Department.)

These columns are available each month for your nature notes and queries. Address your correspondence to the Editor, "Victorian Naturalist", P.O. Box 21, Noble Park, Victoria.

Fantails and Other Birds

The observation reported in the June *Naturalist*, from Mrs B. Strange of Ballarat, has brought the following notes from Mr A. H. Chisholm of Sydney:

It is not surprising to read that the Rufous Fantail was found nesting near Ballarat last year, for in December of 1960 a Maryborough resident and I found the same pretty species breeding near Daylesford. Both places are about the same distance (some 75 miles by rail) west and north-west of Melbourne, but Dayleford has, perhaps, a stronger claim on "Red Fan's" favour because, being on a spur of the Great Divide, its height above sea-level (2000 ft) exceeds that of Ballarat by about 600 feet, and it has a greater area of suitable habitat.

As to the question whether it is unusual for a nest of this species to lack a tail-piece, the answer is "Yes". Whatever the purpose of such a curious appendage (and possibly it simply serves to strengthen the structure), it may vary in size but only seldom is entirely absent.

The same point obtains with the Grey Fantail. Once, however, I saw at Toolern Vale a "Grey Fan's" nest that had no suggestion of a tail-piece, and yet it was situated in a somewhat wind-swept spot, at the unusual height of about 40 feet.

To our pleasure, we also found breeding in the Daylesford district three other species we had not anticipated meeting. These were the Olive Whistler, the Satin Flycatcher, and the Flame Robin, all of them birds with a strong partiality for cool and well-wooded spots. Personally, I had previously known the Olive Whistler and the Satin Flycatcher to nest on the heights at Ferntree Gully, but the only spot in Victoria where I had seen the Flame Robin breeding was in the far east.

In the Daylesford case, the robin's nest was situated in a crevice of a low bank beside a road; it was cosily built of shredded bark and other fibrous material, reinforced with soft lining, and contained three pretty eggs.

Surprisingly, a nest of this species had been found in the previous October (by Mr E. Rich) in a tree in dry open

forest a few miles from Maryborough. It was the first record of the kind for the district, though of course Flame-breasts are common enough thereabouts, in open fields, during winter.

I should add that the Olive Whistlers of the Daylesford area—and we heard several—frequently uttered, loudly and clearly, "I'll wet yoooooo", with the "oooo" gradually fading. Although quite impressive, this call is not so engaging as the dulcet "Pee-poooo" produced by Olive Whistlers of the McPherson Range (south-eastern Queensland) and to some extent by those of Tasmania.

Records of the Fly Agaric

These notes add two more records to the known distribution of our deadly introduced toadstool, *Amanita muscaria*. They are from Miss Jill Doble of Blackburn:

In May 1958 I came across several large specimens of the Fly Agaric beneath some old pines in a large vacant area in Nunawading, between Rooks Road and Mount Pleasant Road, just north of Nunawading South School. This year, on May 29, I returned to the area and found many specimens distributed over an extensive area. Many could easily be passed unnoticed since they were partly hidden by the tangled blackberry bushes under which they were growing.

On June 9, we were driving along Mount Pleasant Road, Eltham. At the top of the hill just after crossing Reynolds Road, my mother pointed out one of the large red toadstools growing quite close to the road, beneath a pine tree. On further investigation, we found three more which were still only in the "button" stage and hence less conspicuous, due to greater density of spots.

One can imagine our surprise at finding these specimens close to roads of the same name, some fifteen miles apart!

Since J. H. Willis summarized Australian records of the Fly Agaric, in February 1960 (*Vict. Nat. 76*: 265), there have been three further reports in this magazine. These appeared in April 1961, July 1961 and May 1962 (*77*: 254, *78*: 78 and *79*: 10).

The *Amanita* now has a general distribution from just east of Melbourne to the Dandenongs and the Upper Yarra, and there are reports of occurrences as far afield at Shoreham, South Gippsland, Narbethong, Mount Macedon and the Otway Ranges. It has also appeared in South Australia and Tasmania.

In most cases the agaric grew under pines, but other "host" trees were chestnut, birch, oak and spruce.

Leopard Seals on Victorian Beaches

This report comes from Mrs Ellen Lyndon of Leongatha:

On or about December 21, last year, a Leopard Seal, (*Hydrurga leptonyx*) was seen on the beach at Port Welshpool. The people who saw it, the Forester family of Berry's Creek, had no idea what it could be. The children pelted it with handfuls of wet sand until it returned to the sea. They remarked on its odd looping method of progression and took a home movie that was later shown at our local camera club. Again no one present was sure of its identity. The film was sent to the Fisheries and Wildlife Department for identification of the creature. Under the wet sand treatment the seal had hissed or snarled at its tormentors but otherwise departed without argument.

A further Victorian record of the species appeared in *Fur Feathers & Fins*, the Newsletter of the Fisheries and Wildlife Department. It reads as follows:

A dead leopard seal was washed ashore at Port Fairy recently. Unfortunately it was returned to the water before our Research Team could investigate the carcass.

The Pradu Tree Again

By W. L. WILLIAMS

[Following the recent description of the flowering of the *pradu* tree, a letter has come to hand devoted almost completely to further data about it. The writer, a recent vice-president of the F.N.C.V., is at present working at the UNESCO Regional Office for Education, in Bangkok.– *Editor.*]

The botanical name has been given to me as *Pterocarpus cambodianus*, but I couldn't at first reconcile an obvious legume with "winged fruit". The point is now clear however.

The little green fruits that I noted on the ground were abortive, possibly not even fertilized. A few remained to develop on the branchlets; some have since fallen, and each looks for all the world like a green thallus, about an inch in diameter. It is an oddly shaped pod, not at all elongate. As it grows, it develops a kind of sac hanging below the line from stem to apex, and this sac contains the seed.

If the pod ripens on the tree, it becomes dry quite soon, and looks like a buff-coloured poached egg, with the seed-chamber in place of the yolk. The whole thing may be an inch and a half across, and the edges of the pod (the "white" of the poached egg) become thin and fragile. Finally, as the pod falls, the frill decays and comes to resemble a skeleton leaf. The fringe of pod material, round the seed chamber, accounts quite reasonably for the name *Pterocarpus*.

The seed chamber is quite tough and fibrous. Most that I have opened so far have held only one seed, an elongated, brown-skinned "bean", broader at one end; but I did find one dried pod with three seeds.

I imagine that the seed would germinate without ejection from the pod, which finally rests on the ground, and that the root would penetrate the tough fibre as it begins to rot. I have hunted for young plants in vain. If the root does push down through the centre of the pod, the thallus-like appearance must become all the more remarkable.

A Navy man gave me an explanation as to why the *pradu* has been adopted as an emblem. Since all *pradus* flower together, they suggest to a ship's company that everything should be done as by one man.

I have been told, too, that the *pradu* is also known as the "teacher's tree", because it is said to flower on a Thursday, which is Teachers' Day in Thailand. This year, the first flowering took place on a Monday, but, to my surprise, a second flowering, ten days later and once more lasting not much longer than twenty-four hours, *did* take place on a Thursday (April 11). But I know perfectly well that no self-respecting scientist can admit fancy or superstition into the calculation.

I have managed to interest a number of very intelligent Thais in their *pradu* tree, and I shouldn't be surprised if one of them turns up with a newly germinated seed, but perhaps we shall have to wait for the rainy season, which begins as a rule in June. I wonder whether all *pradu* seeds germinate on the same day; that would be too much!

The Australian Pigmy-Possums

By N. A. WAKEFIELD*

The pigmy-possums are among the smallest of the Australian possum family, the Phalangeridae. Adults are about 3 to 4½ inches long in body, and the tail is usually somewhat longer. General body colour is grey or brown, with the under parts light grey or white. The tail is prehensible and, except for the well-furred basal half-inch, is practically naked. There is a dark patch about each eye; and in life the muzzle, ears, feet and tail are pinkish. The natural diet is restricted completely or almost so to nectar, insects and other arthropods.

Of the four Australian species, two have been placed in the genus *Cercartetus* and two in *Eudromicia* (e.g. by Troughton, 1957). However, for reasons set out in the Appendix to this paper, all four should be classified as *Cercartetus*. Furthermore, the pigmy-possum of tropical Queensland ("*Eudromicia macrura*") is not specifically distinct from that of New Guinea, and the two populations should be grouped together as *Cercartetus caudatus*.

Following are key features by which pigmy-possums may be specifically identified:

C. nanus attains about 8 to 9 inches (20-25 cm.) in total length. The posterior upper premolar (P^4) has two large well-separated triangular cusps.

In the following three species, P^4 is only slightly bilobed.

C. concinnus attains about 6 to 7 inches (15-18 cm.) in total length, and the belly fur is white right to the base. The posterior lower premolar (P_4) is a minute peg-like tooth.

In the following two species, and in *nanus*, under-fur is grey except at the tips, and P_4 is about as large as the neighbouring molars.

The two preceding species are distributed in temperate Australia, south of latitude 30°S, with *nanus* in the south-eastern part and *concinnus* in the central and western portions of this range.

Fourth molars are lacking in *nanus* and *concinnus* but are present in *lepidus* and *caudatus*.

C. lepidus attains about 6 inches in total length. It is confined to Tasmania.

C. caudatus is about as big as *nanus* in body but its exceptionally long tail gives it a maximum total length in excess of 10 inches (25 cm.). It occurs in north-eastern Queensland and New Guinea.

In both *nanus* and *lepidus*, much subcutaneous fat is accumulated seasonally, and both body and tail thicken conspicuously. There is little such fattening in either *concinnus* or *caudatus*.

In the group the normal number of mammae is four, but *concinnus* is exceptional in having six.

As regards vernacular names, *concinnus* is well suited with the aboriginal "Mundarda", and *nanus* is referred to simply as "Pigmy-possum". Long-tailed Pigmy-possum seems most suitable for *caudatus*, and Little Pigmy-possum equally appropriate for *lepidus*.

TAXONOMY

Cercartetus nanus

The species was originally described as *Phalangista nana*, by Desmarest in 1818, and the type specimen was collected on Maria Island, off eastern Tasmania, in February 1802. Péron (1807)

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describes its acquisition thus (in translation):

> I received a living individual in exchange for some trifles which I offered to a savage who was about to kill it to eat.

The specimen was subadult, and it is preserved in the Muséum d'Histoire Naturelle, Paris.

Adults of the Tasmanian form have a warm brown infusion in the general body colour and are yellowish on the sides and underneath. Bell (1829) included these points in his description of *Phalangista gliriformis*, the locality of which was simply given as "Australia". Though Tate (1945) suggested that the name may apply to the mainland form, there is no doubt that the original specimen was Tasmanian and that *gliriformis* is a synonym of *C. nanus nanus*.

On the Australian mainland the species escaped notice until Krefft (1863) described *Dromicia unicolor* from the North Shore area of Sydney. Subsequently, Jones (1925) described a specimen from Millicent, South Australia, as *Dromicia britta*.

Iredale and Troughton (1934) recognized both *unicolor* and *britta* as distinct subspecies. However, the specimens now available demonstrate that *nanus* is reasonably uniform and continuous in distribution from South Australia to far-eastern Victoria and thence north into New South Wales.

In general, the mainland Pigmy-possum is less brown and less yellow than the Tasmanian. The Australian population may be distinguished as *C. nanus unicolor*, with *Dromicia britta* as an equivalent synonym.

Cercartetus concinnus

The second species of the genus was originally described by Gould (1845) as *Dromicia concinna*, the type of which was from Swan River, Western Australia. Shortly afterwards, Waterhouse (1846) named *Phalangista neillii*, from King George's Sound. The latter is an equivalent synonym of the former.

Members of the Western population of *concinnus* are a dusky fawn-brown colour; and a sample of over seventy specimens in the Perth Museum averaged 165 mm. in total length, while fourteen of them were 180 mm. or more. This south-western group constitutes the nominate subspecies, *C. concinnus concinnus*.

The South Australian and Victorian population of the species is geographically isolated from that of Western Australia, and the two groups differ appreciably in morphology. The eastern population needs taxonomic recognition and is therefore designated as follows:

> *Cercartetus concinnus minor*, new subspecies. Differs from *C. c. concinnus* in (a) smaller size; (b) nasals shorter in proportion to length of skull; and (c) distribution east of Great Australian Bight. *Holotype:* Male; Nurcoung, 10 m. NW. of Natimuk, Vic.; Sept. 1962; F.W.D., No. 328.

Measurements to date indicate that the total length of *C. c. minor* does not exceed 175 mm. and averages about 6 per cent less than in *C. c. concinnus*. Cranial measurements are set out in Table 1.

Older individuals of *minor* sometimes become warm red-brown in general body colour, a

TABLE 1

Cranial details of *Cercartetus concinnus*. (In mms, averages in parenthesis)

	C. c. concinnus Data of 21 spms., West. Aust.	*C. c. minor* Data of 18 spms., S. Aust. and Vic.
Basal length (B.L.)	17.9-20.1 (19.0)	16.8-19.4 (18.0)
Zygomatic width (Z.W.)	14.0-14.9 (14.3)	13.2-14.8 (13.6)
Z.W./B.L. (as percentage)	73.6-78.7 (76.1)	74.0-80.0 (76.7)
Nasals, length (N.L.)	7.8-9.4 (8.6)	7.2-8.4 (7.9)
N.L./B.L. (as percentage)	44.0-48.7 (45.7)	40.7-45.6 (42.8)
Molars (M^1-M^4), alveolar	2.4-2.8 (2.6)	2.4-2.8 (2.6)

feature that has not been noted amongst the western race.

Cercartetus lepidus

Thomas (1888) described the species, as *Dromicia lepida*, using a specimen which reached the British Museum in 1852. Now confined to Tasmania, the population there comprises the nominate subspecies, *C. lepidus lepidus*.

Fossil and sub-fossil remains of the species have been identified from the Australian mainland. Though this material is to be studied in detail, it is probably insufficient to demonstrate the subspecific variation that might be expected from the Tasmanian form.

Cercartetus caudatus

The species was described, as *Dromicia caudata*, by Milne-Edwards, in 1877, from the Arfak Mountains of far north-western New Guinea. Tate and Archbold (1937) published data of four specimens from Central Papua and three from the Huon Peninsula of north-eastern New Guinea, and commented on the smaller teeth of the former series.

Laurie (1952) tabulated details of eleven specimens from various localities in north-eastern New Guinea and three from eastern Papua. She noted that the colour of pelage of all specimens was very similar but that two from one north-eastern locality (Bubu River) were larger than the others and compared with Tate and Archbold's central Papuan group.

In eastern New Guinea, the Long-tailed Pigmy-possum is warm red-brown in general body colour, with the under parts cream-buff and the eye-patches black.

No detailed information is available about the north-western population represented by the type specimen of *caudatus*, and this originated 800 and more miles from the loci of the New Guinea specimens of which there are reasonably full data. In the circumstances, all the New Guinea populations of the species must be tentatively grouped as *C. caudatus caudatus*.

In the original description of *Eudromicia macrura*, from north-eastern Queensland, Mjöberg (1916) stated that its body was much longer but tail shorter than in *caudata*. However, for the two Queensland specimens of which he published measurements, the tail averaged 152 per cent of the head-body length; and exactly the same average percentage is obtained from the measurements given by Laurie

TABLE 2

Cranial details of specimens of *Cercartetus caudatus*
Measurements in millimetres, averages in parenthesis

	C. c. caudatus					*C. c. macrurus*			
	Type, Arfak Mts., after Thomas.	*Data of 4 spms., eastern New Guinea, summarized from Tate and Archbold.*	*Data of 2 spms., Baiia River, after Laurie.*	*Data of 11 spms., eastern New Guinea, summarized from Laurie.*	*Spm., Mt. Giluwe, C.S.I.R.O., No. E.M. 523*	*Spm., Jordan Cr., Q. Mus., No. J. 657.*	*Spm., Tinaroo, A.M., No. M. 5133*	*Spm., A.M.N.H., No. 35690.*	*Type, Cedar Cr., after Ogilby.*
Basal length (B. L.)	24·4	24·6–26·2 (25·4)	25·2, 25·8	22·6–25·1 (23·9)	23·3	21·8	23·2	24·6	25·5
Zygomatic width (Z. W.)	18·0	16·3–18·0 (17·4)	17·6, 18·0	15·4–17·1 (16·1)	15·6	16·3	17·2	17·3	20·0
Z. W./B. L. (as percentage)	73·9	65·9–69·6 (68·5)	69·8, 69·8	66·1–69·9 (67·4)	67·0	75·8	74·1	70·3	78·4
Interorbital width	5·7	5·4–5·6 (5·5)	5·4, 5·2	5·0–5·7 (5·3)	5·2	5·1	5·4	5·1	6·0
Nasals, Length	11·0	—	11·7, 11·5	10·5–12·1 (11·4)	11·1	10·2	11·4	11·6	11·0
Nasals, width	4·2	—	3·0, 3·9	3·0–3·9 (3·7)	3·3	3·8	3·9	3·7	4·3
Palate, length	14·6	14·9–15·7 (15·3)	15·6, 15·5	13·8–15·5 (14·7)	14·6	12·6	14·4	14·9	—
Anterior palatal foramina	—	2·2–2·6 (2·4)	3·4, 3·1	2·0–2·4 (2·1)	2·0	2·1	2·0	2·5	2·0
Molar row (M^1–M^4)	4·6	4·3–4·7 (4·6)	4·6, 4·6	4·1–4·5 (4·3)	4·7	4·1	4·2	4·2	—
Bulla, length	—	—	—	—	4·7	5·0	4·7	5·0	—

(*l.c.*) for thirteen New Guinea specimens.

(When a summary was made of published measurements of *caudatus*, it was noted that increase in body length often seemed to be coupled with decrease in tail length, indicating lack of conformity in measuring techniques rather than actual variation in the species.)

Tate (*l.c.*) noted that the type of *macrurus* was smaller than one of his Papuan specimens of *caudatus* and that it had larger bullae and larger anterior and posterior palatal foramina, but was otherwise the same. These differences are not supported in the series of specimens now available.

Cranial details of the Long-tailed Pigmy-possum from Queensland and New Guinea are set out in Table 2. The two groups are virtually identical in all measurements except zygomatic width. In the four Queensland specimens, the width of the skull is over 70 per cent of the basal length, whereas in 18 out of 19 New Guinea specimens it is under 70 per cent.

Compared with the New Guinea animal, the Queensland pigmy-possum is much lighter in

colour. The general body colour is light chocolate-brown, with the under parts whitish-grey and the eye-patches brown.

The Queensland population should be subspecifically distinguished as *C. caudatus macrurus*.

Distribution and Habitat

Cercartetus nanus nanus

Of the seventeen specimens of *nanus* held by the B.M. (British Museum (Natural History)), sixteen are from Tasmania. Fifteen of these were collected between 80 and 140 years ago and their precise localities are not recorded; the other is from Hobart and was acquired in 1929. (The seventeenth is a mainland specimen, the type of *Dromicia britta*.)

The N.M.V. (National Museum of Victoria) has five specimens of *nanus* from Tasmania but none of them has exact locality data. Four were acquired in 1872 and the other in 1923. In the A.M. (Australian Museum, Sydney), there are six Tasmanian specimens, three of which were acquired in 1877 and three between 1915 and 1920, but again with no locality data.

In the Queen Victoria Museum, Launceston, there are six specimens of *nanus*, one from Magnet near Waratah in 1900, and the others from Launceston, Westbury district, and Fury Gorge near Cradle Mountain, within the past three years. The Tasmanian Museum, Hobart, has a specimen from Cloudy Bay, Bruny Island.

Hickman and Hickman (1960) reported finding two specimens of *nanus* at 3000 feet elevation on the slopes of Mount Wellington, in 1957. Each had burrowed down into the rotted centre of a dead stump but no material had been carried in for nest-making.

Gould (1846) was able to state that *nanus* was "abundant . . . in Van Diemen's Land, particularly in the northern parts of the island." In contrast with that, reports from both local museums indicate that it is now rare in Tasmania. These details suggest a marked decline in the status of the Tasmanian population of *nanus* during the past century.

There is very little information about habitats of the species in Tasmania. The Magnet and Fury Gorge specimens were caught in wet sclerophyll forests of beech (*Nothofagus*), and those from Bruny Island and Maria Island were presumably in dry sclerophyll forests.

Cercartetus nanus unicolor

On the Australian mainland, little indeed was known of *nanus* until the present century. Thomas (*l.c.*) suggested that Krefft's Sydney specimens were escapees which had originated in Tasmania. However, Broom (1896) reported finding jawbones* of the species in the Wombeyan Caves area of New South Wales, and he was most emphatic that both they and Krefft's specimens represented a modern mainland population. A specimen reached the A.M. from Jindabyne in 1903, and another was sent in from National Park, south of Botany Bay, in 1925.

Chaffer (1930) reported finding a specimen of the Pigmy-possum in French's Forest near Sydney in July 1929. It was in

* Specimens now in A.M. (No. S.566).

the lining of a nest of the Yellow-winged Honeyeater (*Meliphaga novae-hollandiae*), in an area of "banksias, dwarf angophoras, grevilleas, stunted eucalypts and numerous small flowering shrubs". The animal escaped after being photographed. The report, and a picture, appeared also in the *Victorian Naturalist* in May 1930 (Vol. 47, pp. 18-19).

The habitat of Chaffer's Pigmy-possum was apparently the same as that of Krefft's original specimens of *unicolor*, which were "captured near St. Leonard's, North Shore, Sydney, feeding upon the *Banksiae*".*

Marlow (1958) gave data of several subsequent specimens from the Sydney-Blue Mountains area, and of one from near Newcastle. The last was collected in 1958 and constitutes the northernmost record of the species. An additional A.M. specimen, from Bowral (1939), and that from Jindabyne, indicate the continuity of the eastern New South Wales population with that of Victoria.

A specimen had been collected at Western Port, Victoria, in 1880, and the species was included in a list of Victorian mammals by Forbes-Leith and Lucas (1884), as *Phalangista glirformis*. Other early Victorian records are an adult from Muckleford, near Castlemaine, in 1886, and two juveniles from Mordialloc in 1887. These four specimens are in the N.M.V. as are others from Avoca (1918), Buangor (1935), Portland (1946), Erica (1947), Wilson's Promontory (1950) and Mount Lock (1952). The last was from 5400 feet elevation.

In the November 1947 issue of *Wild Life* magazine (Vol. 9, No. 11, p. 418) there are several excellent photographs of the Erica animal. It was found "in a messmate log that was being sawn at the State sawmill". As the log may have been hauled from many miles away, the origin of the specimen is not known.

The F.W.D. (Fisheries and Wildlife Department of Victoria) has three specimens of *nanus* which were collected in the Portland district, about 1945, 1957 and 1959; and in 1948 two were received at the A.M. from the same area. The forest there is of Brown Stringybark (*Eucalyptus baxteri*) and other eucalypts, with considerable areas of dense shrubbery including many species of the Myrtaceae and Proteaceae.

In January 1958, two subadult Pigmy-possums were inadvertently brought away in clothing from a cottage at Tamboon Inlet, in the Cann River district of eastern Victoria. The species is abundant there, in the forest of Mahogany Gum (*Eucalyptus botryoides*), banksia (*B. integrifolia, B. serrata*) and thickets of shrubbery, and several have been seen in local holiday houses. The two specimens were placed in the N.M.V., and one other has subsequently (1962) reached the F.W.D. from Tamboon.

In early 1958, I caught a subadult Pigmy-possum near Mallacoota, in a trap set on the ground in a runway used by bush rats (*Rattus assimilis*). The general vegetation was dry sclerophyll forest, but the actual spot was in tree heath, with an abundance

* Troughton (*l.c.*) wrongly attributes this observation to Gould.

Figure 1: Subadult Pigmy-possums, *Cercartetus nanus*, from Rushworth Forest, Victoria. The branch is Yellow Gum, *Eucalyptus leucoxylon*.

of Spear Grasstree (*Xanthorrhoea hastilis*), numerous sedges, heaths, myrtaceous shrubs, and a scattering of Silver-leaf Stringybark (*Eucalyptus cephalocarpa*). The animal was photographed and released.

The F.W.D. has two recent specimens from Mallacoota (1962, 1963), and one from Nowa Nowa (1960). These records, together with further reports of the species in holiday homes at Cape Conran, near Orbost, indicate its abundance in the coastal vegetation of East Gippsland.

Inland records are more scattered. In the Ballarat district, *nanus* is reported to occur only in a few well-separated places, in Snake Valley and the Grenville area. This information comes from E. G. Bedggood, who is a local fuel merchant and a reliable observer. He and his associates regularly find families of phascogales (*Antechinus*) and Pigmy-possums when shifting wood-stacks which have been drying in the bush for two or three years. But whereas the phascogales are widespread, the Pigmy-possums are localized. There is a medium to dense element of shrubbery in most areas concerned. Two Snake Valley specimens of *nanus*, dated 1961 and 1962, are in the F.W.D. collections.

From other inland stations, the F.W.D. has a specimen from the Rushworth Forest (one of four found in a hollow tree in 1961), a group from Yackandandah (1963), and photographic record of a specimen from Whitlands, 3000 feet up in the highlands of north-eastern Victoria.

The last was found by a timber-getter in October 1958 and was kept in semi-captivity for over four years. It was in quite good health up to the time of its death, by accidental drowning. As it was fully adult when first obtained, and presuming that early spring is the breeding time of the species, this individual lived to an age of at least 5½ years, and it would probably have lived considerably longer.

In total, there are only about forty records of *nanus unicolor*.

All are from general areas of dry sclerophyll forest, and about half are from very close to the coast. This form appears therefore to be widely scattered but uncommon in the highland forests of Victoria and south-eastern New South Wales, and it is apparently less rare in contiguous densely scrubby coastal forests.

Sub-fossil data, discussed on page 113, and Tasmanian records, indicate that, whereas *nanus* does occur both in wet sclerophyll forest and in dry, it prefers the latter habitat.

The Pigmy-possum is lacking from the savannah formations of central Gippsland and of the Western District of Victoria, and from the woodlands of the Monaro district of southern New South Wales. The extensive woodland formation of inland New South Wales and northern Victoria, which extends west to the extreme corner of South Australia, apparently forms a general barrier between *nanus* and *concinnus*.

A pigmy-possum has been reported from McKenzie Creek in the north-western part of the Grampians, but it was not identified. It was probably *nanus*, for sub-fossil remains of this species have been found in the Black Range, slightly further west (unpublished data). But these two places are within twenty miles of the nearest known locality for *concinnus*, and the Grampians constitute an island of forest between the general areas of the two species. They may be sympatric there.

Cercartetus concinnus concinnus

The nominate subspecies is represented in collections by at least 180 specimens, almost all of which are in the Western Australian Museum. These show that the form has a general distribution in the south-western corner of the continent, as far north as Moora, inland to Bulong near Kalgoorlie, and east to Belladonia.

Glauert (1933) recorded that it extended north to Sandstone; but there appears to be no specimen to support this, and the locality is in an area of unsuitable climate and vegetation some 200 miles north of the normal habitat of the form.

Lundelius (1957) found sub-fossil remains of *concinnus* in "surface material" of the Murraelellevan Cave, 4½ miles west of Cocklebiddy Tank on the Eyre Highway. He postulated that the "topmost one foot" of this and several other cave deposits indicated modern distribution of species found therein. However, recent work in Victorian caves (e.g. Wakefield, 1963) has brought to light exposed surface material that evidently dates back several thousand years.

The Mundarda is abundant in the Jarrah forests (*Eucalyptus marginata*), where there is an undergrowth of sclerophyllous shrubbery containing many of the Myrtaceae and Proteaceae. This formation occurs in a broad band southward from the Swan River to the Blackwood and thence south-easterly towards Albany. In the coastal strip west of the Jarrah country, the possum occurs in the Tuart forest (*E. gomphocephala*) in scrubby areas rather than the true savannah formation. In the extreme south it is absent from the forests of Karri (*E. diversicolor*), where

Figure 2:

Specimens of Mundarda, *Cercartetus concinnus*, from between Kiata and Little Desert, Victoria, 1962. The plant is Desert Banksia, *B. ornata*.

the rainfall exceeds 40 inches per annum.

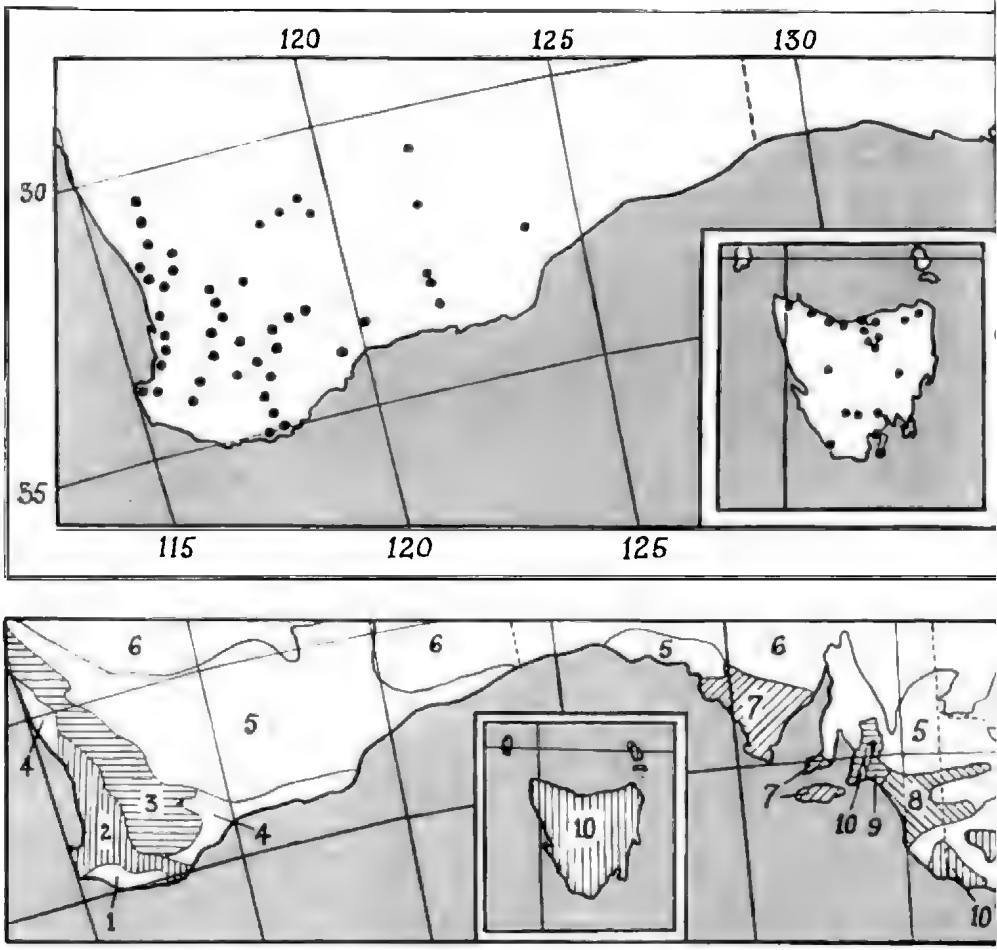
Inland from the Jarrah country, the woodlands dominated by Wandoo (*E. redunca*) do not suit the species. However, within this general Wandoo zone there are areas of a related eucalypt (*E. accedens*), as well as of species of Mallet (*E. astringens, E. gardneri*, etc.), which are accompanied by dense undergrowth suitable for the animal. These Mallet formations extend eastward, well into the general areas of mallee scrub.

The heathland formation, with its abundance of Proteaceae, Myrtaceae and other nectar-producing plants, provides ideal food for *concinnus* but living places are apparently few or lacking. The species is therefore rare or absent from the near-coastal heaths west of Moora, and from the coastal belt between Albany and Israelite Bay. However, in the transitional areas, between heath and woodland or mallee, eucalypts provide homes and conditions are ideal. Alternation of this kind is frequent in the 15-20 inch rainfall zone centred to the north of Albany, and occurs with diminishing frequency as one moves easterly into the drier mallee. At the known limit of the species, the average rainfall is approximately 9 inches per annum.

Neither the drier mallee nor the more northerly mulga bush formations are suitable for the possum; these lack sclerophyllous shrubbery.

The vegetation has been described here in terms used by Gardner (1942), in a lengthy treatment of Western Australian vegetation.

In the terms of Wood and Williams (1960), *concinnus* occurs in the Western Australian sclerophyll forest, sclerophyll shrub woodland, tree heath and sclerophyll mallee; and it is lacking from wet sclerophyll forest, heath, low layered woodland and semi-arid mallee. Therefore it is abundant in the Perth-Albany district, where the necessary formations are dominant, and it becomes rare further east as these formations comprise progres-



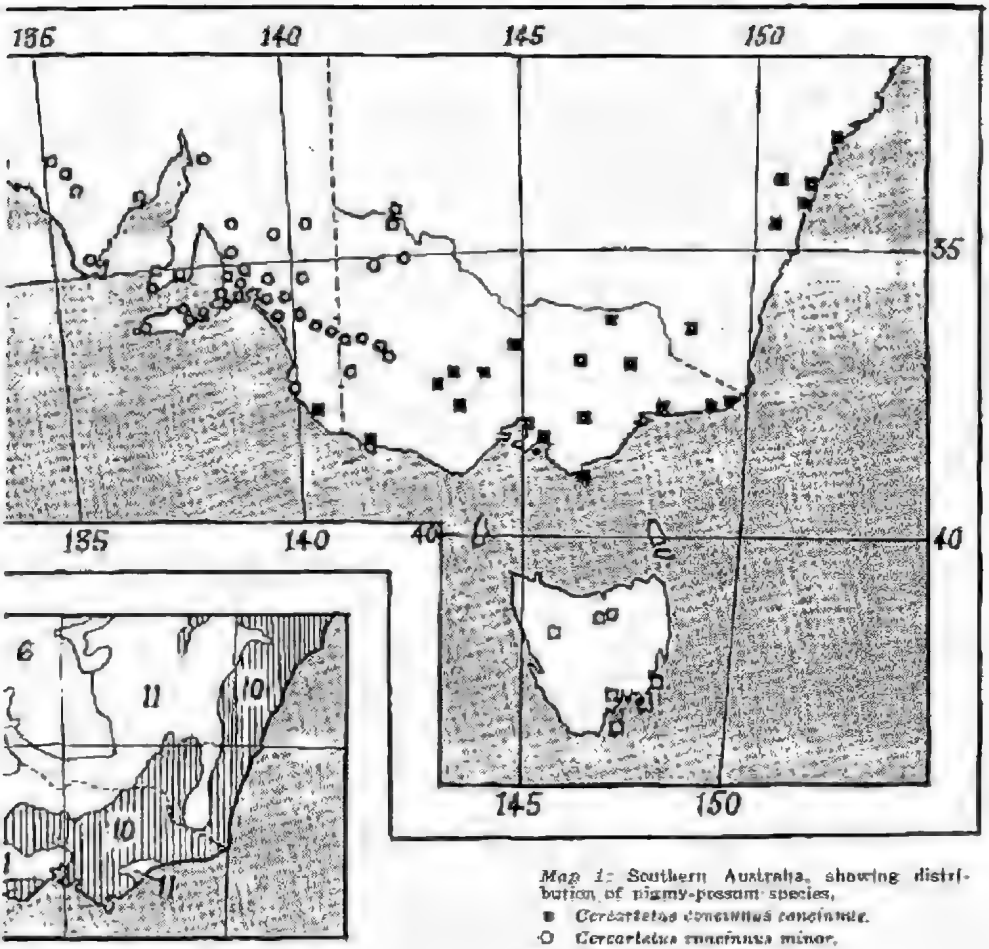
Map 2: Southern Australia, showing general vegetational zones. (Modified from Wood and Williams.)

1. Karri forest.
2. Jarrah forest—Tuart forest.
3. Wandoo forest—sclerophyll mallee.
4. Heath.
5. Semi-arid mallee.
6. Mulga—saltbush.
7. Sclerophyll mallee.
8. Heath-mallee complex.
9. Woodland (South Australia).
10. Dry sclerophyll forest, with some admixture of wet sclerophyll forest, alpine complex and rainforest.
11. Woodland—savannah—grassland.

sively less of the general vegetation.

Cercartetus concinnus minor

There are over 120 museum specimens of the Mundarda from South Australia. About a hundred of these are in the South Australian Museum, but in a number of cases are without record of locality. Last century, the form was known from near Adelaide and as far afield as the Renmark and Port Pirie districts and Kangaroo Island. Early in



Map 1: Southern Australia, showing distribution of pigmy-possum species,
■ *Cercartetus concinnus concinnus.*
○ *Cercartetus concinnus minor.*
■ *Cercartetus nanus unicolor.*
□ *Cercartetus nanus nanus.*
Inset—*Cercartetus lepidus.*

the present century, the collection of further specimens extended its known range to Port Lincoln on the Eyre Peninsula, west to Ceduna on the Great Australian Bight, and into the south-eastern region between the Coorong and the Victorian border.

During the past forty years, material has continued to come in regularly from these general areas of distribution.

The range of *concinnus* in Victoria is mainly demonstrated by some 17 specimens in official collections. The earliest of these are three juveniles, found at Underbool in 1910 by A. H. E. Mattingley. The circumstances of this discovery were discussed by LeSouef and Burrell (1926), but the animals were wrongly identified as *Dromicia nana*.

The Underbool specimens were placed in the N.M.V., and the following year two adults of the

same species arrived there from the Ouyen area. In 1937, a specimen from Serviceton, Victoria, was sent to the South Australian Museum and was correctly registered there as *concinnus*. A further adult specimen reached the N.M.V. from Edenhope in 1952, and two went to the A.M. from Mildura in 1955 but were registered as *C. nanus*. In these circumstances, the species was not credited for Victoria by Bruzenor (1950), or in any edition of *Furred Animals of Australia* (e.g. Troughton, 1956).

The Victorian occurrence of the species was well known to naturalists from the early 1930s onward, and K. V. Hateley of Kiata was responsible for the first published details of the species as a native of the state. These appeared in Wimmera district newspapers—the *Horsham Times* of September 14, 1955, and the *Kaniva Times* of November 14, 1955. The reports were of an animal found near Nhill; it was illustrated by a close-up photograph and correctly named "the south-western pigmy possum", and "*Cercartetus concinnus*". The specimen was taken from a babbler's nest in a *Melaleuca* shrub, in *Eucalyptus baxteri* country, two miles SW. of Mount Elgin. It was collected on September 25, 1955, and is now in the collection of the F.W.D.

Ryan (1963) reported finding a specimen in a babbler's nest in the fringe of the Little Desert near Kiata in December 1961, and at the same time summarized data of certain N.M.V. specimens. Ryan ascertained that a "Mildura" specimen (No. C.2848, collected by W. Roberts in early July 1958) had originated at Trentham Cliffs, on the north side of the Murray River, thus establishing that *Cercartetus concinnus* is native in New South Wales.

During 1962, besides the type from Nurcoung, the F.W.D. received examples of *concinnus minor* from Worrigworm, Bridgewater's Corner and Winiam, three localities between Kiata and the Little Desert. (See Figure 2.)

Mattingley's Underbool specimens were found in a nest of leaves in a hollow mallee trunk, and a similar home was noted at Padthaway, 30 miles north of Nuracoorte (R. Attiwill, *in litt.*, 2.6.1962). Several have been located in disused nests of the Grey-crowned Babbler (*Pomatostemus temporalis*), particularly about the Little Desert.

On October 20, 1958, a pupil of the Stewart school found three in the nest of a Zebra Finch (*Taeniopygia castanotis*) in a roadside clump of mallee about three miles from Red Cliffs. These were released, but the record is substantiated by clear colour photographs taken by A. R. West of Red Cliffs. Another pictorial record of the species is held by A. J. Hicks of Kaniva, of a specimen found at Sandsmere, nine miles NE. of Kaniva, in about 1957.

C. O. Kroker of Horsham has a series of excellent photographs, both in half-tone and colour, of specimens of *concinnus* found at Nurrabiel, about 16 miles SW. of Horsham, in December 1957. An adult pair and one subadult, these were released at the Wail Forest Nursery and may be ancestors of a subadult which

Figure 3:
Habitat of the Mundarda, *Cercartetus concinnus*, on the fringe of the Little Desert, near Kiata, Victoria. The foreground shrubbery is *Banksia ornata* and *B. marginata*, with *Eucalyptus incrassata* behind, and *E. baxteri* in the background.

reached the N.M.V. from the nursery in December 1961.

A specimen is reported (G. B. Eggleton, *in litt.*, 7.4.1962) to have been caught at Lascelles and released at Hattah Lakes; and K. Hateley habitually takes victims of clearing operations in the Kiata area to the local Lowan Sanctuary. These commendable conservation activities should be noted in connexion with future considerations of natural distribution.

The status of *concinnus minor* in local vegetation formations is similar to that of the western race.

The Mount Lofty Ranges carry dry sclerophyll forest, with Messmate (*Eucalyptus obliqua*), Brown Stringybark (*E. baxteri*), Long-leaf Box (*E. elaeophora*) and various myrtaceous and proteaceous shrubs. The surrounding woodlands give way in places to suitable habitats of sclerophyllous shrub vegetation. Sclerophyll mallee originally covered most of the Eyre Peninsula, Kangaroo Island, and the extremity of the Yorke Peninsula; and it contributes, with tree heath and mallee heath, to a complex vegetation which extends eastward from the Coorong to the Victorian border and beyond. The same mixture provides the ideal *concinnus* habitat in the vicinity of the Little Desert and Big Desert of Victoria's Western Wimmera. A typical situation is where sand ridges with Brown Stringybark and banksia give way on the one hand to tree heath and on the other to a mallee association of *Eucalyptus incrassata, Melaleuca uncinata* and numerous small shrubs. (See Figure 3.)

In the Victorian Mallee and the Murray River district of South Australia, to the east of Spencer Gulf, and towards the

eastern end of the Great Australian Bight, there are tracts of semi-arid mallee where the main eucalypts are *E. oleosa*, *E. pileata* and *E. dumosa*. The Mundarda occurs sparsely in these general areas, but in places where less arid conditions allow the development of considerable sclerophyllous shrubbery. As in Western Australia, the limit of distribution of the species in these eastern mallee areas is about the nine-inch annual isohyet. The Mildura-Renmark tract of the Murray River lies approximately along this line.

The species is probably absent from the pure heath formations of the Victorian "deserts", and again, in inland South Australia, it does not reach the low-layered woodland (mulga scrub).

Map 1 shows the distribution of the subspecies of *nanus* and *concinnus*, and its inset shows localities for *lepidus*. Map 2 is of general vegetation types discussed in this paper.

Like *nanus*, the Mundarda is not averse to appropriating man-made homes. Near Kiata, one was found under a bag on the seat of a tractor. At Keith, S.A., they are reported to take up abode occasionally in the tubular seed drills of wheat planters. And, on a farm near Meningie, L. D. Williams observed (*in litt.*, 5.5.1961) that *concinnus* was found "often under stumps and on a couple of occasions in the piping of a disused windmill".

Sometimes the little animals come to grief in man-made objects. A Portland district Pigmy-possum (*nanus*) was trapped in a petrol tin, while another was drowned in a rain-gauge at Mallacoota. And R. H. Hobson reports (*in litt.*, 2.4.1961) that a specimen of Mundarda was drowned in a billy hanging on a fence under a gumtree at Yaapeet in the southern Mallee.

Cercartetus lepidus lepidus

Of this form, there appear to be only three museum specimens which date back to last century (all in the B.M.), but a total of over fifty have reached various museums during the present century. In the past sixty years the B.M. acquired eleven, the Hobart Museum received twelve from 1920 onward, and all twenty specimens at the Launceston Museum were registered during the past thirty years.

These details indicate that, in contrast to *nanus*, the status of *lepidus* has changed from rarity to abundance during the past hundred years. The decline of the one, and the re-establishment of the other, are most likely due to the marked changes in vegetation brought about by the periodic forest fires that have occurred in Tasmania ever since European settlement there.

The Little Pigmy-possum has been recorded in various near-coastal parts of northern Tasmania from Smithton to the Derby area, at Lake St Clair, Campbell Town and the Florentine Valley in central districts, and as far south as Port Davey and Bruny Island.

A little information is available about the habitat of *lepidus*. A story was told by Skemp (1950) of one brought to light by a road patrol-man "shelling dry bits from an old log by the roadside" at the Sideling, west of Scottsdale. That is heavily forested country, about 2000 feet

Little Pigmy-possum, *Cercartetus lepidus*, from Moogara, Tasmania, 1962.

above sea level, with an annual rainfall of about sixty inches.

Hickman and Hickman (*l.c.*) reported that they obtained two specimens near a creek in a heavily timbered valley at the foot of Mount Wellington, one in 1956 "curled up in a small cavity in the broken end of an exposed root of a fallen tree", and the second in 1957 in a "small dome-shaped nest of bark fibres . . . inside a broken hollow branch of a fallen tree."

R. H. Green (*in litt.*, 15.3.1962) told of one in the Tamar area with a small bark fibre nest "inside the barrel of a green gum sapling, the centre of which had rotted away", and a pair "turned up among turf sods when an old fallowed paddock was being cultivated".

C. lepidus (Mainland)

Ride (1960) identified several fossil specimens of *lepidus* in limestone breccia from Wombeyan, eastern New South Wales. He considered their age to be Upper Pleistocene and probably from the period since the last pluvial. In the breccia, more specimens of *nanus* were found than of *lepidus*.

Wakefield (1960) reported both species in a sub-fossil deposit at the Pyramids, near Buchan in eastern Victoria. Again *nanus* was much more plentiful than *lepidus*. Analysis of the Pyramids material indicates that, as *lepidus* declined in status and eventually disappeared, *nanus* became even more abundant. This development appears to have been linked with a vegetational change in the locality from wet sclerophyll forest to dry sclerophyll forest, between the latest Pleistocene pluvial period and a mid-Holocene arid period.

Cercartetus caudatus caudatus

The specimens dealt with by Tate and Archbold (*l.c.*) and Laurie (*l.c.*) indicate a general distribution from the extreme east of New Guinea to at least as far west as the Bismarck Ranges of north-eastern New Guinea and the Central Division of Papua. Presumably the species occurs also between these places and the type locality, but there is no information available to confirm this.

Laurie's animals came mainly from country between about 6000 and 8000 feet above sea level. Tate's Papuan specimens were from 3100 feet elevation, but the height he gives for the Huon Peninsula locality (3700 metres) is obviously an error.

C. caudatus macrurus

There are only eight museum specimens of the Queensland race of the Long-tailed Pigmy-possum, all from within fifty miles of Cairns.

Mjöberg obtained three males and a female "in tropical jungle near Cedar Creek on the Atherton Tableland" in April 1913. They were "lying rolled up close together". These four are in the Swedish State Museum, Stockholm.

The Queensland Museum has two specimens. No. J.6571 was found, as a skeleton, in a nest at Jordan Creek near Innisfail. No. J.7011 was brought in by a cat, in May 1944, at Mount Carbine near Molloy.

The A.M. has a specimen (No. M.5433) which Troughton (*l.c.*) says was found "in a small dome-shaped nest . . . of grass . . . twelve feet from the ground in a tree in the scrub at Tinaroo". It was collected in 1908 but not identified until recently.

The American Museum of Natural History received a specimen (No. 155090) from the Atherton Tableland in 1948.

There is no indication as to whether or not the nests mentioned here were in hollows or that they had been made by the pigmy-possums. Nothing is known of the habits of this Queensland group.

APPENDIX: GENERIC TAXONOMY

For three-quarters of a century the genus name *Dromicia* Gray was in use for several small possums. This included four pigmy-possum species—*nana*, *concinna* and *lepida* of southern Australia, and the New Guinea *caudata*.

Mjöberg (*l.c.*) described a new genus, *Eudromicia*, and a new species, *E. macrura*, from tropical Queensland. In this genus he placed both *caudata* and *lepida*, thus leaving *Dromicia* with two species—*nana* and *concinna*. He stated that *Eudromicia* differed from *Dromicia* in having the full number of molars (i.e. four), strongly developed P^4, two-rooted P^1 and P^2, the squamosal part of the zygomaticum not inflated, and the bullae not swollen.

Iredale and Troughton (*l.c.*) accepted Mjöberg's grouping, but instead of *Dromicia* they used the genus name *Cercartetus* Gloger for *nanus* and *concinnus*. Gloger's genus predated Gray's by several months.

Simpson (1947) adopted *Cercaërtus* Burmeister instead of *Cercartetus*, evidently depending on a statement by Thomas (1888) that the second was obviously a mis-spelling of the first. But the original description by Burmeister (1837) is as follows:

> Eine besondere Gatt. (Cercaërtus Glog.) bildet die mit buschigem Schwanz begabte gemaine Art *Ph. vulpina*.

Phalangista vulpina (Meyer) is an absolute synonym of *Didelphis vulpecula* Kerr, and the latter is the type of *Trichosurus* Lesson. Therefore, as placed in Iredale and Troughton (*l.c.*), *Cercaërtus* is a junior synonym of *Trichosurus*.

Although the name *Cercaërtus* was apparently drawn from Gloger's then unpublished manuscript, the case for mis-spelling cannot stand. There is no reason to doubt that in 1841 Gloger deliberately used the spelling *Cercartetus* for a new genus with *Phalangista nana* as the type species.

Simpson (*l.c.*) did not recognize *Eudromicia* as a distinct genus but placed it, without comment, as a synonym of his "*Cercaërtus*". His action appears to be justified for these reasons:

1. In proportion to the size of the skull, the tympanic bullae are equally swollen in *nanus* and *concinnus*; those of *lepidus* are slightly less swollen, and those of *caudatus* are hardly swollen at all.
2. The squamosal inflation is greatest in *concinnus*, less in *nanus*, and less still but quite definite in *caudatus*. In *lepidus* there is no squamosal inflation at all.
3. The posterior upper premolar (P^1 actually) is not conspicuously more developed in any of the four species.

4. Characters of the small upper premolars vary within a species. There are normally two such teeth (usually known as P^3 and P^4), but at least in *nanus*, *concinnus* and *lepidus*, an additional small tooth (evidently P^2) may be present. In *lepidus* these teeth are acute with two divergent roots. In *concinnus* they are normally single-rooted, but either may have two contiguous roots. In *nanus* they are usually single-rooted but P^4 may be double-rooted; and in *caudatus* they are normally double-rooted but P^4 may be single-rooted or with two contiguous roots.

5. In *lepidus*, M^4 is not much modified, and it fits into a regular size gradient with M^1 and M^2. But, compared with M^1 and M^2, the M^4 of *caudatus* is so small as to be almost obsolete. In *concinnus*, M^4 has two distinct posterior cusps, whereas in *nanus* the posterior cusps of M^4 are obsolete. With each of the four species having a different pattern of molar sizes, the presence of M^4 in the first two does not justify placing them together as a separate genus.

The details given in these five paragraphs, and other points set out elsewhere in this paper, indicate that there is no natural grouping amongst the species of pigmy-possum

In this connexion the development of the anterior cusps (protoconid and metaconid) of M_1 is of interest. In *lepidus* each of these cusps is of medium size. Both *caudatus* and *nanus* have the former strongly developed and the latter obsolete. In *concinnus*, M_1 has a very large fang-like protoconid, and the metaconid is lacking.

In 1916, Matschie proposed new genera, *Dromiciella* and *Dromiciola* for *concinnus* and *lepidus* respectively. The adoption of either or both of these as monotypic genera appears to be more justifiable than the use of *Eudromicia* for *caudatus*.

There is no advantage to be gained by classifying the pigmy-possums into four monotypic genera, and the alternative is to adopt *Cercartetus* for all four species. The latter course should be followed, pending some understanding of their phylogeny.

Summary

Features of Australian pigmy-possums are given, and key features by which the four species can be identified.

Taxonomy is revised as follows:

(a) The generic name *Cercartetus* Gloger is shown to be valid rather than *Cercaertus* Burmeister, and *Eudromicia* Mjöberg is discarded as a genus and its species placed in *Cercartetus*.

(b) In *C. nanus*, the Tasmanian subspecies *C. n. nanus* and the mainland Australian subspecies *C. n. unicolor* are recognized, but *Dromicia britta* Jones is not distinguished from the latter.

(c) In *C. concinnus*, the nominate subspecies is restricted to Western Australia, and the eastern Australian population is distinguished under a new subspecific name, *C. c. minor*.

(d) The Queensland *Eudromicia macrura* is shown to be conspecific with the New Guinea *C. caudatus*, and the former is reclassified as *C. c. macrurus*.

Distribution and habitat of each subspecies are discussed, and it is shown that the status of *nanus* and *concinnus* in their respective areas is largely dependent on the occurrence of dry sclerophyll shrubbery in conjunction with trees.

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References

Bell, Thomas, 1829. Description of a new species of *Phalangista*. *Trans. Linn. Soc. Lond.*, *16*: 121.

Brazenor, C. W., 1950. *The Mammals of Victoria*. National Museum of Victoria, Melbourne.

Broom, R., 1896. Report on a bone breccia deposit near the Wombeyan Caves, N.S.W., with descriptions of some new species of marsupials. *Proc. Linn. Soc. N.S.W., 21*: 48-61.

Burmeister, C. H. C., 1837. *Handbuch der Naturgeschichte, II. Zoologie*, p. 814.

Chaffer, N., 1930. The opossum mouse (*Dromicia nana*). *Aust. Zool., 6* (2): 109, pl. 12.

Forbes-Leith, T. A., and Lucas, A. H., 1884. Catalogue of the fauna of Victoria. Vertebrata: Mammalia. *Vict. Nat., 1* (2): 4-6 (=12-14).

Gardner, Charles Austin, 1942. The vegetation of Western Australia with special reference to the climate and soils. *J. Roy. Soc. W. Aust., 28*: 11-87.

Glauert, L., 1933. The distribution of the marsupials of Western Australia. *J. Roy. Soc. W. Aust., 19*: 17-82.

Gould, John, 1845. *Proc. Zool. Soc. Lond., 1845*, p. 2.

———, 1846. *The mammals of Australia*, vol. 1, plate 9.

Hickman, V. V., and Hickman, J. L., 1950. Notes on the habits of the Tasmanian dormouse phalangers *Cercartetus nanus* (Desmarest) and *Eudromicia lepida* (Thomas). *Proc. Zool. Soc. Lond., 135* (3): 365-374.

Iredale, Tom, and Troughton, E. LeG., 1934. *A checklist of the mammals recorded from Australia*. Australian Museum, Sydney.

Jones, Frederick Wood, 1925. A new South Australian dormouse opossum. *Trans. Proc. Roy. Soc. S. Aust., 49*: 97.

Krefft, Gerard, 1863. Description of a new species of the genus *Dromicia* discovered in the neighbourhood of Sydney. *Proc. Zool. Soc. Lond., 1863*, p. 49.

Laurie, E. M. O., 1952. Mammals collected by Mr. Shaw Mayer in New Guinea, 1932-1949. *Bull. Brit. Mus. (Nat. Hist.) Zool., 1* (10): 271-318.

LeSouef, A. S., and Burrell, Harry, 1926. *The Wild Animals of Australasia*. George & Harrap, London.

Lundelius, Ernest, 1957. Additions to our knowledge of the ranges of Western Australian mammals. *W. Aust. Nat., 5*: 173-182.

Marlow, B. J., 1958. A survey of the marsupials of New South Wales. *C.S.I.R.O. Wildlife Research, 3* (2): 71-114.

Mjöberg, Eric, 1916. On a new genus and species of marsupials. *Kungl. Svenska Vetensk. Handl., 56* (2): 13-14.

Péron, François, 1807. *Voyage de découvertes aux Terres Australes, sur les corvettes la Géographe, le Naturaliste, et la goëlette le Casuarina, 1800-4, vol. 1*. Paris.

Ride, W. D. L., 1960. The fossil mammalian fauna of the *Burramys parvus* breccia from the Wombeyan Caves, New South Wales. *Journ. Roy. Soc. W. Aust., 43* (3): 74-80.

Ryan, R. Mark, 1963. Occurrence of the western pigmy possum, *Cercaërtus concinnus*, in Victoria and New South Wales. *Vict. Nat., 79* (11): 337-340.

Simpson, George Gaylord, 1947. The principles of classification and a classification of mammals. *Bull. Amer. Mus. Nat. Hist., 85*: 1-350, p. 45.

Skemp, J. R., 1950. The story of . . . Tasmania's smallest marsupial. *Wild Life, Australian Nature Magazine, 12* (1): 8-10.

Tate, G. H. H., 1945. Results of the Archbold Expeditions. No. 55. Notes on the squirrel-like and mouse-like possums (Marsupialia). *Amer. Mus. Novitates, 1305*.

———, and Archbold, Richard, 1937. Results of the Archbold expeditions. No. 16. Some marsupials of New Guinea and Celebes. *Bull. Amer. Mus. Nat. Hist., 73*: 331-476.

Thomas, Oldfield, 1888. *Catalogue of the Marsupialia and Monotremata in the collections of the British Museum (Natural History)*. British Museum, London.

Troughton, Ellis, 1957. *Furred animals of Australia, Ed. 6*. Angus & Robertson, Sydney.

Wakefield, N., 1960. Recent mammal bones in the Buchan district—2. *Vict. Nat., 77* (8): 227-240.

———, 1963. Sub-fossils from Mount Hamilton, Victoria. *Vict. Nat., 79* (11): 323-330.

Waterhouse, G. R., 1846. *A natural history of the Mammalia, vol. 1*. Hippolyte Ballière, London.

Wood, J. G., and Williams, R. S., 1960. Vegetation. In *The Australian Environment, Ed. 3*, pp. 67-84. C.S.I.R.O., Melbourne.

Field Naturalists Club of Victoria

General Meeting—July 8, 1963

The president, Mr M. K. Houghton, welcomed to the meeting Mr R. Filson, who has been collecting lichens at Mawson, Antarctica. He announced that the Governor of Victoria, Sir Rohan Delacombe, would be unable to open the September nature show but that he would attend on the Tuesday afternoon.

Since the previous meeting, the deaths had occurred of two members of very long standing, Mr Herbert P. Dickins and Mr Charles J. Gabriel. Members stood in silence in honour of their memory. Mr J. R. Garnet gave a speech of eulogy, referring to the accomplishments of each and to their connexion with the club. Suitable obituaries are to be published in the *Naturalist* shortly.

It was announced that Mr A. J. Swaby is to take another group of thirty to the Grampians in November, to study wildflowers. Vacancies still exist for this trip.

The speaker for the evening was Mr A. Massola, Curator of Anthropology and Ethnology at the National Museum of Victoria. His subject was "The Aborigines as They Were" and, after an introductory talk, he showed black-and-white slides taken about sixty years ago by Sir Baldwin Spencer on his journeys to Central and North Australia. These gave an authentic impression of the people as they were before the effects of civilization and detribalization.

Mr Massola emphasized that the Australian aborigines were essentially of one race, and discussed theories of their origin as well as the problem of the time of arrival of the Tasmanian race. The speaker described marriage taboos, initiations, burial methods, ritual cannibalism, children's games, training with weapons, and many other aspects of the primitive life. The president thanked Mr Massola for a most informative and thought-stimulating lecture.

Exhibits included a Silver-striped Hawk-moth, *Hippotion celerio* (Mrs D. E. McInnes); Banded Nassarius, *Niotha pyrrhus*, the shell used as the old F.N.C.V. badge (Mr J. R. Garnet); pearl-shell with design, from Meekatharra, W.A. (Mr K. E. Hall); and, under the club microscopes, granodiorite, spider pincers, and geranium stigma (Mr D. E. McInnes).

Members with ideas for an "odds-and-ends board" for the nature show were asked to contact Miss McLaren.

Microscopical Group—June 19, 1963

This meeting was chaired by Mr E. LeMaistre and had an attendance of twenty-two, including some visitors from country areas.

A great deal of equipment, chemicals and microscopical material donated to the group, both by Mr J. Evans and the family of the late Dr R. Wishart, was distributed among the members present. It was decided that Mr W. Barrett take charge of the rotifera slides and the sundry literature be set aside for the club library.

The subject for the evening, "Slide Making", was given jointly by Mr E. Snell and Mr W. Black.

Mr Snell described the process of opaque slide making, by demonstrating various materials which he uses for the making of cells, from flattened brass curtain rings to aluminium spacer rings. He went through the process, showing what is used to cement these to both plain and cavity slides, and how the specimen is attached to the slide, dehydrated in a jar of silica gel and finally sealed with a cover.

Then Mr W. Black, with all the equipment necessary, gave most ably a practical demonstration of strewn diatom slide making. The group was shown how the suspension of cleaned diatoms is spread and dried on a cover-glass, the mountant added and the slide finally cooked. The results of his demonstration were viewed under a microscope.

The excellent attendance was indicative of the interest in this subject.

Sixteen microscopes were used to show a wide variety of specimens.

Geology Group—July 3, 1963

Twenty-six members and visitors were present, with Mr L. Angior in the chair. The secretary reported on the geological aspects of the club's general monthly excursion to the upper reaches of the Djerriwarrah Creek near Bacchus Marsh, where Ordivician deposits were examined and creek sands washed by some enthusiastic members. Mr D. Hemmy stated that fifteen to twenty persons attended an excursion on Saturday, June 29, in conjunction with the Frankston F.N. Club, to inspect some of the building stones of Melbourne city buildings. Mr T. Sault reported that the collection of specimens for the group's exhibit at the nature show was proceeding satisfactorily.

The subject for the evening was "Polarized Light" by Mr Angior. The speaker first interested members with an impressive array of instruments and gadgets which covered the whole of one table. The subject was attacked from the beginning, the basic principles and different aspects being explained in detail with the aid of models and blackboard illustrations. After explaining the wave motion of light, and the origin of light from the atom, the break-up of the rays was shown by a comprehensive set of diagrams on cardboard discs. With prepared rock sections and crystals the lecturer finally showed the methods of using polarized light in geological work.

Exhibits: Carnelian and chalcedony from Goulburn River at Seymour, scheelite from King Island, red jasper from Central Australia (Miss Fairley); silicified banded chert, silica core pebble and obsidian from near Broken Hill (Mr J. Millar); microscopes with polarizers to show sections of basalt and granite (Messrs D. McInnes and N. McLauren).

Marine Biology and Entomology Group—July 1, 1963

The meeting, which was chaired by Mr R. Condron, was attended by eighteen members.

The speaker for the evening was the chairman, whose subject was the characteristics of the different families of Rhopalocera in Australia. He

displayed six cabinet drawers of beautifully set and arranged butterflies, pointing out the many structural differences. The talk was much enjoyed by all members, and many questions were asked.

Exhibits: Tiny red sea anemones (by Mr F. Lublin) displayed for him under the F.N.C.V. microscope by Mr D. McInnes, who also demonstrated the method of obtaining polarized light and dark ground illumination under this instrument.

Botany Group—July 11, 1963

The meeting, chaired by Miss M. Lester, was attended by twenty-three members.

The speaker was Mr R. V. Smith, of the National Herbarium botanical staff, on the subject, "Compositae". He referred to the enormous number of species distributed very widely throughout the world, and discussed a theory of their evolution, from lobelioids in the Andes. He mentioned the work of Cassini and Bentham on the composites, and described the structure of the capitulum and the kinds of florets. The various kinds of pappus and the achene were next discussed, then methods of seed dispersal.

Mr J. H. Willis, illustrating Mr Smith's talk, projected many colour slides of various genera and species of the family.

Arrangements for the group's exhibit, being prepared for the September nature show, were then discussed.

The flower of the month was *Caleana*, two species of which, *C. major* (Large Duck Orchid) and *C. minor* (Small Duck Orchid) were shown on slides by Mr F. Zirkler, who had taken them during the club's recent Bairnsdale excursion.

CORRECTIONS

In the July issue of the *Naturalist*, in the article, "Excursion to Bairnsdale—December, 1962", three errors were made subsequent to the original manuscript. These should be corrected as follows:

P. 79, col. 2, line 30; spelling of "spoliation".

P. 82, col. 2, line 25; "Bendigo", not "Bairnsdale".

P. 83, col. 2, line 10; spelling of "Tinamba".

On the authority of Mr J. H. Willis, and of Mr Webb of the Barrier F.N. Club, the DIG tree at Cooper Creek should be called "Coolibah, *Eucalyptus microtheca*"—not "*E. coolabah*", as on page 84 of the July *Naturalist*.

—J. A. Baines

Obituary: S. R. Mitchell

The late Stanley Robert Mitchell was born in St. Kilda on February 12, 1881. He had a brilliant scholastic career and did outstanding work in mineralogy, ethnology, geology and in his profession of metallurgist.

Early in life he became interested in natural history and anthropology. When six years old he visited the Great Exhibition of 1887 and never forgot the big display of Victorian aboriginal weapons, and his book *Stone Age Craftsmen*, published in 1949, is a necessary text book for all students of ethnology. A second book, *Wooden Instruments of the Australian Aborigines*, is ready for publication.

He spent sixteen years prospecting with his father, and few people had a greater knowledge of Australian minerals. He amassed a very fine collection of 10,000 mineral specimens, which he donated to the C.S.I.R.O.

He joined the Field Naturalists Club of Victoria in 1927 and was president in 1936-37. Older members will remember the many excursions he led. He was the founder and chairman of the Hawthorn Junior Naturalists Club from 1942 to 1950, co-founder of the Frankston Field Naturalists Club in 1952, co-founder of the Anthropological Society of Victoria in 1934, and trustee and treasurer of the National Museum from 1945 to 1954.

His interests and membership of various bodies fill a long list and he has many publications to his credit.

For his many achievements he was awarded the Australian Natural History Medallion in 1955.

He maintained keen interest in all these things until his heart failed on March 22, 1963. He is mourned and missed by his many friends.

—L. YOUNG

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

GENERAL MEETINGS

Monday, August 12, 1963—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, reports, announcements, correspondence.
2. Subject for Evening: "A Year in Antarctica", by M. Freeman.
3. Election of Members:

Ordinary Members:

Mrs Margaret E. Griffiths, 39 Hillcrest Avenue, Kew, E.4.
Miss Ruth Menzies, 22 Belmont Avenue, Kew, E.4.
Mr Bruce C. Jones, 34 Boyana Crescent, Croydon, Victoria. (Interests: Botany, geology.)
Mr Graeme R. Perrett, 64 Park Street, West Brunswick. (Interests: Conchology, geology, fauna survey.)

Country Members:

Mr G. Blackburn, 78 Allinga Avenue, Glenunga, S.A. (Interests: Geology, botany, anthropology.)
Mr R. A. Leeds, Warana, Wyandra, Queensland.
Mr K. J. Thomas, 57 Croudace Street, Lambton, 2N, New South Wales.

4. Nominations for Membership.
5. General Business.
6. Nature Notes and Exhibits.
7. Conversazione.

Monday, September 9, 1963—"Heathland Studies", by Dr R. Specht.

F.N.C.V. EXCURSIONS

Sunday, August 18—Blackwood district. Leader: Mr R. Hemmy. The coach will leave Batman Avenue at 9 a.m. Fare, 14/-. Bring one meal and a snack. Bookings with excursion secretary.

August 31-September 22—Western Australia. The coach will leave McKenzie's Depot, 53 Barker's Road, Kew, at 7 a.m. on Saturday, August 31, and Flinders Street, opposite Gas and Fuel Corporation at approximately 7.20 a.m. The main luggage should be left at McKenzie's on Thursday, August 29, and a small overnight bag containing necessities for the first two nights and three picnic meals should be brought on Saturday. Luggage is limited to 60 lb. and members are requested to avoid unnecessary bulk. Anyone who has not paid the full fare should do so immediately.

GROUP MEETINGS, ETC.

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

Wednesday, August 21—Microscopical Group. (See page 121.)

Friday, August 30—Hawthorn Juniors. Hawthorn Town Hall, at 8 p.m. Birthday Night: "Members' Exhibits".

Monday, September 2—Marine Biology and Entomology Group. This group meets at 8 p.m. in Mr Strong's rooms at Parliament House. Enter through private entrance at south end of house.

Wednesday, September 4—Geology Group. Demonstration by members: "Stone Cutting and Polishing".

The Botany Group will not meet in September because of the nature show, but an excursion will be held.

The Fauna Survey Group will not meet in September.

PRELIMINARY NOTICE

December 26-January 1—Mount Buller. A coach has been chartered for this excursion and accommodation booked at Mt Buller for those travelling by coach. Members travelling by private cars should book their own accommodation.

CROSBIE MORRISON MEMORIAL LECTURE

Friday, August 30—"Mound Building Birds", by H. J. Frith, Chief of the C.S.I.R.O. Division of Wildlife Research, whose studies of the Lowan have become a "research classic". In the Murdoch Gallery of the National Gallery; the Russell Street doors will be opened at 7.30 p.m.

PHOTOFLORA 1964

The Native Plants Preservation Society will hold a photographic competition for colour slides, 2" x 2" mounts, of Victorian native plants:

A.—Wildflowers (excluding orchids), as close-ups, plants in flower, and wildflowers in natural landscape. Maximum entry five slides. Four awards.

B.—Orchids. Maximum entry three slides. One award.

C.—Miscellaneous. Other forms of native vegetation (e.g. grass, ferns, moss, fungi, fruits, leaves, bark). Maximum entry three slides. One award.

Subjects should be in natural settings. Slides using obvious artificial backgrounds or unnatural arrangements are not likely to be accepted.

Entry fee 5/-; closing date February 24, 1964. All slides returned.

Results announced March 16, 1964.

Entry forms and further information from Miss B. C. Terrell, 24 Seymour Avenue, Armadale, S.E.3.

FILM NIGHT BY MICROSCOPICAL GROUP (National Herbarium, August 21, 8 p.m.)

"Mitosis in Endosperm"; "The World of the Invisible" (forms of life in a drop of water); "Daphnia, the Water-flea"; "Sand Animals"; and "Raak" (the story of a Wedge-tailed Eagle, in colour).

All have sound tracks and are of general interest. Visitors are welcome.

The Victorian Naturalist

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Field Naturalists Club of Victoria

In which is incorporated the Microscopical Society of Victoria

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2/6

Magnificent stand of White Mountain Ash, *Eucalyptus regnans*, in the Marysville State Forest

FORESTS COMMISSION VICTORIA

. . . . . preserving the beauty of our forests for your enjoyment.

Vol. 80, No. 5

F.N.C.V.

September 5, 1963

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

The Quoll, or native "cat" (*Dasyurus quoll*) almost disappeared from Victoria when its populations were decimated by epidemic in about 1902. A few colonies survived, in places such as Studley Park and the rough basalts near Lake Corangamite, but there has been practically no news of the animal in this state over the past twenty or thirty years. This one was photographed recently in central Tasmania, where both it and the larger "tiger-cat" (*Dasyurinus maculatus*) are still quite plentiful.

Australian Natural History Medallion Award to E. H. Zeck

By C. E. Chadwick

The Australian Natural History Medallion for 1961 was presented to Mr E. H. Zeck, F.R.Z.S. at the Shell Theatrette, Carrington Street, Sydney, on Wednesday, December 4, 1962, at a meeting of The Society of Entomologists, Sydney, in the presence of sixty-five members and friends. The Society deemed it a great privilege to make the presentation to an entomologist who had become well known for his work, not only in Australia, but overseas. The presentation to a distinguished member came at a very appropriate time, as it almost coincided with December 9, the date on which, ten years before, the initial steps were taken to found the Society. At the same meeting members decided that because of its widespread membership a much more appropriate name for the Society would be The Entomological Society of Australia (N.S.W.).

In making the presentation, Mr K. E. W. Salter, President of the Society, expressed his admiration for the excellent drawings produced by Mr Zeck and for the outstanding work in entomology that he had done over a lifetime in the science. He congratulated Mr Zeck on the award which all those present agreed was richly deserved.

Mr C. E. Chadwick spoke of the fine taxonomic work that Mr Zeck had published, of the very broad knowledge he had of insects in general and of measures for dealing with pest species—knowledge invaluable to his work with the New South Wales Department of Agriculture, which he served for many years. The speaker also mentioned the work done by the guest of honour for various scientific societies over a very long period.

Misses Dolce Dobbin and Nina Luckie spoke on behalf of the Naturalists' Society of New South Wales, which had supported The Society of Entomologists, Sydney, in nominating Mr Zeck for the medallion. They stated that Mr Zeck had been an officer of their Society for thirty-seven years, occupying a number of offices, including those of President and Honorary Editor of *The Australian Naturalist*—the latter for many years.

In response Mr Zeck expressed his pleasure at the award of the medallion, at the large number of well-wishers who had attended and the letters of congratulation he had received from all over Australia. Entomology to him had always been a pleasure and he was pleased that he had been able to interpret it to others by his writings and drawings.

Mr Zeck was born in Sydney on November 16, 1891 and, except for a period of six months spent in Mexico in 1926, has lived there ever since. He entered the New South Wales Pub-

E. H. Zeck, 1956.

lic Service in 1908 as a cadet entomological and biological artist, but transferred to the Department of Agriculture in 1923 as an entomologist, from which position he retired in 1956.

Mr. Zeck's work in entomology has covered a very broad field and a bibliography of his publications exceeds three hundred titles. Many of his articles dealt with matters of special interest to primary producers, advising them on the habits and control of injurious insects. However, he also worked on much more exacting subjects, such as the taxonomy of scale insects and aphids, and with the late H. J. Carter wrote monographs on the beetle families Dryopidae and Colydiidae.

His first published papers dealt with insects associated with ants, these being printed in *The Australian Naturalist*. Thereafter his interests took him to the Hemiptera and Coleoptera, and to economic entomology. He also contributed material to both editions of the *Australian Encyclopedia*.

Mr Zeck had experience in teaching entomology at Hawkesbury Agricultural College and Sydney Technical College and, during the second world war, lectured to army personnel on the control of insect pests of foodstuffs.

He participated in the work of scientific societies in Sydney for many years and held several offices. His chief offices in The Naturalists' Society of New South Wales were those of President from 1950 to 1958 and Honorary Editor from 1928 until 1960. In the Royal Zoological Society of New South Wales he was President for 1948-49 and 1949-50 and vice-president for several years.

On its inception in 1935, he became a member of the Australian Institute of Agricultural Science, and in the following year joined the Linnean Society of New South Wales. He became a foundation member of The Society of Entomologists, Sydney (now The Entomological Society of Australia (N.S.W.)) on its inauguration on February 20, 1953.

He has been elected a life member of The Naturalists' So-

ciety of New South Wales, The Entomological Society of Australia (N.S.W.), a Fellow of the Royal Zoological Society of New South Wales and an emeritus member of the Australian Institute of Agricultural Science.

Mr Zeck's record as a writer on agricultural entomology, a taxonomist, entomological artist and officer of scientific societies in Sydney, has made him a worthy recipient of the Australian Natural History Medallion.

Mammal Remains from the Grampians, Victoria

By N. A. WAKEFIELD*

During Easter this year, Mr R. M. Thornton, of Ringwood East, took his family to see some aboriginal shelters and paintings in the northern section of the Victoria Range of the Victorian Grampians. His son, Peter, located a small deposit of animal bones, while investigating a recess in a sandstone outcrop. Peter collected a small sample of these and they were eventually forwarded to me by Mr N. S. Bennett of the Stawell Field Naturalists Club.

The contents of the sample indicated that the discovery was of considerable value, so an excursion was arranged, in July, to procure the remainder of the material and to examine the site and its surroundings.

Several naturalists attended, from the Horsham and Stawell clubs, and rendezvous was made where a forestry access road, appropriately named "The Goat Track", took off from the Syphon Road in the Victoria Valley. The ascent was made in a Landrover, brought out for the purpose by Mr John Donovan, Assistant Forester of Stawell.

A four-mile drive accomplished the ascent of the scarp and a short traverse of some plateau country, to the vicinity of Cultivation Creek, where we joined forces with another party of three naturalists from Hamilton and Casterton, who had walked through from the Glen Isla side of the range.

The site of the bone deposit was a well-sheltered cavity which penetrated about ten feet into a sandstone mass. It was several feet wide and, as the floor sloped steeply and the roof was only about four feet above, the collecting of material was rather difficult. A few of the party spent an hour at the job before lunch, and I completed the task during the afternoon while the others went to view some aboriginal art in a recently discovered rock shelter.

As no sieve was available, the deposit was collected *in toto*. There was less than a cubic foot of it but, when processed a few days later, it yielded skeletal material which included remains of over 400 small mammals representing 22 native species. Details of these are set out in Table 1, the numbers being based on counts of lower jaw-bones (dentaries).

* Department of Zoology and Comparative Physiology, Monash University, Clayton, Victoria.

TABLE 1

Mammal Species and Approximate Numbers of Individuals in the Victoria Range Deposit

Dasyuridae*	
Sminthopsis c.f. *leucopus* (White-footed Dunnart)	16
Antechinus swainsonii (Dusky Phascogale)	13
Antechinus stuartii (Brown Phascogale)	46
Peramelidae	
Isoodon obesulus (Short-nosed Bandicoot)	2
Perameles bougainville (Little Barred Bandicoot)	22
Phalangeridae	
Acrobates pygmaeus (Feathertail)	18
Cercartetus nanus (Pigmy-possum)	75
Petaurus breviceps (Sugar Glider)	1
Pseudocheirus peregrinus (Ringtail)	1
Macropodidae	
Bettongia gaimardi (Bettong)	1
Potorous tridactylus (Potoroo)	3
Muridae	
Rattus greyii (Grey's Rat)	2
Rattus lutreolus (Swamp-rat)	4
Pseudomys auritus (Long-eared Pseudo-rat)	24
Thetomys c.f. *gracilicaudatus* (Queensland Thetomys)	17
Gyomys fumeus (Smoky Mouse)	148
Gyomys c.f. *novaehollandiae* (New-Holland Mouse)	1
Mastacomys fuscus (Broad-toothed Rat)	7
Conilurus albipes (White-footed Rabbit-rat)	1
Vespertilionidae	
Nyctophilus timoriensis (Greater Long-eared Bat)	1
Chalinolobus morio (Chocolate Bat)	1
Scotemus sp. (Broad-nosed Bat)	1

Besides the native mammal specimens, the deposit contained the jawbone of a domestic cat, remains of several lizard species and of a great variety of beetles.

NOTES ON IDENTIFICATION AND DISTRIBUTION

Sminthopsis. Detailed measurement of this Victoria Range material shows it to be of a population of smaller animals than those identified from the Fern Cave near Portland (Wakefield, 1963a). It could be of *murina* rather than *leucopus*, as the former has been collected at Bordertown, S.A., though never authentically recorded in Victoria.

Antechinus. The occurrence in the Grampians of both the species listed was proved last year, when R. M. Warneke obtained specimens of them near Halls Gap; and I caught a Brown Phascogale at the foot of the Victoria Range, beside the Goat Track, during the recent July excursion. It is remarkable that *A. flavipes* (Yellow-footed Phascogale) was not represented in the Victoria Range deposit, for it is widespread in the Grampians.

Perameles bougainville. The Victoria Range material is not distinguishable from central and north-western Australian specimens. The suggestion made by Tate (1948), that *bougainville*, *fasciata*, *notina* and *eremiana*

* There was additional material of about 18 small dasyurids, not specifically identified, but presumably of the three species listed in the Table.

comprises a single species, appears to be justified. Although Victoria has been included in the range of "*fasciata*" by various authors (eg. Troughton, 1956), the Victoria Range specimens provide the first tangible proof that the species did occur in the state. As far as is known, the animal has now died out in south-eastern Australia.

Bettongia gaimardi. This bettong was represented in the deposit by a single dentary of a subadult individual. Its one-time occurrence in western Victoria was demonstrated by recent subfossil specimens from Mount Hamilton and near Portland (Wakefield 1963, 1963a). In this connexion it is interesting to note a comment by Finlayson (1958), when discussing *B. penicillata*, that he had "accounts of a nest building bettong from West Victoria generally in 1854, and the Grampians district in 1910".

Potorous tridactylus. There are unconfirmed local reports that the potoroo still survives on the north-eastern fringe of the Grampians.

Rattus greyii. In Victoria, Grey's Rat is known only from the Portland-Nelson forests of the extreme south-west. It has not been recorded, as a living animal, in the Grampians, but there seems to be no reason why it should not still occur there.

Gyomys fumeus. The Smoky Mouse specimens constituted a third of the mammals in the Victoria Range deposit, and it was very abundant also in eastern Victorian sub-fossil collections (Wakefield, 1960). The species evidently shared in the sudden disappearance of several of the pseudomid group, about a century ago, from south-eastern Australia. An indication of this catastrophe, and data about the various species concerned, have already been noted in the references cited here. The survival of the Smoky Mouse in the Grampians (and in Victoria) was proved by its rediscovery recently near Halls Gap (Warneke, 1963).

Scoteinus sp. This and the two other bats in the Victoria Range deposit have been identified by R. M. Ryan, National Museum of Victoria. He remarks that *Scoteinus* is well-known to him in north-western Victoria though not credited for the state in current mammal literature.

Identity of the Predator

It was obvious that owls had been responsible for the accumulation of bones. Their perch had been a ledge at the end of the recess, and many of their disgorged pellets must have rolled down the sloping floor, dropped to the ground below, and eventually decomposed completely. Fortunately there were a few slabs of stone here and there in the cave, and these had trapped a certain amount of material. Some pellets were sufficiently well preserved to be recognizable as those of a species of *Tyto*. The prey ranged in size up to adult bandicoots and half-grown rat-kangaroos. This indicates that the bird was the Masked Owl, *Tyto novae-hollandiae*.

The cat jawbone suggests that the roost was still used after European settlement of the country, but the absence of ma-

terial either of rabbits or of introduced murids demonstrates that the birds deserted the place many years ago. This pattern of timing is the same in all cave accumulations of owl pellet material known in Victoria; none has been in use in recent years.

The Victoria Range Habitat

Nowadays, the plateau in the vicinity of the bone deposit is an area of dense tough shrubbery, interrupted at intervals by jagged sandstone outcrops. When I suggested to the party that this would not have been the original type of vegetation, the comment was confirmed by two of the local naturalists, who recounted details that had been passed on to them by old residents of the district. It had been the practice, for instance, to graze sheep on the Victoria Range plateau in the early days. But, to promote the growth of fresh grass, it was necessary of course to fire the country periodically. The change from grassy parkland to the present tangle of scrub was the result of this procedure.

In its original state, the locality would have suited the barred bandicoots, bettongs and such murids as the rabbit-rat. Even if small populations of these may have persisted in favourable places, the advent of the European fox would have lessened or precluded their chances of survival. There were fox droppings in the recess with the bone deposit.

Appendix: Black Range Deposit

A small handful of fragmentary bone material was collected in the Black Range last year by A. C. Beauglehole of the Portland Field Naturalists Club. In it there were one or two specimens each of Brown Phascogale (*Antechinus stuartii*), Pigmy-possum (*Cercartetus nanus*), Grey's Rat (*Rattus greyii*), Smoky Mouse (*Gyomys fumeus*) and the Thetomys.

The Black Range is the westernmost outlier of the Grampians group and is about 15 miles WNW. of the location of the Victoria Range deposit. Apart from the fact that, in all five cases, the additional locality record is of value, this lot demonstrates the importance of reporting the occurrence of such material or collecting it, no matter how fragmentary it may appear to be.

Acknowledgement

The cost of the excursion to the Victoria Range was defrayed out of a current grant from the C.S.I.R.O. Science and Industry Endowment Fund.

References

Finlayson, H. H., 1958. On Central Australian mammals (with notice of related species from adjacent tracts) Part 3—The Potoroinae. *Rec. S. Aust. Mus. 13* (*2*) : 235-302.

Tate, G. H. H., 1948. Results of the Archbold expeditions. No. 60. Studies in the Peramelidae (Marsupialia). *Bull. Amer. Mus. Nat. Hist. 92* (*6*) : 313-346.

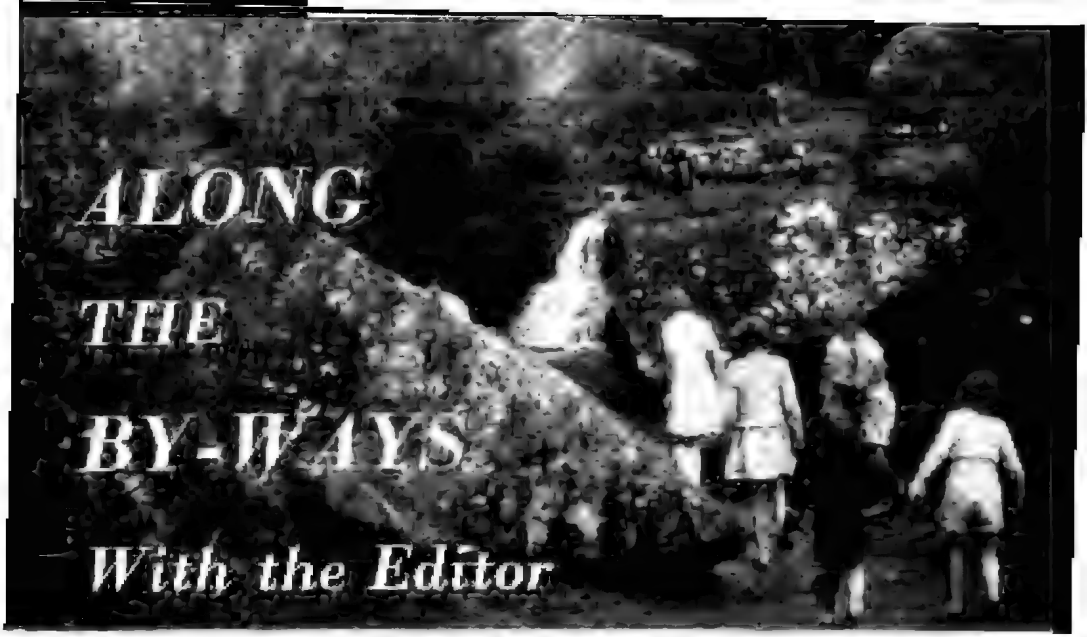
Troughton, Ellis, 1957. *Furred animals of Australia, Ed. 6.* Angus & Robertson, Sydney.

Wakefield, N., 1960. Recent mammal bones in the Buchan district—2. *Vict. Nat., 77* (*8*) : 227-240.

———, 1963. Sub-fossils from Mount Hamilton, Victoria. *Vict. Nat., 79* (*11*) : 323-330.

———, 1963a. Mammal sub-fossils from near Portland, Victoria. *Vict. Nat., 80* (*2*) : 39-45.

Warneke, R. M., 1963. Rare today—tomorrow . . . ? *Victoria's Resources 5* (*1*) : 24-5.



These columns are available each month for your nature notes and queries. Address your correspondence to the Editor, "Victorian Naturalist", P.O. Box 21, Noble Park, Victoria.

Bird Specimens for the Museum

Mr. V. Jacobs of Dandenong is the contributor of these notes, and we heartily endorse the concluding sentence:

Early in April 1962, I found a small dead bird at the rear of a building in Frankston Road, Dandenong. Being unable to identify it, I posted it to the secretary of the Fauna Survey Group, who sent it on to the National Museum.

A reply came, identifying it as "1 Horsfield Bronze Cuckoo. *Chalcites basalis* (Horsf) (Juvenile bird, probably *basalis* rather than *plagosus*)". The identification was interesting but the fact that it was on an embossed certificate personally signed by the Director, was a great incentive to give more help to the Museum.

When I showed the certificate to my pupils they all agreed that any dead birds that they found would certainly be sent to the National Museum. I explained to them that the exchange of a dead bird for a certificate was beneficial to both parties and that the Museum's gesture of appreciation was made because the bird would be valuable to them. Firstly, the skin may be suitable for mounting and adding to their collection without purposely killing a bird. Secondly, even a damaged specimen is a positive proof of the bird's existence in an area.

Since that time no pupils have brought certificates but I have added two to my collection.

In April this year, a low-flying bird collided with the radiator of my car. After a day in cold storage it went to the Museum too and was identified as "1 Grey Butcher Bird, *Cractocis torquatis* (La)".

Early in June I noticed a pair of large pale grey birds flying from gumtree to gumtree in the streets of Dandenong West. They seemed quite attached and though their undulating flights were not made in unison they did spend a few moments together foraging for food in each tree.

Later that month I saw a lone bird and wondered if the two had separated. A possible answer came when I found a dead "Black-faced Cuckoo Shrike, *Coracina novae-hollandiae* (Geml)" on the other side of Dandenong.

I hope that these few notes will give incentive to others in gathering information.

Eastern Water-dragon at Glenmaggie

These notes have been received from Mrs C. McQueen, a metropolitan club member who spends a considerable amount of time in Gippsland:

On Easter Monday, we were exploring the eastern side of Glenmaggie Weir in our boat. One of the rocky banks which had caught our interest, had a deep indentation piled high with dead trees. We pulled in to the edge and climbed up the bank to watch the myriads of small fish close inshore. Then we noticed a large lizard dart under one of the trees and, with all due precaution, my husband pulled it out. The lizard was about 28 inches long with a pale grey body and slate-grey bands across its tail. There was a series of spikes along the back of its neck and, when agitated, it let down a yellow pouch under its chin and opened its mouth wide, showing the bright interior and an array of teeth.

After due examination, it was released, whereupon it headed straight for the water and disappeared. We searched without finding it but, about fifteen minutes later, it was observed swimming, with head well clear of the water, back towards the cove from around the point some fifty yards distant. When it saw us, it stopped motionless against a partly submerged tree limb—with head above the water and inclined at an angle—looking for all the world like a branch. When approached in the boat, it once again dived out of sight and was not observed further.

The Eastern Water-dragon, *Physignathus lesueuri*, is the largest of our Victorian lizards, apart from the goanna of course! It is restricted in this state to the eastern part of Gippsland, and the Macallister River area is apparently its western limit. It has several local names, such as "Gippsland Water-lizard", "Snowy River Crocodile" and, in the Buchan district, "Cocky John". It is only very occasionally that one allows itself to be caught.

Echidna at Lascelles

This observation is from Mr H. R. Hobson of Rosebery, north-western Victoria, and it deals with one of our unique egg-laying mammals, the so-called "Spiny Anteater", *Tachyglossus aculeatus*:

On July 20, I encountered an echidna in an area of mallee scrub of some 7000 acres, a few miles north-west of Lascelles township. I was walking along the bank of a channel and he came into view about sixty yards ahead, quite unaware of my presence. He disappeared over the channel bank and, on reappearing, was wet underneath. He must have entered the water, but evidently decided not to make a crossing.

While he was out of sight I had advanced to within about ten yards. He then crossed a track and started to dig beside a small heath bush that probably sheltered an ants' nest. He seemed to be interested in this site and kept his head underground with short intervals of sniffing and resting with the head and snout above ground level. While he was busy with head underground, I advanced and sat down within about five feet, but he still seemed unaware of my presence.

On his moving I could not resist the temptation to gently turn him over, so he promptly rolled into an almost perfect ball of spikes—a most effective means of protection. After a short interval he righted himself and started to dig under. So I left him to his rightful peace in the bush.

Normally, an echidna is most difficult to overturn. When one tries to push it over from one side, it leans to that side and props two legs out in the opposite direction. However, if one changes sides quickly enough, it can be tipped over before it reverses its props. But its defence is not always effective, for one sometimes finds echidna quills in the droppings of a dingo.

The F.N.C.V. Microscope

By D. E. McInnes

At one of its monthly meetings, the Microscopical Group of the F.N.C.V. discussed at length the adverse effect of the purchase of cheap microscopes which were said to give magnifications of × 100 to ×300 or 500. These were a disappointment to children and adults who bought them, because the magnifications were so high, and the fields so small that, if anything could be seen at all, it might be no more than a hair on an insect. The result was that interest in the microscope was destroyed instead of stimulated.

Members agreed that, for general use in Natural History, a magnification of 100 times was the most that was necessary, and that the most useful powers were from 15 to 25 times. It is important first to see the whole of an object; observation of its parts in detail can follow. The Group came to the conclusion that, to counter the ill effect of the cheap and virtually useless "high power" microscopes now on the market, an attempt should be made to produce an example of what was really required, with the following characteristics:

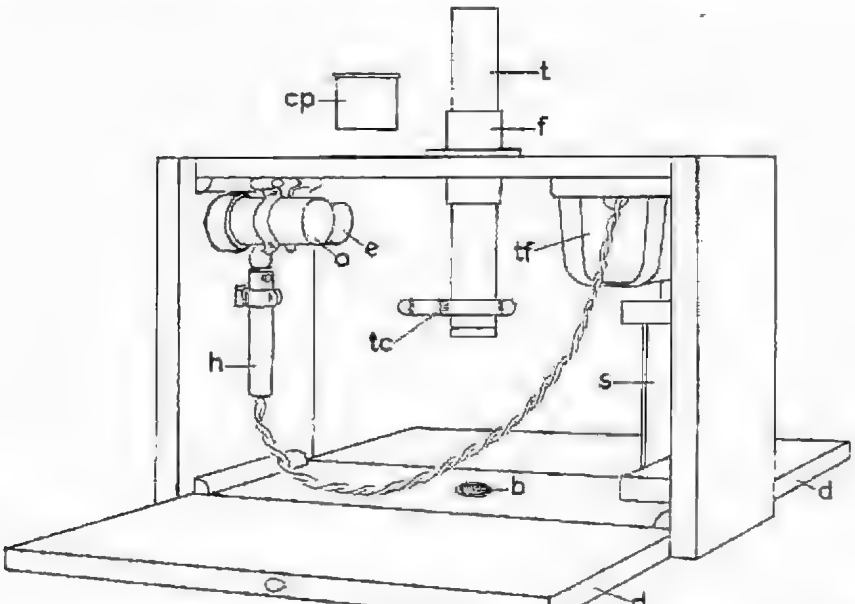
1. Initial low power magnification of × 15 or × 20, with the ability to add higher powers up to × 100;
2. eyepieces and objectives to be of standard size and good quality, such as are used in orthodox microscopes;
3. the instrument to be of simple basic form capable of adaptation to more advanced use with higher powers;
4. the basic outfit to be made available at low cost to encourage children and adults to become interested in the wonderful world of microscopy.

A prototype was built which consisted of a simple tube of the right size to fit standard microscope eyepieces; this was fitted with a threaded socket for standard objectives. A × 3 objective and a × 5 eyepiece were chosen as optical equipment. The

tube was a friction fit in a sleeve screwed to the side of a cabinet which also formed the microscope stand. Coarse adjustment was made by raising or lowering the tube in the sleeve, and fine adjustment by turning the sleeve on a thread. Illumination was by a 230-volt lamp which could be turned to throw light down on to an object or into a mirror in a stage to reflect light up through transparent objects on slides, etc. This microscope was very effective and large objects could be placed under the lenses: thus it was possible to examine marine or freshwater organisms in a holder as big as a porridge bowl.

The prototype was thoroughly tested and various improvements were made to it. Finally, the instrument in its improved form was built by Mr. W. Woollard, whose experience as an engineer and enthusiasm as a microscopist were responsible for developing the original idea into a really practical, first-class microscope. Experience had shown that the fine adjustment thread on the sleeve was unnecessary, for by resting both hands on the box it is easy to focus even high power lenses with the sliding tube alone. The lighting was changed to low voltage (6 volts); though this added to the cost through the provision of a transformer, it made the apparatus safer for children, reduced the heat generated, and improved the efficiency of illumination.

Figure 1. Sketch showing the microscope opened and with the tube pushed up. The other parts are not yet unpacked. *b*, the bush for the stage stud; *cp*, the sleeve cap; *d*, *d*, the doors; *e*, *o*, the eyepiece and objective container in their clips; *f*, the flanged sleeve; *h*, the lampholder; *s*, the stage; *tc*, the tube clip; *tf*, the transformer.



It must not be supposed that the F.N.C.V. microscope is a second-rate substitute for a "real" microscope. It is nothing of the kind: it *is* a real microscope, specially designed to suit the requirements of naturalists and young people, for whom the orthodox high-power instrument is not satisfactory. (Those unfamiliar with the microscope commonly suppose that very high power is a measure of excellence and usefulness, but this is a misconception.) Expert, advanced microscopists and research workers who have examined and tested the F.N.C.V. instrument have expressed appreciation of its construction and performance.

Description of the Microscope

The microscope is packed for storage or transport in a polished hardwood case, measuring 11 in. by 7 in. by 5½ in., with chromium-plated carrying handle and other fittings. A cap covers a flanged sleeve in which the microscope tube slides when the instrument is in use. Two doors are fastened by hooks.

When the microscope is being prepared for use, the box is laid on the work bench with the flanged sleeve uppermost, and the two doors are opened to lie flat on the bench, to the right and left of the user (Fig. 1 *d, d*). The tube *t* is then seen to depend from the sleeve, and the cap *cp* being removed, the tube is pushed up to project above the top of the box. The stage *s* is packed in grooves, from which it can be withdrawn. A 6-v. transformer *tf* is permanently attached to the inside of the box, and is fitted with flex and a plug for connexion to the mains. From its output terminals a short flex leads to the lamp-holder *h*, which is clipped to the inside of the box. The lenses *o* (objective) and *e* (eyepiece) are also held in clips, the objective being in a screw-top container. There is room for extra clips to hold additional lenses.

The chromium-plated tube is of standard eyepiece size, and at its lower end is fitted with an RMS universal objective screw thread. Thus all objectives and eyepieces, made by any manufacturer, can be used. The lengt of the tube is 160 mm., the standard mechanical tube-length for which all modern microscope lenses are computed. A dead-black liner in the tube eliminates reflections from the inner surface, thus preventing glare. The microscope is focussed by sliding the tube up and down in its sleeve. Very fine adjustments are possible by using both hands to give twisting movements to the tube while the heels of the hands rest on the top of the box. It is thus easy to focus precisely quite high power lenses without need for expensive mechanical devices.

The stage (Fig. 2) is an open-ended box, 4 in. square, and in its base is a brass stud *st* which engages with a bush (Fig. 1 *b*) in the bottom of the box, its correct position in relation to the tube being thus maintained. The top is of black metal, with a central hole ⅝ in. in diameter. Under the top is a plate of flashed opal glass *g* which slides in grooves to enable it to be placed either under the hole or to one side, provision thus being made for illumination of the

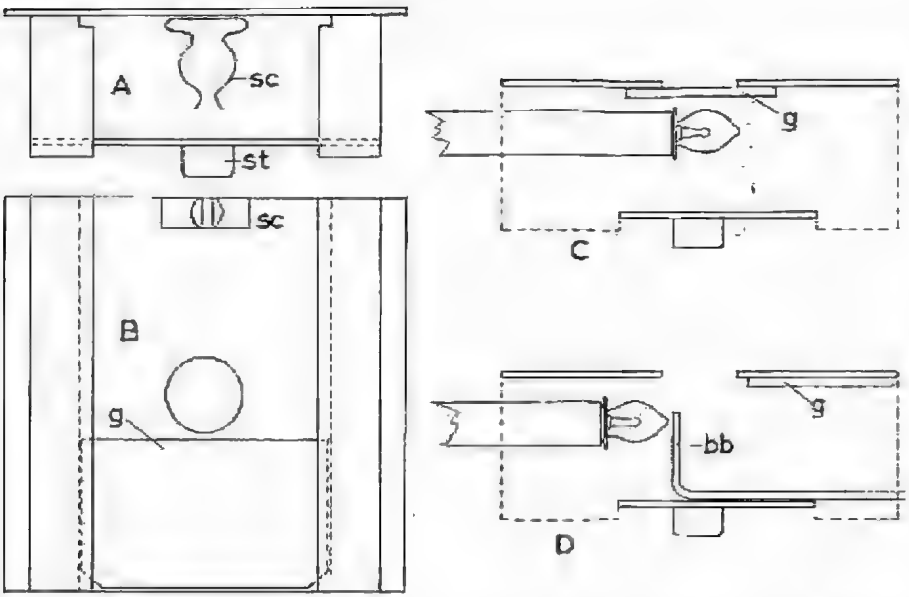


Figure 2. The stage. A, as seen from the end; B, the underside of the top; C, side view showing the lamp and opal glass in position for bright field illumination; D, the lamp, glass, and black board arranged for dark field illumination. *bb*, the black board; *g*, the opal glass; *sc*, stage clip for the lampholder; *st*, the stud.

object by either transmitted or reflected light. When the opal glass is pushed aside, a black board *bb* is inserted inside the stage to produce the dark well conditions which give the best background for observation by top lighting.

The tubular metal lampholder *h*, held in a clip *sc* under the top of the stage, carries an American type bulb which has a long life and is easily replaced, being fixed by a small screw. The lampholder must be adjusted, by sliding it in its clip, until the lamp is quite central under the hole. (Fig. 2 *C*). Then, with the opal glass in position, excellent lighting for transmitted light is obtained for the examination of transparent objects. When opaque objects are to be examined with reflected light, the lampholder is taken out of the stage and transferred to a clip (Fig. 1, *lc*) on the tube; it can then be raised or lowered to a convenient position near the object. In this case, the opal glass is pushed aside, leaving the hole in the stage clear, and the black board is placed under the hole, resting on the base of the stage (Fig. 2 *D*).

When the microscope is issued as a complete outfit, the basic optical equipment consists of an objective of 30 mm. focal length, and an initial magnification of × 4. The eyepiece has a power of × 6, and the combined magnification is × 20 to × 25.

Additional lenses can be supplied separately, at extra cost. Recommended are a 16 mm. objective, power × 10, and a × 10 eyepiece, which give a combined

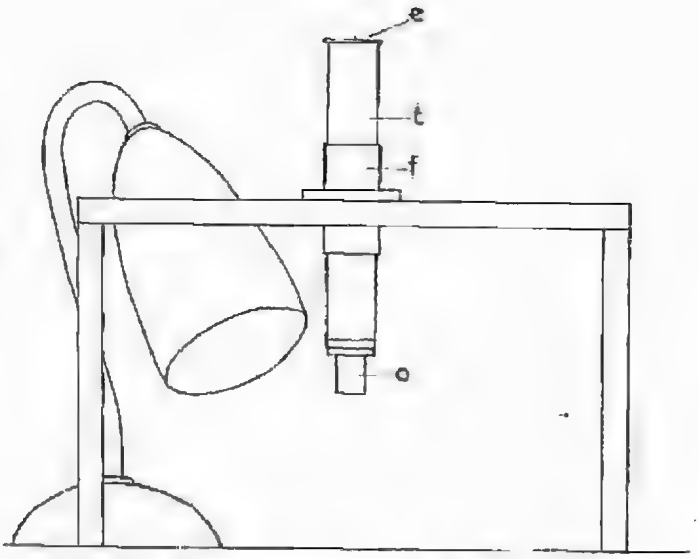


Figure 3.
A simple, home-made, wooden bridge stand, 11 ins. long, 7 ins. high, and 5 ins. wide. The tube, sleeve and lenses (shown set up) purchased separately, and a table lamp in use for top-lighting.

magnification of × 100. Either eyepiece can be used with either objective, the full range of magnification then available being × 20 to 25, × 40, × 60 and × 100, which will cover the requirements of amateur naturalists.

A pair of polaroid discs may be had as extra equipment; these enable the microscopist to examine crystals, rock sections, etc., by polarized light. Spare bulbs for the lamp, complete with flex, can also be supplied.

The cost of the complete microscope to a member of any field naturalists club is £12/15/-. Extras are spare bulbs with flex, for 1/6 each, and pairs of polaroid discs for 3/- a pair, plus postage. The × 10 objective and × 10 eyepiece, giving a maximum magnification of × 100, which are recommended for those who want higher powers, can be supplied at £4/3/- and £1/10/- respectively.

Those who can do simple woodwork can have a useful microscope at much less cost. The tube and flanged sleeve can be bought separately for £2/7/-, the objective lens for £2/10/-, and the eyepiece for £1/10/-. Having these parts, a start can be made with a simple wooden bridge (Fig. 3), using a table lamp for top lighting. A stage similar to that described is not difficult to make, and a bell transformer can be obtained to work a 6-volt lamp.

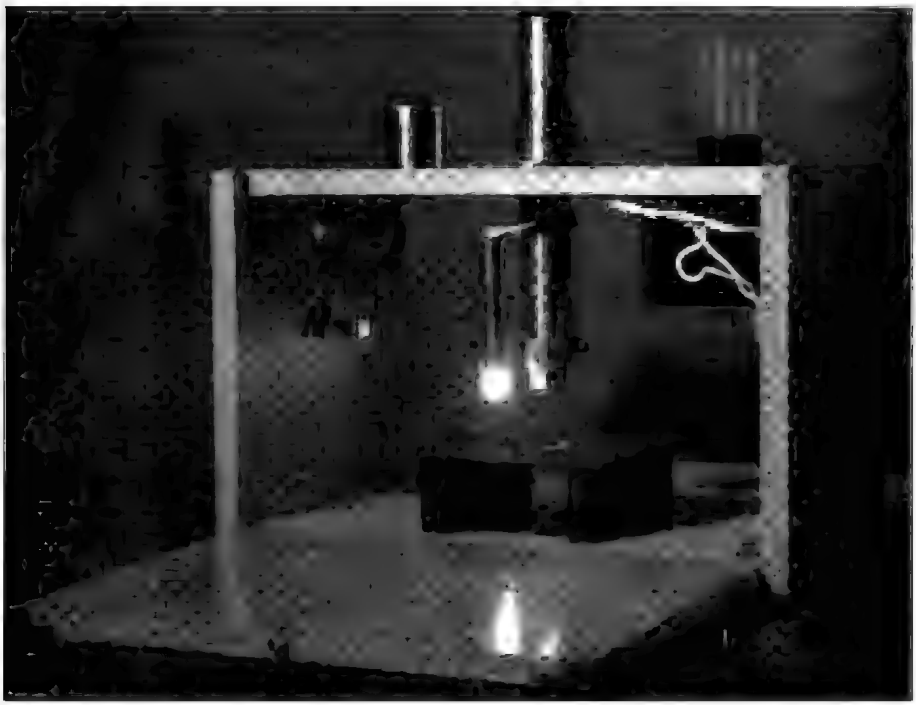
The prices are those current at the time of publication. They may subsequently be modified.

Setting-up and using the Microscope

The microscope box is first laid on its back and opened as described above, and as shown in Fig. 1. The lenses are then mounted, the eyepiece being placed in the top of the tube, and the objective screwed into the lower end. The lampholder is then to be removed from its clip in the box, care being taken to ease it out gently to avoid

jarring the filament of the lamp. (It should never be unclipped or clipped when the lamp is switched on.) For the examination of opaque objects like flowers, rocks, or marine and freshwater organisms in dishes, the lamp is put into the clip on the tube (Fig. 4) to provide top lighting. Quite large objects can be examined if they are placed on the floor of the box. The lamp being switched on, the tube should be pushed down carefully until the objective lens is about half an inch above the object; this must be done while watching from the side, to avoid damage to lens and object by forcing them into contact. Then, looking down the tube, the observer should *raise* the tube until the object is in focus. On no account should the tube be pushed down while one is looking through it: this precaution should become a habit. Focusing is easy if both hands are used, the heels of the hands resting on the top of the box while the fingers and thumbs are used to give a twisting movement to the tube. The lamp can then be moved in its clip to bring it as close to the object as is convenient. If the object is a small opaque one, it is more convenient to use the stage, which should be placed in position with its stud in the bush on the floor of the box. A card or microscope slide carrying the object can then be placed on the stage and moved about as desired.

Figure 4. The F.N.C.V. microscope set up for top lighting.



If the object is transparent, such as part of an insect or plant mounted in balsam as a permanent microscope slide, or an organism such as a water flea in a small glass dish, it must be illuminated by transmitted light, i.e., the light must come from below the stage. In this case the lampholder is put into the clip under the stage (Figs 2*C*, 5, 6) and the opal glass must be under the hole in the stage; the lamp is then moved until it is under the centre of the hole. Focusing is carried out as before, the operator watching the lens as the tube is lowered then raising it while looking down the microscope until the object comes into focus. If the illumination is too intense, causing glare which obscures detail, the lampholder should be moved in its clip until the lamp is a little off centre and the best effect is obtained.

"Dark field" illumination can be used with advantage in some cases for transparent or semi-transparent objects. The dark field effect is obtained by sliding the opal glass aside, moving the lamp to one side until the direct rays to not pass through the object into the microscope, and placing the black board under the stage with its short vertical end creating a shadow immediately under the object (Fig. 2, *D*). The object will then be brightly illuminated against a dead black background, and beautiful effects can be obtained in this way. A variation of the method is to use pieces of coloured paper in place of the black board, thus showing the object against a coloured background illuminated by the lamp.

The polaroid discs can be used for observation by polarized light. One of the discs is placed in the central hole of the stage, resting on the opal glass; this is the "polarizer". The other disc, the "analyzer", is placed on top of the eyepiece, or it is inserted flat on the lower lens inside the eyepiece. The disc should be handled with care, for it is easily scratched. Looking through the eyepiece, and revolving the upper disc, the operator finds that, at two positions in one revolution, the light is blacked out; this is called "extinction", and the polaroids are then said to be "crossed". When objects of a crystalline nature are examined between crossed polaroids they display brilliant colours, and the colours change as the analyzer is revolved. Examples of objects suitable for examination by polarized light are mentioned in the next section below.

Microscopical objects

There is no limit to the number of microscopical objects, especially for naturalists, who will discover, with the aid of the microscope, a whole new world of great beauty and fascinating interest, as well as useful biological information. Perhaps the most interesting and exciting things are the small organisms which teem in ponds and billabongs, and in rock pools on the seashore. Many others occur in gardens, fields and woods.

A square inch or two of the coral-like encrustation on rocks or piles, or small stones covered with growths, may be collected on the shore at low tide, and can be placed in a jar with a little coralline seaweed to be carried home. Some extra water should

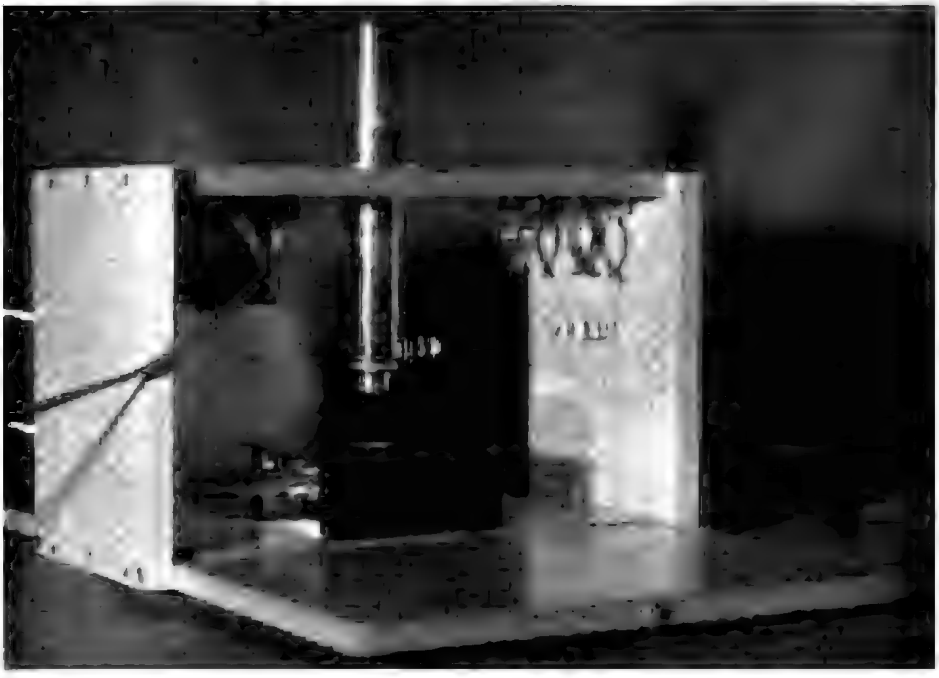


Figure 5. The F.N.C.V. microscope set up for observation by transmitted light.

be taken in a bottle. These objects can then be placed in some of the water in a small dish, such as a porridge bowl. These miniature aquaria will keep in good condition for a week or more if they are not overcrowded; only a little material should be put into each vessel. Top lighting should be used for observation. A great variety of remarkable animals may be seen: marine tube-worms and polyzoa spreading their tentacles to capture small organisms on which they feed, and retreating into their tubes if alarmed; small shellfish, crustaceans, worms; and many others. The small sea plants also are often very beautiful. One bowl can provide material for hours of study.

Similar aquaria can be stocked with material collected from ponds and billabongs which have clear water and plenty of green aquatic weeds. Muddy waters with little or no weed are not productive. Streams also are less productive, though some interesting animals and plants may be found anchored to the long stems of rooted water plants. A handful of weed should be taken home in a polythene bag, and there put into a large bowl of water; then small pieces of weed and creatures found swimming in the water can be transferred to small dishes. Micro-organisms can be collected in large numbers from ponds by filtering them out with a small net. This should be on a frame about 6 inches in diameter mounted on a stick; the net itself should be of some very fine textile like nylon, and it should be funnel-

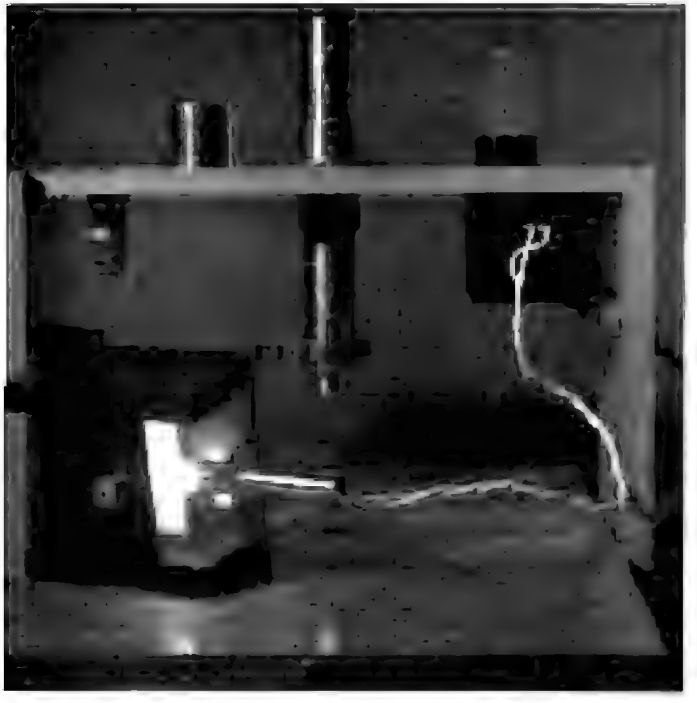
shaped, about 6 inches deep. A small tube or bottle is tied into the open point of the net. Repeated dips into the pond water will result in the minute animals and plants collecting in the bottle, while the water escapes through the net when this is lifted from the water. Finally the bottle is emptied into a jar, and a fresh collection can then be made. In another jar some surface mud from the bottom of the pond should be taken.

White saucers or clear glass Petri dishes are excellent as aquaria. A good substitute for a Petri dish can be made by cutting rings, half an inch deep, from a plastic mug, and cementing them on to small sheets of glass; the best cements are Araldite and "Hardbond" Bostik. A separate dish is used for aquatic larvae, and a piece of pondweed put in with them. In another dish the collection made with the net is put, also with a small piece of weed. The mud is placed in another dish and allowed to settle. In bright field, mud should be thin enough to have plenty of open spaces. The organisms which may be found are too numerous to itemize, but we may mention *Hydra*, *Volvox*, water fleas, water mites, rotifers, *Vorticella*, and innumerable other protozoa. These aquaria, if kept covered to prevent evaporation of the water, will remain in good order for weeks and even months. They should be kept near a window, but protected from direct sunlight.

Live insects can be examined by enclosing them in small cages or cells to restrict their movements. Cells are made by obtaining some pieces of glass about 4 inches by 1½ inches, and 3 inches by 1 inch (a glazier will cut them) and some pieces of hardboard and cardboard of the same sizes. Central holes, circles or ovals are cut in the pieces of board. A sandwich is made of a piece of board between two pieces of glass, and held together with rubber bands. The thickness of board and size of hole can be suited to the insect. Insects can be watched as they feed, the action of their mouthparts being observed; and the cells can be turned over when desired.

Flowers and parts or sections of flowers can be examined by top lighting, to facilitate their identification. Many Australian flowers are very small, and their beauty is not realized until they are seen through the microscope. Sometimes it is convenient to fasten flowers and other objects in position by means of plasticine on a card. Grass flowers, fern pinnules with their spores, fern prothalli, mosses and liverworts, are all most interesting. So are the moulds which grow on damp bread, leather and other organic material. The dung of herbivorous animals produces a crop of wonderful microscopic fungi if kept in a covered dish on moist blotting paper.

Many crystalline substances show beautiful colours when examined with polarized light. Small crystals can be prepared easily by dissolving alum, or washing soda, magnesium sulphate (Epsom salts), or copper sulphate, in hot water until no more will dissolve; then a drop of the solution, placed on a glass



slide, will produce crystals as it cools. Their growth can be watched under the microscope, between crossed polaroids, colour changes being produced when the analyzer is revolved. Borax, menthol, thymol, tartaric and citric acids also provide good crystals, and the platinocyanides show particularly fine effects.

A useful and easily obtained material for examination by polarized light is cellophane, which is commonly used for wrapping cigarette packets. Strips of this should be cut and arranged overlapping, in steps, so that the light comes through one to six thicknesses, each of which will show a different colour when placed between crossed polaroids. Immediate positions of the analyzer will show colours complementary to those seen at extinction. Some organic substances show fine colours; examples are cotton fibres, white horsehair, fish scales, and thin chips of pearl shell. These should be mounted in balsam or in drops of oil, and covered with glass. Starch grains, similarly prepared, show black crosses.

Rock sections, if they can be obtained, are also good subjects, the crystals of which they are often composed giving a variety of different effects between crossed polaroids.

After some experience, microscopists will want to make permanent preparations on microscope slides, a collection of which can be very useful as well as a constant source of interest. There are many books on the microscope and on methods of making slides; some of these

methods are quite simple. The Microscopical Group of the F.N.C.V. is glad to give help and advice on any aspect of microscopy and on the use of the F.N.C.V. microscope. Enquiries should be addressed to me (at 129 Waverley Road, East Malvern, S.E.5, Victoria).

My thanks are due to Mr R. Lee for permission to reproduce his excellent photographs and to Mr H. A. Dade for the line drawings.

Book Review:

"The Eucalypts"

"Botany, Chemistry, Cultivation and Utilization"

A. R. Penfold and J. L. Willis

World Crop Series. Leonard Hill (Books) Limited, London. 1961. 550 pages, illustrated. 80/-.

As stated in the preface, the authors aimed to produce, primarily for the layman, a simple survey of the "botany, chemistry, cultivation and utilization" of the eucalypts. . . . "with an emphasis on practical information in preference to theoretical aspects or exhaustive detail". The task was a difficult one because of the vast quantity of information which has been written on the eucalypts. It would indeed be a wonder if no omissions had been made in a book of this kind.

The Eucalypts is a mine of information on many subjects, but the depth of treatment of individual chapters varies. For instance the chapter on "Essential Oils" is particularly inclusive and contains a comprehensive list of the oil yield and constituents of about 250 species and varieties. On the other hand very little information is given of the growth and timber yield of important species either in Australia or overseas.

Chapters devoted to botanical characteristics, timber, trees for shade, shelter and ornament, honey flora, miscellaneous uses and eucalypts as exotics, leave the reader in no doubt as to the diversity in habit, adaptability and usefulness of this intriguing genus. It is possible, too, to realize the extraordinary aesthetic, economic and protective potential of the group both in Australia and overseas.

Historical facts about the discovery, description and utilization of eucalypts are recorded in appropriate places and problems of classification and nomenclature indicate some of the reasons why the genus has often been referred to as a "difficult" one. The difficulty has been perpetuated by the use of the unmodified form of classification presented by Blakeley (in his *Key to the Eucalypts*) in this volume. It is indeed unfortunate that an improved system of classification had not been devised before a work of this kind was published.

The layman will be disappointed by the omission of the familiar common names of his favourite eucalypts. In the text vernacular names are given to some well-known groups, e.g. "ashes", "peppermints", but not to particular species, except in one or two exceptional cases and in a list of "standard trade common names" which includes 47 timber trees. If vernacular names had been used it may be that jarrah (*Eucalyptus marginata*) would not have been quoted as one of the tallest eucalypts, on pages 1 and 2.

Short accounts are given of the methods of propagation of eucalypts and of insect, fungal and other natural enemies and their control.

The book is illustrated by 22 photographs (1 in colour), 28 figures and 5 maps. In addition, reproductions of 39 plates of beautiful botanical drawings from Maiden's *Critical Revision* enrich the publication and lose but little in their reduction (13 x 11 cm.).

About 150 species are described briefly in one chapter (138 pp.), reference being made to the habit, leaves, inflorescence, fruit and usefulness of

each. Very approximate areas of natural occurrence are found by plotting latitude and longitude details on appended maps. All other described species and varieties are given mention in this chapter.

The authors have produced a compendium of information and the book will prove to be a valuable reference and stimulant for people interested in the eucalypts. To have combined under one cover so much material from so many sources is in itself an achievement.

—C. D. HAMILTON

Leadbeater's Possum at Warburton

By H. E. WILKINSON*

Since the rediscovery of Leadbeater's Possum (*Gymnobelideus leadbeateri*) near Marysville in April 1961 (Wilkinson, 1961), it has been observed many times in that vicinity, and the known range of the species was extended by sight records at the Black Spur and Ben Cairn (Owen, 1963).

A further extension was made in March this year when a dead specimen arrived at the National Museum of Victoria from Warburton. At first the locality was in doubt as the only information supplied was the name and address of the donor.

On the evening of March 16, I went to Warburton and contacted the donor, Mr. Barry Spittles, who is a maintenance engineer at the Sanitarium Health Foods factory. Part of his work involves inspection and cleaning of the grates on an aqueduct which carries water from Cement Creek to a dam on Rocky Creek about half a mile north of Warburton. He found the possum drowned, in the last grate before the dam. Therefore it must have fallen in between that grate and the one before it, about one and a half miles east of the dam. The altitude is about 1450 feet, and the habitat is typical Mountain Ash forest.

It was not possible to visit the spot that night but, before returning home, some time was spent searching the Mountain Ash forest on the Donna Buang road about a mile from where the above mentioned aqueduct (not to be confused with the M.M.B.W. O'Shannassy aqueduct) crosses the road. The locality is about two miles north of the area where Mr Spittles found the specimen, and is at an altitude of 2000 feet. After about three quarters of an hour, during which time we saw several Bobucks (*Trichosurus caninus*), from a tall Silver Wattle (*Acacia dealbata*) came the quite characteristic "chirring" noise of a Leadbeater's Possum, apparently engaged in a domestic squabble. The noise continued for about 20-30 seconds, then stopped just as we arrived with the spotlight. All was quiet for a while, then there was a sudden movement and the spotlight revealed a Leadbeater's Possum running through the branches with the swift sure-footed motion so characteristic of these beautiful little animals.

* Professional Assistant, National Museum of Victoria.

These two records show that the species has apparently established itself on the southern slopes of Mount Victoria, and in the valley of Cement Creek, which rises on Mount Donna Buang. Thus the range is extended some five miles eastward from Ben Cairn. It is reasonable to expect that Leadbeater's Possum could be found wherever suitable habitat occurs in the mountain country between Healesville, Warburton and Marysville, and possibly also in the extensive forest areas south and east of Warburton.

REFERENCES

Wilkinson, H. E., 1961. The rediscovery of Leadbeater's Possum *Gymnobelideus leadbeateri* McCoy. *Vict. Nat.* 78 (4): 97-102.

Owen, W. H., 1963. Further sight records of Leadbeater's Possum. *Vict. Nat.* 79 (10): 292-3.

Leadbeater's Possum near Powelltown

BY W. KING

Since the rediscovery of Leadbeater's Possum (*Gymnobelideus leadbeateri*) by H. E. Wilkinson near Marysville in April 1961 and the further sightings by W. H. Owen at Ben Cairn and on the Black Spur Road, its known range was further extended by the finding of a dead specimen on a water channel grating close to Warburton. I felt that with this extension of field to the south the country around Beenak would be well worth investigatigation.

So members of the Ringwood Field Naturalists Club Fauna Group undertook a thorough survey of Beenak and the country south of the Powelltown—Noojee road. Although many of the fairly common animals were seen during three trips, we failed to see Leadbeater's possum. In discussing this at the F.N.C.V. Fauna Survey Group meeting in June this year, N. A. Wakefield suggested that we should locate the species along the Forests Commission roads north-east of Powelltown.

On the night of July 6, nine members of the R.F.N.C. Fauna Group drove four miles beyond Powelltown, on the Noojee road, then turned north and proceeded to a point four miles from the turnoff. There, in two groups, we worked timber access tracks. A Dusky Glider, (*Schoinobates volans*) was found, rather low in a large messmate, and we were fortunate in being able to view it clearly. Returning to the cars we discovered a ringtail (*Pseudocheirus peregrinus*) close by, and when one member heard a noise we were surprised to see one Sugar Glider (*Petaurus breviceps*) and to hear the alarm call of another. The second party, with J. Hyett as leader, also saw Sugar Gliders.

At our second stop we saw another Dusky Glider and also more ringtails. We then drove to the vicinity of Starlings Gap and, one mile beyond on the Big Rock Road, we formed one large group in order to spotlight the

bush bordering a jeep track. The undergrowth of Mint-bush (*Prostanthera*) and "dogwood" was rather dense. Wattles and tall straight eucalypts rose above this. About a quarter of a mile along the track I was attracted by a noise above and, on directing the light, saw a Lead-beater's Possum run up a tree to a limb about fifty feet above the ground. The other members of the party came up, and the animal ran down the tree for about twenty feet, then sprang to an adjoining tree. At this stage the total lack of membrane and also the distinctive tail could be seen clearly. The animal then proceeded down until it reached a tall wattle and with the typical fast movement of the species, eventually entered the mint-bush and disappeared near ground level.

The night was fine with little or no wind and an almost full moon.

This sighting extends the possum's known range another seven miles, right to the edge of Gippsland. I feel that, with a continuation of our survey to the south, we should find Lead-beater's Possum again, even further towards its old recorded localities in western and southern Gippsland.

The Hazelwood Lake Arboretum

The Latrobe Valley Field Naturalists Club has been occupied for many months on work associated with the planting of a 28-acre arboretum of native vegetation.

This plantation, on State Electricity Commission land which slopes down to the Hazlewood Lake (cooling pond for the Hazelwood Power Station) was suggested by the Latrobe Valley F.N. Club and Morwell Horticultural Society. It was welcomed by the project engineer and S.E.C. forest officers, and approved by the Commission.

The result, after much preliminary work, has been the planting of 1500 native trees and shrubs in the good black soil of the slope facing eastward above the lake. The planting was done by 1200 children from Morwell schools. Each tree was set by a hardwood stake bearing its name stamped on aluminium tape, and a "perm-o-tag" on which each child, after planting, signed his name. Through a sequence of blisters, callosities and perseverance, some of our local club members had spent many hours printing more than 1600 scientific names on the aluminium tape, as a first step toward the planting.

This first planting is to provide shelter for the many species of native plants which the club hopes to establish there later. Some of these have already been given by members and friends, some will be moved from land to be bulldozed in the Haunted Hills, and many will be bought with money generously given by the Morwell Shire Council and our honorary member Miss Minard Crommelin of New South Wales.

The Arboretum, as such, is worth all the work that has been put into it, but many of us hope that its even greater value will be in the interest awakened and fostered in the children of the district.

Each child who came listened to two quarter-hour talks (one on local fauna and another on the flora, or else one on fire prevention and one on plant propagating). Each watched a planting demonstration, and then planted a tree. Many came up eagerly after the planting to ask for a description of the tree planted.

Every tree had been given a number, corresponding to a numbered stake already in position and the same number on the plan drawn up by Mr Nye, the S.E.C. Forest Officer, so the

children had only to show their tree numbers and the names could be found at once.

One boy had laboriously copied the name on the stake by his tree.

Actinostrobus pyramidalis is a big name for a little boy to write, and it proved to be the one name about which this particular helper knew nothing.

"I could find out", I said.

Undaunted, little Wolfgang Zwenkle printed his address on a scrap of paper, and a description of his tree was posted to him later.

The Arboretum will be a sanctuary for native fauna as well as flora and even while work went on, on the bare slope, we identified twelve species of land birds and eight kinds of water birds there.

—JEAN GALBRAITH

Field Naturalists Club of Victoria

General Meeting—August 12, 1963

Mr M. K. Houghton presided, at a gathering that filled the hall. He welcomed Mr W. Hunter from Mallacoota and Mr and Mrs Armstrong from the Ringwood Club.

Members stood for a minute in silence in respect to the memory of Mr H. Reeves, whose death was announced. Mr J. H. Willis spoke in appreciation of the personality and activities of Mr Reeves and the fine work he had done.

The Secretary announced that the 1962 Natural History Medallion has been awarded to Mr N. A. Wakefield.

Notice was given of a Broken Hill Festival, from September 20-29; and of a spring school at Mount Beauty from October 18-26, with Mr A. J. Swaby, helped by Misses Jean Galbraith and Ina Watson and Mr R. Wheeler.

The subject for the evening was "A Year in Antarctica", by Mr M. Freeman, who went to Mawson in 1962 in the "Nella Dan," calling at Davis, Heard Island and Kerguelen. Magnificent colour slides illustrated the immense and starkly beautiful ice and rock expanses and the diverse activities of the twenty-four members of the party at work and play and in contact with Russian and French parties. Mr J. H. Quirk expressed the appreciation of the members in thanking Mr Freeman for the most enjoyable talk.

Exhibits included a large land snail, *Hedleyella falconeri*, from Lamington National Park (Mr I. Morrison); Money cowrie from Port Hedland and matrix opal from Coober Pedy (Mrs Ritse); *Acratricha serrulata* (Mr H. A. Morrison); varieties of coloured sand from Tewantin, Queensland and Crow Ash, *Flindersia australis*, capsule (Miss J. Woollard); and sea-urchin spines under a club microscope (Mr E. Swarbreck).

The secretary confirmed the appointment of Mr P. Kelly as Assistant Librarian.

Ten new members were elected, but the names of three of these had been inadvertently omitted from the nominations published in the September "*Naturalist*" (See page 152).

Marine Biology and Entomology Group—August 5, 1963

The meeting was chaired by Mr R. Condron, and fifteen members attended.

It was decided to have a beach excursion during the weekend prior to the September nature show, to collect live material for an exhibit. There will also be an "Odds and Ends" display at the show, if space permits. Another group outing was decided upon for late spring, at a date to be fixed at the September group meeting.

The chairman announced that Mr Schurr, Entomologist of the Burnley School of Horticulture, would speak at the September meeting, on a field survey undertaken by him into cotton parasites in the Sudan, Africa. Mr M. Houghton will speak on crustaceans at the October meeting. Mr Gorman of the Fisheries and Wildlife Department will speak in November, on a marine biology subject to be decided.

As it was a members' night, many marine and entomological specimens were displayed and described.

Miss E. Macfie showed a collection of shells, mainly Australian, and some tiny sea urchins from Sorrento. Miss L. White exhibited a phasma, collected at Thredbo in the Snowy Mountains, where the species reaches plague proportions and strips the tops of gumtrees.

Mr P. Genery showed a microscope slide of the aquatic larva of a plumed gnat, and spoke of its life history.

Mrs D. McInnes created great interest with egg-cases of a leaf-curling spider, demonstrated with a "club microscope" under low power.

Miss I. Dixon showed a moth of the Bogong group, and Miss V. Balaam a phasma taken at Castlemaine.

Mr Condron displayed some shells from the Cocos Islands, and a beautifully marked cockroach which was found in one of them.

Mrs Z. Lee projected a series of slides of butterflies, spiders, caterpillars and sea urchins, many of which were prize-winning slides.

Fauna Survey Group—July 4, 1963

Mr N. A. Wakefield presided at the meeting, which was attended by twenty-two persons, including seven visitors from the Ringwood F.N. Club.

A great deal of correspondence was read and discussed, from country clubs in response to the group's circular requesting information about local mammals.

Mr W. King expressed concern at the current issue of licences for the killing of possums, and enquired as to what restrictions were being placed on this. Discussion brought out the opinion that each species of our large possums is very abundant in many parts of Victoria.

Mr Wakefield reported the discovery, by a member of the Horsham F.N. Club, of an interesting deposit of mammal bone material in the Victoria Range, Grampians area. This is to be investigated further in the near future.

Botany Group—August 8, 1963

The chairman, Miss M. Lester, received apologies for unavoidable absence from the club president.

Mr A. Court gave the second of two talks on the genus *Acacia*. He referred to the difficulties of identification because of geographical separation, local variation, and the lack in Australia of type specimens and descriptive literature relevant to particular determinations. As an example, he listed the species closely related to *A. verniciflua*, and commented that *A. armata* hybridizes with most of those cited. The abandonment of Bentham's classification, based on the number of nerves in the phyllodes, was shown to be necessary, to be replaced by one based on floral and fruiting structures. Mr Court was thanked for his interesting talk, illustrated with many specimens. The group's nature show exhibit on acacias was then discussed. Mr I. Barker showed slides of *Caladenia*, the "flower of the month".

Excursions to Cheltenham Park and the native garden of Mr A. Brooks, on September 1, and to National Park, Ferntree Gully, on September 29, were planned.

Library

As Mr P. G. Kelly, the new Assistand Librarian, is particularly interested in entomology, his help will be valuable in that section of the library.

Study Groups: As from August 1, 1963, the following members are acting as librarians for F.N.C.V. study groups:—

Botany Group—Mr J. A. Baines.
Geology Group—Mr D. E. McInnes.
Fauna Survey Group—Mr D. Woodruff.
Marine Biology and Entomology Group—Messrs R. Condron and P. G. Kelly.
Microscopical Group—Messrs J. and P. Genery.

Study group librarians will supervise issue and return of loans, and replacement of books and periodicals in their correct order on the shelves. They will endeavour to be in attendance for some time before the group meetings which are held in the Herbarium.

M. E. Argo, Librarian

DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, September 9, 1963—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp

1. Minutes, reports, announcements, correspondence.
2. Subject for Evening: "Heathland Studies", by Dr R. Specht.
3. Election of Members:

Ordinary Members:

Mr. Noel V. Dawson, 64 Park Street, West Brunswick (Interests: Ecology, Fauna Survey).
Mr Peter L. Herry, Zealandia Road, Croydon.
Mrs Kathleen Meehan, 26 Bambra Road, Caulfield (Introduced by Mrs A. Sutherland and Miss M. Elder).

Country Members:

Mr P. Brisbane, 1 Wemyss Avenue, Lower Mitcham, South Australia

Besides those listed on page 120 of the August Naturalist, the following new members were elected at the general meeting on August 12:

Ordinary Members:

Mr Raymond A. Box, 19 Fulham Road, Reservoir (Interests: Geology, Marine Biology).
Mr Jack C. Miller, 38 Brentwood Avenue, Parene Vale South (Interests: Geology).

Country Members:

Mr Roy D Birdsey, 66 North Valley Road, Highton, Geelong

4. Nominations for Membership.
5. General Business.
6. Nature Notes and Exhibits.
7. Conversazione.

Monday, October 14, 1963—"Australian Mammal Study", by N. A. Wakefield.

The Victorian Naturalist

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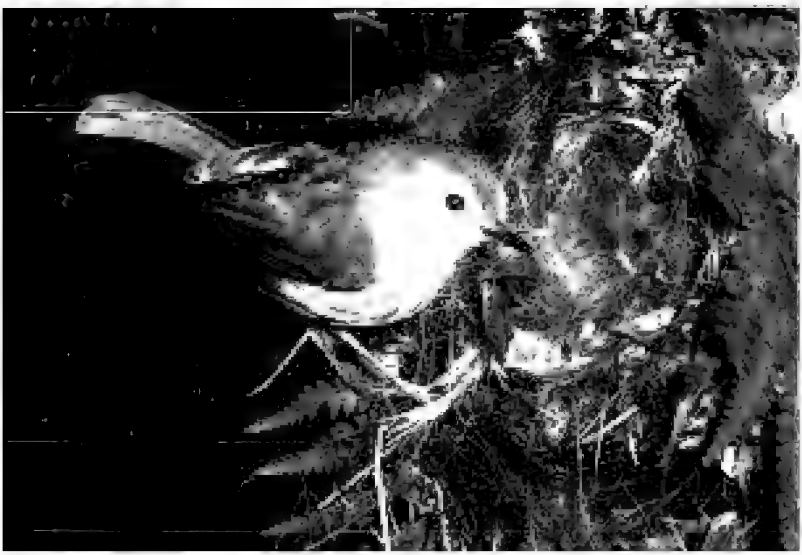

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Field Naturalists Club of Victoria

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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, 1963-64

President:

MR. M. K. HOUGHTON
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Vice-Presidents: MR. E. BYRNE, MR. J. H. QUIRK

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, 400 Collins Street, Melbourne, C.1 (60 1919; after hours, 83 5080).

Hon. Editor: MR. N. A. WAKEFIELD, P.O. Box 21, Noble Park (546 8440).

Hon. Librarian: MISS M. ARGO, 25 Spray Street, Elwood.

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. V. S. MARSHALL, Cr. Chandler Road and Leman Crescent, Noble Park.

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. McQUEEN, 7 Male Street, Brighton (92 6371).

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.

Annual rates 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 80 of the *Victorian Naturalist* is from May 1963 to April 1964.

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The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.SC.

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Front Cover:

The Large-billed Scrub-wren (*Sericornis magnirostris*) occurs in central and eastern Victoria. It is rarely identified, however, possibly because of its small size and nondescript colouration. The cover photograph originally accompanied an article entitled "The Large-billed Scrub-wren in Victoria", in the *Naturalist* of February, 1959 (Vol. 75, pp. 153-8). It was taken in the Dandenong Ranges, by Mr Trevor Pescott, about six years ago.

These columns are available each month for your nature notes and queries. Address your correspondence to the Editor, "Victorian Naturalist", P.O. Box 21, Noble Park, Victoria.

Wattle Time in Gippsland

Although a botanist may inform us that, in practically any district of Victoria, one can find wattles in flower during any month of the year, there is no doubt that September is our real wattle month here in south-eastern Australia. The following notes, by Mr J. McCallum, demonstrate the point very well:

During a journey through Gippsland to the Snowy Mountains, over the week-end of August 31-September 1, note was taken of wattle species that were in flower along the road.

Golden Wattle (*Acacia pycnantha*), Blackwood (*A. melanoxylon*) and Silver Wattle (*A. dealbata*) were present from just beyond Dandenong, extending right through Gippsland. Hedge Wattle (*A. armata*) was also in profusion.

Beyond Pakenham, where some patches of scrub persist beside the road, there were the two needle-leaved species, Prickly Moses (*A. verticillata*) and Spreading Wattle (*A. diffusa*). Myrtle Wattle and Hop Wattle (*A. myrtifolia, A. stricta*) were there too. All four were seen elsewhere during the excursion as well.

Spike Wattle (*A. oxycedrus*) was at Providence Ponds and beyond Bairnsdale, and both sallow wattles (*A. longifolia, A. mucronata*) were often in evidence in the forest areas. Beside the Bruthen-Buchan road, there was a stand of Sweet Wattle (*A. suaveolens*), and beyond Murrindal, the Red-stem Wattle (*A. rubida*) was plentiful and Furze Wattle (*A. ulicifolia*) here and there. A few very late flower-heads persisted on the Sunshine Wattle (*A. botrycephala*), so it was added to our list.

At W Tree Creek Falls, the attractive Red Wattle (*A. silvestris*) was in bloom, as well as patches of Varnish Wattle (*A. verniciflua*).

Between Gelantipy and Wulgulmerang, we passed through an area of Kybean Wattle (*A. kybeanensis*), and toward Suggan Buggan *Acacia paucijuga* was showing a few precocious blooms. From there on, in the *Callitris* forest area, Boomerang Wattle (*A. amoena*) marked the rock outcrops, and in the vicinity of the Snowy River there was a profusion of Snowy River Wattle (*A. boormanii*).

At Jacobs River, *Acacia floribunda*

had begun to flower, and towards Jindabyne there was the Ploughshare Wattle (*A. vomeriformis*). At Island Bend, the first blossoms of Dagger Wattle (*A. siculiformis*) were in evidence.

During the journey, several other wattle species were noted but they were not in bloom. Specific mention has been limited to kinds that were actually carrying flowers, and these totalled 24 species.

These observations were made in the company of Mr N. A. Wakefield, and, from Wulgulmerang onwards, we were accompanied by Mr K. C Rogers.

Almost all the species mentioned in Mr McCallum's report have been described and illustrated in Miss Jean Galbraith's series, "Australian Wattles", in the *Victorian Naturalist* from May 1959 onward. The attractiveness of those that flower along the Snowy River in September was emphasized in an article by Mr Rogers in the *Naturalist* of October 1960. That area has many attractions, but it is worth visiting in early spring just to see the wattles.

Rufous Fantail at Hamilton

Following the notes on the Rufous Fantail in these columns over the past few months, this comment has come from Mr I. R. McCann of Stawell:

On March 23, 1963, a party of Stawell Field Naturalists visited Hamilton for a meeting of the Western Victoria Field Naturalists Clubs Association. After lunching in Hamilton's delightful Botanic Gardens, members explored the area. A Rufous Fantail disporting in a tangle of shrubs provided an unexpected pleasure. The bird was not shy and, although it kept well within the cover of the shrubbery, I was able to approach quite close and keep it under easy observation for several minutes.

The normal summer range of the species is across southern Victoria, in the Otway Ranges and as far west as the lower Glenelg River area. In view of the appearance of one at Hamilton, one wonders if the species reaches the Grampians or the Mount Cole area.

Tuan near Queenscliff

Major H. L. Bell comes from Sydney and his interests are mainly ornithological. However, he is at present attached to the Staff College at Queenscliff and from there has sent this mammal observation:

Squashed on the main Geelong-Queenscliff road near Marcus Hill was a Brush-tailed Phascogale (*Phascogale tapoatafa*). I have no doubt as to the identity. Although a little rotten, the head was in reasonable condition. Unfortunately the rest of it was so mangled that sex could not be determined, and my enthusiasm did not extend to scraping the remains off the road. The tail however was easily recognized. I had looked after one of these animals some fifteen years ago, in Sydney, so you can rest assured on the identification.

In actual fact, I was in a hurry on my way to joining the Staff College (June 6th) and almost drove past assuming that the corpse was a rat, but had a second thought so backed 200 yards to have a look.

There is no bushland around the area and such trees as exist are remnant banksias and she-oaks along the road, introduced trees, and those dreadful-looking Sugar Gums in which Victorians seem to set so much store. Anyway—phascogale it was!

Being nocturnal, the tuan or brush-tailed phascogale is not normally seen by the casual observer, though records show that it is widespread, but perhaps not abundant, in the lightly forested areas of Victoria. The fact that it survives on the Bellarine Peninsula, from which the forest has virtually disappeared, is of considerable interest.

Notes on the History and Vegetation of Mount Napier

By J. H. Willis*

When Major Thomas L. Mitchell marched through his "*Australia Felix*" (now the fertile Western District of Victoria) during winter and early spring of 1836, he climbed a large proportion of the mountains in his path, from the Murray-Mallee to the sea: Mt Hope, Pyramid Hill, Mounts William, Zero, Arapiles, Eckersley, Napier, Stavely, Abrupt, Cole, Greenock, Macedon and Alexander. All except the last one still bear the names he then bestowed. Each peak, whether of granite, sandstone or lava, had a distinctive "personality", but none seems to have fired the good Major's enthusiasm more than 1453-feet Mount Napier (in Napier Hamilton). This bold prominence was doubtless named—although Mitchell does not say so—after Admiral Sir Charles Napier with whom he was associated in the Peninsula War of 1808-14, Sir Charles being official historian and Mitchell cartographer of the campaign sites.

The mount was first sighted, by Mitchell, from the top of little Mount Eckersley (at Heywood) on August 28, 1836. A week later (September 4) he struck out eastward from near the present site of Branxholme, and by late afternoon his party arrived at the foot of Mount Napier. Here follows an extract from Mitchell's journal, published in 1838:

> On reaching the summit I found myself on the narrow edge of a circular crater, composed wholly of lava and scoriae. Trees and bushes grew everywhere luxuriantly, except where the sharp rocks shot up almost perpendicularly. The igneous character of these was so obvious, that one of the men thrust his hand into a chasm to ascertain whether it was warm. The discovery of an extinct volcano gave additional interest to Mount Napier.

This first ascent was towards evening, and Mitchell was obliged to camp at the western foot of the mount overnight. He attempted to climb it again next morning, but mist and heavy showers drove him back—he could "see nothing of the distance". On September 9, he returned and climbed Mount Napier from a more north-westerly direction; but, although the morning had been fine, he had no sooner made the ascent than "rain-clouds gathered in the south-west and obscured the horizon on all sides". Mitchell did clear a station for his theodolite and, at intervals, he took bearings on to the Grampians and Mount Rouse (about 13¼ miles east of Napier) which he also named. Next day (September 10) he ascended Mount Napier for the fourth time, and at last obtained "a clear and extensive view from it in all directions"—including the Lawrence Rocks near Portland. Mitchell estimated the width of the crater as 446 ft and its

* Royal Botanic Gardens and National Herbarium of Victoria.

average depth at 80 ft, with a narrow breach toward the west-north-west. He mentions one species of "moss" that "very much resembled the *Orchilla*"—a valuable plant that "occurs on similar rocks at Teneriffe". *Orchilla* is not a moss but the lichen *Roccella tinctoria*, source of an important purple dye.

In the surrounding country Mitchell noted that the SE. slopes of openly forested hills were soft, boggy and covered with banksias. He collected the type of *Dillwynia hispida* (Red Parrot-pea) near Lyne Creek (6-7 miles west of Mount Napier). In swamps near Yatchaw (north of the mount) he found among the grass a golden flower which, from his sketch, could have been *Ranunculus robertsonii*.

Thus, Napier holds the unique distinction among Victorian peaks of having been climbed by its discoverer four times within a week. During the next 127 years, however, it has suffered astonishing neglect by naturalists—at least, in so far as published reports would indicate. Several early scientists and explorers passed near, but failed to climb, this mount while en route for the higher, more spectacular peaks of the Grampians, for example: Ferdinand Mueller (November 1853), Carl Wilhelmi (January 1857), James Bonwick (1857) and George Neumayer (May 1862).

During 1857 Bonwick toured the Western District of Victoria, as an inspector of denominational schools, and gave fascinating accounts of the localities visited in a booklet published the following year. Recalling his journey from Branxholme to Hamilton he wrote (p. 143):

> Only 16 miles eastward would have taken me to Mt. Napier. . . . Often did I look round to Old Napier as I slowly rode onward to the Grange, and forward thence to Dunkeld, and earnestly did I long to ascend its rugged sides.

Professor Neumayer, whose magnetic surveys led him all over Victoria between 1858 and 1864, viewed Napier from Mt Rouse (13½ miles to the east) on May 5, 1862; he was heading toward Dunkeld and much regretted his inability to visit the larger western mount. There are no more than a few casual references in all the past 79 volumes of the *Victorian Naturalist*; and no excursion party from the F.N.C.V. ever seems to have taken Mount Napier in its stride, although the much

younger Field Naturalists Club at Hamilton has paid several visits. Mr E. M. Webb ascended the mount, with the late Charles McGennisken acting as local guide, during June 1941. In a delightful article, "The Little Mountains", Webb (1943) pays this eloquent tribute:

> The most beautiful mountain of all, when seen from the proper angle, is Mount Napier, about eight miles south of Hamilton. It is an old volcano with a deep crater and alternating steep and sloping sides. I had seen its top often but it was not until I came on it from the south that I realized how truly lovely it was.
>
> Coming up from Portland towards Hamilton, you strike east at Myamyn to pick up the Macarthur-Hamilton road. On the way Mount Napier presents itself, a perfect thing of misty blue, rising symmetrically out of the bluestone plain with gently sloping sides leading up to the concave top which indicates the crater.
>
> As you draw nearer the blue changes to a vivid green, for the slopes are studded with trees. I made a detour to reach it and presently, after a fairly easy climb, was on top. Indications of its last lava flow can be picked out along one of the creeks.

Professor E. S. Hills had examined this area geologically in the 1930s. One of the many photographs taken then is reproduced in his excellent *Physiography of Victoria* (1940), viz. fig. 234, a block diagram on p. 262 also showing Mt Napier in relation to its lava flows. Napier provided all the lava that poured down ancient SW.-trending creek valleys to form the Byaduk Caves, whose remarkable wealth of ferns and mosses was discussed by A. C. Beauglehole and N. F. Learmonth (1957). Cinders and scoria marked the final phase of vulcanicity here, as in other parts of the Western District.

After Major Mitchell's initial survey, Mount Napier was first used as a trigonometrical vantage point by Mr Allan for the official triangulation of western Victoria in April 1869. About this time its scenic interest also must have been realized at government level, for on June 2, 1873, a notice of intention to be gazetted as a reserve was submitted to the Executive Council. Nothing seems to have come of this move, and the rocky region immediately surrounding the peak remained unalienated Crown Land—it was too rough and unproductive to be worth selecting as freehold.

In 1914, residents of the Buckley Swamp district, near Hamilton, raised funds for a suitable cairn on the summit, to commemorate Mitchell's discovery of August 1836 and first ascent. The present marble tablet against the cairn announces that it was: "Erected in his honour by school children of the district. Discovery Day 1915". By October 1917 the memorial had suffered some defacement by vandals.

It was not until September 1921—nearly half a century after the first expressed "intention to reserve"—that a permanent reservation for public purposes was made by Order in Council. This area of 344 acres comprised the whole peak and part of the Manna Gum woodland around its northern flank. A committee of management was appointed at once, the secretary being Mr Charles McGennisken of Hamilton who held this position until shortly before his death in 1944.

During the whole decade 1923-

33 the reserve was being rented for grazing by an adjoining landholder on the east (Mr Joseph Fell); his fees were doubtless the principal source of revenue for any improvements contemplated by the Committee. But, as boundaries had never been fenced, there were disputes with property holders over alleged intrusions to cut timber within the reserve. This led to a new survey by Alf. King in September 1933 and the preparation of a more accurate map, whereby the acreage under reservation was shown to be 348 (*cf.* the original estimate of 344). The Committee of Management lapsed in August 1943, after just 22 years, and it has never been resuscitated. A public meeting was called at Hamilton toward the end of 1943, to appoint a new committee. No one attended, and all attempts during the next two decades to stimulate sufficient local interest have proved abortive. The whole area was swept by disastrous fires in early January 1944, and the only public building erected there (a cement floored shelter hut) is now in a very sorry state of disrepair. Several exotic trees had been planted for ornament in the vicinity of the hut; of these there are still three pathetic survivals—a Sugar Gum, Mahogany Gum and Dutch Elm.

Extending north-westerly from the mount for about $2\frac{1}{2}$ miles is a Timber Reserve of 1616 acres. It occupies part of a rocky wilderness, exactly comparable to the Stony Rises between Colac and Camperdown, and just as useless for farming. Almost the only trees of the region are Manna Gums (*Eucalyptus viminalis*) and small Blackwoods (*Acacia melanoxylon*), with occasional clumps of Tree Everlasting (*Helichrysum dendroideum*) and everywhere an abundant ground cover of bracken (*Pteridium esculentum*).

For many years I had wanted to scale and explore this very commanding, isolated volcanic mountain, mentioned in such glowing terms by Mitchell (1838) and Webb (1943). Botanical colleagues Cliff. Beaglehole (of Gorae West) and Lionel Elmore (of Hamilton) very willingly made available their plant lists for the mount, compiled as a result of brief sorties there in December 1960 and November 1958 respectively—the total was not impressive. My opportunity came on Sunday, May

19 last, when kind friends at Camperdown, Mr and Mrs Gordon Beaton, volunteered to drive me in spite of prevailing dull, showery weather; Miss Gina Black of Noorat also joined our small excursion party. We turned off the Penshurst-Hamilton Road about 3 miles west of Yatchaw and travelled south-easterly until almost abreast of our "quarry"; then drove westward through four private gates along an indifferent winding track that terminated at the "Chalet". This structure, in its park-like setting among Manna Gums and groves of Blackwood, was once a trim corrugated iron hut with built-in fireplace; but vandals have torn the metal sheets from two sides, peppered the remainder with shot-holes and otherwise wrecked the place. From the hut a foot track leads straight up one of the steepest faces of the mount, and this is fast becoming a major erosion channel. Everywhere is evidence of repeated fires, infestation by rabbits, unrestricted grazing and the concomitant spread of many weeds—a sorry spectacle indeed!

In vigour and variety, the present flora within this 348-acre reserve compares poorly with that to be observed at the much smaller Mount Eccles National Park (81 acres) not far to the south; but Eccles has a deep crater lake, while Napier is quite waterless. After careful searching for several hours, I could record no more than 38 native species of higher plants and 21 of weeds. Mr Beauglehole's figures were 55 and 22; however, his visit had been in early summer when several kinds of small seasonal herbs were still in evidence. Not a single representative of the sedge, lily or orchid families was discerned anywhere last May; but Beauglehole had listed two small sedges (*Scirpus antarcticus* and *Carex breviculmis*), while Elmore had noted a single plant of Early Nancy (*Anguillaria dioica*) near the summit in 1958. The total vascular flora from all observations now stands at 64 indigenous and 33 naturalized alien species, a complete list of which has been filed at the National Herbarium, South Yarra. All of the plants recorded are widespread through Victoria and mostly of quite frequent occurrence, although some were rare enough on Mount Napier. Such poverty is no doubt a cumulative result of the various destructive agencies mentioned above.

At the summit, I looked in vain for the trees and bushes that Major Mitchell found growing so luxuriantly. All have vanished long since, and it is not easy to visualize a stand of timber so thick that Mitchell had to use an axe before he could get a satisfactory prospect for his theodolite. The whole summit area and slopes, for 200 to 300 feet downwards, are now completely bald, save for the low cover of herbage—a stunted form of the Variable Groundsel (*Senecio lautus*) which tends to increase with successive fires, bracken, introduced grasses, clovers, thistles and other weeds. One decrepit, very stunted bush of Tree Violet (*Hymenanthera dentata*) was found in a crevice at the western top of the crater-rim. Burnt remnants of Manna

Gum forest cling to the steeper eastern declivities; but it is encouraging to see numerous seedlings of this climax species recolonizing lower ground on the northern side. Mitchell had flushed a Bronzewing Pigeon from the mountain top; we hardly saw or even heard any evidence of birdlife all the morning.

The axis of the peak lies east-and-west, with the small but near-perfect crater situated at its western extremity. The precipitous western half of the crater-wall is a veritable razorback, consisting of ropy lava and scoriaceous material of a vivid brick-red hue. A narrow breach toward the north-west is surrounded by cliff-like walls; it leads down to a small cave (or lava tunnel) near the foot of the mount on that side. Hedgehog Grass (*Echinopogon ovatus*) occurs here with Wallaby-grass (*Danthonia pilosa*) in damp shady spots among big boulders; Maidenhair (*Adiantum aethiopicum*) is also present in small quantity, but Rock Fern (*Cheilanthes tenuifolia*) is commoner.

An enticing objective was to search for the lichen that had so forcefully reminded Major Mitchell (1838) of *Roccella tinctoria* on similar volcanic rocks at Teneriffe (Canary Islands). A few colonies of *Cladonia aggregata*, *Sticta crocata* and *Parmelia* species are to be found encrusting the highest walls of the crater; but the only growth bearing the remotest resemblance to *Roccella* is a "beard lichen" (*Usnea meridionalis*), remarkable for its inflated branchlets. Although Mitchell was a careful observer, his knowledge of cryptogams must have been very limited or he would never have called *Roccella* a "moss"; so, perhaps it is no great wonder that he should also confuse *Usnea* with a non-Australian lithophytic species of *Roccella*—both being fruticose lichens with slender ramifications.

On the occasion of our short visit, botanical interest centred chiefly in the fungi inhabiting stumps, logs and damp litter under the luxuriant crops of bracken fern. Some 16 species of agarics were noted, mostly delicate elf-like members in the large genus *Mycena*. Of relatively giant-size was a honey fungus (*Armillariella* sp.) which grew in immense orange-yellow clumps of up to 100 sporophores at the bases of occasional dead gum-trees. Another highly ornamental object proved to be a vinous purple *Merulius* — thin, furry brackets that completely encircled the top of a chopped-off eucalypt stump, where they sprang from between the freshly exposed sapwood and separating bark. Mr Beaton had a busy time among the tiny disc- and cup-fungi (his particular specialty), and a few worthwhile records were established.

We came away quite satisfied with our morning's hunt, convinced that even an unpromising, fire-damaged "little mountain" has much still to offer the enthusiastic naturalist. And, after all, the geological structure for which Mount Napier is chiefly renowned, will always remain intact—unlike Tower Hill, Mount Leura and other volcanic hills that have been scarred or mutilated by quarrying.

ACKNOWLEDGEMENTS

Thanks are gratefully tendered to fellow officers of the Lands Department who enabled the writer to peruse the file relating to Mount Napier Reserve, to Messrs Cliff Beauglehole and Lionel Elmore for sharing their respective botanical observations, and to Mr Geoff. Stephens (of Hamilton) who made a special trip to secure photographs of Mount Napier for the present article.

REFERENCES

Beauglehole, A. C., and Learmonth, N. F. (1957). The Byaduk Caves. *Vict. Nat. 73*: 204-210.

Bonwick, James (1858). *Western Victoria; its Geography, Geology, and Social Condition* (p. 143).

Hills, E. S. (1940). *The Physiography of Victoria* (figs. 234, 262).

Mitchell, T. L. (1838). *Three Expeditions into the Interior of Eastern Australia 2*: 235, 245-52.

Neumayer, G. (1869). *Results of the Magnetic Survey of the Colony of Victoria* (p. 59).

Webb, E. M. (1943). The Little Mountains. *Vict. Nat. 60*: 70-72.

Notes on Rock-wallabies

By N. A. WAKEFIELD

During the past ten years, the *Victorian Naturalist* has published two articles dealing with *Petrogale penicillata*, the Brush-tailed Rock-wallaby (Wakefield, 1954, 1961). In these reports, details were given of early distribution and apparent disappearance in Victoria, then of rediscovery in north-eastern Gippsland, disposition of local colonies, and some habits of the animals. The present article gives an account of the finding of further colonies of rock-wallabies in the Snowy River district of Gippsland and of the establishment of a wildlife reserve there for conservation of the species. There are notes of investigations, with negative results, of reports of rock-wallabies in other parts of Gippsland and about the Snowy Mountains. Finally, some details are given of occurrences in eastern New South Wales, a record from Deniliquin is discredited, and a sub-fossil occurrence in south-western Victoria is recorded.

FURTHER COLONIES IN GIPPSLAND

During late 1961 and early 1962, exploration of the upper (Victorian) Snowy River valley was continued by K. C. Rogers and other local naturalists. Their efforts were rewarded by the discovery of several more rock-wallaby habitats to the south of the group of colonies already known in the Suggan Buggan-Little River-upper Buchan River area.

This work was summarized by Rogers in an article entitled "Rock Wallabies in East Gippsland", on pages 4-8 of a roneo publication, *The Clematis*, issued by the Bairnsdale Field Naturalists Club in October 1962. Relevant extracts are as follows:

> In October 1961, the writer found that a small colony was living again near the top of Hanging Rock, in a crevice facing the east.
>
> To complete the rock-wallaby picture on the watershed of the Buchan River, an examination was made of the steep west spurs of Mt Seldom Seen (4000 feet) on October 15, 1960.* Several of the spurs leading to the Buchan River are very precipitous from the 3700 foot level down to 3000 feet. All spurs were examined over three different excursions and rock-wallaby droppings were found over an area including most of the west of the mountain down to 3000 feet. On the first of the three excursions a much used lair was found and one rock-wallaby was seen. This was quite unexpected because there was no previous knowledge of these animals in the vicinity.
>
> On December 26, 1961, K. Rogers and C. Bowden examined the Little River gorge below Farm Creek and found only meagre evidence of rock-wallabies visiting that lower portion of the gorge. It is likely that no colony is living there. After camping for the night in Farm Creek, further exploration was carried out up the creek and also under the cliffs high on the west side. Here there was ample evidence of quite a number of rock-wallabies over a very considerable area of the Farm Creek valley. Further high, cliff-bound outcrops running in a north-westerly direction from Farm Creek remain to be explored.
>
> On December 30, 1961, L. Hodge and I set out to explore the Snowy

*Actually, it was a year later, on October 15, 1961.—*N.A.W.*

River valley from the Little River junction to Campbell's Nob for the purpose of observing the flora as well as the rock-wallabies. The east bank of the Snowy could not be investigated. After traversing a granite basin, the Snowy enters the volcanics and at once becomes cliff-bound on both sides. In places it is necessary to climb the precipitous sides to get round sheer bluffs rising from the swirling waters. Rock-wallaby droppings were noticed before reaching Boundary Creek but there was another colony along the cliffs well below high flood level. Yet another colony had been discovered in Boundary Creek on a trip made a month or so earlier with Mr F. Clemm.

On December 31, 1961, after an overnight camp at the mouth of Currie Creek, it was found that more rock-wallaby signs extended for a considerable distance downstream. One rock-wallaby was sighted as it fled off through the scrub on the steep hillside. The smooth granite formation was then visited but no more rock-wallaby traces were seen.

In all it was estimated that rock-wallabies occurred at intervals over a distance of about six miles along the Snowy River. Other gorges entering the Snowy between Campbell's Nob and Tullach Ard remain to be explored. Much of the east side of the Snowy River is very precipitous and appears to be an extremely good harbourage for rock-wallabies.

The most recent rock-wallaby discovery was made near Mt Deddick about 3 miles east of the Snowy River at McKillop's bridge. This was made with P. Hodge on June 20, 1962. It was found that these wallabies frequent a narrow, jagged razor-back spur of sedimentary rock between two branches of Old Joe's Creek a little south of Mt Deddick. Looking south, there appears to be a number of cliffs likely to harbour rock-wallabies.

These discoveries provide an extension of the general northern area known to be occupied by rock-wallabies, southward towards the apparently isolated colony along the Snowy River east of Butchers Ridge. It is almost certain that there are intermediate occurrences.

The status of *Petrogale penicillata* in Victoria is lucidly summarized by Rogers, in his article, in these words:

To the date of writing (August 1962) all the authenticated known areas where the rock-wallaby occurs in Victoria are within the watershed of the Snowy River. In most cases rock-wallabies are to be found either high up along the precipitous escarpment of the tableland, which overlooks the steep valleys and gorges, or else deep down in the gorges along the rock-strewn rivers and creeks. They prefer the rugged cliffs where there are plenty of broken rock masses with holes and crevices for shelter and protection, rather than the great open faces so common in these areas. Rock-wallabies also appear to choose the drier and more sunny aspects for their lairs in preference to the shady sides.

Most rock-wallaby colonies discovered to date are in the geological formation now classed as the Snowy River volcanics. They are chiefly composed of rhyodacites (A. E. Ringwood) and were originally described by A. W. Howitt as Snowy River Porphyries. The exceptions occur where colonies are found among rocks of sedimentary origin—Mt Seldom Seen, east of the Buchan River, and Mt Deddick, east of the Snowy River. An interesting fact is that adjacent basins of granodiorite formation, which, through weathering, have less precipitous outcrops, are not favoured by rock-wallabies to any extent.

The area including all the colonies known to date, extends from Mt Stradbroke in the north to the lower Snowy River in the south—a distance of about 25 miles. The east to west measurement, from near Mt Deddick to the Buchan River near Bentleys Creek, is 20 miles.

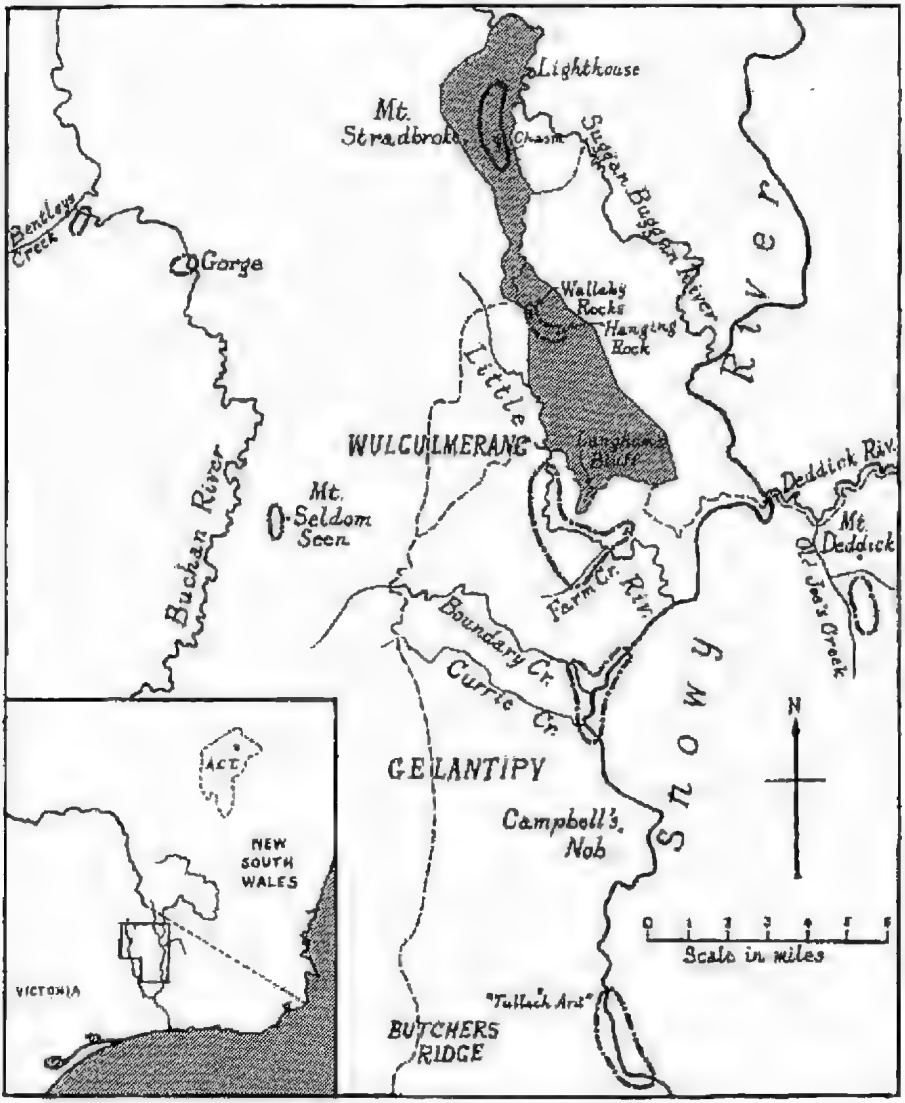
Details of this distribution are shown on the accompanying map. It will be noted that a fairly extensive colony area is indicated to the south of Mount Deddick, but that one place

shown on a previous map (Wakefield, 1961) has been omitted. These two points are touched upon by Rogers (*in litt.*, September 9, 1963), in these terms:

On October 13, 1962, C. Bowden and I found that two colonies of rock-wallabies were living in the

Map of rock-wallaby habitats in eastern Victoria.
General colony areas shown thus —·—·—·—·—
Main roads thus ————————————
Rocky Range Wildlife Reserve is stippled.

Inset shows locality of the large-scale map.



cliffs referred to, southwards from the one we found near Mt Deddick on June 20, 1962. All three colonies are within the various branches of Old Joe's Creek.

As for the Lower Limestone area, it would be wiser not to count it as a rock-wallaby haunt. I did once find a few very old droppings that I then took to be of rock-wallaby, up on a big cliff on the east side of the Buchan, not far south of the Lower Limestone Creek, but no other trace has been found in that area to date. I will examine the spot again in case of further signs.

The Victorian colonies represent by far the strongest survival of the species in south-eastern Australia. In this connexion one cannot do better than quote the concluding sentences of Rogers' article:

> It is pleasing to note that this attractive little wallaby is more numerous than was at one time supposed. The gaining of this knowledge has been ample reward for the many strenuous expeditions amongst the towering cliffs and the deep gorges of the Snowy River country.
>
> May its inaccessibility continue to provide lasting protection for the rock-wallaby.

Rocky Range Wildlife Reserve

In the 1961 report (*l.c.*), an indication was given of some conservation measures being considered by the Victorian Fisheries and Wildlife Department. This planning resulted in the gazettal, of a reservation some 15 square miles in area. It includes the colonies under Mount Stradbroke and at the Wallaby Rocks, and extends from the "Lighthouse" on the Suggan Buggan River in the north to the Turnback Road below Langham's Bluff in the south (see map).

The Department envisages a management programme at the readily accessible Wallaby Rocks, involving a square-mile enclosure bounded by vermin-proof fencing, with control of foxes and rabbits, and probably with artificial feeding of the rock-wallabies. If these measures improve the status of the colony sufficiently, consideration will be given to the question of recolonizing places such as Langham's Bluff.

Investigation of Adjacent Districts

Moroka River

In the 1961 article (*l.c.*), mention was made of a report that in 1923 there were rock-wallabies near the junction of the Moroka and Wonnangatta rivers, in northern Gippsland. An investigation of that locality, in November 1962, has been described recently in this journal (Wakefield, 1963). Though it is considered unlikely that the original Moroka report was correct, another excursion is needed to complete the examination of that area.

Benambra District

For many years there have been rumours that rock-wallabies still survive on Mount Tambo and other outcrops in the vicinity of Benambra.

In June 1962, Rogers visited both Mount Tambo and a crag known as McFarlane's Lookout. An extensive examination of the former produced no positive evidence of any of the animals. On the contrary, the nature of the rocks and other details indicated

Rock-wallaby, on limestones of the Jenolan Caves Reserve.

that there were no rock-wallabies about that mountain.

McFarlane's Lookout also yielded no definite results on that occasion, but there were some promising indications. Rogers and I examined the place again in November 1962 and came to the conclusion that there were no rock-wallabies there.

Rodger River

This stream joins the Snowy from the eastern side about eleven miles north-east of Buchan. Having visited it by canoe in 1938, I remembered the rhyodacite gorge, through which the Rodger finally flows, as a seemingly ideal rock-wallaby habitat.

Being well to the south of the known area of colonies, the Rodger gorge warranted further investigation. This was carried out in January this year, in the company of Rogers and J. McCallum, the latter being a member of the F.N.C.V. Fauna Survey Group.

Although the starting point was East Buchan, a mere nine miles from our goal, it was not practical to attempt a direct crossing of the Snowy River. The alternative approach, via Orbost and along Forests Commission access tracks, involved a detour of about seventy miles.

The final stage was on foot, over rocky scrub-covered terrain and then, by way of a broken angle in the cliffs, down to the river.

Again, it soon became apparent that rock-wallabies did not live there; but the grandeur of the gorge and the beauty of the masses of reddish rock more than repaid our efforts in reaching the place.

Snowy Mountains Area

Costin (1954) indicated that the Brush-tailed Rock-wallaby occurred in both tableland and montane areas of the Monaro region of New South Wales.

Enquiry established that, for the Snowy Mountains district, information had been used from a joint report of the Linnean

Society of New South Wales and the Royal Australasian Zoological Society, to the Kosciusko State Park Trust, in 1946, the relevant data being:

Rock-wallaby (*Petrogale penicillata*). Reported as occurring in isolated small communities on rocky spurs of the Snowy River valley, on each side of the junction with Digger's Creek.

Two other very recent local reports, from widely separated parts of the ranges, were communicated (*in litt.*, May 16, 1963) by D. Wimbush, C.S.I.R.O. biologist stationed at Waste Point near Jindabyne.

All three localities were investigated several weeks ago (Aug. 31-Sept. 1) by Rogers McCallum and myself, and in our opinion none of the places provides rock-wallaby habitat.

Each area was on granodiorite, a formation not favoured by the species, and in the places where this did occasionally form somewhat broken outcrops, there were no suitable roosting-places or any sign of the unmistakable faeces of the animals.

Observations in New South Wales

Warrumbungle Ranges

Marlow (1958) indicates that the presence of *Petrogale penicillata* had been noted in the Warrumbungle area as early as 1906. In December 1961, it was reported from there again, in the bulletin of the New South Wales Fauna Protection Panel (*Wildlife Service*, Vol. 1, No. 12), in a letter by M. Keenan of Mendooran.

The latter report attracted the attention of M. Marsh of the Sydney University Zoology Department, who visited the area on two occasions and succeeded in trapping three of the wallabies.

Marsh made these comments (*in litt.*, October 24, 1962):

I found wallabies in two places three miles apart, the largest number of animals (at least four individuals, since three were marked and one unmarked one seen subsequently) at the locality described by Keenan, Chalker's rock. This is on private land, a sheep station owned by Frank Ferguson. It is volcanic rock, *not* limestone, in the form of a volcanic plug a couple of hundred feet or more above surrounding terrain. Open forest and sheep pasture and alfalfa surround it, the climate being dryish. The other locality, Belougery Split Rock, is in the Park, about 3 miles away. One or perhaps two wallabies were seen there, and droppings were sparser. We found no hide-aways or dropping concentrations, in fact. An elderly ranger told me that the rock-wallabies are sparsely scattered at other spots in the Park. This would probably be an interesting place to study movement and the extent of breeding contacts, since more than one local group exists.

Colour transparencies were obtained of the habitat and of the wallabies. Those that were captured submitted with remarkable docility to being handled and carried about prior to being released again.

Jenolan Caves

In January this year (1963) I visited the Jenolan Caves Reserve as a guest of the reserve overseer, H. Verboog. A few tame rock-wallabies were to be seen in the Grand Arch, but we visited another colony area which, though not far removed from tourist activity, still retains a group of animals that are quite wary of human beings.

Rock-wallaby, Jenolan Caves Reserve.
This is a typical stance, with tail used for balance rather than support.
Note march-fly on the animal's nose.

During an hour or so of exploration about the cliffy outcrops, no animals were seen though there was plenty of evidence that the area was occupied —the usual experience one has in the colony areas of Gippsland. However, a wallaby was eventually sighted high up on a shaded ledge and, during the process of stalking it, two more were disturbed from their daytime roosting-place. The first individual was probably a male, and it appeared to be aged and behaved as if it were partially blind. The others were a female and her half-grown joey.

The female was in quite good condition, and some time was spent endeavouring to obtain photographs of her. It was a small camera fitted with a 135 mm. lens, and one had to handhold it while perched somewhat precariously on a ledge or sloping face. The results were not of high standard, but two of the pictures are reproduced here to illustrate the animal and its habitat. During the episode, march-flies persistently pestered the wallaby, which was almost continuously using a paw to brush one from her nose.

The joey was about twelve inches in height—a little animal delightful both in form and in movement. It would disappear behind a rock mass and, with care and by judicious use of cover, one could approach it quite closely. As one looked cautiously round a corner, the joey might be only a few feet away, and it would stay poised, hair-trigger, ready to flee once more. Further movement by the observer always sent the little fellow scampering, with a series of staccato hops, off into the maze once more. That nimble little rock-wallaby was not to be photographed!

Adjacent to the den of the small family, in a narrow passageway between a huge block and the cliff, there was a graveyard containing skeletons of four rock-wallabies. A group

like that could have been killed by a bushfire or by a plague of some kind, but different colouring of the bones indicated that some remains had lain there longer than others. They did not represent the prey of foxes, for those predators chew away the snout of a victim. And they had not died of senility; the teeth showed that, at the time of death, one had been juvenile, two were young adults, and only one was aged. The remains were gathered up and eventually lodged in the mammal collection of the Australian Museum.

Verboog reports that the tame rock-wallabies at Jenolan have improved considerably in condition since being supplied with protein-rich food in place of bread scraps from the hotel. He estimates that there are only about fourteen individuals in the whole area but hopes that judicious management will improve the numerical status of the group.

Records Farther West

Deniliquin, N.S.W.

The record by Marlow (*l.c.*) of a specimen of rock-wallaby taken at Deniliquin in 1911, is based on material in the National Museum of Victoria. Two specimens are concerned, and they were first noted in the register as having come from a "zoo". Later the reference had been altered to "Deniliquin". It cannot be accepted that the species inhabited the Riverina plains in that region.

Byaduk Caves, Victoria

On April 21, 1961, sub-fossil remains of a rock-wallaby were found by L. K. M. Elmore in the Bridge Cave (or Bat Cave) near Byaduk, about ten miles south of Hamilton, south-western Victoria. The bones were "on rocks in cavern behind bat chamber", and they comprised an almost complete skull, with well-preserved adult dentition, and a number of large pieces of post-cranial bones. The specimen is of *Petrogale penicillata*, with features virtually identical with those of East Gippsland material.

There is little doubt that the Byaduk specimen does not represent a modern occurrence of the species in western Victoria. It would belong rather with the early group of mammal fossils from the Western District basalts, presumably dating back several thousand years.

Acknowledgements

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References

Costin, A. B. (1954). *A study of the ecosystems of the Monaro region of New South Wales, with special reference to soil erosion.* Soil Conservation Service of New South Wales, Sydney. (Page 102.)

Marlow, B. J. (1958). A survey of the marsupials of New South Wales. *C.S.I.R.O. Wildlife Research 3 (2)*: 71-114.

Wakefield, N. A. (1953). The rediscovery of the rock-wallaby in Victoria. *Vict. Nat. 70 (11)*: 202-6.

———(1961). Victoria's rock-wallabies. *Vict. Nat. 77 (11)*: 322-32.

———(1963). Visit to Moroka Glen. *Vict. Nat. 80 (3)*: 64-8.

Native Stone Arrangement at Carisbrook

By A. MASSOLA

In June 1840, when Simson occupied the Charlotte Plains*, the aboriginal inhabitants were already congregated at the Lodden River Protectorate (*Larrne-Barramal*, the Home of the Emus), presided over by Assistant Protector Parker. The reason for this herding seems to have been a genuine desire on the part of the Protector (A. G. Robinson) to remove the natives from the vicinity of the European settlements and their bad influences. The idea was to protect the black from the white. That the purpose was not the reverse can be gathered from the fact that, with the exception of spearing a Mr Allan (possibly a revenge killing), no serious depredations had been committed by the aborigines of this district; in fact, they soon became very useful to the settlers, who employed them for such duties as cutting bark, carrying mail, sheep-washing, and sheep-herding.

In spite of the good relationship thus apparently established between the two races, the white man did not progress very far in the learning of the black man's ways. This, of course, was not a local phenomenon, but occurred everywhere in Australia, the settlers expecting the black man to absorb the white man's accumulated knowledge of 60 centuries during the course of a very few years.

With the exception of a rather sketchy account by Assistant Protector Parker, no description of the natives of this district has come down to us. It is possible, of course, that the feverish activity of the gold-rush period, which came so soon after the first settlement of this part of the country, accounts for this lack. The gold diggers, intent on getting rich quickly, could not afford the time to take an interest in the aborigines; on the contrary, they were a nuisance to be got rid of as soon as possible.

The natives saw their sacred grounds dug up, their ways ridiculed, their elders shot down and their watering places confiscated. Bewildered, they saw their world crumble and the tribe disappear. The white man was not interested in their way of life, so they died without divulging it.

The district must have supported a numerous tribe, as the tribal territory was fully occupied. Scarcity of water seems to have been the main problem confronting some sections of these people. Preservation of natural resources was essential. This accounts for the native water wells excavated in places where the slope of the rock surface made a natural rain-water catchment. Several of these have been found in recent years (see *Vict. Nat.*, *73*: 48-50; August 1956).

*Now Moolort Plains, after Mount Moolort (1087 feet), the highest eminence on the plains. The name is a corruption of *moolaa*, which refers to an edible fern formerly growing there.

The sections of the tribe which lived on the Moolort plains probably fared better than those that lived on the wooded hills. A glance at a map of the plains reveals undulating country, with here and there a swamp on the low-lying parts. This type of country should ensure game and edible roots in quantity, as well as an abundance of water. Water is not only to be had from these surface deposits, as the Moolort Plains are bisected by Middle, Deep or Tullaroop Creeks (? *Tullark*, Marsh Thistle), and bounded by the Loddon River (*Polodgut*) on the north-east and Joyce's Creek (*Kneerarp*) to the south-east. *Kneerarp* probably is a corruption of *Neerark* — Reed Spear, suggesting reeds, used for spear-making, growing on this creek.

A deep water-hole on Middle Creek was known to the old timers as "Blackfellow's Waterhole"; this could have been a former native watering place.

This tribe (the Japawurong) was also fortunate in having in its territory a diabase quarry, from which very good stone axes were made and traded north, to the Murray people, and west, as far as Lake Hindmarsh. In exchange they received weapons of all kinds and possum skin rugs. The precise locality of this quarry has been lost. It was known to the natives as *Burreek*, which means Stone for Axes.

The name Deep Creek refers to the depth of the valley through which the creek flows, and not to the depth of the water, which is mostly shallow. This deep valley was very convenient, for it supplied numerous sheltered localities where ceremonies could be performed out of reach of the curious eyes of the women or the uninitiated. The camps, of course, would be on the high ground, from where the natives could keep an eye on the plains either for game or for approaching enemies.

In this type of country camping places are not as easily recognizable as they are on the coast. In the case of the latter, any sandy, wind-sheltered area, if within reasonable reach of fresh water, exhibits the remains of their food, mostly broken fire-scorched shells. In the plains of the inland, however, where the staple food was vegetable roots, no such easy indications exist. Certainly, in the old days these camps were characterized by the circular, or long oval, heaps of consolidated ash from fires or ovens. However, with the passing of the aborigines these heaps of ash became wonderful burrowing places for rabbits, and of late years farmers ploughed them over, in an effort to get rid of this pest. The only way to recognize the former presence of ovens now is to observe the ground. It will be found that, at these places, the soil is much darker and the grass grows more luxuriantly, due, no doubt, to the potash present in the wood ash.

Because of the inevitable disappearance of aboriginal sites, the recent finding of a ceremonial stone arrangement in a secluded spot of the creek valley is of great importance.

The position for this arrangement was chosen with some care

Boomerang-shaped arrangement of stones at Carisbrook.

by the aborigines. It is situated in such a place along the creek valley as to be unnoticed by people walking along either the creek or the surrounding cliff-tops. The stones used for the arrangement were gathered by the natives from the many fallen from the eroding basalt cliff side. These stones are not large, varying between 6 and 8 inches in diameter. They were placed side by side, forming a boomerang-shaped enclosure 6 feet wide and 95 feet 6 inches in a direct line between the two extremities. The centre of the curve of this boomerang-like enclosure is 26 feet from the direct line. Close to the apex of the curvature are the remains of two stone circles, about 6 feet in diameter, and a heap of small stone, obviously purposely piled up.

This type of arrangement corresponds closely with those described by various authors as being found in southern Queensland, New South Wales and South Australia.

It is possible that other stone arrangements or heaps were originally present on the lower, or creek side, of the "boomerang". However, up to 8 feet of fine white silt, the result of crushings, has been washed down from gold mines and deposited along the valley. Any traces of aboriginal occupancy along the creek would thus have been buried.

This find proves that the initiation ceremonies of the Victorian tribes were of a similar type to those of the rest of south-eastern Australia. The discovery demonstrates one more bond uniting the cultures of this whole area. We can only surmise that over the entire area the ceremonies would also have been conducted in a similar manner, and were for the initiation of youths into the man's status. This is best explained by the French with the term "Rites de Passage", or "ceremonies of passing" (from young man to manhood). They symbolize the disappearing of the child, who has up to now been under the control of the mother, and the birth of the man from the body of the child. The newly initiated youth is thus symbolically transferred from the care of the

women to the control of the tribal elders.

A number of lumps of red ochre and a pounding stone were found in the immediate vicinity of the arrangement. The red ochre would have been used for decorating the bodies of the participants at the ceremonies. The pigment quarry where both red and yellow ochre was obtained is an outcrop of hematite and associated limonite about one mile downstream from the arrangement, on the opposite side of the creek. There is local evidence to show that this outcrop was quarried.

Until this year the locality where this stone arrangement is situated was covered by a vigorous growth of variegated thistles. This pest, introduced with grass seeds by the early colonists, has a certain food value, and is, at some stages of its growth, eaten by cattle. Unfortunately for the farmers, but in this instance fortunately for the anthropologists, it spreads very rapidly, and once established, forms an impenetrable barrier to humans and animals alike. Having taken a foothold on this rocky valley, it spread over and effectively guarded the stone arrangement. It was not until the thistle was destroyed by aerial spraying that the existence of the undisturbed ceremonial ground was revealed.

The honour of this discovery belongs to Mr W. J. Wilson, of Carisbrook. Mr Wilson had, in fact, known of the existence of this arrangement for almost forty years, having noticed it during a period when, for some reason, the thistle was unusually sparse. It was only very recently, however, that with the clearing of the pest and the arrangement becoming fully visible, he disclosed his discovery.

Only one other stone arrangement has previously been reported from Victoria. This was in 1878. It was on a basalt islet in Lake Wongan, near Streatham, but is now non-existent, as cattle have displaced the stones and completely obliterated any sign of an arrangement. Steps are being taken to prevent this tragedy repeating itself at Carisbrook.

In Memory of H. P. Dickins

It was a gracious gesture of the F.N.C.V. to confer an Honorary Membership on Herbert Peabody Dickins in 1962 when he reached his 90th anniversary. He joined the Club in 1925.

Before the days of colour photography he was one of a band of artist members which included H. T. Reeves and W. H. Nicholls, whose hand-coloured photographs and paintings of Australian wildflowers did so much to popularize our native flora.

Herbert Dickins was a practising commercial artist for fifty years. He specialized in illuminated addresses, many for European royalty and other distinguished persons, and he used Australian flowers and scenery in his designs. The F.N.C.V. badge, portraying *Correa reflexa*, was his work, and his painting of the Pink Heath was used as the official design of the floral emblem of Victoria. He painted illustrations for the books of two earlier club members—E. E. Pescott

and J. W. Audas—and twelve colour plates for the Shell Oil Company's book *The Wildflowers of Australia*, of which over one million copies were sold. He published two books, *Victorian Orchids* and *100 Australian Wildflowers*. His paintings had both charm and delicacy. Such was his love of native orchids that he bought a block of land at Belgrave (Victoria) to save the many orchids growing on it.

He was a co-trustee, with V. H. Miller, and a past-president of the Victorian Horticultural Society.

Mr Dickins was a member of the F.N.C.V. council for many years and was very helpful at the club's shows at the Hawthorn Town Hall. With his numerous friends in the printing trade he helped with publicity. He was a good leader of excursions, and his yearly trip along the Yarra by launch was very popular. He knew the history of the Yarra and as an artist he spent many years painting the ships in port, acquiring an extensive knowledge of shipping. He was a past-president of the Shiplovers Society and was affectionately called "the grand old sailor who has never been to sea".

He was one of the enthusiastic group of members who pioneered the Junior Field Naturalists Club at Hawthorn, twenty years ago, and he retained his interest in it until his death on June 22, 1963. He was always cheery and enjoyed living—a happy egotist.

—L. YOUNG.

The Skipton Lava Caves

By C. D. OLLIER

The well-known Skipton Caves, about 30 miles west of Ballarat, have been described before, but so far as is known no plan has ever been published, an omission which can now be rectified. The caves are located on the lower slopes of Mount Widderin, on the property of the same name about three miles south of Skipton on the Camperdown road. There is only one entrance, which leads to a number of chambers, and although there are a number of other hollows on the hillside, none of them leads in for more than a few feet.

The cave plan was surveyed by P. Matthews, C. D. Ollier and G. Rebbechi during an excursion of the Victorian Cave Exploration Society, using a prismatic compass and wire-reinforced linen tape. The cave sections were surveyed by M. C. Brown and C. D. Ollier using an abney level. A source of error in such a survey is the lack of any definite edge to the cave in such places as rock-falls or where the floor and ceiling meet at such a low angle that the outer edge is inaccessible and would, if mapped to the limit, give a false impression of the size of the main cave.

The caves are volcanic in origin and are of the type known as lava tunnels, which are fairly common in Victoria, as at Byaduk, Porndon and Mount Hamilton. These are formed when liquid lava inside a flow (in this case, erupted from Mount Widderin, which is an extinct volcano) continues to drain away after the cooled surface layer has solidified. In the right circumstances the liquid lava can

flow out leaving a gas-filled hollow behind. When such a hollow becomes open to the surface, usually by a later collapse of the roof, it becomes a cave and awaits exploration and description.

The typical shape of lava caves is a rounded arch or tunnel. The longer the cave relative to its breadth the more perfectly tunnel-shaped it will be; if the cave is rather broad for its length it becomes more dome-shaped.

The chambers at Skipton tend to be broad in comparison with their length, and elongated domes are typical. The Ballroom is the nearest approach to a true tunnel, and has a curved roof which comes right down to the floor at the edges. Remnants of tunnel shape can be seen in the Main Chamber, but the Skipton Caves have suffered extensive collapse, and so the original shape is not very obvious. Even the small chambers have collapsed, and the floors are covered with rockfall debris. The Main Chamber and the Ballroom are the largest chambers in the volcanic caves of Victoria.

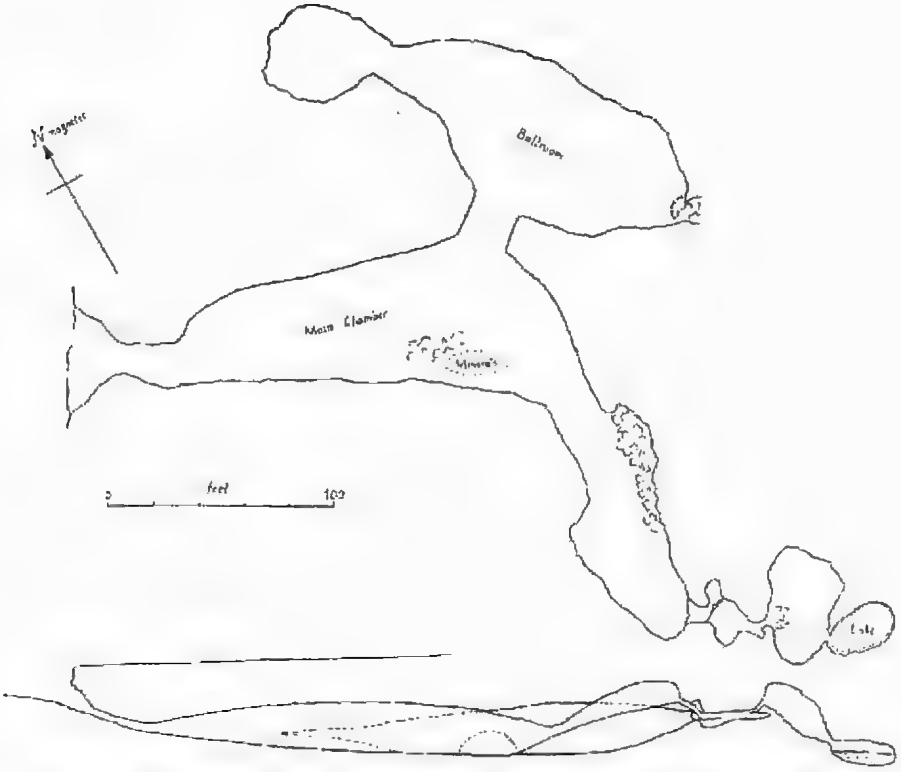
In plan, it is seen that the caves are not aligned in only one direction, but the Ballroom and the Main Chamber are subparallel. Some other chambers appear to be more or less in line with the Main Chamber but it is clear that each chamber was formed to some extent independently. The connexion between the Ballroom and the Main Chamber is a fairly small opening, and is lower than the roof of either of the large chambers.

The Skipton Caves are unusual in containing permanent water, and the lowest chamber is occupied by a small lake. This was full of water at the time of the survey, and so was not accurately surveyed, but the water is over six feet deep, and several yards, perhaps ten, across. It has a remarkable blue colour when seen by either electric or acetylene lamps, although the water is said to be quite pure. The surrounding rocks are not at all blue, and the water appears clear when seen at the surface. It is used for irrigation, and although the lake-level may become low in times of drought the lake has never run dry. The surrounding country is relatively dry, due to the permeability of the volcanic rocks, and the underground lake must owe its existence to an impervious layer at depth.

No bats live in the cave at present, but in 1875 Selwyn wrote as follows:

> Thousands of bats inhabit these caves, hanging in clusters from the roof like a swarm of bees, and on the floor are large conical mounds of rich brown earthy matter, containing imbedded pieces of crystallized gypsum. The deposit itself consists entirely of the excrement of the animals.

The presence of this long-undisturbed guano in association with basalt (which may have provided magnesium in solution) has led to the growth of some extremely rare minerals. Struvite, the main one, is found only in Skipton Caves and Patagonia. It is a complex magnesium ammonium phosphate, and only the unique conditions offered by the Skipton caves have led to its growth. Other minerals present are newberyite, dettmarite, hannayite and schertelite (synony-



SKIPTON LAVA CAVE: PLAN AND PICTORIAL ELEVATION

There is a vertical exaggeration of 2× in the elevation

mous with muellerite), and there are yet others which were reported in early papers but are now unknown. The locality of the mineral deposit is shown on the map. In the past, several tons of the guano were removed for use as fertilizer, but a good deal was also taken for minerals, and specimens are to be found in museums throughout the world. Fletcher reported in 1895 that several tons of guano were turned over, but no bones or other fossils were found.

There are no calcite stalactites at Skipton, such as are found in the lava caves at Byaduk and Mount Hamilton, and there are no good lava stalactites or other decoration, presumably because of the large amount of collapse that the Skipton Caves have undergone.

Thanks are due to Mr C. Notman, owner of "Mount Widderin", for his continued interest and assistance in all aspects of the examination of the caves.

REFERENCES

Selwyn, R. C., and G. H. F. Ulrich, 1866. *Notes on the Physical Geography, Geology and Mineralogy of Victoria.* Melbourne.

Fletcher, R. J., 1895. Notes on a recent visit to some basalt caves near Skipton. *Vict. Nat. 12 (5)*: 53.

Field Naturalists Club of Victoria

General Meeting—September 9, 1963

About one hundred and thirty members and friends attended and Mr M. K. Houghton presided. He welcomed Mr and Mrs J. R. Hudson back from England.

The secretary announced that the Bird Observers Club book *Australian Honeyeaters* could be ordered, and that The Australian Native Orchid Society in Sydney requires members from Victoria.

The speaker for the evening was Dr R. Specht, on "Heathland Studies". A clear map showing the extensive areas of phosphorus deficiency in Australia contrasted with one of the U.S.A. with very small areas of such deficiency. The extent of the heathland vegetation occurring in soils deficient in phosphorus and nitrogen was outlined. Characteristics of the plants were explained and illustrated by fine colour slides. Some studies made at Keith in South Australia at a university research station following the A.M.P. interest in soil treatment were indicated. Problems dealt with included the ability of plants such as *Xanthorrhoea* and *Banksia* to trap and use available water from rain. Many other aspects of the areas and their vegetation were vividly reviewed. Mr Hudson thanked Dr Specht for the much appreciated and informative lecture.

Mrs W. Woollard brought greetings from members of the Naturalist Society of Wales and the Museum of Wales, who had attended the nature show.

Four new members whose names appear in the September *Naturalist* were elected.

The secretary announced that the presentation of the 1962 Natural History Medallion to Mr N. A. Wakefield will take place at the October general meeting.

Exhibits included specimens of native shrubs, displayed by Miss J. Woollard and Mr J. R. Garnet.

Geology Group—August 7, 1963

Twenty-five members were present, with Mr L. Angior in the chair. Mr T. Sault reported on a layer of polished pebbles of Tertiary age, to be seen at Waterfall Gully, Rosebud. The observation was made during the club's general excursion to the area during July. Arrangements were almost finalized for the group's exhibit at the nature show. The secretary tabled a letter from Police Officer S. A. Barnes of Mobile, Alabama, U.S.A., seeking information about Australian geology, and asking for exchange of fossils with interested persons. An excursion on August 11, to the Gisborne area to collect graptolites, was left in the hands of Master Neil McLaurin.

Subject for the evening was "Demonstration of Polarized Light in the Identification of Minerals". The apparatus was set up by Mr E. Snell of the Microscopical Group. Mr A. Cobbett, using a collection of his own slides of rock sections, explained how crystals and minerals could be identified by the use of polarized light. The method was useful to show the different effects of decay and cleavage in the crystals. Mr D. McInnes followed with his sections, to show the textures of rocks and how they varied from different localities.

Exhibits: Specimens from Flinders Range, South Australia, showing Archaeocyathinae (A. McCay); malachite crust on quartz, chalcopyrite, antimony (T. Sault); felspars, pericline, mica, sphene, fluorite, quartz, chalcedony, natrolite, hornblende, olivine, garnets, graphic granite (A. Cobbett); quartzite, granodiorite, granites, solvsbergite, calcite, dacite, dolerite, basalts, limburgite (D. McInnes); orpiment, salt crystals and marbles from India and Persia (L. Angior)

Geology Group—September 4, 1963

Thirty-four members were present, with Mr L. Angior in the chair. Master N. McLaurin gave a report on the group's excursion on Sunday, August 11, to the Gisborne area to collect graptolites. A comprehensive collection was made at various localities, combined with an examination of the lava flows at Couangalt and Mount Gisborne. The secretary made mention of the club's excursion to Mount Blackwood, Blackwood and Trentham Falls. The renovations to St. Paul's Cathedral were of geologi-

cal interest, as the sandstone being used is believed to come from England.

The subject for the evening took the form of a discussion on the build of Australia. Master Ian Bunton first dealt with the continent of Australia as seen at the present day, describing its small size, warm climate and lack of high mountains. Master N. McLaurin followed with a sketch of the geological origin of Australia, dealing first with the pre-Cambrian shield, and explaining the synclinal origin of the eastern parts with the aid of a series of maps and charts. Mr R. Dodds concluded the discussion with a resumé of the subject, amplifying the points of the previous speakers.

Exhibits: Shale from a new dam wall at Moorodue showing a graptolite, *Didymograptus* (T. Sault); aboriginal axe from midden at Torquay, magnesium sulphate (R. Dodds); marble slabs and turquoise from Persia from Mr L. Bairstow's collection (L. Angior); demonstration with club's microscope (D. McInnes).

Entomology and Marine Biology Group —September 2, 1963

The meeting was attended by nineteen persons, and Mr R. Condron occupied the chair. Members were chosen to go on a beach excursion for the purpose of collecting material for the nature show.

It was announced that Mr M. Houghton would speak to the October group meeting, on "Crustaceans", and that Mr Gorman, of the Fisheries and Wildlife Department, would address the November meeting on the subject of "Fisheries Science".

The speaker for the evening was Mr Schurr, of the Burnley School of Horticulture, on "Cotton Pests in the Sudan". The talk was illustrated with excellent colour slides, and, after many questions from members had been answered, Mr P. Curlis moved a vote of thanks to the lecturer.

Exhibits included marine shells from Indonesia (M. Harrison), Indonesian butterflies (Phillip Harrison), and a series of cowrie shells in various stages of growth (Miss E. Macfie). Miss Macfie gave a short talk on her exhibit.

DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, October 14, 1963—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, reports, announcements, correspondence.
2. Presentation of 1962 Australian Natural History Medallion, by Mr A. D. Butcher.
3. Subject for Evening: "Australian Mammal Study", by Mr N. A. Wakefield.
4. Election of Members:

Ordinary Members:

Mr C. K. Wardron, 6 Miles Avenue, Ringwood (Interest: Botany).
Mr Ronald G. Wallis, 247 Rosanna Road, Rosanna (Introduced by E. Swarbreck).
Mr J. H. M. Bartholomeusz, 67 Springfield Road, Blackburn North (Interests: Marine Biology, Microscopy).
Mrs Joan S. Fitzgerald, 6 North Court, Surrey Hills, E.10.
Mrs Nancy M. Kimpton, 11 Henderson Avenue, Malvern.
Br K. G. Mortensen, Christian Brothers' College, 11 Westbury Street, East St. Kilda (Introduced by W. C. Woollard and D. E. McInnes; Interest: Microscopy)
Mrs Gerda Skapokow, 55 Marriott Street, Parkdale, S.12.

Joint Ordinary Members:

Mr & Mrs A. S. Oakley, 87 Windella Avenue, Kew, E.4 (Interest: Birds).

Country Members:

Mr D. S. Bell, 9 Nelson Street, Foster
Mrs Joyce Campbell, 8 Victoria Street, Hastings.
Rev. Alex. Mills, Holy Trinity Vicarage, Walkers Road, Lara (Interest: Anthropology).

5. Nominations for Membership.
6. General Business.
7. Nature Notes and Exhibits.
8. Conversazione.

Monday, November 11—"Bird Watching in Victoria", by Mr R. Wheeler.

F.N.C.V. EXCURSIONS

Sunday, October 20—Wonga Park. Leader: Mr J. Hyett. The coach will leave Batman Avenue at 9 a.m. Fare, 12/-. Bring one meal and a snack. We should be pleased to welcome any country members who can attend the excursion.

Tuesday, November 5—President's Picnic; Hume Ranges. The coach will leave Batman Avenue at 9 a.m. Fare, 12/-. Bookings with excursion secretary. Bring two meals.

GROUP MEETINGS

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

Wednesday, October 16—Microscopical Group.

Friday, October 25—Hawthorn Junior Club. At Hawthorn Town Hall, at 8 p.m. Subject: "Crabs", by Mr M. Harrison.

Monday, November 4—Entomology and Marine Biology. Group meets in Mr Strong's rooms at Parliament House, at 8 p.m. Enter through private entrance at south end of House.

Wednesday, November 6—Geology Group. "Mammal Sub-fossils in South-eastern Australia", by Mr N. A. Wakefield.

Thursday, November 7—Fauna Survey Group. At the Fisheries and Wildlife Department, at 7.45 p.m.

Thursday, November 14—Botany Group.

The Victorian Naturalist

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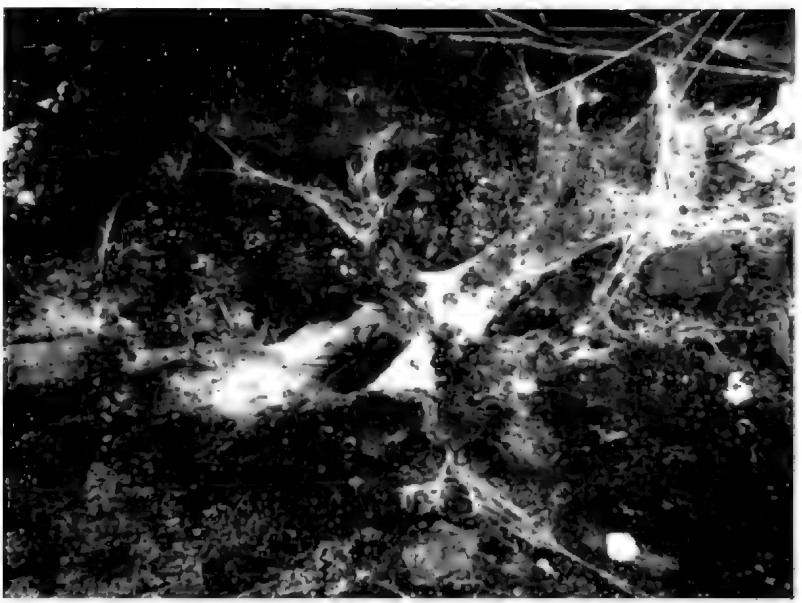

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2/6

Magnificent stand of White Mountain Ash, *Eucalyptus regnans*, in the Marysville State Fores

FORESTS COMMISSION VICTORIA

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Vol. 80, No. 7 November, 1963

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.SC.

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Front Cover:

This is a female of the Sydney Funnel-web Spider, *Atrax robustus*, photographed at Noorinbee, in East Gippsland. The lair was revealed when a log was turned over, and it shows the typical "guy rope" strands which characterize webs of species of *Atrax*. The Sydney Funnel-web was first discovered in Victoria in January 1957, at Mallacoota, and this was reported in the *Victorian Naturalist* in April 1958 (Vol. 74, pp. 174-178).

These columns are available each month for your nature notes and queries. Address your correspondence to the Editor, "Victorian Naturalist", P.O. Box 21, Noble Park, Victoria.

Rufous Fantail Records

Over the past several months, notes have been published in these columns, dealing with the beautiful little Rufous Fantail (*Rhipidura rufifrons*). At one stage, the question was raised as to whether this bird visited the Grampians or the Mount Cole area.

Two country observers have answered the question in the affirmative. First there are these notes from Mrs E. Bedggood of Ballarat:

One male Rufous Fantail was observed by members of the Ballarat Field Naturalists Club along a small creek near Tunbridge's Track, Mount Cole, on November 23, 1962. On December 16, 1962, I observed one male and one female in the same area. However, no evidence of nesting was found.

I have observed other Rufous Fantails at Eganstown (near Daylesford) on February 22, 1959, and in the Spargo Creek area on February 2, 1960, November 24, 1960, February 9, 1961 and February 5, 1962.

The second report is from Mr Claude Austin of Casterton. He follows a locality record with notes on two other birds and with some interesting conjecture on migration routes:

I have seen this bird only once in the Grampians. That was on December 1, 1959, on the slope of Mount William. It frequently appears in the Casterton district in November and March. When it arrives, it stays only a short time in suitable habitat. The longest I have had one in my garden was three days, in early December, 1961. As it is a late nester at the southern end of its range — even nesting in February — it may be that these visitors are on migration.

Two species of similar habitat preference are the Pink Robin and the Satin Flycatcher. Both these also appear here occasionally, on what could well be a migration stop-over. However the Satin Flycatcher does nest regularly in the Grampians. I have no record of the Pink Robin

nesting anywhere in southern Victoria except in the Otways and the Portland scrubs.

It seems more likely that these three species would migrate from the central highlands in a southerly direction to their summer habitat than that they should go in a westerly direction from Gippsland. They therefore should appear on occasions here and in the Hamilton district, but it would be interesting if we had records of more sightings on other parts of their migration route.

Legless Lizards

Mr H. R. Hobson, of Rosebery, sends these observations of some of the denizens of the Mallee:

September 14, around midday, became somewhat humid and warm. Along a track in desert country some twelve miles west of Lake Albacutya, many small reptiles were seen making for cover. The first one was what appeared to a small snake. Progression was snake-like, and there were no visible legs. It was about 12 to 15 inches long and perhaps slightly thicker than a pencil. The head was fairly large in comparison to the body. General colour above, greyish with black longitudinal pattern extending from the head along the back in somewhat diamond fashion.

About an hour later another snake-like individual was seen escaping into a small bunch of porcupine grass, but I was successful in capturing this one. It was about 6 or 7 inches long, brown above, creamy under, with 3 scales across the under surface. There were two scaly lateral flaps, proving this specimen to be one of the snake lizards. Also an ear opening was present. Can you suggest the identity of these?

There is little doubt that the observations apply to the Scaly-foot (*Pygopus lepidopodus*), which is apparently the common legless lizard of the Mallee districts. In September, officers of the Fisheries and Wildlife Department brought back several from the Sunset country, north of Murrayville. They too reported that these lizards take refuge in clumps of "porcupine grass" (*Triodia*), and that smaller specimens are brownish, compared with the conspicuously patterned adults.

Emu's Speed

In July 1963, a pair of adult emus were encountered on a Forests Commission Road in the northern part of the Grampians, western Victoria. When they ran ahead of the car, we decided to take note of their speed.

By approaching them closely, and sounding the horn, we induced them to increase their pace until it was evident that they were fully extended.

This was repeated several times, over a distance of a few hundred yards, and on each occasion the speedometer read 25 miles per hour.

It was a firm level road and, from that experience, we concluded that we had observed their maximum running speed.

Scolytid Beetles—A Request

A letter was recently received from Dr Jozo J. Murayama, a Japanese entomologist, requesting Australian contacts with a particular interest in the family Scolytidae (*Coleoptera*).

In 1958 Dr Murayama visited the Philippines and Borneo to collect specimens and now wishes to extend his studies of the family. Any entomologist interested in the exchange of specimens and copies of relevant scientific papers should write to:

Dr Jozo J. Murayama,
15, Kami-ushirogawara,
Yamaguchi City.
Japan.

—V. JERNAKOV
(Latrobe Valley F.N.C.)

Some Revision in Antechinus (Marsupialia)—1

By N. A. WAKEFIELD* and R. M. WARNEKE†

SUMMARY

The taxonomy of *Antechinus swainsonii* and *A. minimus* is reviewed. The distribution of each species is mapped. Plastic and cranial characters of major populations are examined and compared statistically.

It is demonstrated that Victorian populations of *A. swainsonii* belong to the subspecies *A. s. mimetes*, and not to the nominate subspecies, *A. s. swainsonii*, of Tasmania.

A mainland Australian population of *Antechinus minimus* is revealed. It is distinguished from the nominate Tasmanian subspecies, *A. m. minimus*, and is given the name *A. m. maritimus* (based on *Phascogale swainsoni maritima* Finlayson).

A. swainsonii favours wet forests, while *A. minimus* favours areas devoid of trees. It is concluded that the former nests in logs and that the latter nests in tussocks. Both are terrestrial, in contrast with the scansorial *A. flavipes*, and many features of *A. swainsonii* indicate its convergence with *Perameles*.

While *A. minimus* has a generally shorter tail and a shorter rostrum than *A. swainsonii*, the short anterior palatine foramina of the former distinguish it absolutely from the latter.

Sexual dimorphism is demonstrated in each species, males being larger than females.

In each species, the nipple number is 6 in the Tasmanian subspecies and 8 in the Australian subspecies.

Taxonomy is revised as follows:

ANTECHINUS SWAINSONII

Antechinus swainsonii swainsonii

(*Phascogale swainsonii* Waterhouse, 1840; Tasmania.)

Tasmania.

Antechinus swainsonii mimetes

(*Antechinus swainsonii mimetes* Thomas, 1924; Guy Fawkes District, New South Wales.)

New South Wales, Victoria.

ANTECHINUS MINIMUS

Antechinus minimus minimus

(*Dasyurus minimus* Geoffroy, 1803; Island in Bass Strait.)

Tasmania, Bass Strait islands.

Antechinus minimus maritimus

(*Phascogale swainsoni maritima* Finlayson, 1958; Port McDonnell, South Australia.)

South-eastern South Australia, south-western Victoria.

I. INTRODUCTION

This study of several members of the genus *Antechinus* was initiated by attempts to identify the species which occur in Victoria.

As with most genera, the classification of *Antechinus* has come about by the piecemeal description of species and subspecies each based on either a single specimen or a very small series. All attempts at comprehensive description of the group have been made by overseas workers (for example, Tate, 1947) hampered by a paucity of study specimens. This has produced a disordered array of "species" and "subspecies".

An understanding of the Victorian members of the genus has necessitated investigation of most species which inhabit the geographical region of Australia defined by Wood and Williams (1960) as the eastern highlands,

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and of related forms in north Australia and the far south-west. A reasonably clear picture has emerged of the populations of these species in temperate Australia, but the situation in the tropics is less clear.

This paper is on the *A. swainsonii* group of species, and it is proposed to deal with the *A. flavipes* group in a further paper.

II. Materials and Methods

(a) *Sources*

The sources of specimens and data are as follows:

American Museum of Natural History.
Australian Museum, Sydney.
British Museum (Natural History).
Fisheries and Wildlife Department, Melbourne.
Muséum National d'Histoire Naturelle, Paris.
National Museum of Victoria.
Queensland Museum, Brisbane.
Queen Victoria Museum, Launceston.
South Australian Museum, Adelaide.
Tasmanian Museum, Hobart.

Antechinus swainsonii and *A. minimus* are poorly represented in most collections, even in the museums of those states in which one or both species occur. Other than a series of approximately 120 of the former in the Fisheries and Wildlife Department collection, there is a total of about 60 specimens of each in the institutions listed. Photographs of the skull of the type of *A. minimus* were provided by the Paris Museum.

(b) *Characters examined*

Morphological features usually regarded as being of taxonomic importance were investigated: size of body and appendages, features of the skull, dentition, pelage and characters of the feet. The plantar aspect of the manus and pes were examined for the number, relative size and position of the striated pads. The form and length of the claws were noted.

The data on all specimens in which the milk teeth (deciduous fourth premolars) persisted or the subsequent permanent fourth premolars were not fully erupted are excluded from the tables of measurements. These specimens are objectively recognizable as juvenile or sub-adult.

External changes indicative of breeding activities in both males and females were noted. Breeding condition is considered to be an important variable as it characterizes a class of adult and also defines a specific period in the life span of an individual.

(c) *Techniques of measurement*

Body measurements

The measurements are those which have been taken in the flesh. All the specimens in the Fisheries and Wildlife Department collection were measured, using a measuring board, vernier calipers and a steel tape, as follows:

Total length: With the animal lying on its back and straightened out, the distance from the tip of the nose to the tip of the tail, excluding any terminal hairs.

Tail length: Length from the center of the cloaca to the tail tip.

Head-body length: The difference between the above measurments.

Pes length: Length from the heel to the tip of the longest toe, excluding the claw.

Ear length: The distance from the tragoid notch to the tip of the ear, excluding hair.

Skull and dentition

In addition to measurements, notes were made on dental and osteological features which appeared to be of diagnostic significance. Of sixteen measurements taken, the seven noted below are examined in some detail in this paper. These were selected as being definitive of species in the eastern Australian group of *Antechinus* with which we are concerned. At the same time these data provide a means of assessing the taxonomic status of related forms.

The following measurements were taken:

Basalar length
Zygomatic breadth
Postorbital constriction
Palatalar length
Anterior palatine foramen (maximum)
Alveolar length of the molar row M^{1-3}.
Breadth at M^3 — the distance between the outer edges of the alveoli of the right M^3 and the left M^3.

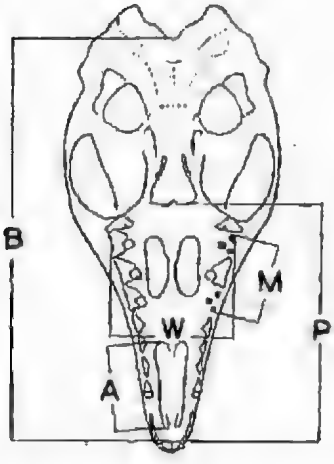
Apart from the last, these measurements are as defined by Cockrum (1955) and as illustrated in Figure 1. All measurements were taken with either a HELIOS dial-reading or vernier calipers, calibrated to 0,05 mm., and with the aid of a binocular microscope at 6 to 10 magnifications.

III. Taxonomy of A. swainsonii

The species was described by Waterhouse (1840) as *Phascogale swainsonii*. The type, a Tasmanian specimen originally in the private collection of W. Swainson, was later acquired by the British Museum (Skin, No. 60. 1. 5. 18; skull, Nos. 60. 1. 5. 26 and 1348.a).

Thomas (1924) established a subspecies, *A. s. mimetes*, based on a specimen from the Guy Fawkes district of north-eastern New South Wales (BM, No. 24. 10. 1. 1; collected by G. H. Wilkins, April 14, 1924).

Iredale and Troughton (1934) recognized these two forms, and gave Tasmania and Victoria as the distribution of the nominate subspecies, and northern New South Wales for Thomas's subspecies. However, distribution data now available demonstrate that there is no major geographical break in the range of *A. swainsonii* on the Australian mainland, and no general morphological division is apparent between the Victorian population and that of northern New South Wales. On the other hand, the mainland group as a whole shows slight morphological variation from that of Tasmania. Therefore the trinomial, *A. swainsonii swainsonii*, should be applied only to the Tasmanian population, while *A. swainsonii mimetes* applies to the whole



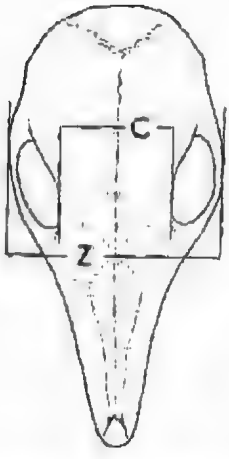


Figure 1:
Skull measurements.
B—Basilar Length
Z—Zygomatic Width
C—Postorbital Constriction
P—Palatalar Length
A—Anterior Palatine Foramen
M—Alveolar Length M^{1-3}
W—Breadth at M^3

Victorian and New South Wales population.

Finlayson (1958) discussed a "drab and dull brown" form from south-western Victoria, which he designated as the "Heathmere variant" of his *Phascogale swainsoni maritima* (= *A. minimus*, see section VIII). Although he did not record measurements of the variant, his photographs of the ventral aspect of a skull and of the upper tooth row (plate 1, *loc. cit.*) identify it as *A. swainsonii*. The length of the anterior palatine foramina, extending back to the level of the middle of P^3 and the spacing of the premolars are definitive. Furthermore, an adult skull, Fisheries and Wildlife Department No. D324, a male, taken at Mount Clay near Heathmere, is not distinguishable from *A. swainsonii mimetes*. The pelage of this specimen (see section V(c)) agrees with Finlayson's description of the "Heathmere variant".

Higgins and Petterd (1883, 1884) described several novelties in *Antechinus* (*niger*, *moorei*, *moorei* var. *assimilis*, *rolandensis* and *concinnus*). All were from Tasmania, but apparently the type specimens have been lost. Thomas (1888) and subsequent authors place the first three in the synonymy of *A. swainsonii* and the last two as synonyms of *A. minimus*.

IV. Distribution and Habitat of A. swainsonii

According to the data available, the densest populations of *Antechinus swainsonii* occur in the Otway Ranges and east-central mountain districts of Victoria and in north-western Tasmania, in which areas the annual rainfall is about 40 inches or more per annum. These are regions of wet sclerophyll forest dominated by White Mountain Ash (*Eucalyptus regnans*), and often with stands of Myrtle Beech (*Nothofagus cunninghamii*) and gullies of Soft Tree-fern (*Dicksonia antarctica*). In this habitat *A. swainsonii*

fossicks, bandicoot fashion, amongst the ground litter and in the friable surface soil, for the arthropods and other small animals which comprise its food.

The habitat at Loch Valley, north-western Gippsland, is in a Forests Commission plantation of *Pinus radiata*, with large Mountain Ash logs about the ground and an abundance of bracken and other low scrub. The average annual rainfall is about 56 inches.

Examples caught in the Grampians, western Victoria (R.M.W., 3.11.1962) were amongst ferns in a wet gully under eucalypt forest. A rabbit trap victim was sent from W Tree, eastern Victoria, by L. Hodge, who described the habitat (*in litt.*, 26.8.1963) as a small valley with mixed eucalypt forest, "silver-grass" tussocks and scattered bracken. At Molesworth, south-eastern Tasmania, a specimen was caught (N.A.W., 21.1.1962) amongst treeferns and shrubbery along a creek through an area of light forest. These habitats are probably typical of the scattered occurences of *A. swainsonii* in western and eastern Victoria, eastern Tasmania and eastern New South Wales. They indicate that the species occurs in small areas of suitable habitat, rather than its having a general distribution throughout regions of drier forests.

No information is available about actual homes of these phascogales in the forest habitats, but we believe they make nests close to ground level, in hollow logs and the butts of partly dead trees. (The nests described by Fleay (1932) as belonging to *A. swainsonii* are those of *A. stuartii*, the latter species having been confused with others prior to the present study).

A few specimens of *A. swainsonii* have been trapped in habitats quite different from those already described. Near Portland, south-western Victoria, one was caught (R.M.W., 9.1.1962) in flat, sandy terrain in open woodland, on tunnel-like runways through a dense tangle of wiry grass. At Port Campbell, west of the Otway Ranges, another was taken (N.A.W., 17.12.1962) amongst large tussocks of Coast Saw-sedge (*Gahnia trifida*) between a coastal swamp and an area of stunted banksia and eucalypt scrub. From Lakes Entrance, eastern Victoria, specimens have been received, which were caught on the narrow strip of scrub-covered sand dunes between Lake King and the ocean. As the last two habitats are devoid of logs which could be used as homes by the phascogales, it must be assumed that in these areas they make nests in tussocks of saw-sedge and in thickets of grass.

Besides the type, there are five Tasmanian specimens in the British Museum: three from Magnet (near Waratah), one from Henty River and one from Table Cape. The species has never been authentically recorded from any island, either in Bass Strait or elsewhere off Tasmania.

Distribution of *A. swainsonii* is shown in Figure 2.

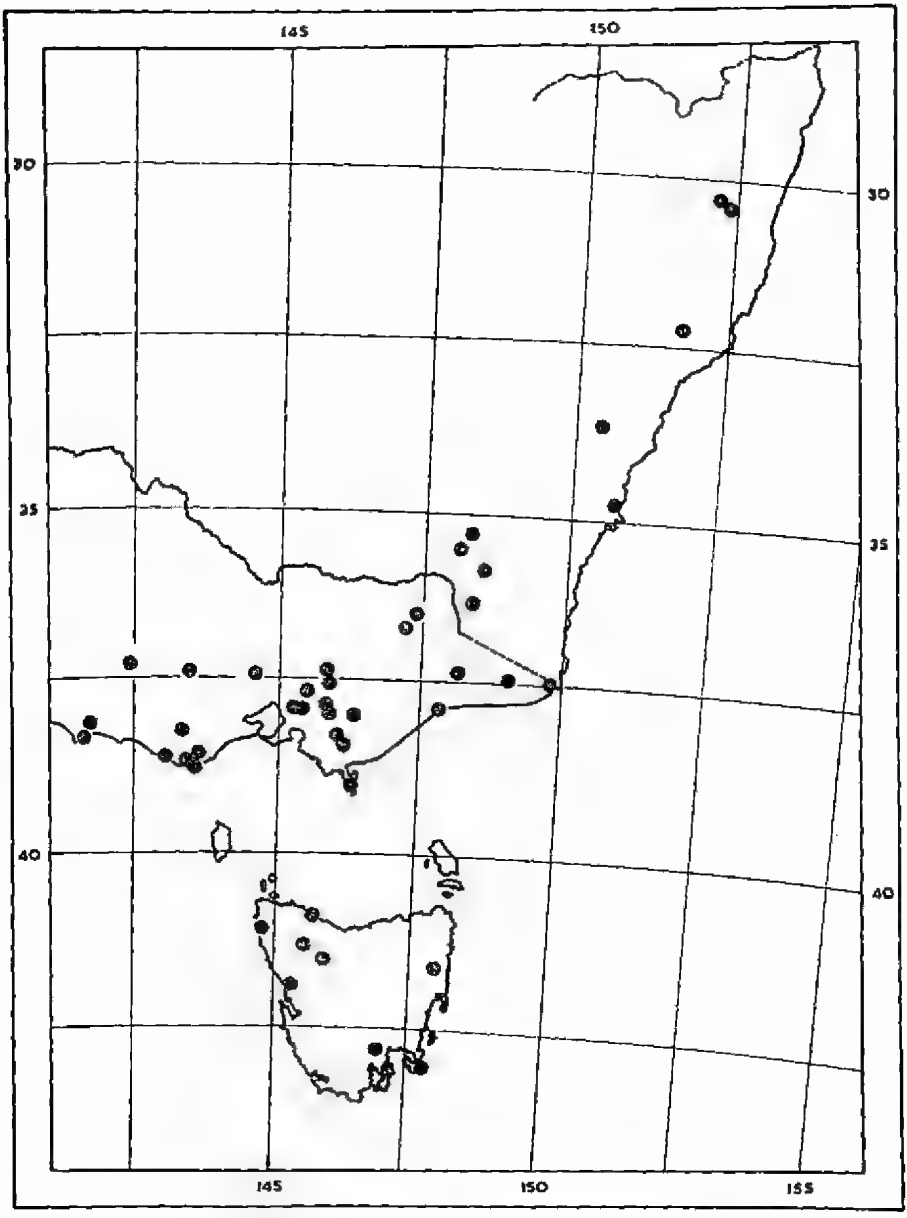


Figure 2: Distribution of *Antechinus swainsonii*.

V. Plastic Characters of A. swainsonii

Troughton (1941) described *A. swainsonii* as one of the more sturdily built species of the genus and drew attention to its particularly slender snout. Compared with other small forest dwelling dasyurids, it is thickset and heavy in the hind quarters. The tail is conspicuously shorter than the body. The largest Victorian specimen in the F.W.D. collection, a male, weighed 128 gm; the largest female weighed 65 gm. The ears are relatively small and are partly hidden by the body fur. The fore claws are long and broad (see Figure 3) and, according to our observations, are used for digging in a manner similar to that of bandicoots. The foot pads are smaller, less prominent and usually one less in number than in other forest-dwelling species of *Antechinus*. Most of these features of *A. swainsonii* are in contrast with those of the scansorial *A. flavipes* group and appear to be adaptations to a terrestrial existence.

(a) *Body Measurements*

The data of body measurements are derived from a series of 57 males and 70 females. Specimens from the geographical extremities of the species range are represented, but the bulk of the series is from Loch Valley in eastern Victoria (38° 00′ S, 145° 33′ E.) Head-body, tail, ear and pes lengths are set out in Table 1. Though the averages indicate that males are larger than females, the body proportions of the sexes are virtually identical. Head-body length and pes length are selected for statistical evaluation of sexual dimorphism within each of the major geographically isolated populations (figure 2). Tables 2 and 3 set out the relevant data from the mainland and Tasmanian series. Data from the Loch Valley series are included in the table to show the observed variation in a reasonably large sample from a small area of relatively uniform habitat.

As the frequency distributions of these variables are approximately "normal", the "t" test of significance, as outlined in Karmel (1959), is used for the comparisons. Males from both the Tasmanian and mainland populations have a significantly greater head-body length than females ($P < 0{\cdot}001$ in both cases). The values of P were obtained from Fisher and Yates (1957). The same data do not demonstrate any significant difference between the two populations.

Again, males of both populations are found to have a significantly greater pes length ($P < 0{\cdot}001$ in both cases) than the female. A significant difference in pes length between the two series of males could not be demonstrated ($P = 0{\cdot}3$). However, mainland females do significant difference between have a significantly longer pes than Tasmanian females ($P < 0{\cdot}001$). When pes length is expressed as a percentage of head-body length it shows no the two populations, in either sex.

TABLE 1

Comparison of body measurements of males and females of *A. swainsonii*.

	Males (57)			Females (70)		
Head-body length	97 — 145	(123.1)		99 — 140	(116.0)	
Tail length	76 — 124	(98.4)	80%	73 — 104	(88.5)	77%
Ear length	12.5— 19	(16.4)	13%	12.5— 18.5	(15.3)	13%
Pes length	18 — 23.5	(21.5)	17%	17 — 22	(20.0)	17%

TABLE 2

Comparison of head-body length of Tasmanian and Australian mainland populations of *A. swainsonii*.
Measurements in millimetres.

		Range	Mean ± S.E.	Standard Deviation
Tasmania	9 ♂♂	102 — 134	117.4 ± 1.06	3.19
	13 ♀♀	99 — 127	112.2 ± 0.77	2.78
Australian mainland	46 ♂♂	97 — 145	124.2 ± 1.58	10.71
	57 ♀♀	101 — 140	116.8 ± 1.18	8.88
Loch Valley	21 ♂♂	109 — 145	127.9 ± 2.02	9.25
	37 ♀♀	101 — 133	114.1 ± 1.09	6.62

TABLE 3

Comparison of pes length of Tasmanian and Australian mainland populations of *A. swainsonii*.
Measurements in millimetres.

		Range	Mean ± S.E.	Standard Deviation
Tasmania	10 ♂♂	20 — 22	21.2 ± 0.29	0.92
	13 ♀♀	17 — 21	19.0 ± 0.27	0.97
Australian mainland	47 ♂♂	18 — 23.5	21.6 ± 0.17	1.15
	47 ♀♀	18 — 22	20.2 ± 0.15	1.03
Loch Valley	20 ♂♂	20 — 23.5	21.8 ± 0.21	0.95
	37 ♀♀	18 — 22	20.0 ± 0.14	0.86

(b) *Manus and pes*

Finlayson (1958, p. 147) gives a good account of the features of the manus and pes of *A. swainsonii*. The appearance of the plantar surface as in Figure 3 is typical of the species.

In *Antechinus* the maximum number of foot pads is normally six*, four interdigitals at the base of the digits and two additional pads, often variable in form, lower down on the palm or sole. In the past, a confusing variety of terms has been used in describing these pads in the Dasyuridae. They were referred to by Jones (1923, p. 8) as thenar — on the inner side of the foot below the first interdigital, and hypothenar — on the opposite side. Finlayson

*The presence of super-numerary minute, striated pads has been noted in *A. flavipes* and related forms.

(*loc. cit.*) used inner metacarpal (-tarsal) instead of thenar and outer metacarpal (-tarsal) for hypothenar. In some species of *Antechinus* the inner metatarsal is fused with the first interdigital, resulting in a single long pad extending from the base of the hallux. Thomas (1888, p. 285) termed this the hallucal, whereas Finlayson (*loc. cit.*, p. 147) restricted that term to the first interdigital alone. Finlayson's terminology is used throughout this paper.

The normal appearance of the plantar aspect of the palm is shown in Figure 3. The inner metacarpal and first interdigital are completely fused. In a series of 75 *A. swainsonii,* drawn largely from Victoria and Tasmania, this condition was noted in 97% of cases. Figure 3 shows

Figure 3: Foot characters of *Antechinus swainsonii. Left*—Left pes. *Lower right*—Left manus. *Upper right*—Foreclaws.

the plantar aspect of the pes, with the hallucal and inner metatarsal pads distinctly separate. Finlayson (*loc cit.*, p. 147) noted fusion of these two pads in 4 out of 16 specimens and commented that "the fusion of the original elements is always made obvious by a constriction at the site". In 73 specimens of the above series examined for this feature, complete fusion was noted in 32 (44%), and in many of these no constriction was evident. In 10 specimens (14%) the pads were fused on one pes only and the remaining 31 (42%) showed complete separation on each pes.

(c) *Pelage*

The main pile is dense, moderately soft and about 10 mm in length mid-dorsally, the tips providing the general dorsal colour of deep brown. Bronze flecks are apparent under suitable lighting, due to a narrow band of that colour below the tip of each hair; the basal zone is deep slate. There is little anteroposterior differentiation, but the rump and flanks usually have a warmer tone than the head and shoulders. The guard hairs are about 15 mm long and are glistening black for the distal third of their length, imparting a sheen to the coat. The ventral fur is uniform greyish white at the tips and slate beneath. Orbital crescents are either absent or ill defined. The ears, manus and pes are of the same colour as the head and shoulders. The tail is short-haired, slightly darker above; the dorsal fur near the base is similar to that of the rump.

Several colour variations have been noted. The coastal specimens from Lakes Entrance and Port Campbell are drab, with the rump, flanks and upper base of tail a warmer brown. The western Victorian population (Grampians and Portland area) are greyish brown lightly flecked with dull fawn, giving a grizzled appearance.

A single instance of melanism was noted in a male from Erica, Victoria (N.M.V., No. C. 1395).

VI. Skull and Dentition of A. swainsonii

According to Tate (1947, p. 182) *A. swainsonii* and *A. minimus* form a strongly specialized division of the genus. They are very similar in most features but the greater degree of modification has occurred in *A. swainsonii*.

In describing the skull and dentition of *A. swainsonii*, *A. flavipes* has been selected as a standard for comparison because it is regarded as one of the least specialized members of the genus (Jones 1923, p. 98). The skull of *A. swainsonii* is shown in Figure 4; and features of it are compared with those of *A. flavipes* in Table 4.

The molars of *A. swainsonii* are smaller than those of *A. flavipes* but are otherwise very similar.

In *A. swainsonii*, the milk premolar (dP^4) is much reduced in size. It is a low-crowned tooth with three roots and is molariform. By comparison dP_4 is appreciably smaller. It has two roots and, except for its low crown, resembles the permanent premolars.

TABLE 4

Comparison of cranial characters of *A. swainsonii* with those of *A. flavipes*

A. swainsonii	*A. flavipes*
Long, narrow rostrum.	Short, broad rostrum.
Anterior palatine foramina not less than 4·60 mm.	Anterior palatine foramina not more than 3·70 mm.
Postorbital constriction broad in proportion to the zygomatic breadth, sides approximately parallel.	Postorbital constriction narrow in proportion to zygomatic breadth, sides not parallel.
Frontal-nasal area concave to straight in lateral aspect.	Frontal-nasal area convex in lateral aspect.
Mandible long; anterior portion narrow.	Mandible short; anterior portion broad.
I^1 of medium size, in contact with I^2, only slightly procumbent.	I^1 large, widely separated from I^2, markedly procumbent.
I^1 slightly compressed laterally, with a well defined inner cutting edge in line with I^{2-4}, in close occlusion with I_1.	I^1 not compressed, without cutting edge, not in close occlusion with I_1.
I^{2-4} compressed laterally, slightly elongated antero-posteriorly, not crowded.	I^{2-4} not compressed, rounded in form, crowded.
Slight descending size gradient from I^2 to I^4, adjacent incisors may be subequal.	Well marked descending size gradient from I^2 to I^4.
Anterior lower incisors markedly procumbent.	Anterior lower incisors less procumbent.
I^3 bears small accessory cusp on buccal aspect near heel, slightly overlapping the canine.	Accessory cusp scarcely differentiated or absent.
Upper canine compressed laterally, usually with a pronounced curve.	Upper canine a broad tapered peg, slightly curved.
Upper premolars compressed laterally, elongated antero-posteriorly; space on each side of P^1.	Upper premolars broad, not elongated anteroposteriorly; P^1 not separated from adjacent teeth.
Lower premolars compressed laterally.	Lower premolars not compressed laterally.

The lower deciduous teeth are lost first, generally by early December, when the animal is about 4 months old, but dP_4 has been found as late as February, persisting at the rear of the erupting P_4.

Table 5 provides comparative measurements of the skull and teeth of the Tasmanian and mainland series, and of a series from Loch Valley, Victoria. Again, the latter set is given because it represents a large

sample from a small area of relatively uniform habitat.

In corresponding measurements, the Tasmanian and mainland series are very similar, and their skull proportions are almost identical. The test of significance, as used previously, shows that the only statistically valid difference between the two series is in length of the anterior palatine foramen ($P < 0.001$). However, in scanning individual measurements of the palatine opening in mainland skulls, some variation is noted in this feature from place to place. A comparison of local populations was restricted to those represented by skull series. Four specimens from the Guy Fawkes district* of New South Wales (30° 25'S, 152° 20'E), at the northern limit of the distribution, averaged 5·00 = 0·16 mm. In Victoria, the Loch Valley series averaged 5·31 ± 0·02 mm; eight specimens from the Dandenong Ranges (37° 51'S, 145° 22'E) 5·78 ± 0·09 mm; and twelve specimens from Mount Macedon (37° 24'S, 144° 34'E) 5·15 ± 0·06 mm. Only the Dandenongs series differs markedly from the average of the whole mainland series. The interpretation of these results is severely restricted by the small size of three of the samples and the paucity of comparative material from the western limits of the distribution. In any case it is not known to what extent these samples represent geographically isolated populations. A possible relationship between the Dandenongs and Tasmanian populations is not borne out by test ($P < 0.01$ for the difference). These findings are the basis of the adjustment suggested in section III, to the major subspecific division which has been recognized in the species, e.g. by Iredale and Troughton (1934) and Finlayson (1958).

It certainly appears that *A. swainsonii* and similar species are more specialized in many features, and this premise is accepted by us as a basis for the following discussion.

Most of the modifications noted in *A. swainsonii* occur also, in various combinations, in other small dasyurids. Elongation of the rostrum is noted in *Neophascogale*, *Phascolosorex* and *Antechinomys*. In the last two genera the incisors are of the same pattern as in *A. flavipes*. In *Neophascogale* the incisors are modified as in *A. swainsonii* but in the former I^1 has reached a stage where it is identical in shape with I^{3-4} (Tate 1937, 1947). The accessory cusp on I_3 in *A. swainsonii* has not been noted by other authors (for example, Tate (1948, p. 317) stated that a bifid I_3 is universal in the Peramelidae and is not found in other related families). In *Perameles gunnii*, the additional cusp is conspicuous and functional in occlusion, shearing past the faintly triangular crown of I_4. In *A. swainsonii* it is inconspicuous and functions imperfectly because of the close proximity of the canine. In *A. swainsonii* (and more so in *Neophascogale*) the arrangement of I^{1-4} approximates closely to that of *Perameles gunnii*.

*The type locality of *Antechinus swainsonii* minutus.

TABLE 5

Cranial Measurements of *A. swainsonii*.
(in millimetres)

	Tasmania				*Australian Mainland*				*Loch Valley*			
	No. of Specimens	*Range*	*Mean ± S.E.*	*Stand. Deviation*	*No. of Specimens*	*Range*	*Mean ± S.E.*	*Stand. Deviation*	*No. of Specimens*	*Range*	*Mean ± S.E.*	*Stand. Deviation*
Basalar Length (B.L.)	13	25·85—28·90	27·70±0·23	0·839	78	26·15—31·30	28·27±0·13	1·155	42	26·60—30·10	28·20±0·17	1·104
Zygomatic Breadth (Z.B.) ..	13	14·50—16·10	15·64±0·14	0·513	77	14·50—18·25	16·19±0·09	0·817	43	14·90—18·25	16·04±0·12	0·819
Postorbital Constriction (P.C.) ..	14	7·20— 7·85	7·66±0·05	0·180	88	7·20— 8·60	7·89±0·09	0·851	47	7·40— 8·60	7·92±0·04	0·257
Palatalar Length (P.L.)	14	14·70—16·55	15·71±0·12	0·459	89	14·45—17·20	15·62±0·06	0·611	48	14·70—16·65	15·71±0·08	0·546
Anterior Palatine Foramen ..	14	5·70— 6·65	6·12±0·06	0·248	90	4·60— 6·35	5·33±0·05	0·492	48	4·60— 6·20	5·31±0·05	0·345
Breadth at M^3 (B.M.)	14	8·60— 9·20	8·93±0·05	0·169	90	8·30—10·00	8·90±0·04	0·344	50	8·30— 9·40	8·78±0·03	0·236
Length, M^{1-3} ..	14	5·10— 5·75	5·43±0·05	0·177	91	5·00— 6·20	5·46±0·02	0·218	50	5·00— 5·70	5·31±0·02	0·162
P.C./B.L., as percent.	13	26·4 —28·6	27·6 ±0·20	0·715	78	24·4 —29·5	27·6 ±0·13	1·162	42	24·5 —29·5	28·02±0·12	0·746
Z.B./B.L., as percent.	13	54·8 —59·0	56·5 ±0·37	1·370	75	52·2 —60·8	56·6 ±0·20	1·721	42	53·9 —60·6	56·92±0·23	1·461
P.L./B.L., as percent.	13	54·6 —58·1	56·5 ±0·27	0·967	78	53·4 —57·7	56·0 ±0·11	0·938	42	53·4 —57·3	55·90±0·16	1·051
B.M./B.L., as percent.	13	31·0 —33·6	32·2 ±0·25	0·890	77	28·4 —34·6	31·6 ±0·14	1·245	42	28·4 —32·6	31·06±0·14	0·917

TABLE 6

Cranial measurements of *A. minimus*.
(in millimetres)

	Maatsuyker Island				*Tasmania*				*Australian Mainland*			
	No. of Specimens	*Range*	*Mean ± S.E.*	*Stand. Deviation*	*No. of Specimens*	*Range*	*Mean ± S.E.*	*Stand. Deviation*	*No. of Specimens*	*Range*	*Mean ± S.E.*	*Stand Deviation*
Basalar Length (B.L.)	14	24·60—26·90	25·89±0·18	0·680	13	23·60—29·60	25·92±0·48	1·740	10	25·40—29·14	27·97±0·41	1·295
Zygomatic Breadth (Z.B.)	12	14·80—16·20	15·64±0·12	0·429	13	14·20—17·70	15·30±0·24	0·882	11	15·60—18·10	17·16±0·23	0·770
Postorbital Constriction (P.C.)	14	7·00— 7·50	7·29±0·05	0·174	16	7·10— 8·50	7·47±0·10	0·386	11	7·00— 7·80	7·37±0·07	0·243
Palatalar Length (P.L.)	13	13·60—14·65	14·29±0·09	0·326	14	13·20—15·40	14·29±0·17	0·637	11	14·20—15·90	15·27±0·05	0·173
Anterior Palatine Foramen	14	3·60— 4·00	3·77±0·04	0·140	16	3·30— 4·40	3·75±0·07	0·288	11	3·35— 4·00	3·68±0·08	0·272
Breadth at M^3 (B.M.)	14	8·90— 9·25	9·09±0·03	0·114	15	8·40— 9·75	8·93±0·10	0·392	11	9·20—10·20	9·65±0·08	0·263
Length, M^{1-3}	14	5·00— 5·30	5·14±0·02	0·087	16	4·90— 5·35	5·08±0·03	0·134	11	5·10— 5·45	5·32±0·03	0·113
P.C./B.L., as percent.	14	27·0 —28·9	28·0 ±0·13	0·486	13	27·2 —30·3	28·9 ±0·27	0·978	10	24·6 —29·1	26·4 ±0·71	2·230
Z.B./B.L., as percent.	12	56·0 —62·5	60·4 ±0·48	1·663	13	54·9 —61·5	59·1 ±0·51	1·853	10	59·0 —63·1	61·2 ±0·43	1·371
P.L./B.L., as percent.	13	53·1 —58·2	55·1 ±0·32	1·170	12	53·5 —56·9	55·6 ±0·28	0·975	10	52·6 —55·9	54·5 ±0·32	1·011
B.M./B.L., as percent.	14	33·6 —36·6	34·9 ±0·21	0·789	13	32·9 —35·6	34·5 ±0·26	0·938	10	32·2 —38·2	34·6 ±0·63	1·974

The above evidence, and other which is discussed in Sections V and X suggests a convergence of *A. swainsonii* with *Perameles*.

VII. Breeding Condition in A. swainsonii

Females

In the series trapped over a period of six years at Loch Valley, Victoria, 35 females provided information on breeding. As in other *Antechinus* so far studied (Fleay, 1949; Horner and Taylor, 1959; Marlow, 1961) breeding in *A. swainsonii* is restricted to a short period in late winter. In Loch Valley animals, birth occurs at about mid-August. Little variation in the date was observed for the years 1957, 1960 and 1961, for which data are available. The earliest dates of occupation of the pouch area in those years were August 14, 17 and 17 respectively.

In the non-breeding condition, which obtains for most of the year, the pouch area is inconspicuous and with no definition of the margins. Its position is marked by a patch of whitish hairs which, unlike the ventral fur, are of uniform colour throughout their length. The nipples are usually difficult to find as they are quite minute and are obscured by this patch of fur.

In late July, presumably during pregnancy, the pouch area enlarges and becomes defined by lateral ridges of skin. The earliest litter recorded at Loch Valley was of eight young, which averaged 6.5 mm in crown-rump length. The earliest date of capture of a lactating female not carrying young was October 11. Presumably the young had been left in the nest. At this stage the pouch area is at maximum development. It is roughly triangular in shape with the apex backward. The anterior border is marked by long reddish-brown hairs. The skin of the mammary area is granular and almost devoid of hair. The nipples are arranged symmetrically, parallel to the lateral ridges of skin. In all mainland specimens examined, the number of nipples was eight; in the four Tasmanian specimens for which a count was possible, the number was six.

Males

The only external sign of sexual maturity in males is the size of the testes. During the period of sexual immaturity the scrotum is small and is partly concealed by ventral fur. In June the testes are at maximum size and the pendulous scrotum is very conspicuous—approximately one month before pouch development in the female.

VIII. Taxonomy of A. minimus

This species was originally described by Geoffroy (1803) as *Dasyurus minimus*, and it is the earliest published species of those currently recognized in the genus *Antechinus*. The type description is in *Bulletin des Sciences par La Societé Philomathique de Paris* No. 81., the date of which is given by Iredale and Troughton (1934) as "1803 . . . . December (*fide*

Sherborn)." Later, Geoffroy (1804) amplified the description in *Annales du Muséum d'Histoire Naturelle.*

Both descriptions of *A. minimus* simply compare it with large dasyures and so are not specifically diagnostic in *Antechinus.* However, the pelage is stated to be *roux* (= reddish, russet).

The type is in the Muséum National d'Histoire Naturelle, Paris, and of it Dr Jean Dorst reports (*in litt.*, 7.6.1962):

> This specimen is mounted and the skull, withdrawn from the skin, is kept separately. It is in fairly good condition for its age. It was brought back by Peron and Lesueur (from the) expedition of the "Corvette le Naturaliste" and (is) kept under the number 381.
>
> The colouration of the specimen is brownish all over the upper parts; the under parts are lighter. The tail is blackish brown, and has only a few hairs bristle-like. The fur is worn out and is fallen in some parts. The pelage seems only a little faded by light.

Photographs of the skull and mandible of the type specimen have been obtained. These confirm the identity of the populations that are treated in this paper as *Antechinus minimus.* In particular the anterior palatine foramina are short (see Figure 5 and Section XI).

As regards the type locality of *A. minimus*, Geoffroy (1803) stated that "M. Péron l'a trouvé dans une île placée dans le detroit de Bass". This detail has apparently escaped the notice of authors dealing with the species; Iredale and Troughton (1934) simply gave "Tasmania" for the type.

Waterhouse (1846) cited *Annales du Muséum* for the original description of the species, and he indicated that Maria Island was the type locality. (In the *Annales*, Geoffroy had omitted the locality data). Waterhouse's error evidently arose from a statement by Péron (1807, p. 359), who, in his record of the expedition's sojourn at "l'île Maria", wrote:

> Dans la classe des mammifères, je n'ai pu voir qu'une seule espèce de Dasyure, de la grosseur à peine d'une souris; j'ai reçus un individu vivant, . . ."

In 1818, Desmarest described *Phalangista nana* (= *Cercartetus nanus*), giving the locality as "L'île Maria" and the size as "Deux pouces et demi environ de longeur". Waterhouse (1846, p. 309) stated that the specimen was "procured by M. Péron at Maria Island" and that it was of the bulk of the Common Mouse.

Evidently the type specimen of *Cercartetus nanus* was the "dasyure" collected by Péron on Maria Island.

In Péron's *Voyage de Decouverte aux Terres Australes*, there is only one entry that could apply to the type specimen of *Antechinus minimus.* This is in volume I., on page 359, in a quoted report by M. Bailly, who had charge of a small party for several days. The relevant extract translates as follows:—

> . . . . a species of small animal, which the crew did not fail to call rats, but which everything indicates ought to belong to a genus or even an order quite different. These animals have long silky hair; their colour is a yellowish grey; they are besides so little shy, that they came

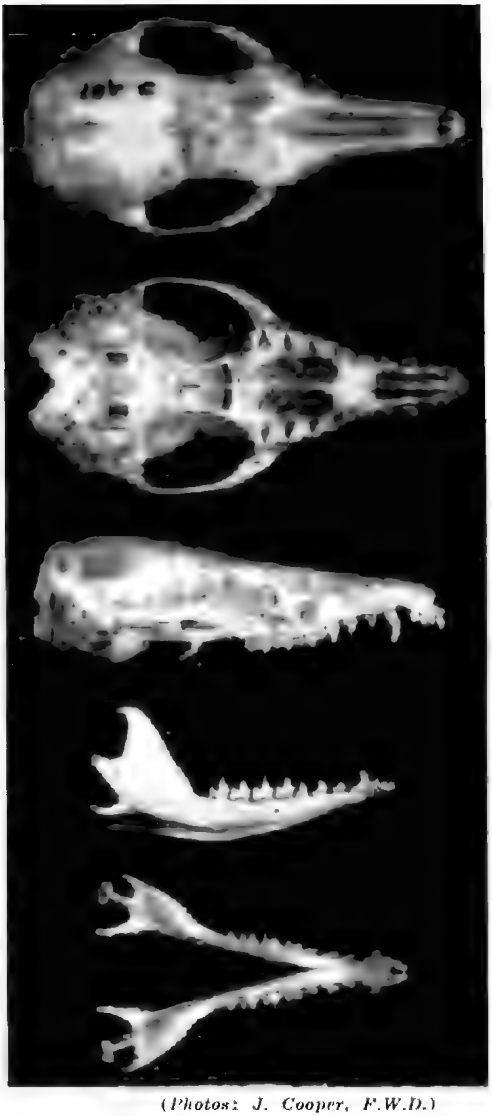
right amongst us to eat the debris of our meal. One of our sailors took one of them with his hand, without the animal appearing to be frightened.

The locality was Waterhouse Island, which lies close to Tasmania towards the eastern end of Bass Strait; and the episode occurred in the late evening of March 17, 1802.

Gray (1841) described a specimen from the Tasman Peninsula, south-eastern Tasmania, as *Phascogale affinis*. Thomas (1888) and subsequent authors placed this in the synonymy of *A. minimus*. The type of *A. affinis* is in the BM (No. 41. 1241 and 316.a), and cranial measurements which were sent from there to us support Thomas's action (for example, the anterior palatine foramina were given as 2.9 mm long).

Our identification of the Tasmanian population as the nominate subspecies, *A. minimus minimus*, is based on the assumption that the type of *A. minimus* was a specimen of this population. As that type specimen was subadult, and because there are insufficient specimens from Bass Strait islands for statistical tests, this assumption is made on circumstantial evidence only. Points taken into consideration are, firstly, the probability that Waterhouse Island *is* the type locality, and secondly, that the faunal relationships of the Bass Strait islands are with Tasmania rather than with the Australian mainland.

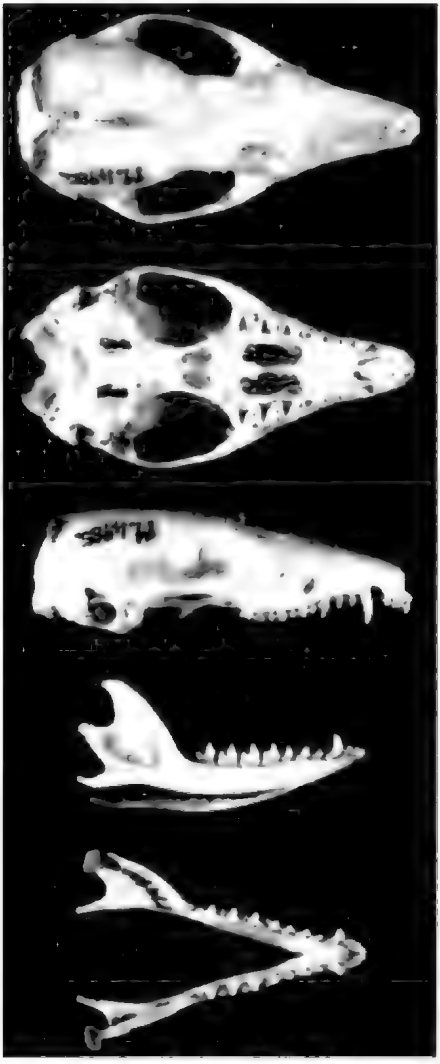
Finlayson (1958) published data of a series of *Antechinus* from coastal tracts of south-eastern South Australia and



(*Photos: J. Cooper, F.W.D.*)

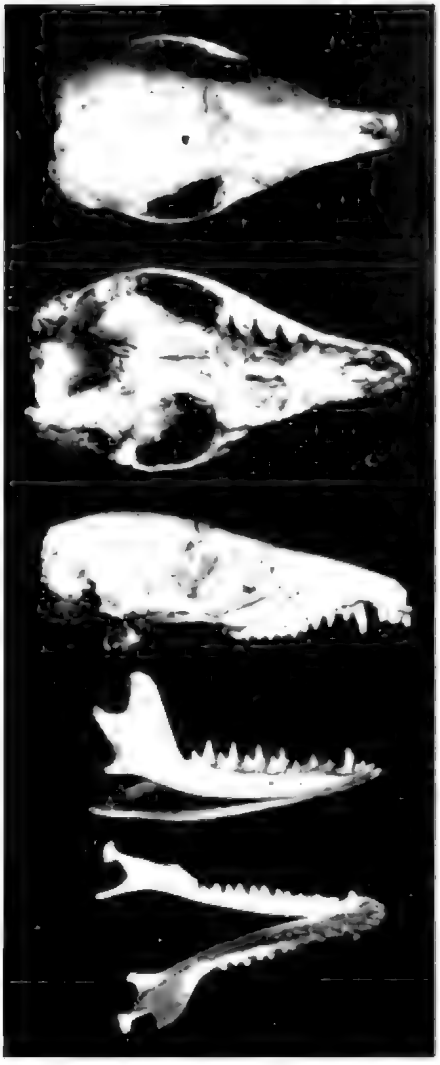
Figure 4: Skull and mandible of an adult male *Antechinus swainsonii mimetes* from Loch Valley, Victoria (F.W.D., No. D.487).

south-western Victoria. He named them *Phascogale swainsoni maritima*, and designated as the type a specimen from Port MacDonnell (S. Aust. Mus., No. M.4985, *leg.* G. Tilley,



(*Photos: J. Cooper, F.W.D.*)

Figure 5: Skull and mandible of the type of *Antechinus minimus maritimus*, an adult male (S.A.Mus., No. M.4985).



(*Photos: Paris Museum*)

Figure 6: Skull and mandible of the type of *Antechinus minimus minimus*, a sub-adult with fourth premolars erupting.

June 1938). Some of the measurements he gave — for example, 3·0-5·5 mm. for the anterior palatal foramina — indicate that the series contained both *A. swainsonii* and another species. Though most of this series has not been available to us, the type has been examined and identified as *A. minimus* (see Figures 5 and 6).

As the Australian *A. minimus* differs in minor characters from the Tasmanian form, it is con-

venient to recognize Finlayson's subspecific name. The mainland population is therefore distinguished as *A. minimus maritimus*. However, Finlayson's "Heathmere variant" (which is a form of *A. swainsonii*) must be excluded from this taxon (see Section III).

IX. Distribution and Habitat of A. minimus

Besides the type of *A. affinis*, from Tasman Peninsula, the British Museum has specimens of *A. minimus* from Scottsdale and Hummock Island. In Australian museums, there are specimens from several other islands of Bass Strait and from Maatsuyker Island, off southern Tasmania. Most other specimens from Tasmania, and all from the Australian mainland, were from close to the coast, indicating that the typical habitat of the species is coastal (see Figure 7). Though properly understood by Thomas (1888) and Tate (1947), *A. minimus* has been confused in Australian collections and literature with *A. swainsonii* and other small dasyurids. For instance, the animal described by Guiler (1960) as *A. minimus* is, in

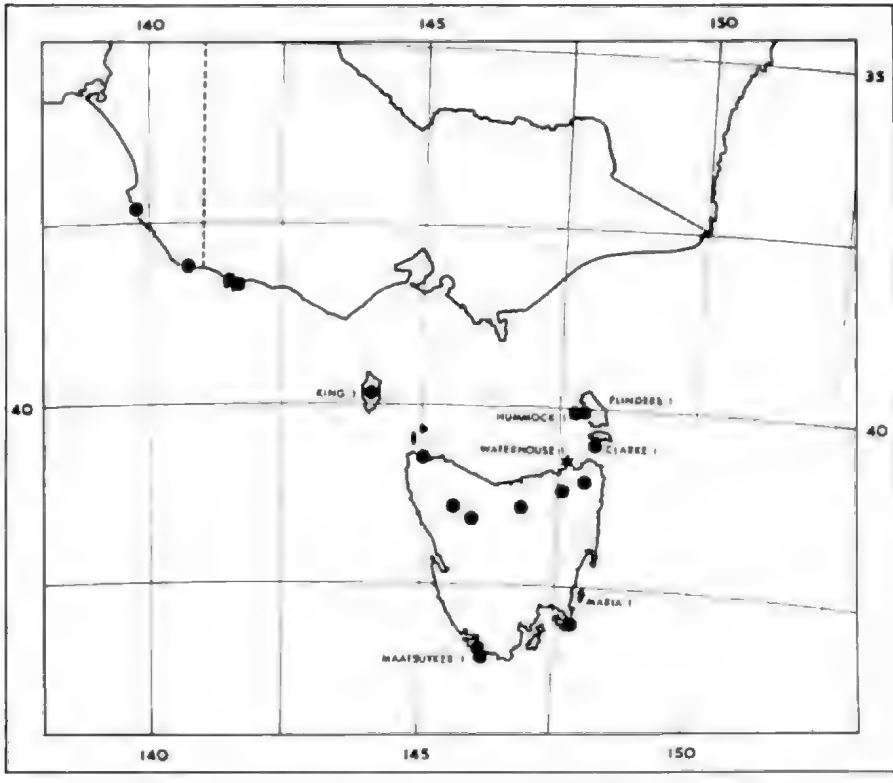


Figure 7. Distribution of *Antechinus minimus*. (Probable type-locality indicated by star.)

fact, *Sminthopsis leucopus*. Because of these misunderstandings, the comment by Troughton (1941) that "no habitat notes are available for the species", remained true until last year.

Two specimens of *A. minimus* were eventually caught (N.A.W., 30.6.1962) at Bridgewater Lakes, near Portland, south-western Victoria. The habitat was near a small lagoon amongst a shrubbery of tall tea-tree (the Moonah, *Melaleuca pubescens*), with areas of dense ground coverage. They entered traps which were on damp ground under a thicket of large tussocks of Coast Sawsedge (*Gahnia trifida*) and within six feet of the water's edge. The area was sand-dune, devoid of eucalypts, and, in the complete absence of other shelter, it is certain that the phascogales there must make their nests in the *Gahnia* tussocks.

In captivity, these specimens were provided with bundles of wiry grass and sedge, and they were quite adept at making nests, by getting into the material and then pulling the strands round themselves.

Similar conclusions were reached this year by R. H. Green of the Launceston Museum, based on his experience in trapping both *A. swainsonii* and *A. minimus* near Waratah in north-western Tasmania, in a locality where open areas of "button-grass" (*Gymnoschoenus sphaerocephalus*) give way to forests of Myrtle Beech (*Nothofagus cunninghamii*). Green summarized his observations (*in litt.*, 11.9.1963) as follows:

> All *Antechinus* taken in button-grass were *A. minimus* and all taken in the myrtle forest were *A. swainsonii*. However, *A. minimus* was taken in thick scrub bordering button-grass, but none of this species was taken actually in the rainforest. There was in one area a short dense growth of fine marshy grass in which we caught *A. minimus* on pads. As for their nests, I consider they build in the dense grass or in the centres of the larger button-grass bushes. There is simply no other suitable place.

X. Plastic Characters of A. minimus

(a) *Body Measurements*

Table 7 sets out the data of body dimensions derived from 18 male and 17 female adult specimens from throughout the range of the species. Although of similar proportions to *A. swainsonii*, *A. minimus* is a smaller animal. The greatest weights recorded for specimens of *A. minimus* are 55 gm for a Tasmanian male and 43 gm for a mainland female. A marked difference between the two is in length of tail, which in *A. minimus* measures about 70 per cent. of head-body length, compared with about 80 per cent. in *A. swainsonii*. A live specimen of *A. minimus* is shown in Figure 8.

A comparison of head-body length of the Tasmanian and Maatsuyker series is set out in Table 8. A close similarity is obvious. As corroborative evidence, cranial measurements of the two forms are practically identical (Section XI). Table 9 shows a comparison of the combined series from Tasmania and

Maatsuyker (presumably the nominate subspecies) with the mainland sample. However, because only one of the mainland specimens is female, the statistical comparison is restricted to males. Despite the small and variable series, the difference between the means was found to be highly significant ($P < 0{\cdot}001$). The pes lengths as absolute measurements are closely comparable; as proportions of head-body length they show divergence, but this is not statistically significant.

The differences between sexes could be tested only in the Tasmania-Maatsuyker series (see Table 10). In head-body length males are larger than females, but only at the 1·0 per cent. level of significance. Though the evidence is inconclusive, due to the small size of the samples, the observed difference is in keeping with marked sexual dimorphism found by us in *A. swainsonii* and by Horner and Taylor (1959) in members of the *A. flavipes* group.

(b) *Manus and pes*

Figure 3, drawn from a specimen of *A. swainsonii*, shows the normal appearance of the manus and pes of *A. minimus* equally well. The only quantitative difference between the feet of these species is merely the frequency of fusion of the first interdigital and inner metacarpal (-tarsal) pads and is of no value in identification of individuals. In *A. swainsonii* fusion occurs more than twice as frequently as in *A. minimus*. This is demonstrated in Table 11. This result is at variance with Finlayson's findings (*loc. cit.*, p. 149), due possibly to his series of "*Ph. s. maritima*" containing some *A. swainsonii*.

Tate (1947) commented on the prevalence of striated pads in forest-dwelling mammals, mentioning marsupials, tree shrews (Tupaiidae), primates and certain of the rodents. This, he infers, indicates arboreal habits, or at least, arboreal ancestry. The lack of striations in some living species of these orders is suggested by Tate to be "an adaptive condition superimposed on ancestral lines that earlier had striated pads." Tate showed that the Dasyuridae are more variable in this respect than other marsupial families but noted that most dasyurid genera possess striatae.

All *Antechinus* possess striated pads. However, in both *A. swainsonii* and *A. minimus* there appears to be a tendency towards reduction in the number of pads. This is in contrast to more typically forest-dwelling species of the *A. flavipes* group, in which the pads are strongly developed and fusion is exceptional.

In both *A. swainsonii* and *A. minimus* there is a pronounced elongation of the claws, particularly those of the manus, which in *A. swainsonii* may exceed 5 mm. As Finlayson (*loc. cit.*) noted, the claws of both species are broader and less curved (see Figure 3) than in *A. flavipes*. *Neophoscogale*, of similar dentition to *A. swainsonii*, also has similar claws (*vide* Tate & Archbold, 1937).

TABLE 7

Comparison of body measurements of males and females of *A. minimus*.

	Males (18)			Females (17)		
Head-body length	103 — 140	(118.7)		98 — 117	(106.5)	
Tail length	65 — 100	(81.2)	69%	67 — 85	(74.6)	70%
Ear length	13 — 17	(14.7)	12%	13 - 15	(13.9)	13%
Pes length	16 — 22	(18.7)	16%	17 — 19	(18.0)	17%

TABLE 8

Comparison of head-body length of Tasmanian and Australian mainland *A. minimus*.

		Range	Mean ± S.E.	Standard Deviation
Tasmania	6 ♂♂	103 — 122	113.2	
	5 ♀♀	101 — 117	106.6	
Maatsuyker Island	5 ♂♂	108 — 120	115.8	
	6 ♀♀	94 — 114	104.8	
Combined Series (Tasmania and islands)	11 ♂♂	103 — 122	113.5 ± 1.70	5.65
	11 ♀♀	94 — 117	105.6 ± 2.13	7.05
Australian mainland	6 ♂♂	118 — 140	128.3 ± 3.14	7.70
	1 ♀		(116.0)	

TABLE 9

Comparison of pes length of Tasmanian and Australian mainland *A. minimus*.

		Range	Mean ± S.E.	Standard Deviation
Combined series (Tasmania and islands)	12 ♂♂	16 — 22	18.7 ± 0.40	1.37
	16 ♀♀	17 — 19	18.1 ± 0.30	1.21
Australian mainland	6 ♂♂	18 — 20	18.9 ± 0.27	0.66
	1 ♀		(17.0)	

TABLE 10

Comparison of males with females in the Tasmania-Maatsuyker series of *A. minimus*.

Measurements in millimetres.

		Range	Mean ± S.E.	Standard Deviation
Head-body	11 ♂♂	103 — 122	113.5 ± 1.70	5.65
	11 ♀♀	94 — 117	105.6 ± 2.13	7.05
Pes length	12 ♂♂	16 — 22	18.7 ± 0.4	1.37
	16 ♀♀	17 — 19	18.1 ± 0.3	1.21

TABLE 11

Fusion of first interdigital pad with inner metacarpal (-tarsal) pad on manus and pes in A. swainsonii and A. minimus.

Fusion	Manus				Pes			
	A. minimus		*A. swainsonii*		*A. minimus*		*A. swainsonii*	
	No. of Spec.	Percent.	No. of Spec.	Percent.	No. of Spec.	Percent.	No. of Spec.	Percent.
On both feet	29	100	73	97	5	17	32	44
On one foot			2	3	4	14	10	14
On neither foot					20	69	31	42

(c) *Pelage*

The texture of the pelage is coarser than in *A. swainsonii*. A distinctive feature of *A. minimus* is a strong antero-posterior differentiation in dorsal colour. The head and shoulders are dark grey, grading into rich yellowish brown on the rump and flanks. The whole is ticked with glints of bronze due to banding of the main pile as in *A. swainsonii*, but in *A. minimus* this is more strongly developed and imparts a grizzled appearance. The dorsum is overlain with glistening black guard hairs. The warm, yellowish brown on the flanks is, however, not diluted with black.

The ventrum is uniform greyish yellow or buff. According to the specimens that we have examined, this ventral infusion of yellow invariably distinguishes *A. minimus* from *A. swainsonii*.

The ear, manus and pes are drab brown, ticked with dull buff. The tail is short-haired, dark brown dorsally and grizzled — due to black and buff elements — and lighter beneath.

XI. SKULL AND DENTITION OF *A. MINIMUS*

Table 6 provides cranial data of the series from Maatsuyker, Tasmania and the mainland. The Maatsuyker series is included separately, as it represents an isolated population at the southern limit of the species range (see Figure 7). These skulls are relatively uniform in size compared with the Tasmanian series. However, the latter are from a variety of habitats, from near sea level to over 2000 feet. There is close agreement in the corresponding mean values of each measurement and proportion. On this evidence, together with the similarity found with head-body data, the Maatsuyker form is part of the Tasmanian population of *A. minimus*.

The mean values of the measurements of the mainland series suggest that this form has a larger skull, with a proportionately narrower postorbi-

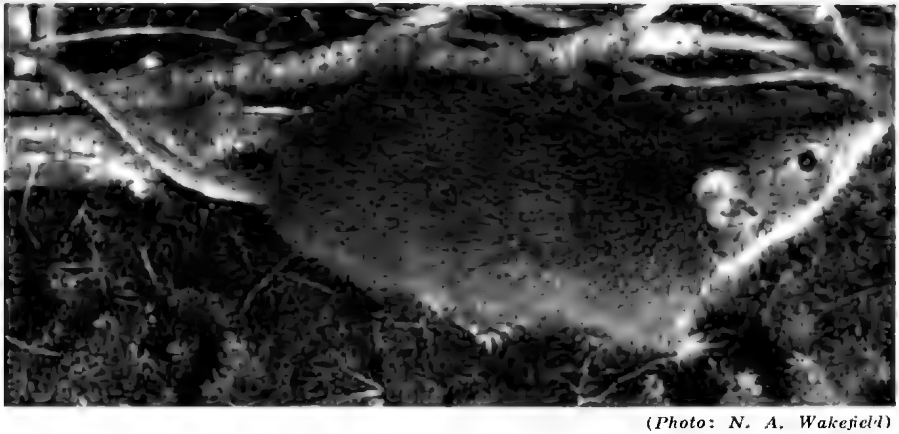
TABLE 12

Comparison of cranial characters of Tasmanian and Australian mainland *A. minimus* (males).

		No. of Specimens	Mean	Standard deviation	P
Basalar Length (B.L.)	Mainland	8	28.23	1.058	< 0.01
	Tasmania	11	26.29	1.597	
Zygomatic Breadth	Mainland	9	17.28	0.629	< 0.001
	Tasmania	11	15.71	0.789	
Palatalar Length	Mainland	9	15.35	0.145	< 0.001
	Tasmania	11	14.45	0.233	
Breadth at M^3	Mainland	9	9.69	0.254	< 0.001
	Tasmania	12	9.08	0.100	
Postorbital Construction/ B.L., as percent.	Mainland	8	26.2	1.046	< 0.001
	Tasmania	11	28.5	0.390	

tal constriction, than its Tasmanian counterpart. Table 12 sets out the results of a comparison of 9 mainland and 12 Tasmanian male specimens. Differences between the two series are very marked and are of high statistical significance, taking into account the small samples. The biological significance of these results is not easily defined; nevertheless, within the limits of the available material the occurrence of a larger form on the mainland has been demonstrated.

Finlayson (*loc. cit.*, p. 149), when commenting on the status



(*Photo: N. A. Wakefield*)

Figure 8: A live male *Antechinus minimus maritimus* from Bridgewater Lakes, Victoria (F.W.D., No. 426).

of the mainland population of *A. minimus* (as *Phascogale swainsoni maritima*) in relation to *A. swainsonii swainsonii* and *A. flavipes*, concluded that *A. minimus* shows minor cranial changes towards *A. flavipes*. A more logical interpretation, now that specific and geographical relationships are better understood, is that less extreme modification has occurred in *A. minimus* than in *A. swainsonii*. (Compare Figures 4 and 6).

In *A. minimus* the rostrum is only moderately elongated. The anterior palatine foramina are conspicuously shorter, reaching back to about level with the middle of P^1. The length of this opening provides an absolute key feature for distinguishing these two closely related species; in the series measured by us, the range and mean for *A. swainsonii* is 4·60 - 6·65 (5·41) mm and for *A. minimus* is 3·30 - 4·40 (3·76) mm. In *A. minimus* the frontal-nasal region of the skull is usually convex as in *A. flavipes;* although occasionally this area is flat, thus approaching the condition of *A. swainsonii*. The postorbital region is parallel-sided, as in *A. swainsonii*.

The teeth of *A. minimus* are of the same pattern as in *A. swainsonii* but as the rostrum is less elongated there is normally no interruption of the upper premolar row by interspaces. The only marked difference is a small distinct metacone* on the M^4 of *A. minimus;* this is absent in *A. swainsonii*. The milk premolars are as in *A. swainsonii* (see Section VI).

*This occurs also in *A. godmani*.

XII. Breeding Condition in A. minimus

Females

In the total series of 25 females, only 3 showed signs of recent breeding activity. Although unoccupied, in each case the pouch area was fully developed and the nipples enlarged. These observations are similar to those recorded for *A. swainsonii*, and it is probable that the timing of breeding and subsequent events is the same in both species.

In all females of *A. minimus minimus* examined (Maatsuyker, 6; Tasmania, 3), the nipple number was six. In our two females of *A. minimus maritimus*, the count was eight. This difference is a parallel to that between *A. swainsonii swainsonii* and *A. swainsonii mimetes*.

Males

It appears that the details recorded for *A. swainsonii* (see Section VII) apply also to *A. minimus*.

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XV. References

Cockrum, E. L., 1955. *Laboratory Manual of Mammalogy.* Burgess, Minneapolis.

Finlayson, H. H., 1958. A case of duplex convergent resemblance in Australian mammals, with a review of some aspects of the morphology of *Phascogale* (*Antechinus*) *swainsoni* Waterhouse and *Phascogale* (*Antechinus*) *flavipes* Waterhouse. *Proc. Roy. Soc. S. Aust. 81*: 141-51.

Fisher, R. A., and Yates, F., 1957. *Statistical tables for biological, agricultural and medical research.* 5th. Ed. Oliver & Boyd, London.

Fleay, David, 1932. Swainson's phascogale (the "bush mouse"). *Vict. Nat. 49*: 132-4.

Fleay, David, 1949. The Yellow-footed Marsupial Mouse. *Vict. Nat. 65*: 273-7.

Geoffroy, E., 1804. Memoirs sur les espèces du genre Dasyure. *Ann. Mus. Nat. Hist. Nat. 3*: 262-3.

Gray, J. E., 1841. Contributions towards the geographic distribution of the mammals of Australia with notes on some recently discovered species. In Grey, G., *Journals of two expeditions . . . in . . . Australia during the years 1837, 38, and 39.* Appendix "C" vol 2: 397-414.

Guiler, E. R., 1960. *Marsupials of Tasmania.* Govt. Printer, Hobart.

Higgins, E. T., and Petterd, W. F., 1883. Descriptions of hitherto undescribed *Antechini* and Muridae inhabiting Tasmania. *Proc. Roy. Soc. Tas. 1882*, pp. 171-4.

Higgins, E. T., and Petterd, W. F., 1884. New species of Tasmanian *Antechini* and *Mus*. *Proc. Roy. Soc. Tas. 1883*, pp. 184-6.

Horner, B. Elizabeth, and Taylor, J. Mary, 1959. Results of the Archbold Expeditions No. 80. Observations on the biology of the Yellow-footed Marsupial Mouse *Antechinus flavipes flavipes*. *Amer. Mus. Nov.* No. 1972.

Iredale, Tom., and Troughton, E. LeG., 1934. A check-list of the mammals recorded from Australia. *Mem. Austr. Mus. VI*: 1-122.

Jones, F. Wood, 1923. *Mammals of South Australia.* Part 1. Govt. Printer, Adelaide.

Karmel, P. H., 1959. *Applied statistics for economists.* Pitman, Melbourne.

Marlow, B. J., 1961. Reproductive behaviour of the marsupial mouse *Antechinus flavipes flavipes* Waterhouse (Marsupialia) and the development of the pouch young. *Aust. J. Zool. 9*(2): 203-18.

Péron, François, 1807. *Voyage de découvertes aux Terres Australes, sur les corvettes le Géographe, le Naturaliste, et la goëlette le Casuarina, 1800-4, vol 1*, Paris.

Tate, G. H. H., and Archbold, R., 1937. Results of the Archbold Expeditions 16. Some marsupials of New Guinea and Celebes. *Bull. Amer. Mus. Nat. Hist. 73*(4): 331-476.

Tate, G. H. H., 1947. Results of the Archbold Expeditions No. 56. On the anatomy and classification of the Dasyuridae (Marsupialia) *Bull. Amer. Mus. Nat. Hist. 88*(3): 101-55.

Tate, G. H. H., 1948. Results of the Archbold Expeditions No. 60. Studies in the Peramelidae (Marsupialia). *Bull. Amer. Mus. Nat. Hist. 92*(6): 317-46.

Thomas, Oldfield, 1888. *Catalogue of the Marsupialia and Monotremata in the collection of the British Museum.* Taylor & Francis, London.

Thomas, Oldfield, 1924. A new Pouched Mouse (*Phascogale*) from northern New South Wales. *Ann. Mag. Nat. Hist. (9) xiv*: 528.

Troughton, E. LeG., 1941. *Furred Animals of Australia*, 1st. Ed. Angus & Robertson, Sydney.

Waterhouse, G. R., 1840. Description of a new marsupial mammal belonging to the genus *Phascogale*. *Mag. Nat. Hist. (2) iv*: 299.

Waterhouse, G. R. 1846. *A Natural History of the Mammalia. Vol. 1. Containing the Order Marsupiata, or pouched animals.* Baillière, London.

Wood, J. G., and Williams, R. S., 1960. In *The Australian Environment.* 3rd Ed., C.S.I.R.O. & Melb. Univ. Press, Melbourne.

Salute to a Master Plant Photographer (The late Herbert Trethowen Reeves)

By J. H. Willis

Announcement of the death, at Heidelberg Repatriation Hospital on July 30, of Mr H. T. Reeves has been received with universal regret by all who knew him as a man and as a most accomplished photographer. The botanical fraternity, in particular, may doubt whether his place will ever be filled.

Reeves was born on February 3, 1894, at Deans Marsh (northern Otway district, Victoria) where his father was engaged in farming. During 1900 the parents moved with their young family of four sons and three daughters to Darnum in central Gippsland, and there Bert was educated. In 1916 he enlisted for active service in World War I, but suffered a severe leg injury soon after arrival at the front. He was hospitalized at Epsom (15 miles S.S.W. of London) for 14 months, following amputation of the wounded limb, and, while thus incarcerated, he endeared himself to both professional and domestic staff: young Reeves was the only Australian soldier ever allowed into the kitchen, and at his departure for home in 1918 he was enthusiastically farewelled by every nurse in Epsom Hospital.

In 1924 he married Miss Pearl E. Jenkin of Castlemaine, and he subsequently worked at Warragul all through the depression years. He transferred to Melbourne in 1936, as senior photographer at the G.P.O., and was soon a keen rifle-shooter at Williamstown butts with a team from the Melbourne Cricket Club; there he came within 13th place in the King's Cup challenge shooting.

About 1937 Reeves undertook to photograph a series of Australian flowers for overseas publicity by the Department of Information, and he became so engrossed in this project that wildflower portraiture was henceforth a major hobby. Up to 1956 he had staged five exhibitions of exquisitely hand-tinted wildflower photos at the Kodak Galleries in Melbourne; it was always his aim to portray a plant in its natural habitat, alongside a close-up study of its blossom or fruit. He was elected a member of the F.N.C.V. in June 1936, but had allowed his membership to lapse in the last few years, and he was also associated with the work of the Native Plants Preservation Society of Victoria.

For decades, H. T. Reeves had scorned the "snapshot" trend among photographers, maintaining that only long, careful exposures and much patience gave satisfactory results. He would carry an old-fashioned, cumbersome camera and supply of heavy glass plates over hill and dale for miles, content if he secured half a dozen perfect exposures in a day's tramping. But, shortly after retirement in

February 1959, he launched for the first time into 35 mm. colour photography with a very modern "Contaflex" camera. His subject matter was of general scenery and objects of natural history interest, but he leaned more and more toward the fungi which claimed his whole attention at the end. During these last four years he built up a magnificent collection of fungal colour transparencies, working chiefly with fast "Anscochrome" film and never using a flashlight. His physical handicap did not deter him from venturing into remote mountain gullies during wintertime, in pursuit of unusual fungi. Thoroughly familiar with the technical requirements for a good picture, he was also an expert at composition—nothing but ideal groupings of the subject gratified his high artistic sense.

Through 1960 and 1961 Reeves made, at the Director's request, a series of colour photographs depicting the Royal

Botanic Gardens during the four seasons of the year. Apart from his own vast collection of negatives, he acquired those of the late W. H. Nicholls (distinguished orchidologist) and of other photographers. All these negatives, also his colour transparencies, were bequeathed to the National Herbarium.

Reeves had collaborated with Nicholls in an article "The Jungle Country of East Victoria" — his first appearance in the pages of the *Victorian Naturalist* [Vol. 54: 139-142 (Jan. 1938)]. This paper was illustrated by two excellent plates of epiphytic orchids (*Sarcochilus falcatus* and *Dendrobium striolatum*), the photos taken by Reeves during an excursion to far East Gippsland in October 1937. An amusing side-light of the journey concerns the fording of Cann River near Noorinbee. Nicholls had waded successfully across, through knee-deep water; but, as soon as Reeves stepped into the swift-flowing stream, his artificial leg bobbed up to the surface like a cork. It was only by dint of perserverering effort and much floundering that he eventually made the opposite bank—to the accompaniment of hilarious laughter from his genial bush-mate.

Thereafter Reeves's magnificent pictures adorned many numbers of the *Naturalist*, his study of a slender tree-fern forming the cover design of our Club handbook, *Ferns of Victoria and Tasmania*. Indeed, he was in almost constant demand as an illustrator of other people's articles; and, if one were "stumped" for a good picture to enliven some natural history paper, the sound advice would often be: "go and see Bert Reeves—he's certain to have a photo that will do." And usually Bert had. He also kept a seemingly endless stock of hand-coloured lantern slides that his friends borrowed freely for lecture purposes.

The nature magazine *Wild Life* was no sooner launched in October 1938 than Reeves became one of its principal photographic contributors. Two pages of his orchid studies appear in the first number, and many successive numbers (up to the last in February 1954) contain wildflower pictures by this talented artist; some of the species portrayed would seem never to have been illustrated before. His botanical portraits are a conspicuous feature in E. E. Lord's *Shrubs and Trees for Australian Gardens* (1st ed. 1948), Jean Galbraith's *Wildflowers of Victoria* (1950) and Thistle Harris's *Australian Plants for the Garden* (1953). Mr Lord's acknowledgement is a fine tribute: "Last and best thanks are due to Mr Bert Reeves whose amazing skill with the camera reveals the beauties of our beloved flowers as no words can ever do." The final examples of Reeves's work to be printed were eight plates accompanying the article "Land Flora of Victoria", in the opening pages of the *Victorian Year Book* No. 76 (April 1962).

One recalls many a visit to his old cramped room in the Postal Services Branch, 581 Bourke St., where the visitor was ushered through a labyrinth of dark passages, past trays and tanks of

developing solutions, across rooms hung with lines of drying photo-plans and blue-prints to Bert's "holy-of-holies". Much of his own superb work, including the hand-tinted enlargements, was accomplished here during spare hours and it was an education to watch him deftly developing up negatives to maximum possible clarity in every part of the film.

Bert Reeves was very popular with children, and he gave inspirational leadership in youth movements, especially scouting. An important venture was to teach boy scouts how to recognize the commoner Victorian eucalypts by means of carefully mounted specimens that he assembled in shallow boxes. As a highly successful home gardener, he kept his household in vegetables of prime quality, grown on the property at 248 Barkers Road, Hawthorn (opposite M.L.C.).

Good-humoured, open-hearted, always friendly and devoid of dissimulation, he was never happier than out roaming the countryside with a crony—in search of scenes, rocks, flowers or fungi to perpetuate in faultless pictures. Bert's lunch always consisted of two incredibly thick slices of bread with a large slab of cheese in the centre—nothing more — and W. H. Nicholls once snapped him in the act of consuming this gargantuan "Reeves sandwich". He was quite inseparable from his pipe, which he sucked furiously in periods of concentration, and *what* an ado there was when he occasionally lost it in the bush!

The whole natural history fraternity in Victoria (and Australia) mourns the passing of a talented, delightful companion, while this Club's genuine sympathy goes out to his widow and married daughter, Mrs Deirdre Glass.

Reviews: Two Books on Tasmanian Wildlife

1. Tasmanian Wild Life, by Michael Sharland, F.R.Z.S.

Melbourne University Press. 1962. 25/-.

This book was published last year, and in it the author has achieved the aim stated in the preface, "to provide a handy means of reference to the native species".

The first chapter, comprising a dozen pages, makes the book a worthwhile item for a naturalist. This deals with the thylacine and provides a excellent documentation of the recent history of the species, a story which is not available elsewhere.

However, a well-established fallacy is perpetuated in the chapter title, "An Animal of Antiquity", and by the reference to "these early predators hob-nobbing with ancient reptile types and gargantuan marsupials, such as *Nototherium*."

The facts are that the "ancient reptile types" predominated throughout the Mesozoic era, and they disappeared by the end of the Cretaceous period (about 75 million years ago), and by that time the tiny shrew-like ancestors of modern mammals had appeared. The great evolutionary radiation of mammals took place throughout the Tertiary; and, by the Pleistocene, *Thylacinus*, *Nototherium*

and the other "gargantuan marsupials" had developed in Australia. It is now accepted that Australian marsupials as a group evolved independently, and the thylacine is a fairly late local specialization, not a "living fossil" survival of the long extinct American carnivorous marsupials of the Tertiary.

An interesting piece of zoological news, which the book gives, is of sporadic visits to Tasmania of the Grey-headed Fruit-bat.

In the introduction, the author states that "the text is supplemented by information drawn from different sources", and in chapter 9 he emphasizes that he has no special knowledge of the native rodents and mouse-like marsupials. In these circumstances it is not surprising that errors and other discrepancies have appeared.

The Pigmy-possum, *Cercartetus nanus*, was collected on Maria Island by Péron in 1802, not "in 1818 . . . by Desmarest".

On page 56, the Tasmanian race of *Rattus lutreolus* is inadvertantly given as *R. l. lutreolus*, though correctly referred to as *velutinus* on page 57. And the *Sminthopsis* is *leucopus*, not "*loncops*" as on pages 54 and 61.

It is a pity to have the species of *Antechinus* and *Sminthopsis* placed with the rodents in the chapter "Native Rats and Mice", and to see the larger dasyures headed "Wild Cats of the Bush".

The problem of vernacular names is obvious throughout the book.

The author uses "Red-necked Wallaby" for the *Protemnodon* (*Wallabia*) *rufogrisea*, but does not indicate that the "kangaroos" and "Bennett's Wallaby" of pictures 7, 8 and 10 are the same species.

"Porcupine" is given as an alternative for Spiny Anteater. We cannot accept "porcupine" for a monotreme. Why not "echidna"? The author repeats Troughton's argument (in *Furred Animals of Australia*) that *Echidna* is a genus of eels. We accept an identical situation by using "platypus" (which is a beetle genus) as a common name for *Ornithorhynchus*! Incidently, pictures 16 and 17 are of the Australian echidna, not the Tasmanian.

Petaurus breviceps is not "best known on the Australian mainland" as "honey glider", and the little marsupial should not be featured as the "Flying Squirrel". Sugar Glider is the accepted vernacular, and it was *not* originally native in Tasmania.

If these adjustments are made to the text, the book can be used as a reasonably reliable guide to the Tasmanian mammals.

2. Coorinna. A Novel of the Tasmanian Uplands, by Erle Wilson.

Melbourne Paperbacks edition, 124pp. Melbourne University Press. July 1963. 6/6.

First published in 1953 (Andre Deutsch Ltd., London), the book now appears as a paperback. It tells the story of a thylacine family, and other animals, the setting purporting to be near Lake St. Clair in central Tasmania.

On the back cover there are quotes from reviews of the first edition, describing it as a "timeless masterpiece" (*The Economist*, London), "a fine account of the lives and deaths of wild creatures" (*New Statesman*, London), and "among the still small number of our novels that will be read by future generations" (*Sun-Herald*, Sydney).

Those claims are perhaps true, for the story is quite well written and full of action. But the publisher's statement, on the back cover, that "from the interactions of the individual creatures emerges as a whole the ecology of the Tasmanian uplands", cannot pass without comment. Much of the wildlife included in the plot does not occur on the central Tasmanian plateau, many of the species are unknown in Tasmania, and most of the characteristics and activities attributed to animals are so far from their natural features and behaviour as to constitute veritable "howlers".

Coorinna behaves as a dog, not as a thylacine, taking prodigious leaps for instance and indulging in "a frenzy of barking". The female remained in her lair after the birth of her litter, until their eyes were open and they were active. The "tiger-cats" are felines rather than marsupials; one even made that "silent little treading

movement of its hind paws" when preparing to leap. We find a porcupine with "her two kittens . . . playing together, squeaking . . . wrestling and pretending to bite . . .", and when attacked the mother "squealed in fear its spines flew up and stones scattered in a small shower as it burrowed down". There are platypuses "snarling and hissing", and a marsupial mouse that gave "a shriek of rage".

The Powerful Owl, which the author has introduced to Tasmania, is ready to tackle an active young thylacine, but in turn a feral cat is prepared to take off the owl! There is an egret rookery and a breeding colony of crested grebes by Lake St. Clair; and a "nesting kookaburra, using its beak as a battering ram, was piercing a hole in an ants' nest set in a fork of a yellow gum".

Innumerable other anomalies include a "big red old man" kangaroo which killed the adult thylacine, and an equally out-of-place "five-foot diamond snake" that was "snatched into the air" by a sparrow hawk.

Attention is given to courtship procedures and fights to the death between males in the breeding season. But surely the most remarkable observation in the book is "a mass of male grass grubs struggling around a single female."

Naturalists will recognize that the story is a work of fiction in virtually all its details, and others who are to read it should be made aware of this fact. As pure fiction, the book can provide a few hours' enjoyable reading.

—N. A. WAKEFIELD

New Records of Frogs in East Gippsland

By M. J. LITTLEJOHN, A. A. MARTIN and P. A. RAWLINSON*

As a result of intensive field work in East Gippsland we have been able to build up a reasonable collection of the amphibians inhabiting that area. Examination of this material indicated the presence of three forms not previously recorded from the state, and a number of additional locality records for three species previously known from only one or a few localities in Victoria. Moore (1961) has given adequate descriptions of the morphology and biology of these species.

I NEW STATE RECORDS

Uperoleia marmorata Gray

Specimens collected: 2 miles north of Cann River.

This material agrees in morphology with *U. marmorata* of Parker (1940). The previous southernmost record for this species was Jervis Bay (Fletcher, 1894). We also collected one specimen of this species 13 miles south of Bombala, N.S.W.

Hyla jervisiensis Dumeril and Bibron

Specimens collected: Club Terrace By-pass about 12 miles west of Cann River.

Voice Record: Bellbird Creek.

The first Victorian specimen was collected by W. H. Owen in December, 1962. Additional material was collected by the present authors on August 24, 1963. The previous southernmost record was Bodalla, N.S.W. (Moore, 1961).

Hyla aurea aurea (Lesson)

Specimens collected: Gipsy Point, Orbost, Corringle Beach,

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6 miles north of Lakes Entrance, and Metung.

Voice Records: Genoa and Nowa Nowa.

The previous southernmost record was Pambula (Moore, (1961), Although Moore (1961) and earlier workers have considered *H. aurea aurea* and *H. a. raniformis* as subspecies our observations and collections indicate that they occur sympatrically without hybridizing where their ranges overlap between Metung and Orbost. The trinomials are retained, however, until the problem has received further investigation.

II Additional Locality Records

Crinia haswelli Fletcher

Specimens collected: 8 miles east of Genoa, 8 miles north-east of Genoa, 2 miles north-west of Mallacoota, 8 miles south of Buchan, 6 miles north of Nowa Nowa, 5 miles east of Lakes Entrance and 3 miles south of Fernbank.

Voice Records: Cann River, Bemm River, Cabbage Tree, Marlo, and Corringle Beach.

This species was previously recorded from only one locality in Victoria: 5 miles east of Cann River (Moore, 1961). We have not found it west of Fernbank and believe this to be its western limit.

Hyla peroni (Tschudi)

Specimens collected: Genoa, Gipsy Point, and 3 miles south of Fernbank.

Voice Records: Marlo, Orbost, 8 miles east of Lakes Entrance, and Metung.

Copland (1957) collected this species at Bruthen. *Hyla peroni* is also found along the Murray and Goulburn Rivers in northern Victoria. However, the western limit of the Gippsland distribution appears to be near Fernbank, with a continuous eastern then northern distribution linking these populations with those of the Murray River valley.

Hyla phyllochroa Gunther

Specimens collected: Genoa, 17 miles north of Cann River, 26 miles north of Orbost, Cabbage Tree Creek, Dargo.

Copland (1962) recorded the first specimens for the state, these being collected 10 miles north of Walhalla. He considered the Victorian material to be subspecifically distinct.

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References

Copland, S. J. (1957). Australian tree frogs of the genus *Hyla*. *Proc. Linn. Soc. N.S.W.*, *82*: 9-108.

— (1962). *Hyla phyllochroa* Gunther (Amphibia) as an addition to the fauna of Victoria, with the description of a new race and a note on the name of the genus. *Proc. Linn. Soc. N.S.W.*, *87*: 137-140.

Fletcher, J. J. (1894). Contributions to a more exact knowledge of the geographic distribution of Australian Batrachia No. 4. *Proc. Linn. Soc. N.S.W.* (2) *8*: 524-533.

Moore, J. A. (1961). The frogs of eastern New South Wales. *Bull. Amer. Mus. Nat. Hist. 121*: 149-386.

Parker, H. W. (1940). The Australasian frogs of the Family Leptodactylidae. *Novit. Zool. 42*: 1-106.

Charles John Gabriel

Charles John Gabriel was born on May 28, 1879, to Joseph and Elizabeth Gabriel of Victoria Street, Abbotsford. He was the second child and eldest son of Joseph Gabriel, a pharmacist.

Joseph Gabriel was a man of many interests, including gardening, woodwork and natural history. A keen member of the Field Naturalists Club and honorary collector for the National Museum of Victoria, he instilled an interest in natural history into his children.

It was at his firm instigation that the young Charles, who enjoyed telling the story in later life, took his first natural history award at the age of nine, for the exhibition of seashells at a club exhibition. His father proposed him for club membership in June 1900, and Charles published his first paper, "A list of Marine Mollusca from Stony Point", in the *Victorian Naturalist* for April, 1908.

This was followed by some 40 papers in scientific journals, on Australian Mollusca. Many of these were written in collaboration with J. H. Gatliff, the "Father of Victorian Conchology". As well as scientific publications, he was the author of the popular F.N.C.V. Handbook, *Victorian Sea-shells*, published in 1936.

In 1933 he was appointed honorary curator of shells at the National Museum of Victoria, a little later changed to honorary associate in conchology. Immediately he showed his continued interest in the Museum by increasing his already valuable contribution of specimens to the collections there. In 1946, when a full-time curator was appointed, he presented all the type specimens in his collection to the institution. From that time onward, until his death, he handed over all type material and representatives of new records, on completion of each paper. On his death he completed the circle of his generosity by willing his

entire collection and conchological library to the National Museum of Victoria, a very important and valuable addition to the natural history collections of Victoria and Australia. Thus it will be available to future generations of conchologists, professional and amateur.

As well as his scientific interest in the Australian Mollusca he was always ready to help children and the amateur in his or her first fumbling efforts towards knowledge, and for many years it was his joy to exhibit and instruct at monthly Field Naturalists Club meetings and at the annual nature show.

In 1958 he was awarded the Australian Natural History Medallion, a long overdue and richly deserved honour, which he had failed to receive previously because his contribution to the cause of natural history had been either scientific or on the person to person basis. Such service wins the recognition of the non-vocal specialist and the grateful individual, but does not bring popular acclaim of the crowd.

He was responsible wholly or in part for 50 publications, which included the description of approximately 130 species and varieties new to science. Most of his publications are contained in the *Victorian Naturalist, Proceedings of the Royal Society of Victoria* and the *Memoirs of the National Museum of Victoria.*

— J. HOPE MACPHERSON,
Curator of Molluscs,
National Museum of Victoria.

Field Naturalists Club of Victoria

General Meeting—October 14, 1963

Mr M. K. Houghton, who presided over a large meeting at the National Herbarium, thanked those who had assisted with the organization and conducting of the nature show in September.

The 1962 Australian Natural History Medallion was presented to Mr N. A. Wakefield. Mr A. D. Butcher, in making the presentation, spoke of work done by the recipient in various branches of natural history, particularly in connexion with activities of the Fauna Survey Group of the club. He commended the close liaison which had been established between the F.N.C.V. group and the Fisheries and Wildlife Department, which was significant from the point of view of conservation of our wildlife.

In accepting the medallion, Mr Wakefield recalled schooldays at Orbost and excursions with his father to the bush. He spoke of contact with Mr F. Robbins first, and then with Major H. W. Wilson at the Melbourne Teachers' College. He told how the discovery of a new orchid, *Cryptostylis hunteriana*, led to friendship with the late W. H. Nicholls who, in 1938, introduced him to membership of the F.N.C.V.

The subject for the evening took the form of a short address, entitled "Australian Mammal Study", by Mr Wakefield. He told how the early piecemeal naming of specimens had resulted in our present disorganized array of "species", the relationships of which are not understood.

He demonstrated this with maps showing trends of revisional studies in some groups, and emphasized the necessity for an organized survey of our mammals on an Australia-wide basis. Some slides were shown of members of the phascogale group and of possums in their natural habitats.

Twelve new members, whose names appeared in the October *Naturalist*, were elected to membership of the club.

The secretary announced that the Lower Melbourne Town Hall had been booked from August 31 to September 2, 1964, for next year's nature show.

Exhibits and Nature Notes

Miss V. Baalam displayed 24 species of *Acacia*, collected in Western Australia.

Mr D. Bowery exhibited an aboriginal axe-sharpening stone, unusual in having two grooves, from King's Canyon, Central Australia.

Mr A. J. Swaby spoke of the long flowering period of grevilleas and exhibited several native species and two horticultural forms, as well as specimens of other native genera.

Mr H. C. E. Stewart read a paragraph from the *Bairnsdale Advertiser*, commenting on movement of Nankeen Night Herons and Bell Miners near Lake Tyers.

Microscopical Group—July 17, 1963

Mr E. LeMaistre presided at a meeting which was attended by 17 members and visitors. Seven microscopes were in use.

Final arrangements were made for both the nature show microscope exhibit and the August film night.

The guest speaker for the evening, Mr G. Sims of the research laboratories of Kraft Cheese, gave the group a most interesting talk on yeast extracts. He outlined the processes of extraction of cell contents, blending, flavouring, colouring and standardization of vitamin content. The speaker had prepared numerous sets of microscopical slides showing yeast cells at various stages of extraction and these were distributed among members for their own use.

Microscopical Group — September 18, 1963

Nineteen members and visitors were present, with Mr E. LeMaistre in the chair.

Members planned to go to Benalla for a weekend in the latter part of October, to visit Mr H. A. Dade, who is a past-president of both the Royal and Queckett Microscopical Societies.

As the evening was a members' night, there was a variety of very

interesting exhibits under the fourteen microscopes in use. Mr H. Barrett showed a recently completed slide of arranged diatoms, which was up to his usual standard of excellent craftsmanship. In answer to a question he outlined the method of cleaning and treating diatom collections. Mr K. Trotter also had a diatom slide and described the method of cementing them in place.

Mr M. A. Janssen showed the group an excellent microscope lamp, a slide box he had made, and a number of Rheinberg discs with which he has been experimenting.

Mr LeMaistre exhibited the desmid *Pleurotaenium*, showing its cellulose wall and nuclear band. He compared this interesting group of simple algae with diatoms.

Mr P. Genery exhibited the larva, pupa and imago stages of a very small fly, whose tiny larvae live upon decaying vegetation in water and breathe through a posterior tube.

Fauna Survey Group—August 1, 1963

The meeting was attended by fifteen persons, with Mr N. A. Wakefield in the chair.

A letter from Mrs F. Gladstone of Beechworth expressed concern at the loss of wildlife, and in particular phalangers, due to clearing operations in the Ovens district. The clearing is being carried out by the Forests Commission in preparation for pine plantations.

The known range of Leadbeater's Possum was extended to near Powelltown with a sighting by Mr W. King, and Mr R. Warneke extended the range even further with a live young female found at Loch Valley in Gippsland. In the latter case, a nest had been obtained from a tree hollow.

One of the specimens reported previously as *Antechinus*, from Jackson's Crossing near Buchan, had been identified as a *Smithopsis leucopus*.

Mr Wakefield gave a report of recent field work in the Grampians. He and several local naturalists went into the Victoria Range to investigate a recently discovered aboriginal shelter and to collect material from a bone deposit.

Mr M. Heddles of the Ringwood F. N. Club told the group how to recharge spotlight batteries from 6v or 12v car battery systems, whilst travelling.

Future activities were planned, including further work at the Mabel Caves near Buchan and a search for rock-wallabies in the Snowy Mountains area.

Owing to the school holidays it was decided not to hold a meeting in September.

Fauna Survey Group—October 3, 1963

The meeting was attended by nine persons with Mr N. A. Wakefield in the chair.

The group had now purchased two battery carriers.

The renewal of the permit to handle protected animals had now been received from the Fisheries and Wildlife Department.

Several reports of interest from the country had been received. Mr Creighton of Alexandra sent in Powerful Owl pellets containing mammal bones, and Mr T. Pescott, of the Geelong F.N. Club, sent in pellets, probably of a Barn Owl. A specimen had been received from Mr N. Bennett, of Stawell F.N. Club, of *Cercartetus nanus* from Mt Drummond near the Grampians.

Mr W. King told of seeing a sea-eagle's nest at Hattah. Beneath the nest were the remains of a Murray River tortoise, duck, rabbits and coot.

Mr Wakefield said that, after photographs have been taken, work at the Mabel Cave will be complete, as all the useful bone material had now been collected.

Messrs Wakefield, K. Rogers and J. McCallum had investigated three reports of rock-wallabies in the Snowy Mountains area but decided that these were erronous as there was no evidence of the presence of the species and the areas were not suitable habitat.

Geology Group—October 2, 1963

Thirty-four members and visitors were present, with Mr L. Angior in the chair. Mr T. Sault made a report about the group's exhibit on the "Building Stones of Victoria" at the nature show. This was considered to be the best effort the group had made, and a record was made in the minutes

of the work of Mrs M. Salau and Messrs T. Sault and R. Hemmy in arranging it. Plans were made for a syllabus for 1964, and the secretary appealed for articles of a geological nature for the *Naturalist*.

The subject for the evening was, "Rock Cutting and Polishing", by Messrs R. Davidson and D. McInnes. Mr Davidson explained the reasons for cutting and polishing stones — to enable the structure to be examined, or for decorative purposes. He explained methods of cutting and polishing, such as with a diamond saw and special polishing powders, and by the "tumbling" method. Mr McInnes then followed with a practical demonstration, by polishing specimens of chert and jasper on glass and steel plates, using corundum, tin-oxide and cerium powders and finishing with a fine glass-paper. By means of a general discussion, members were helped with their polishing problems.

Exhibits: Specimens of gem-stones and other polished material to illustrate his lecture (Mr R. Davidson); fulse opal and moss agate from Coolgardie, W.A. (Miss N. Carstairs and Mrs Z. Lee); specimen showing asbestos bands replaced by silica, from Coolgardie, W.A. (Miss M. Allender); granite from Gilwell Scout Camp, Cockatoo, showing large forms of crystals (Mrs M. Salau and R. Dodds).

Botany Group—October 10, 1963

Chaired by Miss M. Lester, the meeting attracted a good attendance, including members back from the recent excursion to Western Australia.

Miss K. Hall spoke on "Transport in Plants". She dealt with the upward and downward movements of root-sap and leaf-sap respectively, of the phloem as the conducting tissue present in vascular plants, chiefly concerned with the transport of food materials, and of the xylem — the woody fibres and vessels concerned with the conduction of watery solutions about the body of the plant as well as with mechanical support. The talk was illustrated with slides and it created much interest.

Reports were given on the group's wattle exhibit at the nature show, and a preliminary discussion took place on half a dozen suggestions for next year's theme. Mr F. Zirkler reported on the excursion to Ferntree Gully and Sherbrooke, led by Miss A. Hooke, when despite steady rain ten members had an enjoyable day. The excursion had culminated in a visit to Mr H. Hanse's native garden at Bayswater, where an appreciative inspection was made of his fine array of paintings and drawings of wild-flowers, birds and insects, many of them prepared for his lectures to help migrants gain an appreciation of their new natural environment.

The meeting concluded with the showing by Mr S. Barker of some fine colour slides of fungi.

On the Sunday afternoon following the meeting an excursion was made to Maranoa Gardens, where members noted with satisfaction the excellent work being done in caring for and extending the considerable number of species represented.

The next group excursion planned is to Tallarook, where the leader will be Mrs E. Webb-Ware.

Entomology and Marine Biology—October 7, 1963

Twenty-five members attended, and Mr R. Condron occupied the chair. Congratulations were extended to Mr M. Houghton and Miss Joy Sladden on their engagement.

For the subject of the evening, Mr Houghton spoke on the life histories of crustaceans and general characters of their anatomy. This was illustrated by a large, carefully prepared chart.

Exhibits:

Mr D. E. McInnes demonstrated a stereoscopic microscope which he had made, using a blow-fly under low power.

Mr P. Genery showed a water scorpion, *Ranatra australiensis*, a true bug of the order Hemiptera, and a may-fly larva. He showed the breathing tubes of each, under the microscope.

Mr E. Coghill exhibited a case moth pupa, which a wasp had been probing, apparently for the purpose of parasitizing it.

Mr M. Harrison displayed a collection of fossil shells from Fossil

Beach, Mornington, including a "pagoda murex".

Mr J. Strong showed a specimen of the brackish-water mollusc, *Coxiella*, from Lake Corangamite, using a microscope with low power. He commented on the abnormally large number of the Australian Admiral Butterfly, *Pyrameis itea*, about Melbourne gardens the previous week.

Other members brought further exhibits, including an undescribed species of beetle from Central Australia (Mr D. Bowry).

F.N.C.V. LIBRARY

As it is planned to take stock in early December, members are requested to return all loans — books, periodicals and other publications — by November 30. Study group librarians are particularly asked to ensure that publications borrowed by group members are returned by that date. Loans returned by mail should be addressed to the F.N.C.V. Library, C/o National Herbarium, The Domain, South Yarra, S.E. 1. (not to the librarian's private address).

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2/6

Magnificent stand of White Mountain Ash, *Eucalyptus regnans*, in the Marysville State Forest

FORESTS COMMISSION VICTORIA

. . . . . preserving the beauty of our forests for your enjoyment.

Vol. 80, No. 8 December, 1963

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

This is Spotty, the famous lyrebird of Sherbrooke Forest, in the Dandenong Ranges of central Victoria. The photograph was taken by K. C. Halaloff, and it appeared in the *Naturalist* in November 1958, to illustrate an article called "Sherbrooke Diary" (Volume 75, pages 105-112).

These columns are available each month for your nature notes and queries. Address your correspondence to the Editor, "Victorian Naturalist", P.O. Box 21, Noble Park, Victoria.

Frog's Distress Call

An observation has been sent to us by Mr B. J. Thompson of the Burramine South School, near Yarrawonga. In a letter dated October 2, 1963, he writes:

Last Friday evening, whilst on the rear verandah, I heard a noise which sounded like an annoyed cat. However it was not at such a high pitch.

Knowing no-one was outside at the time, I put on the light and went to find the source of the noise. To my surprise, there on the footpath was a bright green frog, with a brown stripe (possibly a Golden Bell Frog), being "investigated" by a terrier and kitten.

Each time the terrier or kitten came near the frog, it made the noise I have mentioned, then jumped away. It definitely wasn't the kitten.

Is this usual for a frog to make such a noise, under these circumstances? I may mention that the terrier and kitten did not harm the frog.

The identity which is suggested is probably correct. The Golden Bell Frog, *Hyla aurea*, is one of the species which is known to make a rather high-pitched squeak when it is distressed. The "investigation" by a kitten and terrier would be quite sufficient to produce this response.

Ant Swarms

This note is dated November 7, 1963, and it comes from Miss C. Barfield of Bairnsdale:

Recently, after a week or more of warm, damp weather, I was in the forest country beyond Mount Taylor with two fellow-members of the Bairnsdale Field Naturalists Club, when we saw some unfamiliar ants. They were about the size of a jumper ant, very dark in colour with a light, greyish-fawn triangular mark on the top of the last body segment. The ants were in a dense cluster flat on the ground and it seemed to be their object to stay in that cluster. The grey marks were very noticeable as we looked down at them.

About a chain farther on we came to a much larger, similar swarm on top of a fallen log. When we disturbed it, we found that the ants had a dense mass of eggs under them. It seemed to be a solid mass of eggs on top of the log, with the ants on top of them.

Can you tell us anything about these ants?

Mr A. N. Burns of the National Museum, suggested that these are one of the species of the genus *Dolichoderus*. Members of this group normally make their homes under the loose bark of trees. Their pupae remain naked in contrast to those of the larger bull-ants, which are enclosed in cocoons. Why those near Mount Taylor should have been in the open is a point that remains obscure.

Butterfly Orchids

Miss Barfield goes on to say:

You may be interested to know that the tree orchid, *Sarcochilus australis*, is now at its best along Iguana Creek. Clusters of the sweet-smelling blossoms are very numerous, many of the plants being on dead twigs of shrubs and even on rocks.

The species is referred to as Small Sarcochilus or Butterfly Orchid, the latter being an allusion to the shape of the labellum.

Other notes on the species, in the Mitchell River area, were published in the *Victorian Naturalist* in March, 1956, (Vol. 72, p. 175). These included reference to one plant which had had three racemes aggregating thirty-six flowers — one raceme bearing eighteen of them.

It is interesting to hear of specimens growing on rocks. A similar departure from normal sometimes occurs with the Tangle Orchid, *Sarcanthus tridentatus*, at Mount Drummer, in far-eastern Gippsland. Some quite vigorous plants of the latter have been noted on mossy granitic rocks.

Question and Comment

From Sydney, Mr J. A. P. Blackmore has written to offer an article on orchids, and he goes on to say:

In the grand old days, long ago, W. H. Nicholls and H. M. R. Rupp made orchidology a queen among the sciences. Admittedly, the zoologists had a rough time of it then, but they are certainly claiming full recompense these days. Why don't the botanist members contribute?

We can only comment, "Why indeed!", and look forward to the orchid article.

Mr D. S. Bell of Foster writes:

I wonder if you have considered including articles for the complete amateur like myself. I find the journal very learned and, at the moment, outside my understanding.

For further comment, readers should refer back to page 74, in the *Naturalist* of July 1963.

We have two points to make. The first is that for many years virtually all popular material submitted has been published promptly in the magazine. Secondly, if we do not receive a number of articles and nature notes within the next several days, the January issue will be below normal size and it will lack completely the feature "Along the By-ways".

A preponderance of scientific material may be interpreted as a lack of popular articles in the editorial basket. The *Victorian Naturalist* is what you, as contributors, make it.

Wyperfeld Diary

By VICTOR JACOBS

Monday, September 2, 1963

Sky mainly clear, with slight cumulus cloud, no wind, temperature 60°F at 8 p.m.

The drive from Dandenong to Dimboola was made in fair, sunny weather and this augured well for our camping trip to Wyperfeld National Park. In the front of the car were my son David and myself, and in the back was an assortment of gear: vascula, plant presses, cyanide and ether bottles, a net, binoculars, forceps, magnifiers, a water bottle, compass, emergency rations, first-aid kit, and books by well-known naturalists.

It was not until we were near Rainbow that we had a glimpse of the country that we had been expecting to see. There the wheatfields to the west of the road gave way in places to golden dunes, and the roadsides themselves were sown as if to compensate for the losses in the paddocks.

Soon we passed through the ornamental entrance of Wyperfeld, and began the five mile drive to Wonga Hut. To traverse the tree-covered plain necessitated reasonably careful driving, as a number of black, boggy stretches had to be negotiated or bypassed. We were thankful for the detours that took us round some of the worst patches.

Expecting to have the place to ourselves, we were surprised to find a sprinkling of caravans and tents dotting the spacious level area around the hut. However, the place was large enough to retain its rural atmosphere and the people there were of a kind: keen students of nature and willing to share knowledge with others. As I had noticed in the past, one often finds the most civilized people in the most uncivilized places.

Selecting a camp site on the south side of the Wonga Hut area amidst towering River Red Gums (*Eucalyptus camaldulensis*), we sited the tent to face south towards the extensive, green lozenge of grassland that is the dry bed of Lake Brimin. Already we had been exhilarated by the sight of eight kangaroos of various sizes moving off the lake bed into the gums on the opposite side. The brief glimpse that we had through the binoculars showed them to be rather patchy, reddish-brown animals, different from those seen at Hattah (*Vict. Nat.*, 80 (1) : 4-8; May 1963). However this patchiness was the exception rather than the rule and we saw no more of those patchy creatures though we did see many other grey ones. They were the Black-faced or Mallee Kangaroo (*Macropus major melanops*). According to some authorities the Red Kangaroo (*Macropus rufus*) should be seen in the park too, but we have been informed by Mr H. E.

Tarr that there are only two reliable records of *M. rufus* in the park this century. The disturbed marsupials caused six emus to cease their foraging and move in a leisurely manner towards cover.

We *were* exhilarated at the sight of these unique animals in their natural setting. The native Australian may not easily appreciate the choice of that word, but it is not an overstatement. This experience with Australian animals behaving normally in their natural habitat, was infinitely more satisfying than contact with them in zoo and sanctuary. Here the animals belonged. They owned the place and we were the visitors. Our presence and that of previous visitors had not corrupted them. They had not become beggars clamouring for our food, nor had they become hermits because of harsh treatment from man. A half-grown kangaroo near Wonga Hut illustrated the point well. It hopped to the centre of the clearing, cropped for a few moments, then, suddenly becoming aware of more habitation than usual, jumped rapidly away into the timber.

It was in a contented frame of mind that we set up camp, though this was done with a number of observational breaks. A few yards away a number of Ringneck Parrots flew from the detritus under a large River Red Gum, perched for a chat, then swooped off. A colony of White-winged Choughs whistled mournfully above our heads, while some Black-backed Magpies stalked over the grass with heads cocked on one side. Their keen hearing resulted in a find that the choughs wanted to share, so down flew the latter and for a few moments a vociferous tussle was in progress. From the distance a raucous White Cockatoo seemed to egg on the opponents.

Shortly after dark, we took the spotlight and headed over the adjacent bed of Lake Brimin to the next lake bed to the south-east. There we swept the beam across the bed and picked up the reflection of a number of pairs of pinkish-red eyes. About a dozen kangaroos were feeding on herbage and we were able to approach the nearest group of three. We had to move when they had their heads down, for if we moved while they were on the alert they would immediately move a few paces away. The next time we used the light we saw, not only the three pairs of eyes, but a fourth pair, rather smaller and in the centre of one animal's body. We realized then that one of the three kangaroos was a doe and the extra pair of eyes were those of her joey.

Turning towards camp we spotted a pair of green eyes strangely in contrast to those of the kangaroos, and by approaching carefully were able to see the black form of a cat as it glided away. Introduced animals, apart from *Homo sapiens*, were few in the park. Besides the cat we saw but two rabbits.

Tuesday, September 3

Sky clear at dawn, covered by cumulus cloud and with a slight shower by noon; light northerly wind at noon, changing to west by evening; temperatures 41° at 6.45 a.m., 73° at 2.45 p.m. and 64° at 8.40 p.m.

The night had been cold and when this chill had penetrated my sleeping-bag, I had awoken to hear the loud, clear "mopoke" of a Boobook Owl and the faint distant reply of its mate. There was also the churring of some other nocturnal bird, probably a nightjar. At dawn we were up and gumboots were needed, for the lush grasses were sopping wet, especially the flower heads of Barley Grass (*Hordeum leporinum*) and Red Brome Grass (*Bromus rubens*).

After breakfast we took the sandy track to Lake Brambrook, heading north between Flagstaff Hill and Mount Mattingley. We were immediately amidst the dunes where we saw, on eroded patches, a mass of Storksbill (*Erodium cicutarium*) and Mediterranean Turnip (*Brassica tournefortii*), both of which are introduced species. There on the dune ridges stand fine, tall specimens of Slender Cypress Pine (*Callitris preissii*).

If you travel to Wyperfeld, do not expect to see a Sahara of undulating, golden sand. Sand is there in abundance but it is generously clothed with a fairyland of vegetation. The pines stand sentinel upon the ridges and look sometimes on dunes lightly covered with Dumosa Mallee (*Eucalyptus dumosa*) and sometimes on dense masses of Green Tea-tree (*Leptospermum laevigatum* var. *minus*). The open spaces between sparkle with white and yellow, where Fringed Heath-myrtle (*Micromyrtus ciliatus*) and Twiggy Guinea-flower (*Hibbertia virgata*) are blooming. The low shrubby *Hibbertia* adds more than one colour to the scene. There are the bright yellow of fresh petals and the brownish tinge of developing capsules, and on the ground there is a variety of golden yellows of discarded petals.

Beside the track the vivid deep gold of the leafless Spiny Acacia (*Acacia spinescens*) invited photography, but its position was awkward and we moved on. We regretted this later, for the species proved to be rare at Wyperfeld, on the routes that we took, and the two other specimens that we saw were not advanced enough to merit an exposure.

Nearby we found a few plants of Small Coobah (*Acacia ligulata*) but they had no sign of flowers. In the distance, on a well-grassed dune, a flock of about twenty Galahs was seen feeding. A few minutes later we stopped when a flash of yellow was observed on the ground in amongst a pile of dead branches. A small bird kept on disappearing and reappearing amidst those branches. It was a Yellow-tailed Pardalote, and its dun-coloured mate sat in a small tree a few yards away watching its activity. It was excavating a tunnel in the sand. This was approximately 1¼ inches in diameter and 5 inches long. Later that day, after dark, when we again passed that way, we re-examined the tunnel. It had been dug out a further two inches, but in doing this the pardalote had uncovered a small root that stood like a miniature pit-prop right through the tunnel. We still wonder whether the bird removed it or submitted to

Mallee, north-east from Sandy Track, east of Eastern Lookout.

it. Amongst the same branches that sheltered the entrance to the tunnel we noticed a black and red ball that uncurled to become a handsome spider. The Red and Black Spider (*Nicodamus bicolor*) is indeed conspicuous and quite common in the sand dune country. A hand lens is needed if one is to see the real beauty of this arachnid. The cephalothorax is red and glossy; the abdomen is black and hairy except for the spinneret mound which is smooth and red, while the legs and pedipalps are red but for the tips and generously clothed with black hairs.

As we topped the next hill four kangaroos moved parallel to the track for a while and were then lost to sight in the Mallee. Soon we were in a position to look down on Devil's Pools, and we saw two alert ducks flying away, while two White-necked Herons perched on the gums that grew beside the shallow waters. A Wattle-bird called harshly, a Wedge-tailed Eagle soared silently, and two Spur-winged Plovers grated at us as they circled the pools.

We were now out of the dunes and into a wide belt of River Red Gums interspersed with some Black Box (*Eucalyptus largiflorens*). A White Cockatoo gave warning of our approach, but this was largely ignored. A flock of Ring-neck Parrots were having a discussion of their own, while a Willy-wagtail, some Brown Flycatchers, and a group of Tree-creepers were hunting for food.

We cleared the gums and stood on the edge of Lake Brambrook. What once may have been a magnificent lake, all of two miles in length and half a mile wide, is now a desolate grassed flat with a few hundred square yards of water in the centre. Even this meagre amount was caused by recent surface run-

off. Perhaps the gathering cumulus clouds and the few spots of rain helped to add to the gloom, but even on a sunny day the area would lack vitality when devoid of water.

Once again two ducks flew off the water, but this time, as they circled to gain height, they passed overhead and it was easy to pick out the bold colours of the Chestnut-breasted Shelduck. A pair of Fairy Martins were working the surface of the water, scooping up beakfuls of water and creating little waves as they did so. We spotted another bird standing in the shallow water and by dint of a hundred yards stalk were able to identify it as a Maned Goose. Near where it stood was a chain of miniature islands — really a string of tussocks separated by water; and as we lay prone the bird ambled to one and sat down. Thinking that it may have a nest, we crept away to have lunch, deciding to check it later. When we next approached, the bird flew off and, using the tussocks as stepping stones, we were able to reach the one where the bird had been. There was no sign of a nest or eggs but, clinging to the grass, was a bat. This we decided to photograph, and the pictures eventually identified it as a Western Mastiff-bat (*Tadarida planiceps*). This is one of the "scurrying bats", that scramble about on logs, the ground and butts of trees seeking insects rather than flying after them. Why that specimen was on that island in broad daylight, we could not guess.

Turning away from the water to the east, we set out to walk the length of Lake Brambrook. Four kangaroos moved out of our path and continued to graze within view at the edge of the lake, and a pair of White-faced Chats were carrying nesting materials in their beaks. There was a small tree, apparently full of nests, but not one of the structures was a bird's nest. The roughly cylindrical masses, varying in diameter from three inches to five inches and in length from four inches to nine inches, had an outer layer of silken web. Upon opening one we found, immediately below the layer of silk, a scattering of discarded caterpillar heads and skins while the rest of the mass consisted of small grains of excreta. These were evidently the deserted homes of colonies of bag-shelter moths, possibly of the genus *Teara* (family Liparidae). On the branches of the same tree we saw a pair of Tenebrionid beetles (*Chalcopterus affinis*) locked in close embrace.

The eastern end of Lake Brambrook is separated from the major portion by a bar. As we breasted this, thirteen emus saw us as we saw them and raced away. Six ran directly away but seven gave us an excellent view of their striding motion by running across our path. One particularly robust cock bird, with neck feathers flying plume-like in his slip stream, looked intensely masculine.

We turned south at the lake's edge, traversed the gum belt and followed a bulldozed track through the dunes. Five emus appeared, and disappeared when

they saw us. After a mile the wide track seemed to take the wrong direction, so we took a compass bearing and headed south-west hoping to recognize Flagstaff Hill when we neared it. Just as we saw it, there was a whistling of wings and a large flock of handsome Regent Parrots banked and landed, while a white hawk which had been pursuing them — or perhaps just following — peeled off and went elsewhere. The parrots, unaware of their follower, remained feeding on the ground or perched in the Dumosa Mallee. From there it was just a short walk to the tent where we were glad to relax for a while before turning to the evening chores.

Wednesday, September 4

Sky with ragged, low, nimbo-cumulus clouds with some clear areas; wind, fresh and westerly at dawn, changing to strong southerly during morning and with occasional very strong gusts; very heavy showers during morning and evening; temperature 50° at 7.20 a.m.

The threatening sky of the previous evening had not brought rain. In fact, bright moonlight had deluded the magpies into singing long before dawn.

After breakfast we drove east from Wonga Hut, looking for a track that runs east then north to Eagle clearing. By mistake, we took a track marked "Fire-break Track", which leads south-east out of the park. Though not our intended route it afforded much interest. We found that there are not enough signs in the park, that maps are not quite accurate, and that some signs are not in strategic positions.

Amidst the burned Slender Cypress Pines at the beginning of the track were a number of plants of Mallee Bitter-bush (*Adriana hookeri*). The most abundant species was the Dumosa Mallee and its stands were enlivened by frequent gleams of Nealle (*Acacia rigens*). The tightly closed flower-heads of Grey Mulga (*Acacia brachybotrya*) gave promise of more wealth to come. Soon we were meeting a shrubby cypress pine, with cones covered by small rounded tubercles. It was the Scrub Cypress Pine (*C. verrucosa*). In open spaces between the eucalypts, the cruciferous Sand Cress (*Blennodia cardaminoides*) was plentiful, and once when leaving the track in search of Lowan mounds we came across two handsome specimens of Pimelea Daisy-bush (*Olearia pimelioides*). Here and there we met patches of Small-leaf Waxflower (*Eriostomon difformis*) and once a small stand of Broom Honey-myrtle (*Melaleuca uncinata*). This last was a small tree with its few leaves on the extremities of the branchlets and small, nearly spherical, crowded clusters of fruits looking like deserted insect galls. Beside the track, Golden Pennants (*Loudonia behrii*) was about to flower, with heavy buds atop the slender fresh green stems. Also, we frequently saw the viscid Wedge-leaf Hop-bush (*Dodonaea cuneata*).

Realizing that we were on the wrong track, and not relishing the gusty southerly wind which

every now and then flung heavy showers of rain at us, we turned back. Very soon afterwards, we saw what we had been hoping for all the morning. A Lowan took off with a whirr and flew for a hundred yards, leading us to believe that we could locate its nest mound. We could not, but we did see a colony of bouncing, cackling White-browed Babblers. Returning to Wonga Hut we found that the wind had been tossing tents about, and our nearest neighbours, not content with re-erecting their own small marquee, had put up our tent too. All we had to do was repair a couple of minor tears, dry a sleeping bag, and redispose the tent so that the wind would no longer blow it up like a balloon.

Not until late afternoon did our faith in the weather return, and we once again set off for Eastern Lookout, to seek the elusive Lowans and their mounds. On the drive out there a young kangaroo showed us his heels; and, in overtaking the car to cross the track ahead of us, he clocked more than thirty miles per hour. A few moments later, seven very large kangaroos made their way into the Black Box flats to the south of Eastern Lookout.

This time we found the correct track, which is marked "Sandy Track" and is merely a scratch mark through the dunes. We walked about three miles along it and though we did not realize our main objective, to observe Lowan activity around a fresh mound, we rested content with finding three deserted mounds. Two of them must have been that way for some time, for plants had recolonized them, but the third one was bare of vegetation. These lipped, saucer-like depressions, four feet in depth and about twelve feet in diameter, were quite unlike the low mounds that we had expected to see. We pondered on the aspect of bird behaviour that would change a mound into a hollow and dispose of many cubic yards of compost and sand.

More plants were identified. With its larger ridged fruits, Yellow Mallee (*Eucalyptus incrassata* var. *costata*) was quite distinct from the Dumosa Mallee. A red and brown pea flower (*Aotus villosa*) was occasionally seen, and the delightfully small Slaty She-oak (*Casuarina muelleriana*) with its dark green branchlets tipped with the rust of staminate spikes. A female she-oak was seen too, but not near the male specimen. Nealie still gleamed amidst the trees, but now some of the golden glory came from Wallowa (*Acacia calamifolia*) whose narrow phyllodes were more lax than the rigid foliage of the other. Not flowering yet were Broom Ballart (*Exocarpus sparteus*), Mitchell Bertya (*Bertya mitchellii*) and Flexile Hakea (*Hakea muelleriana*).

We came across a few bull-ants who resented our approach and were quick to show their antipathy. Their general colour was sandy brown, though the dull tuberculate head and the shiny bulbous end of the abdomen were blackish brown. Their nest entrances were turret-like, with holes much larger

than they seemed to need, and these turrets stood as much as three inches above the ground. The raised entrances looked so fresh that we assumed a recent active period on the part of the ants, in preparation for the inclement weather. Not one more ant did we see at Wyperfeld. Did the ants build after dark or was the fresh look deceptive and had these turrets been built at the height of ant activity last summer? One partly damaged structure showed us that the fine grains at the rim of the turret were replaced lower down by small stones cemented together quite firmly, so we recognized the possibility that the turrets were more permanent than we had thought at first.

The weather had broken up again and we were quite wet from some heavy showers, so we turned back on the same track and maintained a brisk pace to keep warm. The rain had been hard enough to wash out our tracks and they had been replaced by clear emu footprints. We followed them for some hundreds of yards without catching up with the birds. Eventually we could have been quite close for the emu prints left the track abruptly. Apparently emus take advantage of the easy pathway along a cleared track, preferring that to picking their way through the vegetation.

We reached the car, and on the way to Wonga Hut saw five kangaroos feeding on the flats and two emus in the scrub. A large flock of Red-backed Parrots took no notice of our arrival at the tent and continued to search through the mass of twigs and branches at the base of the large gum.

After dark we had two visitors, which were irresistably drawn to the light. One was a Noctuid moth (*Heliothis armigera*) and the other an Ichneumon (*Netelia productus*).

Thursday, September 5

Sky clear; fresh southerly wind; temperature 49° at 3 a.m., 46° at 6 a.m.

Though we had decided to travel north from Wonga Hut for this day, we did make one more attempt to find some Lowan mounds in use. On the way to Eastern Lookout we saw the usual abundance of wildlife. Three emus, and a total of twelve kangaroos, were seen between Flagstaff Hill and Eastern Lookout. Stopping the car at the sight of half a dozen birds spirally ascending tree trunks, we were able to identify them as Brown Tree-creepers. Leaving the car at the start of the Firebreak Track, we walked as far as a sign left by our friends of the small marquee, then, taking a compass bearing, we walked directly north, hoping to sight some mounds that they had seen. Our route took us to the Sandy Track but we did not see the mounds. The walk was rewarding though, for bird life was plentiful. We saw some Brown Thornbills, a Wattle Bird and seven White-browed Babblers. Being close to Eastern Lookout, we climbed it and looked out to the east, over the rolling mallee so well described by J. Ros Garnet in the *Victorian Naturalist* of January 1960 (Vol. 76 (9), p. 239). We drove back to Wonga Hut, gave the tent a cursory glance, and obeyed the signpost that pointed to Black Flat.

Our first halt was at Maiden Swamp where the tree cover was Black Box and Moonah (*Melaleuca pubescens*). The Black Box was so poorly fruited that it was with difficulty that we found a single gum-nut. The ground was covered with a liberal sprinkling of Sand Cress and a small daisy (*Brachycome lineariloba*).The Melaleuca soon gave out as we moved into a pure stand of Black Box. Then the lush green clover-covered ground of Black Flat was ahead, scarred by a sticky, wet ribbon of black mud that was the track through it. We avoided this, keeping to one side and following other car tracks that had flattened the clover without breaking the surface. Reaching the other side safely, we parked the car amidst some large River Red Gums at the foot of the dunes that lay to the west.

Regent Parrots were abundant in the trees. They were not very active except vocally, thus reminding me of children I have taught. One pair of the birds was much smaller than the others and quite greenish below.

We headed due west into the dunes and, by following a ridge, were soon able, by looking left and right, to see two more green patches, each surrounded by its fringe of River Red Gums. By now we felt familiar with the zoning of vegetation within the park. The area is dotted with lake beds, mainly dry though with little surface run-off water in some of them. Each lake bed is surrounded by a zone of River Red Gums and often by a further zone of Black Box. Then the dunes begin, with their open mallee of eucalypts or the dense scrub of tea-tree. With the lake beds so dry, and from all accounts dry for many years, it is at first surprising to find the

View, west of Black Flat, from dunes, through River Red Gum zone, to an empty grassed lake bed.

gums and boxes so healthy. Then one remembers the bore at Wonga Hut and the fact that the last time Lake Brimin filled it did not do so by surface water but by a large quantity that welled out of the ground. It seems that, even in the driest weather, a constant stream must run underground and so maintain the pattern of vegetation.

We came across two large specimens of Weeping Pittosporum (*Pittosporum phillyraeoides*). On one pittosporum a bug was feeding. It was a dark brown animal about 8mm long with two light brown patches on the central part of its back. The specimen was identified as a plant bug of the family Pentatomidae, but the genus and species were unknown, as the National Museum has no comparable specimen.

Both species of *Callitris* were there and their dark green foliage made a good foil for the golden ligules of the Variable Groundsel (*Senecio lautus*).

Navigation in that high dune country was difficult and our attempted beelines would often become zig-zags. Dense scrub would divert us and plants and animals distract us. Austral Tobacco (*Nicotiana suaveolens*) was quite frequent. There were dense masses of Desert Banksia (*Banksia ornata*), with few flowering spikes but the branches were more or less covered with the dark unopened cones of yesteryear. We reached an area that had been badly burned in 1959, and the effect on the banksias had been drastic. The remains of many trees lay neatly on the ground as if some giant hand had dealt them a vertical blow. The branches formed a circle in the centre, while cones lay in a larger, concentric ring outside the charred mass.

After another mile we reached a large dune that had been our target, and climbed its steep slope through a pretty mass of *Aotus;* this was far more abundant and also more advanced

than that beyond Eastern Lookout. Halfway up we stopped and looked down upon a group of White-browed Babblers, then progressed to the top. There amidst burned Scrub Pines we found a single plant of Blunt Everlasting (*Helichrysum obtusifolium*). Also there were the remains of many eucalypts and on a blackened stem we found a handsome polyporous fungus, very much like *Polystictus versicolor*, but with wider concentric rings of red and white. We stood looking out upon mile after mile of high dunes and wondered how those intrepid pioneers felt when, with their every possession with them and nothing behind, they pushed into these same sandhills. We were comforted by the thought that the ranger, Mr A. Campbell, made a complete circuit of the park each day to ascertain if anyone had gone astray. We turned back on our tracks and headed for Black Flat.

On the way down the dune we heard the clinking of a currawong and being unable to identify the large grey bird as it sat in a distant tree, we decided to stalk it. We entered a patch of tea-tree and, hearing an active chirping close by, we froze, while a pair of Southern Scrub-robins investigated us. With short quick runs followed by scanning head movements these sprightly birds came within three yards of us and showed little fear. When we emerged from the scrub, the currawong had gone.

Back at the car we had lunch and watched birds. The Regent Parrots had been joined by some Red-backed Parrots. Fairy Martins were flying around the trees and a pair of Willy-wagtails performed an intricate aerial courtship in and out the branches until it was impossible to see which led and which followed.

After satisfying the inner man, we drove on to a track that led to Lake Wonga. We ignored a sign "Deep Sand", and bogged down a hundred yards further on. With the jack and a few pieces of dead wood we extricated the car and thankfully drove back to safety. We had the satisfaction of knowing that we did not need to destroy any living trees as the previous victim had done. The evidence of his handiwork was a layer of torn mallee branches enough to fill a large truck.

The alternative route to Wonga Lake was by a car track running north-east to Lake Brambrook and then turning north-west towards Pirron Dune. Near Pirron Dune we came to a sign that gave two alternative routes to Lake Wonga and as both were through deep sand we parked the vehicle and began to walk along the one that gave the distance as two miles. The vegetation where we left the car was mainly River Red Gum with a sprinkling of Black Box but this soon gave way to dunes.

The Twiggy Guinea-flower and the Fringed Heath-myrtle were very abundant. We met Golden Wattle (*Acacia pycnantha*) in full bloom, and noted the purple flowers of Kangaroo Apple (*Solanum aviculare*).

Half a mile along, the undulating dunes were replaced by a plain of regenerating mallee. A new growth five feet high stood amidst the blackened stems of the original trees, and the red and white polypore was abundant on these charred stems too. Very small plants of *Hibbertia* and *Micromyrtus* were laden with blooms.

Small clumps of Porcupine Grass (*Triodia irritans*) had within their radii the creamy-flowered, red-stemmed Erect Rice-flower (*Pimelea stricta*); and this rice-flower was to be seen nowhere else. Is this the result of a symbiosis in which the grass stimulates germinating of the *Pimelea*, or is it that animals eat the rice-flower except where it is protected by the grass?

Broom Ballart was common there too and two more groundsels were recorded: Slender Groundsel (*Senecio glossanthus*) and Cotton Firewood (*S. quadridentatus*). While searching for plants we disturbed four emus, which raced off in the usual fashion.

We felt that we had covered two miles when the track turned to right and we were among the largest forest of River Red Gums that we had seen. We plodded on for another mile with many digressions to seek the lake and then turned back. This gum forest was alive with parrots of all the kinds that we had seen earlier, as well as White Cockatoos, Galahs and White-winged Choughs. The occasional Black Box trees were very large and had heavy clusters of gum-nuts.

We sat down to rest a while before turning back, and David noticed some insect activity on the track. A struggle appeared to be in progress. At first we

thought that the larger insect was trying to carry off the smaller, but a closer examination and subsequent identification proved them to be a pair of Thynnid wasps (probably *Thynnus variabilis*). The male measured 22mm in length, not including the antennae which were 14mm long. He had a stout dark thorax, and the tapered abdomen was dull black with four pairs of yellow spots. His narrow wings were 16mm and 13mm long respectively. The female was a shiny brown colour and also had the pairs of spots on her abdomen. She had no wings and the antennae were only 3mm long. In the male the combined length of head and thorax equalled that of the abdomen, while in the female the combined length of the first two segments was just half that of the abdomen. I am quite sure that had we not found them together we would have thought that they belonged to different species.

Just before we reached the car, we saw our first Pink Cockatoo.

David was ahead of me, and when he saw three emus hide behind some bushes he copied their example. While he watched from hiding he saw the cock bird reappear and, assuming that the coast was clear, call to his hens, who then came out. David came into view then and there was a wild rush, by the birds, for the dunes. When the ranger drove up, on his evening check for lost naturalists, we learned just how near Lake Wonga we had been.

Friday, September 6

Alternating bands of clear sky and low cumulus; temperature 46° at 6.30 a.m.; wind westerly; heavy rain for half an hour about 4 a.m., scattered heavy showers during the day.

There is always something miserable about rising on the last day of a holiday, and this morning provided no exception. As the heavy shower had soaked the tent, we made this an excuse to delay packing, and drove off to the foot of Flagstaff Hill. As we began to climb we noticed a Wedge-tailed Eagle being pursued valiantly by a small bird. That bird gave up, but the chase was taken up by a pair of magpies. One flew below the eagle rather ineffectually, but the other, flapping vigorously, manoeuvred into position and made two sharp dive-bombing attacks. All this did not perturb the eagle for a moment and, with a tilt of the wings, it soared effortlessly into the sky.

From the summit of the hill we had an excellent panoramic view and were able to scan our approximate routes of the past few days. On that hilltop stands a fine specimen of the Drooping She-oak (*Casuarina stricta*), and the ground below it was furry with fallen flowers. On the way down the hill I noticed one plant of *Microseris lanceolata*, the Yam, and at the bottom of the steep descent Common Woodruff (*Asperula conferta* var. *wimmeriana*) grew amongst the Red Brome Grass.

Back at the still damp tent we had no choice but to pack and strike camp. Soon we were mobile, and with the camera at

the ready on the seat between us, we moved out of Wonga Clearing. As yet, in spite of seeing many kangaroos and emus, we had not been able to obtain a useful photograph of any of them. Just a few yards from the clearing were a pair of emus and they were so engrossed in feeding that the coveted shot was at last possible. The five-mile drive to the entrance required even more care than when we came in, as rain and the vehicular traffic, though neither was excessive, had caused a deterioration. We saw the pair of Chestnut-breasted Shelducks once more and then left Wyperfeld National Park, mentally waving good-bye to the fauna and flora that had given us so much pleasure.

ACKNOWLEDGEMENTS

My appreciation is due to Mr B. Muir of the National Herbarium for plant determination, to Mr N. A. Wakefield for information on spiders, bats and fungi, to Miss Matheson and Mr A. Neboiss for insect identifications and information, and to my son David for his company and his patience in observation.

The History of Fur Seals on Macquarie Island

By S. E. CSORDAS*

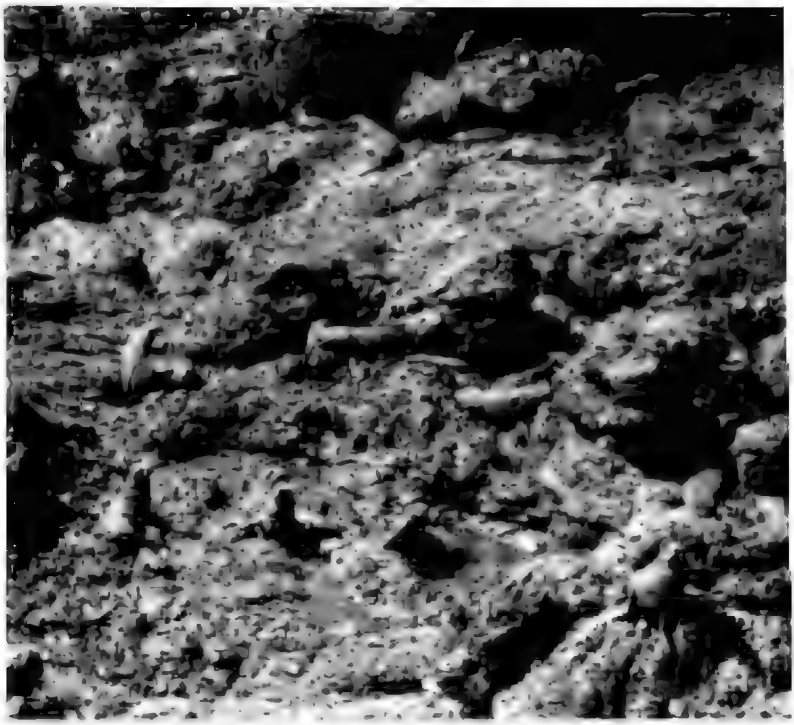
At the beginning of the nineteenth century, everywhere in the Southern Ocean, sealers were searching for new fur seal islands. The competition for the valuable skins was such that if sealers found a new island, they tried to keep it secret until all the seals there had been slaughtered. By 1806 most of the islands near the Australian and New Zealand coasts were exploited and the ships had to travel farther south.

In 1810 Captain Frederick Hassellburgh, in the brig "Perseverance", discovered Macquarie Island (54° 31'S, 159° 31'E). He left sealing gangs there and hurried back to Sydney to report the new, rich ground to his employers, Campbell and Co. Soon a wholesale butchery started on the island, the sealers killing every fur seal they found regardless of age or sex. In 1815 the Sydney Gazette reported: ". . . . . above 100,000 skins were procured there in the season". In 1820, the Russian Antarctic Expedition could not find any fur seal on Macquarie Island.

During the next hundred years several explorers and biologists landed on the island but all reported the complete absence of fur seals.

After the destruction of the fur seals, the island was intermittently occupied by sealers, who killed Elephant Seals and later penguins as well, for the oil. By the early twentieth century this was hardly profitable; and, furthermore, public opinion turned against them. So in 1919 the Tasmanian Government

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



(under whose jurisdiction Macquarie Island belongs) decided to cancel all sealing licences, and in 1933 the island was proclaimed a sanctuary.

In December 1930, the British, Australian and New Zealand Antarctic Expedition saw no fur seals, but in 1947, when the Australian National Antarctic Research Expeditions (ANARE) established a permanent scientific and meteorological station there, they found a small group of fur seals on the rocky northern end of the island. These seals were later identified as *Arctocephalus forsteri* Lesson, the New Zealand fur seal. What species the original stock represented is not known, because no skeleton has been found. These more recent seals were not breeding at Macquarie but were an overflow mostly of young animals, from an unidentified breeding ground.

Since 1948, regular annual counts have shown a steady increase in numbers, not only in the original area but in other, newly colonized parts of the coast. By 1959, fur seals could be seen resting, from January to April, on nearly every rocky part of the east coast. The highest estimated number in that year was 540, more than a 300 per cent increase on the 174 in 1950 though still shockingly low compared with the original population.

At first the seals stayed at the island during the summer months only, but in the last few years an increasing number

have stayed there during the winter. No sign of breeding was observed until 1955, when I was Medical Officer with the ANARE party.

On March 7, 1955, while doing a routine check at the north end of the island, I caught sight of a very small seal with much lighter greyish fur than the others. It also behaved differently from them. Instead of running towards the water's edge with the rest of the group, it ran towards a cave in the rocky hillside. I followed it and saw an adult inside the cave. On April 12, two expedition members caught this little fellow and brought it into the camp, where we found it was a male, 32 inches long and weighing 29 pounds. The big surprise came when we tried to release it into the sea. Instead of swimming away it tried desperately to get ashore. It was obviously not an experienced swimmer and could not possibly have come from another island. It must have been born on Macquarie Island. We carried the handsome little fellow back to its place and kept an eye on it until June, when it disappeared. We watched it being fed by the mother, having swimming lessons, and crawling over the rocks, barking with its shrill puppy voice. But for certain proof of breeding, I had to wait until the next December.

From the end of November, my friend, A. Bolza, and I checked the area nearly every day. On December 8, I saw a youngish looking fur seal at the entrance of the cave where the pup had been in April. As I went closer it became excited, barking at me angrily, but did not run away. When I got closer I could see a tiny furry ball, about 2 feet long, sitting behind the barking seal—a pup only

The famous "first born" pup with its mother.

a few days old. I sat down to observe them. The mother did not move but watched me nervously; the pup crawled around on its wobbly flippers, trying to get closer to its mother, which was sitting on a big rock. When I tried to get closer, the mother attacked me. Every time I visited them the mother stayed between me and the pup. On December 12, I found the pup alone and caught it; it was a female. A pup was born in the same place in each of the following years, but in 1958 the mother did not return.

In nature it is easy to destroy something but to repair the damage takes a very long time. In less than twenty years, thousands of fur seals, the whole breeding population of an island, were killed, and it took more than a hundred years for them to return from their inaccessible refuges and to begin to breed again. The total population is still far from reaching the thousand mark, and is still in an early, slow stage of recovery. If the seals are unmolested for a few more years, the rate of recovery should increase and numbers of breeding adults should begin to build up rapidly. We can hope now that the fur seals of Macquarie Island will enjoy full protection and that people visiting the island will be able to resist the temptation: "Just one skin will not do any harm".

ACKNOWLEDGEMENT

My thanks are due to Miss S. E. Ingham, C.S.I.R.O. Division of Wildlife Research, for valuable advice and for correcting the manuscript.

Long-leaf Box *(Eucalyptus goniocalyx*)* in the Western Wimmera

By G. BLACKBURN†

Eucalyptus goniocalyx F. Muell. is known to many Victorians from its presence in their Western Highlands. According to previous records, the most north-westerly occurrence of this species is on Mount Arapiles, 15 miles west of Horsham.

In 1953, I noticed that this eucalypt was also growing near Duffholme, 6 miles west of Mount Arapiles, but accepted this merely as local colonization from that mountain. In 1962 reference was made by Mr John Maybery of Nurcoung East to the scattered growth of "white gum" among Brown Stringybark (*Eucalyptus baxteri*) in the newly-opened Cooack area at the south of the Little Desert. This "white gum" proved to be Long-leaf Box, and hundreds of specimens were seen growing in an area of a few square miles, in association with broombush (*Melaleuca uncinata*), heath, and Brown Stringybark. The Long-leaf Box seems to be restricted there to shallow sandy soils with ironstone gravel and a clay subsoil.

When *E. goniocalyx* was observed also at the southern edge of the Little Desert on the Nhill-Gymbowen road, it seemed possible that other specimens might be found along the line of the Lawloit Range, through the Little Desert, to connect this more southerly occurrence of the species with that near Duffholme. No evidence of this eucalypt had been seen in the central part of the Little Desert, where the old Nhill-Goroke track crosses the Lawloit Range, but a watch was kept for any unusual eucalypts in the best-known sector of that range — in the Western Wimmera, and three colonies of *E. goniocalyx* were found this year along roads in the range country near Diapur, 40 miles north-west from Mount Arapiles. The environment of this species near Diapur is very much like that in the Cooack area, and the trees show vigour. One small colony on cleared land a few miles south of Diapur is particularly noticeable, the trees exceeding 30 feet in height. The colony of this species lying furthest north-west is near the Sandsmere district, north-west from Diapur.

There is a possibility that other specimens of Long-leaf Box occur along the line of the Lawloit Range, probably in the Little Desert. A north-westerly extension of that range is not generally conceded, but patches of high land are found repeatedly following its trend to the north-west, at least to the Victorian border near Red Bluff in the Big Desert. These distinctive

*In "Studies in the Taxonomy of *Eucalyptus*" [*Contrib. N.S.W. Nat. Herb.*, *3*(*3*) : 103-126], L. A. S. Johnson shows that the name *E. goniocalyx* F. Muell. ex Miq. must apply to the Long-leaf Box, and he supplies a new name, *E. cypellocarpa* L. Johnson, for our Mountain Grey Gum.—Editor.

†Division of Soils, C.S.I.R.O., Adelaide.

Long-leaf Box (*Eucalyptus goniocalyx*) in the Little Desert near Lear's Well, Parish of Cooack, nine miles north of Mitre railway station.

patches of high land show a vigorous growth of *Melaleuca uncinata*, usually together with Brown Stringybark and Oyster Bay Pine (*Callitris rhomboidea*), growing on similar soils to those near Diapur and Cooack. Since these plants are associated with *E. goniocalyx* at other sites in the Western Wimmera, it is possible that this species may yet be recorded from the Big Desert, along the trend line of the Lawloit Range.

These new records of *E. goniocalyx* have special interest to anyone concerned with the botanical similarities of the Mount Lofty Ranges, South Australia, and western Victoria. Many plant species are common to both districts, between which the distributions are discontinuous. The gaps in distribution have sometimes been thought of as between one mountain range and the other, but several of the common plants stretch out from the Victorian mountains into the Victorian Big Desert or its South Australian partner.

For example, there are three eucalypts, *E. baxteri*, *E. leucoxylon*, and *E. viminalis*, which extend from the Western Highlands of Victoria as far as the "desert" country between Lameroo and Tintinara, South Australia. The Oyster Bay Pine, another inhabitant of the Mount Lofty Ranges, does not extend so far from the Western Highlands as the above three eucalypts, for it does not go far west of the Victorian border, north of Bordertown. It seems unlikely that Long-leaf Box (*E. goniocalyx*) will be found as far west as this border, but it is possible that the Diapur district is not the north-westerly limit of its distribution in Victoria.

ACKNOWLEDGEMENT

Specimens of Long-leaf Box in the Cooack district were identified by Mr D. E. Symon, Waite Agricultural Research Institute, South Australia.

A Native Waterhole in the Black Range

By Cecily M. Tudehope

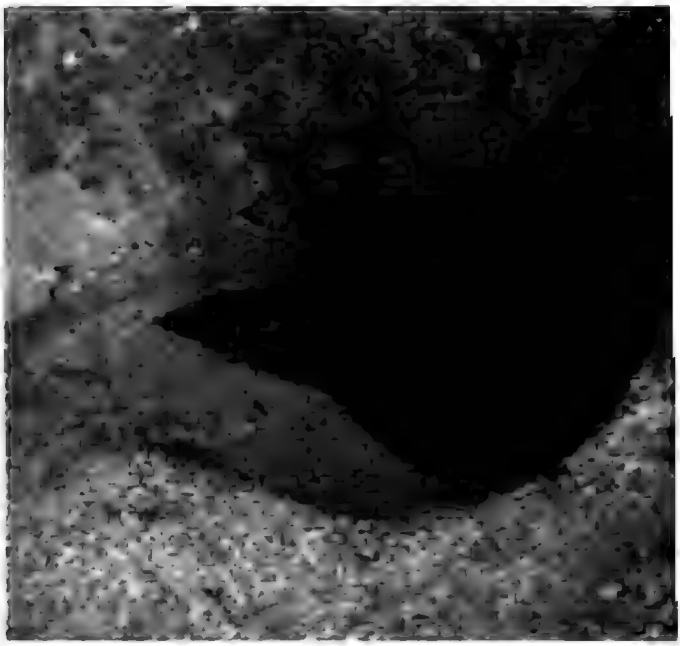
About one hundred and fifty yards south of the famous Sister Rocks on the Western Highway of Victoria, between Stawell and Ararat, a road leads off in a westerly direction towards the Black Range. Five miles from this turnoff the Panrock Reservoir is reached. This is a picturesque dam which provides the water for the Great Western Vineyards. Immediately above this reservoir and dominating the valley is the great Pan Rock. The name "Pan" has classic European derivation and was applied to this rock because on moonlight nights it reflects an ethereal glow which is said to be visible for a distance of thirty miles. Local legend has it that this is the work of Pan.

Separated from Panrock Hill by a slight saddle and rising to a height of approximately 1100 feet, Flagstaff Hill is the highest point of the Black Range. The purpose of this article is to describe an interesting rock well close to the summit of this hill. Mr Ian McCann, well-known field naturalist of Stawell, was responsible for information and for personally leading a small party, of which I was a member, to the well, thus affording me an opportunity of recording a probable aboriginal antiquity. However, it was Mr J. Boyd, whose property nestles in the Panrock Creek Valley at the foothills of the Black Range, who originally disclosed the existence of the water well.

A fairly steep track starting from the paddock at the side of Panrock Reservoir was followed for three miles around the rim of the valley and up the hill past huge boulders, interspersed with level patches of grassed land leading to higher ground. About one mile from the beginning of the track a prolific growth of the Morel (*Morchella conica*), a springtime fungus, was found. This fungus, with its conical sooty-brown cap and honeycombed network of raised ribs and hollow stem, though found in all parts of Victoria, is seldom seen in sufficient quantities to warrant its collection for cooking purposes. It is strange that all early records agree that the natives were not mushroom eaters, although they were fond of "blackfellow's bread" (*Polyporus mylittae*) *, which is, after all, an underground fungus. They also consumed large quantities of the tuberous roots of such plants as terrestrial orchids, of which a great profusion was seen during this climb. There were many signs of recent digging activity by echidnas in search of food, wildflowers were blooming, and plenty of bird life was in evidence.

From the top of the hill an excellent view is obtained. It

*According to J. H. Willis (*Victorian Toadstools and Mushrooms*, page 73), this is a "debatable point".—Editor.



was observed at this point that the rocks, though varying greatly in size, had all weathered in a uniform shape, with a considerable dip or hollow in the centre. No doubt, analagous agencies operated over the whole area. Enormous stringybark trees of great age, and saplings of the same species — but no growth of apparent intermediate age — cover the top of the hill. This lack of middle-aged trees could be due to the burning-off of scrub and young saplings by the early colonists, in order to stimulate a growth of grass for their stock. This practice has ceased in recent years.

The attractive and somewhat rugged terrain leads right to the well, which is situated thirty-three feet from the top and twenty feet from the bottom edge of a huge rock embedded in the hillside. Approximately ninety feet by sixty feet of the rock surface protrudes, facing in a south-south-easterly direction. The well is an oval basin, its maximum dimensions being three feet five inches by three feet four inches. Its depth increases from twelve inches at the water's edge to twenty-four inches at the opening of an aperture which is the mouth of an underground channel, measurable to a distance of eight feet eight inches into the rock. This channel feeds the basin. The water level at the opening of the aperture is twenty inches below the overhanging edge of the rock. The underground channel has an angle of about 35° from the horizontal, and one can only surmise the great pressure from underground springs which forces the water up this incline

to fill the basin. There is a comparatively flat platform in front of the hole, the only level portion of an otherwise precipitous rock, from which it would be quite comfortable for a man to drink from a horizontal position.

As this water-hole is situated so close to the summit of the hill and a considerable distance from any other routes, it must have been used extensively by the aborigines during their hunting excursions. There is still ample evidence of much game in the area: echidnas are numerous, as are possums and emus and, to a lesser degree, kangaroos. At the present day, the animal population is augmented by species imported by the white man. These include wild goats, foxes and rabbits.

Of course, the natives only improved on nature if it facilitated their needs (see Massola: "Native Water Wells at Maryborough", *Vict. Nat.*, *73*: 48-50). There is little evidence of interference in the case of this water well, as the supply was apparently unlimited. It is possible that the mouth of the hole was enlarged but not necessarily by the aborigines. Their only contribution to its upkeep would have been to clear it of leaf debris, and, possibly as was their habit in similar instances all over the continent, to place a large stone at its mouth for hygienic purposes and to prevent repetitive cleaning work. If the hole were enlarged it is more likely that it was done by gold miners in order to enable them to fill their water cans more readily. At the present day there is a well worn track, without lichen, over the rock to the basin, indicating its daily use by creatures of the forest.

A thought upon leaving this lonely well, hidden away on a picturesque mountainside, was to wonder how long it would endure in its pristine state. It is to be hoped that this rock well does not share the fate of so many other aboriginal antiquities.

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THE VICTORIAN NATURALIST. Except for about half the numbers of the first nine volumes (1884 to 1893), almost all back numbers of the journal are obtainable from the club. Assorted lots are available, dealing with particular subjects (mammals, birds, orchids, geology and anthropology).

PAMPHLETS. Lyrebirds of Sherbrooke and Sherbrooke Diary, both by K. C. Halafoff (1/- each). The Land Flora of Victoria (From 1962 *Victorian Year Book*) (2/-). The Yellow-tufted Honeyeater, by N. A. Wakefield (2/-).

Address orders and inquiries to Sales Officer, F.N.C.V., National Herbarium, South Yarra, S.E.1, Victoria. Payments should include postage.

Field Naturalists Club of Victoria

General Meeting—November 11, 1963

About one hundred and forty members were present, and Mr M. K. Houghton presided. He welcomed Mr and Mrs R. Wheeler of the Bird Observers' Club and a visitor from Tasmania.

Mr Wheeler talked on "Bird Watching in Victoria", and showed superb colour photographs of over one hundred species of birds. These had been taken by several members of the Bird Observers' Club and were projected by Mr L. Robinson. The habits of the birds, habitats, diet and contribution to the balance of nature proved an absorbing story. Mr E. H. Coghill, as secretary of the Field Naturalist Club, thanked Mr Wheeler for the most enjoyable talk.

Concern was expressed at the destruction of some of the bush at Yellingbo, threatening the survival of the Helmeted Honeyeater.

Advance orders for the Bird Observers' Club publication, *Honeyeaters of Australia*, were invited.

Twelve new members, whose names appear in the November *Naturalist*, were elected.

Mrs W. Woollard reported that a family of thornbills had been successfully reared in her fernery.

Mr L. Morrison exhibited fresh water crustaceans, *Phreatoicopsis terricola*, from Mount William in the Grampians. Messrs D. McInnes and W. Woollard displayed Club microscopes and reported that sixty-nine were either made or on order.

Geology Group—November 6, 1963

Twenty-two members and visitors were present, with Mr L. Angior in the chair. Mr R. Davidson reported on the group's excursion on Saturday afternoon, October 14, to the Studley Park area. About fifteen members attended. The party first moved along the river bank to the site of the old pumping station, examining Silurian mudstones and sandstones with synclines and anticlines. Some excellent specimens of graptolites (*Monograptus*) were collected. The massive sandstones at Dight's Falls were viewed from the top of the cliffs before the party passed along the Boulevard to see Tertiary dykes, gravels, and folding in the road cuttings in the Silurian beds.

The speaker for the evening was Mr N. A. Wakefield, and the subject was "Mammal sub-fossils in south-eastern Australia". The main area under discussion is known as the Pyramids and is four miles north-east of Buchan. Approximately 16,000 jaw-bones have been recovered from a small cave there, including some material of extinct species. The main source of the bones was from owl pellets, of which the speaker gave a detailed account. By use of a comprehensive series of statistical graphs the material was classified into two groups, grading from extinct to modern, with a complete and mysterious break in between. This break probably coincided with the period of extinction of many large Pleistocene mammals, and was evidently caused by a change of environmental conditions. The lecture closed with some interesting questions and discussion.

Exhibits: Wombat skull from Hume Ranges (R. Dodds); agates, fossil wood and Carboniferous plant fossils, collected on trip to Benalla area (R. Davidson); marble, quartz crystal, copper, various iron and nickel ores, orpiment and realgar from Iran (L. Bairstow); turquoise from Iran (A. Cobbett); coal of probable Carboniferous age from Bellfield Dam excavation, Grampians (Mrs M. Salau).

Botany Group—November 11, 1963

Members were given a treat by Mr A. Morrison, whose excellent colour slides of Western Australian wildflowers were projected by another of the recent excursionists, Mrs E. Webb-Ware. Commentary was given by these two, supplemented by Mr J. Willis when identification was in doubt or when there was need for additional facts of structure, relationship or distribution. Those who went to Western Australia enjoyed the trip

Beach, Mornington, including a "pagoda murex".

Mr J. Strong showed a specimen of the brackish-water mollusc, *Coxiella*, from Lake Corangamite, using a microscope with low power. He commented on the abnormally large number of the Australian Admiral Butterfly, *Pyrameis itea*, about Melbourne gardens the previous week.

Other members brought further exhibits, including an undescribed species of beetle from Central Australia (Mr D. Bowry).

F.N.C.V. LIBRARY

As it is planned to take stock in early December, members are requested to return all loans — books, periodicals and other publications — by November 30. Study group librarians are particularly asked to ensure that publications borrowed by group members are returned by that date. Loans returned by mail should be addressed to the F.N.C.V. Library, C/o National Herbarium, The Domain, South Yarra, S.E. 1. (not to the librarian's private address).

DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, December 9, 1963—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, reports, announcements, correspondence.
2. Subject for Evening: Members' Night—Trip to Western Australia.
3. Election of Members:

Ordinary Members:

Miss Ellinor Archer, Flat 3, Mathoura Road, Toorak. (Introduced by Mrs E. Webb-Ware.)
Mr Reuben D. Kent, 16 Papua Street, Watsonia. Interests: General. (Introduced by Mr D. E. McInnes.)
Mr W. J. Tayton, Head Teacher, S.S. 4718, Olympic Village, Oriel Road, West Heidelberg. (Introduced by Mr D. E. McInnees.)
Miss Jill Wolfenden, 17 Poath Road, Hughesdale. Interest: Fauna. (Introduced by Mr N. A. Wakefield.)
Mr C. M. Amos, 23 Anderson Road, Hawthorn East, E. 3.
Mr William B. Embury, 26 Store Street, Coburg. Interest: Microscopy. (Introduced by Mr D. E. McInnes.)
Mr David J. Lee, 15 Springvale Road, Springvale. Interests: Anthropology, Geology, General.

Joint Ordinary Members:

Mrs G. E. and Miss L. G. MacMahon, 10 Flower Street, Essendon, W.5.

Country Members:

Mr Lesley Amey, Kees Road, Yarram.

Junior Members.

Nigel I. McGillivray, 6 Ebiana Avenue, Montrose.
Miss Margaret Swan, 186 Gatehouse Street, Parkville. (Introduced by Mr D. H. S. Horn.)

4. Nominations for Membership.
5. General Business.
6. Nature Notes and Exhibits.
7. Conversazione.

Monday, January 13, 1964—Members' Night — General.

F.N.C.V. EXCURSIONS

Sunday, December 15—Point Leo. Leader: Miss F. Hosking. Small gemstones can sometimes be found in this area with the aid of a fine sieve. The coach will leave Batman Avenue at 9 a.m.; fare, 14/-. Bring two meals. Members travelling by private cars can meet the party near the Comfort Station in Frankston at 10 a.m.

December 26-January 1—Mount Buller. The coach will leave from Flinders Street, opposite the Gas and Fuel Corporation, at 9 a.m. on Boxing Day. Bring a picnic lunch. Bus fares and accommodation deposits should have been paid already, but if any are still outstanding please forward them to the excursion secretary as soon as possible.

GROUP MEETINGS

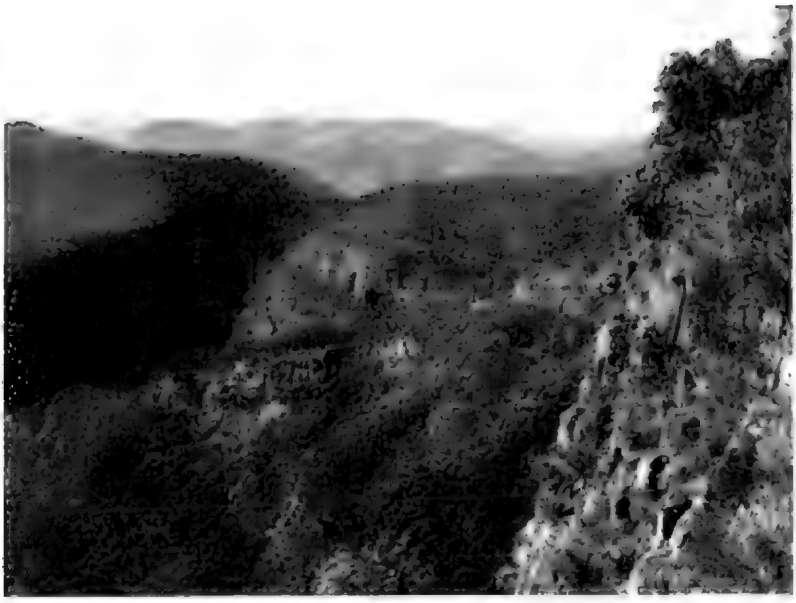
(8 p.m. at National Herbarium unless otherwise stated.)

Thursday, December 12—Botany Group. Members' Night.

The Microscopical Group does not meet in December; and the Marine Biology and Entomology, Geology, Fauna Survey and Botany Groups do not meet in January.

The Victorian Naturalist

Vol. 80 (9) January, 1964



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Celmisia sericophylla, one of the Silver Daisies, among granitic rocks along the Big River below Spion Kop in the Bogong High Plaines area.

The photographs are by J. H. Willis and were used as illustrations when he named the species in the *Victorian Naturalist* in April, 1954.

Vol 80, No. 9

F.N.C.V.

January 9, 1964

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

About twenty miles north-easterly from Buchan, the Snowy River cuts through several miles of volcanic rock. The area was described in an article in the *Victorian Naturalist* in August 1957 [Vol. 74(4), pp. 49-54]. The picture reproduced on the cover is one of the photographs that accompanied the article. The gorge is conspicuous on the left, and the Snowy River is about 2000 feet below the outlook point.

These columns are available each month for your nature notes and queries. Address your correspondence to the Editor, "Victorian Naturalist", P.O. Box 21, Noble Park, Victoria.

Plants React to Humidity

Although members of the animal kingdom respond more obviously to external stimuli, there are innumerable examples in plants as well of reactions which are quite noticeable even during short periods of observation.

Mr J. R. Garnet has written these notes on the behaviour of certain plants when changes occur in atmospheric humidity:

Ixodia (*Ixodia achilleoides*), as well as being a quite showy member of the daisy family, is a curious plant. I took a fancy to it when I first saw it in flower many years ago at Nelson. It was a shapely bush, two to four feet high, with narrow decurrent leaves spaced symmetrically along the stems and branchlets and with clusters of up to fifty or so half-inch-wide white daisy heads.

The species seems to thrive on the Miocene limestones. At any rate the Nelson plants were more luxuriant than those I have since seen on the Tertiary sands of Anglesea and the sandstones of the Grampians.

Thanks to Mr N. F. Learmonth of Portland, I have Ixodia growing in my garden at Pascoe Vale, and over the years I have noted its peculiarities. One of them is its habit of closing its flower-heads when it rains. During a shower or when the garden hose is playing, the floral bracts curl inwards and enclose the little curry-coloured buttons of minute florets in rather grubby-white balls. When the sun shines the bracts open up again.

But that is not all. Being one of the "everlastings", Ixodia can be kept for years as a cut flower. Even though quite dead and dry, its floral bracts will still respond to water by curling up to enclose the florets, and they will open again when dry. This will occur again and again until the bracts drop off, and that might take years.

Ixodia has another peculiarity. When freshly cut it sometimes emits a foetid odour. Fortunately for its reputation as a worthwhile garden shrub, this is not a regular habit, but it does seem to happen in hot humid weather. At most times it is odourless.

In writing of persisting elasticity of plant parts one is reminded that the phenomenon is not unusual in the appendages of seeds and small fruits. Awns of grass "seeds" exhibit it well when they corkscrew their way into the ground. Seeds of the heron's-bill (*Erodium cygnorum*) make excellent humidity indicators. They have a long awn which, if fixed by its tip, will swing like the pointer on scales in response to changing moisture content of the air. When dry the awn curls like a helical spring. Moisture relaxes the coil and a wet awn becomes perfectly straight.

These comments bring to mind another example of a plant mechanism which depends on changes in humidity. The pappus bristles of a dandelion not only tend to plant the seeds by floating the fruitlets point downward to the ground, but they can push the seed along too. When the little fruit is lying on the ground, the bristles spread and relax alternately as humidity changes. This may move the seed along and force it into the soil.

Birds at Beechworth

Mrs Frances Gladstone often sends notes and queries about the bird life near her home at Beechworth. The following are extracts from a letter written on December 11, 1963:

I heard a sharp whistle, and a mottled bird with upturned tail, something like a large slim quail, flew up from amongst the high grass. Three or four baby ones ran in various directions into the dew-wet swamp grasses and disappeared.

They had a line of biscuit colour above the eye and continuing along the neck, and they were beautifully mottled dark and light brown. Could they have been the Banded Landrail? Do other observers know the bird? I am interested as it is now to us.

There is no doubt that the observer's identification is correct. The Banded Landrail is widely distributed; it ranges from Malaya and the Philippines to New Zealand and Tasmania. As they are migratory, landrails are likely to come into an area where they are not usually to be seen.

Mrs Gladstone continues with this note:

We have looked for many years in remote gullies and tree-sheltered glades for nests of the Satin Flycatcher, but decided they must be even deeper in the bush as the flycatchers seemed such shy birds. Yet we found a nest this year over our road. We walk under it almost daily. It is like a willie-wagtail's nest, perched on a dry branch of a Long-leaf Box tree.

Food of Aborigines

In a formal letter to the editor, Professor J. B. Cleland of Adelaide has made these comments:

Re Mr Massola's statement [*Vict. Nat.*, *80*(*6*): 178], October 1963, "in the plains of the inland . . . the staple food of the natives was vegetable roots." Can Mr Massola elaborate this? I think the staple food must have been animal. I doubt that they could get enough nourishment, especially proteins, from the swollen roots of *Geranium*, *Pelargonium*, *Oxalis* and *Microseris*, the tubers of orchids, the roots of *Triglochin procera*, fern roots, the leaf bases of *Xanthorrhoea* etc., to constitute their chief food.

Mammal Sub-fossils from Basalt Caves in South-western Victoria

By N. A. WAKEFIELD

From 1960 to 1962, several large collections of bones were made from limestone caves in the Portland district of south-western Victoria. The study of this material has not yet been completed, but details have been published of the collection from Fern Cave near the lower Glenelg River (Wakefield, 1963).

Much of the exploration and other work in connection with the deposits were done by Mr A. C. Beauglehole of Gorae West, and he extended the field of operations to some of the lava caves which occur near the western extremity of the main basalt area of western Victoria. Bone deposits were found in the Byaduk Caves and near Mount Eccles, respectively 12 miles south and 22 miles south-south-west of Hamilton.

BYADUK CAVES

The system of tunnels and collapses comprising these caves is described in this issue of the *Victorian Naturalist* (Ollier and Brown, 1964).

In April 1961, with the assistance of Mr B. A. Fuhrer of Portland, Beauglehole worked two major deposits. One was at the north-eastern side of the open top of the Flowerpot Cave, and it yielded remains of about 90 small mammals. The other was on the western side of the cave known as Harman Two, and the aggregate from that site was over 300 individuals. Small lots of material were taken from the east side of Harman Two and from Bridge Cave.

Also in April 1961, L. K. M. Elmore of Hamilton found bones of a few animals in the tunnel of the Bridge Cave. Then in May 1961, the Byaduk Caves were visited by J. A. Mahoney of Sydney, Beauglehole and myself; and we collected a little additional bone material from various parts of the system.

NATURAL BRIDGE, MOUNT ECCLES

The site is in a long narrow valley which runs south-westerly from a point south-east of Mount Eccles. The valley has apparently been formed by the collapse of the roof of a long lava tunnel. About half a mile down the valley, a chain or so of the original roof remains, forming what is known locally as the Natural Bridge.

In November 1961, Beauglehole found a bone deposit in the ravine below the "bridge", and he sieved out remains of about 1470 small mammals.

THE HABITATS

In the vicinity of the Natural Bridge, the terrain is rough, with outcropping basalt. This carries a light forest of Manna Gum (*Eucalyptus viminalis*) with an understorey of bracken

Typical collapse area at Byaduk Caves. Church Cave, showing overhanging wall, tunnels and the flat basalt plain.

(*Pteridium esculentum*) and groundsel (*Senecio lautus*). There is also much herbage, including a variety of native grasses.

A full account of the vegetation in and about the actual collapse areas of the Byaduk Caves is given by Beauglehole and Learmonth (1957). It enumerates many fern species, including one kind of treefern, and several native shrubs. No information is available about the original vegetation adjacent to the cave area. Presumably, trees grew about the locality, but the forest on the surrounding plains would have been more open than in the Mount Eccles area.

Analysis of Collections

Species represented in collections from the Byaduk and Mount Eccles sites, and approximate numbers of individuals in each case, are set out in Table 1. Except for the few specimens of larger macropods, and with the further exception indicated in the footnote on page 276, figures are based on counts of dentaries (lower jawbones).

Most of the sorting, identification and counting of murid material has been done by J. A. Mahoney.

Modes of Deposition

The walls of the Flowerpot Cave are overhanging, and no part of its interior would have been used as a den by quolls (*Dasyurus quoll*). Moreover, the position of the bone deposit in that cave was directly beneath sheltered ledges suitable for use as daytime roosts by birds of prey. The presence of remains of adult bandicoots (*Perameles* and *Isoodon*) indicates a comparatively large predator. From this evidence, it is reasonably certain that the Masked Owl (*Tyto novae-hollandiae*) was responsible for the deposit.

TABLE 1

Species and approximate numbers of individuals represented in collections from Byaduk Caves and Natural Bridge.

	Flowerpot Cave	Harman Two		Bridge Cave	Natural Bridge
		East Side	West Side		
Dasyuridae					
Antechinus flavipes			5	1	4
Antechinus stuartii	3		4		44
Antechinus swainsonii	1		12	2	30
Phascogale tapoatafa	1				—
Sminthopsis crassicaudata	1		3		8
Sminthopsis leucopus	3	2	6		31
Dasyurus quoll	3	2	1		16
Peramelidae					
Isoodon obesulus	4	—	4		1
Perameles gunnii	24		6		22
Phalangeridae					
Acrobates pygmaeus					11
Cercartetus nanus	2	1	15		28
Petaurus norfolcensis	4		5	1	
Petaurus breviceps	5		1		6
Pseudocheirus peregrinus	10		1	1	
Trichosurus vulpecula				1	2
Phascolomidae					
Phascolomys mitchellii					1
Macropodidae					
Potorous tridactylus					1
Petrogale penicillata				1	
Protemnodon rufogrisea		1			1
Muridae					
Hydromys chrysogaster			2	2	1
Rattus lutreolus	1	1	17	—	108
Rattus greyii	1		61	2	103
Pseudomys auritus		1	1		157
Pseudomys sp.		5	—	3	581*
Thetomys cf. *gracilicaudatus*	10	1	61	2	61
cf. *Gyomys novaehollandiae*	2		5	1	17
Mastacomys fuscus	6	1	37	3	306
Conilurus albipes	8	4	11	2	24

* This figure represents the number of left maxillae.

Beauglehole suggested that *Dasyurus* was responsible for the large deposit at the west end of Harman Two Cave. If that were the case, the quolls of that district caught a far greater proportion of murids than did those of the Buchan district. Murids comprise 80% of the individuals from the deposit at the west end of Harman Two, whereas by the Murrindal River near Buchan, the group contributed only 34% of the individuals in two accumulations that are attributed to *Dasyurus* (Wakefield, 1960).

However, comparatively large marsupials, such as *Perameles*, *Dasyurus* and *Pseudocheirus*,

were more numerous in the Flowerpot Cave deposit than in the Harman Two Cave; but *Antechinus* and Muridae were far less plentiful in the former. This suggests that the main deposit in Harman Two may have been the responsibility of the small Barn Owl (*Tyto alba*).

In the deposit under the Natural Bridge near Mount Eccles, 86% of the individuals were murids, and comparatively large marsupials were hardly represented. Again, this evidence suggests that the Barn Owl was responsible for almost all the deposit.

Specimens of the quoll (*Dasyrus quoll*) were present both in the Byaduk Caves and at the Natural Bridge. It must be assumed that this animal would have had dens in recesses about the collapsed lava tunnels. Therefore, some of the bone material found in the study areas should be remains of prey of quolls.

Finally, the specimens of large marsupials (*Protemnodon*, *Petrogale* and *Trichosurus*) would represent animals that used the more accessible open caves as homes.

Age of Deposits

Neither the introduced Ship Rat (*Rattus rattus*) nor the European rabbit were represented in the main bone deposits at the Byaduk Caves and the Natural Bridge. The rat is widespread in south-western Victoria, and specimens of it have been caught recently about the Byaduk Caves. The rabbit is ubiquitous in Victoria.

The domestic mouse (*Mus musculus*) is widespread about the western Victorian countryside. It is not represented in the major collections, and the few specimens which have been found about the caves were probably taken there by the Boobook Owl (*Ninox novae-seelandiae*). During the visit in May 1961, we flushed a Boobook Owl from the western side of the Flowerpot Cave, and, under its perch, there were remains of many beetles—apparently its main food—and one domestic mouse. Beauglehole flushed another of these birds from under the Natural Bridge, and he noted similar accumulations of beetle remains there also.

It has been found that remains of introduced mammals were absent from owl pellet deposits near Buchan (Wakefield, 1960). In that case, it was concluded that the owls had ceased to use the shelters concerned before the rabbit came to the district, by about the turn of the century. This appears to have happened in south-western Victoria also.

Except for a single specimen (the rock-wallaby, *Petrogale penicillata*), the material listed in Table 1 is of a modern fauna. Presumably, all species but the rock-wallaby were present on the basalts of south-western Victoria at the time of European occupation of Australia.

Distribution Data

Antechinus swainsonii

The specimens from the basalt formations provide a link in general distribution between the populations in the Grampians and near Portland.

Petaurus norfolcensis

The Byaduk specimens provide a considerable westward extension to the known range of the Squirrel Glider. But no specimen of it has been found in the Mount Eccles-Portland-Lower Glenelg district, nor has it been recorded for South Australia.

Pseudomys species

P. auritus is recorded as a living animal only by the type specimen, which was collected at Lake Albert in South Australia in 1853. However, cave deposits show that in the recent past the species extended eastward, apparently in abundance, to central Victoria.

On the other hand, a larger species (the "*Pseudomys* sp." of Table 1) has been recorded only from lava caves of the western Victorian basalts. Though apparently abundant in the recent past, the species has never been recorded as a living animal, and it is evidently now extinct.

REFERENCES

Beauglehole, A. C., and Learmonth, N. F., 1967. The Byaduk Caves. *Vict. Nat., 73 (12)*: 204-210.

Ollier, C. D., and Brown, M. C., 1964. The Byaduk lava caves. *Vict. Nat., 80(9)*: 279-290.

Wakefield, N. A., 1960. Recent mammal bones in the Buchan district. *Vict. Nat., 77*: 164-178, 227-240.

———1963. Mammal sub-fossils from near Portland, Victoria. *Vict. Nat., 80 (2)*: 39-45.

Eighty Years Ago

In January 1884 the Field Naturalists Club of Victoria published a modest 8-page journal — the first issue of the *Victorian Naturalist*. The editor was A. H. S. Lucas, M.A., B.Sc., F.G.S.

Page one was devoted to an introduction which recorded a little early history of the club and then set out the purpose of the new magazine. Here are a few extracts from the page:

It is now three years since the Field Naturalists Club of Victoria was first formed. The club has supplied a want, and has steadily increased in numbers until over 150 members have been enrolled. Field work has been the main object of the Society, and the enlarged cabinets, and the exhibits at meetings, testify to the activity of members in this direction, while the number of careful observers of Nature in the colony has been greatly multiplied.

Hitherto the proceedings of the Society have appeared in the "Southern Science Record," published by Mr. J. Wing, but it is now deemed time to bring out a periodical of our own. It is hoped that a larger field of usefulness will thus be opened up, and that both members and the public will gain by the publication of a monthly record of work and results, of original papers on Victorian Botany and Zoology, and of current notices of the occurrences and habitat of interesting forms.

Lastly, the Club has decided to prepare, and to publish in this Magazine, scientific lists of the Victorian species of animals and plants for the use of collectors. . . . It is confidently expected that the catalogues will be of value in creating that exact knowledge of specific forms which will facilitate more advanced Biological studies, . . . which must be of great practical and material benefit to the community.

The Proceedings of the January meeting of the club were recorded on pages 2 and 3. In those days interest in natural

history usually centred round the building up of large collections, so it is not surprising to find that most of the meeting was devoted to the examination of suites of specimens of shells, birds and their eggs, orchids and insects, from overseas countries as well as Australia. There was no "Subject for the Evening", but several members read papers to be published in subsequent issues of the *Naturalist*. Some of these evoked lively discussion, for the proceedings contain this record:

Mr Bailey mentioned that worms similar to the one shown and described by him had been found in the Yarra and the Yan Yean, and apprehended that fatality might arise to persons drinking these waters, and so absorbing the ova: but it was pointed out that it has been proved unquestionably that there was not the slightest probability of danger. In the course of the discussion, Mr Watts alluded to, and denied, the general belief that infusoria existed in the Yan Yean, as he had thoroughly satisfied himself that they do not.

Papers published in that first *Victorian Naturalist* were:

"The Orchideae of Victoria: Their Habits, with Cultural Notes", by C. French, Botanic Gardens, Melbourne. (Part I.—Read September 10th 1883).

"Contributions to the Phytography of Australia", by Baron Ferd. von Mueller, K.C.M.G., M.D., Ph.D., F.R.S.

"Entomology. Lepidoptera of the Month", by Dr T. P. Lucas.

That was the beginning, and a *Victorian Naturalist* has been published for each month from January 1884 to the present. The present issue, for January 1964, is Number 961 of the series.

—EDITOR

The Byaduk Lava Caves

By C. D. OLLIER AND M. C. BROWN

The Byaduk caves are located in Harman's valley about two miles south-east of Byaduk North, a village 10 miles south of Hamilton. The caves are in a lava flow which came down the valley from Mount Napier to the east. The flow extends down the valley for 15 miles, and has a width varying from ½ to 2 miles. In the immediate vicinity of the caves it is about ¾ mile wide at the Turk, and narrows down to about ½ mile at Harman 1. The exact thickness of the flow cannot be found as there are no exposed cross sections going down to the base. The depth of the floor of the deepest caves is 70 feet below the top of the flow. The valley sides have a fairly steep slope under the basalt, and it is believed that the flow may be over a hundred feet thick. There is no surface drainage on the flow, which is almost unaltered, the features of the flow being preserved intact.

The main features of the flow have been described by Skeats and James (1937), who also described some of the caves. Another account of the caves has been given by Beauglehole and Learmonth (1957). The position of the caves is shown in Figure 1, which has been drawn from air photographs, and the main purpose of this paper is to record the individual cave surveys.

The caves are aligned along the centre of the flow, with a few branches. They are grouped into systems which interconnect, but it is not possible to go continually underground through all the caves. The tunnels open to the surface at sinkholes (really collapses) which may be roughly elliptical or elongated, but are sometimes remarkably circular in plan. The existing names for the Byaduk caves seem to apply to the sinkholes rather than to the tunnels, and for descriptive purposes we have had to invent a few new names. The nomenclature is shown on the map (Figure 4).

The gradient of the surface of the flow is very small; between the Great Barrier and Church Caves the slope is about 1½°, which appears to be somewhat steeper than normal, and downstream from Church Cave it flattens until at Harman's Cave it is virtually horizontal.

Harman One Cave (Figure 1, top)

Of the Byaduk caves, this one is the furthest down valley. It is a simple lava tube, almost straight in plan and with a flat lava floor and circular arched roof. The height averages 16 feet and the width varies between 35 feet and 45 feet. The cave slopes gently down valley at about 1° and terminates at the western end where the roof comes down fairly abruptly to meet the lava floor.

At the end of the tunnel the lava floor is noticeably arched into a small lava dome about 40 feet in diameter. The surface

Figure 1.
Top—Harman One Cave.
Centre—Fern Cave.
Bottom—Bridge Cave.

of this blister shows flow wrinkles and also some cracks. A bench representing part of the solidified crust of a former higher level of lava in the cave occurs around the margins of the blister. On the lowering of the lava level, the edges of this crust remnant were dragged down. Another old lava level is present along the sides of the tunnel itself.

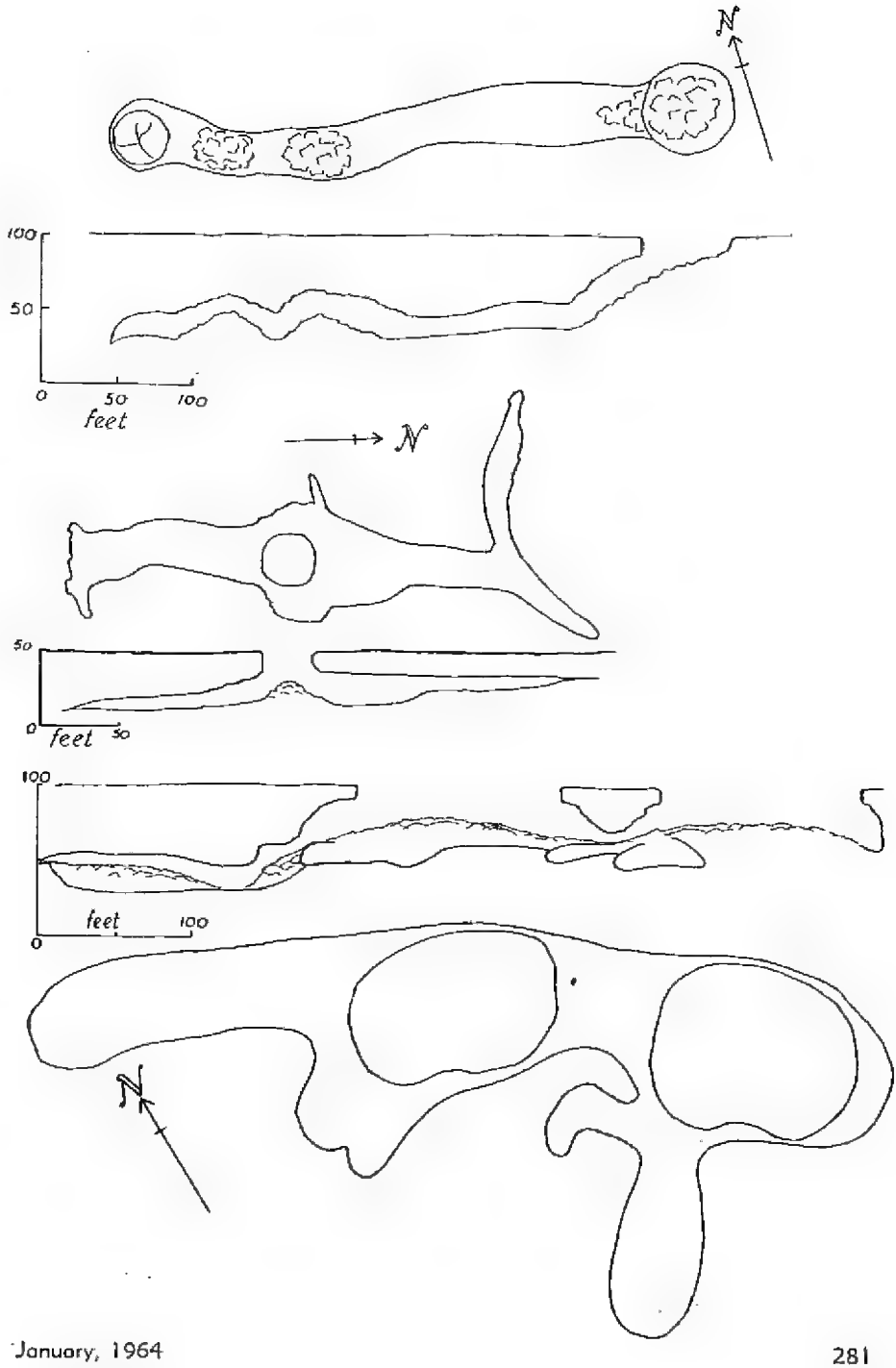
The original shape has been modified by major rock falls from the roof. In two places these have produced inverted cup-shaped stopes in the roof. The entrance to the cave is a circular sinkhole about 50 feet in diameter, with vertical or overhanging walls around most of its perimeter.

Harman Two Cave

This is a sinkhole similar to that of Harman One, but there is only a small overhang below. It is possible, but difficult, to crawl through the rockfall from Harman Two into Harman One, but there is no tunnel.

Bridge Cave (Figure 1, bottom)

The Bridge Cave consists of two large sinkholes and associated passages. The best entrance is by means of a rock-fall on the south side of the western sinkhole, and elsewhere the walls are vertical or overhanging. The western sinkhole is roughly elliptical and about 120 feet by 80 feet across. At the western end this leads by various entrances to low level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passages. On the northern side the tunnel continues for almost 200 feet, becoming progressively smaller and deeper. On the other side is a larger but short recess. The western sinkhole is connected to the eastern one by a short tunnel. There are overhangs all around this sinkhole, and on the south side there is a low passage leading steeply down, with a branch to the west.

Church Cave (Figure 3)

This is the largest of the Byaduk caves, and the most complicated. The roofs are high and have suffered considerable collapse, but the complex floor is still clearly seen in many parts. It appears that after the first Church Cave was formed, the floor solidified for about three feet below the surface, but beneath this skin was hot liquid lava. At a later stage this liquid was also withdrawn and the floor collapsed into its present form of large jointed and broken slabs with spaces amounting to small caves below them.

A branching passage leads back from the main cave, and ascends to a small opening on the steep side of the sinkhole.

Two small features are present at the western termination of the cave. One is a small hole leading down to a rift at a lower level of the cave, which soon becomes too narrow to investigate. The other is a small high level lava conduit of the same shape as a small lava tunnel. Its supply of lava was evidently cut off by the formation of Church Cave, and the lava already in the pipe dribbled down the wall at the end of the main cave as "entrail" lava. However, very little lava drained out, and this conduit has remained filled instead of becoming a cave.

The two sinkholes of Church Cave are joined by a typical tunnel, and at the eastern end is a rounded overhang or cave with some very distinct tidemarks.

The Basin Cave

This is a small cave about 250 feet NNE of the Flower Pot. The entrance is below the steep western edge of a small, shallow,

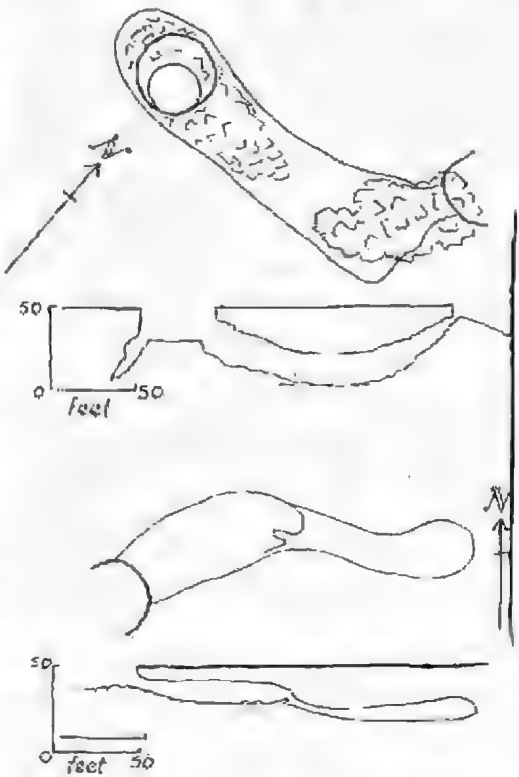


Figure 2
Top—Flower Pot.
Bottom—The Turk.

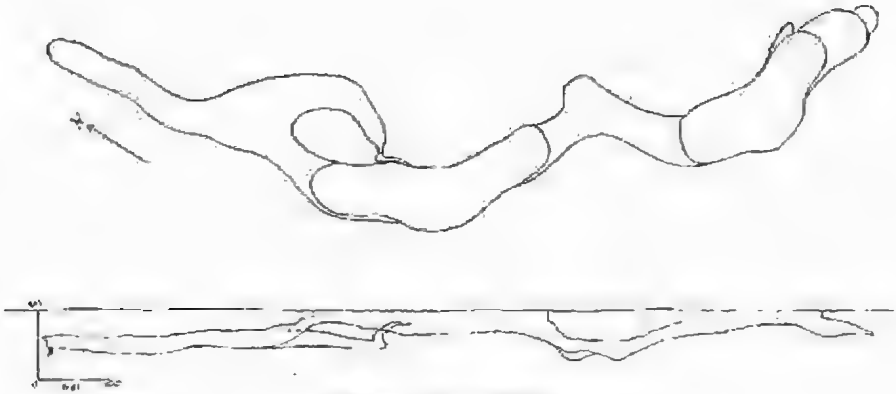


Figure 3. Church Cave.

elliptical depression about 15 feet by 20 feet and is about 2 feet high and 12 feet wide. The bottom of this sinkhole slopes down towards the cave entrance, and this surface continues into the cave as a rock-fall floor sloping down at 35 degrees for about 20 feet to meet a lava floor in the cave.

The roof slopes down at a slightly lower angle for about 20 feet and then slopes more steeply until it comes down to meet the lava floor and terminate the cave. The roof is largely broken, except toward the bottom of the cave where it has a lava skin. The vertical wall terminating the cave has well-developed horizontal "tide marks".

The Flower Pot (Figure 2, top)

This sinkhole above the main tunnel is circular in plan and 40 feet in diameter, with vertical or overhanging walls. This overhang increases in angle with depth as the original roof of the lava tunnel is approached. The cylindrical mass of material which has fallen in from the surface appears to have done so as one coherent block and is found almost intact on the floor of the hole 28 feet down from the surface.

A further 18 feet down from the top of this fallen block and around its edges are the original floor and portions of the roof of the original tunnel. The roof of the tunnel slopes down to meet the floor a short distance to the west of the sinkhole.

On the eastern side of the sinkhole is a tunnel remnant connecting the Flower Pot to the adjacent Bathtub sinkhole.

The Bathtub

This sinkhole is oval in plan and about 120 feet by 170 feet. The walls near the surface are steep or overhanging for a distance up to 12 feet. The floor of the sinkhole slopes at about 20 degrees towards the centre from all directions. At the very centre is a small funnel shaped depression.

The Bathtub is connected by a short bridge-like tunnel remnant to the Tunnel sinkhole, and by a longer tunnel to the

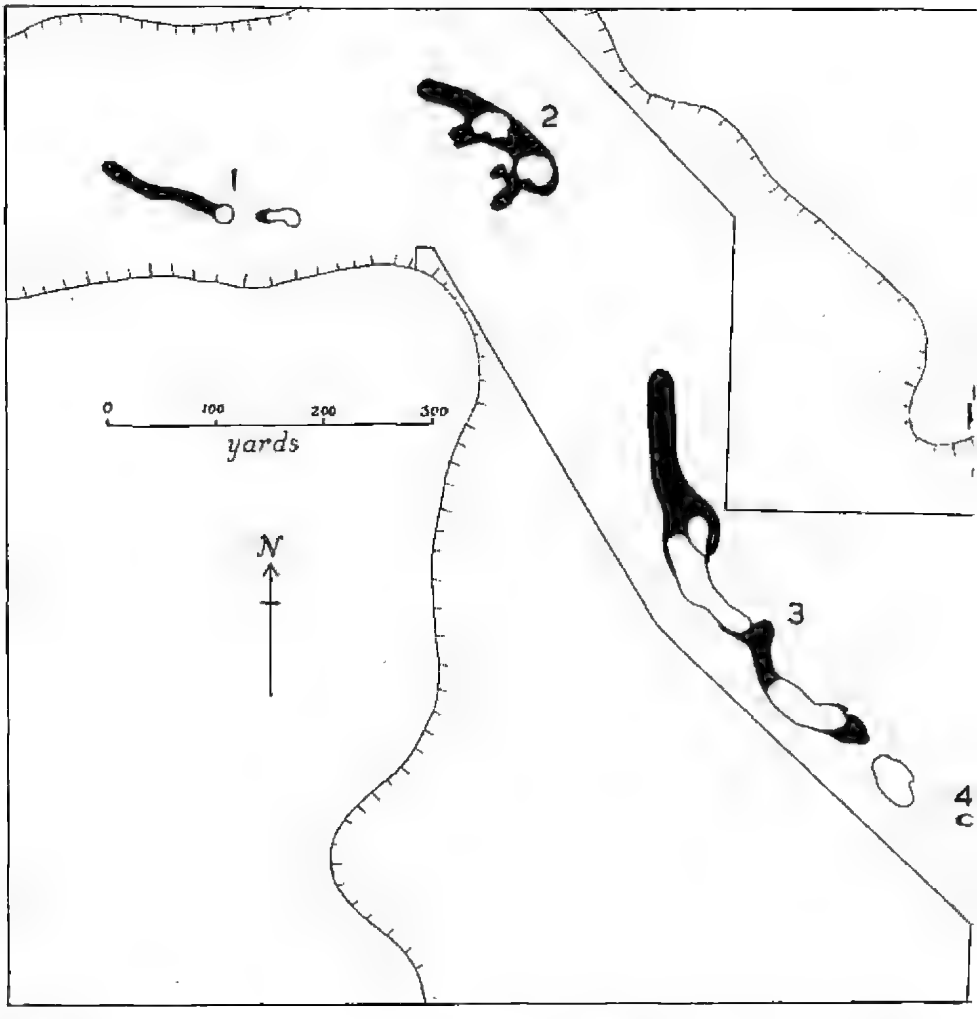


Figure 4.

1. Harman Caves.
2. Bridge Cave.
3. Church Cave.
4. Basin.
5. Flower Pot.
6. Bathtub.
7. Shephard's Cave.
8. Tunnel Cave.
9. Fern Cave.
10. The Turk.
11. Staircase.
12. Brown's Cave.

Flower Pot. The entrances to both of these remnants are obscured from view by collapsed material, but both are accessible.

The tunnel leading off the west end of the Bathtub is entered by climbing down a steep (53°) slope probably representing the edge of the collapsed roof block. It is a relatively broad, low tunnel about 70 feet wide and with the roof

not more than 15 feet higher than remnants of the original lava floor. The original roof and small portions of the lava floor are preserved only along the margins of the tunnel. Most of the top of the roof has been broken, especially near the ends, and the floor is correspondingly littered with broken blocks. As in The Turk, the roof shows cross sections of vertical prismatic columns, about 4 feet across, and the walls show the broken edges of sub-horizontal sheet of basalt about 2 feet thick dipping gently (perhaps 2°) down valley, parallel to the lava surface.

This cave is small in size and is a tributary to the main tunnel from the Turk to the Flower Pot. The entrance is on the north side of the Tunnel Cave sinkhole, and at the entrance the cross section is at its largest.

The cave is subdivided into three chambers. The entrance chamber is irregular in plan and cross section and averages about 15 feet wide and 10 feet high. At the entrance the roof is broken and the floor is littered with large blocks of rock derived from the collapse. The remainder of the cave has its original surface intact. The walls show well-developed "tide marks" which appear to be almost horizontal. The floor is of ropy lava and is almost level, but near the far end of the chamber it slopes upward at a relatively steep angle (about 15°) towards the small hole, three feet wide and two feet high, leading into the next chamber.

The middle chamber has a slightly domed, ropy lava floor that slopes very gently toward the entrance chamber. It has some cracks and is decorated with numerous small lava stalagmites. The intact lava roof has an irregular "scalloped" shape with lava stalactites. The chamber opens out to a maximum width of about fifteen feet and a height of five feet.

The roof becomes very low (about 18 inches, at the entrance to the end chamber.

The end chamber has a ropy lava floor continuous with that of the intermediate chamber, but the crust is broken up into blocks which have in places overriden one another. For the last five feet of the chamber the lava floor slopes upward at about 30° to meet the roof and is crumpled and broken in a chaotic fashion.

Tunnel Cave

This is a roughly elliptical sinkhole, about 100 feet by 170 feet with near-vertical or overhanging walls around most of its perimeter, which has developed over the junction of a main lava tunnel and a tributary (Shephard's Cave).

Remnants of the original tunnel form two natural bridges on the eastern and western extremities. The eastern "bridge" connects the sinkhole with the long depression between it and the Turk cave, and the western one connects it with the adjacent "Bathtub" sinkhole. The western bridge is almost choked by rubble from the collapse and is not visible from the surface. In the centre of the bridge however the original lava skin is preserved right across the semicircular arch of the roof, and small portions of an original, level lava floor appear near the walls. The width of the tunnel is about 42 feet, and the height about 20 feet at this point. The thickness of basalt above the roof is about 27 feet.

The eastern bridge is a more spectacular feature, in that an unobstructed view of its form

can be gained from the surface. The original skin lining the tunnel has broken away and the floor is covered with large basalt blocks. The tunnel at this point was about 60 feet wide and 30 feet high, with a thickness of about 18 feet of basalt above the roof. The horizontal layering in the basalt stops abruptly at the walls of the tunnel.

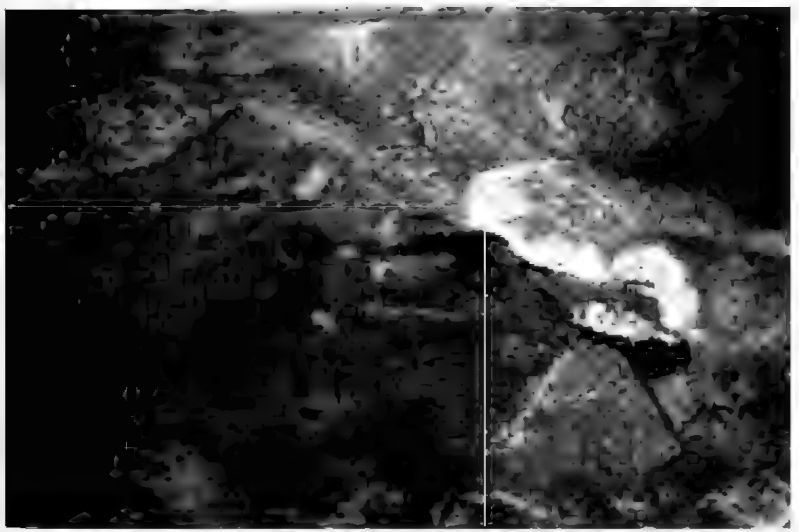
Fern Cave (Figure 1, centre)

This is the only cave where a ladder is necessary to get in and out. There is a circular sinkhole 35 feet across, located over the centre of a tunnel. The collapsed material forms a cone 17 feet high beneath the entrance, and is overgrown with the ferns that give the cave its name. Passages lead both north and south, and there are several branch passages, as shown in the map. The tunnel has a maximum height of only 12 feet, but the original chamber beneath the sinkhole must have been higher than this.

The Turk (Figure 2, bottom)

The entrance to this cave is at the northern end of a long, slightly sinuous depression in the lava surface. The lava surface above the cave is essentially flat.

The cave consists of two distinct parts. That nearest the entrance is a broad cave with a low, broken arched roof, and the floor is covered with fallen debris including parts of polygonal columns. It is about 100 feet long, 50 feet wide and 20 feet high. The walls cut across horizontal flow layers in the vesicular basalt, mostly about one foot thick but up to 5 feet, and the roof shows sections of vertical columns about two feet across. A small exposure of the original floor, which is of ropy



The Turk, showing the passage connecting the inner and outer cave, which goes under an overhanging sheet of pahoehoe lava.

lava, is present near the south wall close to the entrance. Another section of the original floor occurs near the east end of the south wall at the entrance to the inner cave.

The inner cave is an asymmetric lava tube, contrasting markedly with the outer cave in that it has suffered virtually no collapse. The roof has an intact skin of lava with the usual small lava stalactites. The floor is a fresh lava surface. Near the entrance it is generally smooth but is broken in places by cracks. Near the eastern end the floor is broken into fragments about 18 inches across, which have bumped against each other and have developed upturned edges like water-lily leaves. A small "bench" representing a former lava level about 9 inches higher than the present level, occurs along the south wall near the entrance. Further in however the roof meets the floor in a smooth curve.

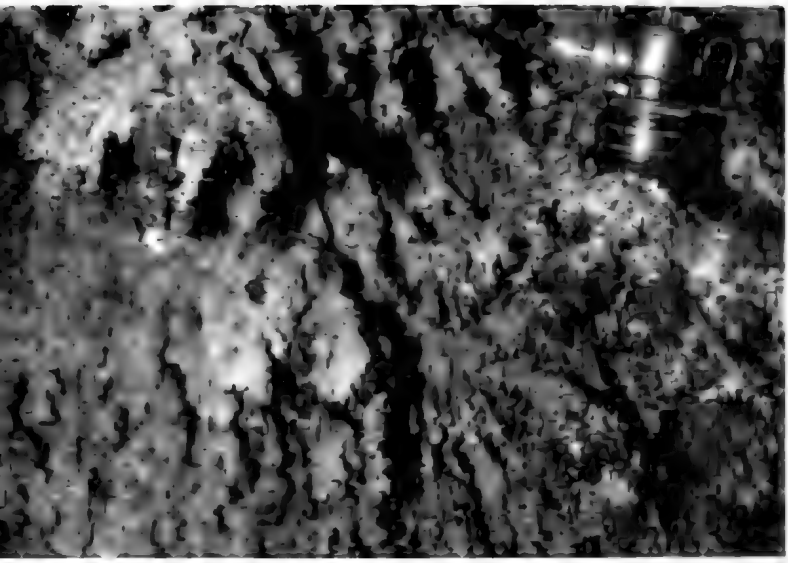
The floor, although a lava surface, is not level but has slopes of up to 5°.

In cross section the cave is notably asymmetrical, with the highest part of the roof closest to the south wall. The south wall may be vertical or even sloping outward away from the floor while the north wall slopes at about 30° towards the floor and meets it at a sharp angle.

The inner cave is only 3 feet high at the entrance but rises to 9 feet inside. The roof of the cave slopes down steeply to meet the floor at the end of the cave so that the roof has a shape like an inverted spoon.

Near the junction of the inner cave and the main cave is a mass of solidified ropy lava sloping down away from the entrance to the inner cave. It

The Turk, inner cave. The cave is asymmetrical, due to squashing after the formation of the original cave. Apart from the few broken blocks, the floor and ceiling have an original skin of lava.



Staircase Cave. Large and frothy "hands" of stalactites on an overhanging

is hollow below the crust and opens toward the entrance to the inner tunnel. It probably represents a former level of the lava surface sloping down from the inner tunnel. Lowering of the lava level removed the lava from below the crust, leaving the hollow.

The Staircase

The entrance to this cave is a small sinkhole about 10 feet across, 200 feet north of the entrance to the Turk Cave and about 300 feet west of a small transverse barrier in the lava surface.

The cave is small in size but of considerable interest in view of the variety of surface ornament on the walls. It consists of a single large chamber, roughly circular in plan and about 50 feet in diameter, with steep walls and a ceiling height averaging 10 feet.

The eastern wall, to the south of the entrance, consists of a flight of steps (giving the cave its name). The "risers" of the steps are of variable heights, averaging 1 foot, and the "treads" vary from 2 to 18 inches wide. The treads have a slight back slope away from the centre of the cave. The stairs have a glazed surface of bubbly lava.

The steep or overhanging southern walls are particularly well decorated with lava stalactites and stalagmites which have a wide colour range. In places complex drooping "hands" of lava stalactites project up to 9 inches from the wall. Due to rock-falls, the roof is irregular in shape over the main part of the chamber, the floor being covered with blocks from the roof. Both floor and roof slope down at about 20° from the entrance. A few remnants of an original lava roof remain close to the walls in the overhanging

Staircase Cave, showing some of the steps which give the cave its name and which are "tide-marks" left by a subsiding lava pool.

north-west side of the cave and near the entrance.

At the southern side of the cave a small closed tube rises at about 30° from a small opening about 4 feet in diameter. It is 23 feet long and opens to a maximum width of 10 feet. The floor is of ropy lava and the roof is a rounded arch with lava stalactites.

The lower part of the eastern wall of the cave has an original lava skin which overhangs at an angle of about 30° from the horizontal for about 10 feet from where it meets a flat lava floor.

A small blind alley leads down from the eastern corner. This has a flat floor with a very smooth surface, and irregular walls with lava stalactites.

The chamber may be the result of the stoping-off of a cylindrical block of basalt from the roof of an underlying lava tunnel. This stoping must have taken place before draining of the lava so that liquid lava rose into the chamber and was subsequently drained slowly, in pulses, leaving the "stairs" as benches and leaving overhanging walls coated with lava stalactites.

Brown's Cave

This is a very small cave with its entrance at the north-east end of a shallow depression about 300 feet east of the Staircase Cave and close to a small transverse barrier in the flow surface.

The cave is an irregular oblong shape. Both roof and floor are irregular and in no place are more than about 4 feet apart, although the cave extends perhaps 12 feet in from the entrance and is about 15 feet across. Some parts of the floor are of flat, smooth lava, and the roof has some lava stalactites.

References

Beauglehole, A. C., and Learmonth, N. F., 1957. The Byaduk Caves. *Vict. Nat.*, *73(12)*: 204-210.

Ollier, C. D., and Brown, M.C.. The lava caves of Victoria. *Bulletin Vulcanologiques*. In Press.

Skeats, E. W., and James, A. V. G., 1937. Basaltic barriers and other surface features of the Newer Basalts of western Victoria. *Proc. Roy. Soc. Vict.*, *49*: 245-292.

Two Unusual Wattles

By Evan Rowlands

In the *Victorian Naturalist* of November 1962 (Vol. 79 (7), pp. 206-211), I referred briefly to two wattles, *Acacia brachybotrya* var. *glabra* and *Acacia* aff. *pendula*. The taxonomic position of these is still uncertain and it is my purpose here to record some facts about them as they occur in the Robinvale area.

Acacia brachybotrya var. *glabra*

Both the species and its variety occur near Robinvale although in four years I was able to find only about half a dozen plants of the variety. The variety occurs in the yellow sands supporting stunted Mallee (*Eucalyptus dumosa, E. oleosa, E. incrassata*) and Porcupine Grass (*Triodia irritans*). It is conspicuously distinct from the species. In habit, it is a slender, open shrub about ten feet high, with ascending side branches, the first of which arise only after two or three feet of trunk. This is in contrast with the species, which is habitually dense and intricately branched right down to the ground. Furthermore, the variety is quite glabrous with peduncles often exceeding phyllode length, averaging in the Robinvale specimens about 16mm with a range of 12-19mm. The species, on the other hand, is pubescent, although it may become glabrous in old age, with short peduncles 4-8mm long and never exceeding the phyllodes.

Thus the variety (as at Robinvale) is distinct on the basis of its

1, slender open habit;
2, glabrous nature;
3, long peduncles.

Each of these differences is now considered in turn.

1. I have seen no reference to the habit in the literature and it is probably not of taxonomic importance.

2. The glabrous nature of the variety appears to be the original reason for giving it varietal rank. Bentham and Mueller (1) in 1864 referred to the variety as "quite glabrous. Phyllodia small and narrow. Flower heads small." in contrast to Bentham's first published description (2) of *Acacia brachybotrya* as pubescent.

3. The case of peduncle length exceeding phyllode length is more involved. J. E. Brown published *Acacia spilleriana* as distinct from *Acacia brachybotrya* on the grounds of a wider pod (8-10mm), seeds usually oblique, peduncles exceeding phyllode length ($\frac{3}{4}$ to $1\frac{1}{2}$ inches in length or 18 to 38mm), and stated occurrences of the species in South Australia at Wirraburra Forest, Clare and south-east of Burra. Specimens are illustrated by Brown in *Forest Flora of South Australia*, Part 7 (1882) p. 31. It appears, however, that Brown kept no material of his new species. Since then no comparable

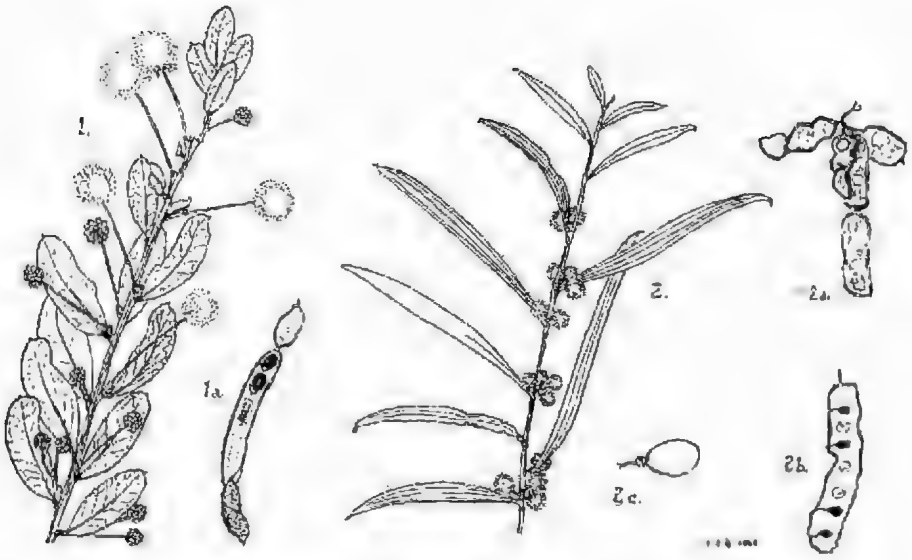


Figure 1.

1. *Acacia brachybotrya* var. *glabra*; Lake Powell, Victoria; 1961.
1a. Pod, showing longitudinal seeds.
2. *Acacia* aff. *pendula*; Robinvale, Victoria; 1961.
2a. Cluster of fruit.
2b. Pod, showing tranverse seeds.
2c. Seed, with folded funicle.

material, especially with the long peduncles, has been collected, and J. M. Black (3) considers it a "rare or doubtful form". Black claims to have seen only three specimens of closely related material and those had peduncles of 10-20mm, occasionally equalling or exceeding the phyllodes in length. On these grounds, he reduces *Acacia spilleriana* to a variety of *Acacia brachybotrya* — i.e. *Acacia brachybotrya* var. *spilleriana* (J. M. Black, p. 533). The Robinvale material shown in Figure 1 differs in no significant way from what has been designated by Black as *Acacia brachybotrya* var. *spilleriana*.

Mr A. Court of the National Herbarium states (*pers. comm.*) that the Robinvale material is referable to *Acacia brachybotrya* var. *glabra*. "An examination of specimens of *Acacia brachybotrya* in South Australia, Victoria and New South Wales shows that it is, by and large, quite a variable species and this does indicate that *Acacia spilleriana* is nothing more or less than a variety of that species. Quite likely *Acacia spilleriana* is far less deserving of varietal rank than the variety *glabra*."

Acacia aff. *pendula*

I know of three specimens only in the Robinvale area and these grow on the north side of the township in a partly cleared paddock opposite the Ampol service station. It is a

shrub some twelve feet high, dense, and branched right to the ground. In phyllode detail and floral features it resembles *Acacia homalophylla* but is distinguished sharply from it by its wider pods and transverse seeds (seeds are longitudinal in *Acacia homalophylla*). At Robinvale it grows in a Pine-Belar-Buloke zone on red-brown sandy loam. Since it is in an area now largely cleared, the original extent of its occurrence cannot be ascertained. *Acacia* aff. *pendula* also occurs at Goschen (10 miles south of Swan Hill), and is common in parts of New South Wales especially between Echuca, Hay and Balranald.

Mr Court, whose courteous assistance I wish to acknowledge, comments (*pers. comm.*) "the habitats of *Acacia pendula* and *Acacia* aff. *pendula* do not appear to overlap in either Victoria or New South Wales" and "I . . . . . must regard it as an undescribed species."

REFERENCES

1. Bentham, George, and Mueller, F., *Flora Australiensis*, Vol. 2., 1864, p. 164.
2. Bentham, George, in Hooker's *London Journal of Botany*, Vol. 1, p. 347.
3. Black, J. M., *Flora of South Australia*, Ed. 2., Parts i-iv, 1957, p. 533.

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Endeavour, *London*; Journal of the Quekett Microscopical Club, *London*; Garden Journal of the New York Botanical Gardens, *New York*; Kew Bulletin, *London*; Microscope, *London*; Plants and Gardens, *New York*; Pacific Science, *Honolulu*; Wild Life, *Nairobi*.

Sirex Wood Wasp

By J. Ozols

On December 20, 1961, the first discovery of the sirex wood wasp *Sirex noctilio* on the Australian mainland was reported from a private timber mill. The manager of the company reported that he had a piece of wood which appeared to contain the sirex wood wasp. It was found to contain both male and female wasps. Then on January 4, 1962, a party of Forests Commission employees found the wasp in a plantation of *Pinus radiata* near Woori Yallock.

The wasp is a native of Europe. It became established in New Zealand about the turn of the century. It is believed that the wasp became very prevalent between 1946 and 1950, when it destroyed much *Pinus radiata* in both North and South Islands. In about two years, eleven out of twelve pine trees were killed by sirex. In Tasmania, the wasp was found in a pine plantation in 1952, and has since spread across the island. Then about ten years later it was discovered in Victoria.

The spread of sirex is fairly rapid. In 30 years, the wasp can travel about 1000 miles, a rate averaging over 30 miles a year. This occurs only if the wasp is not properly checked and controlled.

Sirex wood wasps (Family Siricidae) comprise a family of large insects with conspicuous colouring, being often black, yellow or metallic blue. The adult wasps are closely related to the horntails, and are sometimes mistaken for them.

The size of the wasp can vary, but usually the body length is one to one and a half inches and the wing span is about one and a half to two inches. The male is usually smaller than the female. The adult female is coloured metallic blue, with the two pairs of transparent flight wings chestnut or light brown in colour. The adult male has the same shape, same colour of wings, and same metallic blue, but five of the abdominal segments are chestnut brown.

The adult female has a sheathed ovipositor, which is exceedingly strong. When at rest the organ projects backwards in a horizontal plane and has the appearance of a powerful sting. This instrument is used for boring and drilling. A single female wasp may lay more than 400 eggs. It is a very active egg layer and borer, and may oviposite every five minutes. The female bores a small hole through the bark into the sapwood of the tree, and carefully deposits an egg. The number of eggs deposited in each hole may vary with the species, but usually it is only one. At the same time the wasp deposits spores of wood-rotting fungus, which germinate before the

wasp's eggs hatch. The fungus is carried in special sacs adjacent to the ovipositor in the female wasp. Therefore fungus spores and wasp eggs are laid together. The wood-rotting fungus absorbs moisture and softens the wood, thus enabling the young larvae to consume the wood more easily.

An egg hatches in nine to fourteen days. The larva is cylindrical in shape, yellowish-white in colour, with a large head and three pairs of reduced thoracic limbs. The last segment always terminates in a black horn spine, which aids in motion. Growing and moulting, it burrows into the heart of the tree. When the time comes for it to pupate, it burrows back towards the outer layer of the tree. About half an inch from the surface it forms a special chamber. There it spins a cocoon of silk and gnawed wood, to change into a pupa. Some time later the adult emerges through a perfectly cut circular exit hole, as a fully developed wasp ready to continue the cycle. The wasp will live only 30 to 35 days after emerging. The life cycle of the sirex wasp takes about one to two years before the young adult emerges.

Adult male and female wasps may emerge from November through to May. If the female has mated, the eggs will develop both into males and females. If it has not mated, males only will be produced.

The sirex wasp damages the soft wood in two ways. One is by the tunnels made by the larva and the flight holes by the adult wasp. This seriously reduces the value of the timber. The other is by the fungus injected during the time of ovipositing. This is primarily responsible for the death of the tree. If a tree is severely attacked by sirex, the rot stops the flow of sap and water, and the tree dies. Two to three months after the female has laid the eggs and inserted the fungus the crown of the tree becomes yellow, and then slowly all the pine turns yellow, red to brown and finally dies.

In the United Kingdom and Europe, not only pine trees are attacked and infected, by *Sirex cyaneus* and *Sirex gigas*, but also fir and spruce. A range of pines and firs are attacked by several species of sirex wasp in North America. In New Zealand other trees can also be attacked by sirex, but its principal host is pine. So far the sirex wasp has been found in Australia only in pine trees. Trees holed or badly damaged are more susceptible to sirex attack, but sometimes green trees are also attacked. Generally only softwoods are liable to attack.

The sirex wasp is known to have several parasites. One of them is a small wasp called *Ibalia leucospoides*. It was introduced to Australia from New Zealand to try and combat the wasp. It is black with white markings, and ranges from seven to fifteen millimeters in length. This endo-parasite lays an egg in the sirex wasp's egg. When the sirex larva develops the parasitic larva also develops inside the host. The parasite eats the inner anatomy of the sirex larva. In New Zea-

land it has been noted that twenty per cent of sirex larvae are killed by this little wasp.

In Victoria about 300 to 400 places of sirex infestation have been found. The main infested areas are the Dandenongs, and the Mornington peninsula. The only effective ways of dealing with the wasp are to fumigate imported timber, and burn trees which have been infested.

If the sirex wasp becomes properly established on the Australian mainland, it will be a threat to Australia's fast developing pine forest industry.

ACKNOWLEDGEMENT

Grateful acknowledgement is made to Mr A. Neboiss, Assistant Curator of Insects, for the help he gave me in preparing this work, Mr A. Burns, Curator of Insects, for his advice and to Mr C. J. Irvine for his lecture on the sirex wood wasp.

REFERENCES

Imms, A. A., 1934. *General Textbook of Entomology*, pp. 698, 708.

Irvine, C. J., 1962. Forest and Timber Insects in Victoria, 1962. *Victorias Resources 4 (2)*: 40-42.

Miller, D., 1955. *Native Insects Native in New Zealand*, p. 34.

Taking Temperatures of Flowers

Leafing through an old number of *Country Life* (May 5, 1960), I came on an article that may well be of interest to readers of the *Victorian Naturalist*. It is by N. B. Hodson and tells of experiments made with minute thermometers placed inside the corolla tubes of flowers.

It is well known that flowers attract insects to secure pollination by various devices, such as perfume and the offer of nectar and pollen. Some have special mechanisms, as in *Salvia* species and our own *Stylidium*. But recent work by Dr Budel, Director of the Munich Institute of Bee Research, has shown that in addition to these attractions there are different microclimates within the flowers themselves which may be quite important factors in pollination. For example the temperature inside the perianth of a white tulip was found to be 5°C higher than the temperature outside. As the sun dipped behind a cloud the flower closed, imprisoning a little heat; the air temperature dropped to 16°C but the inside temperature still remained higher, though only by one degree.

Colour also appears to affect the temperature of the flowers. When the air temperature was 16°C, that of a white crocuses was 21°C but that of purple crocuses was 28°C. It would be of interest to compare the difference in the percentage of seed set by these differently coloured flowers.

The snowdrop has a cup-shaped flower that hangs down, the open end of the cup towards the ground. With an air temperature of 15°C the air inside the cup-shaped perianth was 11°C higher, registering 26°C. The hanging cup obviously traps warm air that escapes from the erect cup of the tulip or crocus. "Small wonder", writes the author, "that snowdrops are a favourite resort of bees, with fragrant nectar offered in such luxurious heated premises". At night, however, cold air, rising from the ground is trapped within the flower, and when the air temperature dropped to 10°C the temperature within the flower was only 2°C, a range of 24°C within twenty-four hours.

A curious difference between north and south facing trumpets of the horizontal flowers of daffodils was another point of interest noted by Dr Budel; when the sun shone on the back of the flower the temperature inside the trumpet was only 2°C

higher than the air outside, while in those facing the sun it was 7°C higher. In Dr Budel's experiments made in the Northern hemisphere, these differences were of course on the north and south facing flowers; it would be interesting to find if similar results obtained here with the aspects reversed and if a north facing daffodil proved to be hotter than a south facing one!

Even the surface of flat flowers such as the primrose showed an increase of 5°C over the air temperature, while double flowers such as the peony showed 10°C difference.

These temperatures were recorded only for still days, for wind turbulence, both around and within the flowers, was found to effect flower temperatures as well as those of the outside air.

These notes will, I hope, suggest some interesting experiments to field naturalists and call attention to new fields of research opening up among apiarists abroad.

—M. M. CHATTAWAY.

Fields Naturalists Club of Victoria

General Meeting—December 9, 1963

Mr M. K. Houghton presided and the Herbarium hall was crowded with members and friends.

The secretary reported that profit from the 1963 nature show was approximately £150 of which one-third had been apportioned to the Society for Growing Australian Plants. Next year's show is to begin on August 31.

The subject for the evening was "The Excursion to Western Australia". Mr J. H. Willis outlined on a map the route taken by the F.N.C.V. party — by parlour coach to Perth and back to Kalgoorlie, then to Melbourne by train — a total of 3360 miles by road and 1750 by rail. The excursion had visited mallee country, heathland, sand dunes, limestone areas, granite outcrops and lakes both fresh and salt.

Mr H. A. Morrison projected colour slides taken by members, showing unique plants and their habitats. Mr Willis deplored the wholesale destruction of rare plants in some areas of rural development where there was no retention of natural strips bordering the farms.

Members in the audience were most appreciative of the absorbing description of the excursion by Mr Willis and of the splendid pictures.

Twelve new members, whose names appeared in the December *Naturalist*, were elected to membership of the club.

The president mentioned the forthcoming marriage of Mr R. McQueen, secretary of the Fauna Survey Group, and undertook to pass on to him the good wishes of the club.

Mr J. Baines proposed that the secretary of the club write to the Premier of Western Australia, asking that rare flora and fauna be preserved in developing areas. Mr J. R. Garnet seconded the motion which was supported by Mr Willis, the latter pointing out that people in Western Australia are aware of the need for conservation. The motion was carried unanimously.

Exhibits included a collection of skipper butterflies from "sword-grass" at Dromana and "sword-grass" browns from Croydon (R. Condron). Mrs J. J. Freame brought a mollusc, *Ectosinum zonale*, recovered from in a flathead, and compared it with a fresh individual found at Altona. Mr J. R. Garnet showed *Ixiodia achilleoides*, *Prostanthera lasianthos* and a kangaroo-paw, and Mrs W. Woollard showed specimens of *Goodenia elongata*.

Fauna Survey Group—November 7, 1963

The meeting was attended by eleven persons with Mr N. A. Wakefield in the chair. Mr and Mrs R. Frankenberg were welcomed back after their several months abroad.

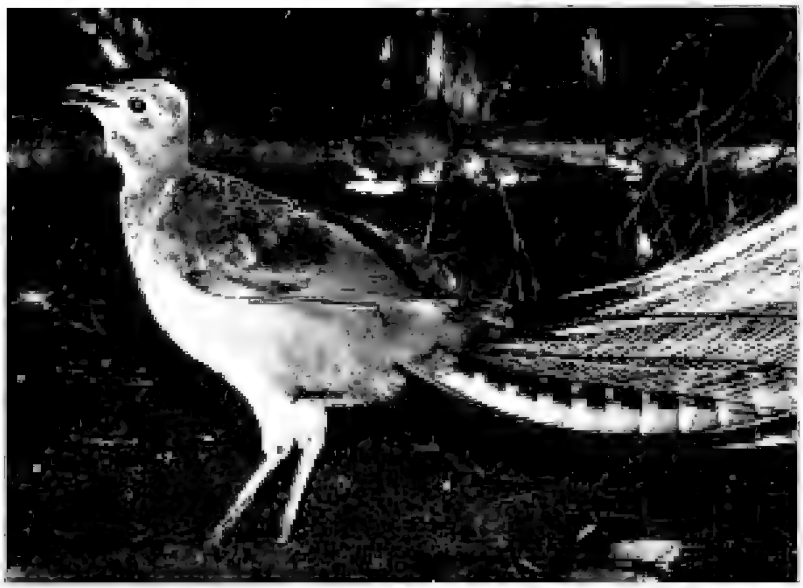
There were several reports from country members. Mr G. A. Crichton of Alexandra had sent in the remainder of a collection of owl pellet material from near the Eildon Weir. A photograph had been received from Mr E. Harrison of Warrenbayne, showing fifteen sugar-gliders and a tuan all on one tree-trunk. And further sighting of pigmy-possums were reported from near Stawell by Mr N. Bennett of the local field naturalists club.

Group members reported a number of observations. Mr W. King showed a colour transparency of a Fluffy Glider (*Petaurus australis*) from near Portland, and he gave a report on investigations in the Mount Tanglefoot area for Leadbeater's possum. Visiting members of the Ringwood F.N.C. commented on the number of echidnas observed recently in the Ringwood-Warrandyte area, and the observation of a Powerful Owl preying on a silver-grey possum at Yellingbo.

Mr. F. Baum of the Fisheries and Wildlife Department reported that a female of *Setonix brachyurus* and its family of six had been received from near Colac, that a number of potoroos had been caught in the Otways area, and that there was a concentration of short-nosed bandicoots in a remnant of natural vegetation at South Clayton.

The Victorian Naturalist

Vol. 80 (10) February 1964



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Magnificent stand of White Mountain Ash, *Eucalyptus regnans*, in the Marysville State Forest

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Vol. 80, No. 9 January 9, 1964

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

Male lyrebird, photographed in Sherbrooke Forest, central Victoria. The picture accompanied an article, "Musical Analysis of the Lyrebird's Song", by K. C. Halafoff, in the March 1959 *Victorian Naturalist* (Vol. 75, pp. 169-178). In the present issue of the *Naturalist*, the same author discusses more refined techniques of analysis of bird song.

Audiospectrographic Analysis of Lyrebird Song

By K. C. Halafoff

With introduction by Dr D. J. Borror, of the Department of Zoology and Entomology of the Ohio State University

Introduction

The previous analyses of the lyrebird song were made by the method of retarded replay of tape and disc recordings (see K. C. Halafoff's articles and notes in *Victorian Naturalist*, volumes 75, 78, 79). The present paper is a discussion of the use of a Vibralyzer in addition to the retarded replay technique.

The Vibralyzer is one of three types of audiospectrographs manufactured by the Kay Electric Company (Pine Brook, New Jersey, U.S.A.); the Sona-Graph and Missalyzer are two other similar instruments. The graphs in this paper were prepared by a Vibralyzer (Figure 1). These graphs are called by various names—vibragrams, audiospectrograms, sonagrams, etc. In this article they will be called simply "graphs". The Vibralyzer, Sona-Graph, and Missalyzer all operate in much the same way; they differ principally in the variety of graphs they can produce.

The Vibralyzer is capable of making two types of graphs: one (the type in this paper) shows time on the vertical axis and frequency on the horizontal axis, and the other (called a "section"; none of the graphs in this paper is of this type) shows frequencies on the vertical axis and intensity (for any given point in the signal being analysed, actually for a 0·005 sec. portion of the signal) on the horizontal axis.

A graph is made by feeding the signal (from a tape recording) into the instrument, where it is re-recorded on a magnetic disc. The graph is made on a sheet of paper 5¾ by 12¾ inches in size that is mounted on a drum which rotates synchronously with the magnetic disc. The marks on the paper are made electrically as the disc rotates and the stylus (a 10 mil stainless steel wire) moves upward over the paper. As the graph is made the drum rotates at the rate of 80 revolutions per minute, and the stylus moves upward at the rate of an inch for every 96 revolutions of the drum. At any given position of the marking stylus, the signal being graphed is being scanned for frequencies in a particular range; this range shifts upward as the stylus moves upward. When the frequencies being scanned for are present, a current is set up which goes to the stylus and makes (actually, it *burns*) a mark on the paper; the more intense these frequencies are, the stronger the current to the marking stylus, and the darker the mark made. The "particular range" of the frequencies detected at any given position of the marking stylus may be "wide" or "narrow"; using the wide band filter gives greater time resolution, and using the

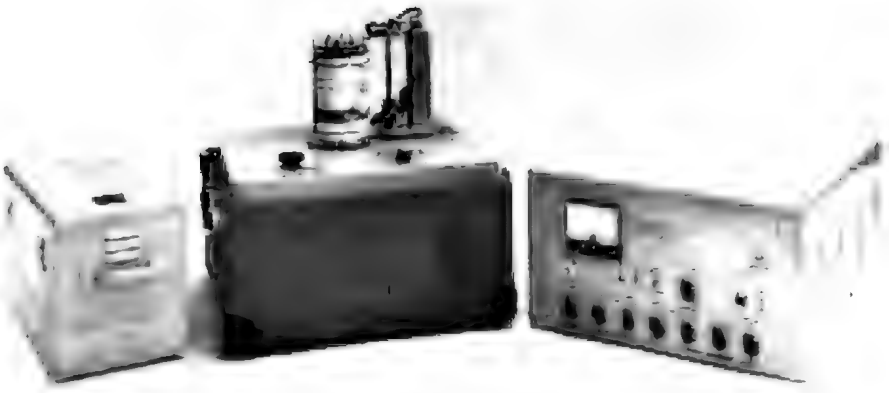

Figure 1. The Vibralyzer

narrow band filter gives greater frequency resolution.

The time and frequency scales of any given graph can be varied —by settings on the instrument (eight different ranges are possible with the Vibralyzer), or by varying the tape speed with which the signal to be analysed is fed into the instrument. Using normal tape speed, the approximate time and frequency ranges are as follows:

Frequency Range of Graph	Length of Graph
5-250 cps	20 sec.
5-500 cps	20 sec.
15-750 cps	6·6 sec.
15-1500 cps	6·6 sec.
44-2200 cps	2·25 sec.
44-4400 cps	2·25 sec.
133-6650 cps	0·75 sec.
133-13300 cps	0·75 sec.

Frequencies on the graph are portrayed over a vertical distance of about 4 inches, and the time over a horizontal distance of about $12\frac{1}{2}$ inches.

Reducing the tape speed when the recording is fed to the Vibralyzer results in a corresponding reduction in the length of the signal graphed and increase in the frequency range for each of these eight scales. The graphs used in this paper were made using the 44-4400 cps range, using either normal tape speed of $\frac{1}{2}$-speed (the latter gives a frequency range, for a little over a second of the signal, of up to about 9000 cps).

—D.J.B.

Reading of the Graphs

A note score could be written from the graph if a piano note scale is drawn on transparent plastic sheet in the same scale as that of the frequencies in the diagram and superimposed over it (leaving half-tones out for better clarity). Another scale could be used for time measurement along the graph. The dissection into bars and the calculation of the metronome ratio is better made afterwards when the melody is already written down.

This work is not as simple as it looks, as each individual note has to be analysed in order to determine whether it is a single or a complex tone. The correct reading of tonal values requires some experience; as the distances between full tones diminish towards zero frequency, the centre

FIG 2A
THE LYREBIRD'S CALL
WIDE BAND FILTER

FIG 2B
THE LYREBIRD'S CALL
NARROW BAND FILTER

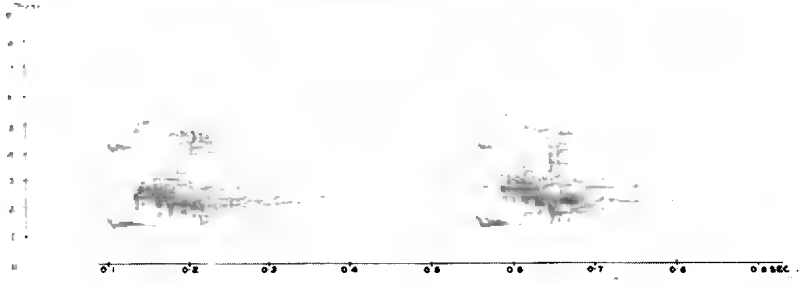

FIG 3A
LYREBIRD'S "RICOCHETTING STICK (BETWEEN TWO CALLS)
WIDE BAND FILTER

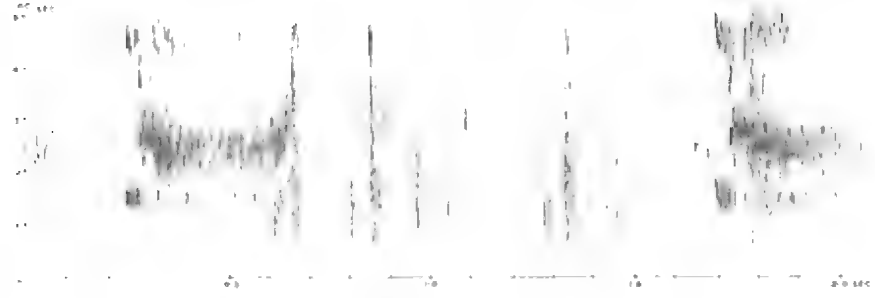

FIG 3B
LYREBIRD'S "RICOCHETTING STICK" (AFTER TWO CALLS)
NARROW BAND FILTER

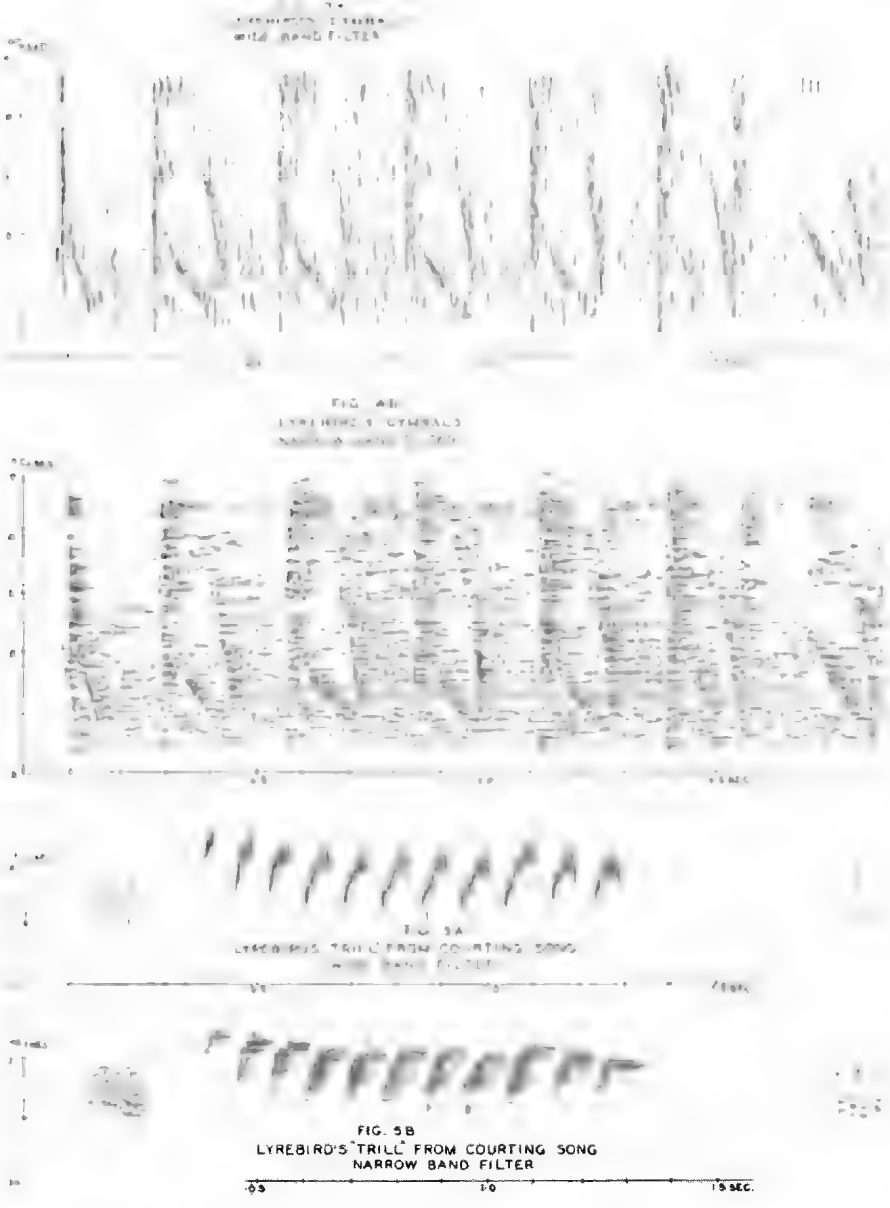

FIG. 5B
LYREBIRD'S "TRILL" FROM COURTING SONG
NARROW BAND FILTER
·05 ·10 1·5 SEC.

of the sound blot does not correspond fully with the correct value of the tone indicated by that blot. However, with some practice—and some checking of the results by the slowed-down playing of the tape (or of a disc cut from it)—a reliable note score may be computed. Such score is easier to analyse than

the graph, as it eliminates the confusing harmonics leaving only the basic notes in their correct tempo and duration, thus representing the actual melody of song.

The best way to show how a graph could be read in tonal values would be to demonstrate it on a concrete example—a lyrebird call shown on Figure 2 (wide band filter) and Figure 3 (narrow band filter).

The 7th note of this call is represented by four blots one above the other. The frequency values of these notes could be read as 2250, 4500, 6750, and 9000—close enough to C♯(2220), C♯(4440), C♯(6660) and C♯(8880). It is obvious that the first C♯ is a basic tone, and three other notes represent its 2nd, 3rd, and 4th harmonics. It is therefore a single tone, not a chord; it is also obvious from the graph that most of the energy is in the basic tone.

Another interesting aspect of this scrutiny is that this is an example of establishing the basic tone by its harmonics. The latter are easily readable in the graph, but the basic tone is much harder to read correctly as, due to its very high volume, the thickness of its blot is so considerable that its extremities occupy a whole octave, partly overlapping the preceding and following notes of the melody. But as it is known that such harmonics as C♯(4550), C♯(6660) and C♯(8880) could stem only from a basic note one octave lower than the lowest harmonic, that note cannot be anything else but C♯(2220) at the start of 8th octave.

The next example is the first note of the same call. From Figure 2 it looks like an interval of about 1400-4200. If no other version of that graph were available, one could be caught in this trap and write that sound down as a compound interval F-C. Fortunately, in Figure 3 there is between these two notes a weak third one, which is missing completely in Figure 2. The frequencies which have a better resolution in this case read as 1400, 2800 and 4200, near enough to F(1397), F(2794) and C(4196), representing thus a basic F note in 7th octave with its second and third harmonics. The fourth one was apparently too weak for the instrument or original tape to be recorded. A check by means of a retarded replay confirms fully the above conclusion as to the nature of both discussed notes, both of which sound as single tones. The note score of the illustrated calls is shown in Figure 6A.

Turning now to the item of the lyrebird song called "ricochetting stick" (an accompaniment to the dance jumps of the bird), the merits of the Vibralyzer as regards the correct timing can be fully realized. To the ear the item sounds, on retarded play, like the note score in Figure 6B.

In fact, as the graph shows, the duration of pauses is somewhat different, as it could be seen from Figure 6C—the note score computed from the graph shown in Figure 4.

The graph also provides a clear explanation why on retarded replay the first note of the item sounds as a single beat while from the second note on the beats become double. It could

be clearly seen on the graph that the second note consists of two separate noise spectra, the additional spectrum being placed higher up in the frequency range. The volume of the 2nd note is the highest on the item, confirming the auditory impression of an accent on that note.

The so-called "cymbals" item as shown in Figure 5 demonstrates the lyrebird's ability to produce several sounds simultaneously. The item begins with an extremely short staccato beat, immediately followed by two sustained notes and a simultaneously starting downward glissando; before the latter comes to an end, a second more rapid glissando starts higher up and finishes together with the first or shortly afterwards.

The complexity of the sound makes this particular graph rather hard to read. There is an indication of a C♯3329-C♯4440 interval at the start; these two notes can hardly be harmonics of the lower octave C♯2239-C♯1110 as the latter are both gliding down while the notes C♯3329-C♯4440 do not change their pitch. The question whether that gliding-down octave is a basic tone plus its 2nd harmonic is hard to answer. There are no traces of a third and fourth gliding-down harmonic in the graphs of that item—even in those made with a boosted volume. In the auditory test by retarded replay that glissando sounds like a single gliding tone—but the ear could not discern a unison as readily as an interval or a chord. The question therefore cannot be answered with certainty, and consequently in the note score (Figure 6D) the notes whose existence is questionable are shown in parenthesis.

The example of the lyrebird call shows that one should be very careful in this kind of harmonic analysis, as a single missing harmonic may cause a single tone to appear as a chord. On the other hand, the fact that the notes in the discussed combinations are harmonically related is not yet a proof that the combination like $F_{(1397)} + F_{(2794)} + C_{(4440)}$ is not a chord, composed of three very pure tones, with harmonics of each component note so weak that they might have passed unrecorded. The "trill" of the courting song (Figure 5) shows a case of such pure tones; on the other hand the lyrebird can, as was shown in the "cymbals" item, produce several sounds simultaneously.

One cannot be safely guided by the relative volume of the component sounds. Though in the call the basic tone has a greater volume than its harmonics, the reverse may easily be the case as, for example, the suspected strong 2nd harmonic in "cymbals". As the lyrebird's song shows a great variety of timbres even in the bird's original item, considerable variations in the volume ratio of harmonics and basic tones could be expected.

The best way to check the nature of sounds indicated by the graph would be to compare it by listening to the actual sound while the graph is being made. The Vibralyzer provides such a facility, so that one may make notes while listening to the playback and watching the stylus

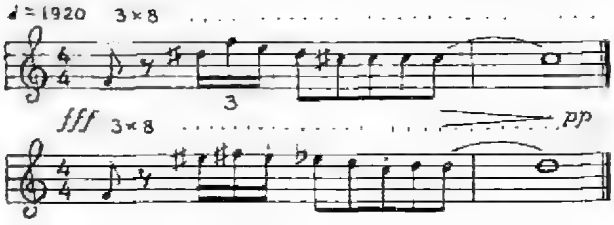

Figure 6A
The Lyrebird's Call.

Figure 6B
"Ricochetting Stick" item, from retarded replay.

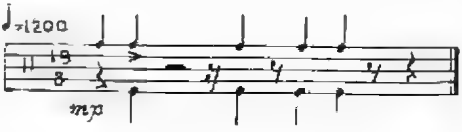

Figure 6C
"Ricochetting Stick" item, from Vibralyzer graph.

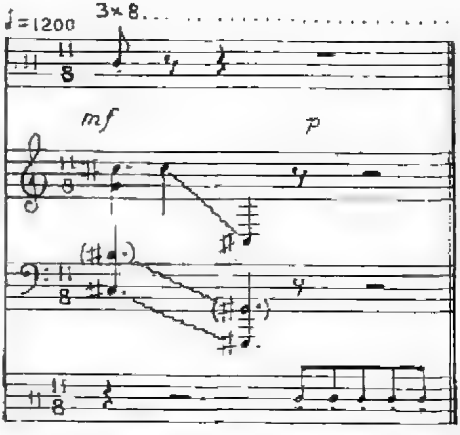

Figure 6D
"Cymbals" item.

moving over the graph. Failing this, the tape could be played back later, with the graph at hand; in case of very rapid passages, it could be copied at a suitable slower speed before replay. This check is very reliable as the human ear possesses an ability of establishing the basic tone from its harmonics—even in cases where the basic tone is extremely weak or even totally absent.

In any case a single graph could rarely be expected to contain all the sounds recorded on the original tape, because of limited volume range of the Vibralyzer. For example, a graph

of a couple of calls, with the "ricochetting stick" item between them, failed to record that "stick" item at all, though the volume of calls was already on the verge of distortion in the diagram.* It appears therefore desirable to make at least two graphs—one recording the loudest notes at a greatly reduced volume to avoid this distortion on the diagram, and another taken with the volume boosted up to bring out the weakest notes.

In case of very rapid fluctuating sounds the minute details of tempo can be better shown and measured if the graph is made at the maximum time scale. What this means, in terms of the actual making of a graph, is to feed the sound to the instrument with the magnetic disc rotating at its maximum speed, and the tape speed reduced.

Theoretically it would appear possible to "flatten" the volume range in the same way as it is done in the gramophone recording studios. The original tape could be re-recorded via such an equalization circuit and then fed into the machine; the resulting graph would, at proper volume setting, reproduce the loudest notes without distortion while retaining the faintest pianissimo notes. Admittedly this would upset the ratio of density in the graph between maximum and minimum loudness of sound, but as that density is only an indication of the volume and does not serve for any measurement of it, such change of the ratio of loudness would not matter much—provided that this ratio remains proportional to the original along the whole frequency range.

But it must be admitted that even with its present limitations the Vibralyzer means a big step forward in the recording of bird song. Not only has it made it possible to establish the exact metric structure of the song and to record its harmonic content, but it also helped to disclose the existence and content of those extremely rapid notes of a duration of only 1/260"-1/250", which it was impossible to discern by using the retarded replay method. Last but not least, it made it possible for the first time to record the spectrum of the percussive sounds and noises. Thus, writing down bird song as the bird sings it—not the fragmentary melody which our sluggish ears interpret—has become a real possibility.

It may sound paradoxical, but it was indeed very fortunate that a full realization of the musical value of bird song and the subsequent attempt to analyse its musical properties have come so late—on the heels of magnetic tape and electronic devices which only recently have made it possible to record authentic bird song with all its minute details —tremolos, rapid glissandos, trills and other adornments in which it abounds. Had that analytic work started earlier, on the basis of field notes, all of it would have had to be scrapped now.

Some Practical Hints

It goes without saying, that in collecting recordings in the field,

*Graph 3A showing both items was obtained by reducing the volume of calls and boosting it for the "stick" item during the operation of the machine.

every care should be taken to ensure that the tonal values are correct. It cannot be recommended too strongly that the speeds of the tape recorder used in field work should be frequently checked, as even a slight discrepancy in speed would mean a recording of the song in the wrong tonality. The same applies to the speed of the turntable used for retarded replay.

The simplest way to ensure the correct results is to record at the beginning of each track of the tape the sound of a tuning fork, indicating at the same time by words what the fork's tone is. If such a note appears on the graph in the wrong frequency, the whole frequency scale of the graph should be moved up or down by the amount of this discrepancy, which will automatically transpose the whole song into the correct tonality.

The best graphs are obtained from song recorded at a moderate volume; any "boosting" of the volume when recording may result in a tonally unreadable graph. Particularly loud items may require a substantial reduction of the volume in order to cut off the reverberation effects as much as possible. These effects are clearly noticeable in the calls of Graph 3A.

One more word about the notation. As things stand at present, special notations like A. Saunders' linear notation have not proved satisfactory, nor have the attempts to supplement such notations with human syllables and even with whole words and phrases. For it has been proved recently that the sound spectrum of human syllables is entirely different from that of birds' utterances (Thorpe, *Bird Song*). The conventional musical notation is usually frowned upon, but it represents a sound basis which could be amended and adopted for the purpose. It has been recently extended to cover quarter-tone music, but it could be extended twice as much by using such symbols as fractions of sharp and "flat" signs. With its present minimum unit of 1/64 of a note, its duration can be reduced as much as desired by using high metronome ratios. The noise spectra as well as musical notes can be recorded then in such amended notation with a precision exceeding that of reading the sonograph. Last, but not least, such notation does not need an interpretation as graphs certainly do, and a note score so computed can be read straight from the sheet and can serve as a basis for studying the melodic line, harmonics and composition of a bird song. This work has hardly started, mainly due to lack of recorded material for analysis; but the few attempts already made show that such analysis holds promise of most interesting discoveries.

ACKNOWLEDGEMENT

The author is much indebted to Professor D. J. Borror, Department of Zoology and Entomology, Ohio State University, Columbus, Ohio, U.S.A., not only for providing this article with an introductory paragraph and for preparing the graphs from the author's tapes, but also for numerous important comments regarding characteristics of the resulting diagrams and, last but not least, for establishing the lyrebird's voice range.

Lyrebird-Fowl Hybrids

Dear Sir,

When recently leafing through A. P. Gray's *Bird Hybrids* (Commonwealth Agricultural Bureaux, England, 1958) I came upon one listed cross which immediately attracted my attention. It was the mention of "presumed" hybrids from a cross of a lyrebird (*Menura novaehollandiae*) with a domestic fowl (*Gallus domesticus*), and it was so provocative that I promptly investigated the listed references. The following is a summary of the information which I gathered, with some suggestions, offered in the hope that some Australian reader will be sufficiently stimulated to investigate further. The importance of confirming this very unusual hybrid hardly needs to be mentioned, and the necessary searching of newspapers can only be carried out on the spot.

Among the most interesting and fruitful references given by Gray were the series of letters and articles between Major H. M. Whittell and former editor, A. H. Chisholm, in the *Victorian Naturalist* from 1946 to 1951. This series was due to Whittell's reading a letter by A. W. Milligan in the *Avicultural Magazine*, and three instances of reported hybrids in addition to the Milligan one were brought to light in the *Victorian Naturalist*. Two of them, the Pennycook claim (*Vict. Nat.*, 63: 47) and the R. Davis case (*Vict. Nat.*, 64: 2), are interesting, but investigation was not pressed at the time nor were they brought to first-hand expert attention; and so they are probably unverifiable. The third consists of a single sentence (*Emu*, 8: 165; *Vict. Nat.*, 67: 188) concerning the exhibition of an apparent hybrid skin at the 8th session (1909) of the R.A.O.U., by C. W. Maclean, the official delegate from Victoria. Incredibly enough the *Emu* and the R.A.O.U. leave the matter hang unsolved and even undiscussed. Surely Maclean must have written something about the skin, somewhere!

The principal recorded instance of hybridization deals with the work of A. W. Milligan in the 1890s. I can find only three primary articles dealing with his work: J. G. O'Donoghue's account (*Vict. Nat.*, 31: 15-16), Milligan's very cursory letter to Seth-Smith in 1904 (*Avicult. Mag.*, New Series, 3: 46) and most important, O. Finsch's translation of a letter of Milligan's to the Melbourne *Argus* (*Ornithologischer Verein*, Vienna, 16: 81-82).

Three of the references mentioned in Gray, namely Page, Hopkinson, and Peterle, simply list (very sceptically) the possible hybrid using either Finsch or Milligan's 1904 letter as a basis. Whittell and Chisholm in their 1946-1951 correspondence were unaware of the 1892 letter translated by Finsch. In this earliest letter Milligan says that two hybrids, one of each sex,

were *caught* ("wurden . . . gefangen") by him and he goes on to describe them, indicates that he plans to experiment with the hybrids, and asserts that he had seen no previous report of such a cross. In his 1904 letter Milligan just casually mentions that he had hybrids and that he exhibited them. O'Donoghue says that Milligan possessed and experimented with lyrebird-fowl hybrids, describes them briefly, and states that they were exhibited at a Melbourne dog and poultry show, where, ironically, they won a special prize.

To summarize, then, we see that Milligan first got his hybrids around 1892, he exhibited them at something called the Victoria Poultry Show in Melbourne around 1896 (according to O'Donoghue—perhaps it was a little earlier), and he experimented with them, having raised two generations before he moved west. This summary is obviously unsatisfactory. Milligan valued the birds and worked with them; why then, is there such a dearth of material? Surely there exists somewhere more detailed records of his work and it remains only to find them. Profitable points of attack on this problem would seem to be further mention of Maclean's skin of 1909, the aforementioned Melbourne poultry show of around 1896, and any writing by Milligan from 1892 to the time when he moved; the back issues of the Melbourne *Argus* should be particularly useful.

The distance between the two species involved in the cross, two different orders, is the greatest ever reported, and as such the cross is of the utmost interest and importance. (I must admit that confirmation of this hybrid would fall in nicely with a hypothesis which I am working on.) The extreme improbability of this hybrid is perhaps not as great as some ornithologists might think. Crosses between families within the Galliformes and Passeriformes (the same orders as involved in the cross in question) are common, and at least one cross between superfamilies is listed in Gray *without* an "alleged" or "presumed" qualification (*Ortalis guttata*, Cracoidea, and our old friend *Gallus domesticus*, Phasianoidea). Milligan and Maclean, both expert observers, and the judges of the poultry show, presumably possessing some knowledge in the field, all recognized that they had something really strange and new. To ridicule the claim after a very perfunctory glance seems to be neither scientific nor fair; action of this sort implies that Milligan was another Paul Kammerer.

There has been a desire to know more about reported lyrebird-domestic fowl hybrids for 60 years or more, and yet confirmation of these reports has been completely lacking because nobody could locate the pertinent documentary material, and the most authentic instance of hybridity, Milligan's birds and his experimenting, has remained almost completely unknown. Surely it is time to dispense with this hybrid enigma. To repeat Major Whittell's appeal, will some Victorian naturalist please investigate?

Useful references (not including those simply listing the hybrid):

Victorian Naturalist, 31: 15-16
" " 63: 47
" " 64: 2
" " 64: 179
" " 66: 198
" " 67: 188
" " 70: 104-105
The Emu, 8: 165
Avicultural Magazine, New Series, 3: 46
Mittheilung ornithologischer Verein, Wien, 16: 81-82

Yours expectantly,

KEITH P. HERTZOG

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U.S.A.

Vale R. M. Wishart

Dr Robert Milne Wishart, F.R.A.C.S., M.B.B.S., F.R.M.S., was a man noted for his deeds. Everything he did, whether in the medical field or the many other interests he maintained, was done meticulously but with that ever present touch of humanitarianism which endeared him to all with whom he came into contact.

Born and educated in New Zealand, he served with distinction as a Medical Officer in the First World War.

After settling in Australia he became a general practitioner with a very large practice in Hawthorn. For over twenty years he held the post of Honorary Surgeon at Prince Henry's Hospital, and later he was a part-time surgeon with the Repatriation Department. His reputation was high in medical circles as it was with his patients. Indeed the mere mention of the "Dr Bob" was sufficient to establish the identity of a loved and respected man.

Leading such an active life, however, was still not enough for a man of his calibre.

At the time of his death, Dr Wishart was an active member of the Microscopical Society of Victoria, with more years of continuous membership than any other presently active member. He was well known as an expert on diatoms, particularly those from the noted New Zealand deposits. His slide-mounting technique, both with diatoms and insects, was the envy of many a fellow member. It was fitting that the Royal Microscopical Society should elect him a Fellow, an honour which has been bestowed on a comparatively small number of Australians.

Dr Wishart was perhaps best known for his work in anthropology, possibly his greatest interest, and he was never happier than when fossicking around the sand dunes and middens, searching for aborigine artefacts. His collection in this field of science was written up in newspapers, shown on television, and was undoubtedly the best of its kind in Australia.

Apart from his loss to medicine and natural history, however, Dr Bob is mourned as a departed friend, for such he was to all who met him. He is survived by a wife and daughter, to whom our deepest sympathy is extended.

—E. LEMAISTRE

Contributions Needed

Natural history articles and short nature notes are urgently required, if the *Victorian Naturalist* is to continue production.

Typed manuscripts are preferred, with double spacing and ample margins. The *Naturalist* format should be observed in writing dates, references, etc.

A service is available for typing handwritten manuscripts. In these, technical terms and scientific names should be carefully written in script print.

—EDITOR

These columns are available each month for your nature notes and queries. Address your correspondence to the Editor, "Victorian Naturalist", P.O. Box 21, Noble Park, Victoria.

Cushion Scales and Mealy Bugs

Many insects of the family Coccidae (Order Homoptera) excrete a covering of mealy white material or even a dense mass of felted white filaments. Examples of species in each of these categories have been received recently.

Mr C. Bowden, president of the Bairnsdale F.N. Club, sent along a tea-tree twig on which there were several specimens, and he made these observations:

> I was arrested in my drive from Stratford to Bairnsdale by a tea-tree (*Leptospermum juniperinum*, I am almost certain) covered with what appeared to be white flowers. On reversing the car to the bush I noted that the "flowers" were balls of material like white cotton towelling with loose fibres moving in the breeze. I think it was the work of a scale insect of some kind because under each ball is a juicy spot and the whole plant was almost dead—evidently robbed of its sap by the parasite.

The insect in this case is probably a species of *Pulvinaria* (possibly *P. tecta*), which attacks various kinds of tea-tree. On December 20 last, I noted that the White Kunzea (*K. ambigua*) at Genoa Falls in far-eastern Gippsland, was infested with the same species. In the Mitchell River district, the Burgan (*Leptospermum ericoides*) has become a serious pest, taking complete possession of otherwise valuable grazing land. It had been thought that this particular coccid may provide a biological control for the shrub.

Four pupils of the Canterbury Girls' High School found about thirty insects clustered on a stem of Black Wattle. Following is part of their description of the species:

> . . .a small insect, 0·4" long and 0·2" wide, with a white mealy covering on its lower back. Towards its

head and on the greater part of its back is a greenish-black patch with orange spots on it; this part is rather crinkly. When the mealy bug was turned over, small black legs could be seen. Under the front part is an apricot coloured part which seems to be laid out in stripes. The rest of the underside is white and fluffy, and is covered with tiny orange dots. Under the microscope, one very small orange creature appeared to move on tiny legs.

These "mealy-bugs" appear to be identical with, or very similar to, the "Fluted or Cottony Cushion Scale" (*Icerya purchasi*), described and figured by W. W. Froggatt in *Australian Insects* (pages 375 and 385). It was a pest on citrus trees in California and was found later in New Zealand. Froggatt notes that it is found on several species of wattles near Sydney, as well as on roses. His comment that "it is very much affected by different species of parasites" may explain the tiny orange creature which was seen under the microscope.

More Ant Swarms

Following the note in these columns in December last (*Vict. Nat.*, 80: 240-1) on swarms of ants, presumably of the genus *Dolichoderus*, comments have come from readers in other parts of Victoria.

In a letter dated December 14, 1963, Mr G. A. Crichton of Alexandra writes:

This characteristic is not peculiar to the Mount Taylor ants, as I located a number of such swarms "airing their young" in the bush in this district during late spring this year.

They are a fairly sturdy ant, more greyish than the "jumper" and with the light greyish triangle on the abdomen, giving them a mottled appearance in the mass.

The ones I saw formed a solid mass, about 4-5 inches across, almost immobile until disturbed. Then the white pupae would become visible as they scurried to remove them underground.

It always seemed they were airing the pupae whilst at the same time shielding them from direct light or from the sight of predatory birds, as their extreme whiteness would make them easily visible.

These ants were not aggressive and endeavoured to disappear instead of attack.

I have occasionally found them in grub holes on splitting wood, and during the winter months they are quite lethargic, in a state of hibernation, with their legs curled up—as much as an ant can curl up.

Although I have closed up the wood on disturbing them and placed it in a safe place about the garden I have never found any evidence of colonization, so it appears they are fairly local in their requirements.

A second comment was made by Mr B. J. Thompson, in a letter written on December 16, 1963:

Last Sunday week, December 8, 1963, whilst walking in the Power's Lookout area, near Whitfield, Mr Robert Fennell and I discovered an ant swarm very similar to that mentioned by Miss C. Barfield of Bairnsdale in the December issue of the *Victorian Naturalist*.

The swarm, which covered an area about the size of a dinner plate, was in an exposed place beside a granite outcrop.

The ants themselves were half an inch long, dark coloured with an olive-grey triangular mark on the top of the last body segment. As was stated in the previous article, the ants kept in a dense cluster, and seemed to be protecting eggs which were underneath. Even when disturbed, the ants did not spread out.

The weather conditions at the time were humid and windy.

May I suggest that if a few more observations were made of these ant swarms, together with the local conditions in each case, it might help solve the problem of why these ants are swarming in the open.

Seal Marking Experiment at Macquarie Island

By S. E. Csordas*

Present day studies of animals in the wild involve marking them for individual identification. Among mammals, seals are relatively easy to study, at least while on land, because they are large, easily seen, active by day and often unafraid of man. During the last 40 years several types of mark have been used on different seals. Which one is preferred on any species depends on its accessibility and approachability on land, whether it is commercially killed or not, and the type of observation to be made.

Since 1949 the Australian National Antarctic Research Expeditions have studied the seals of Macquarie Island. These are not killed commercially, but are left undisturbed and watched from a distance, so large and conspicuous marks are needed. The main work is on the very numerous Elephant Seal, the pups of which have been branded individually since 1951. In this long-lived species no branded male has yet reached full maturity, so temporary marks are necessary for short-term study of adult males and also to supplement the supply of branded females and younger seals. Temporary marks are also used on individuals of the rarer seals, notably the Leopard Seal.

Whatever material is used for temporary marks must be visible from a distance and distinguishable from natural marks, must be resistant to light and sea water and must not be scratched off (Elephant Seals have flexible fore-flippers with strong nails and can scratch any part of their bodies). It should be quick drying and easy to apply and should penetrate the seal's coarse and oily hair to stain both hair and skin.

In 1957 and 1959 I used Vaxoline dye (I.C.I.A.N.Z.). The dyes were used in alcoholic solution, in no definite concentration but fairly dark in colour (red, violet, green and yellow). I carried the ready-made solution in screw-top plastic bottles with a small opening, so they could be sprayed on to a sleeping seal approached from behind.

In 1957 I used simple symbols to identify individuals, for example *, —, =, ×, + and ‡. If these were to be well defined, only a limited amount of dye could be used; then it did not penetrate deeply and soon faded. The symbol that lasted longest was a large red patch (for 34 days), but some of the others lasted only a few days.

In 1959, on Elephant Seals, I applied large patches of dye in one or more of six places: left or right shoulder in front of the fore-flipper, left or right mid-back, left or right near the tail. They were numbered one to three from head to tail, so a simple code indicated any individual by the colour and location of its mark. These marks lasted up to

* Medical Officer with Australian National Antarctic Research Expedition at Macquarie Island 1956, 1957 and 1959.

about six weeks (41 days). Red and violet were the only colours used on Elephant Seals. Green and yellow did not show up well against their brownish coats and could be confused with natural stains made by faeces or rotted kelp, picked up when these seals lie on their backs as they often do.

Leopard Seals, which are much smaller and thinner than Elephant Seals, were marked with irregular patches on the back, side, flippers and head in various combinations. All four colours were used, for green and yellow showed well on the Leopard's light grey coats, and they seldom pick up stains by lying on their backs.

On Elephant Seals the dye marks were most useful in the breeding season (September-October), when about 5000 cows and 500 bulls were ashore on the 6½ miles of beach most intensively studied. Each breeding cow was ashore continuously for 3-4 weeks, bulls were ashore up to ten weeks at a stretch.

Marked Elephant Seal cow.

The cows gather into groups, called harems, of from 20 to over 1000, to bear and nurse their pups. Dye marking helped me to follow a cow's movement, between coming ashore and joining a harem. Some join the nearest harem at once but others travel considerable distances for such clumsy movers on land. For instance, one dyed female moved a mile in four days along a sandy beached and passed two harems before joining a third. Another took four days to travel about 300 yards through rough tussock grass, from the beach where she landed to a more popular one with a large harem.

The breeding bulls were more important subjects for dye marking than the cows, as all but one of them were unbranded. (The exception had been branded on Campbell Island in 1945.) As soon as the cows begin to form harems, the largest bulls move to get possession of them, and there is considerable fighting. A bull in charge of a harem is called a "beachmaster"; one without a harem but able to fight for one is a "challenger", and a bull which takes over part of a large harem which has grown to over 100 cows is an "assistant beachmaster". Since the dye marks did not last the whole ten-weeks season, and since I could not approach bulls in harem close enough to renew faded marks, observations were con-

tinued for only six weeks, by which time nearly all the cows had come ashore and the bulls seemed to be settling down.

In some cases a bull obtained a harem as soon as it formed and kept it throughout, but it was more usual for a harem to change beachmaster several times. In 1959 one harem changed bulls 14 times in 22 days, but this was exceptional. A bull driven out of a harem by a rival might return and fight again, or might take over another harem, became an "assistant beachmaster" in a large harem or end the season without any cows at all. The fate of 30 bulls, dye-marked in 1959, gives some idea of possibilities:

5 obtained harems early, and retained them throughout.
1 obtained a harem that formed later, and kept it.
4 changed harems twice, but were always beachmasters.
2 lost their first harems and became assistant beachmasters in other harems.
2 were never beachmasters, but became assistants.
6 obtained harems after several changes and fights.
10 held harems for a few days but ended the season without them.

Leopard Seals do not breed at Macquarie Island, but every winter a number of young seals visit the island, coming north from the pack-ice. They lie resting here and there on the beaches, never close to one another, and are rather shy. They must be marked quickly when asleep.

The purpose of the marking was to get some idea of the number of Leopard Seals visiting the island in any year, and how long each one stayed. From July to November 1957 we made 92 records of Leopard Seals. Eleven were marked, and of these one was seen 12 times between July 29 and September 21. One was seen twice after it was marked, three were seen once after marking, and the other six were not seen again.

By contrast, during the same months in 1959, we made 387 records, including 209 of 64 marked seals. Twenty of them were not seen after being marked, 13 were seen twice more, and 6 three times more. The rest were seen four or more times after being marked, one being seen a total of 21 times over six weeks from July 19 to August 30. By proportion, we can conclude that there were at least 90 Leopard Seals in the waters round Macquarie Island that year.

These results show that alcohol-soluble dyes are suitable for marking seals while they are continuously ashore or coming ashore frequently, and that the marks will last for six weeks, occasionally longer. The main difficulty has been in the method of applying the dye. I used the plastic bottle method in 1957 and 1959 because these containers were readily available, but I did not find it entirely satisfactory. The constant high wind at Macquarie Island blew much of the dye away from the seal, so it was necessary to stand very close and risk wasting a good deal. Marking a seal at the neck was difficult, as the seal might turn away or, if it were a bull,

it might rear up to attack. In the height of the breeding season it was impossible to approach bull seals closely enough to renew the marks. A container like a spray gun, with a 3-foot hose attached, would be much more efficient and would allow nearly every bull to be marked.

ACKNOWLEDGEMENT

My thanks are due to Miss S. E. Ingham, C.S.I.R.O. Division of Wildlife Research, for correcting my manuscript and for valuable advice.

Australian Wattles—No. 39

The Mulgas

Acacia aneura, A. brachybotrya, A. argophylla

By JEAN GALBRAITH

The true Mulga (*A. aneura*), typical of inland Australia and a life-saving stock feed during drought, is very rare indeed in Victoria, but it grows near the Murray River. It is a small tree with silvery, drooping, narrow phyllodes, needle-like or narrowly flattened, up to nearly three inches long. The pale yellow catkins are up to an inch long. It has broad pods, noticeably veined. It is not very closely related to Grey Mulga or Silver Mulga, both of which have much broader phyllodes and the flowers in globular heads.

Grey Mulga, *Acacia brachybotrya*.
Photo: N. A. Wakefield

Grey Mulga (*A. brachybotrya*) has blunt-ended grey-green phyllodes, varying from under half an inch to over an inch long. When the stiff little bushes grow in the driest parts of the Mallee the phyllodes are oval, slightly oblique, small and crowded, with short-stalked globular flower heads amongst them. Under better conditions the phyllodes may be over an inch long, broader toward the ends and widely spaced.

Silver Mulga (*A. argophylla*) grows in Victoria only in the Murtoa district. It is similar to Grey Mulga but the silky phyllodes are silver rather than bluish and are golden-hairy when young.

All three mulgas are inland species, growing in Victoria only in the north-west.

F.N.C.V. Microscope—Progress Report

The year 1963 saw the birth of the "Micro Project", the object of which was to make a suitable microscope available to members of the F.N.C.V. at the lowest possible cost.

The first prototype was made late in 1962, but it was March 1963 when the first optical parts were purchased for the finished microscope. A dozen boxes were made up and demonstrated to members of the club to show how the F.N.C.V.-designed microscope could be used in many ways to help in the study of natural history objects. The response was enthusiastic and many members placed orders for microscopes, but instead of people building up instruments from parts supplied, as was the original intention, most were pleased with the finished job and ordered complete cases.

A further batch of 24 was put under way. Much of the work involved was done by members to lessen cost and many hold-ups for parts were inevitable.

The September 1963 *Naturalist* contained an article about the microscope, and it made its public debut the same month at the nature show in Melbourne Town Hall. Much interest was aroused and many orders were taken on a delivery-when-possible basis.

By the end of 1963 just over 100 units have been made and delivered. This included 74 fully complete microscopes, a very gratifying result to those enthusiasts who produced the F.N.C.V. microscope.

The year 1964 finds us right out of stock, but a further 36 units will be made up as soon as parts are available. Members will be interested to know that the F.N.C.V. microscope has gone to many Victorian country members and also to Queensland, New South Wales and Tasmania.

Improvements and accessories will be made available to members as they come along; the 6-volt lamp is now made without the soldered lead on lamp and a change-over service will be arranged later. Mr W. Woollard has designed a simple lens to attach to the lamp to intensify the light for use with higher power for top lighting; details of this will be given when it is available.

Higher power objectives and eye pieces will be available this year.

The situation now is that we have over 100 members with F.N.C.V. microscopes, while others have ordinary microscopes, and it is desirable that the *Naturalist* should be the medium to help members obtain the maximum interest and pleasure from their instruments.

All members with microscopes are invited to attend any meeting of the Microscopical Group of the F.N.C.V. and to bring their microscopes with them. Group members will be pleased to help with information and practical assistance. The group meets at

the National Herbarium on the third Wednesday in each month, at 8 p.m.

Most members have acquired polaroid discs with their microscopes. It has been suggested that next month we have an article "How to make a rock section", and also that we make available to members a small parcel containing sufficient grinding and polishing powders, cement, slides, and cover glasses to make half a dozen rock sections. This would be supplied at cost plus postage. Would you be interested? If so, write or phone to enable the demand for sample parcels to be estimated.

—D. E. McINNES

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Food of the Aborigines*

In all societies daily labour is divided into "men's work" and "women's work". In primitive societies, of which the Australian aborigine's is the classical example, food acquisition was one of the most important of these daily labours, and was also partitioned amongst the sexes, each contributing to a larger or lesser degree to the general larder.

The men were the hunters, and were expected to bring back a good supply of meat, be it kangaroo, possum or emu. The women were food gatherers, and brought back edible roots, yams, fruit, and such delicacies as grubs, ants, mice and snakes.

In actual practice, since hunting was not always successful, the women provided to a greater extent than the men, and, therefore, quantitatively at least, roots were the "staff of life", as a state of semi-starvation could ensue if meat was solely relied upon. The pronounced occlusal attrition of the teeth on all skulls dating from pre- and early European contacts, when the food habits of the aborigines changed, are indicative of fibrous root chewing, while the immense number of "mill stones" which have survived indicate that crushing seeds for flour was common.

However, Professor Cleland, a noted authority on the subject, is quite correct in querying my statement, as insects also figured greatly in the Victorian native's diet. Witchetty grubs, lerp (manna), Bugong moths, termite and ant pupae, all of which are in women's work category, would help to balance the diet when flesh was not obtainable; but it must be remembered that these foods were seasonal. It is also true that lizards and snakes were plentiful on the plains, but again only in their proper season.

Australian aborigines were immoderately fond of flesh, and have been described as capable of "putting away" huge quantities of it at the one sitting. In other words, they would gorge themselves at one time and go without any the next. Only vegetable roots were available at all times, and this is why I called them staple food.

It must be remembered that many people live almost entirely on farinaceous food: sago in New Guinea, tapioca in Central America, maize porridge, potatoes and spaghetti in Europe and rice in Asia. This occurs not only when other foods fail, but also by choice in times of plenty.

One curious fact which I am not aware of ever having been mentioned, is that apparently our aborigines can subsist without salt. In all continents salt, or the need for salt, has been the cause of wars, immigrations, and all kinds of inventions. It is still an important article of barter in Asia, Africa, and Oceania, while in many European countries it is a state monopoly. It can be said that salt has influenced the course of history. Yet no one has ever, to my knowledge, recorded that the aborigines used it. Did the tuberous roots of some of the plants provide a substitute?

—A. MASSOLA

* In answer to a letter by J. B. Cleland (*Vict. Nat.*, *80*: 273—January 1964).

Fields Naturalists Club of Victoria

General Meeting—January 13, 1964

The president, Mr M. K. Houghton, was in the chair and about ninety members were present. Miss E. Wannon from the South Australian Naturalist Society was welcomed.

The secretary announced that he had sent a telegram of congratulation to Miss Winifred Waddell on her being honoured with the M.B.E., and he read her letter of acknowledgment.

The evening was "Members' Night". Mr R. Riorden showed close-ups of nature photography, illustrated with superb colour pictures of *Correa reflexa*, a species of Prasophyllum with details of pollinia being removed, and details of aphides. He explained the techniques used in obtaining these.

Mr E. Swarbreck showed pictures of Bushy Yate (*Eucalyptus lehmannii*), extending along a road on Phillip Island for three-quarters of a mile and making a perfect wind-break about 20 feet high. Details of buds, flowers and fruits were shown.

Mr J. Strong showed fine colour pictures of the male and female common brown butterfly, pointing out the differences. Miss J. Woollard illustrated a visit to the Glasshouse Mountains, describing their origin and features. Coloured sands and polished stones and a remarkable banksia were illustrated.

Miss J. Blackburn showed pictures of the flora of the Crosscut Saw and adjacent areas, taken at the end of February. They included white everlastings at Mount Cobbler, golden everlastings and gentians at Mount Howitt, and crowea on the rocky Crosscut Saw. She described forestry roads up to Mount Howitt and near to Crosscut Saw, and the activities of the Mansfield Milling Company looking for a way to the timber of Wonnangatta.

Miss P. Carolan showed pictures of milling destruction in the same area with "woolly-butt" logging trucks on Mount Stirling. After cutting, burning out is practised to get natural regeneration, but the value of this is questionable. *Eucalyptus dalrympleana* is not milled. Pictures showed the destruction of the streams in some Howqua River areas by logging into trucks in the streams. One picture, in the head waters of the Delatite River, showed a mass of small logs, under eighteen inches in diameter, left cluttering up the stream.

Mr A. J. Morrison showed fine pictures illustrating the life history of the Wanderer Butterfly.

Mr A. Parkin showed pictures of gum-trees. These included Gimlet Gum (*Eucalyptus salubris*) from the Western Australian goldfields, a "scribbly gum" (*E. rossii*) from granitic ridges near Cooma, Broad-leaf Sallee (*E. camphora*), and the Long-leaf Box (*E. goniocalyx*).

Mr F. Pinchen showed pictures of a nocturnal blind snake about a foot long, and the tracks left by it in sand. It lives in termite or ant nests or decayed tree stumps. It can distinguish only between darkness and light. He also showed the brown egg of a Golden Bronze Cuckoo in a Yellow-tailed Thornbill's nest.

Mr M. Houghton showed colour pictures of Australian native plants in the Royal Botanic Gardens, Maranoa Gardens and Cheltenham Park.

Mrs E. Hanks explained the features and habits of the Striated Pardalote and illustrated the bird with beautiful colour slides.

Mr A. E. G. Webb showed a green phasmid and a remarkable red fungus from Licola. The latter was recognized by Mr J. R. Garnet as *Aseroë rubra*.

Mr E. S. Hanks was thanked for organizing the "Members' Night". Mr F. Curtis generously worked the projector as usual.

The president invited Miss Blackburn and Miss Carolan to furnish a report to the F.N.C.V. council on their observations of milling operations around the Howqua and Delatite sources.

Exhibits included a sea tulip (*Pyura* sp.) and stalked barnacles attached to a scallop shell, collected at the mouth of the creek at the northern end of Five Mile Beach at Wilson's Promontory (J. R. Garnet), a butterfly (*Ogyris olane*) bred from a mistletoe feeding larva found at Tynong (R.

Condron), some remarkable galls of *Apiomorpha duplex* found on a gum-tree at Yellingbo and a jumping spider under a club microscope and some of the Mount Buller granodiorite under polarized light (D. E. McInnes).

Mr D. Bowrey reported seeing a wallaby in Sherbrooke Forest during the past week-end.

Geology Group—December 4, 1963

Twenty-eight members and visitors were present for the final meeting of the year, with Mr L. Angior in the chair. Mr R. Hemmy reported on the group's excursion to Lancefield area on Sunday, November 10, when twelve members attended. The highlight of the day was a visit to the aboriginal quarries at Mount William. Graptolites were collected at a new road works site, and an examination made of the Cambrian deposits in a cutting on the old Kilmore railway line. Mr R. Davidson gave an account of a visit to Portland to lecture to the local F.N. Club on gemstones. Mr B. Dodds was appointed secretary, and Mrs M. Salau group librarian, for 1964. The syllabus and other activities of the group were finalized for the coming year.

The evening took the form of a members' night, and the following items were presented. Mr N. McLaurin: Material from Waratah Bay including gabbro, fossil corals, trilobites, tourmaline in granite, diabase; slides of the area and of limestone caves at Buchan. Mr A. McCay: Pictures of Flinders Ranges, featuring archaeocyathinae fossils. Mr R. Davidson: Collection of gemstones and minerals featuring agates of many forms; series of slides of a trip to Queensland showing the topography of the western areas, fossil dinosaur bones and scenes around Toowoomba. Mr A. Cobbett: Display of agates from overseas and chalcedony pebbles from Beechworth and Benalla. Mr R. Hemmy: Geological map of Lancefield area, publication of Unesco journal, *The Courier*, with an article on physics and geology. Mr S. Stubbs: Material from Canada including gold ore, uranium, brucite, zinc ore, potash; and specimen card of minerals from Ontario. Miss Bennett: Pink granite from Black Range near Stawell. Master G. Smith: Fossil wood (Qld), micaceous hematite (U.S.A.), hornblende (Ontario). Mr D. McInnes: Comparison of microscope sections of diabase from Ceres and Mount William. Mr R. Dodds: Silicified material from Benalla and books on geology from Russia and Italy. Mr L. Angior: Copper ore, black and banded marble and galena ore (per Mr L. Bairstow) from Iran.

A fruitful discussion followed in which most of the members participated, and the meeting closed with an exchange of season's greetings.

Microscopical Group—October 16, 1963

Twenty-four members and visitors attended the meeting, which was chaired by Mr E. LeMaistre.

A notice was received from the librarian regarding the return of all magazines and books by the end of November.

It was decided that a programme committee meet to work out the coming year's activities.

Mr LeMaistre gave the group a very informative talk on desmids. He clarified points about the delimitation of the group and gave details of habitat and the sensitivity of the plants to change in environment. Details were given of methods of reproduction, of the infinite variety of form, and the lack of desmids in the fossil record. With the aid of coloured drawings, the speaker outlined the present system of classification, and he also related some interesting collecting experiences which he had while living in the East.

There was a wide variety of exhibits under the fifteen microscopes. They included brine shrimps and a root section as well as many desmids.

Microscopical Group—November 20, 1963

Twenty-one members and visitors attended the meeting, under the leadership of Mr E. LeMaistre.

The secretary reported that the group which visited Mr and Mrs H. A. Dade at Benalla were made most welcome and had a delightful evening. The host had gone to much trouble to show the visitors a vast amount of microscopical equipment and to explain various techniques.

Mr D. McInnes asked if members of the group would help in the club microscope display at the monthly

general meetings, as he had found it difficult to attend to this as well as other matters.

Fourteen microscopes were set up, displaying a variety of specimens which members described in turn.

Mr W. Woollard demonstrated a number of prototypes of the F.N.C.V. microscope, featuring a condensing lens, an erecting attachment suitable for dissection work and an instrument with fine adjustment focus.

Exhibits included the "trigger" of a species of *Stylidium* (Miss J. Woollard); terminal joint of fore-leg of a caddis-fly larva to show similarity to the pincer claws of many crustaceans (W. Genery); *Deronectes* bettle larva as a fluid mount (P. Genery); pond water through a Greenough binocular under dark field illumination (W. Evans); remade slide of crab louse (K. Trotter); slide of diatoms from fossil deposits of Archangel, U.S.S.R. (H. Barrett), desmids in chain formation looking very similar to filamentous algae (E. LeMaistre); lupin pollen grains (A. Owens); and hand microtome with punch incorporated, made by Dr G. Sutherland and based on a suggestion of Mr W. Evans.

Botany Group—December 12, 1963

The pre-Christmas meeting was again a "Members' Night", and slides were shown on following subjects: bird use of plant material (Miss M. Butchart), flowers of Little Desert (Mr S. Barker), pitcher plants of W.A. (Mr A. Morrison). Miss M. Lester delivered a short address on hybrid vigour in maize. It was again evident that members can keep up the high standards set by lecturers through the year.

A report on the recent excursion to Woori-Yallock was given by Miss E. Pearce, and the chairman (Miss Lester) reported on the arrangements to date for the exhibit "Conifers" at the next nature show. Slides were shown of types of specimens required.

Correspondence from Mr H. Stewart, accompanied by a cutting from the *Hairnsdale Advertiser*, acquainted us with the activities of the Bairnsdale Field Naturalists Club, in particular their recent excursion to the haunt of the waratah on the Arte River.

The efforts of Mrs E. Webb-Ware as programme steward have provided the group with a round of interest throughout the year and she was congratulated by the chairman for her fine work.

After the closing of general business, the group retired to supper and informal discussion.

Photoflora—1964

Photographers intending to enter for "Photoflora 1964", the competition being conducted by the Native Plants Preservation Society for colour slides of Victorian wildflowers, are reminded that entries close on February 24. Entry forms with full particulars are obtainable from the Competition Secretary, Miss B. C. Terrell, 24 Seymour Avenue, Armadale, S.E.3.

All accepted slides will be screened, with a commentary, at St. Peter's Hall (formerly the National Theatre), Gisborne St., East Melbourne, on Wednesday, Thursday and Friday, March 18, 19 and 20, at 8 p.m. Admission: Adults 3/-, children 1/-.

A screening will also be held at Bendigo on March 21.

Bendigo F.N. Club—Syllabus

Members of the F.N.C.V. and of other country clubs who visit Bendigo are invited to participate in the local club's meetings and excursions. Here is the syllabus for the first half of 1964:

Excursions—Start from Gold Jubilee Statue (half-day at 2 p.m., full-day at 10 a.m.):

February 23 (half-day)—27 Brazier Street, Eaglehawk: Water-lilies (Mrs W. Perry)
March 15 (full day)—Kimbolton Forest Lakeside: General (J. Ipsen)
April 12 (full day)—Macedon: Autumn (Miss Flanagan)
May 3 (full day)—Mitiamo Pine Forest: General (Mr Kellam)
June 14 (half-day)—Strathfieldsaye: Fungi and fossils (Mr Marshall)
July 12 (half day)—Whipstick: *Acacia flexifolia* (W. Perry)

Meetings—Start at 7.30 p.m., at Bendigo Technical College:

February 12—Holiday Observations (Members)
March 11—Spiders (W. Perry)
April 8—Bonsai (G. Allen)
May 13—Insects (V. Wilkinson)
June 10—Lecturette: Fungi, Birds, Orchids
July 8—Parasites (D. Drummond)

Secretary—Mr. G. Marshall, State School, Strathfieldsaye.

Corrections

In the article "Notes on the History and Vegetation of Mount Napier", *Vict. Nat.*, 80: 152 (Oct. 1963), insert before "Hamilton" in line 22 of 1st paragraph the following words:

Parish, about 10 miles SSE. of

In *Vict. Nat.*, 80: 229 (November 1963) it was stated that Mr H. A. Dade was "a past-president of both the Royal and Queckett Microscopical Societies". The report should have read "a past-president of the Queckett Microscopical Club and a fellow of both the Royal Microscopical Society and the Queckett Microscopical Club".

F.N.C.V. Library

Stocktaking has been completed, and the library is now open for unrestricted borrowing. It is proposed to publish lists of missing books for each section (General, Botany, Geology, Marine and Entomology, Zoology, Microscopy and Periodicals). Borrowers still holding any publications which were not returned for stocktaking are asked to return them promptly, both out of consideration to fellow-members and to avoid the necessity of further action by the librarians.

As from the January general meeting, a new loans system has been installed on a trial basis; the success of the scheme will depend entirely upon the co-operation of borrowers, i.e. by making legible entries on the loan forms (in duplicate), returning loans promptly, and placing them on the shelf reserved for that purpose.

The loans system has been placed under the supervision of the Assistant Librarian (Mr P. Kelly) and study group librarians will supervise at their respective meetings.

Bairnsdale F.N. Club

The Bairnsdale club held its third annual meeting on November 15, 1963. The president reported a successful year, with active members scattered through a very wide district.

Meetings, at which a guest speaker has been present, and excursions, have been held every month. The club derived much benefit and enjoyment from the visit of the F.N.C.V. from December 26 to January 1 last summer.

In conjunction with the R.S.L. and the Shire Council, the Bairnsdale club had helped in the planning and planting of an arboretum at the western approach to the town.

The second number of the club's magazine *Clematis* has been published and is now on sale at 3/- per copy.

With two exceptions, all of last year's office-bearers were re-elected. Mr C. Bowden is president, Mr E. V. Barton secretary, and Mr E. Illidge treasurer.

The Bairnsdale club looks forward to another year of interesting activities.

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Koala and Cub, Quail Island

The photograph is by the late Fred Lewis, and it appeared in the *Naturalist* in July 1934, accompanying an article, "The Koala in Victoria" (Vol. 51, pp. 73-76).

Vol. 80, No. 11 March 5, 1964

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

The Blackwood (*Acacia melanoxylon*) is a fine specimen tree when it grows in an open situation. These blackwoods were photographed about fifteen years ago on the Cann River flats in far-eastern Victoria.

Wandering Elephant Seal

By S. E. CSORDAS*

It is easy to follow the life history of domestic animals or animals in a zoological garden, but it is difficult when thousands of the same species are moving about freely in the wild. Seals, for instance, gather together on land in large numbers to breed, and biologists study them at these times. Methods of permanently marking individual seals, preferably soon after birth, so that their age is known, and of identifying them from a distance, are necessary. One of the most effective is hot iron branding, for a brand cannot come off and if properly done lasts a life time.

"Campbell H bull", at 11 years of age, in 1959

The Australian National Antarctic Research Expeditions, in the study of the Elephant Seals (*Mirounga leonina*) of Heard and Macquarie Islands, branded large numbers of seal pups individually in successive years. The work began in 1951 at Macquarie Island, and it is still going on, for these seals are slow-growing and slow-maturing. As well they are highly polygamous; and we have found that eight-year-old males do not have a chance of breeding, though many of them are capable of it and come ashore in the breeding season. In trying to work out when the males become "beachmasters", controlling and mating with large harems of 100 or more females, we received help from an unexpected quarter.

ANARE was not the first to brand Elephant Seals in that part of the world. At Campbell Island, 500 miles to the north-west, a few hundred Elephant Seals breed and these are thought to be an offshoot of the great Macquarie Island herds. There, in 1945-47, J. H. Sorensen of the Cape Expedition branded small numbers of pups, not individually, but with a single letter indicating the year. In 1945, 37 pups were given the letter H.

For twelve years nothing more was heard of them, until on Aug-

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

"Campbell H bull" in harem, in 1959

ust 26, 1957, at the beginning of the breeding season at Macquarie Island, I saw a large bull with a scar, like an H, on his right side. On closer inspection I was convinced that it was a brand. This was later confirmed through a radio conversation with the leader of the Campbell Island expedition.

That seal, then, had come ashore for the breeding season at an island 500 miles from its birthplace. We know from other recoveries that such a distance would be well within its powers. From then on I kept a lookout for the seal. He turned up in the same place several times at irregular intervals, sometimes with fresh, bleeding wounds on his body. On September 17, he disappeared from the north end of the island, though perhaps he settled down somewhere else on the island for the remaining six weeks of the breeding season.

In 1959 I returned to Macquarie Island for another year. I hoped to meet this old fellow again, and I did. I saw him first on September 23, near a harem of 102 cows. He was then 14 years old, with a typical full-grown breeding bull's proboscis (nose) and many more scars on neck and body than in 1957. His length was about 14½ feet from nose to tail. Judging by his size I expected him to become a "beachmaster", ruler of a harem. But I was wrong.

The particular part of the beach was 30-40 yards wide and

"Campbell H cow", in 1957, with brand on right side near tail.

had two harems. At the peak of the breeding season they contained 224 and 332 cows. The Campbell H bull, as we called him, stayed around these harems throughout the whole season and left the island on November 17. He tried very hard to secure a position, had several fights and acquired many deep new scars but could not get higher than "assistant beachmaster", being in charge of an outlying section of one harem. To show how hard he had to fight for his position, I cite one entry from my log book:

October 24.

Campbell H in charge of the north section. During the afternoon, when I visited the harem, he was challenged by another bull from the seaward side. He accepted the challange and chased the other bull back into the sea without any serious fight. While in the sea, another bull moved into the harem from the land side. H bull moved back immediately, chased that bull away too and settled down again in the middle of his section.

In spite of several defeats he stayed in the vicinity of those two harems during the whole season and never tried any others. His record showed that a 14-year-old bull is not necessarily able to obtain a harem for his own.

In 1957 I also saw a cow, branded by Sorensen on Campbell Island in 1945. She pupped in one of the harems at the north end of the island on September 19, having arrived two days earlier. I saw her daily until September 25, after which the harem became too large for me to distinguish the earlier arrivals in the middle, and I did not see her again. In 1959 I searched very thoroughly but could not find her.

These two examples show that there is some interchange between neighbouring populations of Elephant Seals, and supplement observations on younger seals at Macquarie Island. They also show that the effort put into branding the original 37 pups at Campbell Island was well worth while, even though there was no obvious return for twelve years.

ACKNOWLEDGEMENT

My thanks are due to Miss S. E. Ingham, C.S.I.R.O. Division of Wildlife Research, for her valuable advice and for correcting my manuscript.

Spur-wing Wattle—*Acacia triptera*

By JEAN GALBRAITH

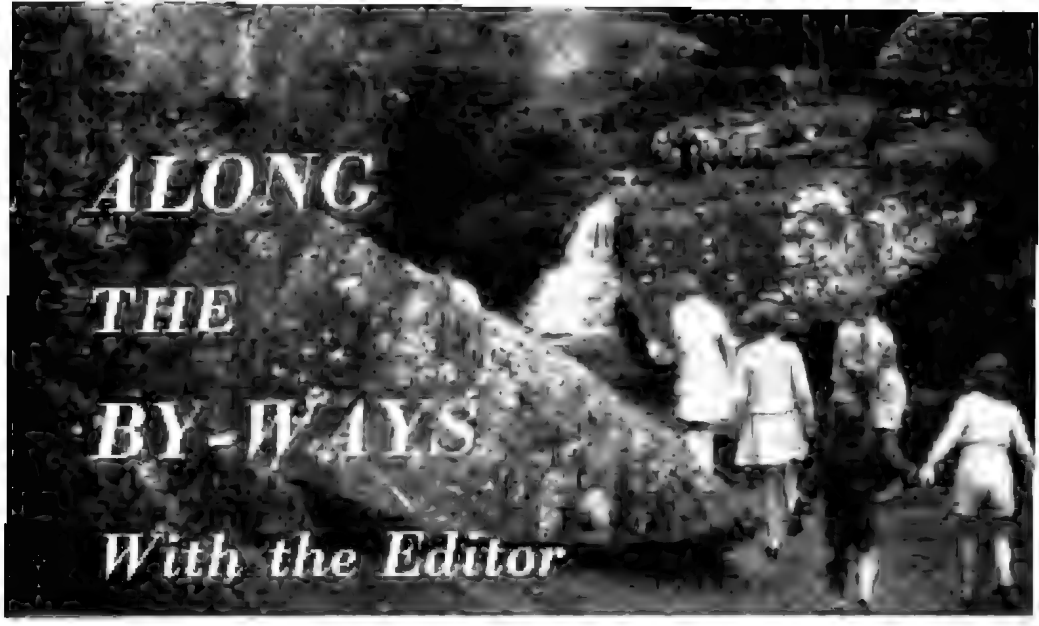
Spur-wing Wattle, fairly well known in parts of Queensland and New South Wales, grows in only one part of Victoria—the Warby Ranges near Wangaratta. Amongst the granite boulders of that range, the bushes themselves are boulder-shaped and squat, often six or eight or even ten feet across. They are inconspicuous, with their stiff dull-green foliage, until September brings them a powdering of gold. Early October changes them into mounds of soft bright yellow, with catkins usually longer than the phyllodes and hiding the unkindly foliage with softest bloom.

Those catkin-like flower-spikes look like thick yellow chenille, because the individual flowers are scattered, barely touching, along thread-like axes. The name *triptera* — three-winged — is hardly appropriate, since the rigid scimitar-like phyllodes, one or two inches long and a quarter-inch or more wide, grow on *four* sides of the stem, not three. But the name "spur-wing" is descriptive, for each phyllode is tipped with a spine as sharp as a spur, and each is joined to the stem by a broad base which continues down as a stiff wing, gradually narrowed as it nears the base of the one below it.

Pods develop at the same time as the soft new growth and seem rather nondescript for such imposing bushes. They are narrow and thin, 1-1½ inches long, somewhat curved or curled, and slightly narrowed between the small seeds.

Spur-wing Wattle, *Acacia triptera*.

Photo: N. A. Wakefield



These columns are available each month for your nature notes and queries. Address your correspondence to the Editor, "Victorian Naturalist", P.O. Box 21, Noble Park, Victoria.

Leathery Turtles in Victorian Seas

Miss Prue Fleming of Foster sent the following observation, in a letter dated December 12, 1963:

> Last week-end we were fortunate enough to see a luth or leathery turtle beached at Walkerville on Waratah Bay. The live turtle was brought to the surface by the crew of a crayfishing boat. It was entangled in the ropes of a cray-pot. There was no convenient place to beach the turtle so it was towed behind the cray-boat from Cape Liptrap to Walkerville and landed on the beach. By that time it was dead. The luth was about 7½ feet long and we think it weighed about half a ton.
>
> Is it unusual for a turtle of this type to be found in southern waters?

Towards the end of 1962 another specimen of the luth was collected from San Remo by members of the Zoology Department of Monash University. There is a published record of one being observed in the harbour at Portland about twenty years ago (*Vict. Nat.*, **61**: 23—May 1944). And the species has been recorded in South Australian waters.

Further information came to hand in the *Bairnsdale Advertiser* of January 16, 1964. Apart from a remarkable coincidence with the Walkerville episode, this last report gives an indication that these visitors are not really rare. Following are extracts from the *Advertiser* item:

> Fishing for crayfish in the vicinity of Cape Everard, Reg. Northrope, skipper of the Lakes Entrance boat *Kiangah*, and his two crewmen were surprised and rather disconcerted when they found the pot-line caught around the neck of a big black-shelled turtle.
>
> The turtle, a non-commercial variety known as a luth or leathery turtle, was shot to prevent in smashing the gear. It was of no value, but cutting it free would have entailed the jettisoning of

some valuable equipment. It could not be lifted aboard, so the skipper and crew decided to tow the rather unwieldly catch to Lakes Entrance, about 10 hours' steaming away.

With the aid of a crane, the turtle was lifted on to the jetty where it was on display for several hours, and attracted considerable attention. Eventually it was taken to sea again and jettisoned.

Luth turtles are seen occasionally in Bass Strait waters, boats from Lakes Entrance having had the expensive misfortune of catching about six in the last decade. The turtles often smash nets and other gear when caught.

Alpine Buttercups

One of the features of our highest mountains (which for want of higher ones we call "alps") is the flush of flowering in mid-summer. Virtually all the herbage and shrubbery must produce blooms and seed in the short comparatively warm period which is summer in the lowlands.

Miss Jean Galbraith, of Tyers, makes comment on some exceptions to the general rule:

Possibly other visitors to the high plains have sought vainly (as I have done) for flowers of alpine buttercups, including *Ranunculus muelleri* and *R. gunnianus*.

In January—which is "spring" on the high plains—there are plenty of buttercups in the Snow Gum woodlands, but they are all forms of the Common Buttercup (*R. lappaceus*).

The absence of other species in January was explained for me when, during the Council of Adult Education spring school in October, we found *R. gunnianus* and *R. muelleri* flowering in abundance.

Like their relative, the marsh-marigold (*Caltha introloba*), they spring up and flower as soon as the snow melts. The bogs close to large snowdrifts which overhung flowering drifts of *Caltha* were dotted with flowers of both species of buttercups. The flowers of Felted Buttercup (*R. muelleri*) (superficially like *R. lappaceus*) surmounted short stems (2-3 inches) above rosettes of entire silky leaves. The leaves of Tufted Buttercup (*R. gunnianus*) had not, in most cases, begun to unfold, but the large golden flowers had spread their strap-shaped petals widely. The largest I measured was 2½ inches across, with about a dozen petals. The flower-stems were 3-4 inches tall, and advanced plants had pinnate leaves, bright green with thread-like segments.

Morels

On the subject of these very palatable fungi, Mr I. R. McCann of Stawell makes these observations:

Mrs C. Tudehope mentioned finding the Morel (*Morchella elata*) in the southern part of the Black Ranges south of Stawell. (*Vict. Nat.*, vol. 80, page 261.) That was a very fine patch indeed. Members of the Stawell Field Naturalists Club have collected this delicious fungus in quantities sufficient for cooking in the northern part of the same Black Ranges, in the Bolangum Ranges and in the Black Range in the west of the Grampians. Isolated specimens have been found in Stawell and also in the northern Grampians at Golton Gorge where the related *Gyromitra esculenta* is also fairly plentiful. It cannot be stressed too much that the whole of the stem of the morel should be discarded before cooking as it remains extremely tough and leather-like.

Mr J. H. Willis, in the F.N.C.V. handbook, *Victorian Toadstools and Mushrooms* (of which the third edition has just appeared) notes that

With the possible exception of the Mallee, morels occur in all parts of the State, but are seldom found in sufficient quantities to justify collection for food.

On one occasion, when visiting the Snowy River Gorge, 20 miles north-east of Buchan, I found a very large colony of *Morchella elata* in the open woodland near the river.

A Gardener Looks at a Gall

By MARGERY J. LESTER

Each August my Cootamundra Wattle (*Acacia baileyana*) is densely covered with bloom. Each September it is covered with reddish "berries". Seen from a distance they are not unattractive but, on approaching, one realizes that the "berries" are not normal and, for some reason, abnormality is offensive.

These "berries" varied in size —not as small as a pea, not as big as a cherry. They were more or less spherical, quite firm and solid, and looked as if they had grown from the flower heads, for there were tufts of stamens protruding at various parts. I knew only that these berry-like growths were galls and that they were caused by insects. Reference to McKeown's *Australian Insects* supplied very little information so I decided to do some investigating with a camera as recorder.

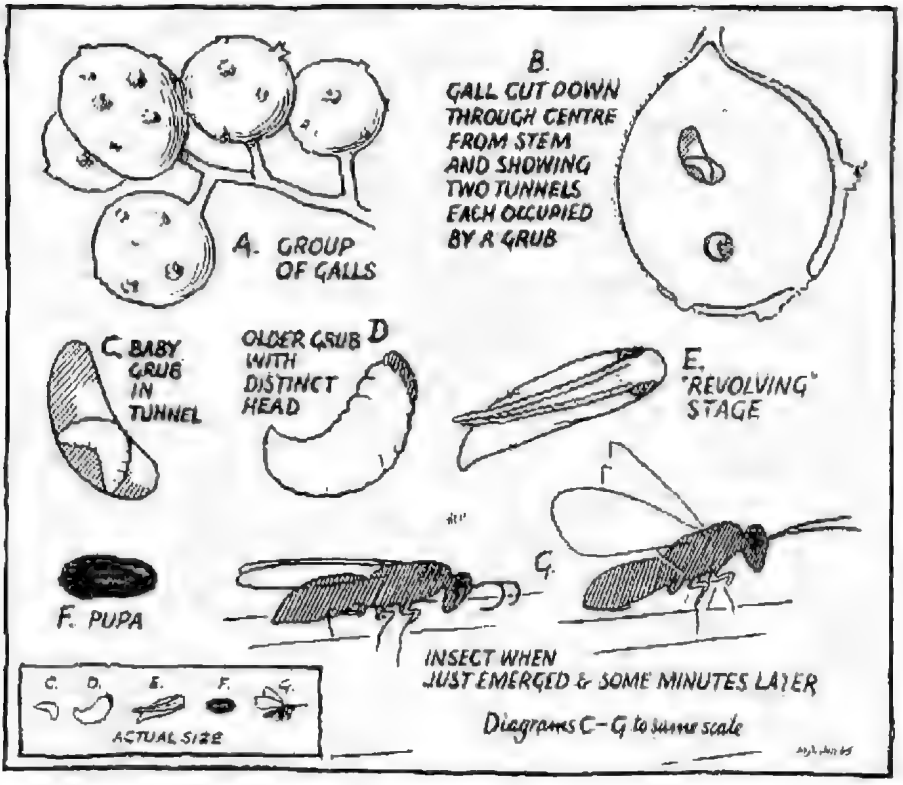
Late in September I cut open several of these galls. The thin reddish skin enclosed a solid whitish flesh in which were two or three little tunnels. In each tunnel was a tiny whitish grub —about ⅛ inch long, usually in a sort of banana curve with seemingly no distinction between one end and the other, legless but able to wriggle down to the further end of the tunnel.

Early in November I cut open some more galls. I found larger grubs, about ¼ inch long, with a definite dark part at a less tapered end, indicating a head.

Some of these galls had a hole to the outside and in several I found some tiny, thin pieces of shiny, black material. Though the holes to the outside indicated that a mature insect had escaped from the gall, I could not account for those shiny black pieces.

A week later I cut open some more galls. The result was more ⅛ inch grubs, more outside holes, more little black pieces. And then I came on a complete black capsule, about ⅛ inch long. I realized that it was a pupa and that the little black pieces that had puzzled me so much were the remains of pupal cases left behind by the emerged insects.

The next discovery was a very different grub — immediately noticed as different because of two segmented "threads" (like threads of miniature beads) that extended along the full length of the body, and there were two dark oval discs at the head, indicating eyes. It began to turn rapidly over and over. The turning action was achieved by a push of the tail against the wall of the tunnel. When removed from the tunnel its action slowed for a while, but then it developed its former rapidity and rolled over and over and over—away from the camera and back again. I was never sure whether it was going to advance or retreat. The amount of energy spent in this revolving action must be immense for such a small creature. Was it spinning into a pupa? Two evenings later this specimen was dead (possibly from exposure and exhaustion) and looked no different from when I



Details of Wattle Gall

first found it. I found no other grubs at this revolving stage nor at any other intermediate stage, but examination of a black pupa under the F.N.C.V. microscope (× 20) clearly showed two lumpy ridges indicating the beaded-thread-like extensions that were such a remarkable feature of the revolving grub.

The final discovery was a winged insect in one of the tunnels with pieces of black pupal skin still about it. I eased it carefully on to the table where it tottered about and then obligingly crawled on the proffered match-stick. There it remained a few minutes, lifting its wings and wiping them and its antennae with the black legs. Not being "up" in insects, it looked to me like any midget fly or gnat. The body was about $\frac{1}{8}$ inch long, dark in colour with yellow legs, transparent wings projecting beyond the body, and long, black, segmented antennae—obviously the metamorphosed version of the "bead-threads" of the revolving grub.

The fly walked to the end of the match-stick, jumped to the table, walked and jumped to the table edge where it preened and waved its wings for several minutes and then took off.

What is the next stage? How

does one keep tag of a flying insect less than a $\frac{1}{4}$ inch long?

One assumes that these flies, emerging in November, December and January, are the mature insects and that they now mate and lay their eggs in the wattle buds. The heads of flower buds on the new wattle shoot are well formed by the end of January, so the potential nurseries are ready to receive their pestilent visitors. What happens then? Do the eggs remain dormant during autumn to hatch out only after the wattle has flowered and has been induced to produce the gall as food and home for the newly hatched larvae? This seems likely, for cutting a gall soon after it has formed reveals nothing—nothing to the naked eye anyway. Does the flower produce the gall as a result of the irritating presence of the eggs? But the questions can go on and on.

For the purpose of this investigation I shall let the gall flourish for another season, but the following season the tree will be clipped immediately after flowering (if it has not outgrown my ladder) and the clippings burned.

Excursion to Mount Skene

On August 11, 1963, I took the opportunity to join an excursion, organized by Yallourn Camera Club, to Mount Skene, which lies in the snow belt. Mount Skene is situated on the Great Dividing Range in the Eastern Highlands of Victoria about 100 miles north-east of Melbourne, and it rises some 5200 feet above sea level.

The mountain is covered by a eucalypt forest and on the slopes there were traces of tree-felling. The top and southern slope were covered with snow which in some places reached 5 inches in depth. In sunnier places the snow was light and wet.

The forest on Mount Skene consists mainly of Snow Gum (*Eucalyptus pauciflora*),* Candlebark Gum (*E. rubida*) and *E. kybeanensis*. The Snow Gum has attractive white bark; it is widespread between 4300 and 6000 feet and is able to survive in a severe climate of prolonged cold and snow.

Besides eucalypts, the following plants were observed: Black Wattle (*Acacia mearnsii*), Daisy-bush (*Olearia phlogopappa*), Common Cassinia or "dogwood" (*Cassinia aculeata*), Mountain Oxylobium (*Oxylobium alpestre*), *Leucopogon gelidus*, Slender Beard-heath (*Leucopogon fraseri* ?), Field Woodrush (*Luzula campestris*), Elderberry Panax (*Tieghemopanax sambucifolius*), Cascade Everlasting (*Helichrysum thyrsoideum*), Tasman Flax-lily (*Dianella tasmanica*), Prickly Starwort (*Stellaria pungens* ?) and Derwent Speedwell (*Veronica derwentia*) with its large pointed saw-toothed leaves. Among ferns must be mentioned the Mother Shield-fern (*Polystichum proliferum*), which was frequently seen in moist shady places, and Common Bracken (*Pteridium esculentum*).

On the branches of old, dead eucalypts there were hanging the greyish green dishevelled locks of the lichen, *Usnea barbata*.

It is interesting to note that not one plant was to be seen in flower at that time.

In some places in the forest there were small glades in which *Leucopogon fraseri* was growing, covered by snow, as well as *Oxylobium alpestre*. In some places we may see dark green mosses.

—V. JERNAKOV
Latrobe Valley F.N. Club

* The herbarium collected by me was kindly determined by Miss J. Galbraith, to whom I express my deepest gratitude.

The Prospect in Western Victoria

By A. J. Swaby

Council of Adult Education and the related body in South Australia conducted a spring school in the Grampians in 1962. In March 1963, emulating that, Hamilton Rotary had a school for local botany and geology. In November 1963, a reunion of students from C.A.E. saw more of the geology and botany of the Grampians.

As the C.A.E. school dispersed, the western naturalists' clubs assembled for a conference. It was disappointing to be unable to remain and meet them; but some of our specimens and other illustrations were left for them. Another coincidence brought the western clubs to Stawell just before the November reunion. Some of the Hamilton naturalists gave valued help in their school. During preparation and between events, there was some correspondence and personal contact, giving a little light on the activity in the west.

Over thirty years ago, it was suggested that F.N.C.V. should foster the formation of clubs in the country. It was pointed out that city people could make only casual visits to the unspoiled country, and continuous study was not easy. Country people had the advantage of contact with nature, but lacked easy access to libraries, collections and leaders in the city. The suggestion was coldly received.

The very definite change of attitude over those years and the large number of affiliated clubs is most gratifying. The increase of activity among central naturalists encourages a hope of more purpose in study everywhere with a more definite co-operation.

Particularly with an eye on Grampians, team work in study, emulating the co-operation in the Fauna Survey Group, has been discussed with individuals. Suggestions have been exchanged, and some time has been promised to discuss them when the westerns meet again soon. Let us hope for echoes.

In the Grampians

Although this most interesting area has long been a centre of concentrated attention, it is really surprising how little is properly recorded and collected.

The botanical record is easily the best. The index of Victorian plants makes it easy to find the distribution of known species and a few hours are sufficient to make a list of known species in a given district. Even that, however, is incomplete—not through the fault of the staff, but through sinners in F.N.C.V., one of whom now confesses. Upon recent checks, it has been found that several species, known in the Grampians, have not been reported. It is useless to ask for recording without confirmation by a specimen.

In that region, with its great diversity of climates and soil conditions, much remains to be done in locating and studying the

different communities of plants and associated animal life.

The field of animal life is everywhere so vast and varied that professional staffs in museums are more than fully extended on classification and storage. Anyone who wishes to know what is to be found in a particular area must search through specimens for any from that area. A worker who is wise confines his attention to one family or one genus. At that, it is usually mere classification of adults. Life histories are mostly unknown. From the most casual observations, it is clear that endless interest and wonder are waiting for observers in any section of smaller animal life. I was unable to find anyone in or near the Grampians who is listing the birds. That is usually a popular study.

In geology, a powerful stimulus to further study has been given by the work of Dr Spencer Jones and particularly by the map published in 1962. It will be seen how slight is the basis for regarding the upper zones as of Carboniferous period. That remark, however, must not be taken as an expression of doubt. Anything that looks like a fossil should be sent to the National Museum.

Helmet Orchids

By Ruth Clark

Members of the Bairnsdale Field Naturalists Club are discovering that one of the delights of winter is the hunt for helmet-orchids.

We know that the five Victorian species grow in the Hedley-Port Welshpool district in South Gippsland and are pleased to record that we have found the five in our district, both on club excursions and on private trips by members.

The Fringed Helmet-orchid, *Corybas fimbriatus*, has a large red translucent flower with wide, spreading, deeply fringed labellum and wide dark hood, all gleaming in the light as it crouches against its single, shining, pale green leaf. It seems to be the most common species, having been found at the "Goat Farm" on the Omeo Road, at Forge Creek, in various parts of the Colquhoun Forest, and even within the township area of Lakes Entrance.

The Small Helmet-orchid, *C. unguiculatus*, is also dark red, but differs entirely from the other species, the labellum being a deep pouch, this feature no doubt being why these quaint little flowers are known as "Pelicans" in South Gippsland. The dorsal sepal closely covers the pouch, inside which is a band of pale feathery glands, and all margins of the flower are entire. The small heart-shaped leaf is reddish underneath and sometimes on the edges. So far as we have found this helmet-orchid only in the one place, about 10 miles north of Lakes Entrance.

There was great excitement on one excursion into the same area

when the party was having lunch in a lovely glade above a creek, and one member discovered she was sitting beside a group of Stately Helmet-orchids (*C. dilatatus*). As the common name implies, the flower carries itself proudly on a stem slightly longer than in the others. The widely flaring labellum has toothed margins and is prominently veined in red, with a very pale central boss; and the dorsal sepal is dark red. This species seems to prefer wooded hillsides and is found also on the slopes above the Toorloo Arm of Lake Tyers, and at the head of the North Arm, Lakes Entrance.

Different again is the Spurred Helmet-orchid (*C. aconitiflorus*). The canoe-shaped, pinkish or silvery-red dorsal sepal is the most conspicuous part of the flower, almost obscuring the quaintly funnel-like labellum. The leaf of this species is also reddish underneath. So far we have found it only at Forge Creek.

Another species found nearby at Forge Creek, but not numerous, is the Purple Helmet-orchid (*C. diemenicus*) with its dark red flowers. The shallow, sometimes pale, green hood does not conceal the labellum which has dark red incurved, toothed margins around a creamy, central boss.

These are superficial descriptions; we leave you the joy of discovering all the wonderful intricacies of these delicate and delightful flowers for yourselves.

We are interested to note that *C. fimbriatus* is common to the whole Bairnsdale-Lakes Entrance area, and *C. dilatatus* is to be found in scattered places around Lakes Entrance; but the other three species are restricted, so far as we yet know, to their own small separate areas. The hunt goes on to discover just how common or uncommon are the various species in our surrounding countryside.

How to Make a Rock Section

By D. E. McInnes

In recent demonstrations of the use of polaroid discs with the F.N.C.V. microscope, various rock sections have been shown, with and without polarized light. One heard remarks such as "Aren't they beautiful!" and "Fancy a rock being like that!" Then usually there were comments about using a diamond saw to cut sections, as they do at some university or other place.

People are surprised to hear that you can make your own rock sections in a simple and easy manner, even if it takes time.

A rock section will make an interesting slide for anyone who has a microscope. Low magnifications only are needed. In fact, most of the illustrations in petrology books show rock sections enlarged 15-25 times; so your F.N.C.V. microscope is quite adequate to start the fascinating task of looking at the crystals which make up rocks.

A section of one of the igneous rocks such as basalt or granite is the best to start with, as it will show larger crystals, and the texture can be most interesting. Once the slides are made, your interest should be aroused and you may be keen to know just what you are looking at. But that is another story. First let us make a rock section slide. What we have to do is:

(1) Select the rock specimen.
(2) Grind it flat, then polish one side.
(3) Cement polished side to 3″ × 1″ glass slide.
(4) Grind specimen until thin enough, then polish.
(5) Fix cover glass with cement.
(6) Clean and label slide.

Before we describe *how* to carry out these steps, let us comment on the materials needed; they are:

(a) Grinding and polishing powders.
(b) Plates to grind on.
(c) Cement to attach specimen to cover glass.
(d) 3″ × 1″ glass slides and cover glasses.
(e) Labels.
(f) A source of heat to melt cement.

(*Note:* To help members, particularly those in the country, a small package containing sufficient powders, cement, slides, covers, etc. to make six slides complete is available. Details are given at end of article.)

(a) Grade 220 Silicon Carbide abrasive grain is used as the coarse grinding powder. Grade 3F Silicon Carbide abrasive grain is used as the fine grinding powder, and 303½ Optical Powder is used for the polishing powder.

(It is of interest to observe the sizes of the grains with your microscope, but make sure they do not come in contact with your lens.)

(b) Grinding Plates. The ideal is to have three 12" × 12" squares of plate glass, one for each powder, but a steel plate or one glass plate would do, though it must be well washed and cleaned when changing to a finer powder. Pieces of window glass will do if placed on a flat board or piece of three-ply.

(c) Cement. The most suitable material is Lakeside Cement. It is in the form of a stick and when melted will fix specimen and cover glass.

(d) Ordinary 3" × 1" glass slides are used and cover glasses can be $\frac{5}{8}$" round and No. 2 in thickness.

(e) Labels can be made or purchased.

(f) The source of heat to melt cement and to dry specimens can be anything that will give a steady warmth, such as a brass plate over a spirit lamp, a metal plate placed over an ordinary gas jet on the stove, an ordinary electric iron turned upside down and fixed steady. Any one of these make a very handy hot plate, but the best idea is to use the electric frypan, which has the heat control and allows different temperatures to be used. 260° seems to be just right to melt cement.

This is *how* to make a slide:

(1) Select your specimen. To save time and labour in unnecessary grinding, pick a piece with a side as nearly flat as possible, about 1" in diameter and about $\frac{1}{2}$" thick. Such a piece is not easy to find but it is better to spend a little more time chipping a rock to get a suitable specimen than it is to grind away a thick section.

(2) Grind flat, then polish one side. Let us assume you have the three glass plates. It is a good idea to paint 1, 2 and 3 on the plates in order to know which is the coarse or fine plate when they are used at a later date. Place a thick layer of newspaper on the table, arrange the plates side by side, have a cup of water and a spoon in the centre. Place the three bags of powder near the plates, with a small spoon for each powder. (A strip of tin will do for a spoon.)

On No. 1 plate place a level teaspoonful of 220 Silicon Carbide, and add water until a thin paste is made. Then, with the fingers of both hands hold the specimen so that the flat side is to the glass, and grind with a very firm, steady, circular movement, round and round the whole surface of the plate. This is done to avoid grinding the plate unevenly. After a noisy rough start the grit seems to get a firm bite.

Keep grinding until you have a perfectly flat face. Wash occasionally to look at progress, but do not make the paste too thin and sloppy. Remember this flat face is the surface that will make the section. Check the whole surface to see that it is ground flat. When satisfied, wash your hands and the specimen in running water, to remove all coarse grains.

On No. 2 plate place less than a teaspoonful of No. 3F Silicon Carbide, add water as before and repeat the grinding as on No. 1 plate. Grind until the flat rough surface is quite smooth to the eye. Wash hands and specimen in running water.

On No. 3 plate use less than a teaspoonful of 303½ Optical Powder, again add just enough water to make a thin paste, and grind the specimen with a light pressure until it is polished. Wash hands and specimen under the tap.

(3) Cement specimen to slide. Plug in the electric frypan, set at 260° and switch on. Put the wet specimen on plate to dry. Wash a 3" × 1" glass slide in hot soapy water, rinse in running water. Now rub the slide with a little Bon Ami on a clean, damp cloth and place it in the pan to dry. Keep sides from touching pan. When dry, polish clean with a new cloth. Have tweezers, magnifying glass and the Lakeside Cement handy.

Place glass slide on frypan, and as it warms up put the end of the cement stick to centre of slide and let sufficient melt to cover the area which the specimen will occupy. Spread the melted cement a little, and pick up the specimen with the tweezers, but remember it is hot. Place the flat side to one end of the cement and push the rock firmly flat along the glass into the cement and then give it a couple of twists. The idea is to expel any bubbles and excess cement. Pick up the slide with the tweezers (it is hot, too), and look with the magnifying glass to see if there are bubbles between the rock and the slide. If there are bubbles, reheat, remove rock, add some more cement and repeat the process.

It is essential to have the join free of bubbles, otherwise the section is likely to leave the slide altogether when it is ground very thin.

(4) Grind specimen until thin enough, then polish.

Prepare No. 1 coarse grinding plate. Now hold the slide with the two thumbs on one side, the two forefingers pressing right in the centre of slide and the other fingers around the edges of the slide. It is important to press only with the forefingers, so that there is no strain which can break the slide. The job for the thumbs and other fingers is to keep the slide parallel to the grinding surface. Grind round and round, occasionally giving the slide a half-turn to help keep the grinding level. Grind away until the rock section is the thickness of a threepenny piece, but remember to keep your fingertips on edge of slide and to finish by grasping just with the nails of your thumbs and fingers. Beware of grinding your fingers. The first indication that you are doing so is usually some blood before any pain is noticed. This can be avoided if you can obtain a piece of plate glass a quarter-inch wider and longer than the slide. Warm the glass block on the hot-plate until some paraffin wax will just melt on it, place slide on to the wax, see that it makes a good join, remove from the hot plate, and allow to cool before using. This method allows greater control when grinding the specimen. Remove slide from block when up to the polishing stage, by simply warming the block.

Move the forefingers to one side if that side appears to need more grinding. A firm pressure can be used for the coarse grind,

but more care is needed than when making the first flat face. When the face is quite flat and parallel to the slide, wash well and carry on with the No. 2 plate and the 3F powder. This time rest the fingers and thumbs on slide, just holding it with the edge of your nails, again only apply pressure in the centre, grind lightly and carefully, keep the slide parallel to the plate.

The correct thickness for a section is 30 microns (0·030 mm), at which quartz in a section will show yellow when viewed with crossed polaroids. If it looks red or blue then the section is thicker, but for a start be content to grind a section until, when examined under a microscope, it is possible to see all the crystals that make up the rock, and stop when the section seems to be breaking away too much at the edges. Wash well and then polish on No. 3 plate. Just use one hand and rub lightly, wash and view with microscope now and again.

Do not be disappointed because the slide looks rough and not very clear; the appearance will be better when the cover glass is put on. It is best to have the section wet when viewing with the microscope. This has the same effect as putting on the cover glass. Your rock section will now be about the thickness of the cover glass, and as long as the crystal structure is clear and not opaque, leave well alone for the first slide. To have the rock section completely disappear after a lot of time and labour is quite a blow for the beginner to suffer. Wash slide well and allow to dry.

(5) Fix cover glass with cement.

Switch on the electric frypan set at 260°. Clean a cover glass by washing in hot soapy water, rinse under the tap and clean and polish with Bon Ami, Use care. The cover glass can be held by the edge with finger and thumb of left hand and the sides polished with a soft clean cloth held with the finger and thumb of the right hand. Place the slide in the frypan. Now break a small solid chip off the end of the Lakeside cement about the size of the two halves of a split pea (it is better to have too much than too little, until you learn to judge what amount is required), place the cement chip on to the rock section, and as it begins to soften gently lower the cover glass on to it. Allow the weight of the cover glass to spread the cement, and as it does you will notice the rock section become clear and sharp. Bubbles will now start to appear and the slide will look as though it is ruined, but set frypan at 300°, the bubbles will be vigorous then gradually lessen, and with a gentle pressure with a match on the cover glass the remaining few bubbles can be pushed clear of the section. Don't worry about a few odd bubbles. Remove slide from pan and allow to cool.

(6) Clean and label slide.

Surplus cement can be cleaned from slide by using a safety razor blade and scraping down the cover glass outwards. Any rock section projecting will be thin enough to be cut off by the razor blade. Trim round the cover glass, wash clean, then

affix label with details of rock and location.

Your slide will show the ends partly ground. As you gain skill it is possible to transfer sections to a new slide before putting on cover glass and also to avoid all bubbles by attaching cover glasses with balsam in xylol, but they take a long time to harden.

You now know how to make a rock section, and you can do it if you have the materials. That is why the F.N.C.V. is offering a small package to help you get started. A couple of chips of basalt that are easy to grind are included to give you a simple but interesting introduction to the crystal structure of rocks. The price will be 6/-, plus 1/2 postage. Write and include a postal note or cheque to:

Mr D. E. McInnes, 129 Waverley Road, East Malvern, S.E./, Victoria.

It is intended that further few notes, on how to look at your rock sections under the microscope, with different methods of illumination, will be prepared for the *Victorian Naturalist* microscope section shortly.

Fields Naturalists Club of Victoria

General Meeting—February 10, 1964

The hall at the National Herbarium was full for the meeting, with Mr M. K. Houghton presiding. Mr W. L. Williams was welcomed back after his lengthy sojourn in South-East Asia.

The secretary announced that he had received a reply from the Minister of Lands in Western Australia, to the F.N.C.V. council's letter about the need for conserving the state's unique flora. The secretary has written also to the Victorian Minister for Forests, enclosing some of Miss P. Carolan's photographs of milling operations in the Howqua-Delatite area.

On the recommendation of the club council, a proposal was carried that Messrs D. E. McInnes and W. C. Woollard be elected honorary members of the F.N.C.V., in recognition of their outstanding service in producing good quality microscopes for their fellow naturalists.

The subject for the evening was "Insects in Colour", by Mr John Landy. A number of colourful insects, representing most of the main groups that Mr Landy had photographed in New Guinea and Australia, were shown. What seemed to be remarkable success in catching moths and butterflies posing obligingly, was explained as being due to taking pictures in early morning, at dusk or in the night, using flashlight, while they were not active. Especially striking were slides dealing with ant-butterfly relationships.

The president thanked Mr Landy for the magnificent display of pictures and for the commentary.

Seventeen new members, whose names appeared in the February *Naturalist*, were elected to the club.

Exhibits included crysalids of the Wanderer Butterfly, and the swan plant on which the larvae feed (Miss Raff); Imperial Blue butterflies from Ringwood and dark purple azure mistletoe feeders from Balwyn, both associated with ants (R. Condron); campions grown from seed, similar to those reappearing on the site of a bombed cathedral in London (Mrs D. Parkin); and a collection of fossiliferous rocks from South Australia and Tasmania (M. Harrison). Mr McInnes and Mr Woollard showed sections of stems under club microscopes.

Nature Notes from Ringwood Field Naturalists Club

The president, Mr W. King, reported that he had killed a small copperhead snake on the evening of January 26, at his home in Warrandyte South. Leaving the snake where he had killed it, he resumed his gardening. A few minutes later he saw a kookaburra swoop down, pick up the snake and fly to a nearby tree. The kookaburra proceeded to deal severely with the snake by banging it on the limb. After these preliminary duties were finished it swallowed the snake in a few gulps. The snake was 15 inches long and had the characteristic light band at the back of the head. This was very distinctive and is quite a feature of young copperhead snakes.

The Fisheries and Wildlife Department identified a Fat-tailed Dunnart (*Sminthopsis crassicaudata*) brought to them by Mr F. Rogers. He had collected it when a domestic cat had brought it to a home at Telangatuk East, near the Black Range, on December 31, 1963. This was the second dunnart caught there by cats in a fortnight. These small marsupials have not been seen for a number of years in that area, but grasshoppers were very plentiful this season and, as these form a main part of their diet, there may be some connexion with their reappearance.

Reports of the Black-shouldered Kite were given by members. These were seen at Nunawading, North Ringwood and East Doncaster. In all cases these graceful birds were seen hovering over open paddocks. They have a beautiful wing action and hover over the one spot, with the body held nearly vertical as if suspended from above.

On an excursion to Lake Mountain held on January 15, it was interesting

to note that the sky lily (*Herpolirion novae-zelandiae*), Sutton's Leek-orchid (*Prasophyllum suttonii*), the Veined Sun-orchid (*Thelymitra venosa*), Mountain Gentian (*Gentianella diemensis*) and a pure white trigger-plant (a form of *Stylidium graminifolium*) were among the flowers seen. A disturbing element in the excursion, however, was the signs of many foxes on the snow grass glades at Echo Flat and further down the mountain.

Miss C. Gray, whilst touring in East Gippsland early in January, was fortunate in finding many orchids, among which was the rare midge-orchid, *Prasophyllum beaugleholei*, in the vicinity of Bendoc. The species is very localized in Victoria, being known by only four collections. In the same area a large patch of *Spiranthes sinensis* (Austral Lady's Tresses) was found, one plant of which was pure white.

Miss B. Hall, another member of the party, found the Leafless Tongue-orchid (*Cryptostylis hunteriana*) on the coastal grasstree plains of East Gippsland.

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Magnificent stand of White Mountain Ash, *Eucalyptus regnans*, in the Marysville State Forest

FORESTS COMMISSION VICTORIA

. . . preserving the beauty of our forests for your enjoyment.

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F.N.C.V.

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The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

The Brown Snake *(Demansia textilis)* is oviparous, and these are a batch of its young. The photograph was taken by David Fleay, and it was reproduced with his article "The Brown Snake—Dangerous Fellow" in January 1943 *(Vict. Nat., 59:* 147-152).

Reluctant Spring, Heard Island

By JOHN BECHERVAISE

Sunday, September 6, 1953

By morning, the wind had planed away a great deal of the soft snow from the beach and from the Nullabor that stretches as a dreary waste between the station and the glacier ice, leaving the older névé and the frozen surface of large stretches of melt-water. Where the more recent snow had been compacted by sledge-runners and the feet of men and dogs, it remained in relief—high continuous ridges, and perfect footprints about two inches high. Most curious of all, and quite beautiful, were the raised pads of the huskies, each casting a long shadow. I could not have imagined such a seeming unreality; deep impressions had all been converted from intaglio to alabastrine cameo, the thousand paw-marks of the racing dog-teams, the incisions of the claws, at first most deeply cut, now raised highest in this astonishing reversal. Last night the surface of the snow was smooth and featureless; one would never have suspected that it contained such a record of passing moments.

Two big elephant seals, heralding the seasonal urgency of their species, had hauled out from Atlas Cove and were far out on the snows of the flat area we call Windy City, apparently making their way overland to South West Bay. By what remarkable instinct they even relocate Heard Island after months at sea is questionable; it seems even stranger that, having landed, they should make such purposive progress towards another inlet of the sea. I have frequently followed wavering trails right across the snow between Atlas Cove and Corinthian Bay, but these I have always considered the evidence of random wandering, and considered it fortunate for the seals that, provided they just kept going on the flat, they would eventually reach salt water. This morning's pair may have had a random destination but, if so, I never saw such vigorous straight-line motion without a purpose. It is true that the happiest, most populous harem sands appear to be at South West Bay — where I photographed so many pups last March; but there is little sign of such gatherings as yet. Perhaps the two young bulls heard distant bellows from their rivals, or caught their scent, carried over a mile and a half of snow.

The only other life taking the morning air were numerous pied Dominican Gulls, so thorough in their search for food, and respecting such trifles, that they may find sustenance right through the winter, even when their more powerful cousins, the skuas, find Heard Island too forlorn. For many weeks now, we have seen no skuas, not even wheeling in to the blood-soaked

carcases of Leon's seals; only the clumsy, prehistoric-looking Giant Petrels, the fluttering Cape Pigeons, the dazzling "Paddies", and the Dominican Gulls—all of which I have already mentioned in this journal.

By the time I had finished in the Variometer Hut, the clouds were much lower and, when I returned, Arthur was beginning to doubt whether they would set out for Saddle Point. However, packing was complete and breakfast over. The day was quite calm.

Arthur, Dick and James, with reasonably comfortable packs (because of the food dump at Saddle Point), left at 9.30. The cloud was then down to the level of their route across the Baudissen Glacier, at about 1000 feet; if it should fall any lower, the way through the hummocks of crevassed pressure-ice might prove too difficult to find. Through my glasses I watched the trio move slowly up the Baudissen ice to the Schmidt Glacier; then I lost sight of them in the clouds. After an hour or more they were again visible, minute black figures making good progress eastwards, on apparently uncrevassed snow. . . .

Monday, September 7

A day of sudden, violent weather changes commenced calm and clear, though overcast at a great height. When I left for West Bay, every inch of the mountain was visible, and I thought that if the campers could have made a really early start they might well have reached Saddle Point in an hour or so from the Challenger Glacier, where I presumed they had spent the night. By the time I had changed the magnetic trace, dense banks of sea fog were crushing in from the north; they rapidly engulfed Saddle Point

and, within half-an-hour, the whole world was amorphous, grey and indeterminate. The fog brought a vigorous thaw, then steady, heavy rain. Peter reckoned the lower cloud then stretched from sea-level to about four thousand feet.

Again I watched the Dominican Gulls during my homeward walk. They appear to take turns; first wheeling and hovering over the incoming waves, diving down to what minute morsels the sea delivers; then, after ten or twenty minutes activity, they stand on the shingle for an equal period, watching how the other half fares. This morning there were about fifty birds in a single, fairly compact flock, about half of which seemed always to be watching from the sidelines.

The Dominican, or Southern Black-backed Gull *(Larus dominicanus)* ranges throughout the entire southern oceanic world—which is remarkable in that the birds are no longer wanderers, and do not migrate from their particular breeding places. They are obviously well-named, being black mantled in a distinctive manner, otherwise snowy-white except for some black tail-feathers. The adult birds, about the size of Australian magpies, have bright yellow bills, red-spotted where they curve. Although they appear as large as their parents, the young birds are completely different, possessing brown, mottled plumage, black bills and grey-black feet. There can be no doubt that the juveniles' protective colouring is extraordinarily effective, especially in the rocky and tussocky areas where they are hatched in rough nests amongst the stones. There always seem to be a good number of young birds present, some of intermediate plumage; this morning they tended to outnumber the adults.

It seems probable that the adult plumage is not attained until the third year, at the soonest. Perhaps I am so fond of the Dominicans because they seem so much less exotic than the penguins and Giant Petrels; they seem to live on bleak Heard Island just as happily and daintily as their close cousins along the coasts of Europe and, as I have said earlier, their cry is in a familiar language. They bear no comparison with any other birds here except the skuas, beside which they are fastidious, patrician creatures.

A little further along the shingle, a magnificent bull elephant seal had come ashore. He was sleek, clear-eyed and rippling with vigour, but with the unintelligent appearance of certain healthy pugilists. In fact, I am bound to say he reminded me vividly of one or two noble sixth-formers I had known in my teaching years . . . who had remained at school principally for the rowing or football. This particular bull was never to know the promised land of adoring cows — nor the indescribable lethargy of the season's end — for Leon came along shortly afterwards and shot him for the dogs (and men) of the station. Leon spent a good part of the day working in cold, grey rain on his ponderous kill, just visible from the station as an animated smudge through the murk. The cloud lifted a little in the after-

noon, and the rain turned to mushy snow.

Just before five, Cec and I floundered up to the Seismic Hut to change the trace. I had hoped to catch a view of Saddle Point, but it was still mist-bound. At 6.50 I should have sent up a flare as arranged, anyway. We returned to the Bio Shack and at 5.30, to my considerable surprise, Arthur walked in gaily, soaked. All were back. It had been a trying journey under thaw conditions, with little chance of biological observations. (Although Arthur did report a great encampment of Gentoo Penguins—about seven hundred, he reckoned — on Little Beach, with numerous Paddy attendants.) Full details of the glaciers, crevasse areas and other obstacles had been logged. It is always

something of a relief to see a field party back at base; the wind may then howl as it likes.

Tonight broke all records, with blizzard reaching a crescendo that was maintained for fully three hours before midnight. During all that time there were repeated blasts of ninety, a hundred, and up to a hundred and fifteen miles per hour. Two separate gusts of 110 were recorded by the Dines anemometer but this was sluggish, with its tubes partially blocked with snow. I like to consider this island on such a night, see its great ice mountain in the midst of an immense black ocean, and to contemplate our isolation . . . the world's most distant settlement.

Wednesday, September 9

The Magnetic Observatory at West Bay is a cold, lifeless place, *en rapport* though it be with terrestrial energies — themselves swayed and shaken by spots on the face of the sun, and reflecting the restless beams of the *aurora australis*. It houses automata — little man-made cogs meshing in to the invisible magnetic lines of force of the planet. Dutifully, if the weights are kept suspended, the traces changed, and the batteries charged, the swinging of small mirrors attached to magnets on quartz fibres will be recorded by the variometers. I like visiting West Bay, breaking the frozen seals of the seldom-opened doors, and replacing the icy blackness with ruby non-actinic light; probing the red twilight with a narrow white torch beam, reading temperatures, chronometers, milliammeters. . . . The "old" tracesheet of photographic paper is removed, pricked by tiny spaced needles in order that any subsequent expansion or contraction may be computed; the "new" trace is dated, held to the safelight to be certain of its emulsion side, and wrapped around the slowly revolving drum. With my black cylinders containing the latent images of magnetic activity, having firmly barred the doors, I leave the huts to darkness, the ticking of clocks. For twenty-four hours a fine ray of light, threaded through prisms, directed by mirrors, focused to a moving point, will describe graphs of magnetic variation. No other method could more easily record the minute oscillations, for here light rays are used as weightless, scribing vectors to magnify the slightest movement.

The day started well with a cold westerly, the snow very firm underfoot, and completely plastering the weather walls of the magnetic huts. On the return journey I paused to watch the "Nellies" (Giant Petrels, or Fulmars, *Macronectes giganteus)*, the Dominicans and the Sheathbills busy on the carcase of the proud bull seal. No longer is there any competition from the skuas, though these will be returning before long. The slaughter of these seals is beastly, but it is necessary if we are to breed dogs for our future antarctic programme. I imagined that the elephant seal might have swum in from a thousand miles or more, his dim consciousness attuned to the approaching season of mating. How swiftly he met

ANARE
Photo:
E. H. M. Ealey

his end! Now, deflated, flayed, obscene, he is game for the most timid birds pecking between his great teeth. The Nellies, black, malign, clumsy on the ground, straddled and side-stepped the remains, wings lifted in a curious, mincing balance against the wind, their powerful bills red with blood. Strangely enough, they are the first to be alarmed at the approach of human bipeds. They shuffle frantically away, and take wing while the stranger is still far off. This gives the Dominicans a chance but they, too, fly off a little distance when the intruder comes nearer. By then the Nellies are wheeling in immense circles over the cove, and the carcase is left to the strutting sheathbills who share man's land-lubberliness, and are not much afraid of him. I stood for twenty minutes in the cold, clear air-stream and watched until, even in spite of my fur-lined anorak, I was chilled. The Giant Petrels did not return until I was at least a hundred yards on my way. Had someone else been with me, and left me standing, the big birds would probably have come in just the same; their number sense is weak.

Though spring is somehow in the air, today the blizzards con-

tinued to sweep the island, swirling up clouds of drift occasionally so dense as to appear opaque, like cotton wool. In between, there were bursts of bewildering sunshine. Soon morose clouds surged up from the west, before a strident wind. The cold, dry drifts grew higher and more fantastically carved.

Dinner was a very cheerful meal; there is often an unconscious light - heartedness after the return of a field party. There was a sudden silence. To fill it, Leon turned to Fred and in his quiet, matter-of-fact drawl enquired, "I say, Fred, how many other seals hauled out with you?" Away from the day and the stormy island, I suppose such injections would not seem so funny.

Thursday, September 10

One of the most refreshing aspects of life on an isolated station is the frequency of occupational change. Every man is, from time to time, impelled to take hammer and nails, a paint brush, a cooking-pot, a boot-last, a fistful of putty, or a needle and thread. The cook assists with the release of a 'sonde balloon, and is interested in its lowest millibar reading, when it has risen twice as high as Everest; or he works the projector, or helps the geophysicist. The radio men assist the meteorologists . . . or refurbish the bathroom; the doctor-biologist spends his day as "slushy", with mop and pail and piles of dirty dishes. Today the radio men fitted a new window to their annexe . . . and were as proud of their achievement as Peter, our senior meteorologist, was of his telephone-box near the theodolite shelter. The specialization of life at home doubtless has great practical value. Division of labour means greater efficiency, more work done. But one is convinced that, in the multifarious tasks that face thirteen men running a settlement such as this, even though they are at times inconvenient, even wasteful of particular talent, there is some creative happiness, and a therapeutic element that specialization has lost. Here, to a great extent, work and relaxation are indivisible.

Friday, September 11

After tea, Arthur and I carried a small tent to Wharf Point and, working in a fury of wind, erected it near the seal carcase in order to watch the birds. We anchored it with great rocks and snow, and plan to spend tomorrow morning observing and photographing the petrels, gulls and sheathbills.

—From *Log for Lorna*, an illustrated diary addressed to the author's wife.

F.N.C.V. Excursion to Point Addis

On February 16, 1964, about fifty members of the F.N.C.V. met the Geelong F.N. Club at Point Addis. They were welcomed by the Geelong club president, Mr T. Pescott, and the secretary, Miss V. Boardman. Mr J. Wheeler led the excursion along the beach. Evidence of brown coal was seen there. The tall Falcon's Cliff showed many wind erosion

cavities in the sandstone, in one of which, in a most inaccessible place facing the sea, was a Peregrine Falcon's nest, which was reported to have been occupied for over thirty years. The present occupant was in the air overhead, while out to sea a gannet was flying.

Mr Wheeler had a Spine-tailed Swift with an injured wing and beak. It had been found on a road in Geelong. It clung confidently to him with its strong claws and with the spines of its tail pressed firmly to the support. It was a great sight to see the sheeny green tail, the long powerful blade-like wings, and the white throat and forehead turning enquiringly about without noticeable fear.

Although the tide was in, beachcombing revealed a cast-up ling and four stingrays. There were also eight apparently newly-born stingrays, which were quite transparent, clearly showing the pink heart and gill circulation and the digestive organs, through the silky skin.

A sea tulip *(Pyura)* and a black elephant snail *(Scutus antipodes)* were found. A few dead Fairy Penguins lay on the beach. Red Ironbarks *(Eucalyptus sideroxylon)* and Moonah *(Melaleuca pubescens)*, in full bloom, grew near the water's edge, with Coast Beard-heath *(Leucopogon parviflorus)* and Coast Pomaderris *(P. oraria)*, while a springy carpet of moss and orchid leaves covered the ground underneath.

A ringtail possum sprang out of a large nest in a moonah top. Right on the sand, mauve Sea Rocket *(Cakile maritima)* was in full bloom, and Sea Celery *(Apium australe)*, *Spinifex hirsutus, and* New Zealand Spinach *(Tetragonia expansa)* held the sand.

After lunch at Point Addis turntable an aboriginal site was inspected, high on the headland. In the ashy sand were masses of broken shells. White Correa *(C. alba)*, Coast Everlasting *(Helichrysum gunnii)* and Ixodia *(I. achilleoides)* were flowering, and masses of Cushion Bush *(Calocephalus brownii)* hugged the cliff. Leaves of *Swainsona lassertifolia* were noticed.

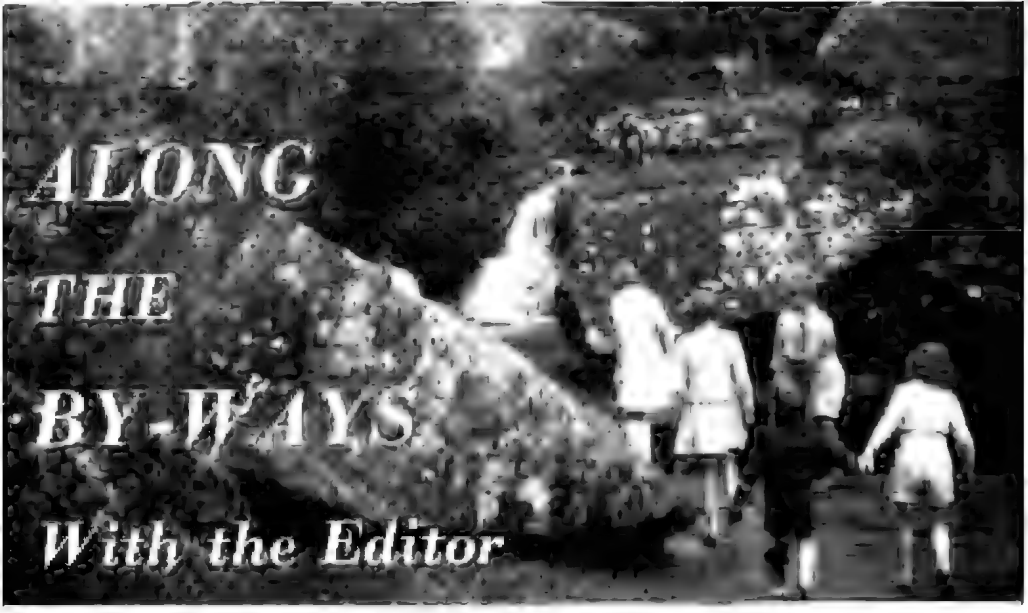
Below the cliff, geology enthusiasts picked away, finding Eocene fossil brachiopods (lamp shells), *Echinocyamus* and other echinoderms.

Returning nearly to the Ocean Road, the coach and cars took the party along a track amongst the trees, two hundred yards east of the road, and a walk led to a depression—"The Basin"—where the stringybark forest ceased and Red Ironbarks became predominant. Bird observers recognized Yellow-winged Honeyeaters, Yellow-faced Honeyeaters, pardalotes, Grey Fantails, thornbills and Rufous Whistler. A Black Wallaby *(Protemnodon bicolor)* was sighted there. Some large ridge-backed grasshoppers were collected, as well as four conspicuous types of galls. There was the four-pronged gall of the coccid, *Apiomorpha minuta*, on eucalypts, large rusty galls on golden wattle *(Acacia pycnantha)*, occupied by larvae of a species of the lepidopterous family Pyralidae, and smaller galls of Cecidomyid flies infecting undeveloped pods of varnish wattle *(Acacia verniciflua)*. Paper-flower *(Thomasia petalocalyx)* showed pale purple blooms, side by side with Slender Velvet-bush *(Lasiopetalum baueri)*; and Pink Heath *(Epacris impressa)* had begun to bloom.

Most striking and unexpected there, a little away from the sea, was a fine specimen of Sea-box *(Alyxia buxifolia)* with fragrant flowers and shiny red berries. Silver Banksia *(B. marginata)* was flowering, while tea-trees *(Leptospermum juniperinum* and *L. myrsinoides)*, Horny Cone-bush *(Isopogon ceratophyllum)* and the spiny Leafless Bitter-pea *(Daviesia brevifolia)* had finished. Winged Spyridium *(S. vexilliferum)* showed its white wings, and grasstrees *(Xanthorrhoea australis)* were plentiful but had no flowering spikes. Many of the grasstrees had bundles of several leaves wefted together with very strong white web, making a closed tube about two and a half inches long, inside which there were about a dozen lively spiders.

Mr E. H. Coghill thanked Mr Wheeler and the Geelong club for the most enjoyable day. Mr Wheeler reported some further efforts to secure at least a part of the Cuthbertson natural area near Ocean Grove for a reserve.

—L. M. WHITE



These columns are available each month for your nature notes and queries. Address your correspondence to the Editor, "Victorian Naturalist", P.O. Box 21, Noble Park, Victoria.

A Bird Problem

Passing references in the *Naturalist* for December 1963, to choughs and babblers, have caused a former president of the F.N.C.V., Mr A. H. Chisholm of Sydney, to meditate on the past and present status of these birds in central Victoria:

In my youthful days in the Maryborough district those two social and hearty species, the White-browed Babbler and Grey-crowned Babbler, were quite abundant. Every boy knew in particular the white-browed birds ("catties"), which could be seen freely tossing bark about in their quests for insects, and scampering over the ground and among low trees, meanwhile uttering their "miaowing" and other odd notes. We knew well, too, the hefty stick nests, and in winter we sometimes set old ones on fire at dusk for the pleasure of seeing the tree-top blaze light up the bush.

The larger, grey-crowned birds were less common but not at all rare, and we esteemed them as well for their bounding activity and for their extraordinary choruses, mainly suggesting the expressions "arco-arco-arco-arco", which naturally caused us to label them "arco-birds".

Now, both species have fallen away in that area. The white-brows are not precisely uncommon but on visit after visit to the district I have failed to see or hear my old friends the "arcoes". What is the cause of this decrease? True, the forestry people have seriously affected certain birds through their tree-felling and so-called "cleaning up", but in spite of that, a larger terrestrial species that was once rather rare in the district is now extremely common.

This "interloper" is the White-winged Chough. In youthful days I saw the chough bands—the species is as social as the babblers—only now and again, but in recent years I have encountered them all over the forests and seen their large mud nests aloft in many trees. Indeed, so common are they that I have often wondered how such large birds, in such large numbers, contrive to gain enough food from the forest floor.

And, I regret to say, there is some evidence to suggest that the choughs' problem is partly solved by the raid-

ing of the nests of other birds, especially those which, like the Quail-Thrushes, Crested Bellbirds, and Grey Thrushes, nest on or near the ground.

Even so, the upsurge and raids of the choughs do not, I think, wholly explain the lamentable disappearance of the "arcoes".

Wood swallows in the Grampians

These notes are from Mr I. R. McCann of Stawell:

During October 1963, Wood-swallows arrived in the eastern Grampians region in great numbers, and nests with eggs or young were to be found through the summer, until the middle of January. The birds were almost all "white-browed", with only a few scattered pairs of the "masked" species.

About sundown on January 4, I was attracted by a great commotion in some Golden Wattles. A flock of White-browed Wood-swallows was wheeling and dipping in the air and fluttering in the wattles and dry grass, and squeaking and chattering excitedly. I found that they were feasting on the winged forms of the sugar ant (*Camponotus* sp.). The large ants were crawling up the grass stems and the wattles to launch themselves into the air. The birds were so eager to get the ants that they actually brushed against my legs and perched within a few feet of me. The few ants that actually became airborne were snatched from the air with loud snaps. Although worker-caste ants were numerous, both on the ground and in the wattles, the birds ignored them completely.

Although the "white-browed" and the "masked" species are only occasional visitors here, we have a permanent population of "duskies". On January 19 at 7.40 p.m., I disturbed a flock of about twenty of the last. The birds wheeled for a minute or two and then perched on nearby trees. When I moved away a short distance, they quickly clustered upon the trunk of a Yellow Box, about eighteen feet from the ground. Most of the birds alighted about a foot from those already on the tree and then pushed into the cluster; others alighted on the clinging birds and then shuffled around until they could wedge themselves into the mass. The birds formed a circle about a foot in diameter. The outer birds all faced towards the centre of the cluster. The ring of protruding tails and the dark mass in the centre studded with the blue-grey beaks made an attractive pattern. I returned the following evening and again saw the cluster form, this time in another tree and only about six feet from the ground. Two days later I failed to find the flock.

Bulbuls at Highett

This observation comes from Mr R. D. Lee of Highett, one of Melbourne's south-eastern suburbs:

About the year 1955, a pair of strange birds appeared in our immediate neighbourhood at Highett—birds we had never seen anywhere before. On investigation, these turned out to be the introduced Red-whiskered Bulbuls. Neville Cayley, in *What Bird is That?* describes them as follows: "Forehead, crown of head and crest, front of cheeks and bill, black; patch behind the eye, pale crimson; back, wings and tail, brown; cheeks and underparts, white, with an incomplete black band on the chest, and washed with pale brown on the sides of neck and abdomen; under tail-coverts, pinkish-red. Length about seven inches."

Although apparently common (and a nuisance) around Sydney, we had never seen or heard of them in Victoria.

Over the period from first seeing them until about two years ago, their population increased until we think there might have been a dozen birds around. They appeared to stay only in our immediate vicinity, to our annoyance, as they were partial to fruit and young cabbages.

Suddenly they all disappeared, and since then the only indication of their presence has been the local English Thrush imitating their call.

Has any club member seen or heard of these birds in Victoria? If not, it is a mystery why they should all suddenly leave and where they went.

Nature Notes from Ringwood Field Naturalists Club

While a member was in the Warrandyte area, he noticed many White-plumed Honeyeaters along the creek bank. He was surprised that when some Fork-tailed Swifts flew over he heard the alarm call of the honeyeaters. This puzzled him and he felt that perhaps the honeyeaters took the swifts to be Little Falcons. There is a similarity between the shape of swifts and the falcons, and he felt that the honeyeaters had been deceived. Spine-tailed Swifts are common in this area at this time of the year, but this was the first local sighting of the Fork-tailed Swift.

At our recent camp-out, behind Mount Cathedral, a Powerful Owl was seen on a bough of Manna Gum *(Eucalyptus viminalis)*. It was perched over a ringtail possum *(Pseudocheirus peregrinus)*. When the tree was revisited one hour later the owl had disappeared, and it was not found again. Members of our fauna group realized why this owl is called "powerful", for the ringtail was a mature animal and apparently the owl could handle it with ease.

Later in the evening the fauna group were fortunate in sighting an Owlet Nightjar. This sighting was on the Blue Range Road, almost at its highest level.

Although many Dusky Gliders *(Schoinobates volans)* were seen during the night, some members may have been excused if they had thought there were several kinds of gliders, because of the various colour phases seen.

On a bird study walk, under the leadership of Mr J. Hyett, the Eastern Spinebill was observed feeding copiously on the nectar of the Mountain Correa *(C. lawrenciana)*. The group spent some time, fascinated by the antics of this bird as it flitted from flower to flower, completely undisturbed by the presence of humans.

Great interest was shown in the colony of *Rattus assimilis* (Allied Rat) which was found in the river valley near the camp.

Mr K. Muir reported on a recent trip to Wyperfield National Park. He had observed many Black-faced Kangaroos *(Macropus major melanops)* feeding in the swamp and lake beds in close proximity to Wonga Hut. One of the main attractions of the park — a lowan *(Leipoa ocellata)* — was seen, as well as numerous White Cockatoos and several Major Mitchell Cockatoos.

Audiospectrographic Analysis of Lyrebird Song

The following corrections should be made to the article in *Vict. Nat. 80*: 304-312 (February 1964):

Page	Column	Line	Item	Correction
308	1	20	C♯ (6660)	G (6660)
308	1	42	C♯ (4550)	C (4440)
308	1	43	C♯ (6660)	G (6660)
308	2	16	C (4196)	C (4186)
308	2	43	Figure 4	Figure 3A
309	1	27	C♯ (3329)	G (3329)
309	1	30	C♯ (2239)	C (2220)
309	2	15	C (4191)	C (4186)
309	1	7	on the item	in the item
308	2	3	Figure 2	Figure 2A
308	2	8	Figure 3	Figure 2B
308	2	11	Figure 2	Figure 2A
310		Figure 6A	Eradicate dots which are over the fourth and seventh notes of the second version of the call.	

Habits of the Orb Web Spider

By Evan Rowlands

It was early in a hot summer evening at Robinvale in February 1962 that I noticed the horizontal bridge threads of a female of the large Orb Web Spinner *(Eriophora transmarina)* spanning the gap between a passionfruit vine and a post about six feet above the ground. Shortly after, the large spider emerged from its daytime concealment in the vine and ventured out along a bridge strand, upside down, pulling itself along in typical fashion by the two pairs of front legs, the third pair being clasped over the thread which slid beneath them. The fourth pair trailed behind, loosely gripping the silk thread. As I have done often before, I sat down to watch this miracle of instinctive behaviour—this inherited complex pattern of responses—as the spider built her large and beautiful snare.

She crossed the bridge to the post and returned to the vine, this time trailing a double thread of silk, half free of the older bridge strands, by the posterior pair of legs. This silk, protruded from the spinnerets, was dry, inelastic and non viscid and from this type of thread the main web structure would be entirely constructed. Having thus consolidated the bridge, she returned to its midpoint (how could she tell? Spiders' distance vision is reputedly very poor), and from here dropped on a thread-pair to a point on the ground below, fastened the threads to the grass and re-ascended to the bridge. Now she proceeded almost to the extremity of one side of the bridge, fastened a thread-pair and, trailing the silk, descended the vertical foundation line for almost four feet, where she fastened the taut silk. This procedure was repeated on the other side of the bridge and the web then had a broad outline of an approximately equilateral triangle some 12 square feet in area.

Now it was time for the radial foundation lines—the spokes of the orb web—to be laid. The spider selected a point about nine inches down the vertical foundation line as the hub point and from here laid down a series of radii. Each radius was laid by proceeding along an established radius, paying out the double silk thread, until the outside foundation line was reached. A further two inches down this line, the silk was fastened and the spider re-ascended to the hub via the new radius, at the same time duplicating the double thread so that in fact each radius became four threads. From time to time, from the hub of the web, the spider appeared to "count" the radii with her legs, and then placed new radii in the spaces where the existing radii were too divergent. She was finally satisfied with 21 radii in all, after a total of about 12 minutes work.

Beginning at the hub, a clockwise spiral was constructed. In the centre it was attached

lengthwise along the radii for short distances and when this was pulled tight the radii were pulled out of line to give an irregular appearance known as the notched zone. At the centre the spiral turns were separated by about an inch, but toward the extremity by about three inches. The skeleton of the web was now complete.

But yet the snare must be primed. Different glands in the spider were activated and now the spinnerets protruded viscid elastic threads, appearing under a lens as a sticky string of beads. Beginning at an outer margin of the circle and progressing by a series of clockwise and anticlockwise arcs, she filled the spaces between the spirals with regular sticky threads about a quarter of an inch apart. The eight legs danced on the slender mesh with unhesitating dexterity. Of the four legs on the side of the spider nearest the centre of the web, the anterior three played the main part in supporting its body while the other legs performed more specialized tasks. The most anterior leg on the outer side, with a quick stroke, established the distance to the junction of the radius and spiral foundation line ahead. As the spider swung its abdomen towards this junction, the posterior pair of legs paid out the silk and finally the outer posterior leg gripped the radial line ahead and pulled it to the spinnerets where, with a little dab of the abdomen, the sticky thread was affixed. With a viscid thread network completed to the centre, the spider settled motionless in the central notched zone, spread legs gripping radii. The orb web had taken seventy-two minutes to construct and now it was dark.

Next morning I rose before dawn to see the web dismantled. The spider was motionless in the web's centre; a jagged rent in a lower corner marked a struggle and escape. As the stars faded, suddenly triggered by changing light intensity, the spider left the web's hub and severed the lower radii. Under the tension of the viscid network, the web rolled upwards in a ragged froth towards the bridge. Mouthing the tangled mesh in its fangs, the spider reduced it to a tiny ball. With only the bridge left, *Eriophora transmarina* returned to inertness in the vine's leaves. Twelve square feet of geometrical beauty had been destroyed in just four minutes.

These web-building activities pose some elementary questions. Does the spider "eat" her dismantled web or simply drop the tiny ball? In the *Victorian Naturalist* of August 1940 (Vol. 57 (4), p. 76) Mrs Edith Coleman, referring to a spider of the genus *Nephila*, states that the "silk of the old snare is liquefied and swallowed"; E. S. Hanks (*Victorian Naturalist*, 59 (12), p. 211), describing web spinning of *Epeira productus* (incorrectly spelt as *Ereira* in the journal), suggests that the web is consumed by the spider. There is a significant note from Mrs Helen McKenzie, in Vol. 64 (1), p. 2, who comments that after watching the spider apparently consume the web, she saw it drop from its mouth a little grey pellet which she assumes

Table 1: Times of Emergence of Spider

Date	Time of Sunset	Spider emerged	Time since Sunset	Weather
24/2/62	7.07 p.m.	7.40 p.m.	33 min.	Cloudless
26/2/62	7.05 p.m.	7.40 p.m.	35 min.	Cloudless
27/2/62	7.04 p.m.	7.36 p.m.	32 min.	Cloudless
28/2/62	7.02 p.m.	7.39 p.m.	37 min	Thin scattered cloud

Table 2: Times of Dismantling Web

Date	Time of Sunrise	Dismantling began	Time before dawn	Weather
26/2/62	6.00 a.m.	5.33 a.m.	27 min.	Cloudless
27/2/62	6.01 a.m.	5.33 a.m.	28 min.	Cloudless
28/2/62	6.02 a.m.	5.36 a.m.	26 min.	Cloudless

to be the old web. The late K. C. McKeown in *Spider Wonders of Australia* (second edition, 1952, p. 27) considers the eating of the web to be impossible. He points out that the spider's mouth is an extremely small aperture suited only to the absorption of fluids, and that the spider's digestive juices contain no solvent capable of liquefying its own silk. He therefore concludes, on logical grounds, that the ball of web is dropped but quotes no observation to support this conclusion. Mr A. N. Burns of the National Museum (whose courteous advice I wish to acknowledge) agrees with McKeown's conclusion. I made an effort to see what happened to that elusive ball of web. I watched from very close; I cupped my hands an inch or two beneath the spider; I laid a piece of paper on the grass beneath. Though I tried on a number of occasions, I did not succeed in finding the discarded pellet.

The Orb Web Spinner emerges to spin at a given time each evening with remarkable consistency. Similarly, the web is dismantled at a very nearly constant interval before dawn each day. It seems apparent that this behaviour is a light kinesis, and I noted that both erecting and dismantling took place in twilight in which stars of the first and second magnitudes only were visible. Table 1 shows that this spider emerged in the evening about 35 minutes after sunset.

Erection of the web on each of these evenings was done to within fifteen seconds of 72 minutes.

Dismantling of the web took place about twenty-seven minutes before dawn, as Table 2 shows.

The response of this spider to changes in light intensity is not invariable. Occasionally, this spider does not build, but will miss a day. Perhaps a full stomach inhibits the light kinesis. Perhaps the silk glands must be rested periodically and empty silk glands inhibit the kinesis. No one seems to know. In another instance, the web was not dismantled but merely abandoned intact for the day. What causes this to happen? I found

also that I could not confuse the spider by illuminating it at critical times with electric light. Perhaps this spider is sensitive not only to intensity changes in light but also to its quality.

There is an infinity of simple things about nature which can still be discovered by those who care to look. This constitutes both the lure and the reward of the field naturalist.

Victorian Flora—1

Hill Banksia—*Banksia spinulosa*

By BRUCE FUHRER

Banksia spinulosa is an attractive shrub or small tree up to ten feet high, occurring throughout Victoria with the exception of north-western districts. It is also found in New South Wales and Queensland. Formerly known as *Banksia collina* in Victoria, this banksia has been found to be the same as the New South Wales *B. spinulosa*, and this latter name now takes precedence over the former.

Its occurrence in hill country

Hill Banksia, *B. spinulosa*

has earned it the common name of Hill Banksia, while a more descriptive name of "hairpin banksia" is more often used because of the hairpin-like glossy black styles arranged in parallel rows along the flower-head. The long narrow leaves are usually serrate, but occasional plants have a majority of entire leaves, bright green above and whitish beneath.

The spectacular flowers bloom in autumn and winter, a welcome sight at this time of the year when wildflowers are scarce.

The large cylindrical flowering heads are up to 10" long, orange to yellow-green in colour. They are cradled at the bases of symmetrically radiating branchlets.

The cones of previous years give an interesting contrast to the flowers, with their dark polished oval seed capsules and rows of dried styles.

The Naturalist and the Microscope

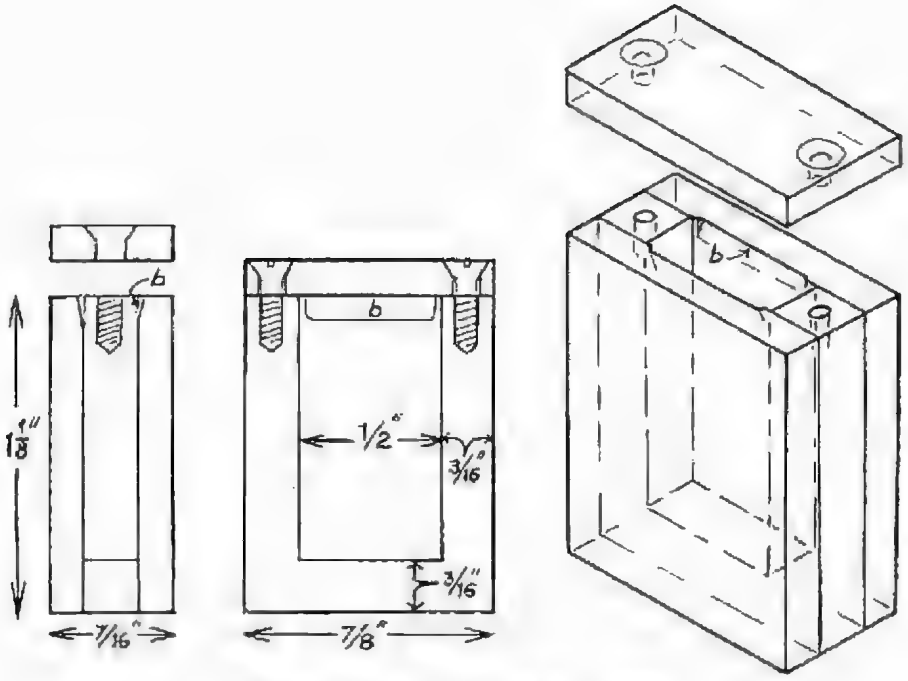
"Micro-jar" Preparations

By H. A. DADE

It is desirable to keep specimens in some way which maintains their fresh appearance, and this usually means storing them in a fluid. Alcohol, with or without formalin or other added fixative, tends to evaporate in spite of efforts to seal the containers, and the care of such a collection entails more labour and greater danger of loss than most institutions can afford. Glycerol, mixed with an equal volume of water, applied after preliminary fixation in alcohol or formalin-alcohol (which dissolves entangled air as well as fixing the material) is an excellent preservative free from the disadvantages of alcohol. When it is prepared it should be heated to expel dissolved air, which otherwise will come out and form myriads of small bubbles which cling to the material; but it should be heated only until it approaches boiling point, and then cooled. Material in bulk can be stored in almost any kind of specimen tube or jar.

It is useful, in addition, to preserve selected portions of the material showing general habit and appearance in a form convenient for examination at any time under the binocular magnifier, thus supplementing the information provided by microscope slides. Formerly such relatively bulky specimens were put up in deep cells cemented to microscope slides, but these preparations are not reliably permanent, the pressure generated by fluctuating temperature causing the seals to break down sooner or later. This kind of material would be regarded better as small museum specimens rather than microscopical specimens, to be kept in something like a museum jar.

Several years ago the writer devised a "micro-jar" container,



The Micro-jar: End, side and general views.

intended originally for insect dissections, but equally useful for microfungi which form characteristic fruit bodies, or pathological specimens with features profitably examined at low magnification (*ca* ×15 to ×20 d.)

These "micro-jars" are easily made from perspex sheet ⅛" and 3/16" thick, the component parts being cut out with a piercing saw with metal-cutting blades. A suitable form is illustrated, the dimensions being shown. It consists of two rectangular panes cemented to a U-shaped middle piece with a solution of perspex in choloroform, and a lid. The assembled parts are screwed in a vice or clamp and left overnight to allow the cement to harden. The rough edges of the jar are filed flat, then rubbed down on the finest glasspaper, laid on a piece of plate glass; finally the whole is polished with Brasso, using a cloth laid on plate glass. The mouth of the jar should be very carefully finished, to make a good joint with the lid. Bubble traps are small areas filed away (as at "b" in the drawings) to hold bubbles and prevent them from wandering across the specimen when the jar is laid flat in the magnifier stage. Holes are drilled and tapped to receive 6BA screws, with which the lid is secured.

Mounting and Storing

The specimen may be a piece of leaf or twig, or agar cut from a culture. It should not be free

to float about, but should be cut so that it fits the inside of the jar. After soaking in alcohol or formalin alcohol until air bubbles have gone, the material is transferred to a watch glass of the diluted glycerol, and left there for a day or two. In the meantime the jar is filled with alcohol to remove air clinging to its inner corners. When the specimen is ready, the jar is emptied and its lip dried and smeared with rubber grease (as used for burette cocks). The jar is then filled to the brim with air-free, 50 per cent glycerol, and the specimen is inserted. The jar should now be over-full, with liquid standing up above the mouth. The lid, also greased, is put on and pressed down, squeezing out the excess liquid, the screws are inserted and screwed up tightly. After rinsing under the tap and drying, a label can be stuck to one side of the jar with "U-Hu" or some similar adhesive which will adhere to plastics, and when this has hardened the label may be protected by painting it with colourless nail lacquer.

It is best to store the jars in the upright position, so that any bubbles will stay at the top of the fluid, and they should never be turned upside down or bubbles may cling to the specimen and be difficult to dislodge. If the lid fits well, there will be no ullage. In the unlikely event of excessive leakage, and the replacement of too much fluid by air, it is a simple matter to remove the lid and "top up".

The relatively thick panes are an advantage: dust particles or faint scratches on the outer surface of the jar are out of focus when the magnifier is focussed on the specimen.

Other forms of container may be preferred by some readers. The back pane can, for example, be made the size of a microscope slide. However, experiments with other models have led the writer to the conclusion that the form described here is the most satisfactory.

A Simple Compressor

By D. E. McInnes

Pond life is a fascinating subject for the microscope, and the observer is always wanting to isolate some particular creature of interest in a drop of water, to enable it to be kept in the field of view. However, a drop of water is convex on the top and causes too much distortion of the image.

The ideal method is to use a compressor. This is a brass and glass gadget with which a cover glass can be raised or lowered by means of a screw, to hold the drop of water on to the slide at whatever depth is needed to restrict the organism in the drop of water. This is very nice if you have a compressor, but if not, try this idea.

Obtain a piece of perspex about the same size as an ordinary 3" x 1" glass slide. This is to be our slide. Why

perspex? Well, a drop of water on an ordinary glass slide has the unhappy knack of spreading out and leaving the prize specimen high and dry or even to one side where it is not wanted, whereas a drop of water on perspex remains a nice little round drop regardless of size.

Protect the bottom side from scratches by fixing thin plastic to each end, or just wrap a few layers of Durex around each end and protect both sides. Place a cover glass in the centre of the slide and run a fine scratch around it. This will give you the position of your cover when it is in place.

Now roll out a small piece of plasticine until it is the thickness of a match, cut it into lengths a quarter-inch long and place three pieces on the slide so that the cover can rest on an eighth-inch of each little roller, spaced around the area the cover will encompass. Press the rollers so that they stick to the slide.

Now pick up your specimen with a pipette and place it in the centre of the area in a suitable sized drop, lower the cover glass on to the drop and on to the plasticine rollers, and gently press with a match over each roller in turn until the specimen is nicely held in position between the cover and the slide.

Vary the thickness of your plasticine rollers to suit the depth of the drop that is needed. If the perspex becomes marked, it can be polished by rubbing it on a felt pad dampened with Brasso.

Field Naturalists Club of Victoria

General Meeting — March 9, 1964

Mr M. K. Houghton was the chairman, and about ninety members and friends attended.

Mr D. E. McInnes and Mr W. C. Woollard were presented with certificates of honorary membership by the president, who said that by their work in providing club microscopes, they had greatly stimulated interest in natural history. Mr Woollard, in responding, said that the work had developed beyond their original dream. One hundred and seven microscopes had been sold and thirty-six more were being constructed. Mr McInnes said that the microscope had been an infatuation with him, and that Mr Woollard had kept the standard of construction up.

The subject for the evening was "Crops and Pests in the Sudan", by Dr H. R. Schurr. Using a clear map, he explained the position of the Sennar Dam and the extensive Gezira and Managil cotton projects between the White Nile and Blue Nile, south of Khartoum. Aerial views of a patchwork of holdings in the quarter million acres of the Gezira cotton area emphasized the extent of the cotton projects. Colour slides illustrated differences between eroded desert. Dr Schurr outlined the succession of thrips and, in dry conditions, jassids, which turn the cotton crop red. He described humid conditions bringing white fly, making honey-dew, which sticks the cotton threads, and aphids following the honey-dew. Pictures of the Nile hyacinth, blocking river traffic, and masses of *Salvinia*, introduced to hide water areas during the war and now ruining fishing on the Zambesi, showed the pest potential of these beautiful plants.

Mr R. Condron thanked Dr Schurr for the most interesting and informative talk.

Mr McInnes, on behalf of the club, presented Mr Houghton and his fiancée, Miss Joy Sladin, with a case of cutlery, and expressed the best wishes of members for happiness in their approaching marriage.

The secretary read a letter from the Western Australian Minister of Lands, stating that the aim for preservation of vegetation was to keep twenty per cent of newly developed areas for reserves. In reply to a letter from the F.N.C.V., pointing out the damage caused by milling in the Mansfield area, the Minister for Forests in Victoria said the matter was being investigated and that the club would be advised at a later date.

Eleven new members, whose names appeared in the March *Naturalist*, were elected. Nominations for the new council were requested, and they must be in hand by the April general meeting.

Mrs W. Woollard reported that she had recently seen pink heath and correa coming out in profusion at Bishop's Rock, and that it would be destroyed if the proposed motel is built at the Promontory.

Exhibits included correa brown butterflies *(Oreixenica correae)* from 4080 feet elevation on Donna Buang (R. Condron); opal from about 80 miles NE of Port Augusta (Mrs M. North); rock sections and the abdomen of a diamond beetle under club microscopes (D. E. McInnes and W. C. Woollard); and velvety galls from *Acacia pycnantha* at Point Addis, containing larvae of an unidentified moth (E. H. Coghill).

Marine Biology and Entomology Group — February 3, 1964

The meeting was attended by twenty-three members, with Mr R. Condron in the chair. As this was a members' night, many exhibits, collected over the holiday period, were displayed. These included the following items:

Mr E. H. Coghill showed a specimen of the Diamond Weevil *(Chrysolophus spectabilis)* and said that the species was one of the first Australian insects to be scientifically described.

Miss L. M. White showed the larva of the Painted Apple Moth and commented that it was commonly known as the "toothbrush caterpillar".

Miss E. Macfie displayed some shells, including a fine specimen of a tun shell, a pearl oyster (family Pteriidae) and a razor shell of the family Pinnidae.

Mrs Z. Lee showed a small murex from Mallacoota.

Master E. Blackmore exhibited a well-arranged collection of top shells which, with one exception, had been found in Victoria.

Mr R. Condron showed several specimens of the Imperial Blue Butterfly *Jalmenus evagoras evagoras)* which he had bred out from pupae. He exhibited a swallowtail butterfly taken at Griffith, New South Wales, and explained that the larva was a pest on citrus trees there.

Botany Group — February 13, 1964

Although the record attendance at this meeting was primarily due to misadvertisement, it was soon obvious that the great majority present were entirely captivated by Mr B. Fuhrer's expert presentation of slides and commentary on the botany of Portland district. Orchids, seaweeds and fungi were illustrated.

Items in general business called for a wide range of discussion, and decisions were made about contributions to the *Victorian Naturalist*, the operation of our library and book committee, the activities of the group in the nature show committee programme, and the determination of species represented in the slide library. Problems associated with the production of Miss Galbraith's new edition of *Wildflowers of Victoria* were brought to our attention; after which a worthwhile and eventful evening was brought to a close.

Geology Group—February 5, 1964

Thirty-two members and visitors were present, with Mr L. Angior in the chair.

Mr F. Bindon, of Nowra, NSW, wrote asking for exchange of fossils, especially graptolites. Letters were also read from Mr L. Bairstow, relating his travels in Greece and Yugoslavia. The chairman read a list of geology books missing from the library, and requested their return if possible. Preliminary arrangements were made for an excursion to Narre Warren Quarries during March.

The subject for the evening was "Holiday Reminiscences", and the following items were presented. Miss N. Carstairs: Colour slides of Central and West Australia, including Nullabor Plains; Cape Eyre; chalk-pit from which aborigines took ochres. Mr E. Daws: Aerial pictures of Macdonnell Ranges and Lake Amadeus; stalactites in Princess Margaret Caves. Mr D. McInnes: Pictures taken on excursion to Mount Buller, showing granite, basalt and hornfels; conglomerate at Power's Lookout; under microscope, samples of Devonian basalt, showing crystals of olivine altered to serpentine. Mr A. McCay: Slides of Flinders Ranges, featuring Wilpena Pound. Mr. D. Hemmy: Folded Ordivician sandstones at Mallacoota, and scenes taken on excursions to Bacchus Marsh, Royal Park and Studley Park. Miss P. Carolan's map of Mount Buller area, with notes attached, was also on exhibit.

Exhibits: Slate with pyrites, quartz crystals, iron concretions from Stawell area (Miss L. Bennett); mica and beryl in quartz, from Triple Chance Mine (N. Wigmore); agates, chalcedony, jasper, turquoise and wavellite crystals in phosphate, silicified material from Mansfield and Beechworth areas (R. Davidson); marble, selenite crystals, manganese ore, bitumen from Iran and Greece (L. Bairstow); agates for cutting from Benalla, silicified material for distribution to members for polishing (R. Dodds).

The evening was most enjoyable, and it was gratifying to note the number of new members taking part.

Microscopical Group—January 15, 1964

Mr D. McInnes acted as chairman, and there were twenty-eight visitors and members present. The group discussed a plea from the editor of the *Naturalist* for more material, and members promised to supply at least one article monthly on microscopy.

The subject for the evening was "Section Cutting and the Staining of Botanical Specimens". This proved most interesting and the excellent attendance showed that it was a subject that most members wished to know more about. The speaker, Mr W. Evans, brought along the equipment needed for section cutting and

staining, along with reagent and stains. Members formed a circle around the demonstrator and were able to watch the operations of fixing, cutting and staining. The speaker distributed to each person present a copy of the procedure and formulae used.

Sections made and mounted under these difficult demonstration conditions were viewed under microscopes and proved to be first class.

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

GENERAL MEETINGS

Monday, April 13, 1964—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, reports, announcements, correspondence.
2. Subject for Evening: "The Euro", by Dr E. H. Ealey.
3. Election of Members:

Ordinary Members:

Mr Robin Bliss, 190 Heatherton Road, Noble Park.
Miss Rosalie M. Coomer, 14 Duff Street, Sandringham, S.8.
Mr Brian S. Edwards, "Heathbank", Kingston Road, Heatherton, S.22. Interests: Birds and Mammals.
Mr Frank Hill, 34 Manning Road, East Malvern. Interest: Geology. (Introduced by Mr D. E. McInnes).
Mr David Stout, 82 Stanhope Street, Malvern, S.E.4. Interest: Microscopy. (Introduced by Mr D. E. McInnes).
Miss Lucia A. Walton, P.O. Box 90, Box Hill. Interests: Marine Biology, Fauna Survey.

Country Members:

Mr Percy Reeves, 10 Acacia Road, Hawthorndene, S.A.
Mr Allen Rothwell, 1 Bonnie View Street, Cronulla, NSW. Interests: Orchids.
Mr William J. Edgar, P.O. Box 19, Nyah.

Joint Country Members:

Mr and Mrs Stanley F. Blott, 7 Allambi Road, Talgdale.

Junior Member:

Michael J. Edgar, P.O. Box 19, Nyah.

4. Nominations for Membership.
5. Nominations for Council and Office-bearers for 1964-65.
6. General Business.
7. Nature Notes and Exhibits.
8. Conversazione.

Monday, May 11—Members' Night: Mount Buller.

GROUP MEETINGS

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

Wednesday, April 15—Microscopical Group.

Friday, April 24—Hawthorn Junior Club, at Hawthorn Town Hall, commencing 8 p.m. How to Make a Rock Section, by D. E. McInnes.

Monday, May 4—Entomology and Marine Biology Group.

Wednesday, May 6—Geology Group.

Thursday, May 7—Fauna Survey Group. At Fisheries and Wildlife Department, commencing 7.45 p.m.

Thursday, May 14— Botany Group, Members' Night.

F.N.C.V. EXCURSIONS

Sunday, April 19—Mount William (Lancefield). Leader: Mr. R. Hemmy. The coach will leave Batman Avenue at 9 a.m. Private cars can join the party at Lancefield at 10.30 a.m., then proceed along Pyalong Road for 7 miles to lane to north of the mountain. There is an easy half-mile walk to reach the aboriginal quarries. Bring one meal and a snack. Fare 15/-. Bookings with excursion secretary.

F.N.C.V. Library—Missing Books

Section: Travel; exploration; general topics

Book No.	Author and Title
E1/3	I. Lee: Early explorers in Australia
E1/15	Barnard: History of Kew
E1/16	Journal of a naturalist
E1/18	Smiles: Life of a Scottish naturalist
E1/19	Audas: One of Nature's wonderlands
E1/21	Chambers' Scientific Reader
E1/30 and 31	Spencer: Wanderings in Wild Australia, 2 vols.
E1/38	Leach: Australian nature studies
E1/39	Marett and Penniman: Spencer's last journey
E2/6	In search of minerals
E2/20	Darwin: Journal of a voyage around the world (copy 1)
E2/24	Miell: Object lessons from nature
E2/25	Ellis: Ocean Island and Nauru
E2/32	Conigrave: Northern Australia (copy 2).
E2/35	Campbell: Cook
E2/38	Roughley: Wonders of the Great Barrier Reef (copy 1)
E2/45	Shepherd: Science marches on
E2/54	Idriess: The great boomerang
E2/62	Pritchard: Old Yarra history
E2/66	Honig and Verwood: Science and scientists in the Netherlands
H1/1 and H1/2	Australian Encyclopaedia, 2 vols.
H3/4	Sowerby: Aquarium
H3/5	Woodward: Manual of mollusca
H4/5	Rayment: Profitable honey plants of Australia
H4/6	Learmonth: Portland settlement
H4/10	Strehlow: Aranda traditions
671	Hyett: Bushman's harvest
A1/6	Ball: Story of the heavens
A1/14	Madigan: Central Australia
A2/3	Miller: Footprints of the Creator
A2/10	Jeans: Through space and time
A3/21	Wood Jones: Coral and atolls

This is merely a selection of books missing from the section. Members holding any books or periodicals from the library are urged to return them as soon as possible, both out of consideration for fellow-members and to avoid the necessity of further action being taken for recovery or replacement. Any information as to the whereabouts of missing books or periodicals would be welcomed by the club librarian or the appropriate group librarian.

ADDENDUM

The following should be added to the caption on page 347 (vol. 80) of the *Vict. Nat.* for March 1964:

1. Fringed Helmet-orchid *(Corybas fimbriatus)*
2. Purple Helmet-orchid *(C. diemenicus)*
3. Small Helmet-orchid *(C. unguiculatus)*
4. Stately Helmet-orchid *(C. dilatatus)*
5. Spurred Helmet-orchid *(C. aconitiflorus)*