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Editor: NORMAN WAKEFIELD, B.Sc.

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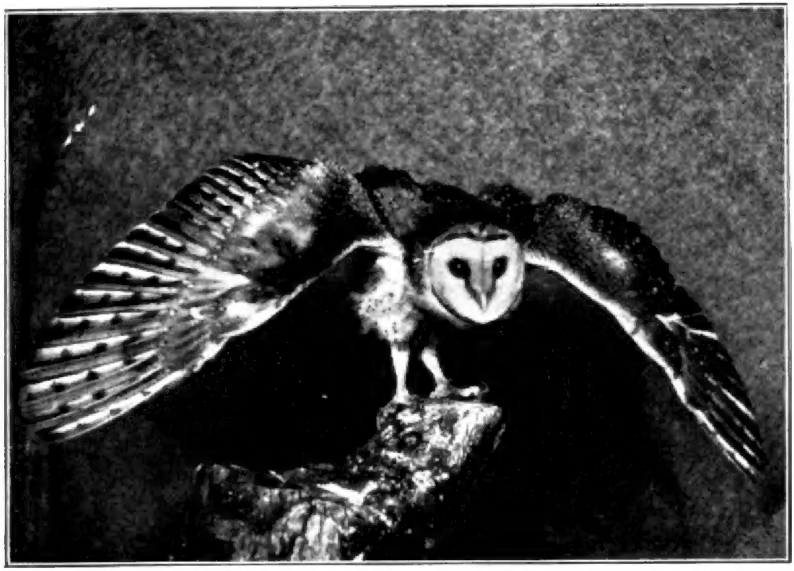

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The Victorian Naturalist

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Front Cover:

This is the Barn Owl, *Tyto alba*, in an attitude of defence. The species is world-wide in distribution, and it is one of our common nocturnal birds of prey. Because of the soft colours of the plumage, it used to be known as the Delicate Owl.

The photograph was taken by David Fleay and it appeared in the *Victorian Naturalist* in January 1941 (Vol. 57, page 164) accompanying an article "Notes on the Barn Owl" by D. J. Dickison.

FORLORN HOPE AND REEDY RIVER

By NORMAN WAKEFIELD

Twenty miles east of Omeo lies a hundred or more square miles of subalpine tableland known as the Nunniong Plateau. It is the catchment area of tributaries and headwaters of the Tambo River on the west, and of the Buchan on the east.

The focal point of the plateau is Nunniong Plain, a square mile of naturally treeless meadow through which meanders the main head of the Tambo River, there a tiny stream only a few feet wide. Southward from the plain runs a Forests Commission jeep track which links with two fairly good Commission roads, one coming up from Buchan and the other from Ensay. The latter serves the fire lookout on Mount Nugong and passes the spotter's house on a picturesque little clearing known as Bentley's Plain. North of Nunniong Plain the jeep track eventually crosses the Great Dividing Range to link with a similar road which connects the Benambra area with Wulgulmerang.

Besides these vehicle routes there is a network of bridle tracks. One ascends the scarp of the tableland from the Tambo valley at Bindi and reaches Nunniong Plain. Another runs westward from Gelantipy, across the Buchan valley and up onto the plateau to a cattleman's hut on the slopes of Mount Nunniong. This mountain is little higher than the surrounding country, but it reaches 5300 feet above sea level and is the highest point of the plateau.

North of Mount Nunniong the main tableland is terminated by the valley of the Reedy River, which begins at a 4500-feet watershed and runs easterly for eleven miles, as the crow flies, to meet the Buchan River at a spot less than 2000 feet above sea level. It is the deep Reedy River valley in particular that cuts the Nunniong Plateau off from the highlands of the Wombargo-Cobberas area farther north.

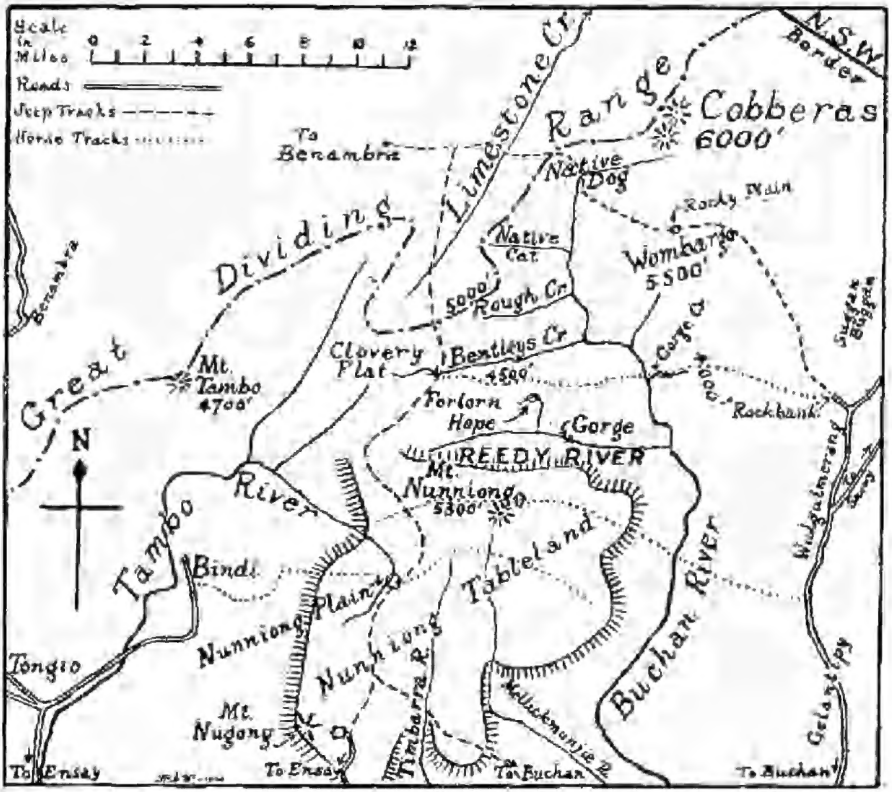
In the early days the Reedy River area was used a great deal for the forest grazing of cattle, and it still comprises part of a lease held by a country member of the Field Naturalists Club, Mr. Keith Rogers, of "Rockbank", Wulgulmerang. However, few or no cattle have been run there in recent years. People familiar with the Nunniong country refer to the "upper Reedy" and the "lower Reedy", for the two parts of the valley are separated by a tract of cliff country which has always been skirted by horsemen.

Some years ago I discussed with Mr. Rogers and his son John the idea of exploring the rocky central tract of the Reedy River, and plans were made to visit it. On January 13, 1959, I accompanied John in his Land

Rover, with equipment and provisions, from "Rockbank" to Buchan, then *via* the forestry road to the tableland, across the Timbarra River, past Nunniong Plain and north to a small glade known as Clovery Flat. The gear was unloaded there and John took the Land Rover on, across the Divide to the Benambra-Wulgulmerang track which was then followed back to "Rockbank". This was a round trip of about 110 miles.

In the meantime, Mr. Rogers had undertaken a twenty-mile ride across country, bringing a spare horse. He arrived towards evening, the horses were yarded and camp made for the night in the open under the stars. Clovery Flat is at about 4500 feet elevation, where the jeep track crosses a head of Bentleys Creek[1], the next main tributary of the Buchan north of Reedy River. It had been chosen as a depot because there was a pole yard there where horses could be left of a night.

Along the creek are typical alpine sphagnum moss-beds, and the surrounding forest is mainly of Snow Gum (*Eucalyptus pauciflora*). In the creekside vegetation there were runways of



Locality Plan of Nunniong-Cobberas Area

small animals, and two which were caught and examined proved to be the Allied Rat (*Rattus assimilis*). A second small native mammal may be recorded for the spot, for the remains of three Yellow-footed Marsupial - mice (*Antechinus flavipes*) were found in a large metal chaff bin which had been left there probably by road-construction workers.

Next morning we rode east for about five miles along the Bentleys Creek-Reedy River watershed. A brumby track followed the top of the spur through pleasant open Snow Gum forest and wild horses were encountered here and there. Then came a descent through a good stand of Alpine Ash[2] (*Eucalyptus delegatensis*) and Candlebark Gum (*E. rubida*) to a delightful open area which is commonly called Forlorn Hope Plain for some long-forgotten reason.

A creek of the same name flows placidly through the plain, but less than a mile away it cascades and falls down precipitous rock faces before making its way to the Reedy River, a further mile away and almost 2000 feet below. Near the creek above the cliffs there was an example of the rare Moonwort[3] (*Botrychium lunaria*), and a second one was found later below the scarp a little farther east. The cliffs were followed westward until a break occurred and the horses were led down, often sliding on their haunches amongst loose rocks. With the constant risk of a major *cul-de-sac*, the jumble of rock outcrops was eventually negotiated, the descent was continued through a scrubby forest of Common Peppermint (*Eucalyptus radiata*) and the river reached in time to boil the billy for lunch.

We rode down the valley then for about two miles, crossing the lower part of Forlorn Hope Creek on the way, to a point opposite an area of steep cliffs. The most interesting plant on the way was Alpine Bossea (*Bossiaea bracteosa*) which grew abundantly at little more than 2000 feet elevation.

After tethering the horses we crossed the stream and explored the cliffs. They were of fine-grained quartzite and bore a great variety of shrubs, prominent among which were Sticky Boronia (*B. anemonifolia*), Box Micrantheum (*M. hexandrum*) and the tea-tree, *Leptospermum sericatum*[4]. Two botanical rarities were present, too: a large spreading prickly ground-berry heath, *Acrotriche divaricata*, which is scattered in the Snowy-Buchan area though only recently added to the known census of Victorian plants[5], and a species of *Grevillea* of similar habit which occurs also in the Omeo district but as yet has no scientific name.

Then came the arduous climb back to Forlorn Hope Plain, by a route to the east of the more precipitous part of the escarpment overlooking the valley. Night fell as we left the plain so a detour was made to avoid the "woolly-butt" forest, and the six-mile ride back along the Forlorn Hope Top was accomplished in the dark.

The general impression gained from the day's excursion into the Reedy River valley was one

of disappointment. It seemed that the area between the upper and lower tracts did not contain anything of outstanding scenic interest. This idea, however, was due for drastic revision!

For January 15 it was decided to carry out a thorough investigation of the flora of Forlorn Hope Plain. A leisurely ride was taken along Forlorn Hope Top; there was an abundance of interesting vegetation of which a few conspicuous species may be mentioned. In the wet soil of drying waterholes on some of the little flats, Dwarf Buttercup (*Ranunculus millanii*) and Mountain Velleia (*V. montana*) were prominent, and in one place there was a quantity of Tiny Violet (*Viola sieberiana*). In rock outcrops, Tree Violet (*Hymenanthera dentata*) grew as a dwarf shrub in crevices, Bitter Cryptandra (*C. amara*) and Diggers' Speedwell (*Veronica perfoliata*) formed clumps, and there were occasional patches of Alpine Riceflower (*Pimelea alpina*). Larger shrubs included Mountain Pepper (*Drimys lanceolata*) and a recently recognized species of alpine beard-heath, *Leucopogon gelidus*[6].

Forlorn Hope Creek cascades and falls down the escarpment.

In several places along the spur, ground had been dug over by wombats, apparently seeking edible roots. There was evidence that some areas had received much attention over a long period. Wombats are very abundant in these highlands.

The main part of Forlorn Hope Plain is an almost treeless flat, irregular in shape, over a mile long and about half a mile across at the widest part. It has a bewildering variety of vegetation. Forlorn Hope Creek runs through the plain, winding here and there with hardly any fall in level. In places the waters are hidden by massed shrubs. Alpine Bottlebrush (*Callistemon sieberi*) is the largest, and smaller ones include Mountain Heath-myrtle (*Baeckea gunniana*), Swamp Heath, Coral Heath and Short-flowered Heath (*Epacris paludosa, E. microphylla* and *E. breviflora* respectively).

Elsewhere the creek meanders between open banks with short

grass and other small herbage. In such places there is a particularly large-flowered form of Mountain Gentian (*Gentianella diemensis*) and a showy bluebell, *Wahlenbergia ceracea*[7], which was officially named only very recently. Often the grass gives way suddenly to large mounds of sphagnum moss or even larger masses of Richea (*R. continentis*). The Richea, in full bloom with its myriad spikes of rich yellow obscuring its foliage, is certainly the floral show-piece of the area.

Back from the creek, in the slightly higher and less moist areas of grass, are patches of a little matted coprosma[8] (*C. niralis*), tufts of Mountain Cranes-bill (*Geranium sessiliflorum*) and an uncommon alpine rice-flower, *Pimelea biflora*[9], only recently named. It was interesting, too, to note numbers of a primitive little fern, the Adder's-tongue[3] (*Ophioglossum coriaceum*). A few wild horses had been grazing on the plain when we reached it and their wallowing places or "dust baths" were apparent here and there.

Although Forlorn Hope is little over 4000 feet above sea level, its open grassy areas are brightened by the usual association of alpine composites. Among those blooming at the time were Silver Daisy (*Celmisia longifolia*), Yam (*Microseris scapigera*) and Erect, Tufted and Field Daisies (*Brachycome aculeata, B. scapigera* and *B. decipiens* respectively).

Several orchid species were noted: Alpine Leek-orchid (*Prasophyllum alpinum*), Swan Greenhood (*Pterostylis cycnocephala*) and Blunt-tongue Greenhood (*P. obtusa*) were flowering, and Golden Moths (*Diuris pedunculata*) had just finished. More interesting, however, were a dozen spikes of the tiny Archer Leek-orchid (*Prasophyllum archeri*) in one grassy patch. The simultaneous flowering of two orchid species which normally appear in autumn and spring respectively, Archer Leek-orchid and Swan Greenhood in this case, brings to mind similar cases, recorded several years before on the Nunniong Plateau, where Parson's Bands (*Eriochilus cucullatus*), normally an autumn species, and Swan Greenhood each flowered in January[10].

That was a perfect day, the weather was pleasantly warm, the area was delightful with its peace and natural beauty, and we were able to enjoy it all unhurriedly.

On the morrow we returned early to Forlorn Hope Plain. I proposed to complete the botanical survey of the place and then to explore the falls where the creek went down the escarpment. Mr. Rogers, however, elected to go on and explore the Reedy River downstream from the spot we had reached on January 14.

The census made during the two days, of vascular plants on Forlorn Hope Plain, stands at 137 native species and several introduced ones. This number is very interesting, for it is the same as the total listed just ten years before on Rocky Plain, a similar subalpine meadow area about ten miles to the north-east, near the Wombargo Range. Of

course there were many species not common to both lists.

Where Forlorn Hope Creek begins to cascade down over the escarpment, there is a wealth of rock-loving shrubs. The tea-tree, *Leptospermum grandifolium*[4], typical of alpine streams, was dominant, while Royal Grevillea (*G. victoriae*) and Tree Lomatia (*L. fraseri*) were prominent.

Further down there was an almost vertical waterfall of perhaps a hundred feet. Below this, on moist sheltered ledges, two unusual ferns were growing plentifully: Common Spleenwort (*Asplenium trichomanes*) and Brittle Bladder-fern (*Cystopteris fragilis*)[3]. The former is a world-wide species which is anything but common in Australia, and the latter is known from only four other Victorian localities. Snow Daisy (*Brachycome nivalis*) and Royal Bluebell (*Wahlenbergia gloriosa*)[7] were there too, though the elevation of about 4000 feet is well below their usual habitats.

Mr. Rogers reached camp very late that night having again made the ride along the Forlorn Hope Top after dark. He had a very exciting story to tell, of the discovery and exploration of a spectacular gorge where the Reedy River made its way through a narrow chasm cut into what appeared to be an unbroken rock wall across the valley. He reported that the passage was no more than ten feet wide in places, with overhanging walls, and that he had eventually climbed round to the top of the higher side and found it to be 600 feet almost sheer above the river.

It must be admitted that hearing all this filled me with a feeling of frustration, for the purpose of the expedition had been to discover and investigate such a place. I had missed seeing it though we passed within a mile of it two days before, and it was necessary to return to "Rockbank" the following day. As it turned out, almost a year was to pass before a second excursion was organized and this matter rectified.

The ride back was to be a long one, over about thirty miles of mountainous country, so an early start was made next morning. Instead of the direct track back, past Forlorn Hope and across the Buchan valley to Wulgulmerang, a route was taken northward across heads of Bentleys Creek then along the main watershed. The Great Dividing Range ran north-easterly for a few miles at about 5000 feet elevation, and it had some very fine outlook points. To the east lay the valley of Rough Creek[1], the next tributary to the Buchan, and to the west the valley of Limestone Creek, which is perhaps the true head of the Murray River. We went down on the western side, then recrossed the Divide to the head of Native Cat Creek, which flows east to the Buchan. In that locality are patches of Richea but, though scattered in the Nunniong area to the south, this attractive heath does not seem to occur anywhere in the Cobberas-Wombargo area to the north and east of Native Cat.

Thence it was three miles north-east to where the Benambra-Wulgulmerang jeep track

traverses Native Dog Flat by the upper Buchan, and this road was followed, *via* Rocky Plain and other areas of subalpine meadow, to skirt the Wombargo Range and follow Omeo Creek and then Little River down to "Rockbank".

Notes

1. On the Department of Lands and Survey topographical map "Cobberas C", the name Bentley Creek has been applied to Rough Creek. The latter is a shorter stream, parallel to the former and further north.

2. Locally referred to as "woolly-butt".

3. For illustrations and information about these species, see *Ferns of Victoria and Tasmania*.

4. Previously known as Slender Tea-tree (*L. attenuatum*); but see *Vict. Nat. 72*: 44-45.

5. Ref. *Vict. Nat. 72*: 109.
6. Ref. *Vict. Nat. 73*: 59.
7. Ref. *Vict. Nat. 72*: 165-169.
8. Ref. *Vict. Nat. 53*: 120.
9. Ref. *Vict. Nat. 73*: 212.
10. Ref. *Vict. Nat. 70*: 28.

(To be concluded next month, with details of a second expedition and a day in the Reedy River gorge.)

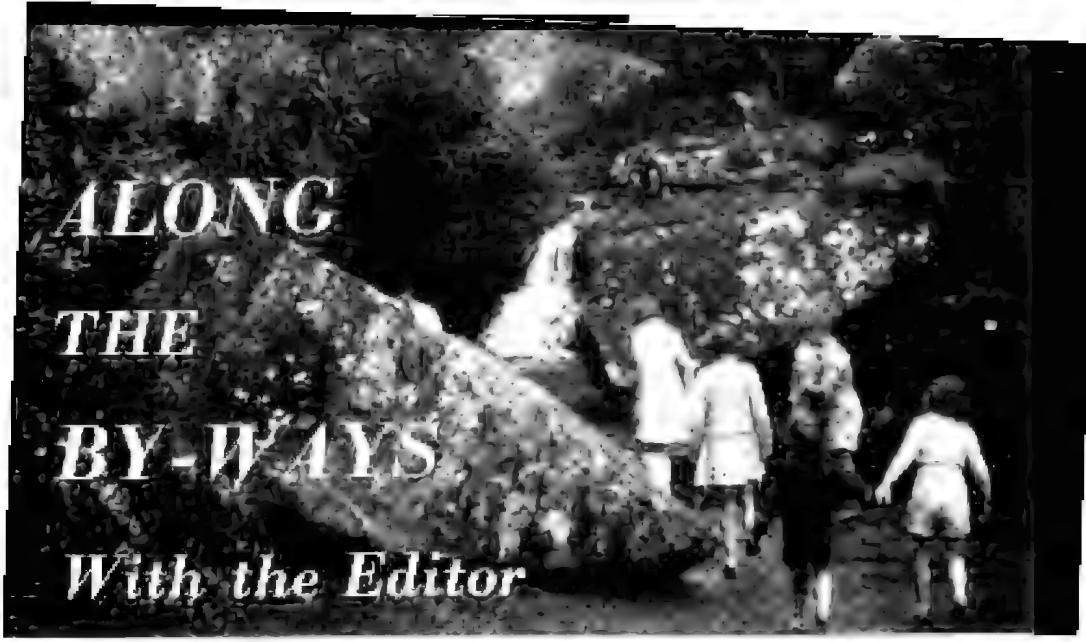
An Invitation to Readers

All readers are invited to contribute to the *Victorian Naturalist*. Here are some suggestions:

(a) Major articles of 1000 to 3000 words, with photographs.
(b) Short articles, preferably illustrated, of under 1000 words.
(c) Nature notes, queries and specimens for identification.

Three times in the past year, the *Naturalist* went to press smaller in size than was originally planned, because insufficient contributions were to hand. In the present issue, all remaining items suitable for "Along the By-ways" have been used up.

Readers, if the editorial kettle is to be kept boiling, it is up to you!



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.

Modified Method of Mounting Opaque Objects

It is pleasing to have a contribution dealing with microscopy. We do not hesitate to include notes on this subject in "Along the By-ways". The microscope provides a pathway to a fascinating world of nature study, one that is neglected by many. Dr. R. M. Wishart sends this interesting observation:

Both professional and amateur mounters universally employ the conventional black background when mounting opaque objects for the microscope. This method is undoubtedly excellent for all brilliantly coloured subjects and cannot be improved upon for the majority of slides of this type. But some very interesting and instructive objects are too drab or too dark in colour to stand out sufficiently on the commonly employed black background.

While mounting the head of a "jumper" (or Hopper Ant) recently, to demonstrate the formidable jaws, it became evident that the normal mounting technique fell far short of expectations. Using a Jade Velspar lacquer to coat the inside of the cell, a light green base was substituted. With this innovation, and using a different top-lighting, the results obtained in selected cases fully justify this method.

Spangled Drongo at Mallacoota

In August last, in these columns, an outline was given of the several times this bird has been recorded in Victoria. A further report is included in a letter from Mr. W. Hunter, of Mallacoota, who writes:

I am fairly sure that a strange bird seen early this month by one of the school-children, David Allan, was a Spangled Drongo. He borrowed my bird book (Cayley's) to find out what it was, and when he told me that there was no bird pictured in the book that was anything like the one he had seen, I asked him all about it. Knowing David as a really keen

young nature student, I have practically no doubt that the bird he saw was a Spangled Drongo, from his description.

By the rules of bird recording this report must be regarded as unconfirmed; it is interesting nevertheless. Cayley's illustration is certainly unlike the bird in life, and the time of this latest observation fits the season of the previous southern records of the species. The Spangled Drongo has been noted in East Gippsland in May 1885, May 1926, winter 1938 and April 1958. Perhaps it visits the Mallacoota area fairly regularly in the autumn.

Longevity of Chocolate Lily

Here is a note from Miss Jean Galbraith, of Tyers, Gippsland:

In the *Naturalist* (Vol. 64, p. 60) in July 1947, I wrote of a plant of the Chocolate Lily, *Dichopogon strictus*, which had come up and flowered in our garden path. Twelve years later it is flowering still, and, as I mentioned in 1947, it is very likely that it has been flowering every year since the path was made, about 1917.

It is not in a position where increase is easy, but three years ago a seedling did spring up, so there are now two plants, the old one still much the larger and stronger.

Specimens for Identification

From Roselyn Thompson, of Camberwell Girls' High School, comes a female example of *Monophlebus crawfordi*, our largest species of "mealy bug". The group is so named because its members protect themselves with a white mealy or felty secretion instead of a hard covering as is normal with scale insects. The specimen was found "at Kyneton . . . underneath a gum-tree"; and "at first it had a whitish furry film over it". It is almost three-quarters of an inch long, oval, wingless and with only minute legs, and deep orange in colour with purplish-brown markings. This species favours smooth-barked eucalypts and often attaches itself half under loose bark. The female produces fine woolly strands to protect her eggs and herself. The males of mealy bugs are two-winged and usually have a woolly fringe of fine filaments at the end of the abdomen.

From Jennifer Ault, also of Camberwell Girls' High School, there is an example of *Eurymela lineata*, a jassid or leaf hopper. It is wedge-shaped, a centimetre long, and of it Jennifer writes, "It is most spectacular, having red legs, purple underwings, and upperwings bronze splashed with white". This insect belongs to a group of genera which live on green eucalypt branches and, like the tree hoppers (membracids), they are generally attended by ants. These hoppers, and the mealy bugs too, all belong to the order Hemiptera.

Notes on the Apollo Bay Excursion

Mr. Trevor Pescott, of 114 Nicholas Street, Newtown, Geelong, who is a country member of the F.N.C.V. and also a keen bird observer, writes seeking "all possible information" about the Fairy Penguin which nested at Apollo Bay, mentioned in last month's *Victorian Naturalist* (Vol. 76, page 318). Could any member who was on the excursion please supply additional information and, if possible, the name of the "local who was guarding the nest carefully"?

Mr. Pescott commented on the Pilot-bird, mentioned on the same page. As this species is not authentically recorded from anywhere west of Melbourne and the species is neither migratory nor nomadic, it would be best to regard this case as one of mistaken identity.

Mr. A. G. Hooke asks that the location of Crayfish Bay, mentioned in the March *Naturalist* (Vol. 76, page 278, line 34), be corrected to read "two miles *east* of Cape Otway".

Balcombe Bay — A Classic Area for Victorian Geology

By E. M. Davies

Balcombe Bay is part of the coastline of the Mornington Peninsula, which is an offshoot of the Southern Highlands, to the east of Port Phillip Bay. Alexander Beatson Balcombe, after whom the bay was named, was the son of William Balcombe of the East India Company. William was purveyor to Napoleon during his captivity on the island of St. Helena, but later he settled at Port Jackson with his family. In 1840 Alexander inspected land near what is now Mornington, and he was granted a leasehold by the New South Wales government. The aborigines, of whom there were many, on account of the availability of sea-food, called the area "Chen-Chen-Gurruk", which means "the noise of frogs". However, Balcombe called his property "The Briars", after the home where he was born on St. Helena.

It was the custom that such tracts of land as "The Briars" were leased from the government for a certain period, after which 1000 acres remained the property of the lessee. There were practically no other occupants on the Peninsula except the McCraes on Arthur's Seat and the Baxters on Baxter's Flat, the nearest neighbours on the north being at the site of Moorabbin, 28 miles away. In the literature, letters and maps of that period, the Mornington headland and area was designated as either Snapper or Schnapper Point.

Alexander Balcombe settled down on his property, which in his opinion was "*Bad for sheep, fair for cattle, good horse country*" (Brookes). He became one of the first trustees of the Church of England schoolhouse, and his generosity is evidenced by this plaque on his memorial at the entrance to Mornington Park:

Memory of
Alexander Beatson Balcombe
Early Pioneer and Benefactor
Where this fountain is erected
Was his leasehold station
From the Crown in 1843
Then called Cheehingurk

A Commercial Enterprise

Balcombe Bay has always been of considerable interest to geologists, both here and overseas, as portion of it discloses horizontal strata of Tertiary age where excellent fossils are abundant and easily accessible. This particular area is 1½ miles south of Mornington township and is called Fossil Beach. Previously it was known as Cement Beach, on account of wells, water vats, grinding mills, furnaces, a jetty and "some stone huts for Habitation" being built there for commercial purposes. In 1941, the Rev. George Cox, who is remembered for his work in helping foster in children a love of nature, published in the *Peninsula Post* some interesting articles regarding the cement works. On October 1, 1861, a Melbourne architect, James Robertson, applied for a patent for "*improvements in the manufacture of hydraulic and other cements from certain indurated marls called septaria, indigenous to the colony of Victoria*". Three months later a public notice appeared warning parties against removing septaria from the coast at Mornington or south of Geelong, "unless authorised". It was signed by James Robertson, manager.

In the Melbourne *Argus* of October 18, 1862, an article stated that:

The patent septaria works at Schnapper Point . . . are now in full work and supplies of the cement have this week been placed on the market. Four hundred barrels can be supplied weekly and if the Builders and Contractors can be satisfied with the cement, the imported will speedily disappear as an item in the manifests of ships arriving from England. Encouragement at the hands of the public is all that is necessary to foster this deserving enterprise.

The Rev. George Cox comments:

But alas! encouragement was not forthcoming. There appear no advertisements or records of sales in the Melbourne newspapers and our own esteemed townsman Mr. Thom. Green positively asserts that the material was never produced and put on the market, as the capital ran out before the works were completed.

First Geological Report 1854

Just over a century ago, Selwyn, the first director of the geological survey of Victoria, published a report with maps on the country between Western Port, Cape Schanck and Point Nepean. In it he stated that the best sections of the Tertiary formations were to be seen on the coast between Tangenong Creek (the first creek south of Frankston) and Mt. Martha, *"exposed in cliffs, in places upwards of 200 feet in height. Both the clays and limestone are very rich in fossil remains and both in general lithological character, mineral and organic contents bear a striking resemblance to the clays and associated calcareous nodules of the London and Hampshire basins"*. In a later report he placed *"the blue clay with selenite and characteristic fossils on the east coast of Port Phillip"* as Eocene. During Selwyn's seventeen years as director, over sixty geological maps were issued. These were among the best of their period and compare very favourably even with today's standards.

Locality Map of Balcombe Bay District, Victoria, Australia.

The Balcombe Bay section has been listed by early geologists under many names: east coast of Port Phillip, Mornington, Schnapper Point, Mt. Martha, between Mt. Eliza and Mt. Martha, and even Hobson's Bay. In 1872 Brough Smyth, that despotic Secretary for Mines, mentioned that he gave some fossils to McCoy for classification and he placed them in the Upper Oligocene because of their similarity to species found in Belgium, northern Germany and southern England. Although Brough Smyth did much work in connexion with our gold-bearing strata, he is mainly remembered for his monumental work, *The Aborigines of Victoria*.

Early Workers on Balcombe Bay Strata

There is very little geological literature, either scientific or popular, from the days when Victoria was being opened up that contains no mention of Balcombe Bay and its wealth of fossils. In 1887, Murray of the Mines Department mentioned *"some gigantic forms of Volutes and Cypraea, from the Oligocene grey clays with septaria"*. The fossils are mainly marine mollusca of which gastropods predominate, and there are many species of coral. Echinoderms and sponges are frequent—the spicules of the latter certainly make their presence felt.

It was in 1854 that Frederick McCoy took up his duties at the University of Melbourne as first Pro-

fessor of Natural Sciences. Not only was he an outstanding man in the scholastic field, but he also had vision and an untrammelled mind. Behind his courteous demeanour was the ability to get what he wanted. When he began his work at the University there were few students, and for many years he took classes in chemistry, mineralogy, botany, zoology, comparative anatomy, geology and palaeontology. His main interest was this last subject, and in spite of opposition, and a trifle surreptitously one must admit, he managed to get transferred to the University a small museum that was housed at the Crown Land Office. Later, the control of the museum was vested in the trustees of the Public Library, and the collection was moved to its present site.

As Government Palaeontologist, McCoy decided that the Geological Survey Report should not be limited to maps as formerly, but should contain figures and descriptions of fossil organic remains that would assist in the determination of geological strata. He called this publication the Prodromus of the Palaeontology of Victoria, and in the earliest decade the first mollusc figured was *Voluta hannafordi* (McCoy) *"from Warrnambool and the Tertiary Oligocene Clays near Mt. Martha"*. In 1936 at this later locality, Cudmore found a similar perfect specimen which is now housed in his famous tertiary collection at the National Museum.

The older tertiary marine deposits of Victoria were regarded by Tate and Dennant and by Hall and Pritchard as referable to the Eocene, but from 1866 McCoy maintained that these beds were post-Eocene. The latter was supported by Chapman and Singleton and many other geologists.

The Balcombian Stage

In 1902 Hall and Pritchard, in an effort to clear up many misconceptions both here and overseas, introduced the name Balcombian Stage. They wrote,

The clays and limestones of Balcombe Bay contain another distinct fauna. The beds are sometimes spoken of as at Mornington, but the locality we give is more exact.

In 1941 Singleton re-defined the Balcombian Stage as follows:

The richly fossiliferous marls are exposed chiefly between tide marks, but fossils become scarcer and more fragile in the cliff section, in which the marls have a thickness of about 35 feet. They are overlain by ferruginous sands and grits, with which the junction is sharp but even. Boring has shown the calcareous marl to persist for 35 feet, and to be succeeded in depth by sandy clays, sands and ligneous clays, and this apparently non-marine series is in turn underlain by basalt.

Extension of Balcombe Bay Beds

The thin Balcombian beds of the type locality become thicker towards the coast as shown by the Sorrento Bore, where Chapman reported 383 feet "representing upper-most part of the Balcombian". Precisely how much of this core is equivalent to the 72 feet (Singleton 1941) of the type Balcombian section has not yet been determined. At Balcombe Bay the top of the Balcombian strata is above sea level, while in the Sorrento Bore the top (according to Chapman) is 1310 feet below the surface.

To the north, the Balcombe Bay beds outcrop at Frankston, while in the Melbourne area they are represented by highly ferruginous strata of shallower water facies at Royal Park and Green Gully (Gill 1957, p. 179). The Balcombian is well represented in the Geelong district. Farther inland the beds are largely buried under basalt, but are locally exposed by river erosion and have been proved by bores. In the Hamilton district blue clays and brown sandy marls, very similar to those of Balcombe Bay, appear in Grange Burn, Muddy Creek and Violet Creek. Muddy Creek is one of the best known localities in the State for Balcombian fossils, particularly mollusca and bryozoa, the former comprising more than 400 species.

Fossils from Balcombe Bay

Characteristic Balcombian mollusca include *Limopsis morningtonensis, Cerithium apheles, Volutispina antiscalaris, Nautilus balcombensis, "Chalmys" dichotomalis, Eucrassa-*

tella dennanti, Turritella platyspira, Pterospira hannafordi and *Solutofusus carinatus*. That interesting pteropod, *Vaginella eligmostoma*, can be seen massed in various parts of the limestone. Amongst the larger foraminifera is *Amphistegina lessonii* and characteristic pelagic forms are *Globigerinoides transitoria* and *Orbulina suturalis*.

"*The section which has furnished the fauna of mollusca, foraminifera, etc., which characterizes the Balcombian Stage comes from the 10 feet of marl, 5 feet above and 5 feet below the top of bed "t" of Singleton's section (1941 p. 27).*" (Carter 1959).

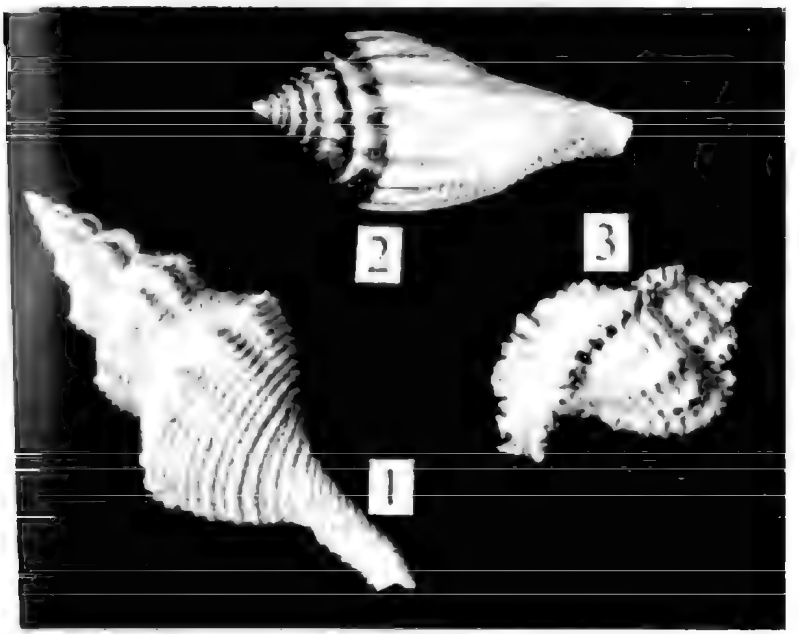
The upper 30 feet consists of selenitic and jarositic clays containing much quartz sand, in which the only fossils are *Ammodiscus* sp. and occasional moulds of mollusca.

Fish Otoliths

An interesting aspect of the Tertiary stratigraphy of Australia is the study of fish otoliths. Considerable difficulty is encountered when systematic identification of the Teleostomi is attempted owing to the almost complete absence of skeletons. There are usually only odd vertebrae, fish spines, teeth, etc., which might be assigned to widely separated genera. The difficulty can be largely overcome by the study of the fish otoliths ("ear bones"), which are usually found associated with other isolated fragments. Frost (1928) and Stinton (1957) described a number of species from Victoria, the majority being from Balcombe Bay.

Age of the Balcombian

The long history of exploration of Tertiary strata in Australia is marked by persistent controversy about the sequence as well as the age of the strata. The need for careful observation, full description of stratigraphic details and collecting from clearly described and measured areas was not always appreciated. It is still a debatable point as to whether the Balcombian is Lower or Middle Miocene. It is believed by some authorities that the first appearance of certain pelagic foraminifera will eventually form the basis for intercontinental correlation of Tertiary rocks and a reliable foundation for Tertiary geochronology. Progress be-



Fossil Gastropoda from Balcombe Bay, Victoria.

1. *Siphonalia longirostris* Tate.
2. *Volutispina antiscalaris* (McCoy).
3. *Chicoreus lophoessus* (Tate).

(About two-thirds natural size)

Photo: Meredith Warren

ing made with potassium—argon dating gives promise that help in world-wide correlations can be expected.

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National Parks and National Monuments—*5*

Churchill Park

By J. Ros Garnet

For Victorians, the era of the police trooper and black-tracker is little more than a memory, but in the closing decades of last century, those formed an important element in our civic organization and, in a way, we have to thank them for Churchill National Park.

On the southern slopes of the Lysterfield Hills, about eighteen miles east of Melbourne and less than three miles north-east of Dandenong, is the southern boundary of the last large piece of Crown land left near Melbourne, an area of little less than three square miles of unsettled bush and grassland. It is the former stud farm for police horses and the site of what were the headquarters of the Force's black-tracker detachment.

The easterly extension of Centre Road is known as Police Paddock Road, reminding us of its origin; and Stud Road, from Dandenong to Scoresby, is another reminder of the early days.

In 1940, representatives of the several adjoining shires, supported by some private organizations, persuaded the then Minister of Lands to have preserved a portion of the paddocks as a sanctuary for fauna and flora. The north-eastern portion was chosen for the purpose, an area of 476 acres, and thus Churchill National Park was created. This part was chosen because it was relatively well timbered and so was better equipped to harbour the type of fauna which was once widely distributed in the district.

The new park's committee of management planned to develop progressively the whole of the 1720 acres of the Police Paddock, restricting its activities at first to the smaller sanctuary area where it hoped to establish a representation of the original environment. The rest, undulating pasture land and sparsely timbered slopes, was envisaged as an outdoor recreation area complete with camping grounds, golf links, sports arenas, open-air theatre, swimming pool, youth hostel, administrative buildings and other amenities and appurtenances of modern recreational activities.

This was an unusual concept of the usage of a national park but, in view of its past history, it is doubtful if

a better plan could have been evolved. It is well situated for these purposes and, now that Dandenong has attained the status of a city, local interest surely will be stimulated to an extent that some of these projects can be commenced.

Public participation in developmental schemes for public recreation is something which has never been highly organized in this country, but here, at Churchill Park, there is ample scope for an endless amount of voluntary work in directions such as tree-planting, surveying, track-making, and even attempts to obliterate the defacements brought about by generations of cattle grazing, wood cutting, quarrying, and, of course, stud farming. Victorians will watch the growth of the scheme with considerable interest. It could be that the old Police Paddock will become something unique among parks and pleasuring grounds for the people of this fast developing State.

The present attractiveness of Churchill Park lies not in any features of supreme scenic value or of special scientific interest of the kind that one expects to find in a national park, but rather in the rural serenity of its wide acres. There, close to densely settled urban areas, is a domain akin to Wattle Park, which is one of the very few places within Greater Melbourne where a semblance of a natural environment remains.

Churchill Park is a place for quiet family picnics, leisurely rambles and those other outdoor activities dear to the heart of youth. All this may be changed when the plans are realized. The 476-acre fauna and flora sanctuary, dedicated as a perpetual reserve by Act of Parliament, cannot be lost, but the future of the remainder is not so certain. Will the pressing needs of an increasing population overtake it and cause it to be whittled away like Royal Park and certain other urban reserves?

EPILOGUE

(A footnote by the editor)

The answer to the last question is "No". Just over two years ago, following some local conferences and a deputation to the Minister of Lands, the remaining 1232 acres of the old Police Paddock east of Stud Road were permanently reserved. The area was divided into three parts and the control of each placed in the hands of one of the neighbouring municipalities: Ferntree Gully, 206 acres; Berwick, 355 acres; and Dandenong, 671 acres.

Dandenong has allocated some loan money for the commencement of the development of its portion. Recreation facilities are to be built on the 535 acres of comparatively high ground, and in the low-lying portion along Dandenong Creek there is to be a 136-acre sanctuary. The latter will be for water-fowl mainly, the idea being to form embankments to retain lagoons and marshlands.

The affairs of Churchill National Park are moving, too. A ranger has been appointed, a residence is about to be built for him, and tenders have been let for the first portion of an 8-foot chain-wire fence to encompass the whole park.

Sets and Back Numbers of "Victorian Naturalist"

The F.N.C.V. can supply individual bound volumes of the *Victorian Naturalist*, from vol. 1 (1884-5) to vol. 29 (1912-13) inclusive (except vol. 4). The binding may be variously board, cloth or half-leather, and in some cases, two to four volumes may be bound together.

Also available, from another source, are (a) vols. 17 to 57 inclusive, uniformly bound in cloth with spine lettered, and (b) vols. 19 to 74 inclusive, the series partly bound.

From the above, it is possible to obtain a bound set of the *Victorian Naturalist* from vol. 1 onwards, excluding vol. 4. The price would be about £70.

Note: It is the practice of the club to supply unbound copies of the *Victorian Naturalist* to members at half original price. Almost all back numbers are available, as far back as vol. 10.

Enquiries: Editor, *Victorian Naturalist*, P.O. Box 21, Noble Park.

Sallow Wattle—*Acacia longifolia*

This is the Sallow Wattle of the hills and heathlands, but in the sand-dunes it is the Coast Wattle. The two outwardly different plants are varieties of the same species. The extremes, to which the two names apply, certainly seem to be distinct species, in spite of the features they have in common. But at Lakes Entrance, for example, you may find every gradation between the two, so we know that they are but one wattle.

Typical Sallow Wattle is an erect bush, with rather erect phyllodes several inches long. The phyllodes are usually nearly a half-inch wide, rarely they are under a quarter-inch across, with clearly marked reticulate veins. The flowers form catkins—large, crowded flower-spikes, often over an inch long.

Sallow Wattle, *Acacia longifolia*

Narrow-leaf Wattle, *Acacia mucronata*, often grows with Sallow Wattle, especially in sandy places, but even from a distance one can usually distinguish the solidly handsome *Acacia longifolia* from the fairy-like *A. mucronata*. The latter has much narrower and often longer foliage, and the flowers are scattered along the spike, with each one separate from the next.

The typical inland form of Sallow Wattle does in places extend to the coast, but usually as one of its broader-leaved forms, the most extreme of which is Coast Wattle (*A. longifolia* var. *sophorae*).

Coast Wattle has the same thick light-yellow "catkins" and the same strongly veined leaves, but its habit is very different indeed from that of Sallow Wattle.

Everyone who has even casually noticed the plants of the Victorian sand-dunes must know Coast Wattle. You cannot see the bases of the stems or tell where the roots are, and it is impossible to determine by looking at a patch of it whether there is one plant or twenty, for sand-drifts cover the evidence. All you can see is a thicket, from a few inches to three feet or more high, of tough light-green foliage on stems pushing out of the sand. Often it appears to be creeping.

You cannot mistake that strongly veined foliage for any other. A phyllode up to an inch wide, narrowed to the base but blunt or very bluntly pointed at the tip, well equipped to stand drought and exposure. It is a hardy sand-binder that has curled light-brown pods when you visit the beach in summer, but it breaks in mid-spring into a radiance of light sunshine-yellow. No wonder it was not at first recognized as a variant of our narrow-leaved inland shrub, though the dense catkins are similar.

Nectar Flowers and Honeyeaters

By NORMAN WAKEFIELD

In the garden at Noble Park there is a massive Green Kangaroo-paw, *Anigozanthos viridis*. In spring it has about sixty flowering stems, the tallest of which is eight feet high. Every day, White-plumed Honeyeaters give the garden the "once over", probing into fuchsias as well as native flowers: grevilleas, banksias and other nectar producers. The kangaroo-paw receives a major share of attention.

Early last December, I noticed one of the honeyeaters which was typically coloured except for a conspicuously yellow forehead; in fact, the whole of the front of its head was yellow. The problem was solved by close observation of the bird as it fed. The yellow was due to a thick powder of pollen from the flowers of the kangaroo-paw.

The flowers of kangaroo-paws are so perfectly shaped for pollination by honeyeaters that one suspects that flower and bird have been associated for a very long time, that they have evolved together.

The corolla of the flower has a tube about an inch long, then a semicircle of six pointed spreading lobes. The tube is curved down a little and is split slightly on the lower side. This suits perfectly the curved beak of the honeyeater as it seeks the nectar that forms in the base of the tube. The six stamens have short filaments joined to the corolla tube near its mouth, and the anthers or pollen sacs are held in a half-circle. The anthers are about an eighth of an inch long and they split lengthwise along the lower or inner face. So the bird's forehead must come in contact with the open sides of all six anthers. Finally, a long style holds the stigma where it too will touch the bird's head just where the pollen has been left, and cross-pollination is effected.

The Australian flora is very rich in nectar-producing species. Eucalypts are the dominant trees in most of our forests, and gum-blossoms are often heavy with nectar. Other members of the myrtle family and many of the protea family (Myrtaceae and Proteaceae) in particular contribute their share, too.

The abundance and diversity of nectar-producing groups in our native vegetation are paralleled by the development of many species of honeyeaters. The Australian representatives of this family of birds number about seventy species. All have developed a bristly tip to the tongue, to brush the nectar from blossoms.

It is remarkable that lorikeets, too, have brush-tongues, for they belong to the parrot-cockatoo order of birds, not the perching bird order in which the honeyeaters are classified. This is a case of parallel evolution. Both our honeyeaters and our lorikeets feed on nectar, and they have both "grown up" with the Australian vegetation.

The White-plumed Honeyeater occurs in Western Australia as well as in the eastern states, but it is by no means the only member of the family that attends the kangaroo-paws. Spinebills and Yellow-winged Honeyeaters feed from these flowers in Victorian gardens, for instance. Hence, one would expect many species of honeyeaters to compete for the nectar of the kangaroo-paws in their natural habitats in Western Australia.

Flowers of Green Kangaroo-paw, showing shape of corolla and arrangement of anthers.

Field Naturalists Club of Victoria

General Meeting—April 11, 1960

Mr. D. E. McInnes presided over the gathering of about 180 members and visitors. It was announced that Mr. Keith A. Hindwood, to whom the 1959 Natural History Medallion has been awarded, cannot come to Melbourne for the presentation, and Mr. Alex H. Chisholm has been asked to perform the ceremony in Sydney.

The following were elected to membership of the club: Mr. and Mrs. R. J. McLeod, Mr. P. Birrell, Mr. Robert G. Taylor, Mr. Robert J. Kosky, Mr. N. L. Lazar, Mrs. Patricia Kaufman, Miss Anne E. Lee, Miss Antoinette Le Cren, Miss Joan E. Brockman and Miss Nancy E. Bowman (metropolitan); Mr. Roger B. Smith, Mr. A. E. Campbell and Miss Estelle McCumbe (country); and Christopher Kaufman and Peter Holmes (junior). All were welcomed by the president to the ranks of the F.N.C.V.

The main item of the evening was a talk on "Conducting Tissues in Plants", by Professor Vernon Cheadle of the University of California. This was illustrated by a series of projected transparencies, including some of electron microscope photographs showing sieve areas magnified 75,000 times. Professor Cheadle stressed the baffling problems concerned with the transport of manufactured food downwards in the phloem. Mr. J. H. Willis, in moving a vote of thanks, expressed appreciation of the vast amount of work being accomplished in this field by the professor.

The numerous exhibits included a cluster of twenty-three egg cases of the Orchard Spider (*Eriaenia excavata*), sent by an anonymous donor. Mr. Eyre Swarbreck commented that this would be a record number of egg cases for this species.

Mrs. Z. Lee described the behaviour of a four-inch spotted sea-slug she had kept for two months in aerated sea water. The process of egg-laying was outlined, and excellent colour and plain photographs illustrated this previously unrecorded performance.

Combined Geology Excursion to Heathcote

On Sunday, March 27, members of the geology group of the F.N.C.V. travelled to Heathcote, where a combined excursion was held with the Bendigo and Maryborough Field Naturalists Clubs. About forty persons attended, under the leadership of Mr. Frank Robbins of the Bendigo club.

As a preliminary, Mr. Robbins gave a general survey of the area, illustrated with a comprehensive collection of specimens of fossils, minerals and rocks. The collection was the result of much time and labour, it was methodically arranged, and was a credit to the owner. A folder of maps was displayed, indicating the thorough surveys which had been made of the district.

After lunch the party investigated the Silurian deposits behind the camping area. In a short time, a wide variety of shells was obtained and some echinoid spines also. These particular beds are noted for their rich fossil content and are evidently an old sea coast.

The party moved across the railway line to an area of decomposed granite, where specimens in various stages of change were examined. The granite is of a fine texture not often seen and it was classified as a "micro-granite". Small quartz crystals were taken from the rock, and the whole process of decomposition was traced from friable rock through to sand and finally almost pure kaolin. Erosion is vigorous in the locality, and members were able to view in miniature the weathering effects that give such variety to the scenery. The whole area could be classed as "bad-lands".

Further along, the Cambrian deposits are exposed, and tuffs were examined in two stages: first, as a natural friable tuff, then where the strata had been impregnated with silica and hardened to what appeared to be a black quartzite. Many quartz veins could be traced through the deposit. Diabase was noted and the

abundance of magnesite was most conspicuous.

From the higher ground, a view over the township showed the Silurian hills on one side, Cambrian deposits in the low-lying area, and the Ordivician hills beyond. This lay-out is what makes Heathcote district such a geological museum.

A quick trip was then made to Lady's Pass, some seven miles along the Colbinabbin road, to see some Cambrian deposits which show a great variety of contortions. The strata are shale with bands of chert prominent in every conceivable state of folding. Some prominently banded examples were collected with the idea of polishing them later.

A further stop was made at a small hill of volcanic agglomerate where angular fragments of igneous rock were plainly visible in the matrix. Evidently the deposit was close to the old volcanic vent and was the result of explosive activity.

The last place of call was the "copper mine", which is really only a shallow hole in the ground. Specimens of azurite (a deep blue carbonate of copper) and malachite (the common copper ore) were obtained amongst the debris. Pieces of selwynite picked up on the surface near the roadside excited considerable comment; this belongs to the chromium group, is emerald green and is composed of alumina, magnesia and silica. The mineral authorities state that it is obtained only in the Mount Ida Range at Heathcote, in the form of dykes, and it is probably a decomposition product of diorite. Rutley notes it in his 1899 edition of *Mineralogy* as recently found in Australia.

Other highlights of the excursion were the despatch of a sizable black snake by Mr. Perry, of Bendigo, ably supported by Mr. Dodds, of Melbourne, and two nests of a species of paper-wasp. The latter provided interest for some members at lunch-time, but the observations were carried out at a distance. Scorpions were found under stones on Red Hill, but no specimens were collected.

The excursion concluded with a vote of thanks by Mr. McInnes, the president of the Melbourne club, to the leader of the excursion, Mr. Robbins.

Geology Group—April 6, 1960

Miss P. Carolan was the speaker for the evening, and the subject was "Landscapes". A survey was made of faulting in land masses and the erosion of the escarpments so formed, to show the effect of wind in dry areas, and rainfall, rivers and floods in other parts. The cutting back of the escarpments to form gorges, the formation of mature valleys, and the filling up of the lower areas to make extensive plains, were seen as the features of a constantly changing landscape.

A splendid exhibition of coloured pictures was shown, to illustrate the geological features mentioned in the lecture. Some of the localities were Flinders Range (South Australia), Grampians, Mount William, Lake Wartook, Wimmera Plains, Hanging Rock, Cathedral Mount, Sugarloaf and Mount Cobbler. The difference in forest growth due to various soils derived from igneous or sedimentary rocks was clearly demonstrated. It was evident that Victoria has indeed a wonderful variety of landscapes.

Exhibits: Agates and sapphires from forest creek bed near Selby, specimens of calcite from Wilson's Promontory (Mr. Davidson); aboriginal axe dug up at Rochester (Mr. Watts); samples of rock from Heathcote area; banded cherts, diabase?, "pencils"? from metamorphic zone of Cambrian schists, fossil shells in Silurian rocks (Mr. McInnes).

Nominations for Office-bearers for 1960-61

President—Mr. D. E. McInnes.
Vice-Presidents—Dr. W. Geroe, Mr. W. L. Williams
Treasurer—Mr. A. G. Hooke
Asst. Treasurer—Miss M. Butchart
Secretary—Mr. E. H. Coghill
Editor—Mr. N. A. Wakefield
Asst. Editor—Mr. W. F. Seed
Librarian—Miss M. Argo
Asst. Librarian—Mr. J. H. Quirk
Excursion Secretary—Miss M. Allender
Auditors—Mr. R. Davidson and Mr. W. J. Evans
Council—Mr. E. S. Hanks, Mr. A. J. Fairhall, Mr. J. M. Wilson, Mr. R. W. De Gruchy and Miss F. Phillips

Microscopical Group—March 16, 1960

Colour photomicrography was dealt with by Mr. W. Evans, with an audience including many visitors from photographic clubs. With his equipment on the bench before him, Mr. Evans illustrated each step by practical demonstration. He showed the kind of illuminant he was using, the distance between the various components, and how illumination may be varied by altering input voltage or by the substage diaphragm. A light meter, placed over the draw-tube from which the eye-piece had been removed, was used to obtain a suitable standard light reading, with the system arranged for Kohler illumination, test exposures were made using this value, and a table of exposures computed from these readings. The exposure was made by fitting an extension tube to the lens mount of a Praktica camera (with lens removed) attaching this over the eye-piece with a special clamp, focusing on the ground glass screen, and then using a cable release. The lecture ended with the projection of fruits of Mr. Evans's labour, when both black and white and colour transparencies were shown.

Fauna Survey Group—April 21, 1960

As the National Herbarium had a prior booking, several members attended a meeting of this newly formed group at the home of Mr. C. R. McQueen in Brighton. Mr. N. A. Wakefield was elected as group leader, and Mr. Graham George as secretary.

Mr. Wakefield exhibited part of a collection of small mammal bones from limestone cliffs he has been investigating near Buchan, and these were discussed at length. It was decided that the further examination of these bone deposits should be the group's first field project, and a camp-out is being organized for the purpose from May 24 onward, during the university vacation.

Other matters discussed were the obtaining of information from members of country clubs about fauna items that should be examined, and the possibility of co-operation by the group with the National Museum and other official bodies.

The next group meeting was fixed for May 12, at the National Herbarium, on the same night as the Botany Group meeting, to finalize arrangements for the camp-out and for general business.

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

GENERAL MEETINGS

Monday, May 9, 1960—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

(*Note:* An Extraordinary General Meeting will be held at 7.55 p.m. to consider an application by the Stawell F.N.C. for affiliation with the F.N.C.V.)

1. Minutes, Reports, Announcements.
2. Correspondence.
3. "Apollo Bay Excursion", by A. G. Hooke.
4. Election of Members:

Ordinary Members:

Spr. Robert H. Stranger, 5/3729 School of Survey, Balcombe (E. H. Coghill/A. G. Hooke).
Mr. J. J. Fischer, 27 Beech St., East Malvern (E. E. Allan/E. H. Coghill).
Mr. Graeme K. Thomson, Louden St., Burwood (E. H. Coghill/D. E. McInnes).
Mr. Charles K. McDonald, 36 Lucknow St., Mitcham (W. F. Seed/N. A. Wakefield).
Miss Norma Rowland, 7 White Ave., Glen Iris (E. Swarbrock/E. H. Coghill).
Miss Jessie G. Annear, 9 Benwerrin Rd., Mont Albert (J. O. Annear/D. L. Robinson).

Country Members:

Mr. Ellis M. Tucker, "Greenacres", Brit Brit, via Colerains (I. R. McCann/E. H. Coghill).
Mr. Herbert C. Dorman, "Moon Hills", Fairfax Rd., Speers Point, N.S.W. (E. H. Coghill/N. A. Wakefield).
Mr. Douglas N. Home, 641 Sherwood Rd., Sherwood, S.W.3, Brisbane, Queensland (E. H. Coghill/A. G. Hooke).

Junior Members:

Kenneth Shepherd, 60A Sussex St., West Coburg (E. H. Coghill/A. G. Hooke).
Fred Becker, Genoa, via Orbost (N. A. Wakefield/A. G. Hooke).

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

Monday, June 13, 1960—Annual General Meeting.
Presidential Address: "The Naturalist's Third Eye".

GROUP MEETINGS

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

Thursday, May 12,—Botany Group.

Thursday, May 12—Fauna Survey Group.

Wednesday, May 18—Microscopical Group.

Wednesday, June 1—Geology Group. Subject, "The Geology of Sydney", by Mr. A. R. Tinckam.

Monday, June 6—Marine Biology and Entomology Group. At Mr. Strong's rooms, Parliament House, at 8 p.m. Use private entrance, south end of House.

F.N.C.V. EXCURSIONS

Sunday, May 15—Werribee M.M.B.W. farm. **Leader:** Mrs. Searle (wife of farm manager). **Subject:** Birds and general. The coach will leave Batman Avenue at 9 a.m. Fare, 12/-. Book with excursion secretary. Bring one meal and a snack.

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2/6

The edible Parasol Mushroom, **Lepiota gracilenta.** Photographed at Kallista, Victoria, by Robert D. Lee

Vol. 77, No. 2

F.N.C.V.

June 7, 1960

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

CONTENTS

Front Cover:

This is a photograph, by Alex H. Chisholm, of a Yellow Robin at its nest. It appeared in the September 1944 issue of the *Victorian Naturalist* (Vol. 61, opp. page 86) accompanying an article "Aromatic Plants as Antiseptics", by Edith Coleman. Yellow Robins often place dry leaves in their nests, but Chisholm suggested that this is only to serve as a "carpet".

FORLORN HOPE and REEDY RIVER

By NORMAN WAKEFIELD

In last month's "Naturalist" an account was given of the investigation of part of the Reedy River area to the north of Nunniong Plateau, some twenty miles east of Omeo. The details of plant life and the pictures published of Forlorn Hope Plain and of the creek falls nearby have a claim to originality, for apparently that locality had never before been visited by either botanist or photographer. Furthermore, it it fairly certain that when Mr. Keith Rogers penetrated the gorge of the Reedy River, on January 16, 1959, he was the first white man to do so. Here is an account of a more recent excursion to that area, to examine and photograph the remarkable rock formation that he found.

With "Rockbank"[1] as starting point, Mr. Rogers and I set out again for Reedy River, on January 2, this year. Two saddle horses were used, and a packhorse carried food and equipment for a three-day outing.

The bridle track went westward for four miles, through gently undulating Snow Gum country which rose gradually to the 4000 feet "Buchan Top" — the watershed between that river and the Snowy. Of the wildflowers there, Common Fringe-lily *(Thysanotus tuberosus)* was most conspicuous; one plant bore a stem with no fewer than ten of its dainty mauve blooms.

An unusual observation was of a bat flying about in broad daylight. The brown body and blackish head indicated that it was Gould's Bat *(Chalinolobus gouldii)*, and it had apparently been disturbed by the passing of the horses from its resting place in the hollow of a tree.

The track left the top—which is actually the western edge of the Wulgulmerang Plateau—and dropped very steeply down the scarp, to follow Gorge Creek for two or three miles to the Buchan River. The creek valley is sparsely forested, and in one part there is plenty of *Acacia kybeanensis*[2], an uncommon East Gippsland wattle.

The elevation at the crossing of the Buchan there is about 2000 feet. The river was forded and then followed upstream for a few hundred yards to where there is a natural occurrence of a mineral salt in sufficient concentration to provide a "salt lick", well known to bush cattle and native animals. Sure enough, there was a small family of brumbies at it—stallion, mare and foal—and they were stalked on foot and photographed before becoming aware of our presence.

Then came a climb of a thousand feet in a mile, through

scrubby forest with no track to follow. This led to a small picturesque lake, a shallow sheet of water about two hundred yards long, in a peculiar little valley seemingly perched on the mountain side. That too is a favourite spot for wild horses, and several were there when we arrived. The stallion, jealous of his territory, trotted up to challenge the intruding horses and he was photographed at close quarters. Brumbies do not seem to realize man's presence when he is mounted on one of their own species.

The overflow from the lake is one of the feeders of a stream appropriately known as Lake Creek, and our route lay southwesterly for a mile along a brumby track beside another of this creek's tributaries. We had ascended by that time to about 4000 feet and were on the Reedy River watershed two miles east of Forlorn Hope Plain, the focal point of the previous year's excursion.

Then the horses were taken southward for a mile or so, down a trackless, scrub-covered, rocky mountain side to a spot known as "Farquhar's Yard", not far from a small running creek named after the same person[3]. The tent was pitched, gear unloaded and put under cover, and the horses taken on and hobbled a few hundred yards to the south beside another small creek.

There was a sign there of the presence of a dingo in the area —a spot where one had been scratching—and later the animal gave voice to a single plaintive howl. After dark, an occasional puppy-like "yap" indicated that a Sugar Glider *(Petaurus breviceps)* was in the trees overhead, but a search with a powerful torch failed to reveal it.

The night developed into one of thunder, rain and gales, and the tent was almost carried

away at one stage. Towards morning the horses passed the camp, with the occasional rattleing of hobble chains and the clank of a bell that had been strapped to one of them. They were feeding along and gradually making homeward as horses will, but they were standing only a hundred yards away at daybreak.

The morning was overcast and showery, and there seemed little prospect of effective colour photography. We rode a little way south-east, along the old Lower Reedy track—still well-defined, thanks to its use by wild horses; then came a scramble up the slope to the right, and the spur was followed down until it terminated in a series of rocky outcrops overlooking the Reedy River.

Our goal was half a mile to the west, where walls of rock several hundred feet high seemed to lie right across the river valley. Obviously, the stream had to have a course through them, but it was impossible to identify the position of the break and, even when Mr. Rogers indicated its exact location, I found it very difficult to appreciate that there really was a ravine there. The accompanying picture illustrates this point.

We looked for some time at the spectacle, thinking what a magnificent subject it would have been for colour photography had it not been dulled by a sky completely filled with scudding clouds. Then, to the south-west, a parch of blue appeared; it spread rapidly and soon the whole countryside was bathed in full summer sunshine. It remained thus for several hours, allowing excellent colour shots to be obtained, first of the cliff panorama and later of the spectacular scenery in the gorge itself.

The horses had been tethered, and we made down westward, along a series of outcrops parallel to the river. The vegetation was much the same as that seen a year earlier a few miles upstream. The groundberry, *Acrotriche serrulata*, was again abundant; Sticky Boronia *(B. dentigera)* and Violet Daisybush *(Olearia iodochroa)* formed clumps here and there, and the showy golden inflorescences of Grey Everlasting *(Helichrysum obcordatum)* seemed to demand a more striking vernacular than the name it has been given. The unnamed *Grevillea* was absent, but the numerous additional shrub species included Woolly Grevillea *(G. lanigera)*. The eucalypts amongst the rock masses were Brittle Gum *(E. maculosa)* and Broad-leaf Peppermint *(E. dives)*.

The river was reached at a sharp bend not far from the gorge, and the position of the latter was now quite apparent. Of the many shrubs along the rocky banks, Royal Grevillea *(G. victoriae)* is worthy of note, and also a most beautiful red-flowered variety of Mountain Correa *(C. lawrenciana)*.

At the mouth of the gorge, rock faces came down into the water, so it was necessary to strip off and wade upstream, carrying the minimum of essential photographic equipment slung across our shoulders. Then came a broad section with some

large Blackwoods *(Acacia melanoxylon)* and Soft Treeferns *(Dicksonia antarctica)* growing on an area of rocks, shingle and alluvium.

Fifteen fern species were listed in the gorge, including two uncommon ones: Narrow Filmy-fern *(Mecodium rarum)* and Austral Ground-fern *(Hypolepis australis)*[4]. Masses of Kangaroo Fern *(Phymatodes diversifolium)* clothed the rock faces, and the five species of waterferns included Alpine Waterfern *(Blechnum penna-marina)* though the elevation was little more than 2000 feet.

Upstream, the walls closed in again to form an extremely narrow ravine. High above this spot, on the northern side, was the pinnacle that Mr. Rogers ascended a year before and which his aneroid had shown to be 600 feet above the river. The southern outcrop was estimated to be a little over 300 feet high. The cliff on the northern side sloped back a little from the vertical but, in one place about thirty feet up, the overhanging southern face came within about ten feet of it.

Higher still, perhaps a hundred feet up, a huge crag jutted out and, from the almost horizontal ceiling beneath it, several remarkable shrubs were growing. They were probably the Burgan *(Leptospermum ericoides*[5]*)*, and one is at a loss to know how their seeds could have become lodged in the crannies up there. But there they were, roots upward and stems vertically downward. The largest had a trunk about twenty feet long and less than an inch thick, at the lower extremity of which there was a sparse tuft of foliage perhaps three feet across. The whole thing wafted to and fro in the wind like a huge pendulum.

Between those sheer walls, the water was too deep for wading but, about three feet beneath the surface, under the

Rock Wall across Reedy River Valley. The Pointers Indicate Position of Top of Chasm.

overhanging south wall, there was a narrow ledge of rock along which one could work his way. But the ledge had a break in it, too wide to step across, so, with one of us at each end of the gap, the cameras were carefully handed along and then taken on up the gorge.

In the next little area of dry gorge floor, a small snake was caught. It was copper-coloured and about a foot long, and after examination without determining its identity, it was released unharmed.

There, the northern cliff had a series of ledges down which water seeped, and great masses of liverworts and mosses covered square yards of rock and cushioning the trunks of treeferns and small trees. There were a few specimens of Privet Mock-olive *(Notelaea ligustrina)* and a solitary Sassafras *(Atherosperma moschatum)*. The last was a healthy sapling, and one wonders how its seed reached the spot, for the nearest known occurrence of the species is ten miles or more from the gorge, on the other side of the Buchan valley.

Upstream, the gorge had less precipitous walls and a wider floor on which Manna Gums *(Eucalyptus viminalis)* grew. It was clear that the most spectacular portion had been traversed, so we turned back.

Near the mouth of the gorge there was a huge water-spider *(Dolomedes)* clinging to an overhanging rock face. It had lost a leg by some misadventure but the remaining seven spanned a good six inches.

We climbed back to the tethered horses and rode along the spur to the camp. On the way there was an interesting band of limestone, only about fifty yards wide, across a small saddle. It was an open area of grass, with Silver Banksia *(B. marginata)* and Sweet Bursaria *(B. spinosa)* here and there — a remarkable contrast to the scrubby eucalypt forest each side.

That evening, between the tent and Farquhar's Creek, the remains of an old wire yard were found. There was a small area which looked different from its surroundings, as if it had been cleared many years before, and in two or three places there were pieces of old fencing wire. One scrap of wire was embedded through the middle of a tree trunk about two feet in diameter; the latter had evidently been a sapling when the yard was made.

In the early days, that wire enclosure was probably a horse yard. The tent stood in a larger open area, most likely the site of an old cattle-holding paddock, fenced round with poles which have long since been destroyed by bushfires. The name "Farquhar's Yard" was established, and it will persist, though all physical evidence—and perhaps all knowledge—of its significance will be lost.

That night the horses passed the camp much earlier, being more familiar now with the terrain, but they were retrieved in the morning without much trouble from a few hundred yards up along Farquhar's Creek. Camp was struck and we made back north-easterly up the steep

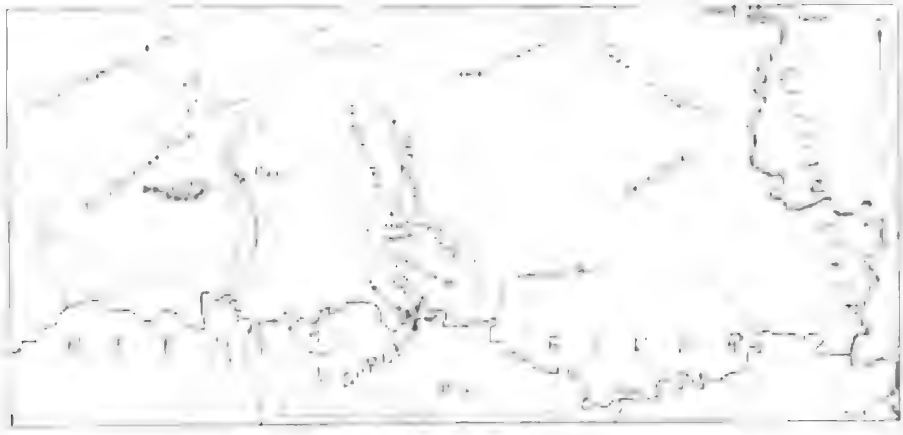
slope towards the head of Lake Creek. The rough climb of 1200 feet was hard on the horses, and they had to be rested frequently. At first it was pleasantly sunny but, before the top was reached, dull showery conditions had set in. It rained off and on for the rest of the day, emphasizing our good fortune in having a few hours of sunshine the day before in which to photograph the gorge.

On the top of the spur, where it ran up towards the somewhat higher Bentleys Creek watershed, an interesting phalloid fungus was found beneath the woolly-butts. It was the brilliant red Star-fish Fungus *(Aseroë rubra)*, with seven arms radiating from an open "mouth" and spanning about five inches. It gave off the foul aroma which is typical of the group, for they attract flies to which the sticky spore-masses adhere for dispersal.

Instead of descending towards the Buchan immediately after leaving the lake, we followed a well-worn brumby track along the side of a south-easterly ridge. It is a rule in those mountains that a definite wild horse pad always leads somewhere, and this was no exception. It brought us to an open area of Kangaroo Grass above a series of rock cliffs that fell precipitously to the Buchan River. The aneroid indicated that this was just 1000 feet above the stream and though mists dulled the panorama, the scene was still magnificent.

The river looked like a silver mark on a map. Far below was a little clearing where we had surprised seven or eight wild horses about eighteen months before and the straight stretch of water they had forded in front of us. On that occasion we had ridden up along the valley to prove that rock-wallabies still

Reedy River Flowing through Main Chasm.



Plan of Forlorn Hope and Reedy River Area

survived in the gorge down below. Signs of these animals were at the top of the cliffs too. However, that is part of another story that it is intended will be published eventually in the *Naturalist*.

Then followed a steep descent round to the north of the cliffs, lunch and rest on a little flat by the Buchan River, and the ride up along the Gorge Creek track. The steep climb out, up onto the Buchan Top, necessitated a number of stops for the horses to recover their wind, and the final four-mile stage through the Snow Gums across the plateau took us back to "Rockbank".

Notes:

1. Mr. Keith Rogers' property on Little River, between Wulgulmerang and Suggan Buggan.
2. See *Vict. Nat. 73:* 158 (Feb. 1957) and *74:* 55 (Aug. 1957).
3. Farquhar McKenzie, one-time resident at Wulgulmerang.
4. For information on this and other fern species, see *Ferns of Victoria and Tasmania*.
5. Syn. *Kunzea peduncularis*.
6. According to Dr. J. Talent, named after a mine which was worked about a century ago.

APPENDIX

(Geological notes supplied by Dr. J. A. Talent of the Department of Mines, Victoria.)

The Forlorn Hope–Reedy River consists essentially of four belts or lithological units striking roughly NE-SW. Fragmental acid lavas (rhyodacites) of Lower Devonian age outcrop for approximately one mile eastward along the Forlorn Hope Spur from the main Buchan-Tambo divide. Adjoining this to the east is a belt of nearly vertical, often strongly jointed Silurian siltstones and sandstones which are responsible for the series of strike ridges that occur west of Forlorn Hope Plain. A band of conglomerate occurs in about the middle of this belt, but outcrops more prominently at "The Rocks" on the Buchan–Tambo divide overlooking the head of the Reedy River. The belt of Silurian sediments extends to within half a mile of Forlorn Hope Plain and is there succeeded by a belt, about 1½ to 2 miles in width, of granitic rocks of highly variable composition. It is the presence of these granitic rocks that has been responsible for the broad U-shape of the upper Reedy River valley and for the gentle topography at Forlorn Hope Plain and Forlorn Hope Spur for about 2 miles to the east.

The head of Forlorn Hope Creek that flows N.E. formerly flowed into

Bentley Creek, but has been captured in comparatively recent times by what is now the lower part of Forlorn Hope Creek.

The belt of granitic rocks is succeeded by a further belt of nearly vertical Silurian sandstones and siltstones which include a minor development of limestones. These sediments are nearly vertical and strike at about 45°. The sandstones are sometimes beautifully ripple marked, but locally they are so strongly indurated that it is difficult to discern bedding. It is these resistant sandstones that have been responsible for the Reedy River gorge. The course of the Reedy River through the gorge has been dictated primarily by the bedding and joint directions of the Silurian sediments, but in the vicinity of the great chasm neither bedding nor regular jointing is well shown, so the underlying reason for the location of the chasm is not known, although the very steepness of its walls owes much to the homogeneous nature of the bedrock.

Field Naturalists Club Formed in Gippsland

From time to time, new naturalists clubs come into being in country districts of Victoria, but it is remarkable that, until this year there was none east of the Melbourne area. The western half of the state had an aggregate of about a score but neither the North-east nor Gippsland had one. Here is a report, from Jean Galbraith of Tyers, of the first naturalist club in eastern Victoria.

The Gippsland Field Naturalists Club was formed on February 26, 1960, at a meeting called by the Morwell Horticultural Society. Originally it was to be called the Latrobe Valley F.N.C., but, as people came from Leongatha, Foster and Heilley as well as from the Latrobe Valley, the more comprehensive name was adopted.

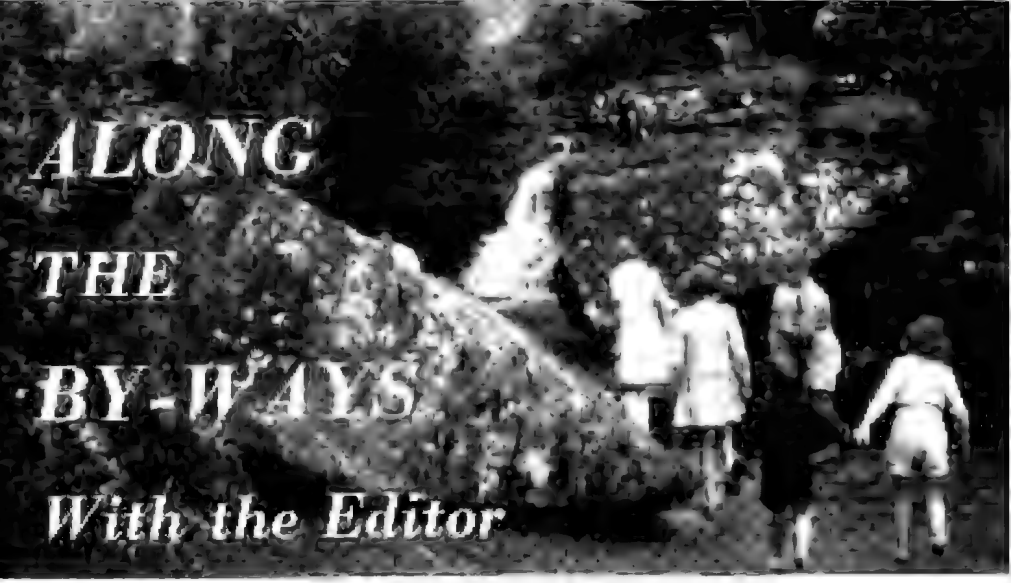
Several of those present belonged to the F.N.C.V., and one had been an office-bearer in the Hamilton club; these were able to give useful advice. Mr. Graham Marshall of Morwell West State School was elected president, Mrs. Faisst, of 18 George Street, Morwell, honorary secretary, and Mr. McIlroy as honorary treasurer. A librarian has since been appointed.

Meetings are held on the fourth Friday of each month, at 8 p.m., in the Morwell High School, and monthly excursions are planned. The new club will seek affiliation with the F.N.C.V. Objectives are the study and protection of objects of natural interest and beauty in Gippsland, the compiling of a census of native flora of the area, and the building up of a reference library of standard works on natural history.

At a second meeting, Mr. R. Auchterlonie spoke of the Narracan fossil beds, illustrating his talk with specimens, and he also led the first excursion, when all members present became, for the time being at least, enthusiastic fossil collectors.

The third meeting was occupied with matters of organization and general discussion, and an excursion to Moss Vale was arranged for May 8. The speaker at the May meeting will deal with entomology, and Mr. J. Courtney has kindly agreed to show members his entomological collection at the June excursion.

The club numbers botanists, entomologists, ornithologists, foresters and geologists among its members, as well as those who concentrate on the cultivation and preservation of Australian native flora and on nature photography, so varied interests will be provided for. No formal motto has been adopted, but the outlook of members accords well with that of one overseas club—"Protect and Enjoy".



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.

News from "Timbertop"

In the list of names of persons for election to the F.N.C.V. this month there is that of Mr. Derek Stone, who is on the staff of Timbertop, the branch of Geelong Grammar School amongst the hills beyond Mansfield. Mr. Stone wrote to the club originally to seek whatever assistance or inspiration there might be available to help foster the interest in natural history which has been established so well at Timbertop by Messrs. John Landy and Ian Edwards. As a result the *Naturalist* is going to Timbertop, and with it we send our best wishes to the boys for an enjoyable year of nature observation there.

In a second letter, about a month ago, Mr. Stone wrote:

There are two groups of grey kangaroos which during the last seven years have become so tame that they frequently hop between the units, and more often will graze on frosty mornings on the relatively clear area below the dining hall, some fifty yards from where 120 boys are having roll-call. Three weeks ago, they greatly amused their audience with boxing bouts. They now ignore the movements of humans unless we come closer than ten or twenty yards and hence are frequently photographed.

The hot summer and perhaps the grasshopper plague were responsible for an unusual number of snakes — Tiger, Copperhead and what might be Brown Snakes (thin, very swift, and always take to water). One boy was bitten on a finger when camping out during the second week-end of term and was unfortunate in that lectures on first-aid had just been given. The doctor had never seen quite such a lacerated finger.

I could add much else about the apparent migration from here to Mansfield of noisy currawongs, the parrots which the boys encourage with bird-seed, etc; but that is the sort of information both you and I would like to see coming from them.

The last comment we can most heartily endorse. The columns of "Along the By-ways"

provide accommodation for nature notes, and there is always room for answers to queries and for the identification of specimens. The *Naturalist* is also a medium for the publication of articles setting out original observations on nature subjects, the sort of data that one does not find in text-books but which is available to an observant person in a bush environment. Whether it is a description of the general topography of an interesting mountain area or some details of the habits or characteristics of a particular species of animal or plant, a published item is read and appreciated by many hundreds of people and it is on permanent record as part of the sum of available nature information.

We are looking forward to further news from Timbertop, and we should like to see examples of the boys' photography too.

Gliders at Mallacoota

Mr. Fank Buckland, of "Sunny Corner", Mallacoota, sends these notes on the aerobatics of glider possums.

In the bushlands of East Gippsland, where I have spent most of my life, the Greater Glider (*Schoinobates volans*) is very abundant. When the eucalypts, especially Red Ironbark (*E. sideroxylon*) are in flower, the very distinctive calls of these animals can be heard throughout the night. From time to time, one may also be heard scampering up a tree, after having glided from another, possibly quite some distance away.

Gliders are purely nocturnal, and as a result are very seldom observed at close quarters in daylight. On one occasion, while kneeling on the ground cutting a dry log through with a cross-cut saw, I saw the head of one protruding from the hollow of a dry tree, about fifty yards away. The head appeared almost black, and not unlike that of a possum, which at the time I took it to be. The noise of the saw cutting into the dry wood apparently had it very interested.

A hard blow with the back of an axe on the butt of the tree brought no less than four large black gliders out of the hollow. They ran quickly up to the topmost limb of the tree, some twenty feet above where they had been living. After remaining there for some minutes, one sprang into the air, and took off towards a big green Bloodwood (*Eucalyptus gummifera*), which stood 130 yards away, up the hill.

There were several smaller trees growing almost in direct line with the tree on which it ultimately landed, and in order to get past them it had to alter course considerably. This was done in much the same way as a plane banks and levels off again. During this long glide, the animal steadily lost height, and landed finally on the big tree only a few feet from the ground. Then it climbed quickly up, and disappeared into the foliage.

Almost as soon as the first glider landed, another took off, and followed the same course. It was followed in turn by the third, but the fourth remained, clinging to the topmost branch.

I was amazed at the apparent size of these gliders when in flight. After springing into the air, they appeared to spread their four legs straight out, at right angles to the body, the loose skin, which forms a big fold on each side of the body when not in flight, then coming into use and making two "wings". Only the feet were visible outside the membrane, as it is attached to each leg almost down to the claws. During the glide the body seems to be slightly higher in front, no doubt to maintain altitude. The big black tail streams behind. When about to land on the tree they have chosen, they appear to let the rear part of the body sink towards the ground, until it is almost vertical. This decreases the speed, and allows them to make a beautiful four-point landing, as effortlessly as a bird.

Another blow on the butt of the tree with the axe caused the remaining glider to take off in a different direction, down-hill, and it landed in a small bushy Yellow Stringybark (*Eucalyptus muelleriana*). It climbed

out on to the tip of a branch, and there it remained, the very small twigs appearing to prevent it taking off again. From there it apparently made off during the night, for it had gone by next day.

David Fleay, in his excellent little book, *Gliders of the Gum Trees*, prefers to call this species the Dusky Glider. He gives the total length of the animal as "forty inches from nose to tail tip" but writes also of "its long pendulous evenly-bushy tail forming almost two-thirds of its total length".

The resemblance of the Dusky Glider to the Ringtail Possum is very marked, as Mr. Buckland indicates. It appears to be impossible to distinguish these two on characters of skull and teeth. Close examination, by the way, shows that the gliding membrane of the Dusky Glider stretches from about the elbow of the front leg to the ankle of the back leg.

Emergence of a Butterfly

From Mr. F. Morley, of Oakleigh, comes a note about that most cosmopolitan of insects, the Wanderer Butterfly (*Danaida archippus*).

Recently I watched a Wanderer Butterfly emerge from the pupa case. The body was short and thick, but as the wings gradually unfolded it slowly lengthened and decreased in thickness, giving it the long, slender appearance of most butterflies. This took about an hour and a quarter, and occurred inside a schoolroom on a day that was cold and wet outside. The pupa case was suspended from a small piece of the Swan Plant * tied to a wire bent so that the insect could emerge without damaging its wings.

Had the specimen been outside, would it have emerged that day? I associate warm sunny days with the emergence of butterflies. However, about a fortnight later I did see a butterfly of a different species fly past the window on a cold, windy day.

Another point of interest: the Wanderer Butterfly had only four legs. We fed it on sugar moistened with a little water. Although it was a glorious insect it never seemed very strong, and when released (it had been kept in a specially constructed cage) it remained at rest on a carnation on which it had been placed, and made no attempt to fly away. What became of it I do not know.

* *Asclepias fruticosa.*

What is it?

Your clue is that it is a picture of part of the flower of a well known group of plants. It is very much enlarged. Turn to page 57 for the answer.

Australian Wattles—No. 14 By Jean Galbraith

Sticky Wattle — *Acacia howittii*

It is appropriate that a Gippsland tree should commemorate the name of one who travelled Gippsland and observed its natural features with affectionate care, when much of it was almost unknown. *Acacia howittii* bears a proud name, for Alfred William Howitt was well known as explorer, geologist, anthropologist and botanist.*

Recently I asked one of Howitt's grand-daughters whether he referred to the wattle in any letters which she has. "No", she replied, "but only the other day I read a letter from his sister in which she wrote how pleased she was to hear of this honour, adding 'I can think of no greater pleasure than to have a tree named after one'."

I always think of it as Howitt's Wattle, rather than Sticky Wattle, though the latter, while unattractive, is a quite appropriate common name.

Travellers in the hill country between Yarram and Tarra Valley cannot but notice the rounded olive-green trees, just too big to be called bushes, conspicuously symmetrical — usually a high dome-shape — with spreading branches and the branchlets sweeping the ground.

Sticky Wattle belongs to the group with flat phyllodes marked by several more-or-less parallel main veins (usually three), and the very short-stalked foliage is ovate, hardly an inch long, and slightly lop-sided, usually with a small bent soft point. The phyllodes turn their flat sides to the branchlets, concealing them without appearing crowded, and they are sticky, especially when young, and are clothed with short inconspicuous hairs which dull their colour, particularly on older foliage. The whole tree has a resinous fragrance.

Acacia howittii makes a pleasant small specimen tree, its beauty lying more in the characteristic habit and the unusual green of its foliage than in its blossom. Indeed, few wattles flower so inconspicuously. The little globes of bloom are primrose-yellow, long-stalked but shorter than the pyllodes, and they grow one or two together from a leaf-axil. There is an airiness about them that tends to fill the tree with a shimmer of pale light, seemingly young and delicate like a shy fair-haired child, but from a distance hardly noticeable.

The trees flower over rather a long period in late spring, and the blossom, though pale, is very abundant. The flat, thin, hairy seed-pods are about two inches long; they appear in summer and are hardly more conspicuous than the flowers. But, as the blossoms lighten the tree, the pods seem to dull it as if it were under a cloud.

The native range of Sticky Wattle is a restricted area of Gippsland.

Sticky Wattle
Photo: W. H. Nicholls

* See *Vict. Nat.* 24: 181-9 (April, 1908).

National Parks and National Monuments — 6

National Park Act and New Parks

By J. Ros Garnet

This month the subject is national parks in general. At the time of writing there is a Bill before Parliament—to add three to the present schedule of fifteen Victorian national parks, to increase the size of one park, and to amend the original Act in several ways.

To introduce the subject, here is the definition of a national park from an early issue of the Victorian National Parks Association News Letter:

A national park is an area under public control, dedicated and set apart for the protection and preservation of indigenous plant and animal wildlife, of features of special scenic, historic or scientific interest and for the benefit, edification, education and enjoyment of the people.

Its boundaries shall not be altered or any portion made capable of alienation except by the Parliament.

It shall be a sanctuary, the natural resources of which shall not be subject to commercial exploitation and within which the hunting, killing or capturing of fauna and the destruction or collecting of flora is prohibited except by or under the control of the Park authorities.

The concept implied by this definition now has world-wide recognition as applying to the ideal national park. It is a yardstick by which the extent of our approach to the ideal can be measured, and it should be used to assess the true worth of whatever may be labelled "National Park". It will be useful to remember it when "developments" within national parks are being considered or when the dedication of new national parks is being planned. With some slight reservations, our present national parks appear to fit the definition and we may hope the new ones will too.

Lakes National Park* is to be extended by some 15,000 acres—a project which its present and past committees of management have long sought. The south-west of the state, for so long what Mr. Noel Learmonth called "a national park desert", may soon have two parks—Mount Richmond and Mount Eccles— small areas certainly but both of supreme value in the cause of nature protection.

At Mount Richmond, on the old road between Portland and Nelson, there is an area of about 1500 acres of superb wildflower country. Unhappily, this was devastated by fire last summer. In the early spring of 1958, under the guidance of Messrs. Learmonth and Beauglehole of the Portland Field Naturalists Club, I had the pleasure of exploring a section of it. We could not have had better guides, for it is to them that Victorians are indebted for bringing to notice the value of Mount Richmond as a first-class conservation area.

Mount Eccles is near Macarthur and south of Hamilton. It is an extinct volcano with a very picturesque crater lake and environs which, many aver, are more attractive than those of Mount Gambier across the border, but this is so only because on Eccles much of the natural charm has been retained. Its dedication will have come none too soon though, for its timbered slopes were being steadily supplanted by grazing lands.

Lastly, the Kulkyne†. Those who understand the significance and purpose of a national park will be disappointed that the Government's intention is to exclude from the area recommended by the National Parks Association all but the large tract of virgin mallee and a few of the smaller lakes. It is somewhat misleading to label it "Hattah Lakes National Park" because the best and largest lakes in the system have not been included, nor has any part of the Murray River. The new park will be, in fact, a place for the enjoyment of naturalists rather than a national park for all—that is, unless Parliament can be persuaded that Victorians

* See *Vict. Nat.* 76: 284-5 (March, 1960). † See *Vict. Nat.* 76: 314-6 (April, 1960).

deserve better treatment in the selection of the parks designed for their benefit.

What is it that distinguishes a national park from other kinds of parks? Fundamentally, a national park is a conservation area, for the preservation of natural scenery of exceptional interest and attractiveness to the public, ecological associations and features of particular scientific value, or flora and fauna native to a region. In such places there should be no need to provide for the amusement and entertainment of visitors by devices of a nature which can be provided more appropriately elsewhere. One should not expect to indulge in the very same recreations or sporting activities which we have in our home cities or towns. To do so would surely suggest that the national parks lacked the kind of universal appeal for which they were established.

It is the business of the National Parks Authority to encourage and develop public appreciation of the magnificent natural assets which it controls, and it is the duty of naturalists to help the Authority in every possible way. However, one has no need to be learned in natural history to evaluate national parks. They exist to serve the needs of all, and the only restrictions on their usage are those imposed by public opinion. Public opinion does not favour bush fires in national parks, nor timber logging, mining, quarrying, grazing of domestic stock, rubbish dumping, shooting of native animals, gathering of wildflowers or any other form of vandalism. The public, it seems, wants its national parks to remain as nearly as possible in their natural state.

Alfred Park in East Gippsland, where the Princes Highway Runs through Subtropical Vegetation at Mount Drummer

Photo: N. A. Wakefield

One of the amendments to the National Parks Act which is now under consideration in Parliament aims at clearing the way for private enterprise to participate in the development of our national parks. The amendment proposes that the National Parks Authority be empowered to grant leases for periods up to 21 years for private concerns to operate within national parks. The clause is so vague about the specific purposes that it gives rise to grave concern as to what the consequences of its acceptance might be. There appears to be no similar legislation operating in other countries.

What could justify the leasing of any portion of such public property for 21 years or for any other period? If private interests can find it sufficiently profitable to establish within national parks public amenities such as motels or ski-tows, then surely the projects could be financed from the public purse and profits devoted to extending the service which good management of our national parks will be required to give.

An Australian Orchid Emigrant

By JOHN A. P. BLACKMORE

Those interested in our native orchids will probably be aware of the discovery in Western Australia in 1943 of an unusual and very un-Australian looking terrestrial orchid which was first described by the late Rev. H. M. R. Rupp as *Monadenia australiensis*. This orchid, when further specimens were available for examination, proved to be identical with the South African species *Monadenia micrantha* Lindley. It is figured on Plate 1 of W. H. Nicholls's *Orchids or Australia*. How it migrated across the Indian Ocean is a matter for conjecture. Apparently, it appeared around Albany for some years after 1943. It would be interesting to hear if it is still to be found in Western Australia and, if so, whether or not it has extended its habitat in the last sixteen years.

It is probably not so well known that an Australian orchid made the return voyage to that followed by the *Monadenia* and was discovered flowering near the National Botanic Gardens of South Africa at Kirstenbosch on the Cape Peninsula in November 1944. This migrant is Robert Brown's well-known species *Gastrodia sesamoides*, the pale brown saprophyte with brown and cream bell-like flowers that is popularly known as Cinnamon Bells or Potato Orchid.

I first noticed a record of this orchid in *Flora of the Cape Colony* and wrote to Miss G. J. Lewis, a co-author of that work, for further details. Miss Lewis in her reply also forwarded a copy of an article from *The Journal of South African Botany*, October 1949, by Miss W. F. Barker, describing the discovery of this new record, the puzzlement as to its identity and its subsequent reappearance in later seasons, in 1949 "as many as 30 racemes being seen in shaded undergrowth over a fairly large area".

The discovery was of particular interest in South Africa as no saprophytic orchid had previously been found growing there, the nearest being a species of *Gastrodia* in the Cameroons some 3000 miles to the north. Not surprisingly *Gastrodia sesamoides* had not been found elsewhere in South Africa. It is apparently doing well, as Miss Lewis states that in good seasons plants up to three feet in height have been found, which would be very robust specimens from New South Wales standards.

The discovery of a successful migration of an orchid is always interesting. The number of plants of any species that grow from seed must be infinitesimal, when one considers the billions of seeds scattered, even with such a successful and widespread species as *Caladenia carnea*. However, the possibility of wind dispersal of seed or the carriage of seed by sea with goods offering a suitable resting place, such as jute bags, is quite a real one. Following the great erup-

tion of the island of Krakataua off Sumatra in 1883, all plant life on what remained of the island was destroyed by the flood of hot volcanic material. Plant life reappeared gradually by seed or spores borne by wind and sea, and a number of orchid species were amongst those which appeared quite early in the twenty years during which the normal tropical vegetation returned.

V. S. Summerhayes in his *Wild Orchids of Britain* points out that most (or all?) orchids require the presence of a mycorrhizal fungus for their growth, particularly to keep them alive from the time of the germination of the minute seed until the appearance of leaves some six months, or in some cases even up to ten years, later. This no doubt partly accounts for the difficulties of raising orchids from seed and must make the germination of wind-blown orchid seeds a capricious matter, as not only must the soil and climate be suitable but the particular type of fungus needed must be in existence.

It is perhaps even more interesting and quite surprising that the first recorded migration of an Australian orchid species should be *Gastrodia sesamoides*, a saprophyte. Plants of this type are almost devoid of chlorophyll and are leafless. Accordingly, they must obtain their food from some other source. This source is the dead organic material in the soil, decaying leaves and vegetation on which the plant lives through its association with the surrounding mycorrhizal fungus. On this it is almost wholly, if not entirely, dependent not only during its seedling stage but during its whole life. If the required fungus is not present a saprophyte has no chance of life, and it would seem that its chances of successful migration would be even less than those of the ordinary terrestrial orchid.

Miss Lewis suggests that the *Gastrodia* may have been introduced with some *Eucalyptus* trees which were planted at Kirstenbosch many years ago, though whether these trees were raised from seed or imported with earth around their roots is not known.

In referring to the first recorded migration of an Australian orchid perhaps I should have included the word "westward". To the east no less than twenty-four species of Australian orchids are to be found in New Zealand also. Some, at least, of these may well have migrated, the seed being carried by wind across the Tasman Sea.

Incidentally, those interested in the migration of orchids may read in D. S. Correll's book *Native Orchids of North America* of the introduction of the European *Epipactis helleborine* and the Asian *Zeuxine strateumatica* to the eastern part of the United States. Both have shown in their new habitat the propensities of weeds, growing along roadsides, in ditches and waste places, and the latter species forms large colonies in lawns in Florida, surely a consummation devoutly to be wished by all keen orchid students, if not by gardeners.

Cinnamon Bells, *Gastrodia sesamoides*.
Photo: W. H. Nicholls

Field Naturalists Club of Victoria

General Meeting—May 9, 1960

Mr. D. E. McInnes presided at a gathering of about 150 members and friends at the May general meeting in the National Herbarium.

An extraordinary general meeting was held first and the Stawell Field Naturalists Club was affiliated with the F.N.C.V.

The president announced that the theme of the club's nature show in September would be the protection of mammals and birds. He asked for additional helpers to strengthen the show committee and also for information about obtaining daylight screens for showing colour transparencies. A letter was read from Mr. A. B. Court thanking those who assisted with the Moomba show in March.

The excursion secretary announced a marine biology excursion to Seaholme and to Mrs. M. E. Freame's marine collection, on Saturday, June 4. It is proposed to hold excursions regularly on the third Sunday of each month.

Mr. A. G. Hooke spoke on the Apollo Bay excursion of last summer. He outlined the topography of the district and traced the early history from 1801 onward, including the building of the lighthouse in 1847. An account was given of the coach excursions by the F.N.C.V. party, and a series of colour transparencies, by several of the members who were there, illustrated the features of the trips.

The following new members were elected: Mrs. J. J. Fischer, Mr. Graeme K. Thomson, Mr. Charles K. McDonald, Spr. Robert H. Stranger, Miss Norma Rowland and Miss Jessie G. Annear (ordinary members); Mr. Ellis M. Tucker, Mr. Herbert C. Dorman and Mr. Douglas N. Home (country members); and Kenneth Shepherd and Fred Becker (junior members). The president welcomed them to the ranks of the club.

Nature Notes: Mr. J. M. Wilson and Mr. E. S. Hanks reported ravens coming into the city area, and many other members confirmed this. Miss J. Woollard had seen numerous robins at Mount Beauty after the first snow. Mr. McInnes had found sea-squirts two feet deep on the beach at Brighton after the recent storms, and oysters had also been washed up.

Exhibits: Mr. E. Swarbreck showed samples of timber and spoke on their respective merits; they included various pines, beeches and White Mountain Ash. Mr. J. Hyett exhibited a lamprey, pointing out its pineal eye and asking about the function of its nostrils. Mr. C. Gabriel showed the minute internal shell of a garden slug and the polished shells of molluscs of which the mantle covers the outside. Miss M. Lester had a named collection of shells from the Apollo Bay area, and Mrs. R. Webb-Ware a spray of Privet Mock-Olive (*Notelaea ligustrina*) with unusual red berries from Mount Stirling. Mr. J. Stirling showed a photograph of an open beehive, with exposed comb in layers outside a Red Gum stump at Kiata.*

Fauna Survey Group—May 12, 1960

As the group is still in its formative stages, the major part of the meeting was spent discussing general organization and planning. Fauna conservation, sources of information and co-operation with other bodies were dealt with. It was decided that approaches would be made to the Fisheries and Game Department and the National Museum concerning permits to handle protected animals during investigation.

Plans for the trip to Buchan were finalized and Mr. Wakefield described conditions of the area in which members would be working. The objective of the trip is to carefully work over the bone deposits left by Native Cats over sixty years ago, before they died out in the area. An investigation of bats in a nearby cave and a general faunal survey of the district will also be carried out.

* Plate 19 in volume 27 of the *Victorian Naturalist* (April, 1911) depicts a similar phenomenon. Opposite, on page 227, there is a lengthy paragraph about it. The combs were on a banksia tree near Lake Reeves in Gippsland and they measured 2 ft. 6 in. in length.—Editor.

Possible future projects mentioned included suburban ones: the distribution of the Short-nosed Bandicoot in the south-eastern suburbs, the occurrence of Sminthopsis on the plains at Sydenham, and the possible survival of Native Cats at Studley Park.

It was suggested that the Group spend Queen's Birthday week-end in the Colac district, investigating the present Native Cat population, as the animals were fairly common there about twenty years ago.

The meeting closed with an account by Mr. Wilkinson of Mountain Possums seen along the roads between Healesville and Donna Buang.

Geology Group—May 4, 1960

Nine members attended, with Mr D. Jeffrey in the chair. Mr. McInnes spoke on felspars, explaining their prevalence and the derivation of the name from a German mining term. Mr. McInnes illustrated the atomic structure of silicon and, with models built of ping-pong balls, the atomic structure and build-up of various felspars. The four fundamental kinds —orthoclase, albite, anorthite and celsian were used to describe other felspars. The decay of different groups was covered. With a knife, the speaker shaped cubes of plasticine to explain crystal forms of felspar and their classification. Mr. McInnes also expounded a theory about the origin of granite. The talk promoted so much discussion that a closure had to ordered eventually by the chairman.

Exhibits: Moonstone (felspar) for use as precious stone (Mr. Jeffrey); albite, sanadine crystals in trachyte, labradorite, anorthite encrusted with manganese oxide, orthoclase from Mount Franklin, green orthoclase from Broken Hill, bytownite from U.S.A., oligoclase from Canada and andularia from Switzerland (Mr. Baker).

Club Excursion to Lerderberg Gorge

Despite difficulty in reaching the City in the absence of trains, the parlour-coach excursion on April 10, was well attended. Two-thirds of the way up the hill beyond Djerriwarrah Creek a stop was made to examine some fine examples of onion or spheroidal weathering, a formation described in many textbooks but which few people realize is so accessible close to Melbourne. From the hill, overlooking the town and flats of Bacchus Marsh, the party stopped to note the various levels of the country: high Ordivician wooded hills in the background, the basalt plain, and the lower lands formed by the Rowsley Fault. This Fault stretches from Mount Anakie in the south-west, past the Brisbane Ranges and the mouths of the Werribee and Lerderderg Gorges. It was the rejuvenation of the rivers after the fault occurred that deepened the gorges.

North of Bacchus Marsh, where the Gisborne Road bridges the Lerderderg River, the party saw the strata of sedimentary rocks which run with an almost vertical dip in the stream bed.

After lunch at the mouth of the gorge, most of the excursionists strolled up the dry stony creek-bed. Biologists found much of interest, and the various rock formations with their contorted strata held the attention of all. The return was made along a former aqueduct, and fossickers' holes on the old river bed showed the original stream level.

Miss P. Carolan led a small party up the cliffs to examine a group of Red Ironbarks (*Eucalyptus sideroxylon*) which had assumed a mallee type of growth on the rocky soil. On the way back to Melbourne, Mount Bullengarook was climbed from the gap on the road.

Reports from Affiliated Clubs

Sunraysia F.N.C.—President is Mr. W. J. Webster; Hon. Secretary, Miss Mary Chandler of Red Cliffs. The club has 52 members and has had a busy year. As in all other interested organizations, members are disappointed at the boundaries proposed for the Kulkyne National Park and are pressing for the inclusion of the whole of the Kulkyne State Forest.

Lorne League of Bush Lovers.—This club holds regular meetings and reports that interest is being maintained. It has 32 members; Miss O. I. Armytage is President and Mr. S. M. Callaghan the energetic Secretary-Treasurer. The league has donated six guineas to the Crosbie Morrison appeal.

Creswick F.N.C.—Mr. S. Geddes is President and Mr. H. L. Barclay Hon. Secretary of this flourishing club. It reports a good year, with pleasant and instructive evenings. Excursions have been a strong feature of the year's activities.

Ararat F.N.C.—This club reports a very quiet year. The President, Miss A. G. Mitchell, has been very ill, and the vice-President, Miss L. Banfield, is now abroad. Miss Z. Banfield is Secretary-Treasurer. We wish both Miss Mitchell and this long established club a speedy and complete return to health.

Ballarat F.N.C.—This club had a successful year, with a slight increase in attendances. Their report also makes special mention of the combined week-end with the F.N.C.V. Mr. Sonsee is President and Mrs. E. G. Bedgood is Secretary.

Hamilton F.N.C.—This club has a membership of 54 adults and 23 juniors. It has had a number of distinguished guest speakers and several excursions. Mr. Dewar Goode is President and Mr. L. K. M. Elmore is Secretary.

Hawthorn Junior F.N.C.—The Hawthorn Juniors continue to flourish, with the evergreen Mr. H. P. Dickins as President, Mr. P. Fisch as Secretary-Treasurer and Mrs. Carbines, the City's Chief Librarian, as liaison officer with the Hawthorn City Council, which provides a hall free. Among interesting subjects at the monthly meetings, was an evening of films of French Antarctica, presented by M. Jardel.

Maryborough F.N.C.—This club changes its officers regularly. Miss E. Thompson is now President, and Miss N. E. Green Secretary. There are 34 members and regular excursions and meetings are held.

Bendigo F.N.C.—Some time ago we published the syllabus of this active club. Its present report consists mainly of a list of office-bearers and we note that Mr. H. McMaster is now President while Mr. A. C. Ebdon continues as Honorary Secretary.

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

ANNUAL GENERAL MEETING

Tuesday, June 14, 1960—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. Hugh B. Amos, 4 Kauri Gve., Glen Waverley (A. B. Fairhall/J. W. T. Strong).
Mr. J. Richard Hudson, 16 Alma St., Essendon, W.5 (E. H. Coghill/ A. G. Hooke).
Mr. J. K. L. Matchett, 845 Riversdale Rd., Box Hill (D. E. McInnes/ E. H. Coghill).
Mr. William E. McLauchlan, 30 Wolseley Cres., Blackburn (N. A. Wakefield/ A. G. Hooke).
Mr. L. L. Devereaux, 22 David St., Hampton, S.7 (A. G. Hooke/E. H. Coghill).
Miss Ruta Ozols, 6 Donlop St., Maribyrnong (J. W. H. Strong/A. J. H. Fairhall)

Joint Ordinary Members:
(Mrs.) Margaret Hudson, 16 Alma St., Essendon, W.5 (E. H. Coghill/ A. G. Hooke).
(Mrs.) E. Strong, Parliament House, Melbourne, (J. W. H. Strong/A. J. H. Fairhall).

Country Members:
Mr. John A. P. Blackmore, 25 Holden St., Ashfield, N.S.W. (N. A. Wakefield/ A. G. Hooke).
Mr. Alan J. Reid, Children's School Camp, Somers (A. G. Hooke/N. A. Wakefield).
Mr. Derek Stone, G.C.E.G.S., "Timbertop", P. O. Mansfield (N. A. Wakefield/ A. G. Hooke).
Mr John E. Courtney, "Ash Grove", Swan Vale, Via Glen Innes, N.S.W. (A. G. Hooke/E. H. Coghill).
Mr. W. J. Plant, "Greentrees", 54 Bonat St., Maitland, N.S.W. (N. A. Wakefield/ A. G. Hooke).
Mr. Keith C. Hofmaier, Box 50, Beulah (E. H. Coghill/N. A. Wakefield).
Mr. I. R. Prentice, 129 The Eyrie, Eaglemont (E. H. Coghill/A. G. Hooke).
(Mrs.) L. McBain, "Eskdale", P. B. Gong Gong, Via Ballarat (N. A. Wakefield/ A. G. Hooke).
(Mrs.) Frances Gladstone, "Havenhome", Box 30, Beechworth (J. Galbraith/A. G. Hooke).
(Mrs.) Freda Negrello, P. B. Cobden (N. A. Wakefield/A. G. Hooke).
(Mrs.) Margaret M. Stone, "Duntroon", Shelbourne, Via Maldon (N. A. Wakefield/ A. G. Hooke).
Miss L. M. Noall, "Graynot", 52 Binarong Rd., Frankston (E. W. Gibson/A. G. Hooke).

Junior Member:
Juris Ozols, 6 Donlop St., Maribyrnong (J. W. H. Strong/A. J. H. Fairhall).

8. Nominations for Membership.
9. Presidential Address: "The Naturalist's Third Eye".
10. General Business. 11. Nature Notes and Exhibits. 12. Conversazione.

Monday, July 11—Members' Night.

GROUP MEETINGS

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

Thursday, June 9—Botany Group. "Succulents", by Mr. A. Burke.

Thursday, June 9—Fauna Survey Group. Business: Organization of Queen's Birthday week-end excursion; filling of observations and records

Wednesday, June 15—Microscopical Group. "The Use of Micro-fossils in Geology", by Mr. Douglas, Department of Mines. Persons interested in botany or geology should attend.

Monday, July 4—Marine Biology and Entomology Group. At Mr. Strong's rooms, Parliament House; enter by private entrance, south end of House.

Wednesday, July 6—Geology Group. Subject: "What is a Fossil?", by Mr. Jeffrey.

F.N.C.V. EXCURSION

Sunday, June 19—You Yangs. Leader: Mr. E. S. Hanks. Subject: Birds, Trees, Aborigines. Coach to leave Batman Avenue, 9.15 a.m. Fare, 16/-; book with excursion secretary. Bring one meal and a snack.

FIELD NATURALISTS CLUB OF VICTORIA: FINANCIAL STATEMENTS, 1959-60

GENERAL ACCOUNT

STATEMENT OF RECEIPTS AND PAYMENTS FOR 12 MONTHS ENDED APRIL 30, 1960

(Figures adjusted to the nearest £1)

Receipts			Payments		
Subscriptions received—			*Victorian Naturalist*		
Arrears	£16		Printing		£1,196
Current	1,095		Illustrating		190
Supporting Members	60		Despatching		114
		£1,171	Index		9
Sales of *Victorian Naturalist*		157	Editorial Expenses		14
Advertisements in *Victorian Naturalist*		219			1,523
Interest received—			Working Expenses—		
Library Fund	2		Postage and Telephone	£33	
Bank Account	19		Printing and Stationary	23	
		21	General Expenses	32	
Commission on Sale of Books		10	Library Expenses	7	
Sale of Club Badges		5	Subscriptions, Donations and Affiliation Fees	4	
Donations		6	Natural History Medallion Expenses	10	
Amount transferred from Building Fund Account for payment of rent		43			109
Donations from Members towards Crosbie Morrison Memorial Appeal		93	Rent of Hall and Library		43
		£1,725	Crosbie Morrison Memorial Appeal, donations from Members		93
Deficit for the year		43			
		£1,768			£1,768

BALANCE SHEET AS AT APRIL 30, 1960

(Figures adjusted to the nearest £1)

Liabilities			Assets		
Subscriptions paid in advance		£225	Bank Current Account and Cash—		
Donation in hand towards expenses of Show in September, 1960		197	E.S. & A. Bank—		
Special Funds—			General Account		£535
Building Fund	£1,550		Petty Cash Advances		17
Publications Fund	1,151				552
Library Fund	50		Current Assets—		
Club Improvement Account	128		Sundry Debtors	£63	
Excursion Account	166		Arrears of Subscriptions estimated to realize	10	
		3,045	Badges on Hand at cost	27	
Surplus of Assets over Liabilities		1,624			100
			Library, Furniture and Equipment		1,668
			Investment of Funds—		
			Building Fund—		
			Commonwealth Bonds at cost	950	
			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	90	
					1,550
			Publications Fund—		
			Stocks valued at cost—		
			Wildflowers of Victoria	67	
			Victorian Ferns	422	
			Victorian Toadstools	164	
			Other Publications	13	
			E.S. & A. Bank, No. 3 Account	57	
			Amounts owing by Booksellers	28	
			Commonwealth Special Bonds	400	
					1,151
			Library Fund—		
			Commonwealth Bonds at cost		50
			Cosstick Reserve—		
			Maryborough—at cost		20
		£5,091			£5,091

BUILDING FUND

Amount of Fund at 30/4/59		£1,535
Interest on Investments and from Bank		58
		1,593
Less Amount transferred to General Account for payment of Rent		43
Amount of Fund at 30/4/60, as per Balance Sheet		£1,550

CLUB IMPROVEMENT ACCOUNT

Amount of Account at 30/4/59		£190
Donations received during year		6
		196
Purchase of Aldis Projector	£49	
Cost of improvement to Public Address System	19	
		68
Amount of Account at 30/4/60, as per Balance Sheet		£128

PUBLICATIONS FUND

Amount of Fund at 30/4/59	£1,030
Surplus for year from—	
Wildflowers of Victoria	91
Ferns of Victoria and Tasmania	15
Victorian Toadstools and Mushrooms	2
Interest on Special Bonds and on Bank Account	10
Amount of Fund at 30/4/60, as per Balance Sheet	£1,151

WILDFLOWER BOOK ACCOUNT

Sale of 418 copies realized		£234
Deduct — Royalty at rate of 10% thereon	£23	
Advertising and despatching costs	20	
		43
		£191
This amount has been divided between—		
Native Plants Preservation Society ⅓rd		£64
Field Naturalists Club of Victoria ⅔rds		127
		£191

Number of copies still unsold—769, valued at £67.

FERN BOOK ACCOUNT

Stock at 30/4/59, 2,423 copies	£454	Sales, 173 copies	£50
Expenses	3	Stock at 30/4/60 2,250 copies	422
Surplus for year	15	2,423	
	£472		£472

TOADSTOOL BOOK ACCOUNT

Stock at 30/4/59		Sales, 143 copies	£34
963 copies	£192	Stock at 30/4/60	
Expenses	3	820 copies	164
Surplus for year	2	963	
	£198		£198

Audited and found correct,

W. P. J. EVANS, R. DAVIDSON } *Hon. Auditors*

A. G. HOOKE, *Hon. Treasurer*

EIGHTIETH ANNUAL REPORT, 1959-60

At the end of the club's eightieth year of existence, we can look back and see a gradual change in the scope and ambitions of the F.N.C.V. The principal objects remain the same — to stimulate interest in natural history and to preserve and protect Australian fauna and flora — but today we appear to be doing this, less by fostering direct and detailed research, and more by endeavouring to interest the less knowledgeable in the well known wonders of nature which they can find around them if they can be induced to look.

The year concluded was the first one of the *Naturalist* in its new form, which is a deliberate attempt to spread our influence over a wider field, and to make that magazine a medium to interest people in nature study generally and in this club's activities in particular. In this, we feel we have achieved a substantial degree of success. Membership has increased from 509 to 515, comprising 377 ordinary members, 184 country, 28 juniors and 26 honorary and life members. In addition there are 108 individual and institutional subscribers to the *Naturalist*, and about 50 copies per month are being sold in bookshops. This demand has grown up during the current year and is still developing. We note that municipal libraries as well as primary and secondary schools are subscribing to the magazine. In anticipation of this trend, we increased the number of copies printed each month by 300 in May last year, and in August we had to increase it a further 100. It appears that we will shortly run out of stocks of the *Naturalist* for May, June, July and August, 1959, and we ask any members who hold these and do not need them to return them to us.

At the club's general meeting each month two developments are apparent; first, an increase in attendance — usually about 150 being present — and secondly, a much greater percentage of younger people in the gatherings.

But we cannot ignore the fact that several members whose opinions we respect have expressed extreme disapproval of the new development with the *Naturalist*. It is also true, however, that a great amount of most enthusiastic praise has been received both from lay and scientific members, and it is clear that a "Gallup Poll" of members would show them to be overwhelmingly in favour of the present set-up. That is not necessarily the only criterion but despite the criticism we have received we feel that the new *Naturalist*, as well as having popular appeal, is maintaining a definite scientific value. Contributions such as Massola's anthropological papers, McInnes's "Observations on the Paper Nautilus", Baker on "Imprisoned Rocks", Hyett's "Pollination of the Nodding Greenhood" and Wakefield's report "The Discovery of Native Figs in Victoria" have comprised over fifty pages of the year's volume. This shows that members and others are making observations of importance and recording them in the *Naturalist*. We therefore hope that those who disapprove of the change in appearance will come to appreciate the dual function of the

new *Naturalist* and will learn to enjoy it as they did the old. In this connection, we are always willing and anxious to receive papers and serious articles, of the type mentioned above, for publication in the journal. Members who make interesting observations or who undertake research, are urged to let us know about them through the medium of the *Naturalist*.

Affiliated Bodies: During the year Sunraysia, Ouyen and Horsham Naturalists Clubs have affiliated with us, bringing the total affiliated organisations to 17. The Stawell F.N.C. also decided to join up and affiliated in May, after the year under review had ended.

A feature of club activities this year has been the number of excursions held in combination with affiliated country clubs. Maryborough was visited in September when we formally took possession of the Cosstick Reserve, there was a combined week-end at Frankston and Kinglake in October, the Marine Biology and Entomology group went to Frankston in November, and in March our Geology group and the Bendigo F.N.C. visited Heathcote.

Membership: During the year we suffered the loss of several friends and members, including a past-president, Mr. L. W. Cooper, Mr. David Lewis and Mr. J. W. Audas. Honorary membership was conferred on Mrs. Eulalie Bennett (formerly Miss Hill) for long service, and on Mrs. Joan Nowlan for her gift of the Cosstick Reserve to the Club.

Natural History Medallion: During the year we learned with great pleasure that the Natural History Medallion for 1958 had been awarded to our esteemed member, Mr. C. J. Gabriel, and we participated in its presentation. The award for 1959 went to Mr. Keith Hindwood of Sydney, whom we congratulate most heartily.

Nature Protection: During the year we were overjoyed to learn that the Federal Government had at last prohibited the export of native fauna. We wrote to Senator Henty, who announced the new policy, and to the State Attorney General, Mr. Rylah, who had long advocated the move, expressing our pleasure and appreciation. We have raised the question whether the depredations of wombats are so serious that they should be classified as "vermin" but so far have had only an indefinite reply.

The matter of *National Parks*—both those already gazetted and others that are proposed—is constantly under review by your council and is also being kept before members and other readers of the *Naturalist*. In January there appeared the first of a series of articles on this subject, and it is to be continued into the forthcoming volume also.

Accommodation: We had long realised that our position as rent-free tenants of the National Herbarium might be subject to revision. During the year the authorities decided to make a charge for the facilities provided, and we now pay a guinea per meeting, about £60 a year. In our last annual report it was suggested that the Crosbie Morrison Memorial Appeal might achieve its objective of providing a hall for societies such as ours. We have had no official news from this appeal for some time, but if it does succeed in that object it will not be for many years.

Funds: The finance committee suggested that the income from the building fund was the appropriate source to meet the cost of accommodation. This was recommended by council to a general meeting and the resolution duly passed.

At the same time, council recommended and the members resolved that the proceeds of sale of back numbers of the *Naturalist* should be paid into the general fund (which had paid for their publication) instead of the publications fund.

Equipment: In the past year we have provided an adequate public address system, the only difficulty now is to persuade speakers to use it. The first substantial asset acquired by means of the club improvements account was a new 85 mm. projector, for which a case was donated by Mr. Ling. The club has also obtained a new typewriter, most of the cost of which was donated by another member. The epidiascope was damaged by another organization using the Herbarium but it paid for the repair, and it should be returned soon.

Finance: Your council has kept a close control on the financial position,

largely through the finance committee which meets quarterly. When we re-organized the *Naturalist* we realized that it would cost us much more to produce than the old had done. Therefore we initiated some advertising and other publicity, aimed at increasing Club membership as well as the circulation of the magazine. As already reported, membership and circulation have increased very substantially, but there is a slight deficit in the year's accounts. In that connection, we must specially thank the 91 of our members who became "supporting members" by voluntarily increasing their subscriptions.

Projects: The Club participated in the Moomba Nature Show, held this year in the Lower Melbourne Town Hall. We had intended to hold a show of our own in 1959 but decided to postpone it until September, 1960, when we hope (with the assistance of the M.A. Ingram Trust) to put on something in keeping with our great traditions.

Lectures: We must once again thank those who have lectured to the club and its groups during the past year. The addresses to the general meetings were of particularly high standard, and the speakers included Messrs. G. T. Thompson, Chairman of the Soil Conservation Authority, J. H. Willis of the National Herbarium and D. D. Lynch of the Fisheries and Game Department.

Excursions: The highlight of the year's excursions was the club outing to the Otways area. Forty or so members made Apollo Bay their headquarters for eight days and from there they ranged as far afield as Port Campbell. During the year, numerous other excursions were held, most of them being well attended. The important ones have already been mentioned.

Study Groups: The Fauna Survey group was formed late in the club year, upon a request from several science students of the University of Melbourne. Mr. G. G. George, who initiated the idea, has been elected secretary and Mr. Norman Wakefield group leader. The purpose of the group is to collate information, mainly by field survey work, on the vertebrate animals of the state. The first project being undertaken is the investigation of deposits of mammal bones in limestone recesses and caves in the Buchan district in East Gippsland. We shall await with interest the publication of the results of such work in the *Naturalist*. It is gratifying to see the formation of a scientific research group in our club.

This year the Microscopical group was fortunate in having two lectures delivered by eminent outside speakers. These speakers, who were experts in their field, were Dr. Susan Duigan and Dr. Ethel McLennan, who spoke on pollen grains and filamentous algae respectively. The remaining lectures for the year were all given by members of the group.

The Botany group has had an active year, with talks covering a wide field. Many excursions were held, and a project to carry out a botanical survey at Cheltenham Park is under way.

The present Marine Biology and Entomology Group has now been in action for three years, and membership is steadily increasing. The average attendance of members at each monthly meeting has been fifteen.

During the year the Geology Group meetings were attended by 15 to 20 members. A prominent feature was the excellent range of colour slides with which members illustrated their lectures. A wide variety of specimens were exhibited, indicating keen field work and systematic collecting.

What is it?

The photograph on page 42 is of the column of a native sun-orchid, *Thelymitra antennifera*. This organ, a combination of stigma (below) and stamen (above), distinguishes orchids from other plant families. The two dark appendages at the top give this particular species its common name, "Rabbit-ears".

Correction

The Kangaroo-paw discussed and illustrated on Page 22 of last month's *Naturalist* was *Anigozanthos flavida*, Yellow Kangaroo-paw, not the Green Kangaroo-paw *(A. viridis)* as stated.

Field Naturalists Club of Victoria

Established 1880

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

Patron: His Excellency General SIR DALLAS BROOKS, K.C.B., K.C.M.G., K.C.V.O., D.S.O., K.ST.J.

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MEMBERSHIP

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

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 of Volume 77 of the *Victorian Naturalist* is from May 1960 to April 1961.

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The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

CONTENTS

Front Cover:

This delightful photograph of a mother koala and her cub was taken by the late Fred Lewis. It appeared in the *Victorian Naturalist*, vol. 70, plate XI (March 1954), accompanying an article "The Rehabilitation of the Koala in Victoria".

The Victorian Naturalist

Three months ago, readers were presented with a summary of the past year's developments in this magazine and of associated trends in the Field Naturalists Club of Victoria. It is too early yet to obtain a clear picture of what the present year will bring, but the indications are that there will be no lessening of the trends of expansion which have been established in both club membership and activities and in the circulation and quality of the *Victorian Naturalist*.

As an indication of confidence in these trends, the F.N.C.V. council agreed, two months ago, to increase the numbers of the magazine printed each month by a further 15 per cent. Furthermore, it is intended that the majority of this year's issues will be larger than last year's average.

The enlargement of the magazine is the most significant move in connexion with its production since the initial launching of the "new" *Naturalist* in May last year. It is steps such as this that can eventually take it to a size which, by general standards, is compatible with its price.

Before it ceased production, *Wild Life* magazine ran to 100 pages each issue, and the price was 2/-. That was possible because the circulation was many thousands. It is obvious that the future of this club's magazine production will depend on ability to vastly increase the circulation of our *Victorian Naturalist*. It was with this in mind that, last April, we asked members and other readers to recommend the club and its magazine to their friends. We thank those who acted upon that suggestion, for the result of their efforts has helped in the decision to budget for a larger *Naturalist*.

As interest in the F.N.C.V. and its magazine continues to expand, the honorary officers of the club must cope with an increasing amount of work. For the treasurer in particular, this aspect is presenting a growing problem. In the *Naturalist* of April last, we published a "Renewal of Subscription" form. The purpose was to eliminate the necessity of making out and posting several hundred subscription notices. Many members and subscribers used the form. If you have not yet paid a current subscription, we ask you to use that form and to do so. For those outstanding, it will be necessary to send "reminder" notices next month.

Readers are reminded, too, of the invitation on page 11 of the May issue. An enlarged magazine requires an increase in the quantity of material submitted for publication. It is pleasing to note that more short items and queries are coming for the columns of "Along the By-ways". We look to you for a continuation of this interest.

WANDERING ALBATROSS-
Fact and Legend

By Susan E. Ingham

At sea off the coasts of Tasmania, as far north as Queensland in winter, and all over the Southern Ocean, you may see the Wandering Albatross. Pure white except for black wing-tips, beautifully streamlined and up to eleven feet in wing-span, it floats along behind the ship or circles it without a single wing flap, using up-draughts from the waves in its effortless gliding flight. Only when it sees food on the water does it suddenly become gawky and clumsy, as it shortens wings, brakes with enormous feet and comes down with a splash and commotion in the ship's wake.

Naturally, legends have accumulated round this largest of sea-birds, such as those crediting it with a wing-span of eighteen feet, and the literary myth that it was unlucky to kill one. (In fact, men on sailing-ships often caught and killed them, making muffs from the skin and tobacco pouches from the feet.) Yet the truth is quite as interesting. We are beginning to know how far an individual bird really travels, and we know the main facts about its breeding.

In 1847 a Wanderer was caught by a whaler in New Zealand waters, and released with a message, giving date and position, round its neck. It flew 3150 miles in twelve days before it was shot off the coast of Chile. In 1887 another flew 3500 miles, from the remote Crozet Islands to Fremantle, carrying a message from a party of shipwrecked sailors, in twelve days—a record rate of nearly 300 miles a day.

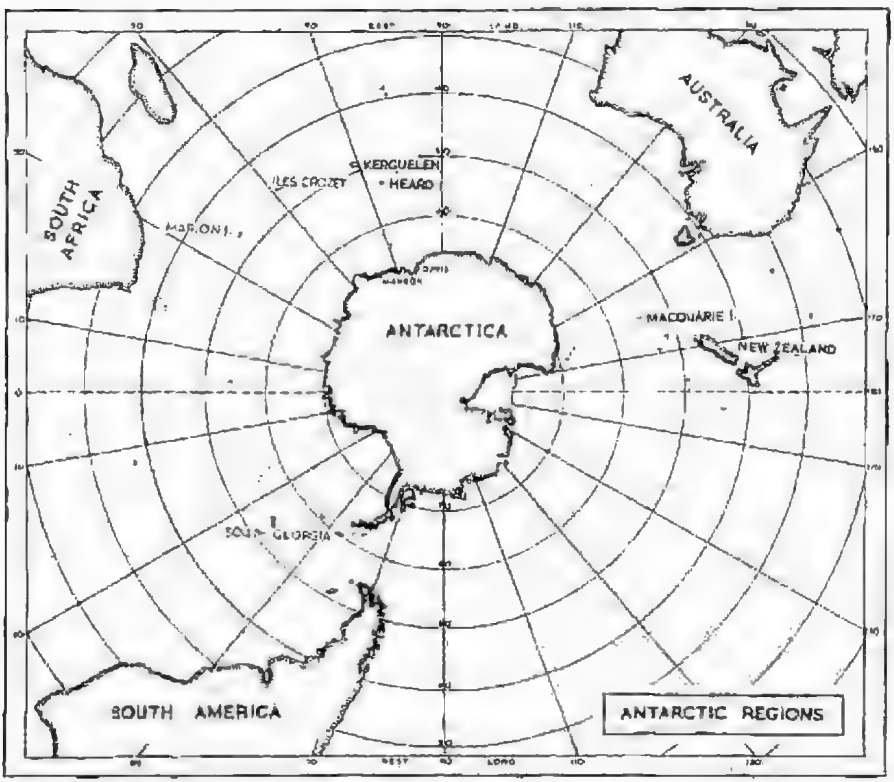
For many years these were the only known examples of flights by marked albatrosses, but now the problem is being studied intensively. Since 1958 Australian amateurs have been catching and leg-banding Wandering Albatrosses at two places near Sydney, where abundant food attracts them near the shore in winter. These are the effluent of the main Sydney abattoirs at Malabar Head, and Bellambi, 50 miles to the south, where the sea is very rich in squid. In calm weather albatrosses cannot take off easily and can be caught from small boats.

Last year this work began to show results. The Bellambi banders caught a bird they had banded experimentally in 1956 and another which had been banded as a fledgling on the far south Atlantic island of South Georgia the previous summer. Conversely, adults banded off New South Wales in winter have been found in summer at South

*Antarctic Division, Department of External Affairs.

Georgia and on Marion Island in the southern Indian Ocean. These show that both young and adult birds may circle the world; both the English name "Wandering" and the scientific name *exulans* are well deserved. However, present-day banding has not yet produced a rival to the nineteenth-century speed records.

Breeding and care of the young are the subject of a legend which is only now being disproved. The Wanderer breeds on remote southern islands without permanent human occupants. Sealers and scientists, visiting in summer, saw the birds courting and building nests and, at Christmas, laying a single egg which would not hatch until March. But at the same time the previous year's chicks were still sitting about, fully fledged, not to depart before the new year. Plainly, adults which were laying and incubating an egg could not still be feeding their last chick; and sealers said they had never seen adults with their chicks in winter. So the legend grew up that the chick was fed intensively until July and then deserted, to live on its own fat until it could fly itself. An immense amount of fat would be needed to carry



A.N.A.R.E. Photograph by J. Béchervaise
Wandering Albatross at Nest, Kerguelen Island

the chick through the winter blizzards, to grow the new feathers and to supply energy for the vigorous wing-flapping exercises of the fledgling!

Over the past thirty years evidence to the contrary has been steadily accumulating. Chicks with full stomachs have been found or actual feeding seen, in all months from hatching to flying. A member of A.N.A.R.E.* at Macquarie Island was lucky enough to see and photograph a fully fledged chick being fed in the middle of December 1958. A.N.A.R.E. men have also weighed several chicks at intervals throughout the year, and found that all grew steadily larger and heavier. Meals may have been hurried and irregular, but they must have been ample.

As the chicks are not deserted, there is only one other possibility — that adult Wanderers do not breed every year. A.N.A.R.E. biologists at Macquarie Island have found this to be correct. Only ten or twelve pairs breed there in any year, and the nests are widely scattered. Even before any birds had been banded, it was clear that the same nest sites were occupied regularly but in alternate years. Banding has confirmed that the same birds return to the same nest site every other year, being faithful both to mate and to home.

*Australian National Antarctic Research Expeditions.

In December, first the male and then the female Wanderers return to the island and build a new nest from moss, plants and peat, near the ruins of their old one, on flat or gently sloping ground exposed to the west wind. Both take turns in incubating the egg and, later, brooding the chick. At first the chick grows very fast, and in late April, when it is about six weeks old, it is too big to brood; then its parents leave it unattended except when feeding it. Muffled up in thick whitish down, the chick sits on the nest through howling gale, snowstorm or thick fog, doing nothing but eat, sleep and grow. From September to December the down is gradually replaced by feathers, which are black except for a white face and the underwings. The chick now spends much of its time standing or walking about and flapping its wings. Still the parents keep coming with meals. Finally, in December or January, when the neighbours are settling in and laying, the chick is ready to take to the air. Its parents are free for eleven months, to fly anywhere in the Southern Ocean or even round the world.

For several years the young birds never come to land, while their plumage gradually changes from black to white. For a few more years they will visit the breeding grounds in summer, courting and choosing a future mate and nest site, before they breed for the first time.

Many questions about the Wanderer's life remain unanswered. How long do the young birds stay at sea? Do they return to their birth places? How long do they live? Do they ever change mates or nest sites? Long-term banding and observation by Australian and British biologists is under way and in time will provide the answers.

Wanderer Albatross in Flight

A.N.A.R.E. Photograph

By Norman Wakefield

Australian Wonder-birds — The Lyrebird

This feature is included in the "Naturalist" mainly for the benefit of school pupils and as information for their teachers, in connexion with nature study in primary schools. It should be of use too to many older students as well as of general interest to the less-expert naturalists who seek to know more of the Australian environment.

The lyrebird family contains only two species, and its natural distribution is limited to the south-eastern part of the Australian mainland. The Superb Lyrebird (*Menura novae-hollandiae*) ranges from the extreme south-east of Queensland, through eastern parts of both New South Wales and Victoria, to within about twenty miles of Melbourne. The Albert Lyrebird (*M. alberti*) is confined to north-eastern New South Wales and border areas of eastern Queensland.

The Superb Lyrebird is probably Australia's most famous species of bird. It is a talented songster and outstanding vocal mimic, and the male bird builds a playground where he sings while displaying his remarkable and beautiful tail. Besides these activities, lyrebirds have a number of very interesting but less-known features and habits.

Over the years, much information about lyrebirds has been published in the *Victorian Naturalist*, and some passages by the expert authors of these past articles will be used in this one.

In Dr. J. A. Leach's *Australian Bird Book*—still the standard reference in most schools—the lyrebird is pictured with its tail in a quite unnatural position. This probably originated from a photograph of a mounted museum specimen and, unfortunately, it has been copied in other places. Many years ago, Miss M. L. Wigan (1) wrote:

> A tour round the world in 1930 revealed to me that of all those in many museums visited, no specimen is correctly mounted. In the British Museum . . . the bird is mounted in the stiff vertical position of that figured on the Commonwealth shilling postage stamp.

This sort of thing is very regrettable, for it does not do our bird justice; with the tail feathers bunched upwards, the real beauty is quite lost. Nowadays, with the publication of many good photographs from life, the error is being gradually corrected, and people are learning to envisage the lyrebird's tail as it is shown in the picture on page 70.

Mr. W. B. Hitchcock (3) has written this description of the tail of our bird:

> The lyrebird is unique in having 16 tail feathers, and the form of these is quite remarkable—at least in the adult male Superb Lyrebird. The two outermost feathers have a broad inner web and a very narrow outer web, and their combined shape is suggestive of a lyre. The inner web, apparently, is notched at regular in-

tervals by spaces that, according to the angle at which they are viewed, seem to be black or transparent. This effect is actually due to the barbs at those spaces being devoid of barbules. The middle pair of rectrices† is likewise unusual. These have no outer web and the inner web very narrow; near their base they cross each other and then diverge, bending round forward near their tip. The remaining 12 feathers, except near the base, have few barbs and appear hair-like. All the rectrices have very strong shafts.

During a performance, the two large tail feathers point horizontally outwards, directly opposite each other, and the others fill in a semi-circle in a forward position over the bird's back and head. The twelve fine feathers are then conspicuously silvery in colour, but that is due to the actual under-surface, so the feature is hidden when the tail is folded and trailed behind again after the performance is finished.

†Tail feathers.

The male bird builds a display mound, usually about four feet across, in a secluded place. He tramples down herbage and ferns and scratches up earth and small rocks to form a raised area of ground. This stage is usually called a "dancing mound", but Mr. Tom Tregellas, an expert early observer of the birds, insisted that the name was wrong. Tregellas (4) wrote this:

I have never seen the birds "dance" on a mound. They merely strut about and turn around whilst giving voice to their mimicry, scratching about in a desultory manner and elevating and depressing their tails while performing all manner of evolutions. Occasionally they give a forward jump whilst calling "pillick pillick" and take two steps backward to the first position. The particular call is very far-reaching and the one designated by the blacks as "buln buln", the name by which they knew the bird.

This description of the bird's performance is worth quoting, whether or not we choose to call it "dancing".

Tail of Displaying Lyrebird, Sherbrooke Forest

Photo: K. Halafoff

The method of "scratching" is not like that of a fowl; rather it is a matter of grasping soil and debris with the long toes and actually lifting it back. In this way, a feeding lyrebird works systematically over an area of ground much the same as a man digging a garden bed, with a shallow trench between the undisturbed part and the overturned soil. Thus it brings its food to light; worms, insects, small crustaceans, etc.

The lyrebird's song includes loud melodious notes and other sounds of its own, but it is famous rather for the borrowed items which it uses. In particular, it imitates the calls of bush birds, including such ones as Whipbird, Kookaburra, Gang-gang and Crimson Rosella. Although the male bird is the recognized singer, the female also gives a good vocal performance and she mimics well, too.

In late autumn or early winter, the hen bird spends about a month building a bulky stick nest, hooded over with fern roots and fine twigs and lined with soft feathers. Her clutch is one egg only,* and it usually takes about a month to hatch.

Mr. K. A. Hindwood (2) has published detailed records of nesting, showing that the incubation period is almost wholly in winter (mainly June and July in New South Wales but July and August in Victoria). The chick remains in the nest for at least five weeks, usually longer, and so may be found there as late as mid-October. When disturbed, the young bird gives a piercing whistle which usually brings a hen bird to the scene.

It is said that, since the introduction of the fox to this country, lyrebirds have learned to build their nests in less accessible places, such as on cliff-ledges, treefern crowns, and even high in the forks of trees. It would be interesting to know if foxes kill more lyrebirds than Native Cats and Tiger Cats did when these carnivorous marsupials were abundant.

Having only short rounded wings, lyrebirds cannot fly pro-

*On a few occasions, two eggs have been reported in a nest, but evidence indicates that in such cases these were not true "twins", the second being laid some weeks after the first or by another hen.

Lyrebird Nest, near Sydney
Photo: K. A. Hindwood

perly. However, they can glide or volplane quite long distances downhill or across a gully. To roost safely, they ascend tall shrubs and trees, by jumping from branch to branch with a flap of the wings each time, often until they are a hundred feet or more from the ground.

Victorians usually associate lyrebirds with the fern gullies of Sherbrooke Forest in the Dandenong Ranges. There, however, many lyrebirds have become so used to humanity that they will feed about or perform within a few feet of a group of people. That is far from the birds' natural behaviour.

In Gippsland and north-eastern victoria, one is very fortunate indeed to be able to watch a lyrebird performing, though their singing is often heard. They are quite plentiful in the forests and scrublands of the mountains, often far removed from fern gullies, and one sometimes comes across their nests on rock ledges at elevations of 5000 feet or more.

References

This is a list of the articles referred to above, together with a few others, to which those interested may turn for further information about the lyrebird.

1. 'Mounting of Male Superb Lyrebird in Full Display', by M. L. Wigan. *Vict. Nat. 51*: 140 (Sept. 1934).
2. 'Nesting Habits of the Superb Lyrebird', by K. A. Hindwood. *Vict. Nat. 57*: 183-8, 199-202 (Feb. and Mar. 1941).
3. 'Classification of the Lyrebird', by W. B. Hitchcock. *Vict. Nat. 69*: 52 (Sept. 1952).
4. 'Mounds and "Dancing"', by Tom Tregellas. *Vict. Nat. 69*: 67 (Sept. 1952).

Both the May 1936 and the September 1952 issues of the *Victorian Naturalist* (Vols. 53, part 1, and 69, part 5) were devoted almost completely to articles on the lyrebird. Also, two pamphlets, *Lyrebirds of Sherbrooke* and *Sherbrooke Diary*, are available from the F.N.C.V.

Female Lyrebird Approaching Nest on Treefern, Sherbrooke

Photo: K. Halafoff

Wirilda — *Acacia rhetinodes*

This is a wattle with pleasant names. Its systematic name means resinous, but does not refer to the foliage which is conspicuously smooth and non-resinous.

Its musical aboriginal name Wirilda has been adopted as its "official" common name, but in some places it is called All-the-year-round Wattle, for there is no season when it does not bloom. I remember noticing, in October, one small clump where there were bushes in flower, others in bud, and some fringed with slender green pods. It may be gold-powdered in spring along the road to Cape Schanck, gold-clustered in summer and autumn at Tidal River, and it flowers in winter in my garden, though at that season its place is usually taken in the bush by the creamy Sweet Wattle with scale-enfolded buds.

Wirilda. *Acacia rhetinodes*

Photo: F. Bishop

Wirilda is variously a shrub or small tree, the smooth firm foliage usually dull or bluish green, long and narrow and with one main nerve. It may be a quarter of an inch wide and six or eight inches long, or up to half an inch wide and barely two inches long, but the phyllodes are always conspicuously but gradually narrowed toward the base and slightly sickle-shaped. When the phyllode is long, the apex is always narrowed to a soft point, but when short it usually broadens toward the tip.

From the base of a phyllode springs a short raceme of globular flower-heads. They are, for a wattle, rather dense and solid-looking, because the stamens are crowded and relatively short. The inflorescence is not unlike that of Hickory Wattle, but this latter and other nearly-related species have much broader phyllodes.

The flowers, though varying a little, are usually a rather light golden yellow—a welcome brightness amongst the quiet colours of summer and autumn.

The pods hang thickly in their season, narrow, sickle-shaped, one or two inches long, straight-edged but slightly rippled because they are thinner (but not narrower) between the seeds.

Wirilda is as varied in its distribution as in its flowering season: at home on the coast, and inland; on hills and plains, but never a shrub of the mountain-tops or heavy forest; and it is unknown in the Mallee. It extends into South Australia.

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.

Air-borne Spiderlings

These comments came in a letter dated June 1, 1960, from Miss Jean Galbraith of Tyers, Gippsland:

Last Tuesday we had the same showers of gossamer that we heard mentioned in news broadcasts. I was surprised that there was any question about its nature, as most of those pieces I examined carried minute brown spiders.

The falling of the gossamer was very beautiful—it caught the light in threads and flocks of silver drifting from a cloudless sky, rising to almost invisible heights then slowly drifting down. It was noticed in Morwell and Traralgon as well as here—but was not at all admired by a neighbour whose washing was coated with the threads!

With their spinnerets, these tiny spiderlings let out streamers of minute threads, without weaving them together into normal strands of web. When there is sufficient to be borne along by the air movement, the little animals take off on their "magic carpets". In *Australian Spiders*, we are told that Charles Darwin observed "hoards of migrating spiderlings" when on the **Beagle** sixty miles from land, and a similar observation is recorded when a ship was two hundred miles out to sea. It is believed that one spider species migrated in this manner, from country to country, right round the world.

Luminous Spiders?

Mrs. E. M. Davies passes on a problem given her by Mr. Colin Barrie of Cheltenham. She writes:

One dark night he saw on his garden path two luminous spiders, one much smaller than the other. The bigger spider was brown to black and about ⅜-inch in diameter. From the centre of its back a light glowed

which could be seen nine feet away. The smaller spider had a much smaller spot but the light was as intense.

K. C. McKeown, in *Australian Spiders*, states that "there appears to be no definite reference to any particular spider as having luminous properties", though he quotes an unconfirmed report from Queensland of an observation of several spiders which were said to give out light, like fireflies, at intervals of about a second.

A reasonable explanation of the Cheltenham observation would be that the cluster of eyes towards the front of the spider's cephalothorax were gleaming by *reflecting* light from some outside source. This is fairly commonly observed with spiders, and those who collect funnel-web spiders about Sydney, for our serum laboratories, often find them by shining a torch light into dark crevices to pick up the reflections from their eyes.

Kangaroo-paws and Honeyeaters

This very informative note comes from Mr. R. H. Stranger, 44 Napier Street, Footscray:

I was very interested in your article "Nectar Flowers and Honeyeaters", which appeared in the May issue of the *Victorian Naturalist*. I would like to add something more definite than "Hence, one would expect many species etc."

In Western Australia, the only birds which have been observed feeding upon the kangaroo-paws' nectar are the Western Spinebill and the Brown Honeyeater. Dr. Serventy has also observed the Red Wattle Bird and the Western Silvereye on the plants but not feeding on them. I have several times observed the Yellow-winged Honeyeater in kangaroo-paw country but cannot recall ever having seen the birds taking any interest in the kangaroo-paws.

Nesting of Black-shouldered Kites

This is a very good example of careful observation. It concerns the breeding habits of one of our native hawks, and was submitted by one of the junior members of the F.N.C.V.—Robert Turner of Lara.

Inhabiting our district are some small hawks called Black-shouldered Kites. They are only a foot long and their wing-span is about two feet six inches. They are white except for black wing-tips and the black shoulders which give them their name. Their call is a "peep" followed by a long rasping note. Except for the Nankeen Kestrel, they are about the commonest hawk in our district. They are found in open and lightly-timbered country. They hover over a paddock and wait for a mouse, cricket or grasshopper to come out in the open, then they will just drop on it and kill it.

These kites are nomadic birds which move from district to district. A few years ago they were not found near Lara, but this year a pair of them built quite close to our house. Their breeding season is September to March. Before they started building, one would grasp a small stick and fly up with it. When he was considerably higher than his mate he would drop it. The other one would turn on her back and catch it in her talons. They chose a tree about thirty feet high, and in the topmost branches they built a very rough nest: larger than a magpie's, but not as neat, for the sticks pointed out in all directions. After they had finished with the twigs they started to line it with gum leaves. One bird would fly over to a gum tree, perch on a branch and pull a leaf off with its beak. I noticed it always returned to the same branch for leaves. It would then fly over and place the leaf in the nest. All this

time her mate was sitting on a dead branch nearby, but if any magpie or other hawk came near the nest he would instantly fly off and swoop at it. Once when a magpie landed in the nesting tree he swooped and actually hit it.

Three eggs were laid, white with brown spots. While the female was sitting on the eggs the male would catch a mouse and fly towards the nest with it. When she saw him with the mouse she would glide off the nest and meet him. The male would then turn on his back and allow the female to take the mouse. She would fly to a post and eat it while the male kept guard over the nest. The young have not yet hatched out (at the time of writing) but I expect they will soon.

Specimens for Identification

From Janet Dyson, Camberwell Girls' High School, a small fawn moth with pointed, orange-striped wings, which was hatched "from a green caterpillar found on the grass". The red pupa-case accompanied it, and also some scores of eggs it had laid. It is *Oenochroma phyllomorpha* of the family Oenochromidae. It apparently has no common name, and general reference books give no information of its habits.

From Elaine Smith, also of Camberwell Girls' High School, a specimen of the Fat-tailed Pouched-mouse (*Smintlıopsis crassicaudu*). It was collected on May 27, 1960, at McEvoy near Echuca, on the property of Mr. Bruce Dench, having been inadvertently dug up and killed by a plough.

Rainbow-bird Migration

Mrs. Frances Gladstone has written this comment and query, from Beechworth in north-eastern Victoria:

Do Rainbow-birds migrate any distance? In November we found their burrows about the creek and paddock banks; and in summer, up until March, flocks of the lovely multicoloured birds were circling and calling with soprano-shrill cries, day after day. But now they are all gone. Do you know where they go?

Rainbow-birds go north for the colder part of the year. Those that nest in Victoria travel at least as far as Queensland, and some may cross to New Guinea and beyond. The actual extent of the migratory movement is not known, for in northern parts of Australia, where the species is present the year round, it has not been determined whether the population is really static or whether the summer groups move north towards winter and are replaced by others from the south.

F.N.C.V. Nature Show

The club's nature show is to be held on September 5, 6 and 7, this year, in the Lower Melbourne Town Hall. The show committee is organizing exhibits on the plant kingdom, Victorian and interstate wildflowers, mammals and birds. It is intended to have rare Tasmanian shrimps on display, an item not previously shown outside the island State. Other exhibits are to includes ones by individual members of the club.

Obituary

On June 26, 1960, Thomas Stephen Hart, M.A., B.C.E., passed away. He was in his ninetieth year and had been a member of the F.N.C.V. since 1887 and of the Royal Society of Victoria since 1894. A short account of his life is being prepared for publication in the *Naturalist*.

Title Page — Volume 76

The centre leaf of this issue should be removed and used in binding volume 76 of the *Naturalist*.

Some Highlights of the Marysville Trip

These notes deal with the F.N.C.V. excursion to Marysville on April 22-25 this year. They were submitted by Jean Galbraith.

The creaking notes of King Parrots began at dawn and their brilliant red and green made flecks of colour in the oak trees in gardens and streets as they busily cracked acorns and nibbled the "meat" inside.

In a time of few flowers, berries delighted us. The curved wands of Turquoise Berry (*Drymophila cyanocarpa*), with lance-shaped opposite leaves, bore fruit like blue beads hanging down from the upper leaf-axils. Large purple-blue berries of Flax-lily (*Dianella tasmanica*) and Appleberry (*Billardiera longiflora*), the first on erect branching sprays, the second on climbing or trailing stems, were not less beautiful because they are familiar. Less familiar were the opaque pearl-white fruiting calyces of the Waxberry (*Gaultheria hispida*) —like clusters of white berries above their net-veined bright leaves—on snow-wreathed Mt. Arnold. There, too, were big orange-red fruits of Rough Coprosma (*Coprosma hirtella*), which when very ripe darken to the colour of black coffee, and the oval scarlet beads of Prickly Currant-bush (*Coprosma quadrifida*) among tiny leaves.

Part of a treefern trunk, used in a bridge near Cumberland Falls, was cut so that the oval outlines of the bases of old fronds showed clearly on the flat surface. One member pointed out that every oval was outlined in green, for countless prothalli (some with a first frond already developed) were growing there, in what had been the outside of the dead fronds.

Bushes of Mountain Correa (*C. lawrenciana*) grew thickly along all the cooler mountain roads. Though these tall shrubs with big ovate leaves, rather leathery and backed with a felt of white or brownish hairs, were not familiar to everyone, all who know the Common Correa (*C. reflexa*) could recognize the characteristic oval buds hanging from calyces like brown suede. We did not find the red form, but a few of the greenish bells were touched with pink. We were too early for any but the first scattered flowers. One member was delighted by the picture made as an Eastern Spinebill hovered before the pale green bells.

Here, as in similar places throughout eastern Victoria, the lacy foliage of Elderberry Ash (*Tieghemopanax sambucifolius*) was conspicuous along the roads and, as usual, it varied from a graceful form with narrow-linear leaf segments to a rather solid-looking one with broadly ovate segments, with every gradation between the two.

Bushes of *Acacia frigescens** were found where the road dips down Mt. Arnold toward Cumberland Valley. This extends the known distribution of this recently-described wattle, but it is country where one would expect it, with a heavy forest cover similar to that in the Baw Baw area where it is common. Its grey-green phyllodes, with very strongly marked parallel veins, distinguish it from Blackwood (*A. melanoxylon*) even when it is not in flower and its smooth bark is not visible. When I first saw it near Tanjil Bren I was reminded of the leaves of *Hakea laurina*, so strongly that it seemed a pity the name Hakea Wattle already belonged to another species.

Because plants are warmer (or less cold) than snow, it was interesting to see them looking up through the round holes they had melted in a snow-blanket about six inches deep. It reminds one of the holes melted around sitting Adelie penguins after an Antarctic blizzard.

Slender Clubmoss (*Lycopodium lateralis*), like a giant moss, up to a foot high, with erect little-branched stems and hairlike leaves, interested members who found it near the Stevenson River.

Perhaps one should include also as a highlight the many (and well-deserved) remarks overheard about the organization and friendly helpfulness of our excursion secretary.

*See *Vict. Nat.* 73: 358 (Feb. 1957).

Bulga National Park

BY J. ROS GARNET

It is now almost a habit to speak of Bulga and Tarra Valley National Parks as if they were twin reserves. They are separated by several miles of roadway and they have a number of things in common. Both are in the Strzelecki Ranges, within twenty miles of Yarram; both were dedicated to preserve samples of the rain forest which originally clothed those ranges; both are managed by the one committee—the Alberton Shire Council and the local Forestry officer; and each is much too small to serve the real purpose of a national park. Both are, however, real gems of Victorian highland scenery. This month's article will depart from custom and will deal with Bulga Park alone.

As long ago as 1904, a small portion of an especially beautiful fern gully at the head of Macks Creek, near Balook, was reserved for public purposes, at a time when very extensive areas of the Strzelecki Ranges were being settled. Almost thirty-seven years later, the fifty-eight acres comprising this reserve was formally gazetted as a State reserve by Order in Council, and about eighteen months after that a further thirty-three acres was added. In 1957, when the National Parks Act was proclaimed, Bulga came under the jurisdiction of the National Parks Authority, and the former "temporary" reserve became, incidentally, "permanent". Its actual management remained with the old committee. Throughout its existence as a reserve for "the preservation of scenic features and of native vegetation", it has been visited by countless thousands of tourists and nature lovers.

Along any approach to the Park one is gently conditioned to the environment of mighty eucalypt forest which envelops Bulga like a protecting mantle. From Yarram, one travels northward from almost sea level through open pasture land and gradually ascends into the ranges along the valley of the beautiful Tarra River, past timbered slopes of gradually increasing steepness, up on to the Grand Ridge Road. At Balook, 1900 feet above sea level, there is a turn-off to the famous gully, and a short walk or drive brings one to the entrance of the Park. From the north or east, the approach is along the Princes Highway to Traralgon and thence over the ranges, or else *via* the South Gippsland Highway to Yarram and then Balook. The finest of them all is the Grand Ridge Road, which actually traverses a portion of the Park. It is a masterpiece of engineering, providing panoramas difficult to match anywhere.

Whichever road is taken, one recognizes the roadside trees and shrubs as characteristic of highland temperate rain forests: White Mountain Ash, Blackwood, Christmas Bush, Mountain Pepper, Hazel Pomaderris, Musk Daisy-bush, Cassinia, Elderberry Ash, Balm Minthush, Clematis, Rough Treefern, Mother Shield-fern and so on—plants that withstand the warmth of summer sunshine as well as cold winter winds and the snow which often mantles the Park and its environs.

A conspicuous feature of Bulga Park is the suspension foot-bridge with its 165-feet span across the creek gully. From it one gazes with sheer admiration on the crowns of massed treeferns and the tangle of Sassafras, Myrtle Beech, Blackwood and Banyalla, and the glimpses of sparkling stream sixty feet or more below. I can recall no other place where one can stand so comfortably above a dense Victorian fern gully! Down below, there are well-graded tracks for the walker beneath the canopy of treeferns and forest giants, where it is delightfully cool on the

By courtesy: Tourist Development Authority

The Suspension Bridge at Bulga Park

hottest summer day and in winter sheltered from icy winds.

In their season, birds enliven the quiet scene. Robins and wrens play hide and seek among the lichen-encrusted trees and creepers; a whipbird calls or a lyrebird mimics; and perhaps, far above, a passing Black Cockatoo screeches. Those who know the native ferns will recognize many uncommon ones—lovely little epiphytes which fairly smother trunks of treeferns and ancient flowering trees.

Bulga is one of the few Victorian national parks which has escaped serious fire damage. There are several reasons. It is well buffered by State Forest, and the Forests Commission, in protecting the latter, has ensured the safety of te Park. The few fires that have occurred in the area have swept over the deep narrow valley leaving the fern gully unscathed. (One recalls Alfred Howitt's account of the holocaust which raged overhead while he and his two native companions were in safety, deep in the gorge of Deadcock Creek.*) Most settlers in those ranges are too conscious of the consequences of bushfires to lightly start something which man cannot control. Lastly, the committee of management has caused a constant watch to be kept on what is known to be an adornment to the district and one of its premier tourist attractions.

The history of Bulga Park is known best to one man—Frank Corrigan, one time Alberton Shire Engineer and later a member of the Country Roads

*See "A Gippsland Beauty Spot", *Vict. Nat.* 40: 77-82 (Aug. 1923).

Board. He was largely responsible for having the reserve brought under the control of his Shire Council, in 1927, and, as Engineer, he was able to ensure that it was looked after. Through him, grants from the Tourist Resorts Committee and from his Council were used to establish access roads, tracks and the picnic ground. His team built the famous foot-bridge, in about 1935 I think. For safety as much as for protection of the proposed bridge, several giant Mountain Ash trees were removed. Local axemen assured him that they could easily fell the trees upstream and avoid damaging the treefern bower. But alas, they were less expert than they believed, for every tree toppled on to the ferns. Corrigan did his best with the shambles and, as he told me recently, little trace of the damage remained four or five years later. Such is Nature's capacity to heal her wounds when conditions are favourable.

What is needed now to complete Frank Corrigan's early plans is to extend the Park to include another magnificent gully called Fincks Gully, some of the adjoining Mountain Ash forest north of the Grand Ridge Road, and a stretch of Macks Creek with a series of small waterfalls down from the Park's southern boundary. An additional few hundred acres would ensure the full protection of the very delicately balanced ecological association which is the glory of Bulga National Park.

Notes. The area mentioned at the foot of page 44 of *Vict. Nat.* 77: (June 1960) in referring to the proposed extension of the Lakes National Park, was inadvertently printed as 15,000 acres. It is actually 1508 acres.

Early in June, the National Parks (Amendment) Bill, 1960, passed through both Houses of Parliament with only one major amendment—seventy-five years was substituted for the twenty-one originally proposed by the Government. Further comment is unnecessary.

Field Naturalists Club of Victoria

General Meeting—June 14, 1960

Mr. D. E. McInnes presided over a meeting of about 100 members. The secretary, Mr. E. H. Coghill, directed members to the report published in the June *Naturalist*. After he had given an outline of some of its significant features, it was received and adopted. The treasurer, Mr. A. G. Hooke, read a report on the accounts which had also been published. In seconding the motion for their adoption, Mr. W. P. J. Evans, one of the club's auditors, stressed the meticulous way in which the treasurer keeps the books.

It was announced that there would be an extraordinary meeting before the July general meeting, to consider the applications for affiliation by Casterton, Warrnambool and Gippsland Field Naturalists Clubs. The University of Adelaide is to hold a spring school at Wilpina in the Flinders Ranges on September 12-17; and there is to be a wildflower show at Portland on October 13-16.

Preparations for the F.N.C.V. spring nature show were discussed. Many volunteer helpers will be needed for the setting up on Sunday, September 4. Members were asked to collect spiders for display in special boxes made by Mr. E. Swarbreck.

It was announced that the Christmas-New Year excursion next summer will centre on Yarram.

Office-bearers, members of council and auditors, as listed on page 24 of the May *Naturalist*, were elected for the ensuing year, and the president thanked past and present officers for their services.

Mr. McInnes then delivered the presidential address, dealing with microscopes as "The Naturalist's Third Eye". He exhibited five kinds of instrument, from an old simple tube to a modern binocular type, all using interchangeable standard optical equipment in eye-pieces and objectives. Some photomicrographs, by Mr. W. Evans, and photographs of coloured plates, were shown on the screen, illustrating many minute forms of life. Excellent microphotographs were shown too of stained sections of plant parts and other items. The merits of top lighting and black and coloured backgrounds were demonstrated.

The twenty-one persons whose names appeared on page 51 of the June *Naturalist* were elected to membership of the club.

Geology Group—June 1, 1960

Nineteen members were present, with Mr. Jeffrey in the chair. Aspects of the Chilean earthquake were discussed, and Mr. Hemmy reported that the tide gauge at Fort Phillip Heads had risen only four inches, so no hazards were caused along southern Victoria. Attention was drawn to an article in the *Herald* by Mr. E. D. Gill of the National Museum, explaining the geological causes of the flooding of the Brooklyn sewer shaft.

The subject for the evening was "The Geology of Sydney", by Mr. R. Tinckam. The history was traced of the various formations and of significant land movements, to explain the occurrences of the sandstones and shales, granites, the coal measures and basalts, and the topography of the drowned valleys and the Blue Mountains. Details of the lecture were illustrated by a diagram of an east-west section through Sydney and some geological maps compiled by the New South Wales Department of Mines. Two short films were shown of scenery along the Nepean and Hawkesbury Rivers, and also some aerial shots taken from a Brisbane-bound plane.

Exhibits: Hornfels from South Blowning, showing laminations (Mr. McInnes); jasper, gabbro and serpentine from Waratah Bay, trilobites (Cambrian?) from Digger Island, Walkerville, and limestones with corals, brachiopods and gastropods from Walkerville (Mr. Fisch); agate from Springhurst (Mr. Watts); and granite from Victor Harbour, S.A., and marl with fresh-water shells from edge of dry lagoon, Coorung area, S.A. (Mr. Dodds).

Fauna Survey Group—June 9, 1960

About ten members attended, and the evening was devoted to general business. Mr. Wakefield reported an interview with Mr. Butcher, Director of the Fisheries and Wildlife Department. Mr. Butcher had been interested in the formation of the group and in its proposed activities, and he had stated that he would consider issuing permits to certain members for the handling of protected animals.

It was decided to continue meeting on the second Thursday of each month, pending possible arrangement of a more suitable date. Members agreed to show colour slides of mammals at the July meeting.

Discussion centred round the recent excursion to the Buchan district limestones and the discoveries and other observations made there. The possibility was considered of obtaining financial assistance towards the cost of equipment for the group and to meet the expenses of publishing adequate reports when important investigations were completed.

Additional projects were listed for future attention: an investigation of the Victorian occurrences of rock-wallabies, a search in the Suggan Buggan area for the wallaroo, and a survey of the mammal fauna about Cardinia Creek near Upper Beaconsfield. Plans were made for an excursion to the Colac area over the following weekend.

The group is to gather data about common names in use for native mammals, with the idea of formulating suggestions for the standardization of suitable replacements for certain unattractive or very long vernaculars given in some reference books.

Fauna Survey Group Excursion to Buchan District

The two car parties met at the Caves Reserve about midday on May 24 and proceeded to East Buchan, where minor caves were examined in two areas of cliffs. The first revealed a cave with a population of bats, and a few mammal bones were found in recesses here and there.

The next day was devoted to collecting from major deposits of bones from old Native Cat dens at The Pyramids, near the Murrindal River. These had been partly worked over by Mr. Wakefield a year or so before.

On May 26, the party examined a very large cavern at Murrindal and studied the two species of bats which inhabit it. They then moved to East Buchan and spent the afternoon in an extensive cave system which had been missed before. The latter contained the same two species of bats and, in a recess high in a cliff face, an extensive deposit of mammal skulls evidently of old disgorged owl pellets.

Before returning to Melbourne the next day, further work was done at East Buchan. It is evident that the area needs more attention, particularly to determine what small mammal species still live in the area.

The bat populations and the bone deposits examined each contain mammal species not previously recorded in Victoria, and it is intended that full reports of these will be published eventually in the *Naturalist*.

Botany Group—May 12, 1960

Members spent the evening considering various aspects of the botanical family Liliaceae, of which twenty-seven genera, including forty-seven species, occur in Victoria. Some of these—*Dianella* (Flax-lily), *Lomandra* (Mat-rush), *Xanthorrhoea* (Grass-tree) and *Burchardia umbellata* (Milkmaids)—were exhibited.

Detailed characteristics of the family were given and it was shown how these could be used to identify its members and to relate them to other groups of the plant kingdom. The latter aspect was illustrated with a chart.

Readers interested in Victorian wildflowers might like to know that *A Census of Plants of Victoria* is still available (unbound) from the F.N.C.V., and that the club has stocks of Jean Galbraith's *Wildflowers of Victoria*.

Mrs. Z. Lee showed coloured transparencies of flowers. These were taken mainly in the Grampians, East

Gippsland, and at Wilson's Promontory, and included many beautiful orchids.

As a number of group members will be in Central Australia just before the spring nature show, volunteers are required to help gather material for the group exhibit. Members prepared to assist are asked to contact Miss Allender.

Microscopical Group—May 16, 1960

Before the talk began Mr. D. McInnes, as leader of the group, strongly suggested to members that they should lodge protests with their local parliamentary representatives against the proposed scheme for logging in Melbourne's catchment areas. He said, and all members agreed, that since we have one of the purest water supplies in the world, it would be foolish to endanger it in any way.

The speaker for the evening was Dr. R. Wishart, whose subject was "The Heads of Insects". He began by projecting micro-slides of spiders to show the appearance and function of the principal head appendages. Projection and discussion of insects such as beetles, flies, moths and thrips followed, and the lecture concluded with an interesting account of the head-parts and habits of various ticks, lice and fleas.

Microscopical Group—June 15, 1960

The group was fortunate in having Mr. Douglas of the Mines Department to lecture on "Micro-fossils and their Value to Geology". He began with a brief survey of the major fields of micro-palaeontology, and described his own and others' works in this field. The projection of coloured slides of microscopical specimens followed, with commentary on each. The preparation of microscopical slides from drill-cores, etc., was outlined, and the lecture concluded with an account of the value of micro- and index-fossils in the location of oil and water by drilling and in correlating widely distributed strata.

The group meeting of July 20 is to be a "gadget night", and members and visitors should bring useful home-made, unusual or obsolete gadgets which find application in microscopy. The speaker is to be Mr. Middleton, and a feature will be a binocular microscope constructed to give extreme stereoscopic relief at high magnification.

Bendigo F.N.C.—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 remainder of this year.

Excursions—Start from Gold Jubilee Statue (half-day at 2 p.m., full-day at 10 a.m.).

July 17 (full-day)—Lyall Glen: General (J. Ipsen).

Aug. 13 (half-day)—Maiden Gully: Botany (A. Ebdon).

Sept. 4 (full-day)—Whipstick: Hakea Wattle (R. Allen).

Oct. 1 and 2 (weekend)—See "Preliminary Notice", page 84.

Oct. 9 (full-day)—Tooborac: Botany and General (W. Gilmore).

Nov. 12 (half-day)—Junortoun: Birds and Nests (J. Kellam).

Nov. 26 (half-day)—Diamond Hill: *Phebalium pungens* (H. Henkel).

Dec. 10 (half-day)—Meadow Park: Birds (J. Ipsen).

Meetings—Start at 7.15 p.m. at Bendigo Technical College.

July 13—Botany (J. Kellam).

Aug. 10—Whipstick (W. Perry).

Sept. 14—Election of Officers; ex-president's address.

Oct. 10—Botany (W. Zimmer, Forests Commission).

Nov. 9—Birds (R. Eddy).

Dec. 14—Specimen Night (Members).

A. C. Ebdon, Hon. Sec., 46 Lucan Street, Bendigo.

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

GENERAL MEETINGS

Monday, July 11, 1960—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

(Note: An Extraordinary General Meeting will be held at 7.55 p.m. to consider applications by the Casterton, Warrnambool and Gippsland F.N.C.s for affiliation with the F.N.C.V.)

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Slides, etc., by Members.
4. Election of Members:

Ordinary Members:
Mr. Cyril Bowden, 21 Elstone Ave., Niddrie (*N. A. Wakefield/D. K. McInnes*).
(Mrs.) Lillian M. Read, St. Anne's, Warrien Rd., Croydon (*N. A. Wakefield/E. H. Coghill*).

Country Members:
Mr. John Hastie, High School, Corryong (*N. A. Wakefield/A. G. Hooke*).
Mr. E. J. R. Taylor, 27 Strachan St., Geelong West (*A. G. Hooke/M. Butchart*).
Mr. C. P. Madden, R.M.B. 219, Milbrulong Rd., Lockhart, N.S.W. (*N. A. Wakefield/E. H. Coghill*).
Mr. R. H. Fulton, School of Forestry, Creswick (*E. H. Coghill/A. G. Hooke*).
Mr. N. J. McLeod, State School, Bogong (*A. G. Hooke/E. H. Coghill*).
Mr. F. N. Pickersgill, Forest Ranger, Cowes (*E. H. Coghill/N. A. Wakefield*).
(Mrs.) Lucy Larkin, 32 Moore St., Colac (*N. A. Wakefield/D. K. McInnes*).

Junior Members:
Anne Selman, "Morongo", P.G.C., Geelong (*N. A. Wakefield/A. G. Hooke*).

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

Monday, August 8, 1960— "Control of Reproduction in Tropical Vertebrates", by Professor A. J. Marshall.

GROUP MEETINGS

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

Thursday, July 14—Botany Group. Miss L. M. White will give brief outline of plant kingdom.

Thursday, July 14—Fauna Survey Group. Members' slides.

Wednesday, July 20—Microscopical Group. "Gadget Night".

Monday, August 1—Entomology and Marine Biology Group, in Mr. Strong's rooms, Parliament House, at 8 p.m. Use private entrance at south end of House.

Wednesday, August 3—Geology Group. "Geology in Colour", by Members.

F.N.C.V. EXCURSIONS

Sunday, July 17—Sherbrooke. Subject, "Lyrebirds". Leader, Mr. F. Pinchen. Coach to leave Batman Avenue, 9.15 a.m. Fare, 14/-. Book with excursion secretary. Bring one meal.

PRELIMINARY NOTICES

Sunday, August 21—Combined excursion to Creswick, with Ballarat F.N.C. Details next month.

Saturday-Sunday, October 1-2—Combined weekend. F.N.C.V. country members and members of country clubs are invited to join with Melbourne members. Saturday afternoon offers a choice of two excursions: Organ Pipes, Sydenham, and Sherbrooke Forest. On Saturday evening, at 8 o'clock, there is to be a meeting at the National Herbarium, when Mr. J. Béchervaise will speak on "Some Aspects of Antarctic Wildlife". On Sunday, a full-day excursion is planned to the Brisbane Ranges. Country visitors needing transport on these excursions should notify the excursion secretary as soon as possible.

December 26-January 2—Yarram. A parlour-coach will be chartered for the excursion, for day trips to Tarra Valley, Bulga Park, Port Albert, etc. Hotel accommodation is available.

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Mt. Pilot aborig. paintings.

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August 4, 1960

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

This is a male Satin Bower-bird, still in its immature plumage, at the playground it made in a garden at East Malvern, an eastern suburb of Melbourne. The full story of this bird is told in an article, "Bower-bird Visits Melbourne", in *Vict. Nat. 73*: 116-24 (December 1956). See also, "Nature-study for Schools" in this issue.

Feeding Associations Among Birds

By K. A. Hindwood

The English ornithologist, Colonel Meinertzhagen, in his recent book, *Pirates and Predators* (1959), uses the term "autolycism" to denote the habit that birds have of making use of man and his works, of other birds, of mammals, reptiles and fish to obtain either food or shelter. He considers that the expressions parasitism, symbiosis and commensalism are inadequate to cover such behaviour; thus the designation autolycism.

In explanation of the other terms it may be stated that commensalism is that condition where one animal lives as the tenant of another and shares its food but does not get it directly from the host; symbiosis indicates the living together of two organisms each of which benefits the other: and parasitism is the living of one form of life at the expense of another.

The word autolycism seems appropriate enough when applied to birds that act in much the same way as Autolycus, a character in Greek mythology who, as it were, lived on crumbs from rich men's tables. The name was also used by Shakespeare for a witty rogue who described himself as a "snapper up of unconsidered trifles."

Most naturalists must have experienced, at one time or another, instances of expediency in the feeding habits of birds. Kookaburras are drawn to picnic parties in anticipation of scraps. Years ago on Lord Howe Island the Bell-Magpies would gather near rat-shooters for the discarded bodies of the rodents, first being attracted by the sound of the guns. In South Australia, Black Kites have been recorded (1922, p. 311) accompanying a horseman and capturing disturbed grasshoppers. Willie-wagtails often feed about the heads of grazing horses and cows, catching insects put up by the breath of the animals, on which they also perch.

Perhaps the word opportunism may better express the actions of several kinds of waterbirds noted feeding in association with other, and generally larger, species near Sydney.

On March 30, 1957, at Bushell's Lagoon, Wilberforce, Little Grebes were seen closely following Coots feeding amongst thickly-growing surface vegetation. The Coots, largely vegetarians, were taking their food from the surrounding growth, whereas the Grebes, either with their heads under the water or else swimming in the normal way, appeared to be catching aquatic insects and perhaps small fish disturbed by the movements of the Coots.

Each Grebe attached itself to a Coot and was seldom more than a foot behind its benefactor; at times the head of a Grebe seemed to be under the tail and between the legs of a Coot, which bird did not resent

the nearness of the one that followed it so persistently. Now and again, when a partly-submerged Grebe happened to touch a Coot the latter bird would flutter a few feet in alarm. No matter how erratic the movements of the Coots, the Grebes would follow much the same course.

Grebes were observed associating with both Coots and Moorhens in the same manner at Longneck Lagoon in April 1957.

The tolerant attitude by the Coots to their smaller associates may be explained by the fact that there is little or no competition for food between the species; the Coot is a vegetarian or largely so, while the Grebe is an eater of insects and fish. It was noticed that Coots feeding in open water did not attract any Grebes.

Almost identical behaviour on the part of Coots and Little Grebes in England was reported in *British Birds* (1956, p. 501). It was stated therein that the association had apparently not been previously recorded. However, other feeding associations among water-birds, such as that which obtains between the Wigeon and the Brent Goose, are well known. Wigeons follow the Geese and feed on debris of *Zostera*, a grass-like marine growth, left by the larger birds (1948, p. 261).

It may be mentioned that in America the Wigeon robs the Coot of the weeds it brings to the surface to eat. The same species, which is largely a surface-feeding or dabbling duck, associates with Canvasbacks, Redheads and Scaups in deeper water and snatches what plant food it can from those divers.

In recent years feeding associations between Moorhens, Coots, Black Ducks, White-eyed Ducks and Black Swans have been noted at Eastlakes, near Sydney. Several thousand Coots and other water-birds were present in that locality on April 20, 1957. Four Black Swans were observed upending and cropping vegetation from the bottom of one of the shallow lagoons. Around the Swans were several Coots, some Moorhens, and a few White-eyed Ducks.

As soon as the Swans raised their long necks from below the surface the smaller birds would eagerly gather within a foot or so of them and greedily grab at any piece of vegetation either dropped from the bills of the Swans or which may have broken loose as they raised their heads. Sometimes when one of the Coots obtained a piece of water-grass or weed other Coots would attempt to steal it and there would be a short scuffle. The dignified Swans did not take any real interest in such happenings. Only on a few occasions were they seen to resent the presence of the attendant birds, and then giving but a half-hearted peck at an over-presumptuous Coot.

The White-eyed Ducks would often dive in the direction of the submerged heads of the Swans, presumably to obtain any water-weeds or aquatic life disturbed by those birds.

Some of the other associations observed at Eastlakes between 1957 and 1959 are listed below.

(*a*) One Moorhen, four Coots, and one Black Duck with two Black Swans.

(*b*) One Moorhen, approximately twelve Coots, and one Black Duck with one Black Swan.

(*c*) One Moorhen, four Coots, and one Black Duck with two Black Swans.

(*d*) Five Coots with one Black Swan.

Mallards have been recorded (1957, p. 439) associating with Berwick's Swans in England; Marsh Terns with Little Grebes in Western Australia (1949, p. 69); Silver Gulls with Pelicans in Victoria (1955, p. 12); and Little Grebes with Black Ducks in New South Wales (1959, p. 207).

Some associations between birds and other animals are very close and could be regarded as examples of semi-commensalism. Cattle Egrets live much of their lives with both wild and domesticated grazing animals, as do Oxpeckers in South Africa.

The instances of feeding associations mentioned above have been, for the most part, purposely restricted to water-birds. The habit also occurs with some frequency among land-birds. The subject has many curious aspects and it is obvious that the scope for investigation is almost unlimited. Apart from relevant books, such as *Pirates and Predators* (Meinertzhagen), *Fleas, Flukes and Cuckoos* (Rothschild and Clay), and *Birds and Men* (Nicholson), many valuable and interesting observations, often incidental to a main theme, are scattered throughout ornithological literature.

Observations on feeding associations noted near Sydney and other places in New South Wales have recently been pub-

lished (1957, p. 351; 1958, p. 129; 1959, p. 207) by John Hobbs.

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Australians Abroad

By E. COLLINE MUIR

One of the delights of travelling abroad is the unexpected recognition of things Australian. Thus it was while in Ceylon recently, our eye was caught by many a familiar sight. Casuarinas (probably some island species) abound near Colombo, and are used largely for cut hedges. In the mountainous "wet zone", where dark, shiny-leafed tea plants twine their knotty roots about the red soil, and cling to the steep hillsides, these fastidious plants receive the sparse shade necessary for their best growth from groves of silky oak (*Grevillea robusta*). Occasionally silver wattle, (*Acacia dealbata*) is used for the the same purpose. Eucalypts are much prized in Ceylon, and many acres are planted in some stringy-barked species, and several others are grown as well. Along a bumpy ridge road we travelled for miles with nothing but eucalypts on each side of us, and clothing the hillsides beyond the valleys. How at home we felt among these trees who had never known the land of their origin! Among our photographic records we find a scene in which are shown eucalypt plantations, silky oak tea-cover, and silver wattle, all at once.

At Horton Plains, a high, cloud-shrouded, 8000 foot plateau of rough grass plains and scarlet rhododendron forests, some fallen leaves by the Government Rest House (the only habitation on the Plains) attracted attention. These, we found, had fallen from some huge and ancient lightwood trees (*Acacia implexa*).

In Italy and Spain and southern France, blue gums looked much at home, but the dismal kookaburra in a small shady cage in a zoo made us want to steal him home to his land of sun and space.

The most curious surprise awaited us in Madrid, at the famous art gallery there, the Prado. One artist who has a room devoted to his works is Jan Bruegel. A man of great observation and attention to detail, he filled his paintings with a vast assortment of curious things. In two of these works was depicted, quite unmistakeably, a sulphur crested cockatoo. And Bruegel lived between 1568–1625! What intrepid Dutch seafarer, we wondered, had, willingly or no, visited the western shores of Terra Australis Incognita at this early date, and while there captured a cockatoo. We have since learned, however, that sulphur crested cockatoos do not occur in Western Australia, but do extend to New Guinea and the Moluccas, so almost certainly the "Cocky" whose portrait had caught our eye was not an Australian after all.

Discovery of Native Drawings

By FRANCES GLADSTONE

We readily agreed to the suggestion of a brother fresh from a city office that we spend a day in the bush, penetrating into a remote valley, often admired from hill-views before but never explored. Now it was possible to reach that previously inaccessible area by way of roads recently made by the Forests Commission.

Driving deeper and deeper into hills timbered with Apple Box (*Eucalyptus bridgesiana*) and Red Stringybark (*E. macrorrhyncha*), we began to glimpse the red of patches of Woolly Grevillea (*G. lanigera*) and the golden sprays of blossom of one of the bush peas (*Pultenaea platyphylla*), then joyously descried the little lustrous mauve faces of countless Waxlip Orchids (*Glossodia major*). The road twisted and turned among masses of Erect Guinea-flower (*Hibbertia stricta*) and clumps of Fringed Heath-myrtle (*Micromyrtus ciliata*) and then petered out into steep runs on one side and, on the other, a frowning hill-slope, remote and solitary, with huge boulders mounting to the fortress-like ridge.

Deciding to explore, we heard, as soon as the car engine stopped, the shy "native canary"† singing his wistful tune over and over, and the Rufous Whistler spilling golden syllables of summer song into the air. We pushed through acres of Nodding Blue-lily (*Stypandra glauca*) amongst which were enchanting patches of Leopard Orchid (*Diuris maculata*). In one tall tree we saw the enormous stick nest of an eagle's eyrie, to which the noble bird came slowly down from the sky. After much climbing we sat down on a huge rock wall in which we saw a large crevice. We crawled in and found ourselves in a long nave inside the rock. It was about thirty feet long, arched and high, and about eight feet wide in places.

We explored several caves, then clambered down the granite to an enormous rocky overhang guarded by large boulders on each side. The roof of the overhang was curiously dented and cracked, and our attention was attracted by differences of colour. Amazement changed to awed wonder when we realized we were in the presence of aboriginal drawings, the crude artistic efforts, executed in red, of some primeval inhabitant of

†White-throated Warbler.

Granitic Formation near Mount Pilot.

Photo: R. Ladson

this land of ours. We seemed like usurpers as the silent markings seemed to reproach us for taking the home hills and hunting grounds of the long-gone tribes. As a woman, I felt a guilty sense of unease, for this was possibly the scene of sacred initiation ceremonies, on which no woman could look with impunity.

This was later confirmed by Mr. A. Massola, of the National Museum, who, when informed of the find, accompanied us on our second visit to the site. He urged us to make further investigations in the hope of finding other authentic evidence of aboriginal use of the area for secret purposes.

Native Painted Shelter at Beechworth

By A. Massola

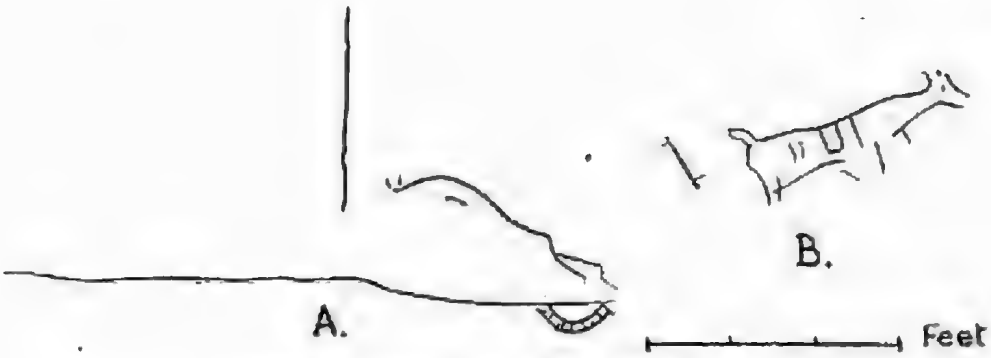
The finding of gold in Victoria sealed the fate of the aboriginal tribes in many parts of the State. Prior to this discovery, the country was occupied in a relatively slow and orderly manner by the pastoral pioneers. When gold was found, however, many thousands of men arrived almost overnight, and the bewildered natives were literally swamped by the long and continuous stream of fortune seekers. As a result, tribes disappeared so quickly that, in some places, no trace or memory of the natives is found at all, and often the ethnologist finds it difficult even to decide what tribe owned a territory.

Beechworth is an example. In 1839, part of this country was taken up by David Reid and added to his already large Carrara-gar-mungee Station. The following year, Dr. G. E. Mackay camped in the area while looking for cattle which the blacks had stolen from his Whorouly Station (then known as Warroughly). For the next twelve years or so, no white man, except perhaps an occasional shepherd, disturbed the tranquility of the place or worried the natives. In February 1852, the Spring Creek goldfield was discovered by a party organized by a certain Meldrum, a former shepherd, who had been in the employ of David Reid and so knew a little of the country.

By the end of the year, many thousands of diggers were camped along the banks of Spring Creek. Within days, Pennyweight Flat and Reid's Gully, Nine Mile Creek, Hurdle Flat, Europa Gully and Woolshed, all had their full complement of miners. By July 1853, the Spring Creek diggings (population 8000) had been surveyed, officially declared a town, and re-named Beechworth.

What became of the native tribe? History is silent on that point. All we know is that the Ya-itma-thang, the people who say "Ya" for "Yes", commonly known as the Omeo Tribe, were divided into two sections, one being the Theddora-Mittung* who were in occupation of this part of the country. By 1862, there remained but four survivors of this tribe. From these remnants, men like Helms and Howitt were able to piece to-

*Mittung means "Us—the people".



Tracings of Aboriginal Paintings at Beechworth Shelter.
A.—? Gomma and Hunting Spear. B—? Kangaroo.

gether a few threads of the evidence of their way of living. Naturally, from such small numbers many important phases could not be recorded. For instance, Howitt's informant was a woman, and many items, particularly those dealing with ceremonials, would have been hidden from her. These gaps will never be bridged now. A few wooden and stone implements and weapons are preserved in museums and private collections, but no camp-sites, burials, workshops or rock shelters were ever recorded from this locality.

By definition, rock shelters are shallow, cave-like hollows of various sizes, large enough to accommodate one or more people, but never deep enough to be dark inside. In granite country, such as at Beechworth, they are made by the splitting or amassing of huge tors left exposed by erosion, thus forming convenient refuges.

Some of these were undoubtedly utilized by the natives for sheltering. Others received painted or drawn decorations on the walls and ceiling, and became ceremonial places. Such designs are generally totemic and mythological, made in order to explain to the newly initiated the activities of the Dream Time Ancestors who were thought to have created the country as it is today. Often these painted shelters were supposed to represent the actual home of the Ancestral Spirit, forming the reservoir in which spirit children and totem animals awaited reincarnation. Because of the sacred nature of these places, nobody was allowed to camp nearby, hence no sign of occupation, such as middens or refuse heaps, is found in the vicinity. Further, no human or animal was permitted to be hunted or killed near these "sanctuaries", so that they played a rôle similar to that of European churches during the Middle Ages.

Not the least remarkable feature in the Beechworth district is Mount Pilot, a mighty pile of granite rising to 1760 feet. There is a fire-spotter's station on the summit, which, being bare of vegetation, gives rise to the local name of "Pumpkinhead". On the western side of

the mount, where this gigantic mass meets the gently rising plain, two enthusiastic bush-walkers located a painted rock shelter, the first found in the district. The discovery was made by Mr. R. Ladson, now of Melbourne, and his sister, Mrs. D. Gladstone of Beechworth. Later, Mrs. Gladstone and her sister kindly led us† to the spot.

Structurally, this shelter is similar to many other formations in the locality. It was formed by the fall of a huge block of granite on two others, thus providing roof and walls. These three rocks meet at the back of the shelter but are wide apart at the front, making a wedge-shaped shelter 21 feet deep and 25 feet wide, and high at the entrance. It faces north-west, commanding a view of the plain not far away. This advantage was no doubt exploited by the natives, as ceremonies could be held on the flat, which today is a beautiful spot, with its sparse covering of native pine, apple-box and stringybark. The shelter is conveniently situated to serve as an aboriginal sacred place.

The outlines of two drawings in red ochre are visible on the southern wall. They are badly faded and hardly enough remains for a correct interpretation. The reddish tinge of the granite increases the difficulty of following the faded design. Nevertheless, enough remains to show that they differ greatly from all other known Victorian examples, not only in style but also in being by far the largest so far reported from this State.

†Mr. D. A. Casey and the writer.

The figure on the right appears to represent a kangaroo. It is 4 feet 2 inches long, and 10 inches high just in front of its hind legs, of which only about 8 inches can be traced. It was completed with a rather unorthodox tail about 11 inches in length.

Behind this animal there is what may be a representation of a goanna with a spear embedded just behind its head. This goanna is faintly traceable for 7 feet 4 inches; however, the hind parts have completely faded, and its full length cannot now be determined. It has a huge head, 3 feet 2 inches long and 18 inches high. If it is a goanna, it is represented in an unusual way, as it is shown in profile, for lizards and crocodiles in aboriginal art are generally drawn in top projection. The vertical line seen in the accompanying illustration could be a spear. It is 2 feet 4 inches long, and to the right of it, just above the head of the goanna, are faint traces of what appears to have been a human figure. If it is the owner of the spear, it may represent the Successful Hunter, the Culture Hero, who gave the natives the food animals and taught the ancestors how to hunt them. But all this is supposition. More sites must be found and examined before definite interpretations can be made.

Somewhere in those hills other painted shelters exist. It is hoped that the example of Mr. Ladson and his two sisters will be followed by others interested in the antiquities of this land.

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.

Gossamer Spiders

While last month's *Naturalist* was in press, with its notes on "Air-borne Spiderlings", the following comments came to hand from Mr. A. N. Burns, Assistant Director of the National Museum of Victoria:

Every few years an occurrence of "Gossamer", or Angels' Down as it is sometimes called, is noted and the one which occurred from May 23 to 27 of this year was one of the most widespread in Victoria for a long time. Actually, a few days before the soft white gossamer floated over Melbourne and the suburbs, it had been recorded all along the road between Tocumwal and Mulwala in New South Wales. Observers there reported strands festooning telephone wires and fences, stretched across the roads in many places, and carpeting the grass and herbage over square miles of country.

The first reports near Melbourne came from some of the outer suburbs: Ringwood, Clayton, Balwyn and others. People reported quantities of gossamer gently floating down from the sky. Other reports came from as far afield as Horsham, Mount Eccles, Euroa, Ballarat, Nar Nar Goon, Drouin, and many places in Gippsland and the Dandenongs. Analysis of the webbing showed it to contain many impurities, no doubt added during its passage through the air. Webbing of many species of spiders was incorporated in it.

The young of the gossamer spider (*Epeiridae*) are very small and active, and on emergence from the eggs immediately begin to construct an irregular type of web, usually on apical shoots of shrubs, etc. In this web the tiny spiderlings congregate and live for about two weeks. Then they become restless and, under the influence of some strong urge, seek a means of migrating as far as possible from their original home. They rush about in confusion and make for the extremities of the bushes; each one then spreads out its legs and commences spinning silk which is wound round the legs to form what is called a "foot basket". Next, fine long threads are spun into the wind and are carried upwards by the warm rising air; more and more silk is emitted until enough is spun

to carry the tiny spider aloft. This process is known as "ballooning" and, when many millions of these tiny creatures are carried high up into the atmosphere, the long threads become interwoven or tangled together and result in long white flocculent strands which gradually become heavier than air and so fall gently back to earth, bringing many of the tiny spiders with them. It is a wonderful natural means of dispersal which may enable them to live the remainder of their lives many miles from their original homes.

White-winged Chough Nests

Dr. J. M. Agar of Geelong enquires about some objects he saw along the Anakie-Ballan road a few months ago. He gave this description:

On a branch of an ironbark, about 40 feet up, was a squat cylinder of mud about 18 inches in diameter and a foot tall, with a definite groove about a third of the way down. About 30 yards away, at a similar height, was a smaller one, about a foot in diameter, with the same groove around it.

These were undoubtedly nests of the White-winged Chough (*Corcorax melanorhamphus*), variously nick-named "black jays" and "happy family" by country folk. Their mud nests are usually under a foot in diameter though they may be up to ten pounds in weight. The choughs often use the nests in successive years, sometimes building a second storey on top of the original structure, thus providing the "groove" noted by Dr. Agar. (See photo, page 102.)

Nest Appropriation by Cuckoo-shrikes

These notes on the Black-faced Cuckoo-shrike are from Peter Miles, who is a student at Toorak Teachers' College:

Last November, on one of my frequent trips to the Yarra at Ivanhoe, I came across a Mudlark's nest with a bird sitting in it, and was surprised to see that it was not a Mudlark but a Black-faced Cuckoo-shrike. The latter is a grey bird with a large black oval around the eyes, and a curved beak, as the name "shrike" suggests.

The nest was a typical Mudlark's nest, made of mud with the walls reinforced with grass and horsehair. It is stuck to the tree by the drying of the mud. In contrast to this the Black-faced Cuckoo-shrike's nest is stuck to the tree with a combination of saliva and cobwebs and it is decorated with cobwebs and small strips of bark.

From the word "cuckoo" in its name, one might expect this bird to leave its eggs in other birds' nests, but this one was sitting on them herself.

During the same season I found three more cases of the same thing happening, and each time the nest being used was one from the previous season, so the Mudlarks' eggs had not been ejected by the birds finally using the nests.

I have looked in quite a number of books about birds without finding anything recorded about this behaviour of the Black-faced Cuckoo-shrike, although it seems that it must be a common occurrence.

This matter is covered by N. L. Roberts in "A Survey of the Habit of Nest-Appropriation" in *The Emu*, vol. 55, part 2 (May 1955). On pages 123-4 he comments:

When in a borrowing mood, the Black-faced and Ground Cuckoo-Shrikes seem to show a preference for mud nests, the Black-faced choosing the Magpie-Lark's and the Ground either the Magpie-Lark's or the White-winged Chough's. Chisholm, who conducted a nature column in the *Argus* for some years, sent me a news item published about Black-faced Cuckoo-Shrikes which used a Mudlark's old nest regularly. His contributor added: "A large red gum beside a creek contained no fewer than fourteen mud-

larks' nests, and each year the cuckoo-shrikes chose a different ready-made home." I have recorded the aggressive dispossession of Magpie-Larks by these Cuckoo-Shrikes, which bullied the parent birds and the young ones that were just ready to leave the nest. Both species of Cuckoo-Shrike invariably re-line the mud nest and sometimes add materials to it.

The picture below is of a different type of nest appropriation. In this case, White-winged Choughs took over a magpie's nest and used it as a base for their own mud structure. The disused nest had been brought down from a tree near Ararat by the then president of the Ararat F.N.C., Cr. H. J. Blackie, when F.N.C.V. members visited there in October 1930.

Chough Appropriation of Magpie's Nest.
(See text on this page.)
Photo: A. H. Chisholm

Microscopists' Corner

Microscope Illumination

By C. S. Middleton

Despite two perfect lamps and the finest microscopes obtainable, I was puzzled at receiving excellent results with one microscope (A) and less satisfactory results with the larger one (B) when using dark ground illumination.

The bench in my study is 20 inches deep, which allowed microscope A to be placed with its lamp in front of it but compelling me to place the lamp for B to one side when both microscopes were placed at right angles to the front edge of the desk. Both instruments were tilted. Both were fitted with high quality achromatic condensers, with patch stops at the back of them for obtaining dark field. Lamp condensers were also achromatic. Tube length in each case was correct. On microscope A lenses were achromatic, while on B they were apochromatic, yet the image on B was unsatisfactory with high power eyepieces. All images on B had a flare on one side and would not focus sharply. This image could not be corrected by any juggling of lamp or condenser, so I tried changing over the condensers of the two instruments. There was no alteration of results. Next I changed objectives and eye-pieces, and still there was no alteration. This also applied when I changed over the lamps.

This left only the position of the lamps in relation to the microscope different. When I moved microscope B so that I could place its lamp in front of it, flare disappeared and the image became sharp. This only applies when the microscope is tilted and is only noticeable with dark field.

This demonstrates the importance of the correct placing of the light source.

By Norman Wakefield

Australian Wonder-birds: Satin Bower-bird

The family to which our bower-birds belong comprises ten Australian species of birds. Seven of them build stick playgrounds or bowers, and they are the true bower-birds. Another clears a small area of ground to play in, and decorates it with leaves; and the other two, known as cat-birds, do not make playgrounds at all.

In general structure, the playgrounds of the various bower-birds are similar. Small sticks, a foot or two long, and laid down to form a platform a few feet wide, then two walls of more-or-less erect sticks are added. These walls, up to two feet long and several inches thick usually, are made parallel so as to leave a passage between.

The playgrounds vary in size, depending on the species and to a less extent on the individual birds which make them. The beautiful Regent Bower-bird of north-eastern New South Wales and south-eastern Queensland, often has a really massive structure. Others, including the two species which extend south into Victoria, are less ambitious with their building. The males are the real bower builders, though a female may do some of the work occasionally. And when it is made, the birds decorate the playground with various articles that they collect in the locality.

The Satin Bower-bird inhabits heavy forests and scrubs from Cape York Peninsula to eastern and southern Victoria. It is about

the size of a magpie and has a strong, slightly curved beak. Females and immature males are greenish in colour with a mottling of yellow on the breast and with the large tail and wing feathers brownish. After about five years the males change completely to a uniform shining blue-black. It is usual to see only one or two adult males—the true *satin* birds—in a flock with a score or so of green ones.

In Victoria the Satin Bowerbird is quite plentiful about the foothills of the north-east and in East Gippsland. One may find their playgrounds for instance on the banks of Boggy Creek, not far from the Princes Highway at Nowa Nowa, and along streams within a few miles of Orbost. There are colonies, too, in the northern parts of the Otway Ranges. A century ago large flocks were to be seen in central Victoria, in areas such as the upper Yarra, but they are practically unknown there now. However, there are occasionally visitors from farther east, and one such bird actually came and lived in a garden in East Malvern for a few months in 1955.*

The bird's call, as it moves about, is a loud clear whistle, descending in tone, alternated a few times with a lower-pitched note. Its actual "singing" consists mainly of harsh notes and a remarkable sound which somewhat resembles an old car's starter-motor turning over for half a minute at a time. But most remarkable is the Satin Bowerbird's mimicry, which may include a long burst of kookaburra

* See "A Bower-bird Visits Melbourne" in *Vict. Nat.* 73: 116-121 (December 1955).

Spotted Bower-bird at Playground, and its Collection of Bones and Tins.

Photo: D. W. Gaukrodger

laughter, the piping of a tree-creeper, cawing of ravens and the calls of cockatoos and honeyeaters. The borrowed songs are alternated with the bower-bird's own harsh notes and the "starter-motor" call. This vocal performance may be rendered while the singer is perched in a tree or it may be given at the playground.

On the platform in front of the stick passage-way, usually with something grasped in his beak, the bower-bird poses on tip-toe with raised wings or crouches with feathers fluffed out, sometimes jumping up and down, giving voice to his singing and mimicry. He may keep this up for a quarter-hour at a time.

The playground is decorated with items he has gathered: blue flowers and parrots' feathers, scraps of blue paper—in fact, anything that is wholly or partly blue. He has been known to steal blue-bags from country laundries for the purpose. All these are carefully placed on the stick platform, and if they are interfered with by someone, the owner restores them to their original positions when next he comes to the bower. Also, there are some brown or yellowish items scattered about, but these are playthings rather than decorations.

As well as a builder and decorator, this amazing bird is also a painter or plasterer. He chews up charcoal and coloured flower petals, mixing them with saliva to make a paste which he then uses to coat the standing sticks of the bower walls.

The playground has nothing to do with the nesting of the species. The female lays her eggs in a stick nest built quite high up in a forest tree.

The Satin Bower-birds' normal food includes the fruits of such plants as pittosporum, lilly-pilly and certain jungle lianas. In season, flocks of them are likely to visit orchards, and their attention to ripening apples, figs and such are most unwelcome to many residents in far-eastern Victoria.

In the mallee scrubs of the state, the Spotted Bower-bird is found. It ranges from north-western Victoria, across the dry inland, to central Queensland. Both male and female are brown with lighter spots and a pink frill on the nape. "Spotty" is as noted a mimic as his satin cousin, but when it comes to decorations for the bower, he avoids blue things and, instead, accumulates a pile of white or silver articles. A similar spotted species—the Western Bower-bird occurs in central and north-western Australia.

In north Queensland there are several species. These include the Golden Bower-bird, the male of which is brown and golden, and the Fawn-breasted Bower-bird. The latter extends into New Guinea, and it decorates its playground with green berries.

For further information, see "Birds that Build Playgrounds", by A. H. Chisholm (*Vict. Nat.* 51: 125-31, Sept. 1934).

Gippsland F.N.C.

Correction: This club meets on the fourth Wednesday of each month, not on Fridays as stated on page 39 of the June 1960 *Naturalist*.

Tarra Valley National Park

By J. Ros Garnet

The Shire of Alberton is the proud possessor of two small but very lovely National Parks—Bulga Park near the top of the Strzelecki Ranges, and Tarra Valley Park at a lower elevation. Much of last month's article on Bulga can be applied equally to Tarra Valley. A generation ago Alberton's Shire Engineer, Mr. Frank Corrigan, fell in love with it during his road-surveying excursions, and his Council was eventually persuaded to protect the bushland gem for the throng of tourists who were to be attracted to the Yarram district.

One of the happy memories of this nature-loving engineer was of the dignitaries, officials and a multitude of lesser folk assembled at the entrance to the new park to celebrate its formal opening. A band played music suited to the occasion, and there were speeches from selected politicians and councillors. The whole show was carefully organized by the Shire's enterprising engineer, who had prepared the way even to the constructing of a scenic road up the Tarra River Valley. Tarra Valley Park was open for the world to admire.

About 1934 or 1935, the Shire acquired a further forty acres to add to the original 160-acre reserve, and it applied itself to providing essential amenities for the steady stream of visitors—tracks, shelters and conveniences. With the completion of the Grand Ridge Road along the crest of the Strzeleckis, tourists travelling to or from Yarram usually made the short detour into the park, where they could linger midst a scene of singular charm.

Late in 1944, the Tarra Valley reserve became one of the several National Parks proclaimed under the Lands Act. Its excellent management remained with the Alberton Shire Council, and when it was dedicated a permanent National Park under the 1957 Act, this was wisely allowed to continue. Now, there is strong hope that the Government will agree to extend the park by purchasing about a hundred acres of private property upstream. That would provide an extra buffer to protect the fernery below.

The traveller along the highways of the Strzeleckis finds it difficult to believe that a century ago almost every valley of those ranges was filled with rain-forest fern gullies, of which Tarra Valley Park is a mere remnant. Old identities of Korumburra, Leongatha and other towns in the region recall the luxuriance of fern and epiphyte in the dense forests along streams which now flow through almost open fields. A few forest areas still remain intact, but their future is precarious. With many, the aesthetic appeal of Nature in her majesty and glory is apt to be dimmed by the thought of so many super feet of merchantable timber in such places, awaiting the moment and the man.

Tarra Valley National Park is a monument—a national monument to Nature in her most gracious mood. Gently-graded foot tracks weave among an astonishing variety and density of ferns. There are Slender Treeferns, some between fifty and sixty feet high, Rough Treeferns, ancient Soft Treeferns, and even the rare Skirted Treefern. Smaller ones include seven species of water-fern, three spleenworts, four filmy-ferns, the Veined Bristle-fern and a fork-fern. In all, more than three dozen species of ferns have been recorded there. Overshadowing them are venerable White Mountain Ash, Myrtle Beech, Sassafras, Silver Wattle and Blackwood, Pittosporum, Austral Mulberry, Elderberry Ash, Woolly Tea-tree, Sandfly Zieria and Muttonwood. A number of specimen trees have been labelled—a device much appreciated by the interested visitor.

By good fortune the caretaker of

By courtesy: Tourist Development Authority

Treeferns and Sassafras in Tarra Valley National Park.

the park, Mrs. K. Healey, has a keen interest in its natural history. Over the years she has sent me for identification specimens of almost every flowering plant and fern in the park. To date the total approaches 150 species. One which I have not seen is Fairy Lanterns (*Sarcosiphon rodwayi*), the curious little saprophyte first discovered on the mainland by Mrs. Edith Coleman in Sherbrooke Gully many years ago. (See *Vict. Nat. 52*: 163-166; Jan. 1936.) Last Easter I had the satisfaction of seeing the very place where the Tarra Valley specimens grew—in the fibre at the base of a massive old Soft Treefern. The specimen went to the Melbourne University Botany School for study.

A previous visit several years ago was with Dr. R. Melville of the Royal Botanic Gardens, Kew. The park was reached too near sunset for more than a hurried inspection, but during the brief time Dr. Melville collected a number of epiphytic mosses, several of which subsequently were found to be undescribed species! It was in this same park in 1937 that I came upon a slender flowering specimen of our "emigrant orchid", *Gastrodia sesamoides*, growing in the fibre of a fallen treefern trunk. The oddness was not only in the medium it had chosen but the subdued light in which it actually flowered.

Trees and ferns are by no means the only attraction offered by Tarra Valley National Park. There are lyrebirds quite as tame as those of Sherbrooke Forest. During our Easter visit we watched a pair foraging beside a path as unconcernedly as fowls. Then, the Cyathea Falls are irresistible. There is something about a waterfall which induces a contemplative mood, and, in Tarra Valley, the means are there to enjoy that pleasure to one's heart's content—not in solitude, but surrounded by a host of living things which do not know our language but can teach us, if we so wish, a little more of the story of this fair land of ours.

In this contemplative mood we may recall that this was the land of a race now almost vanished. But the name of one of that race is commemorated by a national park, a town, a river and a valley. Charlie Tarra was a companion of South Gippsland's earliest explorers. May Tarra Valley Park long continue as a suitable memorial to him.

F.N.C.V. NATURE SHOW

September 5-6-7, 1960

Lower Melbourne Town Hall

The F.N.C.V. Nature Show Committee is pleased to announce that plans for the 1960 exhibition are now almost complete. It will be open from 10 a.m. until 10 p.m. on September 5, 6 and 7. Admission charges will be two shillings for adults and sixpence for children.

The main theme for this year's show is *protection*, and the necessity for caring for our natural heritage is amply stressed throughout.

Special emphasis has been placed on methods of display, and in all cases the numbers of items exhibited have been kept to a minimum but their presentation has received very careful consideration. The Nature Show Committee feels that the public will learn much more from fewer objects displayed in an appealing way than from a large number crowded together or carelessly arranged.

An entirely new method of exhibiting wildflowers will be used. About 160 species of popular native plants will be shown against a pale grey background and in such a way that all will be easily viewed. Several special displays of garden-grown species will be placed at strategic places throughout the hall.

More than fifteen separate exhibits have been organized, covering a very wide range of Australian natural history. Nearly all of these have been designed, constructed and assembled by members of the F.N.C.V. who have spent considerable time during the past two years planning their exhibits.

One of the highlights of the show will be a large exhibit of native birds depicted in a natural setting. Those shown in this display have been chosen to illustrate the value of our birds from many points of view—economic, aesthetic and in nature's own scheme.

Another exhibit which will be unique includes the reproductions of a number of bird calls, each being associated with the species responsible for it by carefully placed lights synchronized with the recordings.

A series of sound films lent by courtesy of the C.S.I.R.O. includes "Mallee Fowl", "Mutton Birds of Bass Strait", "Penguins of Macquarie Island", "Seals of Macquarie Island" and "Biological Control of Insects". These will be shown at regular periods throughout the exhibition.

Unfortunately, space does not permit the enumeration of all exhibits.

Acknowledgements

The F.N.C.V. Council and Nature Show Committee wish to take this opportunity to thank the M. A. Ingram Trust for financial assistance, and the C.S.I.R.O. for the loan of the films mentioned above. The recordings of bird calls have been lent by Mr. Peter Bruce to whom appreciation is extended.

All floral arrangements are by courtesy of the North Balwyn Garden Club.

Finally, the committee wishes to thank all who have assisted in planning, constructing and assembling the exhibits or who have helped in other ways. Special thanks is given to the Melbourne Town Hall authorities for the courtesies extended to the F.N.C.V.

SUPPORT YOUR SHOW!

If this show is to be a success, members of the F.N.C.V. should give support by visiting it. Every member of this club is earnestly requested to tell friends about it and to spread the news as far and as wide as possible.

PLAN OF EXHIBITS

KEY TO EXHIBITS

A. Films.
B. Plant Kingdom.
C. Spiders.
D. Birds and Bird Calls.
E. Grasses.
F. Reptiles.
G. Marine Biology.
H. Victoria's Floral Emblem.
J. Shells.
K. Birds' Nests.
L. Gem Stones of Victoria.
M. Orchestra Pit.
N. Wildflowers.
O. Publications.
P. Moths and Butterflies.

Australian Wattles — No. 16

Sunshine Wattle — *Acacia botrycephala*

By JEAN GALBRAITH

Sunshine Wattle is like a happy child playing amongst the sober autumn trees. It is sunshine in all weathers. You may see it in a bright "island" near Lorne and in another on the Woods Point road. From Tynong eastward it occurs intermittently: north of Moe, south of Traralgon, and it is abundant east of Bairnsdale. The Princes Highway runs through forests alight with it—primrose, lemon or golden yellow—right on to Sydney, and irregularly beyond. It is in Tasmania, too. You are likely to find it in any sandy heathland in far-eastern Victoria, but I have never seen it on clay.

It flowers in autumn mainly, but the season may extend well on into winter, according to the locality.

Sunshine Wattle is usually from six to twelve feet high, and even the small specimens are gracefully treelike, lightly branched, and rarely with more than one trunk. It has bipinnate leaves, dark and shining above but a dull pale green underneath. The pinnae are farther apart and have broader and more distant segments than in any other Victorian wattle. The rather large globular flowerheads are in spreading panicles above and amongst the leaves, as well as in solitary racemes.

The habit of the tree is lacy and light, with leaves most often spreading horizontally; and the quadrangular stems are greenish as a rule, with a brown ridge at each angle.

Sunshine Wattle makes a most attractive autumn-flowering tree in cultivation. It is not too large for a small garden, but it must be watched for attack by borers. It is always decorative, with its broad fern-like leaves, its slim reddish pods that turn brown, and flowers that make its name as apt as a name could be.

Sunshine Wattle
Bush
Bruthen.

Photo:
N. A. Wakefield

Thomas Stephen Hart (1871-1960)

By J. H. Willis

Introduction

"There was no need for an encyclopaedia in any house where Tom lived." Such was the tribute recently paid by the sisters-in-law of the late Mr. T. S. Hart, who died at Croydon on June 26, in his 90th year. His erudition and extraordinary powers of memory—in the classics as well as in science—were, indeed, almost legendary. With his passing, Victoria has lost probably the last of the "old-time", all-round, highly talented naturalists whose like we shall never see again, and, except for Mr. H. Best (now almost 97), Hart must have been the only surviving correspondent of Baron Sir Ferdinand von Mueller.

His father, John Hart, was a secretary and accountant who arrived in Melbourne from London during 1852. Most of his work was with building societies; but he became first secretary of the Caulfield Shire, where Thomas Stephen was born in March 30, 1871—one of ten children, half being daughters. Hart senior traced his ancestry back to one James Stephen of "Ardenbraught" (presumably in Scotland), who was born in 1670, and so proud was he of this family connection that *each* of his five sons received the second name "Stephen".

Young Tom attended the East St. Kilda Grammar School under the Rev. John Reid, and later Craig's Toorak College in its last year as a boys' school. He matriculated (with honours in English) at the end of 1886, embarked at once upon an Arts course at Melbourne University where he gained first-class honours in Classics and second in Mathematics during 1887, also the Wyselaskie Scholarship in Mathematics, and then graduated as B.A. in 1890 when only nineteen. Subsequently he received the degrees of Master of Arts (1892) and Bachelor of Civil Engineering (1901).

His was an alert, inquiring mind, with an astonishingly wide range of interests—Biblical Greek and antiquities, philology, surveying and cartography, road and railway routes, locomotive design, the history of early settlement in Victoria, geography, geology, botany, shore-life and a modicum of entomology. Life was an inexhaustible adventure and the whole world around him pregnant with opportunities of probing, observing, testing and recording what he found—like Charles Darwin last century, and Gilbert White the one before, he neglected few of the alluring avenues that opened up.

When Hart decided to enter the teaching profession as a scientist, Baron von Mueller wrote a very eulogistic testimonial (April 1894) in which he was described as "an accomplished naturalist who, after extensive University studies, has acquired also practical field experience in our Colony, and who has evinced an ardent interest in original and progressive researches". He began work with the Education Department in 1896, taking geology and botany classes at the Ballarat School of Mines and tramping over much of central-western Victoria. There he remained for 17 years until his appointment as first principal of the new School of Forestry at Creswick in 1913.

The school actually dates from 1910, but, for the first three years students did not "live in" and were taught by visiting lecturers who came chiefly from the Ballarat School of Mines, Mr. Hart being among them. Between 1901 and 1908 Hart had been appointed Professor of Geology and Mineralogy at Ballarat, and this title stuck to him after he came to reside in Creswick; in fact, the townsfolk sensed a distinct prestige in having an authentic professor in their midst. Even Mueller, if prematurely, addressed his friend as "Professor" Hart when writing to him for the last time, on August 16, 1896; but the title gradually lapsed and of latter years its recipient was known to all as plain "Mister".

Several amusing stories emerged from Principal Hart's three years at Creswick. One of the rules at the School of Forestry was that all students must be indoors by a certain hour every night. The school stands aloof on a high hill above the township,

whither there would always be a general exodus on Saturday and Sunday evenings. Shortly before the dead-line time, our trusting head would appear in front of his eyrie, waving a lantern as a signal for students to abandon extra-mural activities and return to their dormitory!

One year (1916-17) was spent at Footscray Technical School, after which Hart became a teacher at the Bairnsdale School of Mines and Industries (1917-30). There he did some of his best exploratory botanical work, scouring the Lakes region for specimens and acting on the Committee of Management for Sperm Whale Head National Park from its establishment in May 1927. He left Gippsland early in 1931 to teach geography for the Correspondence School, living first at Hampton, then Brighton, and retired as a public servant at the statutory age of 65 in 1936. During the first three years of retirement he lived at Highett, and in 1939 moved for the remainder of his long life to a cottage in Dorset Road, Croydon. He came to know the creek-flats and "foothills" country between Lilydale and Dandenong like the palm of his hand, very few plant species escaping his keen eyes in that arc of Silurian rocks and derivative soils. Apart from one short visit to southern Tasmania and a shorter one to Adelaide, he never travelled outside his home state.

Hart was elected an Associate Member of the Royal Society of Victoria in 1894 (when living in Brighton), and a Country Member upon appointment to Ballarat in 1896. Between 1894 and 1913 he contributed ten geological papers that were published in the Society's *Proceedings*.

Long Association with the Field Naturalists Club of Victoria

It is not known just how early Hart became attracted to nature study; but all the male side of his family seems to have had a leaning that way. In August 1886 the three brothers, Thomas, George and Godfrey (perhaps with a few others), founded a small private body that they called the "Natural History Society and Saturday Club". This enabled them to read papers on matters of mutual interest and to share experiences gained in their week-end excursions around the heathlands of Caulfield and Brighton, the beaches and forests farther afield. Two thin exercise books give handwritten accounts of these meetings, the 15th (and presumably last) of which was held in March 1887 when Tom was just 16 years of age. He and George contributed most of the papers; there is one each by Godfrey and M. S. Hart, but none by elder brother John who may have been too busy with his university course. Tom's paper on September 26, 1886, was on the "Genus *Eucalyptus*", and this subject was destined to remain a favourite, life-long study. He gradually acquired an amazing knowledge of the past range of certain eucalypt species, particularly around Melbourne, through studying the maps and field notes of our earliest surveyors.

John S. Hart, born December 27, 1866, and also a Master of Arts (as well as a B.Sc.), set botanical papers for university examinations, examined in botany at the Pharmacy College, Melbourne, did a brilliant theological course and later became Anglican Bishop of Wangaratta, from 1927 until retirement in 1942—he died at 85 on May 28, 1952. John and Thomas joined the Field Naturalists Club on the same evening, in August 1887, the former being a joint secretary for the year 1890-91. John led botanical excursions to Cheltenham in November 1890 and September 1891, and was very active in the club's early affairs; but the younger brother Thomas's début in the pages of the *Victorian Naturalist*—either by exhibit, note or article—was not until September 1892, when his geological paper on "The Kerrie Conglomerates" was published [*Vict. Nat.* 9: 64-66].

Why did T. S. Hart wait just five years before appearing in print, when he must have had a spate of observations to put on record? Perhaps he was preoccupied with an exacting university course or, what is more likely, his innate modesty and diffidence proved too much for him before such natural history "giants" as Baron von Mueller, Sir Baldwin Spencer, Sir Frederick McCoy, Hon. C. A. Topp, D. M'Alpine, T. S. Hall, H. T. Tisdall, A. J. Campbell, C. French, etc., whose presence at F.N.C.V. meetings may have awed him. Latterly he tended more and more toward phytologic re-

The late T. S. Hart, during the opening of Memorial Gates at the entrance to the Victorian School of Forestry, Creswick, on October 10, 1952.

Photo by courtesy *Ballarat Courier*

searches and his last paper, more than 61 years after the first, was on "Labillardière's Plant Names" [*Vict. Nat. 70*: 173-75 (Jan. 1954)]. Considering his vast knowledge, Hart wrote relatively little for publication in the interim, five of the more important botanical articles being:

"Notes on the Distribution of Eucalypts about Creswick and Clunes" [*Vict. Nat. 34*: 83-92, 99-107 (Oct.-Nov. 1917)].

"Botanical Notes about Bairnsdale and the Eastern Lakes" [*Vict. Nat. 40*: 107-116, with map (Oct. 1923)].

"The Victorian Mistletoes" [*Vict. Nat. 55*: 44-51, with key (July 1938) —see also "Mistletoe Fruits and Birds" in *Vict. Nat. 57*: 175-77 (Feb. 1941)].

"The Yellow Box, and a Lost Vegetation" [*Vict. Nat. 56*: 9-13 (May 1939)].

"Notes on the Identification and Growth of Certain Dodder-laurels" [*Vict. Nat. 63*: 12-16 (May 1946)].

These all serve to show his interest in the distribution of our vegetation.

It was a proud day for Mr. Hart when honorary membership was conferred upon him on August 8, 1937, after 50 years as a worthy and productive member of the F.N.C.V.—this honour should have come to him ten years previously. He led numerous excursions during the past quarter of a century, chiefly to localities in or near the Greater Melbourne area, and these forays were of a highly instructive nature to the participants. Not only did he carefully prepare his itinerary, fortified with sketches drawn from parish plans, but he would *always* write a report on the main features observed, whether it were published in the *Victorian Naturalist* or not.

He was a familiar figure at all wildflower shows, until the last five years of declining strength, cheerfully giving help in the identification of unnamed specimens for exhibit and often taking charge of a special section devoted to "pygmy plants" (minute species of *Crassula*, *Drosera*, *Centrolepis*, ephemeral *Stylidiaceae* and *Compositae*), which were one of his pet interests. Plant parasitism was another line of inquiry that afforded him special enjoyment, and he wrote several informative articles on our species of mistletoes and dodder-laurels. In days when the Club used to hold its monthly meetings at the old Royal Society's hall, Hart was a frequent attender. Being hard of hearing for several decades, he preferred to remain downstairs, examining the exhibits and chatting to a few cronies of kindred tastes, while the lecture went on upstairs; but sometimes the enthusiastic "chatter" would reach such a crescendo that someone had to go below and mildly admonish the offenders!

At the revival of the Plant Names Subcommittee, in May 1943, Mr. Hart's presence was highly desirable, and he consented to act although it meant monthly journeys from Croydon to Melbourne Herbarium. Deafness prevented him from hearing much that

was being discussed and, to while away the times during which his opinion on this or that was not consulted, he would settle down with a volume of Mueller's *Fragmenta Phytographiae Australiae* (all in Latin) and chuckle intermittently as some phrase tickled his fancy.

The classical mind of T.S.H. turned often to the etymology of plant names, to the reasons why their authors chose a particular Greek word. Works of the botanist J. J. H. de Labillardière held great fascination for him, and staff members of Melbourne Herbarium often coaxed him to talk about that early French voyager—if only to hear the delightful way in which "La-billard-ière" would invariably roll off his tongue. Some ignoramus wrote a few paragraphs on "*Chorisema*" for Oriel's column in the *Argus* of October 24, 1938; it was claimed that the word was of aboriginal origin, meaning "rejoice and dance, because there is water here". Immediately two correspondents hastened to explain (*Argus*, October 26) that the word was derived from Greek—*choros* "a dance", and *zema* "a drink"—because Labillardière's thirsty party danced with joy when they discovered a spring of water, while exploring the coast of Western Australia near Esperance. Neither explanation was anywhere near the truth, but the second absurd legend still persists in some writings on Western Australian flowers. Mr. Hart pointed out that the true roots of *Chorizema* were *chorizo* "I separate" and *nema* "a filament" (in allusion to the free stamens), Labillardière having purposely shortened the spelling "*Chorizonema*" for the sake of euphony —as he did with *Campynema*, *Calytrix* and other generic names.

Conclusion

Now this savant has gone to a well-earned repose, covered with honour, respected and beloved by all who knew him. In 1898 he had married Ethel Jane, daughter of the Congregational clergyman Rev. James Rickard, then stationed at Brighton. There were no children of the union, but they adopted three nephews and a niece who had been orphaned; Mrs. Hart died some ten years ago.

T. S. Hart was a short stocky man who changed little in 40 years, his white hair, beard and merry twinkling blue eyes giving him a peculiarly venerable, "Santa Clausian" appearance. To many of us he seemed almost other-worldly, with his thoughts far in the clouds; but he was well aware of mundane happenings too, and a good sense of humour was apparent in his conversation (one could never call it "small talk") as he spoke in a high-pitched rather husky voice, punctuated with little sniggers.

By nature he was sensitive, self-effacing and most cautious, a simple-hearted happy soul who warmed and attracted people; one never heard him speak critically or disparagingly of others. All his work bore the hall-mark of meticulous forethought and thoroughness. His help was therefore sought by a wide circle of correspondents, and, in acknowledging their letters, he would often make one or even several drafts before phrasing a reply that satisfied him. If there were the slightest doubt in his mind about a plant's identity, he would always say "this looks like such-and-such, but I will find out for you". Difficult specimens went to experts for confirmation (e.g. eucalypts to Blakely, orchids to Dr. Rogers, Rev. Rupp or Nicholls), and he attached much importance to Bentham's opinions as expressed in his own seven well-thumbed volumes of the *Flora Australiensis*. Proof of caution is evident in the fact that, although he must have handled many undescribed Victorian species in his lifetime, he *never* took the step of describing a single new plant. However, he is commemorated in the name of a leek-orchid, *Prasophyllum hartii* Rogers, that he discovered at Bairnsdale in November 1925.

Mr. Hart's herbarium of dried specimens (containing a full set, with field notes, of those collected in East Gippsland by W. Hunter), his district notebooks, correspondence and few books on botanical science were given (July 7) to the National Herbarium where they will be of permanent value. It remains but to place on record the sympathy that all members of the Victorian Field Naturalists Club feel for his surviving sisters-in-law (Miss M. Rickard and Mrs. Turner of Croydon) and his various nephews and nieces.

Field Naturalists Club of Victoria

General Meeting—July 11, 1960

Mr. D. E. McInnes presided at the July general meeting of the club, and about 150 members and friends attended. An extraordinary meeting was held first for the approval of applications to the F.N.C.V. for affiliation by the newly-formed Casterton, Warrnambool and Gippsland Field Naturalists Clubs.

Members stood and observed a minute's silence in respectful memory of Mrs. Alice Osborne and Mr. Thomas S. Hart, both of whom had passed away recently. Mr. A. J. Swaby spoke of the interest shown by Mrs. Osborne in club activities, especially those of the Botany Group, and Mr. J. H. Willis gave a brief outline of Mr. Hart's life during his seventy-three years' association with the club.

A resolution was passed that the F.N.C.V. considers the management of Melbourne's water supply is a matter for the M.M.B.W., that it would be wrong for any outside body, however advised, to over-rule the Board's views, and that the club is therefore opposed to the proposal to allow logging in the Board's watersheds. It was decided to send copies of the resolution to the Premier and the Press.

Mr. J. Wilson gave details of a proposed natural history survey, by members of this club and its study groups, of land at Warrandyte which is to be developed by the National Fitness Council. The latter proposes to establish a small museum there.

Several members contributed items to the "Members' Night" which had been organized by Mr. E. S. Hanks. Mrs. P. Fisch showed a colour film of the Eastern Spinebill feeding young and practising nest hygiene, and shots, too, of the Long-eared Bat, Eastern Water-rat and Orchard Spider. Miss M. Lester showed a colour slide sequence of the emergence of a cicada, and slides by other members dealt with native birds, insects and other animals as well as native flowers.

The ten persons, whose names appeared in the agenda on page 84 of the July *Naturalist*, were elected to membership of the F.N.C.V. The president stressed the importance of study group meetings and gave details of the times of them.

Mr. W. Gasking showed living manna gum stems, up to two inches in diameter, scarred by cicadas laying eggs in the sapwood, two or three eggs being left in each incision by the sharp ovipositor. These were brought from Healesville and were of special interest as Fabre and others had stated that only small dry twigs were used in this way.

Botany Group—July 14, 1960

Because the theme of the group exhibit at the forthcoming nature show will be "The Plant Kingdom", Miss L. M. White was asked to address members on this subject. Miss White's talk was greatly appreciated and should be most helpful to the group in presenting a comprehensive exhibit. With the aid of specimens and charts she dealt briefly with the main divisions of the kingdom and gave advice on what specimens should be collected. Apart from consideration of the show, the talk was thoroughly enjoyed by members and the chairman expressed the pleasure of those present.

It was agreed to combine with other club groups in the survey of the National Fitness Council's site at Warrandyte, and an outing is to be planned to look over it.

Geology Group—July 6, 1960

Sixteen members were present, with Mr. D. Jeffrey in the chair. A tribute was paid to the memory of the late T. S. Hart who was one of the pioneer geologists of Victoria.

Favourable comment was made of the proposal to declare Tower Hill as a reserve. The volcanic nature of the area was discussed and the ash-beds considered in some detail. Mention was made of the successful boring for water at Heywood in the Western District and of its geological aspects.

Mr. Jeffrey then gave the subject for the evening, "What is a Fossil?"

He outlined the history of fossils and various ideas, through two thousand years of history, of their significance. Various kinds of fossil remains were discussed and it was shown how these could indicate past climates and the ages of deposits in which they were found. The speaker illustrated with plasticine how an impression taken of a cast in the rock will give an almost perfect replica of the organism. The petrifaction of fossils was explained, and examples shown of the original structure being replaced, cell by cell, with silica.

Exhibits included a wide range of fossils from various Victorian localities (Mr. Jeffrey), and aboriginal and animal bones from a midden at Bannica Creek, Kerang (Mr. R. Dodds).

Fauna Survey Group—July 14, 1960

Twenty-one persons attended the meeting, at which members' slides were shown. Mr. E. Wilkinson showed colour shots of Allied Rats, gliders and possums in the Healesville district and various mammals at the sanctuary. Mr. K. Simpson had slides of a seal pup washed ashore on Phillip Island, bats from Colac, possums and koalas. As well as bats and native rats from East Gippsland, Mr. N. Wakefield showed a number of slides of various habitats, including rock-wallaby country, and photographs of signs of activity of wombats and the Fluffy (or Yellow-bellied) Glider.

The group was pleased to have Mr. P. Fisch along, as he re-screened the short film shown at the general meeting, of Eastern Spinebill, Long-eared Bat and Eastern Water-rat.

Mr. Wakefield read extracts of a letter from Mr. J. Mahoney of the Sydney University Geology Department, dealing with the identification of some of the bone material collected by the group during the May excursion to the Buchan district. The writer stressed the need to discover similar superficial bone deposits in western Victoria. A second excursion to Buchan and Suggan Buggan is planned for about a week late in August.

An interesting report was received from Mr. Claude Austin of Casterton, telling of a number of mammals on his property and nearby, some of which are rare species.

The next group meeting is to be on Wednesday, August 17, at the National Herbarium.

Fauna Survey Group Excursion to Colac District, June 1960

Five members attended, principally to obtain information on the distribution of native cats in the Stony Rises country south and east of Lake Corangamite. Few records came to light from local residents, the most recent being in the Dreeite district, between the lake and the Warrion Hills. Inspection showed this area to be typical "stony rise" formation, considerably cleared for small farms, and suitable for a full-scale search in the future.

On Saturday, June 11, a long lava tunnel was inspected on the north side of the Porndon lava ring. It contained a large colony of bats, three of which were caught, examined and later released. On the south side of Mount Porndon, in the lava ring itself, smaller tunnels were examined, and one yielded a number of animal bones. Upon investigation later, the identity of the cave bat and of some of the mammal species of the bone deposits proved very interesting, and these are to be dealt with by members of the group in articles in later issues of the *Naturalist*.

Samples of olivine were collected from a scoria pit on Mount Porndon for the National Museum.

At Lake Purrumbeet an Eastern Swamp-rat (*Rattus lutreolus*) was caught, then released. There was evidence of a colony with "text-book" runways from the burrows—every vestige of vegetation having been nibbled away from along them.

At Lake Bullenmerri some fossil animal bones were found and the tooth of a Blue Pointer shark (*Isurus hastilis*), washed out from underlying Tertiary marine sediments.

A Little Eagle (*Hieraaëtus morphnoides*) was seen at Mount Leura, constituting, according to Dr. Graham Brown of Colac, a new district record. At Camperdown there was a flock of over sixty Long-billed Corellas (*Kakatoë tenuirostris*), and two to three thousand Crested Grebes (*Podiceps cristatus*) at Lake Gnarpurt, north-west of Lake Corangamite.

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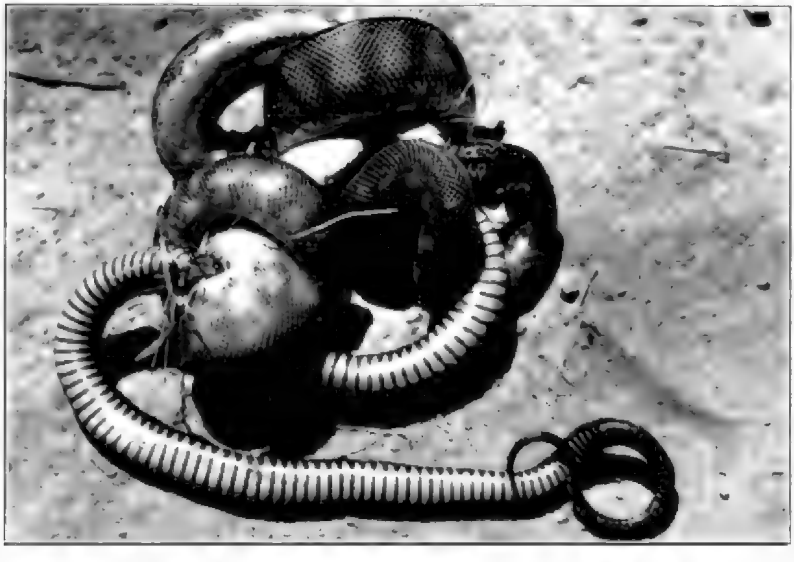

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The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

This is a Black-headed Python (*Aspidites melanocephalus*) devouring a Black Snake (*Pseudechys porphyriacus*) at the Sir Colin Mackenzie Sanctuary at Healesville. The python came from Townsville in Queensland, and David Fleay, who took the photograph, wrote that it disposed of nearly thirty snakes in twelve months—copperheads, blacks and tigers. (Ref. "An Australian Cannibal Python", *Vict. Nat. 58*: 23-4, June 1941.)

Nesting Habits of the Blue Wren

By EVAN ROWLANDS

From December 27, 1959 to January 3, 1960, at Garden Gully, near Great Western, Victoria, the following observations were made on the nesting habits of the Superb Blue Wren (*Malurus cyaneus*).

The nest was found on December 27, in a small shrub of Sweetbriar (*Rosa rubiginosa*) about two feet above the ground and just above the level of the high grass in the area. Unlike the usual dome with side entrance of this species, this nest appeared as if decapitated, like a cup with a contracted rim. Within it were three nestlings, mouths agape, sparsely covered with the beginnings of their first brown feathers. Assuming a nestling period of 12-13 days for this species[1] and from the observation that these left the nest on the 30th or 31st, it is probable that they were about nine days old on the 27th. Attending them were three adults—a male and two others. The latter were apparently females, although either could have been a male from an earlier brood and not yet in adult plumage.

Initially, my presence closer than ten yards from the nest caused almost complete cessation of visits. Finally, I was able to lie still in the grass six feet from the nest with little interruption to the nest routine, except that approaches to the nest were usually made more indirectly than when I was at a distance.

The adults, too, were willing to defend their nest. On my first examination of it, the male and a female flew several times at my face.

In vol. 58, no. 4 of *The Emu*, the Bradleys in "Colour-ringed Blue Wrens" give a comprehensive study of nest routine. I only describe findings here which confirm or supplement theirs.

The nest was observed, at various intervals during December 27 and 28, for an aggregate of 4 hours 35 minutes, during which time feeding visits totalled 119 —an average interval of 2·3 minutes, in close agreement with Bradley's figures of 2·8, 3·3 and 2·5 minutes. The rate of feeding visits remained fairly constant throughout the day as far as was ascertained; for example:

6.42 a.m. to 8.03 a.m.—31 visits
Average 2·6 min.
1.48 p.m. to 2.46 p.m.—16 visits
Average 3·6 min.
3.02 p.m. to 3.32 p.m.—15 visits
Average 2·0 min.
4.50 p.m. to 6.37 p.m.—56 visits
Average 2·0 min.

Only on two or three occasions was the nest unvisited for more than 5 minutes (once an unexplained 19 minutes).

This rate was stepped up in remarkable fashion after I had been within 3 feet of the nest, keeping the adults away, for 20 minutes. Upon my retiring, they

responded by 13 visits in 10 minutes. (Average 0·8 minutes.)

The male bird was a consistent worker if the observations are representative. In different periods of observation, he made 5 visits in 30 minutes (average 6·0 minutes), 18 visits in 107 minutes (average 5·9 minutes). 14 visits in 81 minutes (average 5·8 minutes) and 7 visits in 58 minutes (average 8·3 minutes). In all, he made 44 of the 119 food visits, only on one occasion exceeding 10 minutes in his absences. This energetic behaviour contrasts with that of the males described by the Bradleys.

The females were distinguishable, one being less plump and scraggier than the other, whose appearance was typically immaculate. It took me some time to learn to distinguish these with certainty and so my record of the visits of each is probably unreliable. From observations over a limited time it appeared as if each visited the nest quite regularly (about every 12 minutes).

One fact established with certainty was that as the females fed the young, each perched in a characteristic and different place on the nest rim to the other.

From the Bradleys' and the above observations, it appears that although each adult bird has its own and often apparently irregular food visit pattern, the combined efforts of the adults produce a remarkably consistent feeding rate (2-3 minutes per visit).

Food was abundant and the adults found it with little effort. Between nest visits I often observed them eat a morsel themselves and each often remained perched on a post or wire, apparently resting, for 2 or 3 minutes. Their day, however, was a long one, dawn being about 4.45 a.m., and I observed them still foraging at 8.15 p.m.

The nestlings always cried at the approach of an adult and I wondered what gave them the cue. I found that they did not cry if the shrub was gently shaken as if an adult had landed nor if a shadow passed over their nest. I concluded that the flutter of wings was the stimulus.

It was possible to identify much of the food brought to the nest. In 132 morsels brought, 52 were grubs which the wrens were finding in the grass, 10 were moths, 10 were spiders, 2 were blowflies, 2 were grasshoppers, 11 were other flying insects and 45 were unidentified. The grubs often received a preliminary mashing in the beaks of the adults. One large spider proved a difficult meal for the nestlings, and it was pushed down several mouths in succession before it was finally swallowed. Most of the food was captured in an area of grass, hedge and trees about 50 yards by 50 yards.

Extrapolation of these data provides interesting figures, although to what degree this is justified is another matter.

These 132 food morsels were brought in about 5 hours. If the wrens bring food at this rate (and it seems they did) for a 15-hour day, 396 morsels are brought in a day. On the proportions above, this means the despatch of 156 grubs, 30 moths, 30 spiders, 33 other flying insects and 155 unidentified particles. In addition the adults feed them-

selves. Multiply these figures by 12 and you have the total food despatched by the nestlings in their nestling period: 1872 grubs! 360 moths! What friends to the farmer and gardener!

Furthermore, 396 morsels are distributed to three nestlings in a day. I found the average mass of a typical morsel to be about one-fifth of a gram. Hence, mass of food consumed per day is about 79 grams. Assuming the nestlings receive equal masses, each receives about 26 grams—about one ounce—daily! This must be a very substantial proportion of a nestling's own weight!

Nest hygiene was scrupulous. Each adult remained a second or two at the nest after giving food, alertly watching the nestlings. Frequently the vigil was rewarded and the encapsuled dropping was borne away in the beak of the adult. In the 4 hours 35 minutes of watching, droppings were removed 22 times; that is, every 12·5 minutes or one visit in five to the nest.

I was not able to observe the nest on December 29 and 30, and on the evening of the 31st I found it empty. A quick search of the garden revealed the three adults and the three intrepid youngsters in Sweetbriar shrubs. The former scraggy, sparsely garbed and ill-proportioned nestlings had undergone transformation to a complete immaculate covering of light brown with white bibs. Their tails had begun to grow, now being about half an inch long. The fledglings balanced uncertainly on branches and fluttered energetically but inefficiently on short flights, the longest being between five and ten yards. Most flights were attended by an encouraging adult. The fledglings lost altitude on the longer flights and sometimes

landed in the long grass from which they found difficulty in rising.

The wren family was last seen three days later, and the fledglings, whose rapidly growing tails had reached one inch, were flying confidently.

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Therapy and Natural Science

By E. M. DAVIES

Although most naturalists may not take a very active part in scientific research they are helping tremendously by their interest and co-operation in preserving our flora and fauna and thereby aiding natural science. However, there is a value in the study of natural history that is seldom realized—its great therapeutic potential. We all know the great gulf that may lie between what one wishes to do in life and what one is achieving and if through ill-health or advancing age we are unable to lead an active life this problem becomes intensified. Much can be done to off-set despondent feelings by the acquisition of fresh interests. Too much time in life can be spent in sitting passively before a radio or television set and not enough in creative pursuits.

I foresee the day when the study of some forms of natural science will take its place beside the present study and practice of art and handicrafts in the rejuvenation of the not-so-fit. The study of natural history offers a path into scientific thinking by way of the pleasures of collecting and the development of observation. The learner is not only fitting himself to regain his place in life, but to take his share in the development of human society. Science was once the concern of the specialist but now it enters everyone's life.

The wish to collect, to observe, to draw, to take apart and put together, is common both to the adult and the child. Thus, for instance, a book on Victorian toadstools, a drawing book, some colouring pencils and a few fungi can bring hours of happiness in trying to depict these transient wonders. Happiness means health, and one may acquire the desire to know more about the structure and habits of the object studied. The life history and behaviour of the organisms of the plant and animal kingdoms do not concern only the professional biologist.

Professor Dakin's book *Australian Seashores* readily introduces the amateur to the field of marine biology. With the help of a friend who delights in beachcombing, much material can be garnered from the jetsam of the beach. Seashells and their papery eggs, seaweeds, sea urchins, polyzoal growths and so on, can unfold a new world even for those confined to an armchair. I think we constantly need to see science not as a collection but as an evolution of knowledge.

A collection of rocks and minerals, not so difficult to obtain if the desire is there, augmented by books on the subject from a municipal library, can teach us how insular we have allowed ourselves to become. Science is not just a set of facts; it is a way of giving order and therefore of giving unity and intelligibility to the facts, and these mean most if they are allied to experience.

Likewise the study of insects is a valuable hobby and a most rewarding one. Entomology comprises all the small, detailed, correctly correlated observations that form a basis for the solving of the problem of evolution, and we are never too old to observe. Science is not a cold, dull thing that by-passes culture; it is an organization of knowledge that gives meaning to our world. Natural science makes Nature an intensely vital thing contributing, by information and interest, to our well-being.

New and Interesting Records of Butterflies for Victoria

By A. N. Burns*

Over the past century the butterflies of Victoria have perhaps received more attention from collectors than any other family of insects and consequently their distribution is generally well known. But even at this late stage some species not hitherto recorded for this State have come to my attention.

Recently, Mr. A. May, who lives a few miles north from Cann River, has collected some species which normally are inhabitants of New South Wales and Queensland. No doubt one or two of them are migrants that have wandered south under favourable weather conditions; others, however, are definitely breeding in that area.

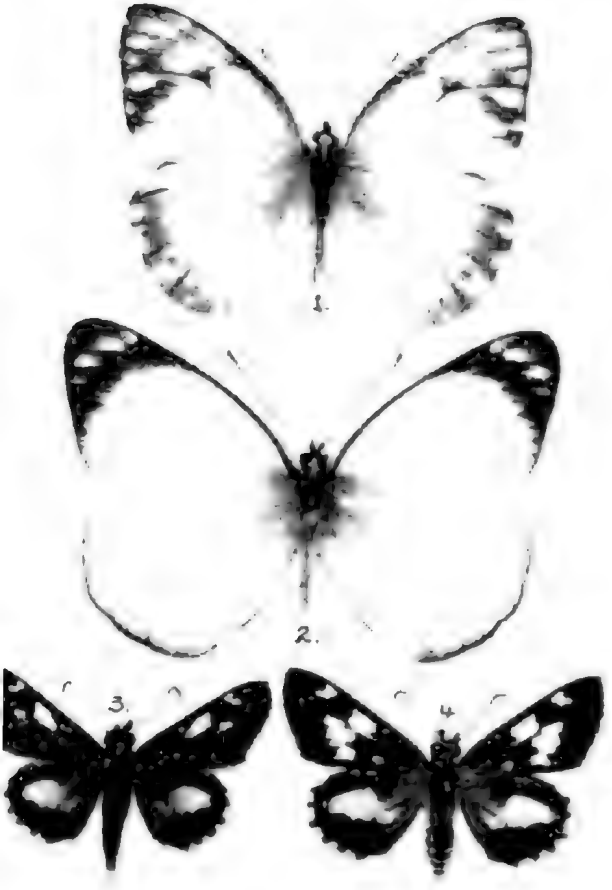
Some years ago Mr. May recorded specimens of the "Rock Ringlet" (*Hypocysta euphemia* Westwood, family Satyridae) and this information was communicated through Mr. N. B. Tindale of the South Australian Museum. The Rock Ringlet is a common species about Sydney and it is found in coastal New South Wales and southern Queensland, in rocky country usually where sandstone formations occur. In Queensland it is a mountain insect and I have taken it at Springbrook and Binna Burra at an altitude of 2000 feet. It is also common about Stanthorpe on the Granite Belt. As its range extends for a considerable distance south of Sydney, it is not really surprising for it to be found in far-eastern Victoria.

Another of Mr. May's interesting finds was a specimen of the "Blue Tiger" (*Danaida melissa hamata* Macleay, family Danaidae), a species which normally ranges from about Port Stephens in New South Wales northwards into Queensland, Northern Territory and Torres Strait Islands. It is even quite a rare visitor to Sydney. Some of the butterflies in the family Danaidae are long lived and capable of flights over great distances, so the occurrence of this insect in Victoria would be purely migratory. The common "Wanderer" or "Monarch" butterfly (*Danaida plexippus* Linnaeus) now almost world-wide in distribution in tropical and warm temperate regions, appears and breeds in numbers each season in Victoria. Its pretty black and yellow striped larvae feed on the introduced "Swan plant" (*Asclepias fruticosa*). The "Lesser Wanderer" (*Danaida chrysippus petilia* Stoll.) sometimes breeds in Victoria on the same plant; it is, however, much more sporadic in times of appearance. An interesting record of another Danaid butterfly, the "Common Crow" (*Euploea corinna corinna* Macleay), was made a few years ago by Mr. A. Allaway of Yarrawonga. This pretty black and cream spotted butterfly is sometimes common about Sydney and normally it ranges from there to Cape York and Northern Territory. Numerous specimens were recorded at Yarrawonga by Mr. Allaway and he found it breeding on the leaves of oleanders.

Another record, and a very interesting one, of Mr. May's, near Cann River, is that of the "Common Jezabel" (*Delias nigrina* Fabricius, family Pieridae). This pretty insect ranges from near Sydney along the coast to Cape York. Its dark brownish-black caterpillars feed on several species of mistletoe, usually the green-leaved one which favours she-oaks. Judging by their good condition, the specimens taken by Mr. May had obviously bred in the area. In northern Australia this butterfly is mostly found in the cooler or dry-season months; Mr. May's records are in January and February.

Even more interesting is Mr. May's record of the "Nysa Jezabel" (*Delias nysa nysa* Fabricius, family Pieridae). His specimens were in quite good condition, indicating that they had bred not far from where they were captured. It, too, is a butterfly which begins to show signs of wear quite soon after emergence. Its normal range is from about Sydney to the Cairns district in northern Queensland. About

*Curator of Insects and Assistant Director, National Museum of Victoria.



1. *Delias nysa nysa* Fabricius. Male.
2. *Delias nigrina* Fabricius. Male.
3. *Hesperilla mastersi* Waterhouse. Male.
4. *Hesperilla mastersi* Waterhouse. Female.

(Natural size)

Photo:
E. R. Rotherham

Sydney it is never common, only isolated specimens being seen from time to time. In my experience it is only locally common. During many years' residence in various parts of Queensland, I saw it in numbers, for a limited time only, at Killarney, Mount Glorious (near Brisbane) and on parts of the Lamington Plateau. Its larvae feed on mistletoes but have been found only on a few occasions. The pupa is recorded as being similar in shape to that of *D. nigrina* and olive brown with yellow and black spines on the abdominal segments.

In addition to these new records, there are several other noteworthy species that Mr. May has taken in his wonderfully interesting area. The rare and apparently very local skipper butterfly, *Hesperilla mastersi* Waterhouse (Hesperidae), is found between the months of January and April. This butterfly, which ranges from the south coast of New South Wales to the Nimbin scrub in the north of that State, is apparently nowhere common, occasional specimens only having been taken even by collectors who resided in places where it occurred. I first observed this butterfly at Mallacoota in 1934; it has since been seen and captured there by Mr. D. Crosby of Balwyn, and a specimen was captured a few years ago at Merimbula in New South Wales, by the late F. E. Wilson.

The "Maheta Skipper", *Trapezites maheta praxedes* Plotz., is another

beautiful species apparently not uncommon with Mr. May; it has been recorded sparingly from several other places in Victoria, mainly in the far east, but many years ago the late J. Kershaw captured a few examples on Wilson's Promontory. The race *praxedes* occurs from Victoria to the Camden Haven-Port Macquarie area in New South Wales. From there northwards to Brisbane and at Kuranda and Herberton in northern Queensland the typical form *maheta maheta* Hewitson is met with.

One more worth mentioning is the "Painted Skipper", *Hesperilla picta* Leach, which is also not uncommon near Cann River. This pretty little butterfly breeds on the tall saw-sedge (*Gahnia*) that grows in swamps and along creeks. I have taken it at Nowa Nowa, Wingan, and Thurra River in Victoria, and its range extends to southern Queensland (where it is quite rare). It used to be very common near Sydney on the North Shore line and at Narrabeen.

These interesting butterflies are not the least of Mr. May's noteworthy records. He has taken many fine species of moths, a number of which constitute new records for Victoria. At some future time I may be privileged to list them.

Presentation of Natural History Medallion to K. A. Hindwood

One of Australia's leading bird-students, Mr. K. A. Hindwood, was presented with the Australian Natural History Medallion for 1959 at a ceremony in Sydney on July 21. This was only the second time the trophy had been presented at a function in New South Wales, the recipient on the previous occasion having been the late Rev. H. M. R. Rupp, eminent orchidologist.

The event in Mr. Hindwood's case took place at a largely attended meeting of members of the N.S.W. Branch of the Royal Australasian Ornithologists Union and the Ornithological Section of the Royal Zoological Society of N.S.W. Mr. A. R. McGill was chairman, and the presentation was made by Mr. A. H. Chisholm, first winner of the Medallion (1940) and a former president of the F.N.C.V. and of the R.A.O.U.

Mr. Chisholm outlined the history of the medallion, from its institution by the late J. K. Moir, and gave a list of winners along the years. The trophy, he said, had become a notable feature of natural history activity in Australia, and it had been distributed through all states with the single exception of Tasmania.

The award of the medallion to Mr. Hindwood had been widely approved, Mr. Chisholm said. From the time when as a young man, in 1926, he had contributed to *The Emu* its first detailed paper on the Rock Warbler, he had been one of the most consistent and informed writers in that journal. He had also written extensively on birds in other journals of natural history and was either author or co-author of three books on the subject. Between whiles he had given much valuable service as an officer of the R.A.O.U., the R.Z.S., and the Gould League of Bird Lovers, and at all times he had freely assisted colleagues. Not the least important aspect of Mr. Hindwood's work was his research into early drawings of Australian birds (by convicts and others) and so the Royal Australian Historical Society cordially associated itself with the presentation.

Mr. Hindwood, in reply, said he was naturally gratified at receiving the medallion, though it was not through any desire of reward that he had begun and continued the study of birds. This study had been for him the pleasant and uplifting recreation of a lifetime, and anything he had been able to do had been done purely in an honorary capacity. He himself had been greatly assisted by colleagues in his younger days, and so he was glad now to be able to render similar aid to others. There was plenty of agreeable work in natural history awaiting attention in Australia.

Australian Wattles—No. 17

Sweet Wattle—*Acacia suaveolens*

By JEAN GALBRAITH

If Sunshine Wattle is the laughing child of autumn, Sweet Wattle is a shy child of winter days. The two grow in similar soils, though Sweet Wattle is far more widespread than the earlier species. It extends from South Australia right across southern and eastern Victoria, through eastern New South Wales and Queensland, and it is in Tasmania, too.

The flowering seasons of the two species overlap. In cooler districts Sunshine Wattle flowers until late May or into winter. In warm districts Sweet Wattle may begin flowering in late February or early March, but it is normally in full bloom in June and July. In all other ways these autumn- and winter-flowering wattles are very different.

Sweet Wattle is a small stiff shrub, with linear phyllodes and very pale flowers. The stems are triangular, but often so flattened that they appear two-sided, with the phyllodes springing from something like shoulders on alternate sides. The phyllodes are thick and smooth, dull or bluish green, ½ to ¼ inch wide; two to four or even six inches long; usually angled sharply upward, with one main vein and generally ending in a very small soft point, but occasionally blunt.

The stiffly erect little bushes bear their creamy fragrant heads of bloom in short racemes, each in the angle of a phyllode and stem. This wattle is distinguished from all other Victorian species by the overlapping scale-like bracts which enfold the buds and are shed when the individual flowers burst out.

Everything about this little bush—with its pale, sweet, winter flowers—is restrained, until fruiting time. Then Sweet Wattle really "lets itself go", producing large, flat, oblong pods, usually ¾ of an inch wide and up to two inches long, of a conspicuous bluish colour. It is probable that the pods are more often noticed than the flowers, delicate though the blossom it.

Nature-study for Schools

Australian Wonder-birds—Mound Builders

By NORMAN WAKEFIELD

Fossil remains have shown us that present-day birds developed from prehistoric reptiles. One stage is illustrated by the pterodactyl, a reptile which flew with bat-like wings. The archæopteryx had feathers, so we may call it a bird; but it had teeth also and a long tail, and the first three digits (or "fingers") of the front limbs were quite separate from the wing.

Birds today are warm-blooded and so have an insulating body-covering of feathers, but they still retain certain reptilian features. The scales on birds' legs show the relationship and, like all reptiles*, birds hatch from eggs. It is interesting to note that in both reptiles and birds there is an "egg-tooth" to help the young one break through the egg-shell.

Normally, the egg-laying reptiles bury their eggs in the ground or hide them under some kind of cover, and they are hatched by the heat of the sun. Almost all birds incubate their eggs by the heat of their bodies, but there are several species which retain the reptile's practice of burying their eggs. These birds are known as the mound-builders, for they accumulate heaps of soil and vegetable matter in which the eggs are placed for incubation. When the young ones hatch, they are at once able to run about and fend for themselves. The parents do not feed or care for them, and this is another feature of reptiles. The eggs are therefore very large, to provide for the advanced development at the hatching stage.

Like many primitive groups of animals, the mound-building birds are found mainly in the Australian region of the world.

Scrub or jungle fowls belong to the tropical islands between south-eastern Asia and Australia, and one species—our Scrub-fowl (*Megapodius freycinet*)—extends into tropical Australia. The Brush-turkey (*Aleetura lathami*) is wholly Australian, ranging from Cape York Peninsula southward into eastern New South Wales. All these are inhabitants of tropical rain-forests, so the Lowan or Malleefowl (*Leipoa ocellata*) of southern Australia is exceptional in its habitat. Lowans live in the belt of dry mallee scrubs from north-western Victoria and western New South Wales, across South Australia to southern district of Western Australia.

Like the lyrebirds, all mound-builders have large feet and poorly developed wings. The family name, Megapodiidae, is derived from words meaning "big feet", and this characteristic is valuable in connexion with mound-building as well as foraging for food.

*In some reptiles, such as Tiger Snake and Blue-tongue Lizard, the eggs hatch inside the parent, so the young are brought forth alive.

Photo: L. G. Chandler

Lowan on its Incubation Mound in the Mallee

The Scrub-turkey makes a mound about a dozen feet in diameter and six feet high, but that of the Scrub-fowl is really huge —perhaps twenty feet across at the base and fifteen feet high. Such structures are known to have been in use for over fifty years, so it is concluded that successive generations of birds use the one mound. With these two northern species, it is the heat of decomposition of the vegetable matter used in the mound that incubates the eggs. However, the Lowan, which makes a mound mainly of sand and measuring about twelve feet wide and three feet high, depends more on the sun's heat. Only in the early stages of incubation does the plant material help much.

Once laid, the eggs of mound-builders are not turned as are those of birds that brood their eggs. This is another parallel with reptiles, but unlike the latter, the mound-builders take great care of the site of their eggs during the incubation. They periodically test the temperature, with their heads or feet, and add to or open up the mound so as to maintain it at the required heat. Early settlers gave the Lowan the name "thermometer bird" for this reason.

Mound-builders spend much more time in connexion with the production of the next generation than do birds that brood

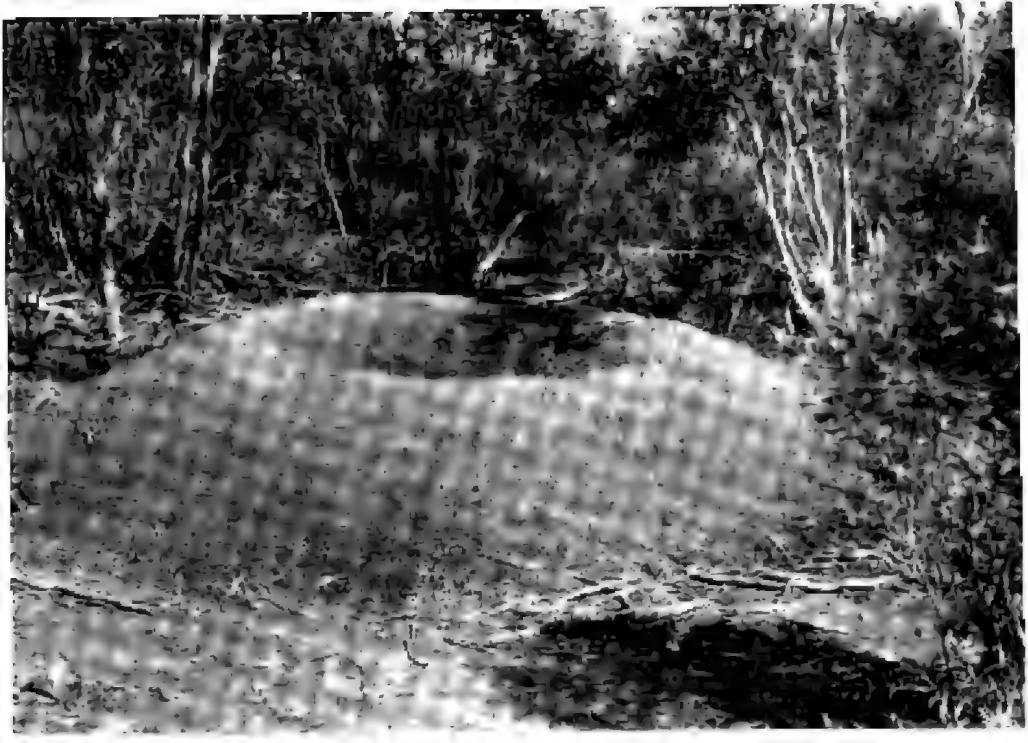


Photo: C. L. Barrett

Lowan's Mound Open

their eggs and feed the chicks. The latter procedure is evidently a more advanced development, involving smaller eggs and, from the beginning of nest-building to the getting of the young "off their hands", much less effort on the part of the parents.

The Lowan is about two feet in overall length; it somewhat resembles a small turkey and is light fawn in general colour, with dark and light spots on the wings. The late Fred Lewis carried out an investigation of the species when he was Chief Inspector of the Fisheries and Game Department; and his observations and records provide a very interesting picture of the birds' work in making and maintaining the mound.

A pair of lowans clean out their mound during April and May, making a depression four or five feet wide in the top. Throughout the winter they gather sticks and leaves from over several acres, raking them along into a pile near the mound.

Beginning in August, the debris is put into the hollow and finally covered up by mid-spring. The temperature of the mound then rises to over 90 degrees. Lewis found that during the whole of the incubation period a temperature of 94 degrees was maintained. The initial temperature rise is due to decomposing vegetable matter but from late

November onwards all heat is provided by the sun.

About twenty eggs are laid in a season, from late October to late January. As the average incubation period is about eight weeks, the last several eggs are laid while young are hatching. There is a maximum of about fourteen eggs in the mound at any one time.

On sunny days the parents remove sand to within a few inches of the eggs, at about 10 a.m.; they attend more or less all day, then close the mound at about 3 p.m. If the weather becomes too hot or cold or windy, they heap sand high and then leave it.

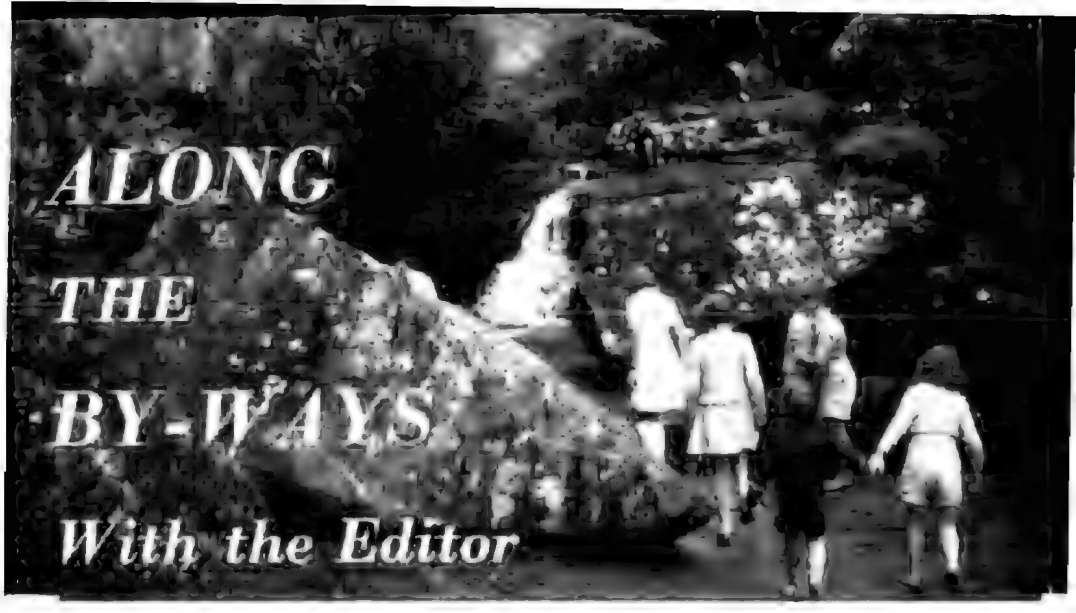
Normally the eggs are buried under two feet of sand, and each chick takes about two hours to struggle through it to the open air. Usually it rests for half an hour, then runs off into the scrub. The chicks probably become acquainted with their parents, simply because they happen to live in the same area, but the youngsters are quite independent as soon as they emerge.

The last chick comes out about the end of March, and the industrious parents immediately begin to prepare the mound for the following season's eggs.

The three hundred square miles of Wyperfeld—Victoria's largest national park—provides protection for some lowans; so too does the Lowan Sanctuary near Kiata. The latter is a recent reservation, comprising 735 acres and lying a few miles south of the town. Clearing operations, bushfires and the introduced fox all menace the Lowan. However, it is hoped that we will be able to ensure the survival in Victoria of this remarkable bird.

Scrub-turkey Chicken

Photo: D. Fleay



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.

Looper Caterpillars and Camouflage

This contribution comes from Mrs. E. M. Davies, who apparently takes note of phases of natural history other than her fossils and other geological interests.

The ability of looper caterpillars or "measuring worms"* to change colour according to their surroundings never fails to amaze me. On my Muehlenbeckia creeper the grubs range from grey, through various shades of brown, to a light reddish colour. Against the fence the loopers resemble splinters of the palings when they stiffen themselves. They lie along the older stems of the creeper and look like part of it with their dull brown colouring. On the thin young tendrils, young reddish grubs deceive you with their likeness to the young twigs. My neighbour has a castor-oil plant (*Ricinus communis*) and her "brand" of loopers are not stick-like but are fat, green and with a texture very similar to the leaf on which they are feeding. The moths of these caterpillars have marbled, flat wings of a greyish colour and are difficult to detect on the fence posts where they frequently rest.

*Geometridae means earth measure.

Feeding Associations Among Birds

This note on bird partnership comes from Mr. E. H. Coghill:

To the examples of "autolycism" given by Mr. Hindwood in the *Naturalist* for August 1960 (page 92) may be added another very common example, the Lyrebird and the small birds of the scrub, especially the Pilot-bird and the Yellow Robin.

These are nothing but thieves, snatching stray morsels turned up by the Lyrebird, nevertheless the latter does not appear to resent their presence. I have seen a Lyrebird brush a Yellow Robin to one side with his foot, but this did not seem to be done in any angry spirit. Certainly it was not regarded so by the robin, which was back in its place within a split second.

Wedge-tailed Eagles

In their zeal for the protection of our flora and fauna, nature lovers are apt to "put a case" for a native species rather than look objectively on all sides of a problem. We welcome this opportunity to record some comments about the Wedge-tailed Eagle by Mr. Keith Rogers who is a country member of the F.N.C.V. and who has a grazing property at Black Mountain, about forty miles north of Buchan in East Gippsland. Mr. Rogers writes:

Much as one admires the Wedge-tailed Eagle as a fascinating creature when it soars overhead, the bird is not welcome when it comes to earth and pays attention to a paddock of lambing ewes. On a property such as ours at Black Mountain, one of the major problems is the loss caused by eagles at lambing time. Not only will they frequently kill a ewe that is down, by tearing a hole in her side, but some eagles take to killing lambs. If those particular birds are not destroyed, they will keep on killing until the lambs are quite big; and losses can be very serious. I have at times seen an eagle strike a lamb and then continue on to attack others, apparently for sport.

Eagles usually frequent a paddock in pairs, or perhaps three or four together. But if a carcase is left, their numbers increase greatly for the time until the feast is over. Not all eagles appear to become lamb killers. If two or more eagles are destroyed, the quota that hunt a paddock will immediately be made up from the considerable but unseen number in the surrounding hills.

On one occasion, when three of us were working among sheep in a temporary brush yard near some timber, a Wedge-tail flew into a spreading Candlebark Gum almost overhead, and just sat and watched operations. Our dogs were with us working the sheep. Another unusual example of the boldness or curiosity of an eagle was on one occasion when my wife was riding home, with her dog following, from a place called Black Dog Flat about two miles east of Black Mountain. An eagle flew quite close to her, sometimes only a few feet above her head, for a distance of over a mile. At times the bird would fly a short distance ahead and perch on a limb or a tall stump, only to resume its attentions when the rider came by.

Two interesting comments in these notes are that not all eagles kill lambs, and that those that learn to do so will continue with the habit. Exactly the same applies to the Australian Goshawk and chickens. The problem of the Wedge-tailed Eagle raises some questions. How numerous were these birds before settlement and the introduced fox eliminated most of their original food animals? Did their numbers increase when rabbits became so widespread and replaced much of the native mammal fauna? How has the reduction of the rabbit population by myxomatosis affected the Wedge-tail's numbers, and its attention to lambs? And what will be the outcome if we succeed in eliminating the rabbit from our countryside?

The Case of the Wombat

Here is a further set of comments from Mr. Keith Rogers, on another problem animal:

In the club's annual report, in the June issue of the *Naturalist*, I noticed, under the heading "Nature Protection", that the question has been raised as to whether the depredations of wombats warrant their being classified as vermin.

As a country member of the club, and as one who speaks from experience, I should like to emphasize the need for the wombat to be kept in check by every means available. For

some reason wombats appear to be increasing over wide areas of mountain and forest in East Gippsland. These animals are no harm in themselves, but the damage they do to wire-netting fences is enormous; it has to be seen to be believed. A new wire-netting boundary fence can cost as much as £600 a mile. No owner of a well-run property can afford to have rabbits let in through the holes made by wombats.

I am as keen as any other member of our club to see adequate protection for our native animals, but not to the extent that a species that has become a pest should not be adequately controlled.

Few field naturalists would disagree with Mr. Rogers' final comment. If a native animal is a pest, as the wombat undoubtedly is in certain circumstances, then it should be *adequately controlled*. However, the question touched upon in the annual report of the F.N.C.V. was somewhat different; it was whether or not wombats should be classified as *vermin*. It is required by law that animals classed as such must be destroyed wherever they occur in Victoria. Must all wombats be destroyed, including those in the remote fastnesses of places like Wilson's Promontory and the Mount Buffalo National Park? An alternative is to have the wombat as an unprotected animal, in the same category as the Wedge-tailed Eagle. In that case it could be adequately controlled where necessary but left unmolested in sanctuaries and other places far from wire-netting fences. Another alternative, and a far better one, which we hope is not beyond the realms of possibility, is to eliminate the rabbit and the need for vermin-proof fences; then give the wombats "which are no harm in themselves" a free pardon and add them to the list of protected native fauna.

Kangaroo-paws and Honeyeaters

Following the notes on this subject in the issues of the *Naturalist* for May and July last, Mrs. I. P. Hanks of Black Rock (Vic.) adds this comment:

In our garden we have several clumps of Yellow Kangaroo-paw (*Anigozanthos flavida*). These are visited frequently by the Little Wattlebird (*Anthochaera chrysoptera*). They make a very attractive sight swinging on a stem with the bill deep in a flower. There can be no doubt that they are feeding. They also visit and feed in the flowers of the succulent that is variously called "Chinese Rose" and "Hen and Chickens".

"The Stick Game"

Mr. A. H. Chisholm writes from Sydney:

Although Robert Turner, writing in the *Vict. Nat.* for July, states that in the Lara district Black-shouldered Kites breed from September to March*, I would say that in most areas the period is the other way round—from March to September. In open-forest country immediately west of Sydney, for example, lots of nests of the species have recently been found in autumn and winter.

That point aside, it is interesting to read that when a pair of kites were nesting near Lara one bird would grasp a small stick, fly aloft, and then drop it, upon which "the other one would turn on her back and catch it in her talons". The suggestion here seems to be that the male was dropping sticks for the female to catch and use in the nest. Possibly this is sometimes the case. But, in fact, various hawks practise what we know as "the stick game" in the non-breeding seasons, and for no utilitarian purpose. Our chief

*Reference to Robert Turner's letter shows that he gave the season correctly; the months were inadvertently reversed when the manuscript was typed.—Editor.

"player" appears to be the great Wedge-tailed Eagle (which may use either a stick or a dried rabbit-skin), but S. W. Jackson reported in 1919 (*The Emu*, vol. 18, page 166) that he had seen Black Kites in western Queensland indulging in the same type of game. In some instances a bird drops its plaything for another bird to catch, and in other instances the game is played singly the bird that drops the stick swoops and catches it before it reaches the ground.

The use by birds of inanimate objects as "tools", or "instruments", or simply as playthings, carries many interesting implications, and all observations on the subject are welcome.

F.N.C.V. Excursion to You Yangs

By I. P. HANKS

More than forty members and friends took part in the club excursion to the You Yangs on June 19. On the way a short halt was made at the obelisk which stands near the original confluence of the Yarra and Maribyrnong Rivers. This commemorates the discovery of the Yarra by Charles Grimes, who landed there in February 1803.

At the You Yangs the first point visited was to the north-east of Flinders Peak, where there have been extensive workings for the removal of gravel for sale. Some picturesque old trees have been sacrificed, but the Forests Commission has arranged that the top soil will ultimately be replaced and the area replanted. Then it is expected to support a better plant coverage than formerly.

After a ramble there the party drove through the reserve to the picnic ground for lunch. Mr. Morley, the forests officer in charge, gave an informative talk on the planting experiments carried out and on the qualities and uses of the various timbers grown. These points were amplified later when he accompanied the party through the plantations.

After lunch the parlour-coach drove to the "turntable", where the view was admired and some members went on to climb the peak. The remainder took the downhill track to Big Rock. Much interest was shown in the rock-hole which contains water during most of the year. Evidence that the aborigines used this spot as a camp—perhaps a hunting camp—is still evidenced by the artefacts to be found here. These consist mainly of scrapers, points and crescents, of which the party found several. Some of these had been uncovered by rabbits scraping in patches of earth and debris accumulated in depressions on the Rock.

On the hill slopes the Rock Fern, *Cheilanthes tenuifolia*, was growing luxuriantly, and on almost all rocks there was a beautiful display of mosses and lichens. The indigenous Yellow Gum, *Eucalyptus leucoxylon*, was in blossom, and also the introduced Brown Yate of Western Australia. In the plantation the Brown Mallet, *Eucalyptus astringens*, was admired for the distinctive colouring of the trunks: this tree is cultivated for the high percentage of tannin in the bark.

The day being cold and windy, bird life was not much in evidence, the most notable being a flock of White-winged Choughs, *Corcorax melanorhampus*, numbering between twenty and thirty.

Orchids found in bloom were the Mosquito Orchid, *Acianthus exsertus*; the Striated Greenhood, *Pterostylis alata*; and the botanical highlight of the day the Brittle Greenhood, *P. truncata*. There were about half a dozen blooms of this orchid in a patch of rosettes estimated to number many thousands. These were growing in a shallow veneer of soil on the granite.

Among the spiders noted were several specimens of *Kebilus swarbreeki*, some not full-grown. Appropriately enough, these spiders were found by the member in whose honour the specific name was given, Mr. Swarbreck remarked that so far, he has found this species only in granite country where it lives in fissures in the rock.

Back at the picnic ground where the billies were boiled, the president thanked the forests officer, and the leader, Mr. E. Hanks, for their help, and the party set out on the return to Melbourne at about 5 p.m.

Lind National Park

By J. Ros Garnet

That region of Victoria east of the Snowy River is the County of Croajingolong, favoured by nature with some of the most enchanting scenery in the State. Those who travel east along the Prince's Highway to Orbost and beyond must feel that they are entering a new world. Perhaps they have traversed the great valley of the Latrobe and the long plain between Sale and Bairnsdale, past Providence Ponds and other places that remind one of pioneers such as Angus McMillan. They will have admired the Gippsland Lakes and the beauty of the wayside between Lakes Entrance and Nowa Nowa.

The further east one travels the more fascinating does the wayside become and the greater is the temptation to explore side-tracks and branch roads. But we press on across the Snowy River — into Croajingolong, perhaps stopping first to gaze down across the lush flats about Orbost from the magnificent lookout on the Newmerella cliff. The palaeontologist might be tempted to dally and glean some marine fossils from the railway cutting just below, but we must continue our journey eastward.

The Mahogany Gums lining the banks of the Snowy are a stately introduction to the far-eastern Victorian flora. They are a mere remnant of the dense vegetation which long ago clothed these banks. We could journey downstream to Marlo to look for some of the rare plants that grow there, or on further to Cape Conran, a place of notable scenic appeal. On the way we might visit a well-concealed spot by the Brodribb River, where a few Cabbage Palms are known to flourish, amidst a tangle of jungle vegetation. But we will move deeper into Croajingolong, by-passing the road to the Murrungowar Mountains where the Incense Plant (*Humea elegans*) thrives by the roadside and the track to the big colony of palms down along Cabbagetree Creek. Eventually we cross the Bemm River and reach the valley of Euchre Creek and Lind National Park.

There, in January 1926, 2882 acres of virgin forest and fern gully were permanently reserved for the protection and preservation of scenery and of the dense sub-tropical vegetation which flourishes there. The name of the reserve does honour to Sir Albert Lind, a former Minister of Lands and Forests, a grazier who has for very many years represented the people of East Gippsland in the Victorian Legislative Assembly and who has always shown some understanding of his state's need for a sound system of national parks.

Thirty or forty years ago, East Gippsland was known to relatively few travellers—mostly those who adventured along the Prince's Highway between Melbourne and Sydney. Euchre Valley was chosen for a national park not because it furnished the supreme example of Gippsland's forest and gully flora but because it was the best-known one in those parts. The highway traversed it for almost three miles, and the tourist, in passing, could scarcely fail to be enraptured by its singular beauty. Now, thousands travel the highway but few stop to explore the park. Indeed, there is little need to do so. Its special charm is in its scenery viewed as a whole. Tracks winding along the creek valley and into the forested hills might tempt the naturalist, although such folk seem to prefer places where there are no well-worn tracks.

The value of Lind National Park lies in the permanent preservation of a specimen of forest containing an ecological association which in this state is peculiar to East Gippsland. It is, and may well remain, a purely primitive area without a network of tracks or much else to cause the tour-

ist to linger. A small picnic ground with car park, log cabin, fireplace and rustic seats near the creek among treeferns and tall trees is all that most of us would need.

I first passed through Euchre Valley more than thirty-five years ago on a strenuous cycling holiday from Melbourne to Mallacoota. Six years later a similar adventure showed changes in this part of Victoria. Settlement had spread in many river and creek valleys, but Euchre Creek remained unchanged.

In 1939 in the company of our editor I gazed on Lind National Park once more—a sad scene of havoc wrought by the holocaust of that dreadful summer. We were amazed that a gully, almost wet with moisture even in midsummer, should have been burnt at all, but, like many another, it was wrecked. The surrounding forest was blackened. There was little undergrowth to hinder the view through the maze of scorched tree trunks. Now, in 1960, it is restored to its former glory. Once again the hills are clothed with tall trees with their under-storey of lesser trees. Shrubs and treeferns again deck the banks of the rippling stream. The Lilly-pilly-Kanooka-Blackwood association is green once more, and, reaching to the light above, are the massive water-vines and other lianas. Thanks to the warmth and moisture of the valley the scars have faded or are well concealed. The wallabies are back, Black Cockatoos screech overhead, and the others of the community seem to have re-assembled in their chosen haunts. May they long persist undisturbed.

Settlement may eventually crowd in around the park, the nearby state forest will be logged again and again, fires will menace it and may even burn it once more, but it is good to know that almost five square miles of territory is now to enjoy a measure of intelligent management and determined protection from the avoidable dangers that beset every acre of primitive wilderness in that lovely County of Croajingolong.

[*Note:* Lind National Park is destined to become a remote area, off the beaten track, for the new alignment of the Prince's Highway will by-pass it completely. However, the present road through Euchre Valley will probably be maintained for timber haulage and access to a few settlements.—Editor.]

Notes on Ferns of Victoria and Tasmania

By NORMAN WAKEFIELD

This article provides some supplementary distribution details and a few amendments to *Ferns of Victoria and Tasmania*, which was published by the F.N.C.V. in 1955. The page numbers after the species below are references to that book. Other references are indicated in the text by numbers in parenthesis and are then listed at the end of the article.

Skirted Treefern (*Cyathea marcescens*), pp. 11-12:

The Otways record of 1944 was at Mait's Rest, and the species was reported recently by A. G. Hooke (3) in Paradise Gully, near the east branch of the Barham River, Apollo Bay.

(*Note*: The lower picture, facing p. 11 in the fern book, is wrongly named in the caption. It is the Slender Treefern, *not* the Skirted.)

Austral Ground-fern (*Hypolepis australis*), p. 25:

This occurs in western as well as eastern Victoria. It has been found in the Otway Ranges, in the Calder River area about 6 miles west of Apollo Bay (N. A. Wakefield, 19/11/1955).

Downy Ground-fern (*Hypolepis punctata*), p. 26:

Within the political boundaries of Tasmania, the species was recorded only from Flinders Island. It has now been found in eastern Tasmania: by the Tasman Highway, 4 miles east of Myrtle Bank (N. A. Wakefield, 15/1/1960), and at Ferntree, by the Huon Highway near Mount Wellington (N. A. Wakefield, 26/1/1960).

Brittle Bladder-fern (*Cystopteris fragilis*), p. 28:

A fifth Victorian locality has been reported (5): Forlorn Hope Falls, 4000 feet, on granite faces and ledges (N. A. Wakefield, 16/1/1959).

(*Note*: The locality for the lower picture, opposite p. 31 of the fern book, is Mount Buller, *not* Mount Bogong as in the caption.)

Shredded Spleenworth (*Asplenium adiantoides*), p. 30:

As well as Darlot's Creek, this plant is recorded from Byaduk Caves by Beauglehole and Learmonth (2). In 1920, Audas (1) recorded the fern—as *Asplenium praemorsum*—from the "gorge of the Wannon River below Mount William". Beauglehole reports that it has been found on the other side of the Grampians, in two places on the west side of Victoria Range: Deep Creek, Billywing area (P. E. Finck and A. C. Beauglehole, 16/3/1957), and Cultivation Creek Gorge (L. K. M. Elmore and A. C. Beauglehole, 11/2/1960), there being in each case several plants on sandstone ledges.

Maidenhair Spleenwort (*Asplenium hookerianum*), p. 31:

This little fern was included in the book as a "doubtful", having been collected once only in Australia, probably on the New South Wales side of the upper Murray River*. Early this year, several plants of it were found on trunks of trees and treeferns along the Hellyer River near the Waratah Highway (N. A. Wakefield, 29/1/1960). *This constitutes a new record for Tasmania.*

Shield-ferns (*Ctenitis*), p. 46:

M. D. Tindale (4) has revised the classification of these three species as follows:

Shiny Shield-fern, *Lastreopsis shepherdii.*

Creeping Shield-fern, *Lastreopsis microsora.*

Trim Shield-fern, *Lastreopsis decomposita.*

Short-fruit Nardoo (*Marsilea hirsuta*), p. 56:

Previously known in Victoria only from the north and west, this plant has now been found in Gippsland: Bairnsdale, in river lagoons (F. Drake, 11/2/1953).

*The original record was "Upper Hume River, 3-4000 ft., F. Mueller, Jan. 1874".

Long Clubmoss (*Lycopodium varium*), on treefern trunk in Otway Ranges. Austral Filmy Fern (*Mecodium australe*) is massed to the right.

Long Clubmoss (*Lycopodium varium*), p. 61:

In 1955 this plant was known in Victoria only from two granitic peaks in far-eastern Victoria. More recently it has been found by P. E. Finck and A. C. Beauglehole in three places in the Victoria Range of the Grampians, growing on sandstone ledges: 4 miles NNE. of Chimney Pot (25/2/1957), saddle between Mount Thackeray and Little Princes Highway Mount (18/3/1957), and SW. side of Indian Head Mount (3/3/1957).

Finally the species was located in the Calder River Scenic Reserve, Otway Ranges (N. A. Wakefield, 6/9/1959), growing on the trunk of a treefern as it has been reported to do in places in Tasmania.

Until 1940, the Long Clubmoss had been collected only once in Victoria—at Genoa Peak in 1860 by Baron von Mueller. The finding of it, during the past twenty years, in six places representing practically three extremities of the State, is almost a parallel to the story of the Skirted Treefern.

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4. Tindale, Mary D., "A Preliminary Revision of the Genus *Lastreopsis* Ching", *Vict. Nat. 73*: 180-85 (March 1957).
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Warrnambool F.N. Club

The Warrnambool Field Naturalists Club, which affiliated with us earlier in the year, has now been in existence for two years and seems to be in a flourishing state. Mr. John Edge is now president and Mrs. D. G. Collins secretary-treasurer.

Like all naturalists, they look forward with hope to some improvement in the position at Tower Hill but regret the loss, at Goose Lagoon, of what they fear is the only ibis rookery in southern Victoria.

A most interesting discovery was a tiger-cat trapped at Mount Eccles, but unfortunately it died of the injuries. They also report the photographing of a Powerful Owl.

This club seems to range far and wide, having had combined excursions with the Stawell, Hamilton and Portland clubs, while their former president, Rev. Keith Schrader, addressed a meeting of the Sunraysia F.N.C.

We hope some of them will range as far as Melbourne on October 1 and 2.

The Range of the Lyrebird's Voice

By K. C. HALAFOFF

Proceeding with the investigation of the frequency range of the Lyrebird's voice, further measurements have been made by means of an oscilloscope. The disc used was a new lacquer one made from a tape recording of Spotty's song, taken by Mr. Peter Bruce with my assistance at Sherbrooke in 1959.

The new tests were concerned with the upper limit of the frequency range and with the ratio between fundamental tones and their harmonics. "Clicks" showed a frequency of 8 kc./sec., a surprisingly low figure for a percussion sound, especially in comparison with 12 kc./sec. observed during trills concluding the "stanza". One of the purest high tones proved to be an imitation of the Pilot-bird, though due to the incessant change of the picture on the screen it was hard to say whether it was still in a fundamental range.

Regarding the relationship between the fundamentals and the overtones, the following observations were made:

1. Whipbird call: fundamentals 9 kc./sec., harmonics 16 kc./sec.
2. Lyrebird stanza (without trills): fundamentals 6-7 kc./sec., overtones 15-16 kc./sec.

The results of the oscilloscope reading were in general agreement with the previously reported test, so that five and a half octaves (from F of the 5th octave to the top of the 10th octave) may be considered as a conservative assessment of the total voice range of the Lyrebird.

Full, accurate analysis of the range of frequencies and volume of the song would be possible only if photographs were taken of the oscilloscope screen and carefully measured. As that screen is small (2 in. to 3 in. diameter), and the shiny green sound curve is rather thick, and as the curves change shape in a fraction of a second, the distance between the peaks of the curve indicating the frequency become difficult to read by eye at or over 16 kc./sec.

There is reason to believe that the phenomenon called by some naturalists "telepathic message" may be nothing but a high frequency call beyond the human audible range. It is possible that a tape recording could be made and that riddle of the "telepathic message" solved. If there was a high frequency beam, the oscilloscope would clearly show it even if its frequency were inaudible to humans, provided the recording equipment was capable of registering frequencies considerably above 16 kc./sec.

Note: The previous oscilloscope tests referred to established the range of fundamentals from 400 c./sec. to 12 kc./sec., with harmonics up to 14 kc./sec. They showed also that most fundamentals were accompanied by harmonics, and that single frequencies, indicated by a pure sinusoide, appeared very rarely in the song. See *Vict. Nat. 76*: 126 (September 1959).

A Banksia Complex

By JEAN GALBRAITH

In a hollow on Wilson's Promontory, between the road to Lilly Pilly Gully and the gate near the foot of Mount Oberon, there is an interesting banksia community.

The first bushes I noticed there were typical *Banksia collina*, as we have known it in Victoria: foliage sharply serrated, flat and about ¼ inch wide. But one bush stood out from the rest; it had narrow leaves, with the revolute margins entire except for a trifid tip. This last had in fact almost the foliage of *B. spinulosa* as described by Bentham—not quite so revolute, but definitely more so than *B. spinulosa* as I know it on the Sydney sandstones.

An examination of many bushes showed that there was in that one hollow at Wilson's Promontory every

gradation between *B. collina* and *B. spinulosa*, and I began to wonder whether there was any reliable distinction between the two species; they are differentiated on foliage only. A box of specimens received through the courtesy of the Committee of Management of the Wilson's Promontory National Park proved so bewildering that I forwarded the material to the National Herbarium in Melbourne. Later it was sent to Sydney National Herbarium in the heart of "spinulosa country".

The final report from Sydney made it clear that no consistent difference can be found between the two, and, to quote Mr. J. H. Willis of the Melbourne Herbarium, "*B. spinulosa*, being an older name than *B. collina*, must take precedence for this species". So our old friend *Banksia collina* R. Br. is replaced by (or, more correctly, is included in) *B. spinulosa* Sm.

MICROSCOPISTS' CORNER

By C. S. and G. J. MIDDLETON

Oblique Illumination

Nearly all present-day microscopists are unaware of the value of oblique illumination. Indeed, after being described in one short paragraph in a recent publication on the effective use of the microscope, it is dismissed in the following sentence: "Oblique light is used primarily for the study of diatoms."

Certainly the secondary structure of many diatoms cannot be resolved without it, but it has a much wider application. The structure of all transparent unstained living organisms, including living cells of the higher animals, is more clearly seen with suitable oblique illumination such as was demonstrated at the F.N.C.V. Microscopical Group Meeting in July.

People spend comparatively large sums of money on expensive Phase Contrast equipment, whereas results almost indistinguishable from Phase Contrast can be obtained with a suitable arrangement of oblique light at practically no expense. Even an expensive microscope lamp is unnecessary. In fact, better results are obtained by using a portion of a powerful opal globe as a light source. A kerosene lamp, using the flat side of the flame, not the edge, will suffice, though results are less brilliant.

To obtain the best results, an achromatic sub-stage condenser is desirable but by no means essential. An ordinary Abbé condenser will serve reasonably well. Use low power objectives, such as 16 mm. or 10X, and high power eye-pieces—as high as can be obtained. We use 16 mm. apochromatic objective and a 27X eye-piece.

The arrangement we have found best is to place in the sub-stage stop carrier a diaphragm having a central opening the same diameter as, or slightly less than, the back lens of the condenser. This diaphragm is moved out of centre until the inner edge reaches approximately the optical centre of the condenser. The iris diaphragm is now closed until the internal structure such as the nucleus becomes clear and sharp. If one now removes the eye-piece and looks at the back lens of the objective, one should see a patch of light the shape of a gibbous moon on one side, the rest being dark. The best way to examine the back lens of an objective is to have a 4 dioptre lens mounted to fit in place of the eye-piece. A diaphragm with ¼-inch hole should be fitted on top of the lens.

Microscopes fitted with the continental decentring diaphragm will give an effect nearly as good as the above method. Merely close the diaphragm and decentre it.

Pond life enthusiasts, and people working on tissue cultures especially, will find this system of illumination of great value, as they are often studying their specimens in the living state.

Note: Queries on Microscopy are invited. For personal replies, please enclose stamped, addressed envelope.

Field Naturalists Club of Victoria

General Meeting—August 8, 1960

About 180 members and friends attended at the National Herbarium, and Mr. D. E. McInnes presided. Members stood for a minute in silence in respect for the memory of Mr. P. Erasmus Wilson, who passed away recently. Mr. Coghill spoke of Mr. Wilson's work as a former president of the club, as an ornithologist and entomologist, and an honorary staff member of the National Museum.

Professor A. J. Marshall of the new Monash University spoke on the factors that stimulate and control reproduction in vertebrate animals in tropical climates. The speaker gave details of biochemical changes in secretions in brain and glands, resulting finally in the formation of reproductive cells and sex hormones. Cellular changes were illustrated by projected microphotographs. The situation in the tropics was contrasted with that in temperate parts where factors such as increasing day length and white light induce sexuality in animals. A great number of tropical examples were cited together with data in each case of what stimulates reproduction.

Eleven new members were elected, and the president welcomed them to the ranks of the F.N.C.V. Their names appeared on page 117 of the August *Naturalist*.

Exhibits included specimens of *Callitris endlicheri** from Eldorado by Mrs. Webb-Ware, and the second-largest Victorian shell (*Pterospira roadknightae*) by Mr. Gabriel.

Botany Group—August 11, 1960

The group met at the Herbarium, and Mr. G. Francis gave a talk on "Soil, Weeds and Erosion". He showed the importance of weeds in the scheme of growing things, and their function of feeding to the topsoil moisture and mineral elements from the subsoil. Mr. Francis attributed the failure of the "Operation Groundnut" project of the British Government in Tanganyika to the neglect of rules which, to a botanist, appear elementary.

A preliminary visit to the National Fitness Park at Warrandyte is to be made by a small party who will report to the next meeting.

*A cypress-pine formerly known as *C. calcarata*

Geology Group—August 3, 1960

Eighteen members were present with Mr. Jeffrey in the chair. Mr. Fisch gave a condensed translation of an article from a Swiss newspaper on the frozen mammoths of Arctic regions. The subject for the evening was "Geology in Colour". Slides were shown by the following members: Mr. Hemmy—Lederderg Gorge, Heathcote (Cambrian tuffs), Cape Woolamai, Morwell and Yallourn open cuts, Grampians (Cave of the Hands), Warrandyte, Mouth of Snowy River and Noosa (beach deposits); Mr. McInnes—Step Beach at Airey's Inlet, and Anglesea (coastal deposits); Miss Butchart—Heathcote, Lederderg Gorge and Anglesea (coal mine).

Two films were screened. Mr. Tinckam showed sea-scapes of New South Wales and shots from a plane on a trip from Perth to Darwin. Mr. Fisch showed a film of Victorian seacoasts, illustrating geological deposits from Cambrian to Tertiary.

Exhibits: Mr. Davidson—fossil wood (Cretaceous), agates (special), chalcedony pebbles and agate material; all from Muttaburra, Queensland. Mr. Ken Shepperd—ammonites (location unknown).

Microscopical Group—July 20, 1960

The meeting took the form of a "Gadget Night", and members brought along unique, unusual or useful gadgets and described how they were made and for what they were used.

Mr. Burbury exhibited a micro-telescope, a very versatile stand and a blower for a projection lamp—all of his own making. Mr. Dixon brought his Zeiss micro-camera and a micro-copying device for a Leica camera. A home-made binocular microscope, constructed from old gun sights, was demonstrated by Mr. Genery.

The two most interesting exhibits were Mr. Middleton's microscope showing a live amoeba under oblique illumination, giving a more effective result than phase contrast, and Mr. von Gizycki's high-power binocular microscope equipped to give excellent stereoscopic relief. By the use of special eye-piece caps, an excellent stereoscopic effect may be obtained at any power on any single objective binocular microscope.

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

GENERAL MEETINGS

Monday, September 12, 1960—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Lecture: "Southern United States", by Dr. M. Eileen Lowe.
4. Election of Members:

Ordinary Members:

Mr. Lindsay Tonkin, Yarra St., Warrandyte (E. H. Coghill/A. G. Hooke).
Miss Christina Rodger, 11 Paterson St., Hawthorn, E.2 (E. H. Coghill/A. G. Hooke).
Miss Valda C. Trenberth, 15 Moffat St., Brighton, S.5 (E. H. Coghill/N. A. Wakefield).

Country Members:

Mr. A. H. Bishop, "Hwaiyin", Woodhouse (L. K. M. Elmore/E. H. Coghill).
Mr. K. M. Walker, 6 Macpherson St., Hamilton (L. K. M. Elmore/E. H. Coghill).
Mrs. M. Dempster, 18 Clarendon St., Hamilton (L. K. M. Elmore/E. H. Coghill).
Miss N. Pedrina, 4 Kitchener St., Hamilton (L. K. M. Elmore/E. H. Coghill).

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

Monday, October 10, 1960—"Victorian Alpine Scenery", by Joan Lang.

GROUP MEETINGS

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

Wednesday, September 14—Geology Group. "Sediments", by A. A. Baker.

Thursday, September 15—Fauna Survey Group. "Healesville Survey", by Eric Wilkinson, and general business. (8 p.m. at 7 Male Street, Middle Brighton.)

Wednesday, September 21—Microscopical Group.

Monday, October 3—Entomology and Marine Biology. At Mr. Strong's rooms, Parliament House, at 8 p.m. Use private entrance, south end of House.

Wednesday, October 5—Geology Group. "Some Aspects of Fossil Man", by R. Dodds.

F.N.C.V. EXCURSION

Saturday-Sunday, October 1-2—Combined weekend. F.N.C.V. country members and members of country clubs are invited to join with Melbourne members. Saturday afternoon offers a choice of two excursions: Organ Pipes, at Sydenham, and Sherbrooke Forest. On Saturday evening, at 8 o'clock, there is to be a meeting at the National Herbarium, where Mr. J. Bécher-vaise will speak on "Some Aspects of Antarctic Wildlife". On Sunday, a full-day excursion is planned to the Brisbane Ranges. Country visitors needing transport on these occasions should notify the excursion secretary as soon as possible.

PRELIMINARY NOTICE

December 26-January 2—Yarram. A parlour-coach will be chartered for the excursion, and day trips will be made to Tarra Valley, Bulga Park, Port Albert, etc. Hotel accommodation is available.

Back Numbers of "Victorian Naturalist" Available

The *Naturalist* has been published monthly since January 1884, and most of the 900-odd back numbers are still in the club's stocks and are available for purchase. Club members may obtain any of these, up to the end of volume 75, for half original price. Non-members may have lots for original face value.

In the lists below, the part numbers are placed in parenthesis after the corresponding volume number. Volume 1 ran to 16 parts and all others had 12 parts each.

Following are the reduced prices per copy (i.e. half original price):

1 (1) to 41 (3): 3d. each
41 (4) to 43 (5): 6d. each
43 (6) to 49 (1): 9d. each
49 (2) to 64 (2): 6d. each
64 (3) to 68 (2): 9d. each
68 (3) to 69 (2): 1/- each
69 (3) to 75 (12): 1/3 each

Several years ago, details were published of sets of issues of the *Naturalist* dealing with specific subjects, to cater for those who wished to obtain reference sets about their particular interests. The sets covered the period from May 1929 to April 1953 (i.e. volumes 46 to 70). These sets are now brought up to date by the addition of appropriate parts of volumes 71 to 75. These are the revised details, the prices quoted being for members, at half rates:

Orchids

Series A (wholly Victorian). Dealwith new species, new state records, etc. (mainly by the late W. H. Nicholls), each with a full page or more of illustration; providing a coverage of the local work done on the subject subsequent to the *Census of Victorian Plants* (F.N.C.V., 1928), *Flora of Victoria* (Ewart, 1930), *Gems of the Bush*, etc.

The series comprises 46 (2, 7, 9), 47 (8, 10, 11), 48 (6, 7, 10, 11, 12), 49 (1, 2, 4, 7, 8, 9, 11), 50 (3), 51 (6), 52 (9, 12), 53 (4, 8), 54 (10, 11), 55 (9), 56 (2, 4, 6, 8, 12), 57 (8, 11, 12), 58 (6, 7, 8, 11), 59 (1, 9, 12), 60 (4), 61 (6, 12), 62 (4), 63 (6), 64 (6), 66 (5, 11, 12), 67 (3). Fifty-two separate parts—£1/17/3.

Series B (Victorian). Less important articles and notes, by various authors, some with very good illustrations, all of interest to the keen orchid student; suplementary to Series A and covering the same 30-year period: 47 (7), 48 (5, 8), 49 (10), 50 (2, 5, 11), 52 (2, 11), 53 (2), 54 (12), 55 (6, 7, 8), 56 (3, 10), 57 (3, 4, 5), 58 (12), 59 (3, 4, 11), 60 (2), 64 (8), 65 (1), 67 (8), 68 (1), 69 (10, 11), 70 (2, 4), 73 (8/9). Thirty-three parts —£1/1/6.

Series C (not Victorian): A number of parts containing papers and articles by various authors, on new species and records, etc., of other Australian states, covering the same period and supplementary to Series A and B combined: 46 (1, 5, 10, 12), 47 (2, 12), 48 (1, 9), 49 (3), 50 (1, 4, 7, 8), 51 (3, 4, 7, 8), 52 (1, 4, 7), 53 (11), 54 (1, 4, 8), 56 (9), 57 (2, 6, 9), 58 (2, 3, 9), 59 (7, 8, 10), 60 (11), 61 (2, 9, 11), 62 (4), 63 (8, 9), 64 (9, 12), 65 (2, 5, 6, 7, 11, 12), 66 (3, 4), 67 (1, 7, 10), 68 (5), 69 (3, 9, 12), 70 (10), 71 (12), 72 (1, 7, 12), 73 (3, 7), 74 (5), 75 (10). Sixty-seven parts —£2/6/3.

Anthropology and Ethnology

Set of 55 individual numbers, selected over the 30-year period, containing about 200 pages on Australian aborigines, including many text-figures and with 28 plates additional. Price, £2/0/6. This set comprises 46 (1, 10, 12), 47 (5), 48 (2, 6, 8), 50 (3, 8), 51 (6), 52 (5), 53 (9), 54 (3, 6, 9), 55 (8, 9, 12), 56 (4, 5, 7, 11), 57 (6, 7), 58 (11), 59 (5), 60 (3, 4, 5, 6, 7, 12), 62 (1, 6), 64 (12), 67 (10, 11, 12), 68 (2), 69 (2, 12), 70 (8, 12), 71 (8), 73 (2, 4, 5), 74 (2, 3, 5, 6, 7), 75 (2, 5, 8).

Mammals

Two sets dealing almost wholly with local marsupials, covering the same period of the journal.

Series A: Over 170 pages, with numerous text-figures, and with 52 plates in addition, featuring in particular David Fleay's valuable contributions. Price 18/6. This comprises 47 (1), 49 (3, 4, 5, 7), 50 (2, 6), 51 (3, 4), 52 (4, 6, 8), 55 (1), 56 (8, 10), 58 (10), 59 (1, 7, 8, 11), 61 (1, 2, 3, 4), 63 (6, 7, 8, 12), 65 (12), 71 (2).

Series B: Complementary to Series A, 67 pages, with illustrations, and two plates also, of articles of less outstanding nature. Price 11/6. This comprises 46 (6), 47 (5), 51 (10), 53 (5, 7), 54 (4, 11, 12), 55 (6), 57 (5, 8, 11, 12), 58 (1, 2), 59 (2), 61 (11), 62 (6), 64 (10), 67 (4, 8, 9), 71 (1).

Geology

Set A includes about 160 pages of well-illustrated papers and articles of major geological interest, by such authors as Chapman, Keble, Pritchard, Colliver and Mitchell, dealing mainly with Victorian subjects. This contains 47 (2), 48 (5, 7), 49 (12), 53 (11), 54 (10), 55 (5, 9), 56 (11), 57 (2), 58 (5, 9), 59 (7, 12), 62 (3, 8), 65 (2, 8), 66 (4, 12), 67 (6), 68 (8), 69 (4), 71 (9, 10, 11), 72 (6), 73 (6), 74 (12). Twenty-nine individual numbers—£1/3/-.

Set B includes about 90 pages of material of less moment but which should be considered by those making a serious study of local geology. It contains 46 (5, 7, 10), 47 (6), 48 (3, 10), 49 (8), 50 (1, 3, 5, 11), 53 (7, 9, 12), 54 (3, 5, 7, 11), 55 (2, 4, 10), 60 (1, 4, 10, 11), 62 (7), 64 (4), 66 (2), 67 (4), 68 (1, 4, 7), 69 (10), 70 (3, 4), 72 (3), 75 (9, 10, 11). Thirty-seven individual numbers—£1/7/6.

Birds

Set A is made up of major articles with copious illustrations, by such noted ornithologists and photographers as C. L. Barrett, A. H. Chisholm, D. Dickison, R. T. Littlejohns and R. K. Munro; it contains special issues dealing with Helmeted Honeyeater, Lowan and Lyrebird. It contains 48 (11), 50 (5, 7, 8, 9), 51 (2, 4, 5), 52 (7, 9, 10, 11), 53 (1, 2), 54 (4, 6, 11, 12), 55 (5, 6), 56 (4, 7, 12), 57 (3, 4, 5, 8, 9, 10, 11), 60 (9), 61 (1, 10), 63 (2, 3, 4, 6, 9), 69 (5), 71 (5), 72 (5, 12), 73 (8/9), 75 (1, 10, 11, 12). Forty-seven numbers—£1/10/-.

Set B consists of articles and reports of less outstanding nature but of vital interest to the student of birdlore. It contains 47 (11, 12), 48 (7, 10), 49 (1, 6, 9), 50 (3, 11), 51 (8, 10, 12), 52 (5, 6), 53 (3, 8, 11), 54 (2), 55 (9), 56 (2, 9), 57 (2, 7, 12), 58 (1, 3, 4, 5, 6, 7, 8, 9), 59 (4, 12), 60 (4), 61 (4, 8), 62 (2, 3), 63 (5, 7, 10), 64 (4, 9, 10), 65 (1, 2, 10), 66 (1, 3, 6, 7), 67 (7), 70 (3, 8, 9), 73 (2), 74 (9, 11), 75 (5, 7). Sixty-one numbers—£2/4/-.

Those who have some copies of the *Naturalist* already, may supplement their files by purchasing individual numbers or any section of the above sets. Members with general interests may purchase a complete set, from volume 10 (1894-5) to the present, with only occasional numbers lacking, for less than £20.

It should be noted by new members and subscribers that the present format of the *Victorian Naturalist* began in May 1958, and before that date it was a journal produced on scientific lines rather than a popular nature magazine.

The features "Australian Wattles" and "Nature-study for Schools" commenced in May 1959, and so too did a series of articles on the Bogong High Plains. The feature "National Parks and National Monuments" began in January 1960.

Those who have not a complete set of the *Naturalist* in its new format and who wish to keep one, may obtain the required individual issues, out of the last and the present volumes, i.e. from May 1959 onwards, for the current price of 2/6 per issue.

Orders may be addressed to the F.N.C.V. Sales Officer, National Herbarium, The Domain, South Yarra, S.E.1.

Note: Stocks of the *Victorian Naturalist* for May, June and August, 1959, are very low, and the librarian would appreciate the return of any unwanted copies of these issues. Also, many numbers of the first nine volumes (1884-93) are urgently required by various members to complete their sets of the *Naturalist*, and news would be welcome of any of these that might be available.

Field Naturalists Club of Victoria

Established 1880

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

Patron: His Excellency General SIR DALLAS BROOKS, K.C.B., K.C.M.G., K.C.V.O., D.S.O., K.ST.J.

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

Microscopical: MR. J. WALSH, 4 Smith Street, North Coburg.

Fauna Survey: MR. GRAHAM GEORGE, 40 Maitland St., Glen Iris (BY 2134).

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 of Volume 77 of the *Victorian Naturalist* is from May 1960 to April 1961.

The Victorian Naturalist

Vol. 77 (6) October 1960

Published by the

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Vol. 77, No. 6

F.N.C.V.

October 6, 1960

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

CONTENTS

Front Cover:

"The Banded Ant-eater—an animal whose exact origin is shrouded in mystery, a living but passing relic of the earth's very early furred animals, a marsupial so different that it requires a special family name in zoological literature, and a probable Methuselah even among the kangaroos, possums and their kindred—this is the strikingly coloured, exquisitely dainty creature known to the aborigines as Numbat, and to the student of zoology as *Myrmecobius fasciatus*."

This quotation is from an article (*Vict. Nat.* 59, pp. 3-7, May 1942) written by David Fleay when he was director of the Sir Colin MacKenzie Sanctuary, Healesville. The photograph reproduced on the cover is one of four which accompanied the original article.

Editorial:

A Role for the "Victorian Naturalist"

Several months ago, the president of this club was approached by the representative of a number of comparatively young members who wished to form a group to be concerned with the study of native fauna. The club council decided to agree to the request.

Most of the members of the newly-formed Fauna Survey Group are science students who are taking second or third year Zoology at the University of Melbourne. They recognize the need for much field work, in connexion with native mammals in particular, so that details of the ecology and distribution of various species and groups may be recorded before it is too late.

The group took over several projects which had been begun in the Buchan district of East Gippsland. Skeletal remains of native mammals were known to occur in various places, and group members have been investigating them. Much is to be learned of the cave bats in Victoria, and these are receiving attention too. The present status of the Rock-Wallaby in Victoria is being investigated, and evidence is being accumulated of the original distribution of these animals in the state. The possible existence of colonies of the Wallaroo in north-eastern Gippsland is to come in for examination shortly. Other projects of a like nature are envisaged for the next year or so.

The Director of the Victorian Fisheries and Wildlife Department is interested in the group's field work, which is expected to provide useful data on native species, so the Department has decided to permit group members to study some protected species.

The Trustees of the M. A. Ingram Trust have made a grant of considerable size to defray expenses in connexion with group activities and to finance the publication of results of the researches. This issue of the *Naturalist* contains the first major contribution in what is to be a series of papers on Victorian mammals. Acknowledgement is made of the valuable assistance given by the Ingram Trust in meeting a large proportion of the cost of the additional printing and blocks which are involved in presenting the accompanying report on the Buchan bone deposits.

It is gratifying to know that a section of the *Victorian Naturalist* will be devoted from time to time to further original contributions to scientific knowledge. That was the function of the journal many years ago, when the F.N.C.V. numbered amongst its active members many field naturalists who were also prominent scientists and before there was the present abundance of scientific periodicals to accommodate their findings.

The *Victorian Naturalist* is now a magazine for the education of the unscientific naturalist, and it will remain so, but at the same time it will contain material of scientific value.

Wattle Time by the Snowy River

By K. C. ROGERS*

Snowy River Wattle, in the river gorge.
Photo: N. A. Wakefield

On August 21, an excursion was made from our home at Black Mountain to McKillop's Bridge with the object of seeing the wattles in bloom along the Snowy River. There was some uncertainty as to whether they would be fully out by then, but we were not disappointed.

Up here on the Wulgulmerang tableland there was only an occasional spray of Silver Wattle (*Acacia dealbata*) even partially out; whilst the Red-stem Wattle (*A. rubida*) at Wulgulmerang Creek was merely in advanced bud, and so too was the less noticeable Dagger Wattle (*A. siculiformis*) by the Little River.

For about a mile, as the road skirts the Little River Gorge before leaving the tableland, there is a considerable area of Kybean Wattle (*A. kybeanensis*), a very attractive and shapely wattle of shrubby growth. However, this was still only in the forward bud stage.

From Langham's Bluff, at an altitude of 2600 feet, the road descends for the next five or six miles to an altitude of only 600 feet by the Snowy River at a point four miles downstream from McKillop's Bridge. Soon after beginning this descent, we were in a thicket of Golden Wattle (*A. pycnantha*) which was just coming into bloom. The vegetation had changed entirely to a savannah of White Box (*Eucalyptus albens*), a striking example of the climatic effect of only a thousand feet drop in elevation and a change of aspect.

Next, on the warmer granitic slopes, we encountered the Boomerang Wattle (*A. amoena*) with its small, bright green foliage and less conspicuous flowers. Then, where the road finally descends, there is a large tree of

* Of "Rockbank", Wulgulmerang, via Buchan, Victoria.

Currawang (*A. doratoxylon*) overhanging the high cut-away bank; this flowers much later, however.

Along the four-mile stretch of road leading to the bridge there is a profusion of the lovely Snowy River Wattle (*A. huntericana*). This was just at its best, and so too were some typically graceful specimens of Golden Wattle on an open park-like area of ground.

The crowning glory of all, however, first seen on crossing the bridge, was the Red Wattle (*A. silvestris*). It grows in profusion along the river, particularly about high flood level, lining the stream for many miles in company with Snowy River Wattle, Silver Wattle and others.

Near the water, Red Wattle grows straight and fairly tall; it is a sizeable tree with bright green "feather-leaves" and green stem. It bears a great abundance of bright yellow flowerheads on the tips of the branchlets and is, to my mind, the most showy of all our district wattles.

Elsewhere, on the barest rock outcrops and cliff faces, Red Wattle grows in a stunted form. The sides of the gorges are often clothed with its bright gold, even when seen from a distance, during the short flowering season of this most conspicuous wattle.

When it was time to return to our still wintry tableland, we felt that we had been amply rewarded by the great beauty of wattle time by the Snowy River.

[NOTE: *Acacia silvestris* Tindale was named scientifically in February 1957, in *Vict. Nat. 73*: 162, though in East Gippsland it has been known as Red Wattle for decades. The pinnules are large (mostly over 5 mm. long and about 1 mm. wide) and quite acute, and the latter feature distinguishes Red Wattle from related bipinnate species in Victoria.—Editor.]

Red Wattle, *Acacia silvestris*, near Wulgulmerang.

Photo: N. A. Wakefield

Alfred National Park

By J. Ros Garnet

Water-vine, Lilly-pilly and a Profusion of Ferns in the Sub-tropical Jungle of Alfred National Park.

Photo: N. A. Wakefield

The journey east, beyond Lind Park, brings one to Tonghi Creek and, if one is sufficiently interested, a few miles walk upstream, following what becomes an obscure foot track, will bring one to Tonghi Falls, where the rare Tonghi Bottlebrush (*Callistemon subulatus*) grows in the fissures of granite rock. In some of the crevices one may be surprised to see the quill-like foliage of luxuriating plants of the Streaked Rock-orchid (*Dendrobium striolatum*). A very pleasant spot is Tonghi Falls.

Once upon a time, the spot where the Prince's Highway crosses the creek was pleasant too. Now it is a recognized roadside fire-place and camping spot, liberally fouled with empty food-tins, soiled paper, fruit skins and such things that unsupervised travellers and campers are apt to spread about in our beauty spots.

Four miles further on is Cann River, a place which deserves more than a mere mention, but if one is to see the next of our series of National Parks, one must move twelve miles beyond the Cann. At a spot about 304 miles from Melbourne, the Highway enters Alfred National Park and for the next four miles traverses it as the road climbs over a shoulder of Mount Drummer and then winds its way down to the eastern boundary of the park above Karlo Creek.

For many miles the highway has passed through changing scenes of singular beauty—forests of towering stringybarks and other eucalypts, dense fern gullies, patches of wattle, banksia and geebung, and streams

lined with Lilly-pilly and Kanooka. There has been a gradual change in vegetation as one moved east.

On Mount Drummer one sees the Gippsland Waratah (*Telopea oreades*) flourishing as tall trees. Many of them, above the road, were destroyed by the great bushfire of 1939, but happily those in that section of the park to the south of the highway were hardly touched.

In tracing the history of Alfred National Park, two men come prominently to mind: Charles Daley and Edward Pescott. Both were one-time presidents of the F.N.C.V. and, in their earlier years, ramblers in out-of-the-way places. Both had explored parts of Croajingolong and had noted the great patches of subtropical jungle at Mount Drummer. Through them the club's committee sought the reservation of this vegetation in a national park. The Minister of Lands, Alfred Downward, M.L.A., Member for Mornington at that time, agreed to the club's request, and 3,352 acres of jungle and forest on the south side of the highway were set aside for the preservation of scenery and native vegetation. This reserve was gazetted in January 1926. Later, a further 2,054 acres, on the north side of the road, was added to the reserve, mostly to preserve the fine waratahs. The park thus comprises almost 8½ square miles, the jungle portions of which are several hundred acres.

Downward was a modest man who refused to have his surname used, but he raised no objection to the park being named "Alfred" because (so they say) he felt there must be plenty of Alfreds deserving to have a national park named after them!

Those who know the Croajingolong jungles consider that Alfred Park includes the bst example of them. So far, fate has been kind to the Drummer jungle, for it has not been badly burned within the span of living memory, although the surrounding forested parts of the park have suffered.

In an account of this national park* N. A. Wakefield tells the story of the origin of the name of the mountain. Drummer was none other than a somewhat wayward bullock whose claim to immortality arose when he managed to sabotage the progress of a team in its journey over the old Noorinbee-Genoa track. He put his head around the wrong side of a tree, which resulted in his untimely death on the slopes of the mountain which now bears his name.

My first view of Mount Drummer was in the early thirties when, after industriously climbing to the top in the heat of a summer day, I was grateful for the ice-cold water which gushed from a roadside spring. What I also enjoyed was the delight of sitting on the saddle of the bicycle and free-wheeling for five all-too-short miles down to Karlo Creek.

Another memorable visit, in the terrible summer of 1939, was in the company of the present editor of this magazine. We set off with a packhorse to follow part of the old and now almost vanished blazed trail from Noorinbee to Genoa. It crossed the Thurra River and then a branch wound its way through the bush to the Drummer saddle.

During the leisurely journey we came across many things of interest: small mobs of kangaroos, a Satin Bower-bird's playground, an old settler on the Thurra who "hadn't shot any pheasants" for quite a time, seedling waratahs in hundreds, a Tangle Orchid (*Sarcanthus tridentatus*) sprawling symmetrically on a granite rock. That was before we reached the highway and corralled the old horse in the yard of the old "tin hut", a building which has long since disappeared. Then we plunged down into the famous jungle and browsed about in its cool twilight for a few hours. Both of us had an eye for orchids, and we were impressed by the fact that the epiphytic *Sarcanthus* thrived best in places where a shaft of sunlight penetrated the canopy of foliage. It grew on Pittosporum, Coprosma, Lilly-pilly, Kanooka, Musk Daisy-bush, Blanket-leaf and Water-vine. Sometimes an ancient orchid would be suspended from its host by a single long slender root. Such a one might hang thus for years, for in the jungle there is little wind. During a day's visit, J. H. Willis listed 74 flowering plants from Mount Drummer, but this is but a fraction of the total number. Wakefield records about fifty ferns for this national park, and, as he mentions in his article,

* *Vict. Nat.* 70: 12 (April 1954).

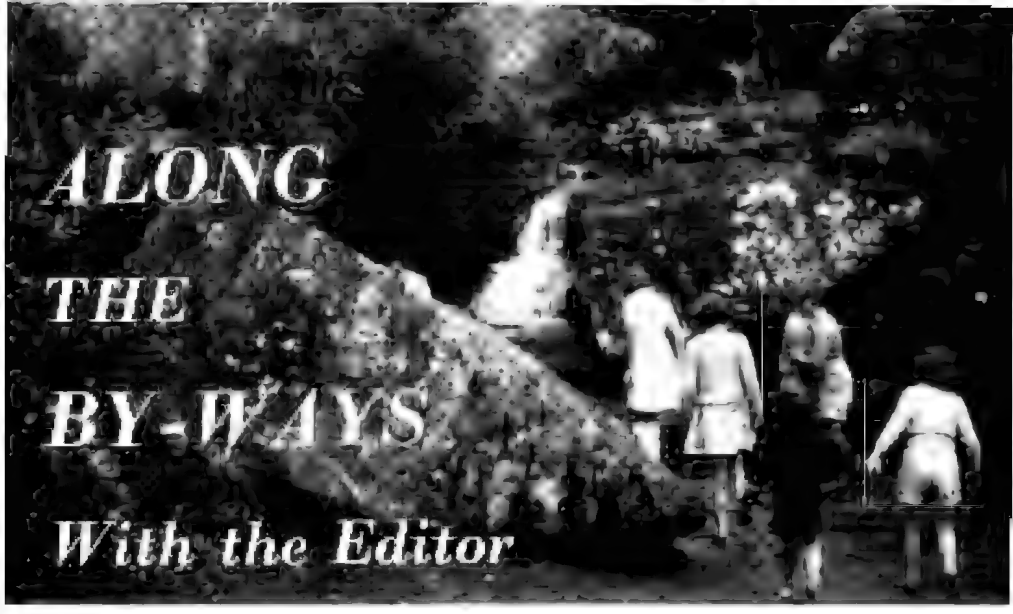
several of them are known in Victoria only from the Drummer jungle.

The average tourist may not be particularly interested in the names of individual species of plant and animal to be found in the park, but will for certain continue to be impressed by the contrasting character of the vegetation. As yet there is no recognized track to be followed through the jungle, but from the highway there are several vantage points where one can gaze on its dark green roof and see it sharply separated from the grey-green of the surrounding eucalypt forest. The adventurous will brave the barrier of secondary growth beside the road, and some blackberries, to find himself in a grotesque grove of tall trees, their trunks enveloped in epiphytic mosses and ferns and supporting massive vines and lianes with scarcely a leaf within reach. Far above, in the full sunlight, are their flowers, fruits and leaves. Underfoot there is little to impede one's step—perhaps a trickling stream, tender ferns, rotting branches and logs of fallen trees, with their attendant fungi and, as our F.N.C.V. excursionists discovered in the summer of 1958, their attendant Funnel-web Spiders. The Drummer jungle is the last place where one would have expected to find *Atrax robustus*! Yet another curiosity of the place is a solitary old Gully Gum (*Eucalytus smithii*) in the middle of the jungle. Is it the sole survivor of a forest of its kind which has been smothered by the enveloping jungle?

Apart from occasional wallabies, there is little evidence of mammals in the jungle, but a number of birds prefer its shady quietude. Brown Warbler, Rufous Fantail, Black-faced Flycatcher and Lewin Honeyeater comprise a typical jungle fraternity, and there are Satin Bower-birds and Lyrebirds, too.

Skirted Treefern in Alfred National Park.

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.

Plastering the Nest

Do any Australian birds, other than the mud-builders and the saliva-producing Grey Swiftlet, use plaster of any kind (apart from spider-webbing) in the making of their nests? In particular, do any of the sittellas do so?

In asking these questions, Mr. A. H. Chisholm (Sydney) says he read recently in the *Aubudon Magazine* (U.S.A.) an article in which Dr. A. L. Rand discussed "The Pitch-plastering of the Red-breasted Nuthatch". Like its close relatives, this nuthatch nests in hollows but differs from most cavity-nesting birds in that it lines the chamber and lays coloured eggs. In addition, some members of the group use mud to close cracks in the wood and to reduce the size of the entrance hole; and the red-breasted species consistently smears the face of the nest-hole with globules of pitch obtained from trees. This practice has been supposed to be designed to protect the nest against ants or other predators, but Dr. Rand thinks that it is merely "a hangover from the days when it was part of a functional process" and now serves no useful purpose.

Whether or not the Australian sittellas, or treerunners, are related to the old-world nuthatches, Mr. Chisholm says, they build a very different type of nest—an open, cup-shaped structure of bark and fibre placed in a horizontal or sloping tree-fork—and yet they do a certain amount of plastering. Their medium is, for the most part, spider-webbing, but it has been claimed they use either gum or saliva to stick the base of the

nest to its site and to attach small pieces of bark (all neatly trimmed to size) to the outer walls of the structure. See *The Emu* for 1907 (vol. 7, p. 18).

Adding that he thinks that the Painted Honeyeater sometimes uses the sticky juice of mistletoe berries as binding material for the fibre in its slight nest, Mr. Chisholm reverts to the sittellas to suggest that these small birds merit close study, both in regard to the nature of their nests and the problem why three or more birds often attend the one nest.

Spotted Harrier's Meal

Through the good offices of Mr. A. H. Chisholm, we have received a number of notes written by Mr. J. A. Bravery of Atherton in north Queensland. The latter is described by Chisholm as "a bush birdman", and here is an example of his observations:

A few weeks ago I noticed from my dairy a Spotted Harrier flying very low over a lucerne field, winding in and out, relentlessly hunting some animal towards a laneway which was fairly bare of grass. Eventually the animal was driven to the wire fence near the edge of the lane, going to ground near the fence. I wondered what was the prey but was unable to leave the dairy for a couple of hours, and the harrier, being under the fence, could not be seen. I thought he may have damaged a wing, for he didn't leave the ground. Later, when I was able to look, the harrier was still there, but flew off undamaged. Searching for the prey, I found the tail and a very small portion of the rump of a medium-sized bandicoot. The harrier was over two hours consuming the meal, which included bones of the body and head as well as fur, and he would have finished the rest had he not been disturbed. I am at a loss to know how he managed to eat the bones. I have seen the other harrier (Swamp Harrier) consume a snake five feet long which had been thrown over a wire fence, taking most of the morning to do so and also leaving no bones.

Australian Wattles

These comments come from Mr. A. E. Brooks of Cheltenham:

Having followed Jean Galbraith's feature, "Australian Wattles", with more than passing interest, particularly the articles dealing with Sticky Wattle and Wirilda, I feel disposed to make some comments.

For some time several plants of Sticky Wattle have been growing in different parts of my garden. The "unusual green" of the slightly weeping foliage makes it attractive throughout the year but, when the trees are covered with a wealth of primrose bloom, each is a beauty to behold. The delicate colour of the blossom is a pleasing contrast to the deep gold of other species nearby. The most remarkable feature of this wattle in the garden is its hardiness. One mature specimen, when cut to within three feet of the ground, sent out so many new shoots that it was soon more vigorous and bushy than ever.

Wirilda is also worth cultivating, not only because its pale golden blossom is produced off and on throughout the year but because it is an easy species to deal with. Sometimes plants have a few sprays of bloom all through the year and a special display in the spring. This wattle has definite possibilities for planting around parks and sports grounds, where it could be alternated with a eucalypt such as Yellow Gum.

Specimens for Identification

An example of Basket Fungus, *Clathrus gracilis*, from Mr. Derek Stone of G.C.E.G.S., Timbertop, via Mansfield. This strange plant is commented upon on page 81 of *Victorian Toadstools and Mushrooms* (2nd ed.) by J. H. Willis.

Two specimens, sent some months ago, of Stately Helmet-orchid, *Corybas dilatatus*, found at Genoa by Fred Becker.

Recent Mammal Bones in the Buchan District—1

By NORMAN WAKEFIELD

On May 25, 1958, the writer visited the limestone formation known as the Pyramids, near the Murrindal River, about four miles NNE. of Buchan in eastern Victoria. At the base of a cliff a little distance east of the four conspicuous pinnacles, a place was found where a wombat had scraped some earth from a small tunnel in the rock. Amongst this were numerous bones of small mammals, and a collection was made of jaw-bones and skull fragments. This material provided remains of twelve kinds of mammal: six were small marsupials such as Phascogales (*Antechinus*) and possum species still present in the area, but the six rodents included the rare Broad-toothed Rat (*Mastacomys*) as well as a recently-extinct Rabbit-Rat (*Conilurus*) and two unidentified small species.

When discussing this with members of the Speleological Society of Victoria, it was learned that similar remains were to be found in small caves in cliffs by the Murrindal River a few hundred yards downstream from the Pyramids. This area was examined on August 30-31, 1958, and sites were located in each of which there were many square feet of small bones to a depth of several inches. These were picked over and some hundreds of jaw-bones and small skulls were collected. Classification of the material did not add to the number of kinds of rodent but it brought the marsupials represented in these deposits up to a total of fifteen species. The additional ones were larger kinds such as Bandicoots, Rat-Kangaroos and Native Cats.

Following the practice of the Speleological Society, the last two sites were given numbers. M 27 is a small cave not far upstream from where the underground branch of the Murrindal River finally comes out again, and M 28 is a recess at the base of the cliff a little further north.

The Murrindal cliffs were visited a third time on December 30-31, 1959, and more bone material was collected from M 27 and M 28. On each of the three visits, I was accompanied by one or more members of the Hodge family of W Tree, which is several miles north of Murrindal. Mr. Leo Hodge is a country member of the F.N.C.V., and his two sons, Peter and Michael, are also keen naturalists. The three assisted considerably in the rather arduous task of sorting and collecting by torch light in the semi-darkness of the recesses in the cliffs.

After the formation early this year of the Fauna Survey Group

The Pyramids, Murrindal
The Pyramids Cave is under the main cliff.

of the Field Naturalists Club, two excursions were organized to continue work on the Buchan bone deposits. On May 25, 1960, members of the group collected a quantity of material from both M 27 and M 28, and in it were fragments of an additional species of rodent and another small possum. Further reports had been received of two sites containing recent bones at East Buchan and both these were examined on May 26-27 by the group members. A system of passages and large chambers known as the Mabel Cave proved most interesting. On the floor of a tunnel-like recess in the cliff face, overlooking the Buchan River, there were innumerable rodent and small marsupial bones. A considerable number of these was collected.

Mainly because one of the small rodents could not be identified, pending the collection of a more complete skull, I went back to the Mabel Cave on July 16, together with Mr. A. Triffett of the C.S.I.R.O. A small additional amount of material was taken out and the required skull parts were obtained.

Members of the Fauna Survey Group were in the Buchan area again on September 1-2, 1960. A sieve was used and more specimens obtained from the deep dust layer on the floor of the entrance chamber of the Mabel Cave.

On September 1, I went with Mr. J. K. Dempster, a research officer of the Victorian Fisheries and Wildlife Department, to the original cave below the Pyramids. Being of sufficiently small build, Dempster was able to wriggle to the end of the rock passage and enter a large chimney-like chamber above it. Sev-

eral feet up, a narrow passage led out to the cliff face and it had a large amount of skeletal material on the floor. A rake was improvised from the forked stem of a shrub and used to collect a quantity of material from the upper tunnel. A further lot was bagged up from the end of the entrance tunnel below. The bags of dust and bones were left there to be sieved later.

On September 4, I took Mr. R. M. Warneke (also a research officer of the Fisheries and Wildlife Department) to the Pyramids, and we treated the collected material as well as some more from the floor of the lower tunnel. A preliminary sorting on the spot yielded about a dozen mandibles (lower jaw-bones) of an unknown possum (sub-family Phalangerinae) as well as several which were suspected to be of the rare (or extinct) Leadbeater's Possum (*Gymnobelideus*).

Next day Warneke and I sieved and bagged large quantities of bones from the deposits in both M 27 and M 28; and on September 9, a similar task was performed in the Mabel Cave at East Buchan. Fly-wire screening was used and this retained all but the dust and minute bone fragments. The material obtained in this way was kept, and it has yielded large numbers of specimens of the very small rodents and marsupials, most of which had been missed before. Further examination of the bulk of bone material in these collections from the Buchan district is being carried out in the Wildlife Laboratory of the Fisheries and Wildlife Department.

Comparisons with specimens in the National Herbarium of Victoria have shown beyond doubt that there is a number of mandibles of Leadbeater's Possum in the collections from the Murrindal River area. The unidentified possum from the Pyramid cave proved to be an extinct species named *Burramys parvus*. The identity of the latter was suggested, from my description to him, by Mr. J. A. Mahoney of the Department of Geology and Geophysics, University of Sydney. I wish to acknowledge the considerable help which Mahoney has given over the past two years in connexion with the identification of the skeletal remains in the Buchan district.

Origins of the Deposits

There is no reasonable doubt that both M 27 and M 28 were dens of the Eastern Native Cat (*Dasyurus quoll*). David Fleay (4) has given evidence of the habit of this animal of accumulating bones in stone shelters in the Colac district, and F. J. Buckland (3) has published notes which indicate that they take in prey and leave it uneaten.

Rabbits appeared in the Buchan district within a few years of the turn of the century but evidently not (or at least not in significant numbers) before the epidemic of 1901-3 which practically annihilated the Native Cat populations of south-eastern Australia. No rabbit skull has been found in M 28, and a single one in M 27 is of no more significance than the occasional rabbit remains found here and there amongst the Buchan limestones.

Foxes, which are plentiful in the district, have left rabbits'

limb-bones in many cliff recesses, but, after the style of dogs, they eat the whole head. Foxes certainly did not accumulate the thousands of small animals whose skeletons comprised the deposits in question.

Introduced rats (*Rattus rattus*) came later than the rabbits, and there is no evidence of their remains amongst those of some thousands of native rodents. The introduced mouse (*Mus musculus*) came to the district quite early, but the only skeletal evidence found of this species was a single mandible amongst bones of a few native mammals in another cave at East Buchan. The skeleton of a domestic cat nearby

suggested the agent responsible for the mouse remains.

There is little likelihood of M 27 and M 28 having been the dens of the Tiger Cat (*Dasyurops maculatus*). This animal is still present in the district though apparently uncommon. Again the absence of skulls and mandibles of rabbits and other introduced rodents indicates that the accumulations of bones ceased about sixty years or more ago. This idea is further supported by the abundance amongst the relics of specimens of several marsupial and native rodent species which apparently died out in south-eastern Australia with the spread of settlement and the coming of rabbit and fox. The remains of Native Cats themselves were well represented in the two deposits by both adult and juvenile material, but there were very few bones of Tiger Cats and all the latter were very juvenile. Occupants of animal lairs would be expected to die in them occasionally, as Buckland (3) noticed in connexion with Native Cats in Western Australia. The presence of remains of juvenile Tiger Cats, no bigger than adult Native Cats, may be explained by the habit of the latter of dragging the remains of large animals to their dens.

When members of the Fauna Survey Group began working on the skeletal deposits at the Mabel Cave at East Buchan, the nature of the remains suggested that the bones had been incorporated originally in pellets disgorged by large owls. Many of the pellets were collected almost intact, and thus we obtained the component parts of many individual skulls with their respective mandibles even though the sections had become detached from each other. In some cases a pellet contained the complete skeleton of a small rodent or marsupial. There was evidence that on occasion the entire head of a Rabbit-Rat had been swallowed and the skull—about two inches long—disgorged later.

At the Pyramids cave on September 4, the appearance of some of the skull material suggested that owls were responsible for that deposit too. This was confirmed when Warneke brought to light a well-preserved pellet containing the skull, mandibles and other bones of a Broad-toothed Rat.

The possible identity of the owl species responsible for the Mabel Cave deposits and those at the Pyramids has not yet been fully considered, but a discussion of it is to be included in the second part of the report on the Buchan deposits.

It is evident that owls are no longer using either the Mabel Cave or the one at the Pyramids. No fresh pellets are to be found at either site, and the rodent remains most abundant are of species which are now extinct or very rare.

More than half the bones of most species represented in the Pyramid cave are brittle and have become more or less light brick-red in colour. A small percentage of those in M 27, M 28 and the Mabel Cave show a slight approach to the same state. The development of this colour is evidently an indication of age, in which case the Pyramids cave deposit was accumulated over a much longer period than any of the other three. The status in the

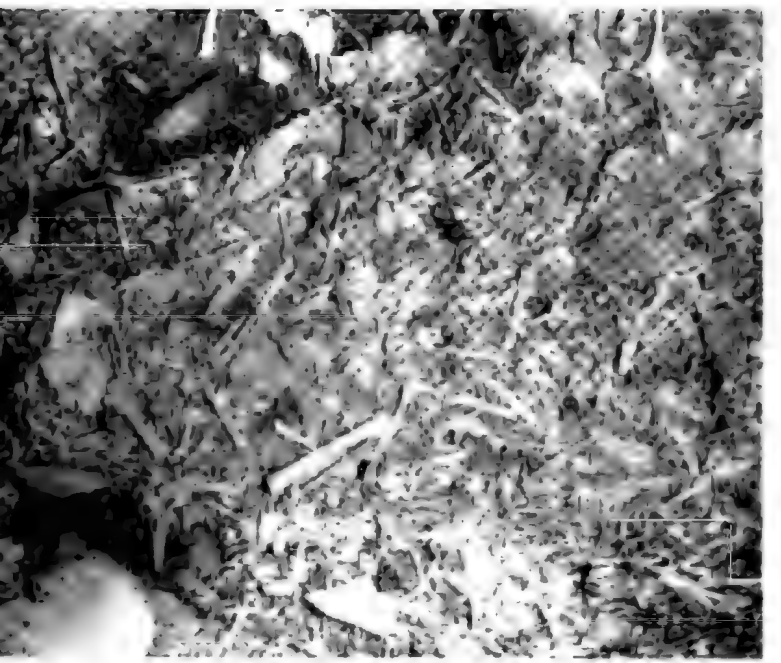
Pyramid cave of *Burramys* and *Gymnobelideus* confirms this.

Statistical Data: Marsupials

With all species represented in the Buchan bone deposits, the mandibles or lower jaw-bones have given the most satisfactory evidence of the numbers of individual animals in the accumulations. In most cases the mandibles have been classified as right or left and adult or juvenile; but where very large numbers were involved, they have simply been counted and the totals halved in order to assess the minimum numbers of individuals represented.

For the eighteen species of marsupials the total count to date stands at over 2000 individuals. Of the Native Cat dens, M 27 yielded over 600 and M 28 over 350. It is likely that the count for M 28 could be at least doubled, for most of the floor there is moist and cannot be sieved. When the Fauna Survey Group works in the area again, the wet material could be shifted, allowed to dry, then processed for collecting. It would be advisable for that to be done soon, for the moisture is causing the bones to deteriorate, and furthermore the deposit is being encroached upon and gradually incorporated in the solid limestone of a large stalagmite.

In early collections, some of the material from M 27 and M 28 was mixed, so for several species accurate comparisons between the two sites cannot be made. However, the proportion of this material was quite small and could not effect any of the numbers set out on page 170 by more

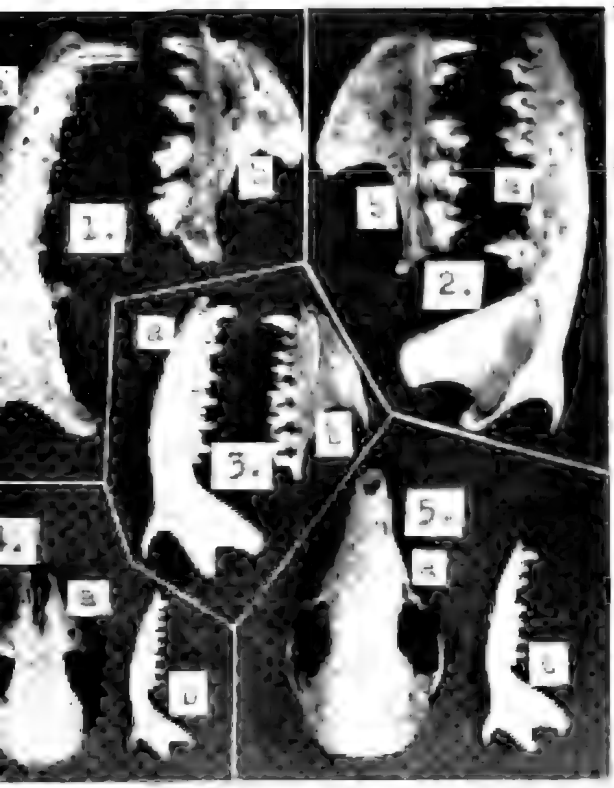


Part of Bone Deposit on Floor of M 28.

TABLE SHOWING NUMBERS OF INDIVIDUAL ANIMALS ACCOUNTED FOR TO DATE IN COLLECTIONS FROM THE FOUR SITES

(* The asterisk indicates that figure is approximate only.)

Predators	Native Cats		Owls	
	M 27	M 28	Mabel	Pyramids
Antechinus flavipes (Yellow-footed Phascogale)	104	33	307	254
Antechinus swainsoni (Dusky Phascogale)	39	18	20	39
Phascogale tapoatafa (Tuan)	8*	9*	7	4
Dasyurus quoll (Eastern Native Cat)	14*	8*	2	1
Dasyurops maculatus (Tiger Cat)	—	2	—	—
Isoodon obesulus (Short-nosed Bandicoot)	50*	26*	13	9
Perameles nasuta (Long-nosed Bandicoot)	55	30	17	14
Acrobates pygmaeus (Feathertail Glider)	26	4	82	62
Cercaertetus nanus (Pigmy Possum)	43	16	69	121
Burramys parvus	—	—	—	11
Gymnobelideus leadbeateri (Leadbeater's Possum)	2	—	—	9
Petaurus breviceps (Sugar Glider)	164*	113*	27	30
Petaurus norfolcensis (Squirrel Glider)	27*	20*	1	1
Schoinobates volans (Dusky Glider)	11*	8*	—	—
Pseudocheirus laniginosus (Common Ringtail)	88*	67*	12	10
Trichosurus vulpecula (Brushtail Possum)	5	1	1	
Bettongia gaimardi (Bettong)	1	1		
Potorous tridactylis (Potoroo)	10*	11*		
TOTALS	647	367	560	568



1. *Dasyurops maculatus* (Tiger Cat)
   a—juvenile mandible (P 20614)
   b—juvenile maxilla (P 20615)
2. *Dasyurus quoll* (Eastern Native Cat)
   a—adult mandible (P 20616)
   b—adult maxilla (P 20617)
   [In 1 and 2, compare size of upper molars.]
3. *Phascogale tapoatafa* (Tuan)
   a—mandible (P 20618)
   b—maxilla (P 20619)
4. *Antechinus flavipes* (Yellow-footed Phascogale)
   a—skull (P 20620)
   b—mandible (P 20621)
5. *Antechinus swainsoni* (Dusky Phascogale)
   a—skull (P 20622)
   b—mandible (P 20623)
   [In 4 and 5, compare shape of frontals, width of coronoid processes, and shapes of incisors and premolars.]

than about 10 per cent. Where accurate records were kept, there is little deviation in the counts, for individual species, from the overall ratio of 5:3 for M 27 and M 28 respectively. Actually the two deposits show a remarkable parallel as regards the respective percentages of the various species represented in each. As they are close together these two shelters were probably used by the same colony of Native Cats. In M 28, however, where the deposit is subject to moisture and exposure, bones of smaller species have apparently disintegrated.

The respective compositions of the two owl cave collections are remarkably parallel too. The few differences between them in the respective proportions of remains of particular species are attributable to differences in the two environments. East Buchan apparently carried more open forest than did the Murrindal area. To date, each owl site has yielded specimens of about 550 individual marsupials. It is unlikely that all the remains in the Mabel Cave and at the Pyramids were due to the activities of owls; probably a few of the specimens of larger species came there by other agencies. However, the figures for these sites provide some quite definite evidence of the abits of the owls

and they allow some interesting comparisons to be made between the activities of these predators and of the Native Cats.

It should be possible to sort the material from the Pyramids cave according to age, as indicated by colour change, and to determine what shifts have occurred with time in the proportions of species represented. If this can be coupled with radiocarbon dating of one or more samples of uniform colour, it should provide a valuable contribution to our knowledge of trends in the mammal population, at least of the Buchan district, before the coming of Europeans to Australia. Some material remains to be collected in the Pyramids cave, particularly in the practically inaccessible upper passage. It is hoped that what is left can be taken out in sections and layers for careful analysis and study.

Yellow-footed Phascogale

(*Antechinus flavipes*)

Of the marsupial specimens, this little animal comprises about one-eighth of those caught by the Native Cats and just half those taken by the owls. The species is still abundant in East Gippsland,

KEY TO ILLUSTRATIONS ON OPPOSITE PAGE

1. *Pseudocheirus laniginosus* (Common Ringtail): a—skull, from above (P 20623); b—skull, from below (P 20624); c—adult mandible (P 20625); d—juvenile mandible (P 20626); e—very juvenile mandible (P 20627).

2. *Schoinobates volans* (Dusky Glider): a—part of skull, from below (P 20628); b—mandible (P 20629).
[Compare 1c and 1d with 2b and note that in *Schoinobates* the angle is more strongly inflected, more acute and with a flat inner edge the base of which hides the inferior dental foramen. In this species the coronoid process (when entire) is neither acute nor falcate.]

3. *Petaurus breviceps* (Sugar Glider): a—skull, from above (P 20630); b—skull, from below (P 20631); c—mandible (P 20632).

4. *Petaurus norfolcensis* (Squirrel Glider): a—skull, posterior portion (P 20633); b—skull, anterior portion (P 20634); c—mandible (P 20635).

5. *Gymnobelideus leadbeateri* (Leadbeater's Possum)—mandible (P 20636).
[Compare with 5c and note that in *Gymnobelideus* the jaw-bone is narrower, the first incisor straight, the angle less divergent, the coronoid process shorter, and the inferior dental foramen elongated and more posterior.]

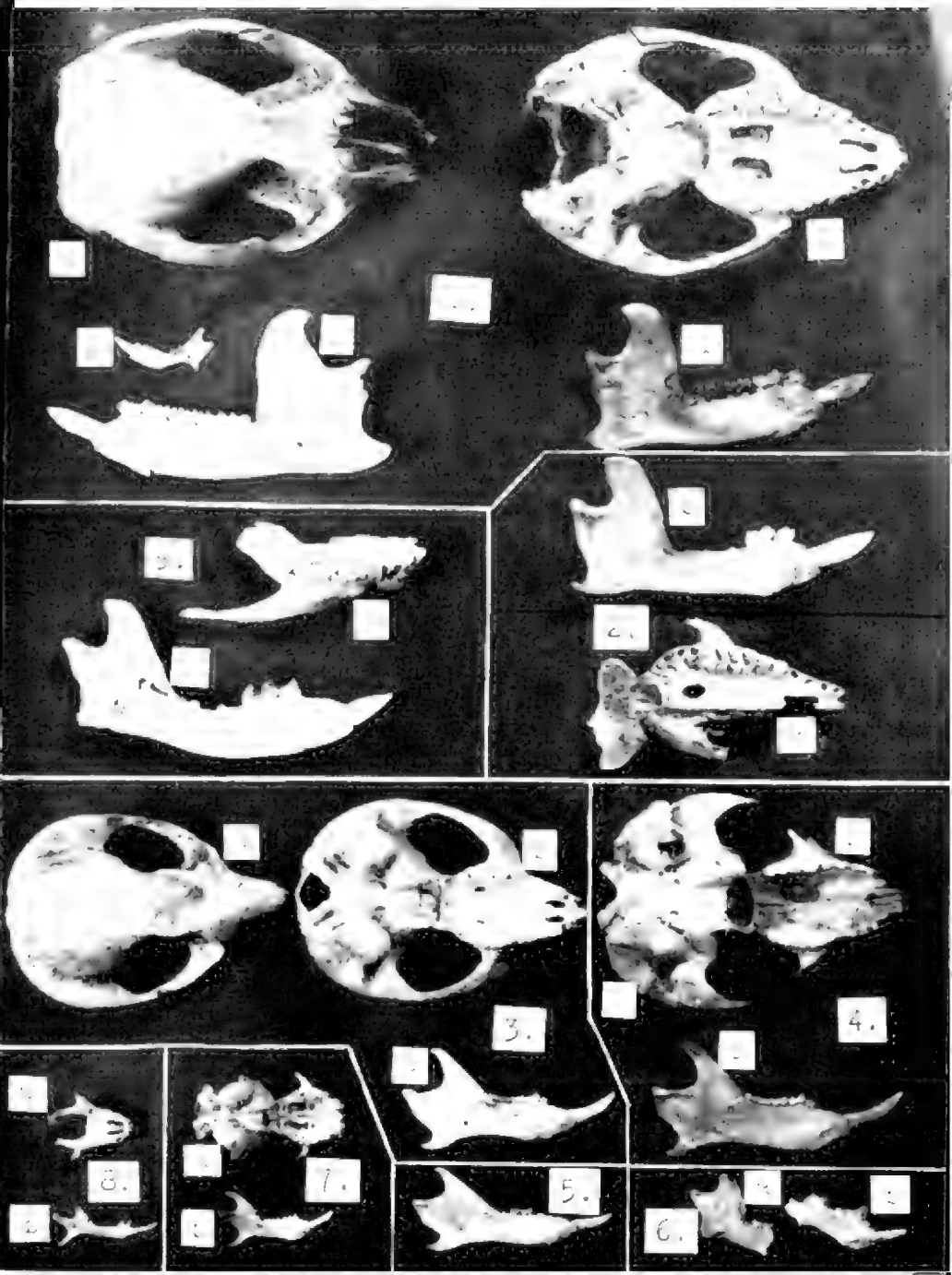
6. *Burramys parvus*: a—posterior portion of mandible (P 20637); b—anterior portion of mandible (P 20638).
[Note the comparatively large premolar.]

7. *Cercaertetus nanus* (Pigmy Possum): a—skull, from below (P 20639); b—mandible (P 20640).

8. *Acrobates pygmaeus* (Feathertail Glider): a—anterior portion of skull, from below (P 20641); b—mandible (P 20642).

9. *Trichosurus vulpecula* (Brushtail Possum): a—juvenile maxilla (P 20643); b—juvenile mandible (P 20644).

[NOTE.—The numbers given here and also for the illustrations on pages 171 and 174 refer to the Palaeontological collection in the National Museum of Victoria. All specimens are shown natural size, and all came from the Buchan bone deposits discussed in this article.]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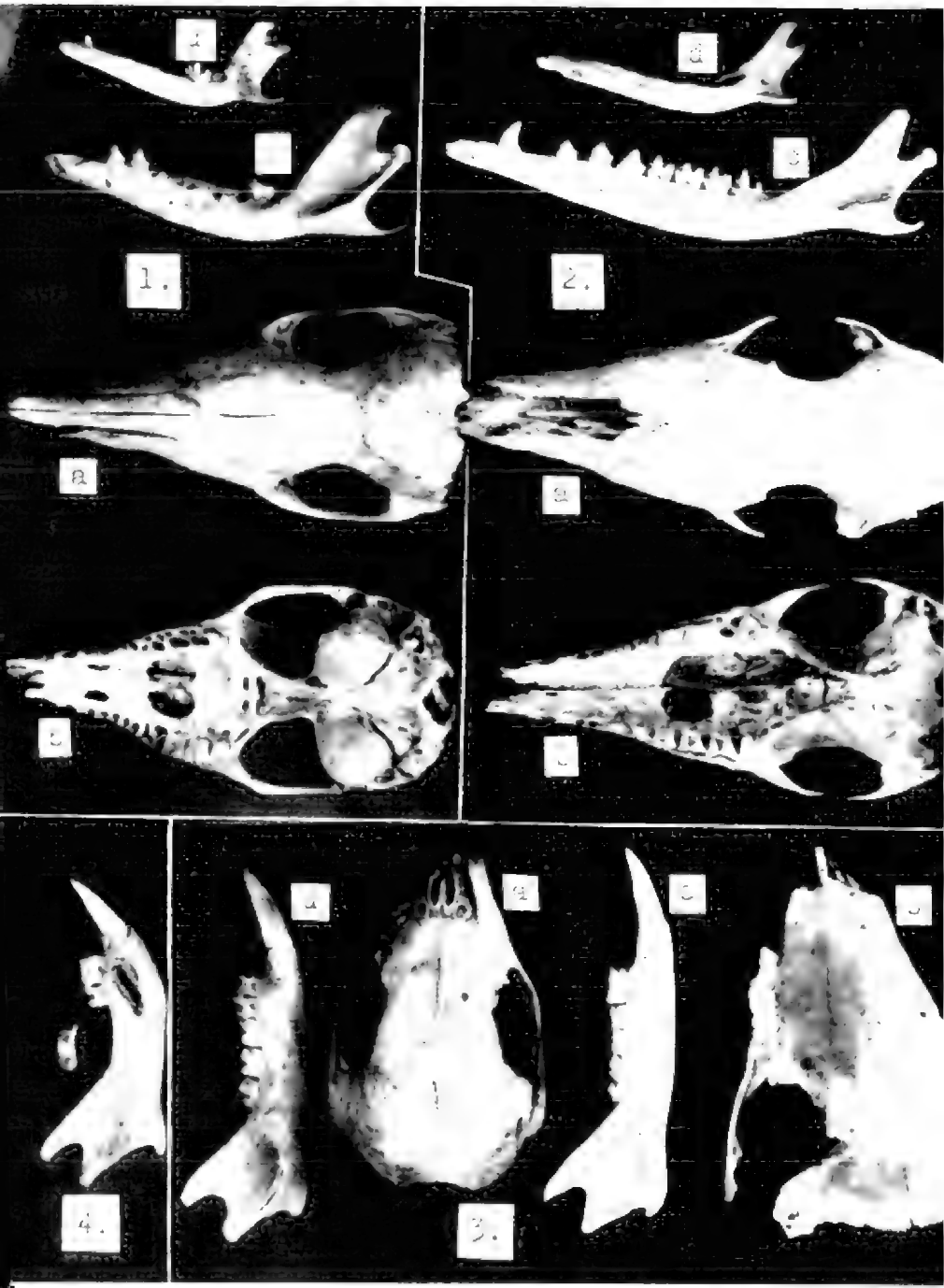
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ranging from coast to highlands and, with several young at a time, it has been able to maintain its numbers despite the activities of predators such as those of the past and the present-day foxes and domestic cats. The normal habitat of the Yellow-footed Phascogale is open forest country, which accounts for the ease with which it was taken by owls and the fact that they obtained more at East Buchan than at Murrindal River.

Dusky Phascogale

(*Antechinus swainsoni*)

This is not plentiful in East Gippsland and apparently it never was, for it belongs rather to the heavy forests of west and south Gippsland and central Victoria. One was caught recently by Mr. Leo Hodge at The Basin, which is adjacent to both the Pyramids and East Buchan. Because the Dusky Phascogale inhabits the forest floor amongst dense vegetation, it did not fall easy prey to owls, and there were apparently more of them in the Pyramids area than about East Buchan. It has been recorded too from Wingan Inlet.

Tuan

(*Phascogale tapoatafa*)

A few were caught by Native Cats and fewer by the owls. Most of the specimens were adult, and some were quite big for the species. The Tuan may still be in the district; one was seen by Mr. Alan Hodge twenty miles to the north in about 1940.

Eastern Native Cat

(*Dasyurus quoll*)

The animals which had their lairs in shelters such as M 27 and M 28 disappeared about sixty years ago, and they survive in very few places in Victoria. A local resident reported seeing one at East Buchan about ten years ago, but this is unconfirmed. Buckland (3) recorded the species from Mallacoota comparatively recently, and reports are to be published shortly of its presence at Wilson's Promontory.

Tiger Cat

(*Dasyurops maculatus*)

There are a few in the heavily forested areas to the north of the Buchan district, and there is

KEY TO ILLUSTRATIONS ON OPPOSITE PAGE

1. *Isoodon obesulus* (Short-nosed Bandicoot): a—skull, from above (P 20645); b—skull, from below (P 20646); c—adult mandible (P 20647); d—juvenile mandible (P 20648).
   [Compare with 2, and note large auditory bullae and broad coronoid process in *Isoodon*.]
2. *Perameles nasuta* (Long-nosed Bandicoot): a—skull, from above (P 20649); b—skull, from below (P 20650); c—adult mandible (P 20651); d—juvenile mandible P 20652).
3. *Potorous tridactylis* (Potoroo): a—juvenile skull, from above (P 20653); b—adult skull, from below (P 20654); c—adult mandible, showing large permanent premolar (P 20655); d—juvenile mandible, showing two premolar milk-teeth (P 20656).
4. *Bettongia gaimardi* (Bettong)—juvenile mandible, with the large permanent unemerged premolar extracted to show the diagnostic sculpture of about seven grooves (P 20657).

an unconfirmed sight record of one recently at East Buchan.

Short-nosed Bandicoot

(*Isoodon obesulus*)

Many were caught by the Native Cats, and it is of interest that at least two-thirds of the victims were adult animals. This bandicoot is plentiful in coastal areas, where it favours sandy bracken country, and it was probably not plentiful in the Buchan district. Only a small number found their way into the owls' deposits and of these about half were juvenile.

Long-nosed Bandicoot

(*Perameles nasuta*)

Of those taken by Native Cats only about one-sixth were adult, and in the owls' deposits only one-tenth. This indicates that the species was far better able to defend itself than the Short-nosed. But, as both the Native Cats and the owls took more of the former than the latter, the Long-nosed species must have been quite abundant in the district. A museum specimen was taken at the head of Basin Creek (east of the Pyramids) in 1951, and there was much evidence that this bandicoot had been working the ground under tea-tree scrub by the Murrindal River in September last. It is apparently still plentiful in the area. (It is possible that the adult bandicoot material found in the owl sites was not taken there by the birds themselves.)

Feathertail Glider

(*Acrobates pygmaeus*)

Native Cats took a few but, because of their arboreal habits, the owls took many more. The Feathertail apparently favoured the more open forest country of East Buchan; it is still plentiful in East Gippsland.

Pigmy Possum

(*Cercaertetus nanus*)

The comments about predation on the last species apply equally to this. However, the Pigmy Possum seems to have favoured more the heavier forest country about the Murrindal than the more open East Buchan vegetation. It too is still plentiful in East Gippsland.

Burramys parvus

This animal was known only by the original series of fossils from the Wombeyan district in New South Wales. It was described in 1896 by R. Broom (2), and the material is believed to date back to the Pleistocene. Twenty mandibles, all old, representing at least eleven individuals, were found in the Pyramids cave and they match perfectly the illustrations published recently by W. D. L. Ride (6). We now have *Burramys*, not as a fossil perhaps ten thousand years old, but as free skeletal material contemporary with our possums and our marsupial-mice. This discovery will be further investigated and reported upon fully at a later date.*

*While this report was in press, the Pyramid cave was visited for the purpose of systematically collecting the remainder of the deposit. This has not yet been sorted, but a preliminary look through material being bagged brought to light many more mandibles of *Burramys* and *Gymnobelideus* as well as some maxillary pieces of each. The whole deposit will now be analysed and its antiquity assessed.

Leadbeater's Possum

(*Gymnobelidius leadbeateri*)

Seventeen mandibles, all apparently very old, were found in the Pyramids cave, and two recent ones (belonging to different individuals) came from M 27. Previously only five examples of the species were known: two from South Gippsland about a century ago, a third later from the same area apparently, and two from Mount Wills in north-eastern Victoria in 1909. Our skeletal records indicate that it was not uncommon originally about Murrindal and that it survived there probably at least until towards the end of last century. Possibly the species is not yet extinct.

Sugar Glider

(*Petaurus breviceps*)

This was by far the most frequent victim of the Native Cats, comprising more than a quarter of their total of marsupials. The owls caught comparatively few. Despite their susceptibility to predators, including nowadays the domestic cat, the Sugar Glider is still very abundant in East Gippsland.

Squirrel Glider

(*Petaurus norfolcensis*)

Enough of these were taken by the Native Cats to indicate that there was a significant population of them in the Murrindal area. Apparently nothing is known otherwise of either the past or the present status of the species in Gippsland. A specimen is cited by Marlow (5) from near Bega in south-eastern New South Wales however.

Dusky Glider

(*Schoinobates volans*)

A small proportion of these animals was represented in each of the Native Cat dens but none in the owl sites. This large glider-possum is quite plentiful in heavy forest, particularly to the north of the limestone area. It apparently sometimes descended to the ground to be caught by "cats".

Common Ringtail

(*Pseudocheirus laniginosus*)

Of the numerous Ringtails caught by the Native Cats, about three-quarters were juvenile, ranging from half to almost fully grown. Two or three tiny mandibles apparently belonged to very young animals which were still being carried in the pouch when their mothers fell victim to the predators. The owls caught a small but significant number of well-grown young Ringtails.

Brushtail Possum

(*Trichosurus vulpecula*)

The common "Silver-Grey" is abundant in East Gippsland, and in the Buchan area it inhabits holes in limestone cliffs as well as hollow trees. Several juvenile mandibles were collected, showing that the Native Cats occasionally took half-grown specimens. An adult skull found in M 27 would not be the responsibility of the Native Cats.

[All specifically distinguishable skull parts of *Trichosurus* have been of *T. vulpecula*; but some of the mandibles found may be of *T. caninus* (Mountain Possum) which is known to occur in the district.]

Bettong

(*Bettongia gaimardi*)

Two juvenile mandibles of *Bettongia* were found, one each in M 27 and M 28. Nothing is known of the original status of this genus in Gippsland, and the nearest Victorian record of it is an old National Museum specimen labelled "Upper Yarra". Local residents report that Rat-Kangaroos were plentiful in the early days, especially in the Gelantipy district, but at least the majority of them would be of the following species. Apparently settlement and foxes completely wiped out all Rat-Kangaroos in Gippsland many years ago.

Potoroo

(*Potorous tridactylis*)

The remains of several well-grown juvenile Potoroos and also one adult were found in each Native Cat den. The few juvenile ones at the owls' sites may not have been taken there by the birds. The National Museum has a specimen collected at Rosedale in Central Gippsland in 1900, and the animal, once abundant in Victoria, may still survive in the south-west of the State.

[*Note*: Some of the vernacular names above are different from those given either by Bravenor (1) or Troughton (7), but they can be interpreted by reference to the scientific names in one or other of the books by these authors.]

Appendix

The seven species of native rodent were represented in the four deposits by large quantities of bones. Sorting and counting of these has yet to be completed and a report on these rodents should appear in the *Victorian Naturalist* in the near future.

Some skeletal material of bats has been collected too, and this is to be dealt with in a report on the bat populations of caves in the Buchan limestones and other areas.

Remains of various birds, lizards and some insect material from the Buchan deposits have yet to be investigated and reported upon.

Also there are other aspects of the original fauna of the Buchan limestones, including evidence of the occurrence of the Brush-tailed Rock-Wallaby (*Petrogale penicillata*), which should be published.

Finally, a programme of live trapping is to be carried out, with the co-operation of the Fisheries and Wildlife Department, to determine the present status of several mammal species in the Buchan district.

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Field Naturalists Club of Victoria

General Meeting—September 12, 1960

About 180 members and friends met at the National Herbarium for the monthly general meeting of the club.

The recent nature show was discussed; Mr. A. G. Hooke reported an estimated profit of £60, and a vote of thanks was carried to Mr. A. B. Court for his planning and to the show committee and helpers. It was decided that the Lower Melbourne Town Hall should be booked for another show on September 4, 5 and 6, 1961.

It was announced that A.N.Z.A.A.S. would meet in Brisbane from May 29 to June 2, 1961, and delegates from the club were called for.

Each study group in the club is to be asked to appoint representatives to get in touch with the librarian to seek books and periodicals suitable for study.

Dr. Eileen Lowe, an American Zoology Research Scholar at present at the Melbourne University, gave an illustrated lecture on "Southern United States". She dealt especially with Louisiana, illustrating its four regions and their vegetation and fauna. A vote of thanks was carried for a very well presented and informative lecture.

The seven persons whose nominations were set out on page 147 of the September *Naturalist* were admitted to membership of the F.N.C.V. The president welcomed them to the ranks of the club.

Miss R. Chisholm reported an increase in the koala population at Macedon; many had come down to Lower Macedon, thus missing the fires.

Exhibits included seven species of land shells from Central Australia (Mr. Garnet), a freak form of *Pterostylis nutans* with spreading petals (Mr. Hyett), deep-sea sponges collected at Shoreham (Miss Elder), and wildflowers from Wilson's Promontory (Mrs. Coghill).

Aspects of the kangaroo problem were discussed and it was decided to ask the Fisheries and Wildlife Department for a statement regarding protection of these animals in Victoria. An explanation was given to members of the club council's considerations about the wombat.

Geology Group—September 14, 1960

Fifteen members were present, with Mr. Jeffrey in the chair. Mr. Davidson commented on *Anaspides*, the Tasmanian "living fossil", exhibited at the recent nature show. Mr. Fisch told of a similar shrimp-like creature found years ago in a creek near Melbourne.

Mr. Davidson reported receiving a letter from Mr. Cobbett who is touring overseas and is at present in Iceland. It was arranged for Mr. Baker to lead the excursion with the country clubs to the Organ Pipes at Sydenham on October 1.

The main part of the evening was a members' night. Mr. Tinckam showed slides taken from a plane over the alps of the South Island of New Zealand, Mr. Jeffrey showed views of places visited by group excursions, and Mr. Dodds the copy of a new paper-back from America depicting "History of Geological Sciences", and the new geological map of Melbourne issued by the Mines Department.

Exhibits included glacial pebbles (Mr. Davidson), meteoric iron from South Australia (Mr. Jeffrey) and greenstone from New Zealand (Mr. Tinckam).

Fauna Survey Group—August 17, 1960

Ten members attended the meeting, and arrangements were made for a second visit to the Buchan district in late August, to coincide with the University vacation. Further sifting of the bone deposits was planned to recover some of the smaller and rarer native mouse remains, and two days were to be spent looking for Rock-Wallabies in rough country about Suggan Buggan and the Little River Gorge.

Plans for the publication of articles on various topics and reports on the group's work were outlined.

Mr. Wakefield then went on to discuss the Buchan bone deposits, making interesting comparisons between species and relative numbers of in-

dividuals found in the Native Cat dens and those of owls. Some of the remains were exhibited and features pointed out which characterize the skulls and jawbones of various species.

Mr. E. Wilkinson showed a series of slides of a Mountain Possum (*Trichosurus caninus*) and a Fat-tailed Pouched-Mouse (*Sminthopsis crassicaudata*); and Mr. Wakefield showed a few slides of Sugar Gliders (*Petaurus breviceps*) taken near Benalla.

Fauna Survey Group Excursion to Buchan District

Seven members travelled in two private cars from Melbourne, on Sunday, August 28, and established camp in two bark huts by the Little River beyond Wulgulmerang beside the Snowy River road. Most went on down to McKillop's Bridge to enjoy the magnificent scenery from the road and the display of wattles along the Snowy.* In the meantime, Mr. Wakefield, who had arrived the day before with Mr. K. Dempster of the Fisheries and Wildlife Department, had had a day in the valley of the Little River, below the Gorge, in the company of Mr. K. C. Rogers of Black Mountain. The three called in at the camp at about ten o'clock, after a gruelling three-hour trek by moonlight along the side of a rocky scrub-covered ridge, to report the presence of Rock-Wallabies at the lower end of the gorge.

The following day most of the party climbed up through the Stradbroke Chasm in the side of Rocky Range above the Suggan Buggan valley, and others went to the Lighthouse further up the river. Rock-Wallabies still live in the former spot but have long since disappeared from the latter. Tuesday was spent in the Little River Gorge. This involved a couple of hours climbing down a seemingly impassible saw-tooth ridge of rock to the river 1500 feet below. A small section of the valley was explored as well as the environs of the Wulgulmerang Creek Falls, near where the latter stream joins the river. There was ample evidence of more Rock-Wallabies along the river and about the cliffs above. The party climbed out on the other side of the gorge by way of a bare 40-degree slope of huge jumbled rocks. Members are of the opinion that this spot has scenic grandeur probably not equalled elsewhere in Victoria, and an illustrated report of it should eventually be published in the *Naturalist*.

On Wednesday the Mabel Cave at East Buchan was investigated further and the bats in the inner chambers given some attention. This involved crawling through some passage-ways with several inches depth of ice-cold water flowing along the floor. On the Thursday, the party went into the Federal Cave (Murrindal) for a time to observe the bat colonies there before returning to Melbourne.

Other activities of the group on the occasion of this excursion are dealt with in the main reports on the Buchan bone deposits.

Microscopical Group—August 17, 1960

The speaker for the evening was Mr. W. Evans, and his subject was "The Radulae of Molluscs". Mr. Evans began by describing how the radulae are used in rasping food of molluscs, such as slugs and snails, in which they take the place of teeth. The address was illustrated with projected diagrams and was solidly based on practical experience. The attendance for the evening was small, as a wrong notice had been sent to the *Naturalist*, and it was a great pity that such an excellent address should have been heard by so few. This lecture will be repeated in the near future, so members may make use of the second opportunity to hear a very interesting talk.

Microscopical Group—September 21, 1960

The meeting took the form of a "Projection Night", and members brought along their micro-projectors to show specimens on the screen. Mr. Burbury and Mr. Middleton exhibited plant sections, spiders, mites, etc., as well as two live specimens of *Hydra viridis*. Mr. Evans was unfortunate in having some globe trouble with his projector, but the three instruments present combined to give members a profitable evening.

* See pages 157-58.

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The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

CONTENTS

Front Cover:

One of the permanent islands of the Goodwin Sands, in the main lake at Mallacoota, is the site of rookeries of both Silver Gulls and Crested Terns. The birds nest amongst the grass and tussocks in the left foreground of the picture, and in the middle distance are some of the wooded shores of the Inlet, which comprise part of the Mallacoota National Park. The photograph appeared first in the *Naturalist* of May 1958, with a report, "F.N.C.V. Excursion to Genoa District—Dec. 1957" (*Vict. Nat. 75*: 3-18); and the National Park is further dealt with on pages 208-10 of this issue.

The Shelter at the Camp of the Emu's Foot

By A. MASSOLA*

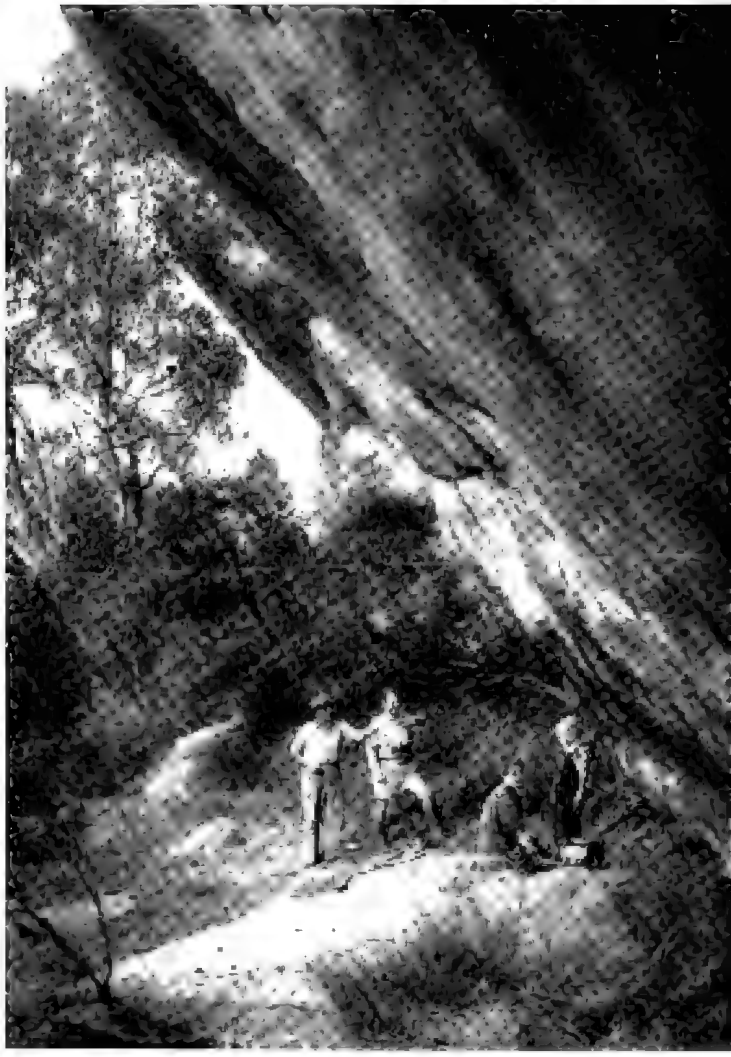
By far the largest number of examples of Victorian aboriginal rock paintings that have been discovered are in the Victoria Range, in the western Grampians. This is despite the difficulty of locating them, hidden as they are amongst vast numbers of crags and fissures in the maze of rugged scarps and huge tors, in an area covered by a tangled mass of vegetation. Does it mean that the natives of this locality were more adept at, or, perhaps, felt a greater need for, this type of art than tribes inhabiting other localities? Whatever the reason, the fact is that yet another painted shelter has been discovered in the Victoria Range.

The latest find is situated on the northern extremity of the range, almost at the point where it terminates in the immense and thickly wooded Victoria Valley, familiar to visitors to Reid's and Rose's Lookouts. To the natives, this part of the valley was the *Janang-en-yawiye*, or the "Camp of the Emu's Foot". But they knew this place best as the source of the Glenelg River, which stream was known to them by different names throughout its course: *Pawer*—the river, *Wurri-wurri*—lips (i.e., applied to the water, to drink), *Jerapoohl*—(now Cherrypool), and *Burumbuart*—muddy (at its junction with Salt Creek).

The discoverer of this new site was Mr. E. Tucker, of Brit-Brit, near Coleraine. Mr. Tucker was searching for unusual botanical specimens, when, on coming to a huge overhanging rock, he noticed a group of native paintings on the rock face. The rock itself is many hundreds of feet long and at least two hundred feet high. It runs east and west, and faces slightly west of north, overlooking the Victoria Valley. Here and there it is eroded or even split, and a number of shelters are formed along its base by virtue of a slight overhang. In following the base of this massif Mr. Tucker found three other groups of paintings.

The four groups of paintings occur on the walls of some of the shelters, and they are separated from each other by a few chains. They were executed in red ochre but are now somewhat faded, and in some cases flaking of the rock has occurred, causing the disappearance of painted areas. The surviving designs are purely symbolic, for no recognizable human or animal figures occur except possibly some vertical lines, ranging from five inches to almost two feet in length, each furnished with two sets of short diverging lines set obliquely to the central shaft. This results in a feasible representation of lizards (figure 1).

* Keeper of Anthropology, National Museum of Victoria.

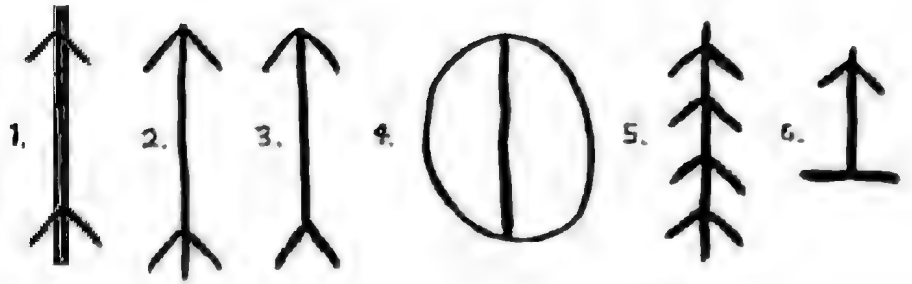


Part of the Rock Shelter

The overhanging face enables some of the paintings and below it is the polished rock.

Photo.
C. Kenyon

These "lizard" renderings are prevalent in the Victoria Range, and because of this I suggested, in a former paper, that the general locality may be sacred to the Lizard Totem. Another design (figure 5) conforms to the "herring-bone pattern", already recorded from another site in the Victoria Range—the Cave of Fishes. In the present example it appears to have been made simply by joining two of the lizard figures. Similar designs in Central Australia have been identified as representing poison bones or darts from pointing bones. Drawings resembling them, but with the ribs pointing upwards, are representations of plant totems in both Central and Northern Australia.



Figures represented in the Paintings at the Rock Shelters.

Figures 2 and 3 may be merely variants of the lizard. Figure 2 has no head, and figure 3 lacks both the head and the tail. Figure 6 is a puzzle. It occurs in only one of the four groups, where it is repeated several times. It is a broad arrow with a base at right angles to the shaft. To my knowledge this design has not previously been reported from any Australian site. Figure 4 is a drawing which occurs only twice in this shelter, once among lizards, and the second time is isolated on a detached rock, thirty feet east of the third group. It is an oblong or egg-shaped drawing standing on its long axis and divided into two by a vertical line running through its centre. This symbol, though not previously described from Victoria, has a world-wide distribution, having been reported, either painted or engraved, from Europe, Africa and America, as well as from Tasmania. Its nearest known occurrence is in South Australia, where it is found in localities extending from the River Murray to the Flinders Ranges. In Central Australia similar drawings are known to represent a ceremonial head-dress of possum fur.

The third group appears to have been the central and the most important of the four. The shelter in which it is situated is the most commodious; it is fifteen paces broad and twenty-five paces long. It has the best floor, which is level and sandy. Many fires must have been lit there, judging by the large amount of charcoal mixed with the sand. A number of chips of stones foreign to the locality, a broken axe-grinder, and a fragment of edge-ground axe were picked up, as surface finds, by members of the party.*

The spaciousness of the main shelter is broken by two large rocks jutting out of the ground. One of these is of special interest because it has been *polished* all over, not in the sense that it has been smoothed down and ground, like the edge of a stone axe, but it is shiny and smooth as if worn by countless bare feet walking on it, or perhaps by natives sitting on it with bare buttocks. The second jutting rock bears no trace of this treatment. It is likely that the first rock, which measures 13 ft. 8 in

*The party consisted of Mr. and Mrs. E. Tucker and their little daughter Madeline, of Brit-Brit, Mr. I. R. McCann of Stawell, Messrs. E. Peucker, E. Barber and C. Kroker of Horsham, and the writer.

probably been the reason for the birds nesting. This is the first time a rookery has been recorded there as far as we can find out. Mr. Harry Wright and Mr. Bill Barrett have been down to erect more duck nesting boxes—two at least of those already there contain nests of Chestnut Teal—and they report that they only covered part of the swamp and counted at least 150 ibis nests.

The rookery should be safe, as it is on Crown land and, moreover, land which is already reserved as a koala sanctuary. The rookery is not visible from the roads and can only be approached by "flatty" and by deep wading.

This is good news and helps to make up for the loss of the ibis rookery bulldozed at Goose Lagoon, Port Fairy, last year. (Incidentally a report from Port Fairy says Goose Lagoon and the swamp are flooded again and that the ibis, not to be deterred, are nesting on old swans' nests and any reed beds remaining.)

Broad-toothed Rat in South Gippsland

While a report by R. M. Warneke was in hand, dealing with the rediscovery of the Broad-toothed Rat (*Mastacomys fuscus*) in Gippsland,* a packet came by post from Mrs. Ellen Lyndon of Leongatha and it contained the skull and jaw-bones of a recently-dead member of the same species. On being asked for information about the place and date of her discovery, Mrs. Lyndon tendered the following information and comments:

The area, perhaps twenty acres, of oft-burned bush, has been spared in a thoroughly-cleared hilly tract of country about four miles north of this township, because its previous owner left instructions that it be kept intact for all time to show people what the country looked like before settlement. There is a movement in the district to have it officially reserved, and this find might help matters. There are still at least one pair of Whipbirds in residence, plenty of Grey Thrushes, Yellow Robins, Grey Fantails and numerous smaller fry. The sealed road to the hill district of Mount Eccles cuts through the bush, making a beautiful drive for a short distance.

The soil on the upper or south side of the road is sandy, the principal tree is Messmate, and there is a dense ground cover of bracken. On the north side is a half-ruined gully with running water, good high cover of Messmate, Blackwood and Silver Wattle, Cassinia, Christmas Bush (*Prostanthera lasianthos*), *Zieria smithii*, Coprosma, wattles—including Prickly Moses and Hop Wattle, Hop Goodenia, Hazel Pomaderris, Scented Paperbark (*Melaleuca squarrosa*), Rough Treefern, Hard Water-fern and three climbers: *Clematis*, *Pandorea* and *Ligustr*. The tiny creek makes its way through a tangle of ferns, fallen logs and shrubs matted together by Wiregrass. The rat skeleton lay on top of the ground cover as if it had been dropped there. The dark fur and short tail indicated that it was not an introduced rodent. The date was October 2, 1960.

Studying Mr. C. W. Brazenor's *Mammals of Victoria*, I note that he says the Eastern Swamp-Rat is probably now confined to western Victoria. If this rat is the *only* one that makes the long bare tunnel-like runs through the grass-roots and tussock butts, then I am sure it is very common here amongst our Tarwin swamps. I have rescued the stumpy short-tailed rat in flood time and it is well pictured in this book. Amongst dense growth of bracken and silver tussocks the earth is full of burrows, with heaps of loose earth thrown out, and the runs are well defined and numerous.

There is little doubt that much of Mrs. Lyndon's comment in the last paragraph applies to the Eastern Swamp-Rat (*Rattus lutreolus*). The species is apparently scattered across Victoria's near-coastal areas; it occurs in at least two places to the east of Orbost. In appearance, the Swamp-Rat is not distinguishable from the Broad-toothed Rat,

* See page 196

though they differ greatly in details of skull and teeth.† As regards runways under the vegetation, both these species use them but so does the common and widespread Bush Rat (*Rattus assimilis*). It is probable though that the Swamp-Rat makes the best-defined tracks.

There is much to be learned about the distribution and habits of the native rodents of Victoria, and these matters are being investigated at present by members of the Fauna Survey Group of the F.N.C.V. Specimens and observations like those sent in by Mrs. Lyndon are of great value, not only in the establishment of definite records but by directing attention to areas that should be investigated.

† The skulls of these two rats as well as those of other native rodents are to be pictured in next month's issue of *Victorian Naturalist*.

Notes from Warrnambool F.N.C.

In a letter dated September 24, the secretary of the Warrnambool club sent these notes:

During a count of the bird population this month at Framlingham, near Warrnambool, both the Rose Robin and the Mountain Thrush were seen. These are the first records which the Warrnambool Field Naturalists have of these birds in this area.

On Sunday, September 18, a further 120 trees were planted at Tower Hill. These had been supplied by the Fisheries and Wildlife Department to Dr. R. B. Robinson, and they included *Eucalyptus leucoxylon rosea*, *E. viminalis*, *E. numerosa* and *E. occidentalis*. This makes approximately 350 trees planted this month as a start in the re-aforestation plan for Tower Hill.

We should welcome news of this kind from other clubs and country members, to add to the interest of the *Naturalist*.

Rediscovery of the Broad-toothed Rat in Gippsland

By R. M. WARNEKE*

Two specimens of *Mastacomys fuscus* Thomas, commonly known as the Broad-toothed Rat, were trapped in August this year by members of a research team of the Fisheries and Wildlife Department. The locality was the Loch Valley Pine Plantation near Noojee. The Fisheries and Wildlife Department has been engaged in a study of the biology and ecology of the Allied Rat, *Rattus assimilis* Gould, in this area since March 1959. The need for this work has arisen because of the seasonal damage caused by this rat each year to young pines in Forests Commission plantations.

The new find was quite a surprise as 600 Allied Rats have been taken from this plantation since experimental trapping commenced in 1959, and yet this was the first indication that another rodent species occurred in the same area. The original specimen taken at Loch Valley was mistakenly identified as the Eastern Swamp Rat at first, but on examination of its skull, its true identity was established.

The Broad-toothed Rat is a sturdily built, dusky brown animal, with long fine fur, dark brown feet and a short tail. In appearance it is remarkably similar to the Eastern Swamp Rat, *Rattus lutreolus* Gray, which has been recorded from areas nearer the coast. Both these rats prefer wet habitats. For comparison the Allied Rat, though of much the same size, is much greyer and has a longer tail and greyish-white feet.

The genus *Mastacomys* was founded on a single specimen from Tasmania, by Thomas in 1882. Fossil specimens were recorded from the Wellington Caves in New South Wales three years later. The next record was of a skull, found in a sand drift on Swan Island in 1905; this is now in the National Museum, Melbourne. Three Victorian specimens were donated to the National Museum in 1918 by the late Mr. H. Quiney of Mortlake. Two of these were from Lavers Hill in the Otway Ranges. The other specimen was sent from his home at Mortlake, which is situated in the open plains 50 miles north-west of the Otways. It seems likely that the last was also collected in the Otway Ranges.

A juvenile was recorded from Gippsland prior to 1922 and is now in the British Museum. This is the only other record of a modern specimen from the eastern half of the State. Since the discovery of the Gippsland specimen, living *M. fuscus* has been reported from high swamp country in Tasmania where a series of five specimens was obtained. C. W. Brazenor of the National Museum reported on a specimen taken at Olangolah, near Beech Forest at the head of the Gellibrand River in 1934. Ellis Troughton caught a specimen in the Kosciusko area in New South Wales in 1946.

The known original range of the species in Victoria has been extended westwards by the more recent discovery of skulls in limestone caves near the Glenelg River in south-western Victoria. Skull fragments of *M. fuscus* have been found among skeletal remains from caves in the Buchan district in 1958. Some of these appear to be of recent origin and this suggests that the Broad-toothed Rat is still to be found over a wide area of Gippsland. Systematic trapping would be necessary to delimit its range in our Gippsland forests.

The recent capture of two specimens at Loch Valley follows the pattern of previous records of trapping this species. In its only known habitats in Victoria it lives amongst large numbers of Allied Rats and leaves no conspicuous signs of its presence. In fact its capture on each occasion has been incidental to the trapping of *R. assimilis*.

* Research Officer, Fisheries and Wildlife Department, Melbourne.

Footnote: On October 25, a third *Mastacomys* was trapped alive at Noojee. This particularly fine specimen was a female not fully grown. It is at present housed with a study colony of Allied Rats at the Fisheries and Wildlife Department. In captivity it is remarkably tame and can be handled without fear of being bitten. This behaviour is quite different from that of captive Allied Rats which have never become tame even after a year. It is hoped that a male will eventually be captured and so provide a breeding pair, as details of the life cycle of this interesting species are quite unknown.

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Rules for Spelling Generic Names

By J. H. WILLIS*

To the uninitiated enquirer, botanists must often seem to be afflicted with a mania for changing the scientific binomials of plants; indeed, the extent to which familiar names are constantly being swept away is bewildering and annoying in the extreme—so much so that foresters, agriculturists, nurserymen and other practical plantsmen can hardly be blamed for treating the average systematist with contempt. When we are asked to scrap the long-used botanical names of such important trees as Murray Pine, Norfolk Pine and Douglas Fir, everyone is surely entitled to a convincing explanation.

As a matter of fact, most systematic botanists are thoroughly honest fellows who would be the last to countenance nomenclatural frivolity, or to accept radical changes unless these were absolutely necessary under the strict International Rules of Botanical Nomenclature. If the Code stipulate that, in certain circumstances, a particular binomical *is* illegitimate and must be replaced, then all reputable systematists are bound to submit—irrespective of the unpopularity they may reap in so doing.

Not quite so frequent or obvious, but none the less disconcerting, are those changes that occur in the *spelling* of certain names; and botanists here are not always in agreement among themselves, despite the rules laid down for their guidance. One such rule is emphatic that "*the original spelling of a name or epithet must be retained, except in the case of a typographic error, or of a clearly unintentional orthographic error*".

Difficulty sometimes arises in deciding whether such-and-such a spelling is intentional *or* unintentional. The author of a generic name is at perfect liberty to spell it in any fashion he chooses, e.g. '*Tintinnabuliella*' (instead of *Bellia*, when honouring Mr. Bell), and no one can alter his deliberate choice; the Code, however, does caution him to "show judgment and taste" and "not to make names very long or difficult to pronounce".

The present writer was recently asked to arbitrate on an interesting discrepancy in the spelling of two well known and horticulturally popular West Australian genera. Should they be *Anigozanthos* and *Leschenaultia or Anigosanthos* and *Lechenaultia* respectively? The former renderings are undoubtedly the more familiar, being used in G. Bentham's standard *Flora Australiensis* (1873 & 1869), in C. A. Gardner's *Enumeratio* of West

* Botanist, National Herbarium of Victoria.

Australian plants (1930) and in W. E. Blackall's *How to Know Western Australian Wildflowers* (1954 & 1956). Yet, in Gardner's more recent *Wildflowers of Western Australia* (1959), we are confronted by the latter spellings '*Anigosanthos*' and '*Lechenaultia*'. Why?

The generic name of the spectacular, lop-sided kangaroo-paws is derived from two Greek words, *anisos* (unequal) and *anthos* (flower). Labillardière first published it in 1799, and one might have expected him to spell it '*Anisosanthos*' (or '*Anisosanthus*'), in the same way that many similar names are formed from a Greek adjective and noun. But he apparently disliked the sibilance of a repeated *s*, and changed the first two into other consonants for the sake of euphony. This sort of thing happened again and again with Labillardière's plant names, and one has no option but to adopt the form of spelling he deliberately used—ridiculous though it may be from a strictly etymological viewpoint. So ANIGOZANTHOS remains for this genus, and Gardner's later, incomplete attempt at correction ('*Anigosanthus*') must be rejected.

The case of *Leschenaultia* versus *Lechenaultia* is rather different. Here we have a generic name based on the name of a person, on L. T. Leschenault-de-la-Tour. Robert Brown published it as '*Lechenaultia*' in his *Prodromus* of the Australian flora in 1810, remarking in Latin (p. 581): *Dixi in honorem amici aestimati Lechenault*, i.e. "I have dedicated (it) in honour of (my) esteemed friend Lechenault." It is almost certain that Brown made a mistake in referring to the famous French voyager-naturalist as 'Lechenault'—he is called M. Leschenault in the vast majority of botanical writings during his lifetime and after his death in 1826. Thus we are permitted to correct this unintentional error of Brown's and to render the genus as LESCHENAULTIA (not '*Lechenaultia*', as originally spelt). Gardner's current resurrection of the erroneous *Lechenaultia* is curiously inconsistent, for he heads his chapter "Leschenaultia family (*Goodeniaceae*)" in *Wildflowers of Western Australia* p. 148, then proceeds to drop the *s* when referring to the genus itself.

It may be argued that, while we carefully conform to the actual spelling of a man's name here, great liberties have been taken in other instances. For example, *Goodenia* Sm. derives from the name of Rev. Samuel Goodenough, and *Leeuwenhoekia* R. Br. from that of Antony van Leeuwenhoek; so why should they not be amended to read *Goodenoughia* and *Leeuwenhoekia*? The answer is simply because Dr. J. E. Smith chose deliberately to shorten the former (as is obvious from his dedicatory remarks), while Brown decided to anglicize and simplify the latter. Cases of this kind could be multiplied *ad lib.*, but the criterion of a spelling must always be: "was the author's choice deliberate, or was it the result of an unintentional mistake?" The same principle applies to specific epithets, which must agree in gender with the substantive generic name, and sometimes fantastic slips of typography cry out for amendment.

Orthographic variants are another source of difficulty to botanical workers. The adjectives *caerulens*, *levis*, *silvaticus* and *sinensis* are sometimes spelt '*coerulèus*', '*laevis*', '*sylvaticus*' and '*chinensis*' respectively. While the former rendering of each is much more acceptable, the latter variants must not be altered if deliberately chosen by their original authors. But, as mere variations of form, no pair can be employed simultaneously within the same genus—we cannot have a *Poa laevis* and a different species *P. levis* as well. Thus it is with suffixes, such as the masculine '*-urus*' and '*-eurus*'. Either is permissible alone; but there is no room for a genus *Podocarpus* and a *Podocarpus* simultaneously.

It may be as well to point out here that, while botanical law forbids the use of the same name (or even an orthographic variant of it) for two distinct groups of plants, there is no obstacle to retention of the same generic name in both vegetable and animal kingdoms. For example, *Bassia* All. (*Chenopodiaceae*) is legitimate while the later *Bassia* Koenig (*Sapotaceae*) must be rejected, but *Alectoria* (the handsome crested grasshopper of inland Australia) and *Alectoria* (a group of boreal lichens) are both legitimate in their respective biological kingdoms.

By NORMAN WAKEFIELD

Moths and Butterflies

Two major groups of the animal kingdom—birds and insects—vie with each other for the largest share of attention in primary school nature-study. The reasons for this are different. In general, birds are attractive and conspicuous; usually insects are neither. But the kinds of insects that are known exceed twice the number of species in the remainder of the animal kingdom, and it is their abundance that forces them upon everyone's attention.

The great problem in school work with insects is the bewildering variety of them and the seemingly hopeless task of getting to know by name even a fraction of the local ones. This aspect was touched upon in an early part of this feature, when the compilation of reference collections was dealt with.* Now the discussion is to be on reference books as a source of information and, as the whole class Insecta is too cumbersome

* See *Vict. Nat.* *76*: 67-9 (July 1959).

Pupation and Emergence of Imperial White Butterfly.

Right: Larvae on their community web, ready to pupate.

Left: Several butterflies just emerged from chrysalids.

Photos: Edith Coleman

to handle here, one order—Lepidoptera or Moths and Butterflies—will be used to illustrate the principles.

The standard reference for the subject—*Australian Nature Studies* by J. A. Leach—is in effect a small encyclopedia. There is practically no nature topic or group of plants or animals that is not touched upon both in the text and in the illustrations. Chapter XVII covers the phylum Arthropoda or Joint-limbed Animals, and it comprises more than a quarter of the whole book. Seven-eighths of the chapter deals with insects, and in it are illustrated about as many moths and butterflies for instance as there are pictured in *Australian Insects* by Keith C. McKeown. Both these books are issued free by the Victorian Education Department to its State Primary Schools, and it is difficult to assess which is the more useful teachers' reference on insects. McKeown is more comprehensive and deals with the subject from the entomologist's point of view; Leach's is a concise unscientific approach aimed at providing quick identification and a few fundamental facts about most common species or groups.

Probably the most useful reference for the identification of Victorian insects and for details of their life histories was the series *Destructive Insects of Victoria* by Charles French. This was published in five volumes, from 1891 to 1911. Each species included was depicted in colour, showing in almost all cases the stages or life history, the food plant and the enemies of the species. French dealt thus with 35 species of the Lepidoptera for instance, which is slightly more of the group than were pictured in either McKeown's work or Leach's. *Destructive Insects of Victoria* is long since out of print, but most old-established schools had copies and those that are still in existence should be used as the main reference on insects for school nature-study. Copies are available occasionally in second-hand book shops and are well worth buying.

Over the past seventy years, both the scientific and the common names of insects have been revised a great deal. Most of those used by French are now out of date, and the common names given in Leach's book are

Pterolocera amplicornis (fam. Anthelidae).

Note the large antennae of this male moth. Its "woolly bear" caterpillars eat grass.

usually not coupled with the scientific ones, so a person is often in doubt as to the exact identity of the insects pictured. McKeown's work is more recent, but even since its publication there has been some revision of names. A table is therefore included with this article setting out the classification and the common names of the species of moths and butterflies illustrated in the three books which have been discussed, together with the appropriate page references. About half the species dealt with in the table are named according to the *C.S.I.R.O. Bulletin No. 275* (1955), entitled "Common Names of Insects", and the others have been checked by Mr. A. N. Burns of the National Museum of Victoria.

The greatest interest in the study of insects in schools should be the observation of the various stages in their life histories. McKeown dealt little with this aspect, Leach touched on it more, and French emphasized it. In all primary schools there should be facilities for keeping insect larvae. These may be fed on appropriate plants until they pupate, and the emergence of adult insects can be observed.

In 1945 the Victorian Education Department issued the *Circular of Information O, Nature-Study (Observational Work)*, in which there are set out for each month of the year a great number of suggestions for the effective conducting of the subject.

Saunders's Case Moth.

At the lower end is the pupal skin from which a male moth has emerged.

Photo; Edith Coleman

Cabbage White Butterfly.

Note the typical clubbed antennae and erect wings of the butterfly, and compare with the moth on the opposite page.

Photo: E. R. Rotherham

The keeping of moths and butterflies, and observations in connexion with the group, are emphasized the year round. Teachers should find constant stimulation and excellent guidance in this booklet.

Over the years there have been several contributions to the *Victorian Naturalist* dealing with life histories of insects. In November 1935, in Vol. 52, pages 127-32, David Fleay published an excellent article entitled " *Anthela nicothoe*—An Interesting Moth". This is one of the species with "woolly bear" larvae, of the family Anthelidae, and the accompanying illustrations showed eggs, larvae, cocoons and adult moths of both sexes.

In the issue for June 1938 (*Vict. Nat. 55*: 33-4) was "An Inhabitant of the Cypress Hedge", by B. Blackburn. It pictured eggs, larval stages and the adult moth of the Cypress Looper, *Chlemias zonae*, of the family Goemetridae.

There is an article called "Notes on the Wanderer Butterfly" (*Danaida archippus*) in Australia" by Edith Coleman (*Vict. Nat. 55*: 202-8—April 1939). This is a very good account of the species, with full pictorial coverage, and two of the photographs which accompanied the original article are reproduced here.

The Wanderer Butterfly is second only to the Emperor Gum Moth in popularity with school children. Its larvae appear wherever *Asclepias fruticosa* is grown — the shrub variously called Swan Plant, Cotton Weed or Wild Kapok. It is doubtful if caterpillars of the Wanderer ever eat daisy species (Compositae) as shown on page 290 of *Australian Nature Studies*.*

Edith Coleman gave us too a picture study of the Imperial White (*Delias harpalyce*), in her article named "Menace of the Mistletoe", in *Vict. Nat. 66*: 24-32 (June 1949). Two of her pictures of stages in the butterfly's life history are reproduced here. This "Mistletoe Butterfly" is often brought to school by children, for the communal pupa web is conspicuous; and the simultaneous emergence of a score or so of red and white butterflies is most spectacular.

The vegetable gardener who is constantly warring with the Cabbage White Butterfly may be interested in a note which appeared in the June 1939 issue of the *Victorian Naturalist* (Vol. 56, page 25). Older people are aware that the pest has been

* Page references to this book refer to the Third Edition, revised by E. Byrne (1952).

with us only about twenty years, though this may be news to the younger generation. The report was entitled "Cabage Butterfly in Australia", and it read:

At the meeting of the Club on May 8, Mr. C. French stated that the Cabbage Butterfly (*Pieris rapae*) had reached Victoria, probably from New Zealand, where it has long been a serious pest, introduced from Britain. This is the first record of the species for Australia. Mr. French captured a specimen at Canterbury; Miss J. Raff collected the Cabbage Butterfly in the University grounds; and Mr. C. C. Brittlebank took specimens at Elsternwick.

Because of its comparatively recent advent here, the Cabbage Butterfly was not dealt with either in French's or Leach's book. A photograph of the adult butterfly is reproduced on page 201.

REFERENCES TO ILLUSTRATIONS OF VICTORIAN MOTHS AND BUTTERFLIES

		Leach	French	McKeown
HEPIALIDAE				
Oxycanus fusco-maculatus	Brown Swift Moth	—	IV, 72	—
Oenetus lignivora	"Green Hanging Moth"	—	IV, 76	—
Oncopera intricata	Corbie	—	IV, 102	—
COSSIDAE				
Zeuzera eucalypti	Wattle Goat Moth	300	III, 107	246
Xyleutes lituratus	—	—	—	246
TINEIDAE				
Tineola bisselliella	Webbing Clothes Moth	302	—	248
Tinea granella	Mottled Grain Moth	—	III, 128	—
Erechthias mystacinella	"Curve-winged Apple Moth"		I, 56	
PLUTELLIDAE				
Plutella maculipennis	Cabbage Moth		II, 156	—
XYLORYCTIDAE				
Cryptophasa unipunctata	Fruit-tree Borer		I, 122	251
GELECHIDAE				
Gnorimoschema operculata	Potato Moth		II, 146	252
EUCOSMIDAE				
Cydia pomonella	Codling Moth	302	I, 44	253
TORTRICIDAE				
Tortrix postvittana	Light-brown Apple Moth	—	I, 66	253
PYRAUSTIDAE				
Sylepta clytusalis	Kurrajong Leaf Tier	—	—	254
PHYCITIDAE				
Plodia interpunctella	Indian Meal Moth	—	V, 84	255
Ephestia cautella	Dried Fruit Moth			255
PSYCHIDAE				
Oecetieus elongata	Saunders's Case Moth	306	II, 76	256–8
Hyalarcta hubneri	Leaf Case Moth	306	IV, 58	—
Clania ignobilis	Faggot Case Moth	306	IV, 114	258*
Thyridopterys herrichii	Ribbed Case Moth	306	—	257
LIMACODIDAE				
Doratifera vulnerans	Mottled Cup Moth	—	IV, 142	259
Doratifera ochroptila	—	—	—	260
Doratifera oxleyi	Painted Cup Moth	300	IV, 142	—
LASIOCAMPIDAE				
Pinara cana	Drinker Moth	298	IV, 118	—
ANTHELIDAE				
Chelepteryx collesi	White-stemmed Gum Moth	—	—	261
Anthela ocellata	"Common Darella Moth"	298	V, 112	—

* Erroneously as *Hyalarcta hubneri*.

Photos: Edith Coleman

Emergence of Wanderer Butterfly. Note the curled proboscis in the left picture.

		Leach	French	McKeown
LYMANTRIIDAE				
Orgyia anartoides	Painted Apple Moth	300	III, 94	262
NOCTUIDAE				
Phalaenoides glycinae	Vine Moth	287, 300	II, 100	263
Cirphis unipuncta	Army Worm	302	—	—
Periectania ewingii	Southern Army Worm	—	III, 74	
Agrotis infusa	Bogong Moth	302	III, 74	264
Dasypodia selenophora	Old Lady Moth	294	—	—
Heliothis armigera	Northern Bud-worm	—	III, 48	—
NOLIDAE				
Roeselia lugens	Gum-leaf Skeletonizer	—	V, 118	—
ARCTIIDAE				
Ardices glatignyi	Light-striped Tiger Moth	298	V, 27	—
Diacrisia canescens	Dark-spotted Tiger Moth	—	V, 27	—
NOTODONTIDAE				
Danima banksiae	Banksia Moth		III, 120	266
Ochrogaster contraria	Australian Processional Caterpillar	298	—	267
SPHINGIDAE				
Hippotion celerio	Vine Hawk Moth (or Silver-striped)	294	II, 108	268
Sphinx convolvuli	Convolvulus Hawk Moth	296	—	—
Coequosa triangularis	Geebung Hawk Moth	—	—	268
Cephonodes hylas	Humming-bird Hawk Moth	—	—	269

		Leach	French	McKeown
BOARMIIDAE				
Mnesampela privata	"Blue Gum Moth"	—	III, 54	—
BOMBYCIDAE				
Panacela lewinae	—	—	—	270
SATURNIDAE				
Antheraea eucalypti	Emperor Gum Moth	296	III, 113	—
LYCAENIDAE				
Ialmenus evagarus	Imperial Blue	292	—	—
Zizeeria labradus labradus	Grass Blue Butterfly (or Bean Butterfly)	—	IV, 62	—
SATYRIDAE				
Heteronympha merope	Common Brown	290	—	—
Oreixenica orichora	Orichora Brown	—	—	276
NYMPHALIDAE				
Pyrameis cardui kershawi	Australian Painted Lady	287	—	—
DANAIDAE				
Danaida plexippus	Wanderer Butterfly (or Monarch)	290	—	277
PIERIDAE				
Anaphaeis java teutonia	Caper White	294	III, 100	278
Pieris rapae	Cabbage White Butterfly	—	—	279
Delias harpalyce	Imperial White	292	—	—
PAPILIONIDAE				
Papilio anactus	Small Citrus Butterfly (or Dingy Swallowtail)		V, 17	281
Papilio aegeus	Orchard Swallowtail	—	—	280
Papilio macleayanus	Macleay's Swallowtail	292	—	—

By JEAN GALBRAITH

Bower Wattle — *Acacia subporosa*

One must travel a long way east from Melbourne to see Bower Wattle at home. I remember it first about 260 miles away, where the Lind National Park borders the Prince's Highway in Euchre Creek Valley. A broad-leaved variety grows in the Avon country of central Gippsland, probably the western-most occurrence of the species.

The Euchre Creek tree is a graceful form with long narrow phyllodes. The wattles troop down to the stream, their foliage drooping like a cassowary's feathers. The branches spread first, then weep as they become thinner and more divided towards the ends, so that, clothed in slender hanging phyllodes, they do literally make bowers, which one can enter by parting the foliage.

In this variety, the phyllodes are curved, linear, about a twelfth-inch wide and some four inches long. Usually there are several veins, despite the narrowness. The blade is resinous and minutely glandular-dotted, like that of Cinnamon Wattle (*A. leprosa*); and the light yellow, globular flower-heads grow several together from the leaf-bases, on stalks a quarter-inch or more long.

On many leaves only one long vein can be seen without close examination, and indeed in a few cases a leaf may have only one vein. In Cinnamon Wattle, every leaf is single-veined with faint feather-veins spreading from the centre.

Bower Wattle is a larger tree than Cinnamon Wattle, but the two are similar in many ways—drooping habit, narrow phyllodes and details of the inflorescence—and both have slender drooping pods, though those of Cinnamon Wattle are rather wider. Both have foliage varying from dark to (very often) yellowish-green, without any touch of blue.

The broad-leaved form of Bower Wattle has phyllodes nearly a quarter-inch wide and only two inches or less long, but it is otherwise similar to the slender form.

It is not merely because the word "bowers" comes into the poem that this lovely eastern wattle with its cassowary boughs reminds me of Henry Kendall's "Bell Birds". It is a tree of just such "channels of coolness" and "dim gorges" as the poet pictures, and near it Bellbirds often flock and call.

Bower Wattle from Mallacoota.

Photo: N. A. Wakefield

Native Cats on Wilson's Promontory

By R. McQUEEN

Owing to an epidemic disease during the period 1901-3, many populations of our marsupial fauna were obliterated. Possibly the hardest hit forms in Victoria were the Tiger Cat (*Dasyurops maculatus*) and the Eastern Native Cat (*Dasyurus quoll*). Of the latter only about three functioning populations are known to have survived in the State, in widely separated areas.

In 1939, David Fleay released on the Promontory progeny of *Dasyurops* which he had succeeded in breeding from a single pair caught in the Otway Ranges in 1932. At that time it was generally believed that both this species and *Dasyurus* had died out within the Wilson's Promontory National Park. From then on, very few reports of observations on either of the two "cats" in the area have come to hand.

While investigating fore-dunes on Squeaky Bay beach in August this year, definite Native Cat tracks were identified in association with the larger ones of the Tiger Cat. The two are distinguished by the characteristic absence of both pad and first toe in the print left by the former. This interesting observation induced me to try to assess to what extent each species occurs in the park.

Further searching of other beaches and associated dunes, particularly parabolic dunes further inland, revealed only four tracks positively identified as those of *Dasyurus quoll*. These were intermingled with a great number of tracks of *Dasyurops maculatus*. Several nights were spent in the vicinity of fresh tracks, in conditions that seemed favourable, without yielding results of any kind.

On August 10 this year, I was one of a University Botany School party which walked across to Sealers Cove to record and collect *Monotoca elliptica* and *Brachyloma ciliatum*, two of the more unusual members of the Epacridaceae on the Promontory.

While returning, I became separated from others of the group, while endeavouring to locate and photograph several Black Cockatoos (*Calyptorhynchus funereus*) which were screeching in the dense scrub. About twenty minutes later I returned to the track and, after walking about two hundred yards, saw a small mouse-like animal moving about ahead of me. It was about 4.30 p.m. and, as photography was out of the question, I moved quietly forward hoping to identify the creature. At this stage it was joined by a second animal, and the two played in the centre of the path, apparently quite oblivious of my presence, less than thirty feet away.

I was probably twenty-five feet from them when one uttered a high-pitched squeak and ran to cover under a fallen log. The second specimen had become greatly agitated; it rushed to the opposite side of the path and there assumed what I supposed to be an aggressive attitude to perhaps another philandering member of its species. He (I took it to be a male) sat erect and held his fore-paws in a "boxing" attitude.

Intensely interested, I moved forward to within about fifteen feet, when I kicked a stone. Immediately there was a snarl from the scrub, a sudden disturbance, and out of the vegetation came a marsupial cat, which snatched the little animal, on the run, and disappeared on the other side of the track. This happened so quickly that I thought first it would be impossible to say whether or not the animal had the spotted tail which superficially distinguishes Tiger Cat from Native Cat. However, two factors point towards the latter: the body was about fifteen inches long and the tail about twelve, and the general colour was very dark brown with whitish patches and there was a white "bib" under the chin. A third clue was provided by the track, which showed one reasonable paw mark where the "cat" had contacted a soft patch on its downward plunge. Although the print was imperfect, due to skidding, it showed no evidence of pad mark and there were only four claw impressions.

I think this is conclusive evidence that the animal was the Eastern Native Cat (*Dasyurus quoll*).

The observation was made about 14 miles on the Sealers Cove side of the Mount Ramsay saddle (known as "Windy Pass"). It was midway between two huge fallen trunks of *Eucalyptus regnans*, which would fix the spot for anyone walking there. Vegetation was extremely dense, consisting of a peculiar blend of heathland and understorey plants of the wet sclerophyll forest. It contained *Hakea sericea*, *Banksia marginata*, *Acacia melanoxylon*, *Olearia argophylla*, *Olearia axillaris*, *Atherosperma moschatum* (Sassafras), *Correa reflexa* and *Epacris impressa*. Until the fires of 1952 the area was a forest of *Eucalyptus regnans*.

The identity of the little victim of the Native Cat is not certain. It looked like *Sminthopsis crassicaudata*, the Fat-tailed Sminthopsis, but that is a species of northern and western Victoria and is not known to occur in Gippsland; it may have been the Yellow-footed Phascogale (*Antechinus flavipes*), for this latter is fairly widespread in Gippsland, especially in near-coastal heathlands.

Native Cats at Sealers Cove

By G. G. George

The Quoll or Eastern Native Cat (*Dasyurus quoll*) is apparently holding its own in the rougher parts of Wilson's Promontory. Mr. Robert Taylor and I were fortunate in seeing four or five of them at Sealers Cove in early December last year.

We were strolling along the beach in moonlight at about 11 o'clock one evening. The tide was out and our attention was attracted by noises that sounded like something between an animal's snarl and the cry of a plover coming from further along the beach. We approached cautiously and saw four low, sleek, bushy-tailed animals running about amongst the refuse left by the receding tide. We watched them in silhouette from about sixty yards away, but on our moving closer they saw us against the light sand and three ran off into the adjacent scrub. The fourth, apparently unaware of our presence, ran towards us and then stopped and sat upright on its haunches, looking along the beach in our direction. Obviously feeling uneasy it then ran off into the scrub. We waited, and one returned about fifteen minutes later but did not come very close nor did it stay very long. Another, possibly one of the four we first saw, was later sighted further along the beach.

Tracks were seen the next day all over one section of the beach and they confirmed that the animals of the previous night were Quolls and not fox cubs. The prints were small and narrow, with the claw marks close together, and the impressions left by the pads were indistinct—in contrast to the deep impressions left by a dog's pads. They had apparently been visiting the spot every evening for some time.

We returned to Sealers Cove in March this year to try to photograph the animals, but this time we saw none. One individual was still frequenting the beach, as fresh sets of tracks were seen on the sand on two successive mornings. An all-night vigil failed to produce a sighting of the animal.

One fox and numerous fox tracks were seen at the northern end of the beach and on both occasions the Quolls were found to be frequenting the middle stretch. No fox tracks were noticed on our first visit, although the cry we heard could have been that of a fox, and perhaps the activity of foxes affects the numbers of Quolls in the area.

Footnote: "Quoll" is used here as a better alternative name for *Dasyurus quoll* than the inappropriate one in common use today, i.e. "Native Cat". The specific epithet *quoll* is based on an early aboriginal name for the animal in the Sydney district. Our spotted marsupial is not a cat and is more closely related to kangaroos than to the true cats.

Mallacoota National Park

By J. ROS GARNET

Mallacoota is something of an outpost of settlement in Eastern Victoria—338 miles from Melbourne, 350 miles from Sydney, 567 miles from Portland and 683 miles from Mildura. Despite these distances its thousands of summertime visitors—campers, caravaners, sportsmen, walkers and naturalists—seem not to regret the effort of getting there. In the warmth of its summer sunshine it is an exceedingly charming place.

The traveller to Mallacoota leaves the Prince's Highway at Genoa and, for a few miles, follows a winding road above the banks of the Genoa River. His first glimpse of the Inlet is at a place called Cape Horn, where one may pause to admire the vista of a broad stretch of blue water. One sees each cloud of the sky above and the trees of the timbered slopes reflected in the lake.

The National Park comprises 11,225 acres of the country that borders the Inlet, although here and there certain areas are excluded, such as Gypsy Point and Mallacoota townships and a dozen privately-owned allotments.

The park was reserved temporarily in 1909, and since then proposals have been made to extend the area of the reserve to include a wide strip of very picturesque coastal country back as far as Sydenham Inlet and to incorporate all of the Victorian territory bounded by the eastern shores of the Inlet, the Tasman Sea and the New South Wales border. This latter proposal was recommended as long ago as 1923, revived in 1950 and, most recently, in August 1959 when the Victorian National Parks Association asked the Government to consider its recommendation to establish a link with the 28,000-acre Nadgee Faunal Reserve on the New South Wales side of the border. The proposal is now being closely studied by several interested official bodies.

In this projected extension area are two large, permanent, freshwater lakes—Barracoota and Wau Wauka. The Fisheries and Wildlife Department has evinced some interest in them as potential game reserves. To the north-east, in the vicinity of the Howe Ranges, there are pockets of merchantable timber which the Forests Commission proposes to examine. However, those whose prime interest is in the complex problems of conservation and nature protection are convinced that this area will best serve the people of Victoria by being incorporated into the Mallacoota National Park.

The charm of the park, as it now is, lies not so much in its own 11,225 acres as in the beauty of the lakes which it surrounds. On its placid waters holiday-makers may enjoy long excursions by boat. They may spend hours exploring the sandy islands and tidal creeks or watching birds on the Goodwin Sands. The Inlet, its sand-spits and tidal islands are a haven and home for countless birds.

From the sandbar which cuts the Inlet off from the Tasman Sea, the adventurous may indulge their passion for sea fishing, or they may sail across to red-granite Gabo Island to explore its charms. Gabo—a name said to be an aboriginal's version of "Cape Howe"—was, in the early days of white settlement, linked to the mainland by a neck of land over which mail and stores were transported to the famous lighthouse. Access to the island is now only by sea, except by an adventurous horseman at very low tide. The visitor wishing to make the trip from Mallacoota should consult the Casement brothers, who regard the hazardous adventure of crossing the bar as little more than an interesting exercise in navigation. As the mail and supply contractors to the lighthouse staff they do it regularly and often.

Mallacoota has plenty to offer the landsman too, and naturalists find the place entrancing. Botanists, armed with the *Census of the Plants of Victoria*, will come upon numbers of

plants which, in that book, are noted as occurring only in Eastern Victoria. Mallacoota is their Victorian home.

Gum Myrtles (*Angophora intermedia*) takes the place of the giant eucalypts of other districts, although the Bloodwood (*Eucalyptus gummifera*) is there, in places reduced to the size of mallees. Mallacoota is a place where strange mistletoes occur, some so hungry for sustenance that they parasitize other species of mistletoe. In pockets of almost tropical jungle which come down to the water's edge one may light upon many plants whose recognized home is far to the north, in New South Wales and Queensland. Most of these botanical curiosities have been discussed from time to time in this magazine.

The no less fascinating realm of entomology has received its share of attention too. The references given below may provide a rich source of information about the natural history of Mallacoota and its environs.

What is the future of Mallacoota? Unquestionably it will develop into one of Victoria's foremost tourist resorts—a trend which the people of the Shire of Orbost view with satisfaction. The thriving holiday centre one sees today bears little resemblance to the Mallacoota I first visited about 35 years ago. Tourist resorts tend to become rather banal with advancing years. To preserve their original elegance requires considerable thoughtful planning as well as some measure of control of both residents and visitors. Without such planning it would be too much to hope that this wonderful nature conservation area will remain for ever unimpaired. Settlement and tourists will move inexorably toward the shores of the Inlet and penetrate deeper into the forested areas. Those lovely old Angophoras will be replaced by homes, week-end cottages, guesthouses and motels. Fortunately, much of the shoreline is within the National Park and, if Victorians are fortunate enough to be granted the long-sought extension to its boundaries, more than 20,000 acres of superb wild-life sanctuary will come within control of the National Parks Authority and the newly-established Committee of Management. To gain this extension the Authority may have to sacrifice a portion of the western sector, but, whatever happens, the Crown will preserve the customary water-frontage reserve to ensure, for all, unimpeded access to the Inlet.

Naturalists at any rate will be interested to know that the responsibility for planning the development of the National Park territory at Mallacoota has been delegated to a group of citizens among which they will recognize several kindred spirits. The new Committee of Management includes F.N.C.V. members F. Buckland, L. B. Wallace, R. T. M. Pescott and N. A. Wakefield, as well as W. R. Mann (a prominent member and past President of the Melbourne Walking Club), L. Robinson (currently President of the Bird Observers' Club), representatives of the Orbost Shire, Lands Department, Fisheries and Wildlife Department and Forests Commission, and local residents.

Something they might well do as a first step in promoting an interest in the park is to cause a few large signs to be erected in strategic places just to let folk know that they are entering one of Victoria's great national parks.

Note: On the front cover of this issue there is a picture of a section of the Goodwin Sands, where Gulls and Terns nest.—Editor.

Lair of Funnel-web Spider (*Atrax robustus*), in log at Shady Gully, Mallacoota.

Photo: N. A. Wakefield

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Field Naturalists Club of Victoria

General Meeting—October 10, 1960

About 180 members and friends attended the October meeting at the National Herbarium. It was decided that the regular meeting night should be adhered to when it fell on a public holiday; so the meetings next March and June are to be held on the second Monday of the month.

The secretary read a letter from the Fisheries and Wildlife Department which, in reply to a query from the club, stated that the Grey Kangaroo was still completely protected in Victoria but that the protection of the Red Kangaroo had been somewhat relaxed. He stated that he had had verbal information that it was still illegal to kill the latter in Victoria but not illegal to have the meat. The secretary has written also to the Department, asking if it had any programme for the protection of the harmless species of reptiles.

Mr. J. R. Garnet warned members of a scheme to use 15,000 acres of the Wilson's Promontory National Park for soldier settlement. The meeting decided to compile a petition and send it to the Government protesting against such action, and members were urged to communicate similar protests to their local members.

Mrs. Joan Lang of Bright gave a talk on Victorian alpine scenery. This covered aspects of topography, botany, goldfields history and agriculture, and all these were illustrated with excellent colour slides. In moving a vote of thanks, Mr. W. L. Williams stressed the outstanding artistry of the pictures.

Twenty-five new members were elected, and the president welcomed them to the ranks of the club. These comprised twelve ordinary members, six country members and seven juniors; their nominations were published on page 181 of the October *Naturalist*.*

The meeting finally adjourned for the usual conversazione and perusal of exhibits.

* The secretary apologized for mistakes in the list submitted to and published in the *Naturalist*; in particular there was the incorrect rendering of the names of Mr. and Mrs. Bertrand W. Bright.

Geology Group—October 5, 1960

Fourteen members attended with Mr. McInnes in the chair.

Mr. Fisch, quoting from the *Cambridge Natural History*, supplied additional information on the *Annaspides* which was on exhibit at the show in the Melbourne Town Hall. They much resemble species found fossil in the Carboniferous. Mr. Hemmy reported a visit to the large lava tunnels in the basalt at Pomborneit, Nerrin Nerrin and Mount Hamilton. The origin of the tunnels can be explained by the cooling processes of the magma. Mr. Angior drew attention to a newspaper report of the discovery of a rich limonite iron-ore deposit in Western Australia.

The secretary gave an account of the excursion on October 1, in conjunction with country clubs, to the Organ Pipes at Sydenham. Between thirty and forty persons attended, to enjoy the outing ably led by Mr. Baker.

The subject for the evening was "Some Aspects of Fossil Man" by Mr. Dodds. The speaker arranged the lecture in two parts, the first dealing with the historical and social sides of the subject and the second with fossil man himself. The talk was illustrated with diagrams and a skull, to emphasize the most vital points.

Fauna Survey Group—September 15, 1960

The meeting was held at the home of Mrs. C. McQueen in Brighton, and thirteen persons attended. The group was pleased to hear that the M. A. Ingram Trust had made a considerable grant towards the cost of carrying out field work and of publishing articles on mammals. Some time was devoted to discussing the recent excursion to the Buchan area, and slides taken on that occasion were shown at the end of the meeting.

Mr. E. Wilkinson addressed the meeting, speaking on the mammals of the Healesville district. Geography of the Healesville-Donna Buang area, and distribution of the species were outlined. Slides shown included ones of features of the area and of noc-

turnal mammals taken by flashlight. At the conclusion of his talk, Mr. Wilkinson showed slides of a native mouse, *Leggadina hermannsburgensis*, which was sent to the recent F.N.C.V. nature show from Central Australia, and he exhibited a collection of mammal bones from a basalt cave in the Stony Rises near Colac.

In view of the forthcoming University examinations, it was decided not to hold a group meeting in November.

MICROSCOPISTS' CORNER

By C. S. and G. J. MIDDLETON*

Dark Field Illumination

Discussion with biochemists, medical students, and amateur microscopists generally, has shown how little attention is now paid to dark ground illumination. In fact one medical student was advised that a dark field condenser was an unnecessary and expensive luxury. This powerful research tool seems to have gone out of fashion in recent years.

For the pond life enthusiast, all that is required is an Abbé condenser, normally fitted to nearly all microscopes, and a suitable patch stop in the stop carrier. The most suitable size of stop can be found by experiment. They can be made of cardboard, and blacked, or sets may be purchased from dealers in microscopical apparatus.

To obtain best effects, one should use the lowest power objectives which will resolve the detail to be investigated and the highest power eyepiece that the objective will stand without breaking down.

With a 16 mm. apochromatic objective of .3NA and a 27X eyepiece, which is the highest power eyepiece we have been able to purchase, we have seen a surprising amount of fine detail in pond life specimens. Quite small motile bacteria, spirilla, etc., totally invisible with bright field, were clearly observed in their thousands with this arrangement.

To obtain success with dark field, you must have a bright light source, preferably Köhler illumination, and correct tube length, as especially with high power eye-pieces, poor definition is painfully apparent with incorrect tube length.

If your microscope, in common with many modern stands, has no draw tube, your results may be less spectacular but still useful. Should you want the superlative definition obtainable when everything is correct, you would do well to purchase a "Jackson Tube Length Corrector", manufactured by W. Watson & Sons, London.

The Abbé condenser, especially in the 3 lens form, is quite adequate for giving dark ground illumination, even when used dry, with lenses up to .65NA which means most modern 4 mm. students' objectives.

The 3 lens Abbé, when used as an immersion condenser, will give a successful dark field with high power oil immersion objectives fitted with a funnel stop.

For our pond life work, we use an 8 mm. apochromatic .65 objective with dark field, obtained with a patch stop at the back of a dry achromatic condenser, and find that for most pond life studies, the tube length of the microscope cannot be shortened sufficiently. We therefore fit a negative lens of —6 dioptres at the back of the objective. This allows us to use the draw tube for final correction. The organisms are living, so, of necessity, are in a comparatively thick layer of water, even though the cover glass is a number 1.

Tube length is easily corrected by observing a small spot on the slide and, by means of the fine adjustment, focus through it first below focus, then above focus. The two out of focus images should have the same appearance. Increase or decrease the tube length until this is so, and it will generally be found that the draw tube must be pushed right home, especially for objectives over .3NA.

Note: Queries on microscopy are invited. For personal replies, please enclose stamped, addressed envelope.

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The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

CONTENTS

Front Cover:

This is a male specimen of the Striped Possum, *Dactylopsila picata*, of tropical north-eastern Queensland. The photograph was taken by David Fleay at the Healesville Sanctuary about twenty years ago. The beautiful little animal had been sent from Cairns in June 1941, and its story appeared in the *Victorian Naturalist* in February 1942 (Vol. 58, pages 151-155).

Buchan Caves National Park

By J. Ros Garnet

The story of Buchan Caves began in the Palaeozoic era, when the warm seas of the Middle Devonian caused enormous deposits of calcareous remains of animals. These comprised corals, gastropods, brachiopods and many more of those curious forms we recognize as fossils.

The intervening millions of years have seen changes in landscape and in the rocks, with results that leave us somewhat awed as we emerge from an exploration of one or other of the Buchan Caves. Transformations elsewhere may be equally complex but perhaps fail to capture the imagination to the same extent as the glittering spectacle of stalactites, stalagmites, pillars formed by the union of the two, and the twisted string-like helictites.

People appreciate the beauty in the variety and colour of the sculptured limestone, and naturalists have an added interest in the caves, for they contain relics of animals long since vanished from the world's seas. As well, they sometimes yield fossils from more recent times, even the remains of present-day species.

The Buchan deposits, which overlie a series of hard volcanic rocks of Lower Devonian age, occupy an area roughly 22 miles long and up to 5 miles wide, from Buchan to the Murrindal district. Howitt considered them to be up to 500 feet thick. In such an extensive field, it is not surprising to find that cave formation is very well developed. Although only two caves—Royal and Fairy—are now open for organized inspection, many more have been explored by local people and naturalists. The existence of some was doubtless known to the aborigines, and the early pioneers knew something of them too, but they were not widely publicized until after a visit in 1888 by the Government Geologist, James Stirling, and his naturalist companion, J. H. Harvey. With the aid of magnesium flares, the latter secured what must be the first photographs of the Buchan Cave formations, as seen in Spring Creek, Wilson's and Dickson's Caves. Writing some twenty years later, W. Thorn remarked that all the stalactites and stalagmites in Spring Creek Cave had been removed by visitors.

Mr. Frank Moon, the original caretaker of those caves, was an ardent cave hunter, and to him is given the credit for the discovery of Spring Creek, Moon, Kitson (1906) and Fairy Caves (1907). Others have been located while excavating passageways through caverns already known. Mr. Moon, who is now eighty, lives in retirement at Buchan.

The cave country generally is notable for "sink-holes" and "swallow-holes". There are at least seven in the hillsides west of the Buchan River close to the township. It is through such places that access to many of the Buchan Caves was gained. To the east of the township is Wilson's Cave, while Lilly Pilly and Murrindal Caves are near the Murrindal River to the north of Buchan. At the Pyramids, the Murrindal has carved a picturesque little gorge into the reddish volcanic rock, and nearby it flows underground, beneath the limestone, for nearly a mile.

The flow of an underground stream through the limestone is a major factor in the formation of those remarkable vaults and caverns. Their peculiar ornamentation comes later, as a result of chemical action and the percolation of surface water.

The marine fossils associated with the Buchan limestones have long been familiar to geologists, palaeontologists and Victorian stone-masons. Thousands of citizens see them as they pass up and down the "marble" stairway in the Melbourne Public Library. This

Photo by Courtesy Tourist Development Authority

Formations in Buchan Cave

beautiful marble is packed with fossil corals, crinoids, "pagoda stones" (allied to our *Nautilus*) and brachiopods. Sir Frederick McCoy first recognized the contemporaneity of Buchan limestones with those of Ilfracombe in Devonshire. The extinct lampshell, *Spirifer*, was the clue, as it occurs in all limestones of the Devonian period. Thus the Buchan Caves were shown to be older than the Tertiary formation at Naracoorte in South Australia and on the Glenelg River near Nelson in Victoria. And they are more recent than the Jenolan Caves which are formed in Silurian limestones.

The natural vegetation of the Buchan countryside is typical of limestone areas, the major component being Yellow Box and rather poor stringybarks. In the Park Reserve of more than 870 acres, the original timber has been gradually replaced until the environs bear little resemblance to the original. However, the area is quite picturesque, laid out somewhat formally as a model camping ground for tourists, with most of the conveniences and amenities which campers and caravanners now expect. Even a swimming pool is provided. All this has evolved since 1916, when the Victorian Government proclaimed the first 750 acres of reserve, under the control of the Lands Department. Prior to 1919, the caves were inspected by torch-light and lantern, and the special treasures were dramatically revealed by cunningly contrived magnesium flares operated by the guide.

Although Buchan Caves Reserve is, to all intents and purposes, a National Park, it is not scheduled as such in the 1956-1960 Act. It continues under Departmental control, administered through an Advisory Committee of government officials. The reserve is not designed for the protection and preservation of native flora and fauna but "for public purposes and the protection of natural features". The latter are mostly underground of course. Although no special effort is directed towards the preservation of native wildlife, enough remains to assure the visitor that he is still in Gippsland.

Photo by Courtesy Tourist Development Authority

Camping Area in Buchan Caves Reserve

For instance, the Currajongs of Buchan are something to be proud of.

The township derives its name from an aboriginal word "bukkan", meaning dilly bag, not from the Buchan of Scotland. It is 220 miles easterly from Melbourne, via the Princes Highway to Bairnsdale and thence through Bruthen. In former days this road was a delight to the botanist. In the hills near Buchan were groves of Crimson Bottlebrush (*Callistemon citrinus*), stands of the graceful Incence Plant (*Humea elegans*) and a wealth of other gems of the Gippsland bush. Alas, much of that beauty has vanished with encroaching settlement.

The traveller approaching from the east should turn from the Highway at Orbost, to travel over a more scenic route. For much of its 35 miles, this road follows the general course of the Snowy River, though it is out of sight of that stream after leaving the peaceful river flats. The vistas of distant horizons, of mountains and valleys, of vast forests and cleared places, are something the visitor to the Cave Country will long remember with pleasure. From Buchan, one may travel further afield, to localities with such fascinating names as Gelantipy, Wulgulmerang, Suggan Buggan, Deddick and Cabanandra. Such places will enrich his memories.

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Australian Wattles — No. 19

By JEAN GALBRAITH

Acacia brownii and *A. ulicifolia*

Acacia brownii and *A. ulicifolia* are sister wattles, both with globular flower-heads and short prickly phyllodes. For a long time they went under one name—Juniper Wattle (*A. juniperina*), though they are really quite different. The position has now been resolved, so that we now have *A. ulicifolia*, which has very pale yellow flowers and usually grows near streams, and golden-headed *A. brownii* of open lowlands in sandy or gravelly soils.

A. brownii is like a child, small and happy and as golden as sunshine. It is a sprawling bush, usually under two feet high, but spreading widely; its flat, stiff, extremely narrow phyllodes sharp-pointed, and nearly always shorter than the long flower-stalks which end in balls of deep rich yellow. The phyllodes are scattered, and there is only one flower-stalk from the base of each, so that the sprawling little wattle looks light and open as well as gay. It flowers in mid-spring, adding a note of rich gold to the lighter yellows of other small wattles and the duller yellows of bush-peas.

A. ulicifolia is erect and more sober, with creamy or primrose blooms on stalks noticeably shorter than its rather crowded, narrow, prickly phyllodes. It blooms from autumn to early spring, and its pale yellow is like that of the winter-flowering Sweet Wattle, though it is unlike it in every other way. I have never seen it far away from stream-banks, though it may grow elsewhere.

When other wattles are gay in spring, the lacy bushes of *A. ulicifolia* stand erect and quietly green, up to six feet high and hung with small wavy pods which are flattened, narrow and curved. The wavy outline is caused by narrowing of the pod between the seeds. Like *A. brownii* it has only one flower from the base of each phyllode.

Common names have not yet been fixed for these two newly-distinguished wattles. Perhaps we should retain Juniper Wattle for *A. ulicifolia*, and *A. brownii* could be called Heath Wattle.

Acacia brownii, from Haunted Hills, Gippsland.

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.

Whipbirds at Play

The Eastern Whipbird (*Psophodes olivaceus*) is well known to Victorians, for they may hear its loud ringing note almost anywhere in the forests of the eastern half of the state. It is equally available for observation in the tropical rain-forests, as the species extends to far-northern Queensland. Here is a description of the display of a pair of these birds, put together from notes by Mr. J. A. Bravery. The observations were made along a bush track, amongst eucalypt forest and lantana scrub, about five miles south of Atherton in north-eastern Queensland. It was late morning on April 24 this year:

The birds were very excited and took no notice of the observer but, with crests erected, chased each other in and out the lantana. Then they would fly slowly over the track in a whirling manner something like the flight of Tawny Grassbirds. Again there would be much chasing and hopping about, with constant chuckling calls and plenty of head-bobbing and swinging of tail and body from side to side. After some minutes of movement, one bird—probably a male—would perch on the lantana, swell his throat gradually, then burst out with his explosive note. There were both the usual stock-whip call and another more like a Rufous Whistler's though stronger.

Then again the pair would fly whirling across the track. Sometimes one would land on the ground, but not for long. The display followed the same pattern for half an hour; there were at least eight bursts of song, each following some minutes of chasing. Finally the activities ceased abruptly, and the birds moved away through the lantana.

"As I was able to see the bird swell the throat," Mr. Bravery adds, "I knew when he would explode the song. It was remarkable how the voice was thrown at least a chain away and, I noticed, always to the south-east."

Ants and Shells

This is a puzzle and we do not know the answer to it. On March 16, 1960, a letter came from John Bolton, a pupil of the Mannerim school near Geelong, in which he wrote:

In our school-ground there are two large ant-heaps, each about three or four yards from a sand-heap that has lots of tiny shells in it. Soon after the sand was put there we noticed that the ants had decorated the ant-heaps by carrying a great many of these shells and putting them over the ant beds. They looked really pretty and if any of these shells are knocked down their holes they carry them up again. They have also laid shells along their little tracks away from their homes.

This matter was discussed with Mr. A. N. Burns, Keeper of Insects at our National Museum. He suggested that the species concerned was *Iridomyrmex detectus*, the Meat Ant, but could make no suggestion to explain John's observation. Ants are apparently not known to have any decorating tendencies.

In writing to John it was suggested that the ants may have actually brought the shells up out of the ground in the first place and that these did not originate from the sand heap. However, the matter was not allowed to rest there, and letters came from both John and Mr. E. Bolton, the head teacher.

John wrote that he "watched one ant pick up a shell from the sand pit and put it on a hill". His teacher confirmed John's original comments and added:

The ground is a very hard gravelly soil and there are definitely no shells in it, but after loads of sand containing tiny shells had been placed a few yards away from two of the nests, on different sides of the school, we noticed that the ant-hills were covered with tiny shells. And later we noticed that the ant-tracks from one bed to another were also strewn with the tiny shells; the effect is quite striking, especially on a sunny day.

In the face of this evidence, *we* must ask some questions now. Has John observed a common phenomenon which has not been noticed before? And has this activity of the meat ants at Mannerim any real significance. Perhaps this species habitually decorates its mounds and tracks with small items less noticeable than shells. If so, what is the significance of the activity?

Years ago another boy reported seeing birds catching ants and putting them amongst their feathers. At first his observation was discounted as something accidental or trivial. But eventually it was realized that something quite important had been noted, and now "anting" is a word in the ornithologist's vocabulary.

Has any reader noticed similar activity by ants, or are there any suggestions as to why those at Mannerim have decorated their home with shells?

Black-shouldered Kites near Geelong

Following Robert Turner's notes on the nesting of these birds at Lara, and A. H. Chisholm's further comments on the subject, we now have a report from Mr. Trevor Pescott of Geelong who sets out data of the status of the Kite in the environs of that city:

Although plentiful in the district now they were not always so, for when Charles Belcher wrote his book, *Birds of Geelong*, he stated that he had seen only two specimens for this

area. The first one was blown against the wall of Christ Church, Geelong, in the early 1890s, and the second was about 7 miles north of Geelong in October 1911. Both birds were weak and appeared to have suffered in the heavy north winds that had prevailed. Belcher's book covered a period of 15 years up to 1914.

In the succeeding 35 years, the Kites became more frequent and several pairs had established themselves by 1950. There was an influx of these birds in 1951, and since then they have become quite common.

Nesting records, however, are rarer; I have seen flying young birds at Little River, Torquay and several other areas, and there was a nest near Leopold a number of years ago.

I have observed only two nests of the Kite in the Geelong district. On November 2, 1957, Mr. T. I. Fletcher of Newtown found a nest at about 25 feet in the top of a Red Gum near the Barwon River. Although it resembled a Magpies', the nest was very well hidden and almost impossible to see from below. The bird brooded for four weeks, then it unaccountably deserted when the eggs were almost ready to hatch. The four eggs were light brown, marked all over heavily with chocolate brown, and averaged 42 by 33 mm.

There was another nest two years later at Corio; on 1/9/59, I saw a bird breaking dry sticks from a peppercorn tree and carrying them 40 feet up into another tree. These birds succeeded in rearing three young ones, which flew from the nest in November.

The immature Kite is a pretty bird, being white with light grey wings and black shoulders but marked all over with streaks of reddish brown.

Sea Anemones at Altona

At the recent F.N.C.V. nature show Mrs. M. E. Freame, of Seaholme, included in her marine biology exhibits two rather unusual sea anemones (*Peachia* sp.), collected at Altona.

Unattached, this species lives buried with its body upright in the sand, the tentacular disc being above ground. The body is pear-shaped, transparent, with longitudinal lines running from one end to the other at equal distances. The upper disc is oval, surrounded with twelve short tentacula. When put into salt water, it swells out with water like a Holothurian (sea-cucumber), disclosing longitudinal septa. It differs from all other Actinias in having a posterior opening, taking it on to the Holothuroidea.

Nest and Eggs of Black-shouldered Kite near Barwon River.

Photo: Trevor Pescott

Recent Mammal Bones in the Buchan District—2

By Norman Wakefield

Two months ago, the first part of this report was published (10), giving details of the discovery and investigation of animal bones in four sites in the Buchan district of East Gippsland. It was shown that the Eastern Native Cat (*Dasyurus quoll*) had accumulated two of the deposits, designated as M 27 and M 28, and that owls were responsible for one other, called the Pyramids Cave; these three being in the vicinity of the Murrindal River. The fourth site was in the Mabel Cave at East Buchan, and owls had accumulated it too.

A table was presented showing the distribution in the sites of remains of over 2000 individual animals representing 18 species of marsupials, and the past and present status of each of the species was discussed. Since that set of data was compiled, more material from the Pyramids Cave has been sorted, and it is necessary now to present some information supplementary to the previous treatment of the marsupials. The identity of the owl species will then be discussed. Details of the rodent remains in the four sites will be recorded and discussed. Finally some inferences will be drawn concerning changes in mammal population during the period of accumulation of the deposits.

Additional Marsupial Data

On October 1, 1960, Mr. J. A. Mahoney and I went to the Pyramids Cave and collected a large quantity of additional bone material. This has been sorted and counts made of the animals represented in it, and the figures have been combined with those obtained before from the collections made in company with Messrs. J. K. Dempster and R. M. Warneke of the Victorian Fisheries and Wildlife Department. In the latest material, one more species of marsupial was identified, bringing the total number of these to nineteen. This is a species of *Eudromicia*, and is tentatively identified as *E. lepida*, the Tasmanian Pigmy Possum.

More than half the skeletal material from the Pyramids cave is of a reddish colour, and it is apparent that this red lot is older than any in either M 27, M 28 or the Mabel Cave. The figures published for the Pyramids Cave in the table with the first part of this report (p. 170) apply to some of the older material and to some which is more recent. For comparisons between the activities of the predators, it is more appropriate to use figures given by the more recent (whitish) material only.

The up-to-date figures for the

marsupials in the Pyramids Cave are as follows, with counts for the whitish material shown first and those for the reddish in paranthesis:

Antechinus flavipes (Yellow-footed Phascogale)	280	(432)
Antechinus swainsoni (Dusky Phascogale)	35	(59)
Phascogale tapoatafa (Tuan)	2	(4)
Dasyurus quoll (Eastern Native Cat)	0	(1)
Isoodon obesulus (Short-nosed Bandicoot)	0	(1)
Perameles nasuta (Long-nosed Bandicoot)	12	(20)
Acrobates pygmaeus (Feathertail Glider)	53	(186)
Cercartus nanus (Pigmy Possum)	78	(302)
Eudromicia ?lepida (?Tasmanian Pigmy Possum)	0	(27)
Burramys parvus	0	(37)
Gymnobelideus leadbeateri (Leadbeater's Possum)	1	(56)
Petaurus breviceps (Sugar Glider)	13	(52)
Petaurus norfolcensis (Squirrel Glider)	3	(1)
Schoinobates volans (Dusky Glider)	1	(3)
Pseudocheirus laniginosus (Common Ringtail)	11	(20)
Potorous tridactylis (Potoroo)	7	(7)

This gives a total count for the marsupials of 513, as compared with the 568 previously published (p. 170). In almost all cases, the proportions of the species are about the same, so the inferences which were drawn in the discussion which followed are still appropriate. However, in three cases some adjustment is necessary.

(a) The owls did not obtain a greater proportion of Yellow-footed Phascogales at East Buchan than at the Murrindal River.

(b) The Sugar Glider was apparently a little more plentiful about East Buchan than near the Murrindal River, which is to be expected from the more open nature of the forest in the former locality.

(c) The more recent remains of Pigmy Glider in the Pyramids Cave are less than the previously published figure indicated; but the inferences drawn in connexion with the species still apply.

It is likely that there was a time interval between the respective accumulations of the red and the white bone material in the Pyramids Cave. The whitish bones from all four sites give a picture of the population of small mammals which was in the Buchan district a hundred and more years ago, before white settlement and introduced fauna caused such drastic changes. The red material in the Pyramids Cave represents a community of animals that was there still earlier—probably thousands of years ago.

Over two-thirds of the marsupial bones in the Pyramids Cave are reddish, and comparisons have been made between the proportions of the various species in the red and in the white lots, with these results:

1. The status of many species has been remarkably constant throughout the two periods of accumulation. This applies to all three Phascogales (*Antechinus flavipes*, *A. swainsoni* and *Phascogale tapoatafa*), Long-nosed Bandicoot (*Perameles nasuta*) and Ringtail (*Pseudocheirus*

Location of Mabel Cave at East Buchan
The Owl Chamber is a few feet above the exact centre of the picture.

laniginosus). Other large possums (*Schoinobates volans* and *Petaurus norfolcensis*) as well as a Rat-kangaroo (*Potorous tridactylis*) may be included in this category, though figures for them are too small to be really significant.

2. The Short-nosed Bandicoot (*Isoodon obesulus*) was apparently very rare in the area during the accumulation of the red material, for evidence of only one individual has been found in the older lot.

3. There has been a marked decline in the status of the smaller possums, both in the number of species and the numerical strength of each. Since the accumulation of the red material, one species became extinct, another disappeared completely from the Australian mainland,* another reached the verge of extinction, and two or three others became significantly less abundant. This is probably the most valuable evidence which has come to light from the study of the Buchan bone deposits. This aspect is to be studied further; in the meantime the following notes are presented on the remains of the small possums in the Pyramids Cave.

Burramys parvus

So far, the material has yielded 89 specimens, representing at least 37 individuals of this extinct possum. All of it is reddish in colour. There are about twenty maxillary pieces, some of which

*Assuming that the *Eudromicia* is *E. lepida*.

show details of teeth and palate that were not apparent in the original collection dealt with by Broom (2) and Ride (8).

Leadbeater's Possum

(Gymnobelideus leadbeateri)

There are specimens of at least 56 individuals in the old material and of one in the more recent. This confirms the picture of a species originally plentiful but almost extinct at the time of European occupation of Australia.

?Tasmanian Pigmy Possum

(Eudromicia ?lepida)

Amongst the reddish bones there are mandibles and skull fragments of 27 individuals of *Eudromicia*. Dr. W. D. L. Ride has informed me that he has found Tasmanian Pigmy Possum (*E. lepida*) in mainland deposits. Though not specifically identified yet, the small size of the Buchan material indicates that it belongs to that species.

There is a greater proportion in the reddish material than in the whitish of both Pigmy Glider (*Acrobates pygmaeus*) and Pigmy Possum (*Cercaertus nanus*), and the figures indicate a decline in each species, between the two periods, to about 60 per cent of its original abundance. Each of these two has been seen by reliable local observers, between twenty and fifty miles north of Buchan, within the past several years, but there is no evidence of how plentiful they are. Being small, nocturnal and arboreal, they would usually escape notice, so it is quite likely that one or both are abundant.

The Sugar Glider (*Petaurus breviceps*) is a little more strongly represented in the older material than in the more recent, and there has probably been a slight decline in its status; but in this case the proportions do not differ enough to justify drawing a definite inference.

The Identity of the Owls

The system of huge subterranean chambers which comprise the Mabel Cave is reached through a low passageway which goes in from an open recess about thirty feet up in the cliff face. Ten feet or so inside this entrance chamber and six feet from the floor there is a rock ledge which was obviously the roosting place of the owls responsible for the bone deposits there. These points are illustrated in the accompanying pictures.

At the Pyramids Cave on October 1, Mahoney and I found that there was a very similar cave-like recess, complete with roosting ledge, in the cliff face about fifteen feet above the tunnel where the original skeletal remains were noticed. The upper chamber is only two to three feet wide, and it is about six feet from front to back. In a rear corner there is a hole in the floor leading to the upper tunnel and thence to the chimney and lower tunnel which were described in the first part of this report (pages 165-6). It could be seen that the accumulation of both reddish and whitish bones had originated on the floor of the upper chamber beneath the roosting ledge. Skeletal material and other debris had been moved by gravity, assisted by the passage of animals such as Ringtail

Possums, throughout the small cave system.

At first it was thought that the Powerful Owl (*Ninox strenua*) must have been the predator of the Mabel and the Pyramids Caves. Hindwood and McGill (7), in discussing this species in the Sydney area, wrote:

> Examination of castings in a roosting cave, high up on a hillside in the Royal National Park, from which the bird was flushed in June 1933 revealed the bones of rats (*Rattus* spp.) and Ringtailed Possums.

That bird must have been exceptional for, as David Fleay has pointed out in an article on the species (5), the Powerful Owl does not normally seek such shelters nor does it usually hunt terrestrial animals. Two of Fleay's relevant comments are these:

> Habitually the owls "camp" on regular perches in a well-defined round of roosting trees. . . .
>
> The Powerful Owl subsists almost wholly on arboreal native mammals, rarely bothering, except in the nesting season, about bandicoots, rabbits or birds.

In a letter dated October 25, 1960, John Calaby (Wildlife Survey Section, C.S.I.R.O., Canberra) wrote these comments:

> In my opinion the only candidates are the Barn Owl (*Tyto alba*) and the Masked Owl (*T. novae-hollandiae*). They are the only owls which live in the type of caves or rock shelters which you describe. I am certain that the latter species could deal with *Conilurus*. The Tasmanian race, *T. n. castanops*, can certainly kill adult rabbits. Admittedly *castanops* is considerably bigger than the mainland races of the Masked Owl, but the southern Masked Owls are the largest mainland ones.

David Fleay has stated further (letter, November 2, 1960) that "for the Masked Owl of Gippsland much would apply that also holds good for the Tasmanian Masked Owl". About twelve years ago (6) Fleay had published this information:

> The size of pellets of bone and fur disgorged by female Tasmanian Mask-

Owl Roost in Entrance Chamber of Mable Cave. Numerous bones can be seen in the dust on the floor. The whitish rock in the right foreground may be identified in the picture on page 229.

ed Owls is nothing short of phenomenal for they may actually be larger than those cast by *Ninox strenua* and compare favourably with those of *Bubo bubo* the Giant Eagle Owl of Europe. The answer to the fact that these Tasmanian birds may produce cylindrical pellets three and a half inches long by one and three quarter inches in diameter lies of course not merely in the voracious appetite of the species but in the exceptionally wide gape of which owls of this long-beaked family are capable.

A description of ground hunting by Masked Owls in the Casterton area (Victoria) was published by A. E. D'Ombrain in 1905 (4), and in 1949 David Fleay (6) expressed the opinion that the Tasmanian race of the species was "capable of dealing with bandicoots, ringtailed possums, rat kangaroos, the present-day rabbit, and doubtless, if necessary, with the native cat".

Further evidence has been provided by Mr. A. R. McEvey, Ornithologist at the National Museum of Victoria, who has notes on the felty external texture of pellets of the Powerful Owl from Airey's Inlet. On the contrary, David Fleay wrote (letter, November 2, 1960) of the genus *Tyto*, that "pellets tend to have a type of dried mucous covering". Pellets in both the Buchan owl sites were found to have a firm skin-like outer surface, indicating that they belonged not to *Ninox* but to *Tyto*.

(See picture on page opposite.)

The Winking Owl (*Ninox connivens*) has been considered. Like the Powerful Owl, it habitually roosts in trees; and, according to Fleay (in letter), it kills animals as large as Squirrel Glider and immature Brush-tail Possum, but its pellet evidence, he says, is "poor and quite insignificant".

It is most unlikely that the smaller Barn Owl would be capable of handling the Bandicoots, Ringtails and Rat-kangaroos that were taken to both the "owl caves" under discussion. A final possibility is the Sooty Owl (*Tyto tenebricosa*). A. J. Campbell has reported shooting the latter "on the forested slopes of Lake King" (3), which is about thirty miles from Buchan, but there appears to be no available information about the habitat or food of this species.

There are no records of large owls of either group from the Buchan district, though the Powerful Owl should occur throughout the heavy forests of East Gippsland. However, on June 3, 1956, I found a Masked Owl which had been killed by a car on the Prince's Highway at Newmerella, twenty miles south-east of Buchan; and there is a specimen in the National Museum of Victoria, collected at Bumberrah —20 miles south-west of Buchan —in 1920.

Available evidence leaves little doubt that the predator was of the genus *Tyto*, and it suggests strongly that the species was the Masked Owl (*T. novae-hollandiae*). Moreover, the very close similarity in the proportions of most marsupial remains in each case, indicates that the same owl species was responsible for the bones in the Mabel Cave as well as both the new and the old lots in the Pyramids Cave.

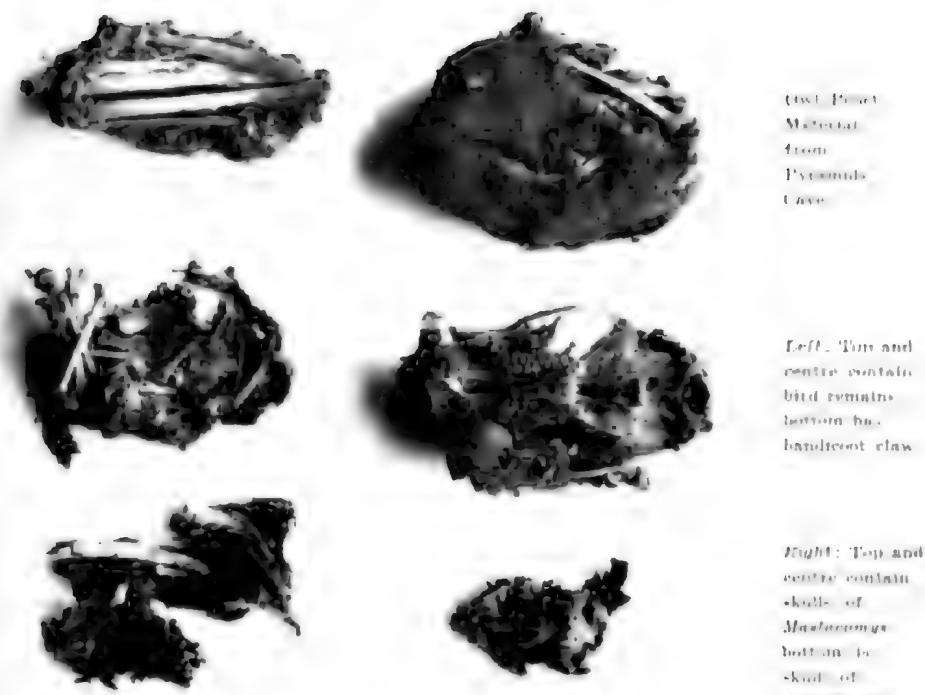
There is one matter which remains obscure. The contents of the best-preserved owl pellets indicate that the last activity of these birds in both sites was

when there was an abundance of several rodent species which are now presumably extinct or very rare. The last section of this report shows the great change that occurred in the rodent population, apparently during last century. This disappearance was somehow coupled with the coming of white settlement to Australia. Did the loss of its main food supply reduce the owl population to a fraction of what it was formerly, or did those predators turn their attention to other prey and change their living habits as a result?

STATISTICAL DATA: RODENTS

As with the marsupials, the numbers of rodents represented in the four bone deposits have been assessed by counting the mandibles. As large numbers were involved in most cases, the general procedure has been to take half the total number of left and right mandibles combined. The table shows the numbers arrived at for the seven species of rodents in each of the four sites. For the Pyramids Cave, the first figures apply to the more recent whitish material, and those in parenthesis are for the older reddish material.

The figures on page 235 of this issue and those on page 170 of the October *Naturalist* show that, during the period of accumulation of the whitish bones which have been counted to date,



(Owl Pellet Material from Pyramids Cave.

Left: Top and centre contain bird remains, bottom has bandicoot claw.

Right: Top and centre contain skulls of *Mastacomys*, bottom is skull of *Uromys*.

the Native Cats and the owls brought in about equal numbers of marsupials. The figures on page 235 show that the corresponding totals of rodents caught were 415 by the Native Cats and 1570 by the owls.

Inferences drawn from these figures depend on the assumption that the remains found do in fact give a fair indication of the numbers of the species caught by each of the two predators. It is significant that the range in size of the rodent species is quite comparable with that of the marsupials, and both large and small animals are well represented in each type of deposit. Nevertheless, it is possible that small species are better preserved in the owl deposits than in those of the Native Cats, either because of physical differences between the sites or due to different eating habits of the two kinds of predator.

At face value, figures indicate that rodents comprised about 30 per cent of the Native Cats' prey, and about 60 per cent of the mammals killed by owls. This applies to the more recent period represented by the accumulation of the whitish bones and it is based on the records in all four sites.

Only 43 per cent of the reddish mammal material in the Pyramids Cave is the remains of rodents. So in the earlier period the owls caught less rodents than marsupials, and the situation was reversed in the later period.

The reason for the reversal of the marsupial: rodent ratio in the prey of the owls seems to lie in the decline in numbers of the several small possum species. Those possums comprised about 29 per cent of the mammals of the earlier period but only about 11 per cent of the later ones. The difference between these percentages is virtually the same as between the 43 per cent and 60 per cent for the rodents in the respective accumulations.

In view of these changes it is interesting to note that, at about 25 per cent, the proportion of *Antechinus* is the same in the remains for each period. The inference is that, when the small possums became less, the owls compensated for the loss by a corresponding increase in their predation on rodents.

The proportions of the species of marsupials was very similar in each of the Native Cat dens, but no such conformity is found in the rodents left in those two sites. As these places are only a few chains apart and were probably used by the same colony of "cats", it appears that the composition of the rodent populations varied even over short distances. In M 28, the proportions of both *Mastacomys* and *Conilurus* are greater while for *Rattus* and *Gyomys fumeus* they are less than in M 27.

The proportions of various species vary too between the two owl sites. This is to be expected, as Mabel Cave and the Pyramids Cave are about four miles apart, in areas differing somewhat in vegetation. *Rattus* and *Gyomys fumeus* obviously favoured the Pyramids area, while *Gyomys novae-hollandiae* and *Pseudomys* favoured East Buchan. Again this was due to the more open nature of the latter area.

When the figures for M 27 and M 28 are combined and compared

TABLE SHOWING NUMBERS OF INDIVIDUAL ANIMALS ACCOUNTED FOR TO DATE IN COLLECTIONS FROM THE FOUR SITES

Predators	Native Cats		Owls	
Sites	M 27	M 28	Mebal	Pyramids
Gyomys novae-hollandiae (New Holland Mouse)	6	1	96	67 (7)
Gyomys fumeus (Smoky Mouse)	28	10	51	107 (301)
Pseudomys australis oralis (Eastern Pseudo-Rat, coastal subspecies)	74	53	408	253 (69)
Rattus species (Allied and Swamp Rats)	73	26	117	189 (505)
Mastacomys fuscus (Broad-toothed Rat)	53	60	119	116 (35)
Conilurus albipes (White-footed Rabbit-Rat)	10	31	26	21 (2)
TOTALS	244	171	817	753 (919)

with those for the whitish material in the Pyramids Cave, an idea is obtained of the susceptibility of the different species in the Murrindal River area to owls as compared with Native Cats. The New Holland Mouse was caught far more by owls than "cats", but both Rabbit-Rat and Broad-toothed Rat comprised much larger fractions of the rodents killed by "cats" than those taken by owls. Again this is in fitting with the habitats of the rodents concerned.

The most remarkable point which emerges from an examination of the statistics for the rodents, is the marked change which seems to have taken place in the status of all the species between the periods represented by the reddish and the whitish bone accumulations in the Pyramids Cave. It is almost as great a change as has occurred in the group since European settlement of the country. In the early period the Smoky Mouse comprised one-third and *Rattus* over half the rodents caught by the owls. The other five species were represented, but together they made up only an eighth of the total individuals.

In the more recent period, the five previously rare species were each present in several times their original percentages, with the Pseudo-Rat providing half the total. And the others—abundant before—had each been reduced to less than a quarter their previous status.

There is a possibility that, following the great decline in numbers of small possums, the owls learned to hunt in more open country and so came into contact more with species of woodland and grassland. This could account for at least some

of the differences in the percentages of each species in the two lots of material in the Pyramids Cave. Smoky Mouse and the two rats (*Rattus*) were animals of dense vegetation, whereas New Holland Mouse, Pseudo-Rat, and probably Rabbit-Rat, favoured open places. The various numbers of all these and those for the Short-nosed Bandicoot, fit well with this suggested possibility. However, the figures for Broad-toothed Rat contradict it; this is an animal of wet forest growth but it figured more strongly in the recent deposits than the older ones. Moreover, the proportion of Phascogales was the same for each period.

It is hoped that the ages of different lots of the Pyramids bones will be determined eventually. It may be possible then to explain changes in the fauna of the area in terms of alterations of vegetation due to changes in climate.

Now, to the best of our knowledge, three of those seven rodents are extinct, including the recently-abundant Pseudo-Rat. With the passing of others, the Allied Rat has regained its original dominance; it is widespread and abundant, and it is the only native rodent at present known to survive in the Buchan district.

Notes on the Rodents

The species have been identified by J. A. Mahoney who is preparing a revision of the native species of some genera of the Muridae. However, the classification used here is that given by Troughton (9) and is not necessarily what is to be presented eventually by Mahoney.

New Holland Mouse

(Gyomys novae-hollandiae)

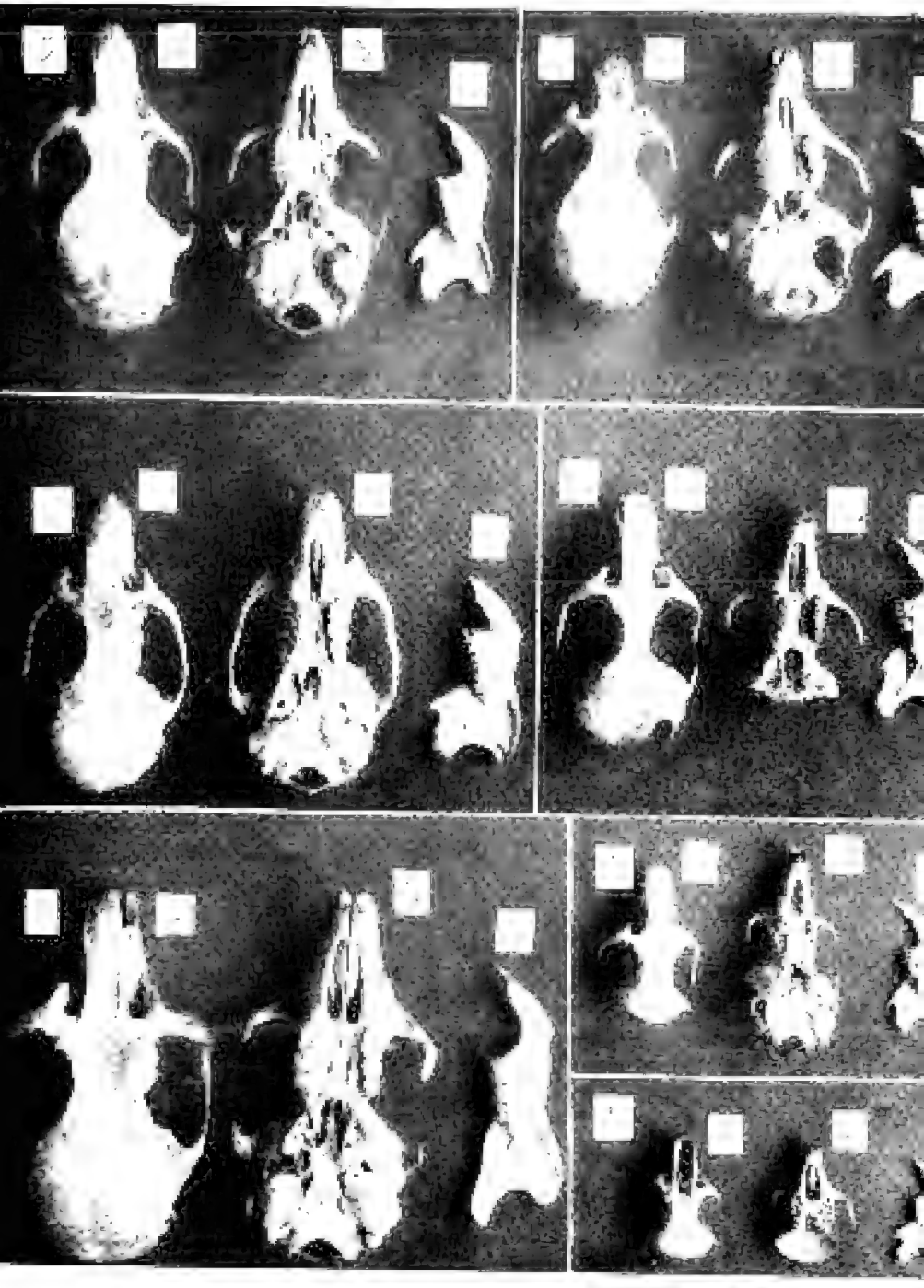
The species was discovered in north-eastern New South Wales early last century. A few specimens were obtained but it has not been recorded for the last hundred years or more. The Buchan occurrence extends its known original range south into

Key to Illustrations on Opposite Page

1. *Gyomys novae-hollandiae* (New Holland Mouse): a—skull, from above (P 20658); b—skull, from below (P 20659); c—mandible (P 20659).
2. *Gyomys fumeus* (Smoky Mouse): a—skull, from above (P 20660); b—skull, from below (P 20661); c—mandible* (P 20661).
3. *Pseudomys australis orulis* (Eastern Pseudo-Rat—coastal race): a—skull, from above (P 20662); b—skull, from below (P 20663); c—mandible (P 20662).
4. *Rattus lutreolus* (Eastern Swamp-Rat): a—skull, from above (P 20664); b—skull, from below (P 20665); c—mandible (P 20665).
5. *Rattus assimilis* (Allied Rat): a—skull, from above (P 20666); b—skull, from below (P 20667); c—mandible (P 20668).
6. *Mastacomys fuscus* (Broad-toothed Rat): a—skull, from above (P 20669); b—skull, from below (P 20670); c—mandible (P 20670).
7. *Conilurus albipes* (White-footed Rabbit-Rat): a—skull, from above (P 20671); b—skull, from below (P 20672); c—mandible (P 20672).

Note.—The numbers given here refer to the Palaeontological collection in the National Museum of Victoria. All specimens are shown natural size, and all came from the Buchan bone deposits discussed in this article.

*The incisor is abnormally exserted in the photograph.



Victoria. It seems to have been very rare during the early accumulation in the Pyramids Cave but quite plentiful in the latter. Troughton indicates that it used to inhabit dry grassy country, and that kind of habitat would account for the owls catching far more of this mouse in the Buchan area than the "cats" did.

Smoky Mouse

(Gyomys fumeus)

The only live specimens ever caught were taken in the Otway Ranges of south-western Victoria about thirty years ago (1). The Buchan records establish that it originally ranged into eastern Victoria, and there is evidence (see later) that it extended into eastern New South Wales. The Smoky Mouse seems to have been abundant at first but to have declined in numbers over the period of the accumulations in the Pyramids Cave, and today it is apparently very rare indeed if not extinct. In the Otways it was associated with the Allied Rat in dense vegetation, and analysis of the remains in the Buchan area indicates that the two have had a similar ecology there throughout the period under study.

Eastern Pseudo-Rat
(Coastal race)

(Pseudomys australis oralis)

This subspecies was known originally from a single specimen collected at Hastings River in north-eastern New South Wales. The Buchan material shows that formerly it extended into far-eastern Victoria. At Buchan, the Pseudo-Rat seems to have increased in numbers during the period represented by the Pyramids deposits, until very recently when it suddenly died right out. It was apparently an animal of open places, with an ecology very similar to that of the New Holland Mouse.

In a personal communication (September 10, 1960), J. A. Mahoney stated that he had found remains of *Gyomys fumeus, G. novae-hollandiae* and *Pseudomys australis oralis* in superficial bone deposits in the Central and Southern Highlands of New South Wales. This establishes a northern extension in the range of the first and bridges the distribution gap between the type localities of the last two and their eastern Victorian occurrences.

Allied Rat

(Rattus assimilis)

It has not been possible to separate this from the following species on the evidence of mandibles. The more complete skull fragments indicate that most of the material of *Rattus* belongs to *R. assimilis,* so a reasonably accurate picture can be obtained of the history of this species. The general narrowness of the molars in the reddish *Rattus* material indicates that most of it in that older lot belongs to *R. assimilis.* The Allied Rat then was abundant originally but it evidently declined in numbers until quite recent times. It still survives in the Buchan district and it apparently occurs in abundance throughout forest areas of south-eastern Australia, from coast to alps. Probably it has increased in status, filling the gap left by the disappearance

of other rodent species, but this cannot be proved.

(The Native Cat dens, M 27 and M 28, have together provided 56 skulls of *Rattus assimilis* and 18 of *R. lutreolus*; Mabel Cave has yielded 14 and 70, and the Pyramids Cave 4 and 20 respectively of these two species.)

Eastern Swamp-Rat

(Rattus lutreolus)

No skulls are preserved in the reddish bones of the Pyramids Cave, so whether the Swamp-Rat is represented in that older lot, or to what extent, has not been determined. In the more recent material, identifiable skulls indicate that the ratio of this species to the Allied Rat was about 1:5 in the owl deposits and 1:3 in those of the Native Cats. This is in keeping with the different habitats of the two species; the Swamp-Rat inhabited wet places with dense low vegetation and, having better cover, was less susceptible to the owls than to the "cats". The Swamp-Rat is not uncommon in Gippsland though it is much less abundant than the Allied Rat; so it seems that white man's influence has not effected these two species very much.

Broad-toothed Rat

(Mastacomys fuscus)

This rodent was very poorly represented in the earlier period but seems to have become quite plentiful later. R. M. Warneke (11) has given a good account of the species, which is apparently very rare now. Its habitat is in dense vegetation, which is why the Native Cats caught a larger proportion of it than did the owls.

White-footed Rabbit-Rat

(Conilurus albipes)

This was a very large rodent, its body about ten inches in length and its skull a full two inches. It originally inhabited lightly forested inland areas of eastern Australia. In the Buchan area, *Conilurus* was apparently rare during the earlier stage of accumulation in the Pyramids Cave but plentiful during the more recent period. Presumably the species became extinct towards the end of last century.

APPENDIX

There are burrows of native rats in dense fern and grass growth between the Murrindal River and the cliffs containing the recesses M 27 and M 28. There is ample evidence too that rats frequent caves and ledges of the limestones about the Buchan district. A programme of live trapping should determine whether any of the original rodent species, other than the Allied Rat, still survive in the district.

The foregoing report was in press when a paper by W. D. L. Ride (8A) came to hand, dealing with the fossil fauna of the Burramys breccia from Wombeyan. Ride extracted bones from a limited quantity of rock and identified the following numbers of individual animals:

Antechinus flavipes	4
Phascogale tapoatafa	1
Pseudomys wombeyensis	3
Cercartetus nanus	1
Eudromicia lepida	2

**Palaeopetaurus elegans*	2
**Pseudocheirus antiquus*	3
**Burramys parvus*	3
Potorous tridactylis	1
Pseudomys australis oralis	3
Gyomys glaucus	17
**Mastacomys wombeyensis*	1

Species indicated by an asterisk were named originally from the Wombeyan fossils and have not been recorded elsewhere. Ride stressed the possibility that at least some of these may not be specifically distinct from present-day species. The Buchan material indicates that *Palaeopetaurus elegans* may be the same as *Gymnobelideus leadbeateri*, and it is probable that the specimens referred to *Gyomys glaucus* are in fact *G. funereus*. If the *Perameles*, *Pseudocheirus* and *Mastacomys* listed above do prove to be our present local species of their respective genera, then Ride's sample of Wombeyan fossil fauna is practically what one might obtain from a small quantity of the reddish bone material from the Pyramids Cave.

Wombeyan is south-west of Sydney, on the coastal side of the Dividing Range, about 250 miles NNE. of Buchan. Ride independently reached the conclusion that owls were "mainly responsible for the accumulation of the bones in the Burramys breccia".

Errata

The following corrections should be to Part I of this report, in the *Victorian Naturalist* of October 1960:

p. 166, column 2, line 1—For "Herbarium" read "Museum".

pp. 170, 172, 176—Spelling of "*Cercaertus*".

p. 171, caption, under 5—*Antechinus swainsoni*—For "P. 20623" read "P. 20622",* and for "incisors" read "canines".

p. 171, last line—Spelling of "inhabits".

p. 172, caption, under 5—For "5c" read "3c".

p. 175, foot of column 2—Delete "It has been recorded from Wingan Inlet".

p. 177, top of column 1—Spelling of "*Gymnobelideus*".

p. 178, under Potorou—Spelling of "Brazenor".

*Both mandible and skull are of the same specimen.

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Field Naturalists Club of Victoria

General Meeting—November 14, 1960

About 180 members and visitors gathered at the National Herbarium, and the president, Mr. D. E. McInnes, occupied the chair. Members stood in silence in respect to the memory of Mr. C. E. W. Bryant. Mr. E. S. Hanks spoke of Mr. Bryant's work for natural history, as editor of *The Emu*, and as photographer, lecturer and reviewer. He was the holder of a Natural History Medallion and, as a lawyer, had helped in framing the articles of the F.N.C.V.

In view of the Government's recent decision not to allow part of the Wilson's Promontory National Park to be used for soldier settlement, it was no longer necessary to go on with the idea of a petition on the matter. The secretary reported writing a letter of appreciation to the Premier on the satisfactory decision that had been made.

Club members were asked to collect fruits and seeds, illustrating plant dispersal, for the botany group which is organizing a display at the Moomba show.

The Fisheries and Wildlife Department, in reply to the suggestion that kangaroos be introduced into national parks, has replied that, apart from the high cost, such operations would upset the ecology of the parks.

Mr. A. N. Burns, Assistant Director of the National Museum, spoke on cicadas. He gave details of their life history, world-wide distribution and the features upon which they are classified; the last were illustrated by very clear drawings. Habitats of cicadas in many parts of Australia were shown with colour slides, and Miss M. Lester screened a series illustrating stages in the emergence of the adult from the nymph skin.

The fifteen nominees for membership, listed on page 213 of the October *Naturalist*, were elected, and the president welcomed them to the ranks of the F.N.C.V.

The president asked that persons with suitable slides contact Mr. E. S. Hanks who is organizing a "members' night" for the January general meeting.

Exhibits included a mass of stalked eggs, in an oyster shell, of a species of cephalopod (Mr. Allan); flowers of native shrubs (Mr. Garnet); a case of butterflies (Mr. Bell); and midget stalactites from Cave Hill and a twig coated with calcareous material from Rotorua (Mrs. Salau).

Nature Notes: Miss Woollard reported an exceptionally good year for Chocolate Lilies, Milkmaids, Bulbine Lilies and Trigger-plants. Miss Young reported ravens eating food put out and using their claws to hold it. Mr. Sarovich told of a Central Australian toad which was reddish-brown in sand of that colour, but it changed colour in the hand and became green in green paper; he described too, an octopus, different parts of which were coloured according to the adjacent parts of the coral amongst which it was. Mr. McInnes reported masses of sea-squirts washed up at Brighton Beach. Mrs. Lee told of a courageous plover attacking a moving car, and Mr. Garnet commented on the mass of wildflowers which have followed the fire at Wyperfeld National Park.

Geology Group—November 2, 1960

Fourteen members attended with Mr. McInnes in the chair. Mr. Fisch gave an outline of a report from a Swiss Natural History Magazine of the finding of a fossil Tertiary Man. The report made a comparison of the skull with the morphology of the apes and man-apes, and it confirmed many of the present theories on the subject. The Secretary reported on the excursion to the Bayview Quarries, Tullamarine, on Saturday, October 15.

The subject for the evening was a talk by Mr. McInnes on a recent visit to Central Australia. Many slides of geological interest were shown including views of Ayers Rock, the conglomerate structure of Mt. Olga, Palm Valley, Finke River Valley, chasm in the Macdonnell Ranges and Heavitree Gap. The lecture closed with a discussion on the erosion and weathering effects in arid areas.

Exhibits: Collection of gem-stones made whilst on a trip abroad (Mr. Cobbett); microscope demonstration

of red sands of the Centre, conglomerate from Mt. Olga, silicified specimens, mica schist and satin-spar from Central Australia (Mr. McInnes); basalt from Tullamarine and Airey's Inlet (Mr. Angior).

Fauna Survey Group—October 13, 1960

Ten members attended the meeting. The secretary reported that some equipment, comprising hand spotlights and cage traps made to specifications, was being obtained. Mr. K. Simpson told of some interesting observations made recently by several members during a recent visit to the Colac-Otway area. Mr. N. Wakefield outlined some conservation measures which are being contemplated by the Fisheries and Wildlife Department.

Several ideas were put forward for the group exhibit at the next Moomba nature show; it is to feature the homes of animals. Mr. G. George reported on a proposal by the National Fitness Council to fence a portion of the Jumping Creek Reserve near Warrandyte, to maintain it in its natural state. The various club groups have undertaken to survey the natural history of this area.

For December, a live-trapping programme in the Buchan area was discussed, this being a desirable follow-up after the recent work there on the bone deposits.

Entomology and Marine Biology Group—October 3, 1960

At the meeting, members who went on the recent excursion to Central Australia recounted some of their experiences. A number of insects and allied creatures obtained on the trip were displayed by Mr. D. E. McInnes, but the names of the specimens are as yet undetermined. Comment was made on the difficulty of keeping specimens intact under travel conditions, in this case by parlour coach the whole way.

Reporting on the excursion on October 1 to the Organ Pipes at Sydenham, Mr. E. H. Coghill mentioned the many snails seen at the bases of Artichoke Thistles about the countryside. He exhibited also some unidentified beetles found in profusion on the leaves of the Horehound which abounds in many places.

Microscopical Group—October 19, 1960

At this meeting Mr. P. Genery spoke on aquatic insect larvae. He gave a brief summary of the subject as a whole, showing how and why they evolved secondarily from terrestial forms. The problems of such things as respiration and surface tension, confronting any creature adapting itself to an aquatic life, were discussed. Details were then given, with the aid of 35 mm. slides, of typical examples of the nine orders frequently found in water.

The lecture wound up with an exhibit of live Caddis-fly, *Dytiscus* and May-fly larvae.

Botany Group—October 13, 1960

The meeting at the Herbarium on Thursday, October 13, attracted a very good attendance. The subject was "Central Australia" and the speaker was Dr. Margaret Chattaway.

Dr. Chattaway spoke about the recent trip to the "Centre" by members of the F.N.C.V., with particular reference to Ayers Rock and Mt. Olga. Other members, who had made the trip, contributed to the discussion. Mrs. Hooke showed a collection of grasses.

A committee, consisting of the Chairman, Secretary, Misses A. Hooke, M. Lester and M. McLaren, was appointed to make arrangements for an exhibit depicting the dissemination of seeds, which the F.N.C.V. council has requested the Botany Group to prepare for the next Moomba nature show.

Botany Group—November 10, 1960

At the usual monthly meeting of the group members showed pictures taken in Central Australia. Arrangements were made to visit the National Fitness Council park at Jumping Creek, Warrandyte.

Mr. G. Francis made a number of observations regarding the conduct of the group and, after general discussion, the following suggestions were adopted.

1. To hold annual elections of office-bearers at the meeting following the parent club's elections.
2. The subject of the meeting to take precedence over all other business after the minutes.

3. One half-day excursion to be held each month, on a Saturday, related if possible to the subject of the monthly group meeting.
4. Members to be encouraged to exhibit specimens and to make short notes, to be read at meetings, of their observations of plants or readings of botany subjects.
5. The group to compile and display a list of botanical references together with an indication of their worth.
6. The president be asked to direct attention of general club meetings to the group meeting and to make a few remarks on the subject of the evening.
7. A car, with "F.N.C.V." displayed, should meet trams at the Domain Road stop in St. Kilda Road, up to 5 minutes to 8 o'clock on group meeting nights.

Miss M. Lester agreed to report to the next meeting with a suggested syllabus for future meetings.

Country F.N.Clubs

Horsham Field Naturalists Club

Mrs. McKenzie, the Press Correspondent of this young but flourishing club, has forwarded to us a copy of its first Annual Report, of July 1960. Mr. Eric Barber is President, and Miss Susan Robertson, of the Municipal Library, is Secretary. They report several excursions and a number of meetings, of which "Members Nights" have proved popular.

Changes in Office-Bearers

The Portland club reports that Mr. C. Beauglehole is now president, and Dr. Eva G. Kneebone, honorary secretary.

Ouyen District Naturalists Club also has a new secretary, Miss Yvonne Brownjohn.

Mr. Robin Hughes, 121 Mary Street, Morwell, is now Secretary of the Gippsland F.N. Club.

Western Victoria Association of Field Naturalists Clubs

On Saturday, August 20, a meeting convened by the Wimmera Field Naturalists Club was held at Hall's Gap. Delegates attended from Ouyen, Hamilton, Wimmera, Horsham, Portland, Ararat, Warrnambool and Stawell. The purpose was to see if, by meeting annually, the interests of the country clubs in western Victoria could be co-ordinated and brought on to a common footing.

Mr. Ian McCann occupied the chair, and the president of the Wimmera club, Mr. K. Jordan of Kiata, explained why the meeting was called. After discussion it was decided that the Western Victoria Field Naturalists Clubs Association be formed for the purpose specified above. A conference is to be held annually at a place decided by the executive committee.

The officers of the association are: President—Mr. E. T. Muir of Dimboola, Vice-President—Mr. K. Hateley of Kiata, Secretary—Miss A. Jordan of Kiata, Natural History Secretary—Mr. H. Dakker of Hamilton, and Treasurer—Mrs. L. McKenzie of Horsham.

It was decided that the National Park Authority be written to protesting that grazing in the parks was detrimental to the best interests of the parks. Conference resolved that the Education Department be congratulated on their teaching of natural history and hoped this is to be continued.

The question of a national park in the Grampians was discussed and referred back to clubs. Speakers pointed out that expenditure by the Forests Commission was about £22,000 annually and access roads over the years had cost perhaps £250,000. It was felt that the Authority could not hope to match these figures. The clubs are to see what areas would be suitable as sanctuaries for flora and fauna in the Grampians. It was decided to ask the Commission to take responsibility for the protection of aboriginal

paintings in the area and to erect protecting fences to prevent vandalism.

The meeting resolved to hold combined excursions in the coming year, and the exchange of speakers for meetings was also mooted. In the evening, visiting members were shown slides of Grampians flora and fauna by Mr. McCann, and on the Sunday those who had stayed overnight were taken on a tour of Grampians beauty spots by the Stawell club under the leadership of Mr. J. Miles.

Membership of the association is open to Field Naturalists Clubs and societies with kindred interests; the fee is 10/- per annum.

MICROSCOPISTS' CORNER

Abbé Condenser and Gift Microscope

By C. S. and G. J. MIDDLETON*

We have received the following query:

"Is the Abbé Condenser, although not achromatic, suitable for High Power Dry Objectives? If it is, could you explain the technique?"

Yes, although the Abbé condenser can not be considered satisfactory for high resolution bright field, it can, especially in the 3-lens form, be very suitable for dark field so long as only a narrow annular ring of illumination is used. This is obtained by selecting the smallest patch stop which will give a nice dark background and closing the iris diaphragm until all flare disappears.

If achromatic objectives are used, a monochromatic green filter will further improve the image.

If now the tube length is correct and Köhler illumination is used, very high power eyepieces may be used with relatively low power objectives such as 4 or 10x to make visible very small living organisms such as all but the smallest bacteria. These organisms thus revealed normally require staining and an oil immersion objective, or a special high power dark field illuminator used with an oil immersion objective and funnel stop to reduce its aperture, or objectives specially corrected for High Power Dark Ground.

Since the above condenser is essentially an oil immersion condenser that may be used dry, it can, when immersed, be used to obtain dark field with the highest powered and highest apertured dry objectives.

Further queries are invited. For personal reply please enclose a stamped addressed envelope.

A Microscope for Christmas?

Do not buy your child a toy microscope unless he knows it is only a toy and that no real microscopical work can be done with it. It will probably be inferior to a good hand lens.

One of the authors remembers to this day his acute disappointment, when, as a boy of eleven, he received a so-called microscope, very impressive with its lacquered brass finish but with completely inadequate optics. The images were highly magnified but showed none of the detail given in books written and illustrated for children. In disgust he put aside the instrument disillusioned and disheartened. Only the accidental access to a real microscope rekindled an interest which developed into a lifelong hobby.

The modern toy microscope, with its set of equipment attractively packaged, would be just as disappointing to the intelligent child to-day and could deprive him of a lifelong interest, or even a profession or fame, and the community of a much-needed research worker.

The cheapest, new, usable microscope retails at approximately £15, and if this is too much for you, it would be better to buy a good 10x aplanatic magnifier and see whether the child is sufficiently interested to warrant saving up for a proper microscope.

The writers still use such lenses, in spite of the fact that they now possess the finest microscopes that money can buy.

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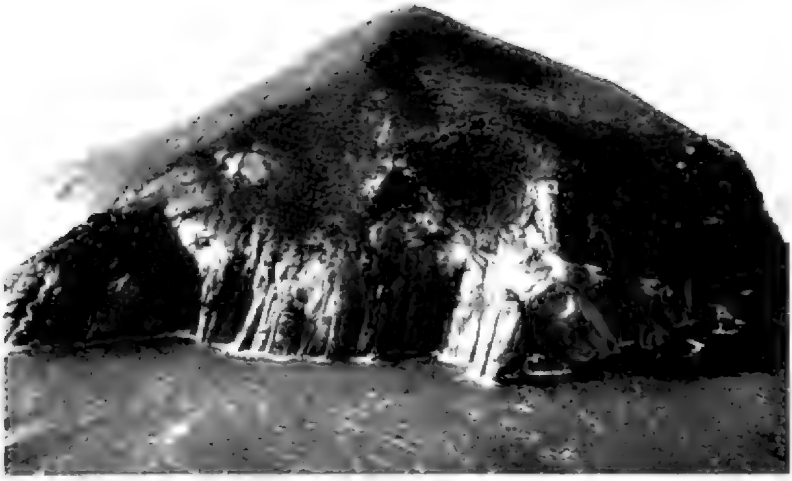

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The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

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Front Cover:

Rodondo Island can be seen from the lighthouse on Wilson's Promontory. It is a conical hill, mainly of reddish granite, rising to a height of 1150 feet, above the waters of Bass Strait. In January 1947, a landing was made on Rodondo by Mr. John Béchervaise and a party of boys from Geelong Grammar School. They were the first persons to set foot on the island, and several days were spent exploring the place.

The picture on the cover is from an aerial photograph of the northern side of the island. It appeared in the *Victorian Naturalist* in June 1947, accompanying an article entitled "The Rodondo Episode" (Vol. 64, pages 18-20). The present issue of the *Naturalist* contains another contribution from John Béchervaise, this time about bird life on Heard Island.

By JOHN BECHERVAISE

Birds Under the Ground

Heard Island
Sunday, December 13, 1953

After lunch Arthur suggested that I might accompany him on a walk to Corinth Head to inspect, and possibly to photograph, his Macaroni Penguin colony. Fred and Ken also decided on an excursion over the Azorella, and Berni went off fishing. Most other men stayed close to the station, being on duty, except Dick who went off on a ramble along the three beaches to record the presence of any seals showing the brands of previous year.

I can never tramp over the firm Azorella hummocks, on the rare day that is soft or sunny, without discovering a wild, vicarious joy for all the thirteen-year-olds who should be there. Every way tops green rises and follows twisting lanes and watercourses; there are many quiet pools, and even the areas of frost-shattered lava are brightened by innumerable olive-green hemispheres of moss, each luminous in the sun. The lava uplands between the station and the cliffs would delight most boys. There they would discover, and make their own delectable haunts, numberless caves and tunnels, wonderful places to hide in and to explore. What keen natural historians some of them would become, knowing the ledges where nest the gentle Sooty Albatrosses, finding the crevices of the Fairy Prions, and the Dove Prions' green tunnels. There would be great adventures in the old craters and fumeroles, airy cliff-climbing, and further alarms in the tussock grass from the great rushing wings of the Skuas bearing down on all who approach their young or their dappled eggs.

It was months since Arthur and I had walked across the Azorella to the Tuscan arches of the buckled lava. The months of deep snow, when the tundra was masked and flattened all the way to the headlands, today seemed a far dream. We stumbled across groups of moulting seals, bloated and lazy by the water-pools, bellowing at us as we passed, but too lethargic to raise more than flippers of protest. The air was filled with the beat of Skuas' wings as they "dive-bombed" us —whenever we inadvertently walked close to a nest. As the great gulls seem to possess no natural enemies, it is hard to understand the furious yet well co-ordinated attack. The technique is certainly not learned especially to combat humans. Time after time, more energetically than any nostalgically remembered magpies, they wheeled to assail us, swooping down to within a few inches of our heads, at tremendous speed. It was most intimidating. Then, as each pair in turn were satisfied with our withdrawal, they landed together on a knoll, raising their white-

Corinth Head, Heard Island

The Station is shown by the few white dots by the arc of Atlas Cove on the far side of the Atlas Roads, immediately in front of the shoulders of the figure. The broken-down volcanic cones, of recent period, are clearly visible. The whole of this area is frequently clear of snow in summer time.—*ANARE photo by John Béchervaise.*

banded wings heraldically and screaming continued defiance.

The average adult Skua appears somewhat larger than a domestic fowl, but its wing-span is fully three feet. As Skuas shout, their great black beaks are wide open, the upper mandibles curved like eagles'. What terrible predators these Skuas are! All over the lava and Azorella are the dismembered wings of Prions and Diving Petrels, caught emerging from their tunnels, and torn to pieces in a trice. The Prions are seldom taken on the wing, for they can twist and turn and evade the fury of the Skua's attack, but the little black and white divers fly straight and, if they value their lives, may emerge only in the dusk.

Year after year, the Dove Prions (*Pachyptila desolata*) return to the same tunnels in the Azorella; most of the entrances are rounded and green as though they have always been there. The divers, on the other hand, excavating in earth and sand, must constantly renew their homes.

There was enough to see at our feet, but we could also look wide to the misty glaciers, back to the Baudissen and the Challenger, or over the Atlas Roads to those of the Laurens Peninsula; there are so many places on Heard Island, still, which have never been visited. Sometimes one imagines that here, someday, by a strange twist of circumstance, there will be men, women and children living in strong

stone houses. If a balanced community, with its dreams and struggle, could be established here long enough, its desires and questing would give Heard Island a literature and a legend, which I suppose it will always lack, for there is no sufficient reason. Always the thirteen-year-olds will be here only by proxy . . . as the boys still eager within the hearts of men.

Soon we reached a hole in the lava where a tunnel of buckled magma had collapsed. The lower level still held drifts of coarse snow, but, within these and extending far into the shadows, were dozens of Rockhopper Penguins (*Eudyptes chrysocome*) excitedly complaining of our presence. Arthur was seeking birds ringed by him last April, and was soon exploring the depths with a torch. I followed, to find great numbers of these small penguins, pale lemon-coloured tufts streaming back from their eye-brows, nesting in almost total darkness. The warm afternoon had thawed the edges of snow-drifts, and the birds were tramping in dark, half-frozen slush. It was an odd environment, smelling and sounding like a farmyard, dark and damp, and dense with avian troglodytes. Most of the eggs were mud-stained and some, particularly those lying at the bottom of little circular pits in the hard snow-drifts, were long beyond hope of hatching, yet in all cases the birds tucked them under their breasts, generally on their feet and under a fold of feathered flesh, and deserted them only with the utmost reluctance.

Rockhopper Penguins and eggs, Heard Island. *ANARE photo by John Béchervaise.*

Arthur soon spied a ringed bird—the metal band placed neatly round its flipper—but it retreated further and further down the black tunnel. At some distance there was another opening to the light—perhaps a hundred yards away—so I walked over the top to this hole and waited while Arthur, bent almost double, shepherded the flock underground. Then, eventually, I caught the little fellow as he came below me and Arthur was able to take his measurements of weight, size of bill, and so forth, and to observe how the ringing had stood the test of several months in the Antarctic seas.

During his underground trek,

Arthur had made the exciting discovery of many nests of the Fairy or Cliff Prion (*Pachyptila crassirostris*) formerly only known to nest in almost inaccessible narrow cracks and crevices in the steep cliffs. Perhaps we were the first men in time to stand comfortably and, by torchlight, to see them sitting on their eggs, exquisite, fragile blue-grey little petrels with bright eyes shining. Their black-tubed bills were the only immediate and obvious link with the Giant Petrels of the open lava over near West Bay. I gently carried one to the surface to obtain a photograph; Arthur spread its fine, graceful wings to display the delicate dark line that seems to bracket the span of the bird when it is flying. So fine and dainty are these prions that, when they are flitting like swallows below the cliffs, they seem almost transparent, and the darker lines appear like X-rayed shadows of the birds' internal structure.

Next we moved over to the cliffs and watched the same birds wheeling and rolling in the air below. One might have thought they were pursuing some swarming insect, like multitudes of swallows over a turbulent lake. Never resting, they flew at extraordinary speed, too fast for the eye to follow them when they were close below. The reason for their "swarming" is obscure: perhaps it is some sort of "familiarization" behaviour, a memorizing of the intricate cliffs so that, when they come homewards from the sea in deepest dusk, they will unerringly find their crannies. Beyond them, a hundred feet or so below, the sea broke furiously against the basalt.

At one or two places along the cliffs it is possible to descend to "beaches" of huge tumbled and rounded boulders. Here, again, the Rockhoppers nest. It is curious that a single species can inhabit such an extreme range of nesting sites in so small an area—from abysmally dark caves to spray-swept rocks facing the sea. The birds here were very spruce and clean, and their

eggs spotless, very faint bluish-white. In the calm air and sudden bursts of sunlight we had perfect conditions for visiting the colony. Arthur again found some ringed birds. I have a *penchant* for the little Rockhoppers; perky, diminutive fellows, and very courageous in defence of their eggs. They are close relatives of the Macaronis which, today, after all, we did not visit, but they lack the stature and full golden top-knots of their cousins. There is an air of comical distraction about the Rockhoppers; their pale wispy side-crests make me think of anxious clerks with pens behind their ears.

For a short while we smoked in the sunshine. Ken, Fred and Berni passed along the cliffs overhead. And soon we followed them back across the Azorella to the huddle of huts on the edge of Atlas Cove.

Note: This is an extract from a journal entitled *Log for Lorna*, which is to be eventually published in full in book form. The author has agreed to provide the *Victorian Naturalist* from time to time with further illustrated pages from the diary.

"Those London Starlings"

By Hugh C. E. Stewart

My interest in Dr. Margaret Chattaway's notes on this topic, in *The Victorian Naturalist* of February 1953 (Vol. 69, p. 129), has been revived by perusing the contents of a letter by the late Professor Frederic Wood Jones to a friend in Melbourne. The letter recently came into my possession and it bears the date October 5, 1951. It was written from Lincoln's Inn Fields, London, where Dr. Wood Jones occupied the Professorial Chair of Human and Comparative Anatomy at the Royal College of Surgeons.

The part relating to the London Starlings is, in the Professor's own words:

Now that I am a garden-less and bird-less London flat dweller, I take more interest in the marvel of the evening flight of the starlings. You know all about this strange and more or less new habit of theirs. In the evening they leave the country for 20 miles or so all round London (and some other big cities) and fly to town. They come in parties, from two or three birds, to thousands. They follow the same course every evening and their time is regulated by light. Now they come in at 5.15-5.25—and at about 5.30 p.m. There are millions of them, in huge flocks that wheel round and round and then suddenly drop to roost on one or two chosen buildings.

From my window in the flat I see them coming in from the south. Evidently they take the river as their guide and fly exactly over the same landmarks every evening. Yesterday I went to Lambeth Bridge to watch them cross the river and tonight I am going to take my wife to Waterloo Bridge so as to get nearer to the point at which they drop out of the sky to roost in the big buildings of the Inland Revenue, etc. From the distance of Lambeth Bridge the flocks last night looked just like the swarms of mosquitoes over a swamp in the Coorong (South Australia). It is a marvellous thing—a new habit—and, of course, no one really knows *why* they do it. It seems though that the most wonderful phenomenon of bird migration might have had some such beginning. These things are very strange. Forty or fifty years ago starlings roosted in communities where they lived—now they all go to cities

for the night. It is something like the odd business of the Tits, all over England, taking to opening milk bottles, and doing other queer things that they had never done before.

And yet I have friends who think that everything is well known?

I wonder if when I am dead I shall learn these things. I shall not learn them otherwise.

Note: Professor Wood Jones died in London on September 29, 1954.

Notes on Collecting Insects

By A. N. Burns*

Many naturalists, not necessarily interested in the study of insects, may at some time be making a trip to a country area in Victoria or some other State and be asked to bring back "any insects that they may be able to get on their travels". By this means many valuable and rare insects are from time to time collected but unfortunately are often spoiled through improper handling or lack of proper facilities for collecting and storing them until the trip is completed.

Actually the necessary equipment is not costly nor is it bulky to carry. Butterflies and moths are perhaps the most difficult subjects in that they should be killed in a properly made cyanide bottle. This is not within easy reach of most people, but chloroform is a fairly good alternative. Some drops of this liquid are placed on a wad of cotton wool on the bottom of a wide-mouthed bottle or jar (a square honey jar about six or seven inches high is excellent) and the specimens are dropped in when caught. They become immobile in a matter of seconds and should be quite dead in about five minutes. after removing the specimens from the killing bottle the best way to store and carry them is to place each specimen separately in a paper envelope; the wings are folded over the back and the date of capture and name of locality written on the outside. From a scientific point of view this information is most important.

For most other insects the routine is easier, especially from the storage point of view. The killing medium used is acetic ether (ethyl acetate), about 20 drops of which are placed on a wad of cotton wool which is pressed firmly on the bottom of a 5" x 1¼" flat-bottomed tube with suitable cork. Several of these tubes can conveniently be carried in the pockets and many insects can be stored in them. They are excellent for beetles, flies, wasps and bees, grasshoppers and allied insects, dragon-flies and damsel-flies, lacewings and other Neuroptera—in fact most insects other than very small ones such as thrips, fleas, lice and caddis-flies which should be killled in 70 per cent alcohol and left in it until ready to be prepared for mounting as micro-slides.

Each acetic ether tube can be filled with insects; if several separate "catches" are included in one tube, simply separate each with a wad of cotton wool, and include with each lot the date of capture and name of locality. This should be written in *ordinary lead pencil* on white paper. Ink or biro is soluble in ether and will fade right out. Insects stored thus in ether tubes will remain relaxed for about a month, they will keep in good condition for subsequent handling, and many can be stored in a single tube. It is desirable when in the field to use a couple of tubes as killing tubes, then from time to time take the insects out of these and carefully place them in other tubes preferably set aside for each type of insect. Beetles being very hard bodied must not be placed in the same portion of a tube as a soft-bodied insect such as a dragon-fly. Spiders, scorpions, centipedes etc. should be killed and stored in 70 per cent alcohol.

If these notes are followed with reasonable care it should be easy for even the youngest amateur to bring his material home in good order and condition, and thus it will be of scientific value.

*Curator of Insects, National Museum of Victoria.

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.

Baron von Mueller and the Blackberries

Mr. John M. Elliott, head teacher of Warragul State School, supplies some further information about Baron von Mueller's habit of scattering blackberry seeds in the bush (*Vict. Nat. 76*, p. 33, June 1959).

My father, 86 years of age, when shown the column, immediately remarked: "They might have mentioned old Uncle Alex, too." This was Alexander Elliott (possibly Elliot), who came out from Scotland in the early 'fifties, if not before, and who became the first Curator of Gardens at the University of Melbourne. He was a botanist of some note, and spent countless weekends in the bush with von Mueller, seeking and classifying Australian flora. During their explorations together, von Mueller spoke to Alexander Elliott of his anxiety at the amount of erosion taking place along the streams where the land was cleared or partly cleared, but also in the lower hill reaches of virgin country. He concluded that something should be planted along the streams to prevent erosion. Alexander promptly suggested the "blaeberry" of Scotland, and von Mueller heartily agreed. They promptly sent to Scotland for supplies of seed, which they scattered along streams in their later rambles —with some fear that these seeds might not grow well in this new environment and climate. "Happily" they did grow well.

Some of the imported seed was used by Alexander's younger brother, John Elliott (my grandfather) to plant a hedge of blackberries around his orchard on the banks of Bullock Creek, Marong, where there is today a profusion of blackberries directly descended from those.

Mr. Elliott concludes by claiming that there are many people who would agree that blackberry-infested streams do not erode as do the bare-banked ones, and also that those who enjoy blackberry-picking and the jam and jelly they make would think that von Mueller *had* earned some blessing from posterity!

Brown Snake and Stumpy-tail Lizard

In the *Victorian Naturalist* of March 1960 (Vol. 76, pages 288-9), a short account was published of a Brown Snake that had swallowed a Stumpy-tail Lizard. The contribution came from Mr. A. B. West of the Sunraysia Field Naturalists Club.

Here is an observation, from Mr. H. R. Hobson of Rosebery in the Victorian Mallee, describing an encounter with another Brown Snake which had also caught a Stumpy-tail. Apparently the latter is often the prey of these snakes.

On October 23 last, I had a rather interesting experience with a young and very fortunate little Shingle-back Lizard, 8½ inches long, in a Government reserve of about 25 acres of Mallee country a mile from my home.

At about 9 o'clock in the morning, I came upon a large Brown Snake coiled around something and biting at it so intently that it did not notice my presence even though I had walked a few steps past before seeing it. I stepped back and watched. It was on the other side of a fence, near the butt of a tree. After about thirty seconds, it became aware of me and stopped chewing. It was then that I could see the nose and eyes of the young Shingle-back or Stumpy-tail Lizard protruding from the coils of the snake. The latter uncoiled and hastily vanished into the high grass; and I was content to let it go.

The young Shingle-back was very dazed and appeared to be trying to vomit. I let it rest for a few minutes, then picked it up and took it home for observation. I noticed what was probably one fang puncture above the left eye, but I doubt if it penetrated the armour. By 5 p.m. young Shingle-back had brightened up and was ready to bite me. After twenty-four hours, Lizard junior had fully recovered from his ordeal with *Demansia textilis*. But if it had not been interrupted the snake would undoubtedly have ended the lizard's struggles by constriction and then would have swallowed it.

Woolly Bears

This account, by Mr. A. E. Brooks, is an appropriate accompaniment for the picture story on pages 270-1 of this issue.

It was quite by accident—a rather unpleasant one—that I recently learned more of a certain caterpillar and the cocoon it makes. It is one of the so-called "woolly bears".

While handling a piece of eucalypt wood I had, without realizing it, touched a cocoon which appeared to have bristles over it. I picked a bristle or two from the palm of the right hand and the thumb of the left. The amount of discomfort I was to suffer was out of all proportion to both the size and the number of those short stiff hairs.

Areas on both hands commenced to itch. By the next day there was considerable irritation, and rashes had developed. They consisted of many small blisters; and this trouble lasted for more than three weeks. As one whose skin is allergic to iodine, I can say that the bristles had a similar effect.

The cocoons were those of the Tussock Moth (*Chelepteryx collesi*). In *Life Histories of Australian Insects*, the authors (Brewster, Brewster and Crouch) state:

"The caterpillar of reddish-brown is armed with stiff bristles which give it a formidable appearance, and these bristle-like hairs are a weapon of defence, for they have an irritating effect on the skin.

"The caterpillar feeds on eucalyptus leaves at night, resting by day on the bark where it is inconspicuous. They sometimes grow to a length of six inches.

"When pupating, the caterpillar presses . . . against the silky cocoon, causing hairs to protrude right through, in which position they remain when the larva withdraws."

I believe that the cocoons are also sometimes called Hairy Marys.

Kinglake National Park

By J. Ros Garnet

An important unit in the Victorian nature conservation system is Kinglake National Park. It is little more than forty miles by road north-east of Melbourne and extends irregularly over the crests, slopes and valleys of the Plenty Ranges.

The park was established in March 1928, and two small additions have been made since, to bring the area to its present dimensions. One of these was the small but very lovely Wombelano Falls-Harts Creek reserve, about five miles due north of Kinglake township and consequently separated from the main area of the reserve. The irregularity of the park's boundaries is due to the disposition of settlement in the Kinglake district in the early days. In fact, Victorians are fortunate that sufficient unalienated Crown land remained as late as 1928 to allow as much as twenty-two square miles for a national park.

A succession of forest fires, coupled with intense logging, had reduced the timber potential enough to give the impression that the region was of little value as State Forest and, to some extent, this may have encouraged the idea that it could be reserved as a national park.

There are several approaches to Kinglake National Park, all scenic enough to invite the traveller: from Whittlesea and Flowerdale *via* Kinglake West, from Hurstbridge and Panton Hill *via* Queenstown, and from Yarra Glen *via* Steele's Creek. The last is possibly the most scenic.

A mile or so beyond the settlement of Steele's Creek the road enters the national park and winds its way up the steep valley of Full and Plenty Creek to Mount Slide, at the north-east boundary of the eastern sector of the park. The road traverses some magnificent fern-gully scenery—typical of the ancient uplifted, deeply eroded, volcanic formations found in this portion of the Great Dividing Range.

The eastern portion of the park is separated from the central sector by private holdings along Diamond Creek valley—settlements which are served by the alternative road from Hurstbridge via Queenstown. This road enters the park about a mile above North Queenstown, goes over Cookson's Hill, passes by the famous stone quarry below Forster's Cutting, and finally emerges on the spur a mile or so south of Kinglake township, where it joins the Kinglake–Mount Slide main road.

Along this last road is the by-way leading to Jehosaphat Gully and the track into Lyrebird Gully, two entrancing fern-decked valleys which drop steeply south through a fine Mountain Ash forest.

On the western side of Diamond Creek valley, on Silurian country, is the central sector of the park. It is clothed mainly in eucalypt forest typical of that formation and, consequently, this area is notable for the variety and profusion of small wild-flowers. Another of its attractions is a remarkable lookout rock, known as Bald Spur, overlooking the head-waters of Diamond Creek. From it one may gaze with uninterrupted view on the world beneath—to the south, east and west of the great Yarra valley and to the ocean beyond. Access to the lookout is by road from the north.

The original committee of management, with the help of working bees organized by rover scouts and the Youth Hostels Association, formed a number of hikers' tracks through all

sectors of the park, but most of these have since been obliterated by bush fires and secondary growth. The only well-defined track now in the central part, other than the one to Bald Spur, is the fire-break formed by the State Electricity Commission to protect its Rubicon high tension transmission line.

The western sector is probably the most frequented part of the park. Within it are two notable scenic spots—Mason's Falls and Sugarloaf. The pleasant picnic ground at Mason's Falls is a delightful place at which to enjoy a day in the bush.

Tommy's Hut—as Kinglake West was once named—was one of the big logging and mill centres in the ranges, and hikers of an earlier generation will remember the timber train-line which left what is now the main Kinglake road, at a point between Tommy's Hut and Pleasant Creek, to plunge into the forest in the direction of Mason's Creek gully. It terminated just above the falls at a mill which was destroyed in a big forest fire in 1926. A vestige of the sawdust dump still remains close to the present picnic area, but it is doubtful whether any evidence of the old timber track exists now. Cultivated fields cover much of its route.

After good rains, Mason's Falls present the impressive spectacle of a series of cascades ending with a precipitous drop to about 150 feet below the level of the uppermost fall. Set in a frame of towering eucalypts, wattles, tree-ferns and aromatic undershrubs, they are the main attraction for visitors to this part of the park. Scarcely less popular is Sugarloaf, with a well-surfaced and graded road replacing the old rough track. From this vantage point, 1805 feet above sea level, a vast panorama stretches away to east, south and south-west. The Dandenongs and more distant eastern ranges, Port Phillip and Corio Bays, Mornington and Bellarine Peninsulas, You Yangs and Brisbane Ranges, Macedon and the Otways, all come within the view.

Each of these features has its own story of vast physiographic changes in ages past, but these stories could be no more romantic than that of Sugarloaf itself. Who stands on Sugarloaf stands on an ancient sea bed. At one's feet lie rocks which were the sediments of Silurian and early Devonian seas, laid down 400 to 200 million years ago. The fractured surface of this rock often reveals fossils of such extinct forms as trilobites and shellfish.

Hills and valleys of those past ages have been obliterated by lava flows whose rocks in turn have decomposed to form the rich red soil which today nurtures great eucalypt forests and the luxuriant fern gullies where Lyrebird and Pink Robin dwell.

The infrequency of tracks into the forests and gullies of Kinglake National Park is not altogether a disadvantage. In their absence, the native fauna can remain relatively unmolested. When land sub-division leads to closer settlement in surrounding districts, the importance of this national park will be enhanced. It is a conservation area for the native wildlife which inhabits the forests of the ranges. Like the forest trees, the population of birds and furred animals is gradually recovering from the effects of the forest fires of 1939. Kangaroos and possums are plentiful, koalas are increasing, and even the maligned wombat has sanctuary there. The music of the Lyrebird, the call of the Whipbird, and screeching of Black Cockatoos are sounds that enliven the air.

Botanists have a warm affection for Kinglake National Park, because it gives them an assurance that some of Victoria's rare plants should be preserved for all time. In some of the moist gullies, there is one of our few epiphytic orchids—*Sarcochilus australis* or Butterfly Orchid. In the open Messmate and Stringybark forests of the ridges, the quaint Elbow Orchid (*Spiculaea kuntiana*) occurs, as well as the Small Tongue Orchid (*Cryptostylis leptochila*) and Cinnamon Bells (*Gastrodia sesamoides*)—each of them occasionally in profusion. Creeping Grevillea (*G. repens*), too, grows on more sparsely-timbered slopes, together with Grass-trees, Fringe-myrtle, Pink Bells, Heath, Bush-peas and other gems of the bush.

Reed Growth in the Gippsland Lakes

By E. C. F. Bird*

The Common Reed (*Phragmites communis*) is found in damp situations such as swamps, or along the borders of rivers and lakes, in almost every part of the world. It is said to be the most widely-distributed of the angiosperms, and is well known along the banks of the Nile, in the swamps of Louisiana, on the shores of the Baltic Sea, and in the English fens. It grows where the water is fresh or slightly brackish, but it is not strictly a salt marsh plant, and it dies out in the more saline sections of estuaries.

Communities of reeds dominated by *Phragmites communis* are found in fresh-water and brackish swamps in Gippsland, notably along parts of the shoreline of the Gippsland Lakes. These are coastal lakes cut off from the sea by a barrier of sand dunes, except for an artificial entrance cut at Lakes Entrance in 1889. They may be described as estaurine, for they are essentially river estuaries enclosed by a coastal barrier; fresh water from the rivers meets and mixes with saline water entering from the sea, and the salinity of the lake water increases towards the artificial entrance. The pattern of salinity varies seasonally: at the end of a warm, dry summer, the lakes are very brackish, but winter flooding from the rivers reduces their salinity and after a serious flood they become temporarily fresh.

Reed growth is best developed in the south-western corner of Lake Wellington (see Fig. 2), where a fringe of reeds up to half a mile wide in places extends out from the lake shores to a line where the water is about four feet deep. Behind the reeds there are extensive areas of scrub dominated by the Swamp Paper-bark (*Melaleuca cricifolia*), a type of vegetation that may be termed *swamp scrub* (see Fig. 1). Examination of this swamp vegetation has shown that the reed fringe and swamp scrub are not merely occupying suitable habitats on the lake margin; they are causing the building-up of new land along the lake shore. The reeds are spreading out into the lake, and causing sediment and driftwood to be trapped and deposited, raising the level of the lake floor. At the inner margin of the reeds the water depth has been reduced to such an extent that *Phragmites* is rooted in mudflats, and here colonization by young shoots of *Melaleuca cricifolia* is taking place. Farther back, the dense growth of *Melaleuca cricifolia*, with tall, closely-spaced trunks and a thick canopy of foliage overhead has "shaded out" the *Phragmites*. A close network of shallow roots binds the surface mud together, and decaying relics of *Phragmites* stems and roots are found just beneath. Clearly, a vegetation succession is taking place, and since it brings about encroachment of swamp from the lake shores it may be termed the *encroachment succession* (see Fig. 3). Much of the extensive swamp land west and south of Lake Wellington (see Fig. 2) must have been built up in this way, encroachment having reduced the area of this lake to little more than half its original dimensions. If the process continues, the lake will eventually be replaced by a swampy plain, across which the Latrobe and Avon rivers will have to maintain an eastward outlet to Lake Victoria.

Similar encroachment, initiated by reed growth, is seen at the western end of Lake Victoria, and on part of the shore of Jones Bay, an arm of Lake King. Many other sections of the shore of these two lakes have a low-lying fringe of swamp land without any fringe of reeds; and in these cir-

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Open waters of lake bordered by Common Reed (*Phragmites communis*), with Swamp Paperbark (*Melaleuca cricifolia*) in the background.

cumstances, shoreline erosion is taking place. Waves are attacking the shoreline, laying bare the root systems of *Melaleuca* swamp scrub, exposing the swamp soil in miniature cliffs, and leaving the shore line strewn with dead branches and trunks of undercut Paper-bark trees (see Fig. 4). Clearly some change has taken place, for swamp land was formerly developed along these shores, and now it is being destroyed. In some cases a swamp fringe has been completely removed, and waves are attacking the sand dune terrain behind, forming cliffs of crumbling dune sand; and this sand, spread along the shore by waves and currents, is being built into beaches, spits, and cuspate forelands. The deposition of sand on parts of the lake floor where a swamp fringe has been eroded is responsible for the curious phenomenon of "mud islands" which appear from time to time off the eroded southern shore of Lake Victoria (Woolnough, 1930), mud being squeezed upwards by the load of deposited sand. On the northern shores of the lakes, pebbles derived from the gravel deposits on the coastal plateau have been incorporated in the lake-shore beaches. Locally, the erosion of swamp land has been arrested (probably only temporarily) by the accumulation of a beach of sand on the lake shore.

With all these changes in progress on the lake shores, the shape (or configuration) of the Gippsland Lakes is gradually changing. Some shores are being built up, either by the spread of reed growth or by the accumulation of sand, and others are being cut away, the erosion attacking swamp land or the dune terrain which lies behind it. Studies of lakes and estuaries in south-eastern Australia show that swamp scrub vegetation cannot invade open water directly, except in very sheltered conditions; it is generally preceded by some form of reed growth, which protects it from erosion, and builds up land for further colonization. When a reed fringe is not present on the shores of the Gippsland Lakes, swamp scrub is suffering erosion (see Fig. 3). Evidently the reed fringe was formerly more extensive on the shores of Lake Victoria and Lake King, permitting the development of swamp scrub land, and the contemporary erosion is to be correlated with the disappearance of part of this reed fringe.

Direct evidence of the former existence of a reed fringe along swampy shores now suffering erosion was found by examination of lake floor mud up to 20 yards off the eroded shore of the Mitchell delta, the long low silt jetties that protrude into the northern part of Lake King. *Phragmites* root-

material was found anchored in this mud, together with relics of stems of reeds that formerly grew there. Confirmatory evidence comes from notebooks and maps compiled by Wilkinson, who carried out the first survey of this area in 1849. These documents (kept in the Lands Department offices in Melbourne) show that this part of the shore of Lake King was then bordered by "high reeds and scrub", and this seems to have been the general condition of the lake shores when the famous geologist, J. W. Gregory, saw them in 1901. He observed that "reedy shores" were encroaching, but he made no reference to any visible erosion (Gregory, 1903). By 1922, however, much of the reed fringe had gone, and T. S. Hart drew attention to the serious erosion that had developed along the lake shores (Hart, 1922). This has been going on now for more than forty years. The delta built by the River Tambo has been much reduced in area, and the well-known silt jetties at the mouth of the Mitchell are withering rapidly and breaking up into a chain of small islands. More generally, swampy shores bordering Lake King and Lake Victoria have receded by varying amounts, in some cases as much as 30 or 40 yards.

The disappearance of the reed fringe

The correlation of erosion along swampy shores with the disappearance of the reed fringe is not, in itself, an explanation of the erosion. But whereas swampy shores are being *cut away* by wave erosion, the disappearance of the reeds is due to dying-back. The reed fringe is not being eroded, it is simply dying away. When a surviving part of the reed fringe is traced along the shore it becomes narrower and sparser before finally dying out, and where it is sparse there are signs that reed growth is struggling against some adverse ecological condition. Some reeds begin to grow in spring but die away in early summer. It will be useful, therefore, to consider the factors that may limit the growth of *Phragmites communis*, and the six relevant factors are (1) exposure to wave and current action, (2) the nature of the substratum in which the plant grows, (3) depth of water, (4) damage by animals, (5) interference by man, and (6) salinity conditions. A change in one or more of these six factors may have led to the disappearance of part of the reed fringe. Another possibility is that *Phragmites* is being attacked by some form of disease, comparable with that which destroyed *Zostera* in European waters some thirty years ago, but there is no direct evidence of this and it is difficult to see how it could account for *partial* disappearance of the species from the Gippsland Lakes. Any explanation must account for the fact that *Phragmites* survives, and thrives, on some parts of the lake shore.

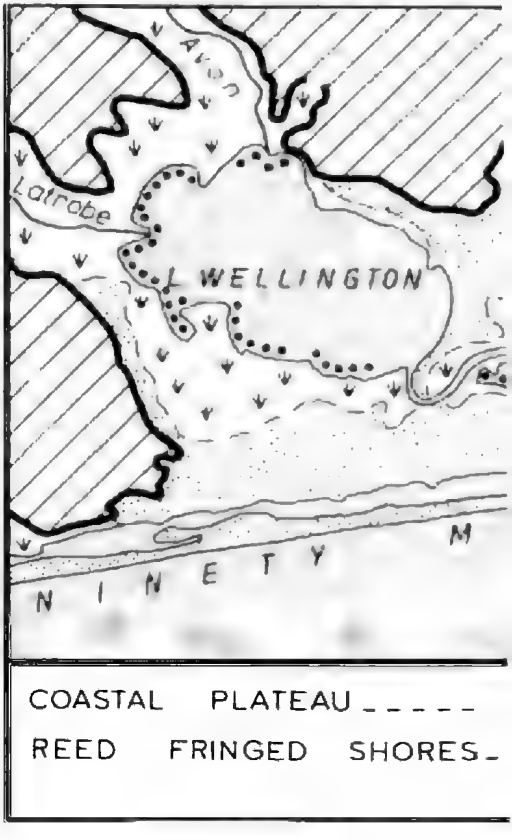
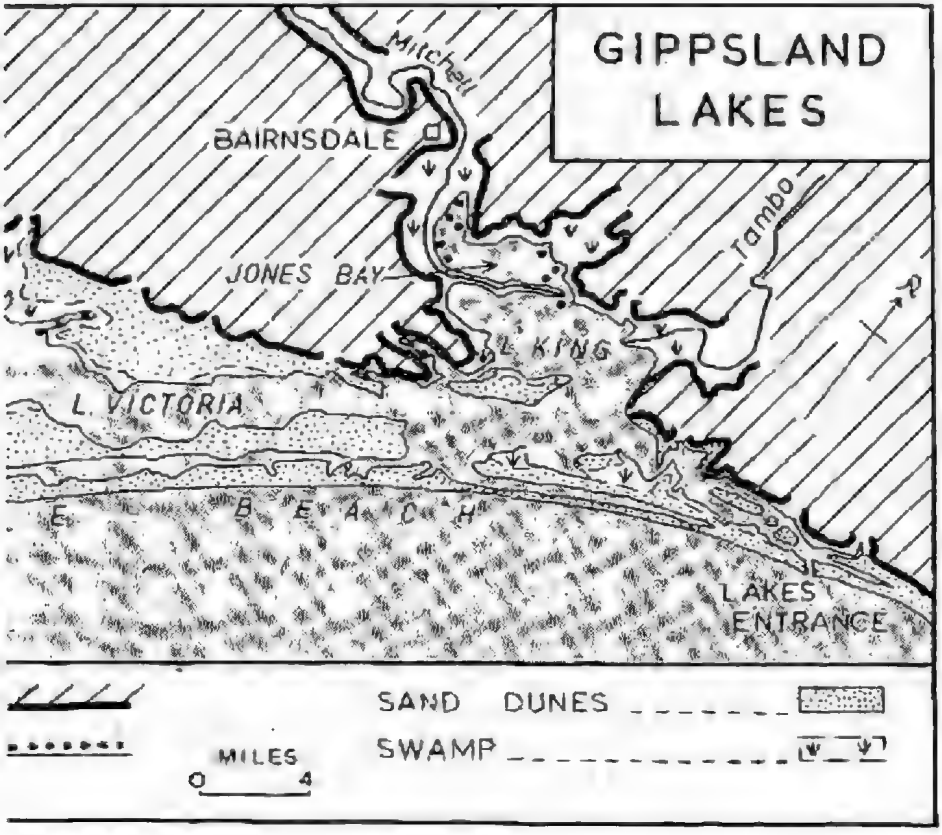


FIGURE 2

Gippsland Lakes area, showing details of topography and vegetation.

In Lake Wellington, reed growth is most prolific on the section of shore that is sheltered from waves generated by the prevailing westerly and south-westerly winds, but reeds have disappeared from equally-sheltered sections of Lake King, south of the Mitchell delta. Water weeds, notably the fresh-water Eel Grass (*Vallisneria spiralis*), are abundant outside the reed fringe in Lake Wellington (see Fig. 3), and they may contribute to the "damping-down" of wave action. In Lake King the marine Grass Wrack (*Zostera* spp.) is present, and may play a similar role, but its presence has not permitted the survival of reed growth south of the Mitchell delta. Current action is strongest in narrow straits, such as McLennan's Strait, linking Lake Wellington to Lake Victoria. Reeds border this Strait (it was not possible to include them on Fig. 2), narrowing on the outer bends of the two meanders, where current action is undercutting the banks, but they are not present in a similar situation on McMillan's Strait, the narrow strait linking Lake Victoria to Lake King at Paynesville. It is not possible to account for the reduction of reed growth in terms of exposure to waves or currents.

Phragmites grows best on a substratum of river silt, or in the organic mud which it tends to accumulate on lake shores. Such a substratum persists near the shores of Lake King in sections from which reeds have disappeared, so that a change in sub-



stratum conditions cannot be the explanation. The spreading of sand along the shores of Lake Victoria must be regarded as a consequence, rather than a cause, of changes in shoreline vegetation, the sand having been eroded after removal of a fringe of swamp land.

Under favourable conditions, *Phragmites* will grow in water to a depth of more than 4 feet. If the level of the lakes were raised the margin of the reed fringe would recede to the new 4 feet limit, but it would only disappear completely if the depth of water immediately adjacent to the shoreline were more than 4 feet. Reeds have disappeared from sections of the shore where the water is shallower than this, so that a change in lake level cannot be the explanation.

The possibility of destruction, either by animals or by human actions, needs careful consideration. Reed growth is damaged where cattle graze and trample the reeds, and where swans congregate and nest; it is damaged by fishermen, and by the wash caused by boats. Each of these effects can be demonstrated locally to have reduced the reed fringe, and to have led to erosion of swamp land (or reclaimed pasture land) behind it, but if interference were the primary cause, the pattern of reed growth should be related to the accessibility of the shorelines. This is not the case, for on the one hand reed growth persists on the shores of Jones Bay, which are readily accessible, and on the other it has disappeared from the southern shores of Lake Victoria, which are not readily accessible.

Phragmites growth is certainly limited by high salinity. The fact that it dies out as estuaries open to the sea indicates a limit of salinity tolerance somewhat below the mean salinity of the oceans, i.e. below 35 parts per thousand (3·5%) sodium chloride. The present distribution is clearly related to the present salinity regime within the lakes, in that reed growth persists on parts of the shore that are farthest from the most saline part of the Lakes, the artificial entrance from the sea.

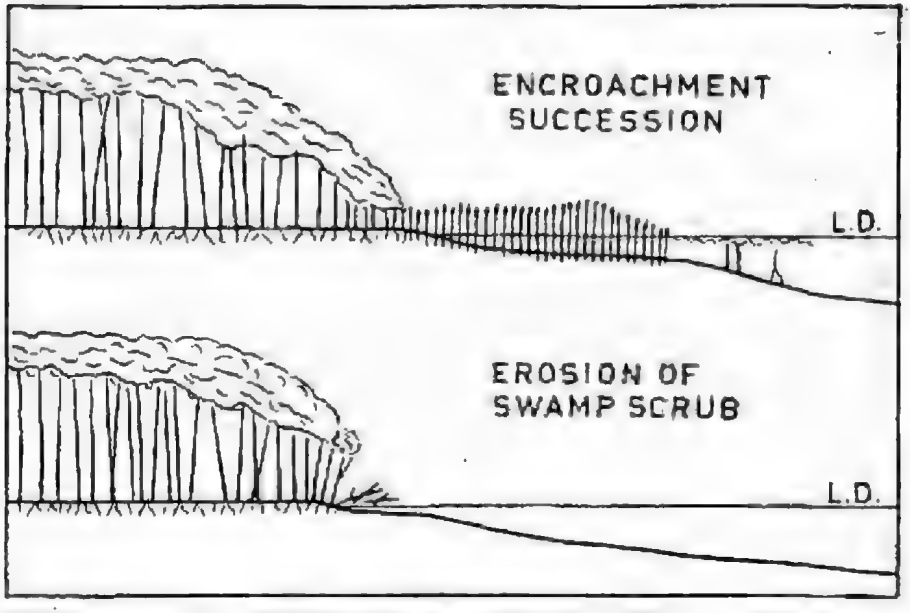


FIGURE 3
Diagrams illustrating sections of lake-side vegetation.

FIGURE 4
Swamp Paperbark being undercut by wave action.

Salinity tolerance of Phragmites communis

Accurate measurements of the salinity tolerance of this species are quite rare. In the marshes of Louisiana, according to Dr. J. L. Chamberlain (personal communication), *Phragmites* is essentially a fresh-marsh plant, and will not grow where the salinity of soil water exceeds 1·05%. Finnish ecologists, working on the extensive *Phragmites* fens on the shores of the Baltic, did not include salinity as a limiting factor, but the Baltic Sea off the Finnish coast is rather less saline than Lake Wellington, where salinity often exceeds 0·50% in summer. A closer comparison may be made with the estuarine lagoons of South Africa, where Professor Day and his co-workers found evidence that *Phragmites* died back during droughts, when lagoon salinity attained high levels (personal communication).

It is clearly possible that salinity is the primary factor limiting reed growth in the Gippsland Lakes, and that the reduction of reed growth has resulted from an increase in salinity in the lakes. A comparison was made between two sites on the shores of Jones Bay, alike in degree of exposure, nature of substratum (soft black mud), depth of water, and accessibility to animals and men. The first, at the western side of the bay, had a reed fringe, but the second, on the northern shore of the Mitchell delta, was being eroded, following the loss of a former reed fringe, traces of which were found in the mud offshore. Salinity measurements over the period November 1958 to May 1959 gave the results set out in the table. It appears that the limit of salinity tolerance for *Phragmites* is approximately 1·00%–1·20%.

Has lake salinity increased?

If the Gippsland Lakes were somehow freshened, it is likely that reed growth would become more extensive, spreading around the lake shores and resuming its former stations. The artificial entrance which now permits free influx of sea water at Lakes Entrance was opened in 1889, and prior to that the lakes may well have been less saline than they are now. There are no accurate measurements to prove that this was so, and the documentary evidence, as far as it goes, shows that the lakes were never completely fresh. Before the artificial entrance was cut, a natural outlet existed intermittently just east of Lakes Entrance. When the level of the lakes was raised by river flooding, an outlet was formed through a narow section of the coastal barrier, but in dry summers when the level of the lakes fell, wave action on the seaward side of the barrier tended to seal off the natural outlet. On some occasions ships were trapped high and dry for several months, and it was the difficulty of navigating the variable natural outlet that led to the cutting of a permanent artificial entrance. On February 1, 1874, in the latter half of

TABLE OF SALINITY

(Jones Bay—November 1958 to May 1959)

Site	*Salinity*
With reed growth	Substratum: 0·75%–1·20% Lake water: 0·36%–0·73%
With no reeds	Substratum: 1·20%–2·12% Lake water: 1·24%–1·89%

a dry summer, Skene and Smyth observed that "the waters of Lake Wellington are fresh, those of McLennan's Strait brackish in the upper part and salt near Lake Victoria", but nowadays, in a dry summer, the waters of Lake Wellington are certainly not fresh they show surface salinities of up to 1·06%. The fact that salt marshes occur west of Lake Wellington has no bearing on this problem. They occupy enclosed depressions where water dries out each summer, maintaining soil salinity at a high level. The salinity is evidently an inheritance from an earlier marine phase, before the coastal barriers sealed off the lakes from the sea.

Although it is clear that the lakes have never been quite fresh, the possibility that their salinity has increased since 1889 to a level that has substantially reduced the extent of the former reed fringe offers an adequate explanation for existing conditions. The idea of increased salinity is supported by the fact that salt marshes are extending at the expense of swamp scrub on land adjacent to the lakes (*Melaleuca ericifolia* also has a limited salinity tolerance); by the repeated invasion of the lakes by the marine plague crab *Paragrapsus*; and by the penetration of the marine wood-boring shipworm, *Teredo*, to the lower reaches of the Mitchell river.

Prevention of the erosion

If sea water were kept out of the lakes it is likely that reed growth would revive, and erosion would be arrested. The barrages constructed at the mouth of the Murray river in South Australia to exclude sea water from the coastal lakes have led to a freshening of those lakes, and to the development of reed growth along parts of their shores. However, the problem of barrage construction is more difficult in the Lakes Entrance area owing to the absence, at reasonable depth, of any foundation as firm as the South Australian aeolianite rock. The effects of such a barrage might soon be offset by the formation of a new natural breach on the narrow section of the coastal barrier near Ocean Grange, 8 or 10 miles down the coast from Lakes Entrance.

An alternative would be to introduce some plant capable of taking the role formerly played by *Phragmites*, but with a higher salinity tolerance. The Rice Grasses (*Spartina* spp.) grow well on the margins of estuaries and lagoons in Europe and North America, and an investigation of these in terms of the Gippsland Lakes problem is desirable. Townsend's Rice Grass (*Spartina townsendii*) has developed vigorously in estuaries in Britain, but it spreads across mudflats that are exposed at low tides, and such mudflats do not exist on the shores of the almost tideless Gippsland Lakes. Moreover, recent research suggests that this species may be only temporarily successful, for die-back has developed in some British estuaries (Goodman, 1959). It is possible that some North American species can invade from the shores of brackish lagoons.

The erosion problem in the Gippsland Lakes is part of a much wider problem of conservation, requiring combined physiographic and biological research. The area would be a fine site for a field centre of the type established by the Field Studies Council in Britain, a centre where research work is accompanied by the training of students in the field sciences, geography, botany, and zoology.

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Lightwood — *Acacia implexa*

By JEAN GALBRAITH

In Victoria, there are few native wattles that bloom in midsummer. One of the few is Lightwood—as refreshing as a passing cloud on a hot day.

People often couple it with Blackwood (*A. melanoxylon*), as if the two were similar; and even the names are confused, for Blackwood is commonly called "Lightwood" in Gippsland. They are not much alike really. Blackwood has phyllodes that are short and blunt; those of Lightwood are four to six inches or more long, tapered to a point at each end, and with a sickle-like curve especially in young luxuriant growth. Young phyllodes may be no more than a quarter-inch wide, but mature ones are as much as an inch at the broadest part.

Blackwood is a densely-growing forest tree, abundant in sheltered gullies and well-watered lowlands; Lightwood is smaller and more slender and it is usually a tree of relatively dry hillsides. However, the latter is abundant in the light forest which still covers some tracts of level country beside the Prince's Highway in Gippsland, to the east of Stratford. The two species can be seen growing side by side near Murrindal, a little to the north of Buchan.

Blackwood has creamy or primrose blossom which appears in early spring; Lightwood has lemon-yellow blooms and they come in midsummer or later. The curved brown pods of the two are outwardly similar, but one of the key distinctions between the species is inside those pods. The seeds of Blackwood are almost surrounded by the double curves of their stalklets (funicles). The funicle of Lightwood, though several times folded, does not even partly surround the seed.

Blackwood is solid and strong; Lightwood is light and graceful with its strongly-veined phyllodes hanging slenderly. The veins of the latter are parallel and rather numerous, following the curve of the leaf. The light-yellow flower-heads of Lightwood are small and globular, very loose but rather long-stalked. The heads form small clusters or loose racemes arising from the axils of the terminal leaves.

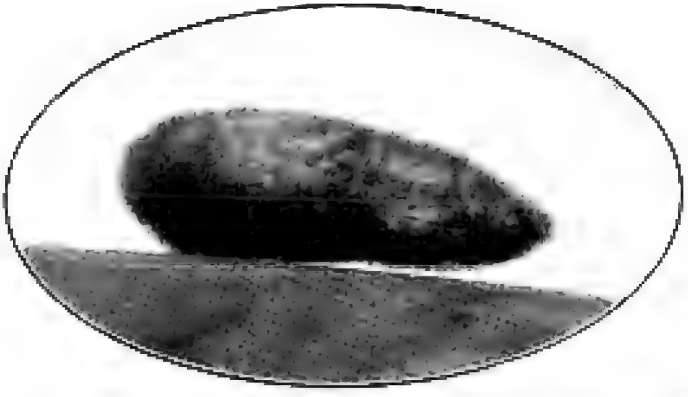
Lightwood extends northward, through New South Wales, into Queensland.

Lightwood, *Acacia implexa*
Photo: F. J. Bishop

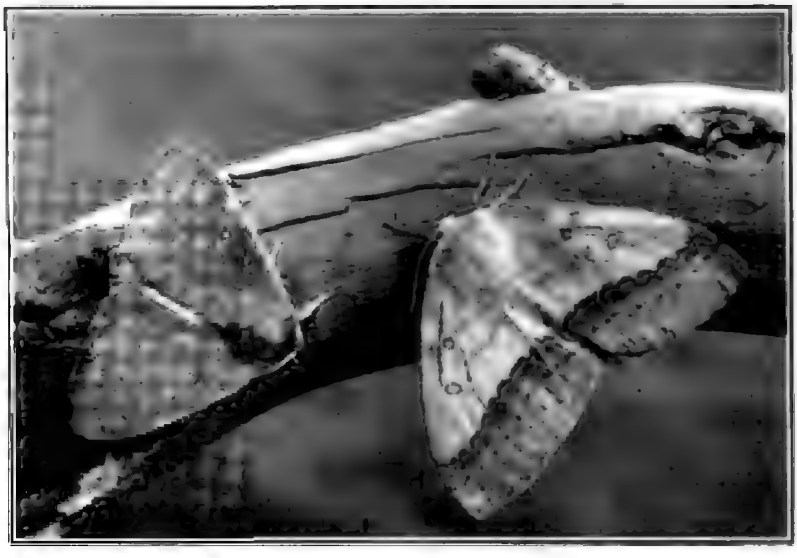
Life History of *Anthela nicothoe*

A Picture Story by David Fleay

The moth, *Anthela nicothoe*, has no common name. Its larvae, like those of many other species—especially of the family Anthelidae—are known as "woolly bears", because of their dense covering of bristles. The caterpillars hide by day but are abroad for food at night. The cocoons they spin for pupation are white and silky at first, but the spines are eventually pushed out through the covering so that the cocoons too become "woolly bears". This is an excellent protection, for to touch a cocoon usually results in an irritating rash. These four photographs appeared originally in the November 1935 issue of the *Victorian Naturalist* (Vol. 52, pages 127-132), illustrating an article by David Fleay, entitled *"Anthela nicothoe*—An Interesting Moth".



"Woolly-bear" cocoon with brittle spines projecting.



Yellow female moth—right (wing spread 1¼ inches)

Fawn-coloured male—left (wing spread, 2⅝ inches)

Woolly-bear larvae of *Anthela varathon* on twig of wattle

emale moth, upty cocoon d ocolate-brown gs.

Present and Past Distribution of the River Red Gum and Related Eucalypts

By EDMUND D. GILL*

Fossil red gum is common in Quaternary deposits in Victoria. These fossil woods have been determined by Mr. H. D. Ingle of C.S.I.R.O. Division of Forest Products, who advises that while it is possible sometimes to distinguish by wood structure *Eucalyptus camaldulensis* and *E. tereticornis* it is usually impossible to separate these and *E. blakelyi* which form a group of three very closely related species. For the following discussion of palaeobotanical distributions, the three species will be treated as one and called "red gum".

The *E. camaldulensis* group of eucalypts occurs in all states of Australia but not in Tasmania. It is remarkable that this tree, which can adapt itself to so wide a range of environments, should not be present in Tasmania. During the Pleistocene periods of low sea level, floral exchanges took place across what is now Bass Strait, but the red gums apparently did not make this crossing. This note suggests why the distribution was not extended to Tasmania.

A stump of red gum with a trunk of about 4 ft. diameter was found *in situ* about 63 ft. below present low tide level on the site of the south abutment of the Spencer Street bridge over the River Yarra at Melbourne, Victoria (Chapman 1929, Gill 1949). Two radiocarbon dates have been secured for different parts of the piece of stump preserved in the National Museum of Victoria, as follows:

U.S. Geological Survey W-95: 8780 ± 200 years

Yale University Y-151: 8300 ± 210 years.

The sea must have been at least 10 ft. lower than the stump, or the salt water would have killed this tree. Godwin, Suggate and Willis (1958) have shown that this date and level fit in with levels from other parts of the world also dated by radiocarbon to show the Flandrian Transgression occurring progressively from 13½ to 5½ thousand years ago. In Victoria the climate was colder and wetter when the red gum was growing, as is shown by the palaeobotanical remains associated with the fossil stump (Willis 1955, Duigan and Cookson 1957), the contemporaneous sedimentation in the Keilor Terrace (Gill 1955), and the relationship of the C^{14} date to the oxygen isotope palaeotemperature curve of Emiliani (1958).

In spite of the colder climate, red gums were flourishing in Melbourne 8500 years ago, but it would appear that they were at about the limit of their range. Mr. A. B. Costin of C.S.I.R.O. Division of Plant Industry has kindly informed me that "*Eucalyptus blakelyi* extends some 20 to 30 miles southwards from Queanbeyan and Canberra towards Michelago in the northern part of the Monaro. The mean annual temperature at Queanbeyan is about 56·5°F. and at Cooma (about 40 miles south of the southern limit) is 54·1°F. Therefore 55°F. would be a reasonable figure for the lower limit of *E. blakeyi* in the Monaro Region."

The Commonwealth Bureau of Meteorology has kindly supplied the following present mean annual temperatures for eastern Australian centres:

Sydney	63·7°F.
Melbourne	58·8°F.
Stanley	54·8°F.
Launceston	54·9°F.
Hobart	54·4°F.

These figures show that the present mean temperature in Tasmania is barely high enough to support red gums, and so during the glacial periods of the Pleistocene, Tasmania would have been far too cold. When by reason of low sea levels the red

* Curator of Fossils, National Museum of Victoria.

gums had the opportunity of migrating to Tasmania, the climatic conditions did not allow it. A reconstruction of the ecology of Bass Strait during the last low sea level suggests that streams and lowlands suitable for red gums existed there at that time.

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The Passing of a Great Plantsman

James Wales Clarendon Audas

By J. H. WILLIS

On October 12, 1959, the last personal link with our former Melbourne Herbarium, as it was before the turn of the century, snapped in the death of Mr. J. W. C. Audas who was almost 87. It was through the influence and recommendation of Baron von Mueller that he embarked on his botanical career of 40 years in the Public Service; and, when retirement came in December 1937, he had been senior botanist at the National Herbarium since 1923 (for 12 years of which there were only two permanent officers on the staff).

Joseph Audas, the father, was an artist in England; but, after migrating to Victoria, he took up farming and other rural pursuits in the Beaufort district where James was born on December 7, 1872. There were ten children, of whom only 93-year-old Percival still survives—he was formerly a miner and sawmiller in the Nar-Nar-Goon district. Other members of the family also attained ripe ages. Young James was educated at Grenville College, Ballarat, and in March 1890 (when 17) he came to Melbourne as a clerical assistant in the Titles Office—his first Public Service appointment. But there was more congenial employment awaiting one who later admitted that "the bush always exerts a magnetic influence over me". He loved everything that contributes to the beauty and distinctive charm of Australian bushlands, particularly the plant-life, and in October 1897 he was appointed Herbarium Assistant in the Chief Secretary's Department, at a salary of £81 per annum. Mueller had died just a year previously and was succeeded as Government Botanist by J. G. Luehmann, under whom Audas did his initial training in matters botanical. Following Luehmann's death (1904) and the arrival of Professor Ewart from England (1906), Audas was promoted in December 1910 to Class "D", with salary of £348.

He joined the Field Naturalists Club of Victoria in June 1906, and the meeting of July 1947 conferred honorary membership for his services during more than 40 years. He had been a committee-man for four years (June 1926-June 1928, 1932-33, 1935-36), had conducted numerous excursions in the Port Phillip area, and assisted in naming material for the big wildflower shows of the 1920s and 1930s. He served on the original plant names committee and the reconstituted body of 1943.

There has always been a close liaison between the Naturalists Club

and Melbourne Herbarium. Indeed, it became almost a tradition that at least senior officers of the latter should also be ardent F.N.C.V. members, and this may help to explain why systematic botany has always loomed so large in the club's interests, covering more pages in the *Victorian Naturalist* than any other branch of natural science. The monthly journal was a very convenient vehicle for publishing regional notes, local lists of species, revisional studies and descriptions of botanical novelties (that by now must have run into hundreds of new species and varieties). To these papers James Audas contributed his share.

After the establishment of Wilson's Promontory as a national park, Professor Ewart arranged for Messrs. Audas and St. John to spend a fortnight there in October 1908 for the purpose of making "a complete botanical survey". Audas's report, with list of the 364 plant species (excluding cryptogams other than ferns) then known to occur within the 102,000-acre reserve, was published in *Vict. Nat.* *25*: 144-149 (Jan. 1909)—his first contribution to scientific literature. These two investigators revisited the Promontory in October 1909 and October 1910, their reports appearing in *Vict. Nat.* *26*: 133-136 (Jan. 1910) and *27*: 208-214 (Mar. 1911) respectively; following his third visit Audas could record just 500 species of indigenous plants for the national park.

In September 1912 he accompanied the Minister for Public Works and a parliamentary party on a tour of inspection to the Grampians (Hall's Gap, Wonderland, Mt. Rosea, Barney's Creek, Mt. William, McKenzie Falls, Mt. Difficult and Wartook); Messrs. C. and F. D'Alton went along as local guides. Audas was enchanted by "this glorious wonderland" which drew him back again and again over the next 18 years, until he had seen most parts of the ranges. His impressions furnished a series of chatty articles for the *Victorian Naturalist* and these papers were later brought together in book form. His swan song in the *Naturalist* [*63*: 136-139, 160-164 (Oct.-Nov. 1946)] was "A Botanical Retrospect" of thrilling times spent among the Grampians. It was there, on Mt. Difficult during October 1919, that he had found a new shrub (*Trymalium ramosissimum*) which was described in *Vict. Nat.* *38*: 35, t. 1 (Aug. 1921)—one of the only two new species he ever described, the second being *Persoonia coriacea* from Merredin, W.A.

Other trips within Victoria were to the Bairnsdale-Bruthen-Buchan region (Sept. 1910), Tambo Valley to Omeo and Benambra (Oct. 1911), Mt. Cole at the southern end of the Pyrenees (Easter 1912), Koo-wee-rup Swamp to Gembrook and Beenak (Oct. 1915), Portland district (Sept. 1916), Yarram and Tarra Valley (Oct. 1917), Balangum Ranges north-east of Stawell (Oct. 1920), Black Range south of Horsham (Oct. 1927) and the Benalla district (Sept. 1933). Thus he covered a large portion of the state, excepting the Mallee and Alps. Much material was collected for exchange with extra-Victorian botanists, and the floristic features of each area were discussed in travelogue form through the *Victorian Naturalist*.

Audas had first visited Tasmania in December 1905, and a month was spent in Queensland during July-August 1908—see *Vict. Nat.* *25*: 177-188 (Mar. 1909). Subsequently he returned to both states, and also travelled through Western Australia (Aug. 1926), New South Wales (Aug. 1932), New Zealand (Jan. 1937), South Australia and *via* the Stuart Highway to Darwin—a post-retirement venture after World War II. Several of these journeys were undertaken in conjunction with meetings of the Australian and New Zealand Association for the Advancement of Science, but Audas seldom contributed a paper to the various botanical sessions: at the Auckland meeting of 1937 he spoke on his favourite theme, "The Flora of the Grampians".

He kept no private herbarium, but had a wide circle of correspondents. A work of some magnitude was his identification of many hundreds of numbered specimens from the Western Australian collector, Max Koch, in 1924. These valuable collections remain in Melbourne Herbarium, but sets of the *Acacia* and *Myrtaceae* numbers went also to Sydney. He was

a prolific writer for agricultural and horticultural journals and for ordinary newspapers, besides which he published three books and three brochures, *viz.*:

Books: *One of Nature's Wonderlands — the Victorian Grampians* (1925), *Native Trees of Australia* (1934), *The Australian Bushland* (1950).

Brochures: *General Observations on the Australian Flora* (1929), *Australian Vegetation* (1933), *The Flora of Mitcham* (1938).

Australian Bushland (712 pages) is a *pot-pourri* of practically all his other writings, embellished by many additional plates, and it re-tells his botanical wanderings of half a century.

In addition to a long period of membership with the F.N.C.V., J. W. C. Audas had been an Associate of the Victorian Royal Society for a few years from 1911. He was also a Fellow of the International Faculty of Sciences (London), Fellow of the Royal Society of Arts (London), Fellow of the Linnaean Societies both of London and Lyons (France), and a Fellow of the Royal Microscopical Society.

For the last 20 years he resided at Norwood Avenue, Brighton Beach, having previously lived at Mitcham and before that in Punt Road, Prahran. Tall, broad-shouldered and of commanding appearance, Audas was formerly dark and athletic, having been an enthusiastic cyclist who was fond also of golf and tennis. Most people remember him as a bluff, hearty, kind-natured man. Always an excellent gardener, and never without an impressive assortment of good vegetables, he delighted to share his home produce with neighbours and visiting friends. Up until the last few days, when succumbing to congestion of the lungs, he worked among his beloved garden plots.

On November 26, 1928, he had married a nursing sister, Marjorie Lawless Bell, who survives him and who is assured of the sympathy of his botanical colleagues, within and outside the Field Naturalists Club.

Field Naturalists Club of Victoria

General Meeting—December 12, 1960

The president, Mr. D. E. McInnes, chaired a well-attended meeting. He referred to a survey of Gippsland which is being carried out by the State Development Committee and for which evidence will be required of areas suitable for setting aside as nature reserves. He announced that arrangements are being made for the affiliation of Warragul and other recently-formed F.N. Clubs.

Anyone knowing the address of a club member, Sapper Robert H. Stranger, was asked to contact the secretary.

It was announced that the bookstall which has been run so successfully and profitably for the F.N.C.V. by Miss M. Lester for a number of years, will now be able to sell only club publications, as the bookseller concerned has decided that the arrangement was too unprofitable.

Members were reminded that the botany group will need specimens illustrating seed dispersal for its display at the Moomba show.

Mr. Quirk drew attention to a recent article on the conservation of animals in Africa, and asked for the support of members in making a contribution to a fund for providing water in the fauna parks.

Members were asked to collect (legally) any specimens which could be of use for the Little Desert scene to be displayed in the September nature show.

It was moved that Miss Florence Smith, who has been a member for forty years, should be made an honorary member, and it is hoped that her attendance at a meeting can be arranged soon for the presentation of the certificate.

Mr. Norman Wakefield gave a talk on Victorian mammals. He gave some details of the evolution of the three main groups, showing the unique position occupied by Australia in having most of the primitive mammals of the world and few of the more recently evolved orders. Changes were outlined which took place either before or after the coming of Europeans to this country, and some aspects of conservation were discussed. Finally a series of colour slides was shown, illustrating habitats and activities of native mammals as well as some of the animals themselves.

The nominees for membership listed in the November *Naturalist* were elected as members, and those present were welcomed individually.

Nature notes: Mr. Wilson reported having seen a small goanna swimming in a creek—something he had never heard of before.* He also reported having heard, near Ensay, that many people are visiting the district "for the kangaroo shooting", and suggested that these activities should be investigated.

Entomology and Marine Biology Group —November 7, 1960

The recent club excursion to Step Beach, Aireys Inlet, was discussed, and there was particular interest in the zoning of different groups of shells, such as periwinkles, mussels and limpets. Members who took part in the trip to Central Australia referred to the crustacean *Apus*, seen in pools on Ayers Rock; it disappears when the waters dry up but reappears when they return. A large water-beetle, *Dytiscus*, obtained in Palm Valley, was exhibited under a microscope to demonstrate structural details. Also under microscopes were examples of briazoa (moss animalcules)—a freshwater form typical of ponds in the Royal Botanic Gardens, and a marine species associated with tube-worms on sea-weed. The group discussed other forms which associate with tube-worms, and these can be seen with the naked eye, then their parts examined with a hand-lens and finally more detail is revealed by the microscope. A white scale-insect, found on a piece of bark, was placed under a microscope; it was covered with a substance resembling icing sugar, and there was a cluster of similar young ones.

*Probably the Water Dragon, *Physignathus lesueurii*, which may exceed 3 feet in length.—Editor.

Fauna Survey Group—

December 1, 1960

The final group meeting for the year was devoted mainly to general business. Plans for obtaining equipment were discussed as well as such projects as the group exhibit at the Moomba nature show and the surveying of the Jumping Creek reserve. A letter had been received from a wildlife officer of the C.S.I.R.O. in Canberra, stating that a party would be visiting Buchan to band bats in about a week's time.

Proposals for the protection of rock-wallabies and Potoroos in Victoria were discussed with Mr. J. K. Dempster who was present at the meeting as a visitor from the Fisheries and Wildlife Department.

Plans were outlined for forthcoming field excursions. Three members planned to carry out live trapping and other observations in the Buchan area, from December 3 to 9, and to co-operate with the C.S.I.R.O. bat-banding party. Four of the group, as well as Mr. Dempster, are to spend about a week studying aspects of the mammal fauna of the Colac–Otways area, from December 9 to 16. Saturday, January 14, was proposed for a group excursion to Warrandyte.

Mr. K. Simpson gave an account of observations during a recent visit to Lady Julia Percy Island, where there were some thousands of Fur Seals and a single Elephant Seal. The island is six miles off the coast of south-western Victoria and is therefore within the political boundary of Tasmania.

A system was worked out for the preparation of a comprehensive mammal species index to the *Victorian Naturalist*, and several members obtained series of early volumes from the club library to work through.

The final part of the meeting was devoted to the screening of colour slides, mainly of mammal subjects, by Messrs. Simpson, Wilkinson and Wakefield.

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

GENERAL MEETINGS

Monday, January 9, 1961—At the National Herbarium, commencing 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. **Subject for Evening:** Items by Members.
4. Nominations for Membership.
5. General Business.
6. Nature Notes and Exhibits.
7. Conversazione.

(Note: An extraordinary general meeting will be held at 7.55 p.m. to consider the affiliation of the Warragul F.N. Club with the F.N.C.V.).

Monday, February 13—"The Bindibu Country", by Dr. D. F. Thomson.

F.N.C.V. EXCURSIONS

Sunday, January 15—Lake Mountain. Parlour-coach will leave Batman Avenue at 9 a.m. Fare, £1; bookings with excursion secretary. Bring two meals.
Saturday, February 11—Botany Group Excursion. (Details at group meeting.)

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

Thursday, January 12—Fauna Group (commences 7.30 p.m.).
Wednesday, January 18—Microscopical Group.
Wednesday, February 1—Geology Group: Members' Holiday Experiences.
Monday, February 6—Entomology and Marine Biology Group. In Mr. Strong's rooms, Parliament House. Use private entrance, south end of House.
Thursday, February 9—Botany Group: The Plant Kingdom—General.
Thursday, February 9—Fauna Group (commences 7.30 p.m.).

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February 9, 1961

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

CONTENTS

Front Cover:

"Rearing up in anger, a six-foot Brown Snake prepares to strike forward with open mouth." This was the caption when the photograph appeared in the *Victorian Naturalist* in January 1943. It accompanied an article by David Fleay, entitled "The Brown Snake—Dangerous Fellow". This specimen certainly looks the part!

Beware — This Small Snake is Dangerous

By David Fleay

The unbelievably sudden death of a practical joker, following a bite from a mystery snake only 25 inches long, was revealed in 1959 at a coroner's inquest in Sydney. Exhibiting the small reptile on a bar counter at Drummoyne, the man was bitten on a finger, where the fangs apparently entered a vein. The victim died within seven minutes. At the coroner's inquest, Mr. J. R. Kinghorn identified the reptile responsible as the Rough-scaled or Clarence River Snake.

The tragedy lends weight to accumulating evidence that this comparatively rare little snake, *Tropidechis carinatus*, belonging to coastal south-eastern Queensland and north-western New South Wales, has so far been greatly underestimated. Textbooks dismiss it as "venomous, but not deadly", and "not aggressive—unlikely to be dangerous to an adult". Even its maximum length has been given as 30 inches. Yet, we have captured this greenish-brown species, with its darker broken cross-bands, in the South Coast swamps of Queensland, at lengths of three feet.

We find the Rough-scale to be almost invariably nocturnal, and persistently pugnacious, lunging fast and furiously with coughing hisses when approached. Captivity doesn't mellow it and I regard it as the "fightingest" small snake I've ever encountered—one that is more likely to retaliate when approached than most others. At Beechmont a little one killed Mr. Campbell Duncan's cattle dog inside half an hour. On West Burleigh Road, Mrs. Nitz's fox terrior died, even though we tried to save it with Tiger Snake antivenene. A large mouse, flectingly bitten at West Burleigh, lasted a mere three minutes. One, less than a foot long, bit me on the right hand and, in spite of one-the-spot incisions, symptoms over the ensuing 24 hours embraced a stiff neck and headache, accelerated heart action, sweating, and repressed breathing. Evidently the venom of the species is strongly neurotoxic. It is highly probable that the fast-moving rough-scaled species was the snake responsible for a young woman's death in 1957 after nine days in hospital following a bite at night at Binna Burra.

Without any alarmist ideas, I think it just as well for inhabitants and visitors to coastal vicinities above and below the New South Wales-Queensland border not to wander in bare feet in swampy areas after dark. All our captures of these snakes have been made at night time either in paper-bark tea-tree (*Melaleuca viridiflora*) swamps, along creek beds, or on roads traversing such localities; so it is not so remarkable that these tough little characters are not seen by day. After dark they hunt certain species of frogs and show

also a partiality for mice and tiny marsupials of the genus *Sminthopsis*.

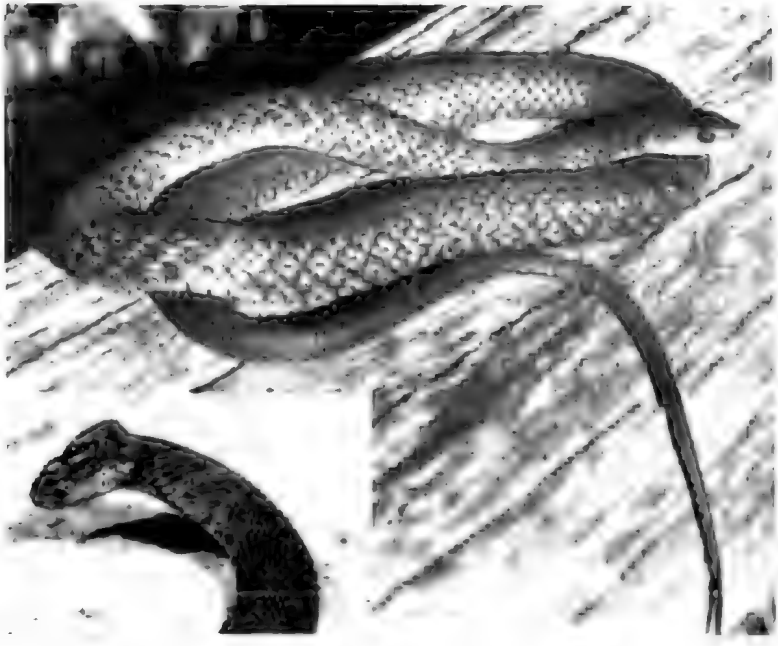
In many respects *Tropidechis carinatus* is just what one would expect of a pocket-edition Tiger Snake. The term Rough-scaled Snake arose from the fact that, of the scales on the upper surface, all those along the mid-dorsal line possess a slightly raised KEEL. The outer ones are smooth.

Associated with its restricted habitat and comparative rarity are its small litters. Two specimens to come under our notice as traffic victims have contained seven young at the most, and the species is not an egg-layer but gives birth to immediately active progeny.

Take a good look at the markings and appearance of this uncommon and typically angry little snake in the accompanying pictures. Only recently, after a number of attempts, did photographs of our rough-scaled fellows turn out successfully, for hitherto the small, fast, and very savage creatures have beaten me repeatedly.

Olive-green above, with numerous broken crossbands of a darker shade, this particular bad-tempered, pugnacious specimen was brought in by Mr. Bill Freeman of Currumbin Creek, Queensland. We've called Freeman's 33-inch fellow "Arrowhead", for, immediately any of his kind becomes angry, the jaw angles expand, giving the head an extraordinary likenes to the business end of an arrow.

Thirty-seven inches is the length of the longest specimen we have ever captured. When disturbed *Tropidechis* is anger personified. Accompanied by explosive hisses, it lunges again and again, and is more accurate in striking than the Death Adder, Tiger Snake or Black Snake. Truth to tell, when it comes to "milking time", I'm far more at home dealing with our Adders, Brown Snakes and Taipans. I



The harmless Freshwater Snake, which shares the Habitat of the Rough-scaled Snake.

Inset:
Arrowhead appearance of angry Rough-scaled Snake.

hate handling those quick, foul-tempered, little reptiles.

Correspondence which followed an illustrated article of mine on the Rough-scaled Snake in the Brisbane *Courier-Mail* showed how easily confusion could arise between the nasty little Rough-scale and the quite harmless Freshwater Snake (*Natrix mairii*). Actually this is the only other snake for which it could be mistaken. This confusion is intensified because habitats overlap and *Natrix* is found in much the same surroundings as the dangerous rough-scaled species. Certainly there is a superficial resemblance between the two.

Not so fond of the water as its name would suggest, *Natrix* has no venom glands nor specialized fangs and lives on frogs about swamp margins. Often called "Water Tiger" it grows to about three feet and ranges roughly from the Clarence River north into New Guinea. Unlike the rather rare Rough-scaled Snake it is quite common about Brisbane, though it is not usually such a nocturnal wayfarer as its bad-tempered relation.

Usually of a tweedy pepper and salt colour, each upper scale is fitted with a strongly-keeled ridge so that numerous raised lines appear to run the reptile's whole length. If anything, this gives it more of a rough-scaled appearance than its rather badly named colleague. The belly scales may be a beautiful salmon-pink.

In the unlikely case of an accidental bite, when of course it is always wise to kill and deliver the responsible snake to the nearest doctor, you could immediately relieve yourself of much worry by inspecting the attacker's hind end. *A double row of scales under*

the tail immediately distinguishes the Freshwater Snake from the Rough-scaled Snake, and never does the Freshwater fellow's head assume the arrowhead angles of an angry Rough-scale.

It is important to remember that, though the Rough-scaled Snake is a menace because of the danger of blundering on to it in the dark, the Commonwealth Serum Laboratories have established that Tiger Snake antivenene affords protection against its bite. Nevertheless further work is in progress on venom being provided by three Rough-scaled Snakes at our West Burleigh Fauna Reserve, and for this purpose they are sent under the rather unromantic labels of A, B and C.

Note: In *T. carinatus*, body scales are in 23 rows—dorsal ones KEELED and outer ones SMOOTH; anal is entire; ventrals number 165-171; sub-caudals 52-54, all single.

Manganese Nodules

By E. M. DAVIES

Challenger Cruise

In 1872 the British ship H.M.S. *Challenger*, with its party of scientists and naturalists, under the command of Sir Wylie Thomson, commenced its four-year cruise for the study of the oceans of the world. Prior to this expedition only a relatively small amount of sea research had been undertaken, mainly in connection with coastal topography. Since the *Challenger* cruise, there have been other expeditions, sponsored by various nations and carrying greatly improved equipment. The development and installation of continuously recording deep-sea echo-sounders have resulted in much additional topographic information, thus revolutionizing this aspect of submarine geology. However, the findings of the *Challenger* still rank high in the annals of deep-sea research.

Red Clay and Manganese Nodules

One of the most important discoveries made by the *Challenger* was that the most abundant abyssal ocean deposit is the so-called red clay. It is considered that the red clays are decomposition products of pumice, volcanic glass, windblown dust, and other fine particles, their reddish-brown colour being due to the presence of oxides of iron and manganese. Surveys show that in the Pacific, the red clays are darker and contain more manganese than those of the Indian Ocean, while the latter are darker and contain more manganese than those in the Atlantic.

Associated with these red clays, the *Challenger* expedition found numerous nodules consisting predominantly of manganese. The nodules vary from minute, granular deposits to large masses several pounds in weight. In some regions "everything at the bottom, even the bottom itself, appeared to be overlaid with manganese". Kuenen (3) states that all hard surfaces whether pebbles, rocky bottom, coral fragments or shells that remain for a sufficiently long time uncovered on the sea floor, in certain areas, become coated with manganese. This takes place in all depths at least below a few hundred metres.

A single dredging made by the *Challenger* in the Central Pacific from a bottom of dark chocolate clay at a depth of 2385 fathoms, yielded between two and three bushels of manganese nodules. In addition there were 15,000 specimens of sharks' teeth and fragments, about 50 ear bones of whales, 12 rounded pieces of pumice and 6 rounded pebbles.

Scripps-Navy Survey

The U.S.A. Scripps-Navy Survey of 1950 both contributed to and verified previous data concerning the mid-

Pacific Ocean. It had been known that certain shallow seamounts (isolated elevations that rise more than 600 fathoms above the sea floor) were a topographical feature of the oceans. This survey found that certain seamounts of the mid-Pacific were not separated by deep passes, as thought previously, but formed part of a great ocean ridge upon which the seamounts rise as peaks. This ridge, called the Mid-Pacific Mountains, is a great submarine mountain chain that extends from Necker Island in the Hawaiian Group to near Wake Island, a distance of 1500 nautical miles. It forms a well-defined geomorphic feature of ocean topography and is surmounted by sharp peaks and ridges as well as by anomalous flat-topped *guyots*.

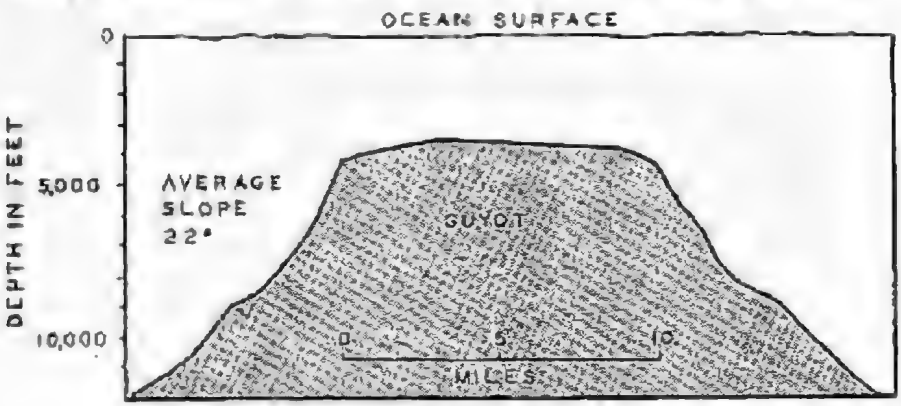
Guyots

These *guyots* attracted world-wide scientific interest when Henry Hess published a paper in 1946 on drowned islands of the Pacific Basin (2). Hess became aware of these flat-topped seamounts from echo-sounder traces while on war-time cruises for the U.S.A. He named them *guyots* after the nineteenth century Swiss-American geographer, Arnold Guyot, and the name has been accepted. Several hundred of these submarine islands are known in the Pacific Ocean, and a few have been reported in the Atlantic, Arctic and Indian Oceans. Hess believed that the guyots were of volcanic origin, their flat tops being due to wave action. The Scripps-Navy Survey substantiated this theory by research on and around five of the *guyots*, and in addition found on two of the *guyots* a "well integrated reef-coral, rudistid, stromatoporoid, echinoid and molluscan fauna that lived in Cretaceous times". This is the oldest fossil fauna yet found in the Pacific Basin. Manganese was present on all of the *guyots* where it formed coatings and crusts on all types of rocks and sediments and was apparent as flakes and nodules in all dredge hauls.

In general the *guyots* are between half a mile and a mile from the surface. Some *guyots* were apparently submerged during the Cretaceous to below the zone of reef-coral growth, finally sinking to their present depth. The submergence is thought to have been due to regional subsidence of the sea bottom resulting for the most part from isostatic adjustments and subcrustal forces. A minor part of the submergence is due to increase in ocean volume and sedimentation. In general the findings support Darwin's subsidence theory for the formation of atolls.

Manganese Deposits on Land

There is some manganese in almost every kind of rock in every country, but it is not a very common element. Both manganese deficiency and excess manganese in the soil can



Cross Section of a Guyot (Planated Conical Seamount). After Hess. The Horizontal Scale is in Nautical Miles.

Manganese Nodule Dredged off Cape of Good Hope by H.M.S. *Challenger* during its Voyage 1872-6. (National Museum of Victoria Mineralogical Collection, No. 6166.)
Left. Exterior of Nodule (Natural Size).
Right. Interior Structure of Nodule. (Position of Fracture shown in photo. on left.)

be a problem to the agriculturist. The amount of manganese in plants varies with the soil to a greater extent than that of any other essential element. In Australia manganese deficiency disease has been noted with many plants but is most acute with oats and barley, and it can be the cause of complete failure of the crop. The supply of manganese is ample on all acid soils in Australia except for some very poor leached sands. In fact it can rise to poisonous concentration in some acid soils, especially if they remain moist and the rain is not heavy enough to wash out soluble salts. As a result, tobacco, growing on acid soils, often suffers from manganese poisoning.

More than 200 minerals contain manganese as an essential element. It occurs in the earth's crust combined with other elements, chiefly oxygen and silicon. Almost all manganese ore deposits are of secondary origin. The most important kinds are residual, replacement and sedimentary. Residual and replacement deposits are formed from the weathering of manganese-bearing minerals which are sparsely or moderately distributed in underlying or nearby rocks. By the weathering of silicate minerals containing manganese (garnet, rhodonite, pyroxenes, etc.) the manganese is changed to manganese oxide. These oxides may accumulate to form residual manganese deposits at or near the surface since they resist solution during weathering.

Manganese ore minerals are of considerable economic importance. Manganese is used to harden and toughen steel. Its use in metallurgical processes such as the treatment of uranium ore is invaluable. It has a wide range of chemical uses, one of the most important being the use of pyrolusite in the filling mixture of dry batteries. Other uses are in the paints, pigments, disinfectants, fertilizer and glass industries. Pliny records its use by the Ancient Egyptians and Romans in glass manufacture.

In Australia the largest known deposits of manganese ore occur in the Peak Hill district, Western Australia. The ore there (mainly psilomelane) occurs as surface cappings sometimes more than 50 feet thick overlying barren rock. The deposits

are believed to have been formed by the replacement of the weathered lateritic material of an old land surface with manganese dioxide derived from nearby manganese - bearing rocks, and conveyed there by surface waters. In South Australia manganiferous haematite (iron ore) containing up to 30% manganese comes from the Iron Monarch. Manganese compounds (oxides, carbonates and silicates) play a conspicuous part in the silver-lead-zinc lodes of Broken Hill in New South Wales. In New Zealand, all manganese mined has come from pockets or lenses associated with contemporaneous spilitic volcanic rock ("red rocks").

Manganese Deposits in the Ocean

Bacteria and algae deserve serious consideration as agents in precipitating manganese from solution. It has been said that the manganese of the sea floor is mineralogically close to *wad*. This is an impure manganese ore formed by the precipitation of manganese oxides in lakes of low-lying areas through the action of minute plants. Several genera of bacteria common in soils and in oceanic muds, especially *Crenothrix*, *Leptothrix*, *Cladothrix* and *Clanothrix*, precipitate manganese oxides from a number of manganese salts. It is possible that some bacteria precipitate manganese carbonate. It has been considered that the spherical and concretionary forms of manganese oxides, such as are found near Tschiaturi in Russia, may have been deposited by algae. Numerous perfect sharks' teeth and a few invertebrate fossils indicate a marine origin for these beds. Although it is possible that the sedimentary particles absorb some manganese before reaching the sea floor, arguments point towards direct precipitation on the floor. The rate at which the manganese oxide is precipitated would be influenced by the alkalinity of the water, the oxygen content and the rate of water movement.

The association of manganese, volcanic rocks and pyroclastic material on the ocean bed is an established fact. A theory advanced for the deposition of manganese is that the manganese is easily derived from the alteration of volcanic rock fragments, that it goes into solution as carbonate, is oxidised by the dissolved oxygen of the sea water, then precipitated near its point of derivation around any nuclei at hand.

Manganese Deep-sea Nodules

Manganese ocean nodules range from spherical and elliptical to irregular in shape. They are said to conform to a great extent to the shape of the nuclei. The surfaces are commonly botryoidal and mammillary, much like those which characterize manganese nodules on land. The concentric layering of the nodules is evidence for a concretionary origin, and for the suspension of these nodules in the sediments where accretion could take place on all sides. Nodules formed round nuclei on a hard surface would tend to be flat on one side (for example "biscuit" nodules). It has been stated that both fresh water and ocean manganese nodules are more radio-active than the average igneous and sedimentary rocks. It is noteworthy that although every ton of sea water contains only 0.001 to 0.01 gm. of manganese, this mineral is concentrated in suitable environments in the form of nodules.

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By JEAN GALBRAITH

Black Wattle—*Acacia mearnsii*

There could hardly have been a more appropriate name for our Black Wattle than *Acacia mollissima*, as most of us knew it, for that means "most soft"; but unfortunately that name belongs elsewhere and we must henceforth call our tree *Acacia mearnsii*. Black Wattle blooms in more or less open forest in southern Victoria, throughout November and early December, when its dark foliage is hidden by clouds of soft primrose blossom. Occasionally it begins to flower in late October.

It has a warm, rather heavy fragrance, which some find too strong but which suggests to me all the pleasantness of late spring days, of flowering grasses and harvest time, and those clouds of the "most soft" wattle blossom along country roads.

Black Wattle
Photo: F. J. Bishop

Black Wattle is usually a tree 20 or 30 feet high, and it often has a spread greater than its height. Its brownish-green or black bark exudes "stalactites" of amber gum. The branchlets are slightly—and as a rule crookedly—angular, but they lack the sharp, almost winged angles of *Acacia decurrens*, the Sydney Green Wattle.

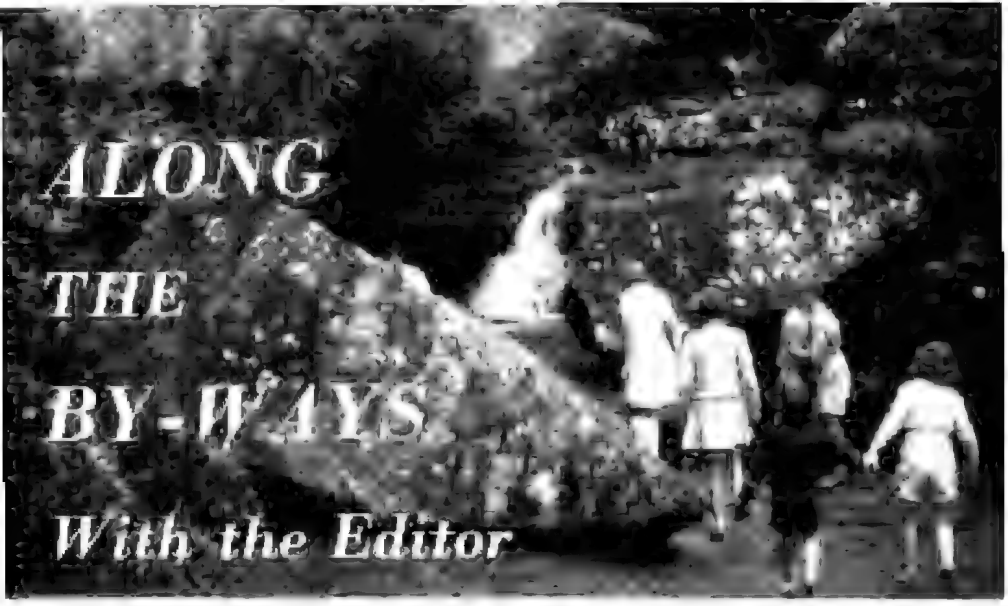
Acacia mearnsii belongs to the small group of feather-leaved (bipinnate) wattles, all the Victorian members of which have flowers in globular heads. The feathery leaflets (pinnae) are composed of up to 60 or more pairs of small segments or pinnules. The last are relatively short and broad, with their edges very close or actually touching, which gives the leaf a rather firm appearance. Mature leaves are dark green and shining on the upper side but duller and minutely hairy underneath. The young growth is yellowish and downy, and it becomes bright green before finally maturing.

The pale yellow blossom grows in panicles at the ends of the branchlets and in short axillary racemes, not hanging down like those of Silver Wattle, but rounding the branch ends with soft colour. Though the heads are small they are very abundant and attract more bees and butterflies than any other wattle I know.

By Christmas the soft bloom is gone and below the springing new growth hang bunches of narrow seed pods—reddish brown and lumpy, and curving as they dry and open.

A related wattle is *Acacia paucijuga** of eastern Victoria and southern New South Wales. This is a tall shrub with minutely rough leaves with about 20-30 pairs of pinnules to each pinna. It flowers in late summer.

*See *Vict. Nat.* 72: 93 (October 1955).



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.

"Inconsiderate Songsters"

This is the title given by Dr. R. M. Wishart to an account of unusual nesting sites of some thrushes. However, one gathers from the narrative that he appreciated the companionship of the birds rather than that he deplored their lack of consideration. This is Dr. Wishart's story:

For the past three years our visits to "The Shack" near Cape Liptrap during the months of November and December have been complicated by the fact that Grey Thrushes have built their nests in most inconvenient places. We have a small porch open at each end which proves an excellent spot to hang our canvas shower, pieces of rope, haversacks, etc., on large nails driven into the studs. There is also a rack to hold brooms and a rail for our tea towels.

Two years ago the canvas shower was selected as the nesting place. It was therefore, while we were there, a question of jumping into the cold creek or going dirty, as the shower was definitely out of action. Last year a pair of Grey Thrushes nested on top of our brooms, so that meant that the women folk were debarred from sweeping.

On December 8 last year we were surprised on our arrival to find a nest built between two haversacks hanging on a nail just outside the door. Each time the wire door was opened the edge of the door was only inches from the nest which contained three eggs. Next morning two babies had arrived, leaving a single egg to hatch. After the arrival of the third of the triplets later that day we watched the female tidy up the nest by eating all the pieces of egg shell. She became so tame that twenty-four hours after making my acquaintance she was accepting flies and pieces of cheese and fat from my fingers.

On the third day, which was a "scorcher", there were blowflies round the nest, and we noticed a peculiar smell. Unfortunately one nestling had died. Although we did not witness the event the parents (or a parent) removed the corpse and must have taken it some considerable

distance before dumping it, as there was no sign of the poor wee thing's body close handy. Two brown fluffy half-naked youngsters were left.

Whenever the sitting member wanted a change of scenery, a series of melodious calls was exchanged between the pair, then followed the changing of the guard.

Cattle Eating Stringybark

Apparently some cattle have an unusual taste for the fibrous bark of stringybark eucalypts. These are some comments on the subject by Miss P. Carolan of the Melbourne University Geology School.

A farmer west of Woodend drew attention to some dying Messmates (*Eucalyptus obliqua*) in a partly-cleared paddock. They had been effectively ringbarked by cows. At Hurstbridge several Red Stringybarks (*E. macrorrhyncha*) had been stripped to cow-head height, and teeth-marks were apparent on the wood. Other trees in the paddock (box and gum) were untouched. In the Toongabbie district some Stringybarks (probably *E. scabra*) were dead and others had been protected with barbed wire. Near Balliang, at the foot of the Brisbane Ranges, we were watched as we walked past by two inquisitive heifers with bark hanging from their mouths; then they went back to chewing at a felled stringybark log.

Perhaps some country readers who have more opportunity to observe this sort of behaviour could comment.

Swamphens at Lara

In July last, these columns contained some notes by Robert Turner on the activities of Black-shouldered Kites near his home at Lara in central Victoria. Here are Robert's notes on another species of bird that inhabits the district.

Recently, beside the creek at Lara, I was attracted by the calls of an Eastern Swamphen. I turned round and saw a fox emerging from the reeds with one in its mouth. Each year many are killed by foxes and many are shot, but in spite of this they still remain plentiful.

They inhabit about two miles of creek at Lara. Most of this is thick reed-beds and lagoons—their favourite haunt. If there is a crop near the creek they go into it, trample it down and make tracks through it. Therefore they are not very popular with farmers.

As spring approaches they bite the centres out of reeds and bend them over to make platforms. I have found two nests of Swamphens in crops. Some of the birds are very tame. This year there was a nest which I could approach to within two feet before the bird left it. However, most of them leave the nest quietly before one comes very close.

Each year a number are run over by cars while crossing the road. If a car approaches, they do not hurry but walk slowly across, flicking their white tails.

Swamp Harriers also kill a few. They fly up and down the reeds for hours until they see one. While I was watching a mother and her family of seven crossing a grassy paddock, a Harrier flew overhead. The mother flew for the reeds and the young ones squatted down in the grass until the Harrier had gone.

Your *Victorian Naturalist*

Members or subscribers who pay fees for the current club year (May 1960 to April 1961) should receive all issues of the *Victorian Naturalist* from May 1960 onward. Those who pay a subscription for the latter half of the year should receive all issues from November 1960 onward.

Occasionally these conditions are not fulfilled for one of a number of reasons, and some issues go astray in the mail—particularly if there has been a change of address.

Persons who have not received *all* copies of the *Victorian Naturalist* due to them should not hesitate to inform an appropriate office-bearer of the club so that the omissions can be rectified.

Victorian Cave Bats

By Graeme George and Norman Wakefield

During the past several years, observers have paid some attention to the bat fauna which inhabits caves in various parts of Victoria. It is apparent that this field of study had been neglected, for recent comprehensive books on our mammals give a very incomplete picture of the local distribution of the three species with which this report is mainly concerned.

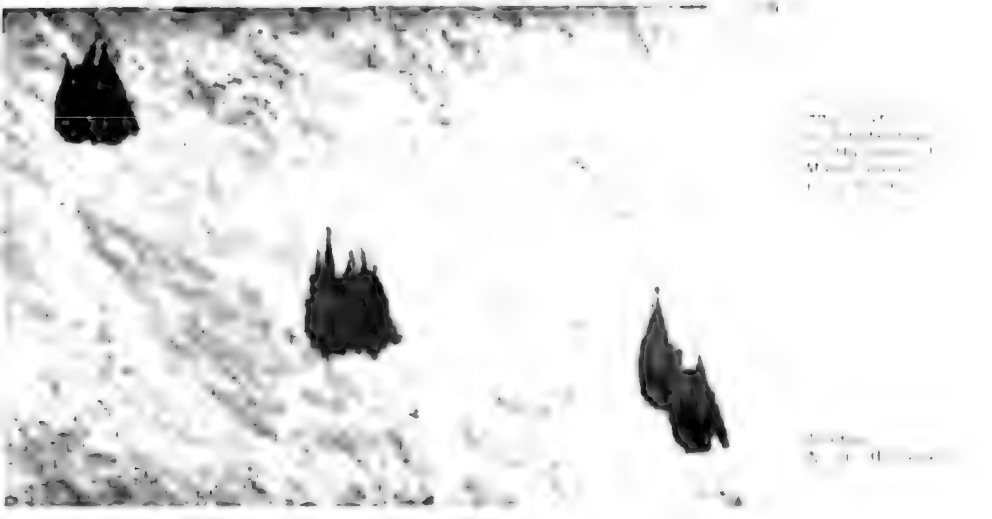
In the various editions of *Furred Animals of Australia* (1943-1957), Ellis Troughton cited the Bent-winged Bat (*Miniopterus schreibersi blepotis*) as "not yet recorded from the . . . south-eastern corner of the continent", the Eastern Horseshoe Bat (*Rhinolophus megaphyllus*) as ranging south to "the Murrumbidgee River, southern New South Wales", and the Large-footed Myotis (*Myotis adversus macropus*) as "apparently not yet recorded from eastern Victoria or New South Wales". None of these species appears in C. W. Brazenor's *Mammals of Victoria* (1950).

In actual fact, the Bent-wing is the common cave bat of south-eastern Australia, the Eastern Horseshoe Bat is plentiful in limestone caves of the Buchan district of eastern Victoria, and the Large-footed Myotis occurs at Buchan also. Our present knowledge of the cave bats of this state is due firstly to observations by members of cave exploration societies, and secondly to recent investigations by the Fauna Survey Group of the Field Naturalists Club of Victoria.

For the first correctly identified records in Victoria of *Miniopterus* and *Rhinolophus*, credit belongs to Miss Barbara Dew of the School of Public Health and Tropical Medicine, Sydney University. When asked recently for specific data about these records, Miss Dew replied that the observations were made at Buchan from December 24, 1953, to January 2, 1954. Her notes were as follows:

> The Eastern Horseshoe Bat, *Rhinolophus megaphyllus*, was caught and released in Blackwood Cave (only a few specimens seen) and one of a group was caught at the entrance to the Royal Cave (open to tourists) at night. These bats were only seen in this locality at night and then only in the first part. They were *not* found in the cave itself during the day. (Specimen Aust. Museum Reg. M 7823.)
>
> *Miniopterus schreibersi* (*blepotis*) was very common and we took specimens from the following caves: Federal (a few), Blackwood (common), Moon (plentiful) and Wilson (very, very common). In this last cave they were so plentiful that we left them in complete possession as general exploration would have been most unpleasant due to the rain of guano. (Specimen Aust. Museum Reg. M 7824.)

Since its formation about a year ago, members of the Fauna Survey Group of the F.N.C.V. have made a number of field excursions to basalt caves in the Colac district of western Victoria and to the limestone areas



of the Buchan country. Notes have been kept of numbers of cave bats in certain of their habitats, and from these a general picture may be obtained of the status of the three species under discussion and of the fluctuation in their numbers in various places.

Bent-wing Bat

Miniopterus schreibersi blepotis

The Bent-wing is widespread and very common in Victoria, and we have identified it from caves in the Buchan and Colac districts, from rock crevices along the Yarra River at Warrandyte and from a granitic outcrop near Genoa. Cave bats are known to occur in other parts of the Western District and eastern Victoria, and most likely these are Bent-wings also.

Although it was not recognized in Victoria, *Miniopterus schreibersi* was identified correctly in South Australia. In 1925, Wood Jones cited "a good series captured in the Naracoorte caves". (Ref. *Mammals of South Australia*, Part III, p. 433.)

In the Buchan district, most of the accessible limestone caves and recesses opening on hillsides or in cliff faces contain colonies of Bent-wings at one time or another. They have been observed by members of the Fauna Survey Group in Moon, Maze and Spring Creek Caves in the Buchan Caves Reserve, in Mabel, Clogg's and Wilson Caves at East Buchan, and in the Anticline Cave* at Murrindal. About fifty miles north of Buchan, near McKillops Bridge on the Snowy River, there are some old copper workings; a tunnel has been driven into the hillside and this is a regular roosting-place of Bent-wings.

In the basalt at Mount Porndon, in the Stony Rises of the

*This name has been adopted by the Speleological Society for the old Federal Cave at Murrindal, to avoid confusion with the well-known Federal Cave at Buchan.

Western District, there are two lava tunnels which have collapsed at one end, making them accessible. One of these is O'Callaghan's Cave; it has long been used by large numbers of Bent-wings, and accumulated guano has been mined from the floor of the tunnel.

One of us (N.W.) has had a colony of Bent-wings under observation for over twenty years, in a granitic outcrop about two miles south-east of the township of Genoa in East Gippsland. A mass of rock has moved a little to leave a large crevice several feet wide and twenty feet or more deep. From this, lateral crevices take off, providing a day-time roosting-place for a colony of the bats.

The Bent-wing has apparently never been specifically recorded for Victoria in our literature on mammals, evidently because of its confusion with the Wattled Bats (*Chalinolobus*). Three specimens from the Genoa colony were presented to the National Museum of Victoria in 1959 and, when acknowledged by letter, they were identified as *Chalinolobus gouldii*.

Bats of the genus *Chalinolobus* derive their popular name from the wattle-like lobe near the angle of the mouth. *Miniopterus* lacks this lobe. The latter may be distinguished by the very long third digit of the front limb, which is folded against the upper wing when the animal is at rest — hence the name

"Bent-wing". The Bent-wing is uniform chocolate brown, as is the smaller Chocolate Bat (*Chalinolobus morio*). Gould's Bat, (*C. gouldii*), although about the same size as the Bent-wing, is distinguished by its light-brown sides and the contrasting black colour of the head. All three have short muzzles and short rounded ears. The two genera differ in dentition: in *Chalinolobus* there are only two lower premolars on each side, compared with three in *Miniopterus*.

Bent-wings are gregarious, congregating in tightly packed clusters on favoured parts of a cave or tunnel roof. The clusters usually vary from two or three individuals to several hundred, but occasionally about 2000 have been seen in one group. Regular roosts are indicated by piles of guano and by etching in the roof—probably the action of excreta. On several occasions, solitary Bent-wings have been examined and these have proved to be males, while animals taken from large clusters have been females.

These bats are often in a torpid state during cold weather, owing to a lowering of body temperature. Towards evening, in preparation for feeding flights, the animals overcome this state by a period of shivering, to promote better circulation. During warm weather, however, Bent-wings usually move as soon as one enters their roosting chamber, a torch-beam being sufficient to cause them to fly further into a cave.

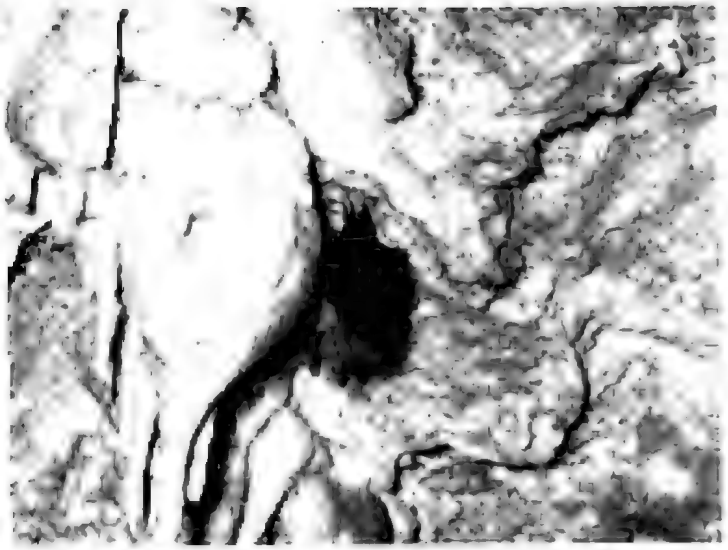
During visits by the Fauna Survey Group to the Buchan and Colac areas, fluctuations have been noted in numbers of Bent-wings in various of their habitats. However, observations have been insufficient to allow definite conclusions to be drawn about their movements.

When O'Callaghan's Cave at Mount Porndon was first visited, in June 1960, there were about 1400 bats in occupation. It was afternoon and the animals were torpid. A day later, they did not appear to have shifted position and it was thought that they may have been hibernating, but a visit after dusk revealed that most of the colony had left the cave. The remaining 200 or so had shifted and were in a cluster about 18 inches in diameter. These were restless and, disturbed by the torch beam, began to fly about. Most of them did not leave the cave but settled eventually in the original daytime position.

In August, there were about 2000 Bent-wings in O'Callaghan's Cave, and in December there were only thirty. Members of the Colac F.N. Club have occasionally found this cave to be empty of bats.

In late May 1960, there were about 150 Bent-wings in a cluster high up in the large inner chamber of Mabel Cave, and here and there groups of three or four on the walls. In August there were several near the entrance of the cave but none further in, possibly because the low access tunnel was partly filled with water. In December, there were no Bent-wings in Mabel Cave.

The mine tunnel near Mc-



Killops Bridge contained 200 bats in early December but was empty three weeks later. In August there were few bats in Moon Cave, but in December there were about 200 Bent-wings. On the latter occasion, Spring Creek Cave had about 300. Despite the very large numbers reported by Miss Barbara Dew in Wilson Cave in 1953-4, there were only about a dozen Bent-wings there in December 1960—one cluster of five and the rest solitary.

The Anticline Cave at Murrindal and Clogg's Cave at East Buchan usually contain 20 to 40 Bent-wings and, on each occasion when the Genoa colony has been visited recently, there has been a similar number there.

Eastern Horseshoe Bat
Rhinolophus megaphyllus

The Eastern Horseshoe Bat is more static than the Bent-wing. We have observed it only in the limestone country about Buchan—in the Anticline, Mabel, Maze and Moon Caves. The Anticline Cave at Murrindal carries the largest numbers and a few dozen are usually to be found there.

One of us (N.W.) visited the Anticline Cave, with a local resident, Mr. Peter Hodge, on January 20, 1959, and an Eastern Horseshoe Bat was caught as it flew through a passage near the entrance. This was presented later to the National Museum of Victoria—the first example of the species from this state to reach that institution. No observations were made then in the large inner chamber of the Anticline Cave and it was not realized that the place was frequented by Bent-wings as well.

In May 1960, there were about thirty Horseshoe Bats in the Anticline Cave, all solitary; a few Bent-wings were there also but not in the clusters that this species usually makes. In

August, an estimate was made of fifty Horseshoe Bats, and about a dozen Bent-wings were noted; and in September about twenty Horseshoe Bats were seen. It is difficult to assess the exact numbers of bats in the Anticline Cave, for they move individually from place to place in the vast cavern as they are disturbed; the population seems to remain fairly constant, however.

Mabel Cave at East Buchan had about a dozen Horseshoe Bats in May, none in August, and four only in December; and on occasions a few of the species have been seen in the Maze and Moon Caves at Buchan.

We have not observed the Horseshoe Bats in clusters of any kind. Each individual apparently prefers to roost away from its neighbours in the same cave. Probably because of its solitary habits, the Horseshoe Bat, unlike other local cave species, characteristically wraps the wings round its body, evidently for warmth, as it hangs from cave roof or stalactite.

In *Rhinolophus* the rear part of the nose-leaf projects upward to form a somewhat acute triangular segment. The group to which it belongs is characterized by the front part of the nose-leaf being shaped like a horseshoe. Neither *Miniopterus* nor *Myotis* has a nose-leaf.

Large-footed Myotis

Myotis adversus macropus

The Large-footed Myotis is apparently an uncommon species; we have found it only at East Buchan, in Clogg's Cave. It was first noted there in late September 1960, when one of us (N.W.) found two lots of bats in that habitat. There were numerous Bent-wings, which were very restless and flew about the cave when approached; and there was a clus-

Eastern Horseshoe Bat, showing details of Nose-leaf.

Cluster of Large-footed Myotis, in Clogg's Cave, East Buchan

ter of about twenty smaller bats which were so torpid that those handled made no attempt to fly. The latter proved to be *Myotis*.

Two members of the Fauna Group visited Clogg's Cave in December and found two groups of *Myotis* there. A cluster of about fifty were identified, by means of spotlight and binoculars, high in the main chamber, and there was a cluster of 23 on a low part of the roof. Young bats were present in both groups.

When Clogg's Cave was visited in May 1960, some Bentwings were caught and identified. It is likely, however, that *Myotis* was present also but escaped notice. Probably Clogg's Cave is a regular home of the latter.

Myotis adversus macropus has very large feet (1 cm. long) and, compared with *Miniopterus*, its ears are long and narrow and project well out from the head. The *Myotis* is a lighter brown and the under-surface is grey to grey-brown. One specimen observed at East Buchan was somewhat rufous on back and under-surface.

Cave Bats of New South Wales

Over the past twelve years, speleologists have compiled data about cave bats in New South Wales. They have found this fauna to be the same in their

state as we have at Buchan, both in the species represented and the relative abundance of each.

Bent-wings have proved to be the commonest, having been noted, often in hundreds, in about a dozen cave systems or artificial shelters in eastern New South Wales. The Eastern Horseshoe Bat has been recorded from three of the cave areas of the same region. The cave explorers found the *Myotis* once only, at Narrangullen near the Burrenjuck Reservoir, evidently in May 1953.

A recent record of the *Myotis* has come from Mr. D. Purchase of the C.S.I.R.O. Wildlife Survey Section, Canberra. He reports that there was a colony of about 100 individuals in a cave on the Burrenjuck prior to 1960 but that it had disappeared from there over the past year. They may have been the same group that the speleologists observed.

The C.S.I.R.O. has for some time been carrying out a bat banding programme in New South Wales, mainly dealing with *Miniopterus*, and it is proposed that the banding be extended to the Buchan district of Victoria. Some data on this work has been published in "A First Report on Bat-banding in Australia", by D. Purchase and Pauline M. Hiscox, in *C.S.I.R.O. Wildlife Research 5 (1)*: 44-58 (1960).

Large-footed *Myotis*, showing details of Foot, Ear and Muzzle.

Appendix

The confusion which has existed between *Miniopterus* and *Chalinolobus* places considerable doubt on some of the published information about the latter. Neither the recent New South Wales observers nor we have found Wattled Bats in caves, and the question arises whether the two local species (Chocolate Bat and Gould's Bat) are either gregarious or cave-dwellers.

The little Brown Bat (*Eptesicus pumilus*) was reported from the Anticline Cave at Murrindal in 1958, but we have been unable to authenticate this record.

Field naturalists may help to further our knowledge of these interesting little animals, by reporting the presence of groups or colonies of them when they are found. Live specimens may not be taken except by permit,

as all species of insectivorous bats are now protected by law in Victoria. It would be helpful, too, if any dead specimens that are discovered, such as victims of domestic cats, were placed in spirits and passed on to an appropriate authority.

Acknowledgements

The cost of printing this report at length and of producing the accompanying illustrations has been defrayed by a grant from the M. A. Ingram Trust. The Trustees are thanked for their favourable consideration of the request for such assistance.

We wish to acknowledge the help which has been forthcoming from Miss Barbara Dew, who made available notes on the cave bats of New South Wales and of the Buchan area.

MICROSCOPISTS' CORNER

By C. S. and G. J. MIDDLETON*

Home-made Waterproof Glass Troughs

Hitherto the only satisfactory glass trough available for microscopy was expensive, being professionally made —with vitreous cement and baked in a furnace—and was beyond the capacity of the amateur to construct. The result of his attempts with such materials as glass, ebonite and marine glue, inevitably leaked after a period of use.

Now, with a modern cement—an epoxy resin marketed as "Araldite" —glass troughs for most purposes of the naturalist may be readily made at home with no equipment other than a glass-cutter. They are extremely strong and will not leak.

A good source of glass suitable for troughs is old photographic glass negatives, with the emulsion removed with hydrochloric acid. It is very flat and of good quality.

Among other accessories we have made using this cement is a *Rousselet Aquarium Microscope*, as illustrated on page 269 of *The Microscope and its Revelations* (8th ed.) by Carpenter and Dallinger.

The trough was made from two half-plate negatives separated by three glass strips ¾-inch wide to form the ends and base and cemented at the edges with "Araldite".

The wooden framework to hold the focussing magnifier and the trough was also cemented with "Araldite". This is a stronger join than is given by nails, screws, or any other glue.

This aquarium microscope, like all devices of Rousselet, is extremely useful for anyone studying pond life. So far as we know, it, in common with many other useful devices, is not now made commercially but may occasionally be available secondhand.

With it one can search the water for specific or minute organisms for further study under the microscope, and since it leaves both hands free for using the pipette, the organisms can be readily transferred from tank to slide without being lost.

Notes on use of Araldite

1. Ours was purchased from Brooks Robinson, Melbourne, but doubtless it is available elsewhere and perhaps under other trade names.

2. Directions for use come with the product.

3. It is very easy and convenient to use provided it is not contaminated with water while in the plastic state, as this prevents its setting.

4. It is not affected by the reagents commonly used by microscopists but can be dissolved by powerful paint removers.

5. It could often replace solder as it will join almost anything to anything and is extremely strong.

We have successfully cemented brass rings to glass slips to form moist chambers, etc.

Note: Queries on microscopy are invited. For personal replies, please enclose stamped, addressed envelope.

*68 Victoria St., Sandringham, Vic. (XW 4085).

National Parks and National Monuments—14

Mount Richmond National Park

By J. Ros Garnet

It is a curious circumstance that pioneer settlers in regions rich in primitive bushland rarely interested themselves in permanent protection for samples of their environment. They were by no means oblivious of the aesthetic attractions of their surroundings, but perhaps there was so much of it that it scarcely occurred to them that it was vanishing before their eyes. Every acre of forest cleared, of scrub burned, of swamp drained, gave more immediate prospect of a livelihood from the exploitation of a seemingly inexhaustible resource.

Conservation for the sake of wildlife was a concept slightly ludicrous considering the battle being waged by the pioneers for survival against the forces of nature. Nature was quite capable of looking after herself. If she failed to do so, then the settler would benefit! It was a philosophy that seemed to work well enough when there was room for both, but developments in the last few decades have vastly altered the picture. The swift changes have revealed to those of an older generation that, in a few more years, there might be little remaining of the scene they had known so well. Almost unbelievably the birds and beasts, the wildflowers and wilderness, which had been their constant companions, their peculiarly Australian environment, are disappearing. Their successors may live in an altogether different environment, one which lacks that intangible character which identified its inhabitants as Australians.

One of the first settled districts of our state was Portland, not far from the south-western corner, and the story of its development is as spectacular as that of any Victorian municipality. Despite its long history of human occupation, up until last year it was what a local naturalist described as a national park desert—a region still well endowed with tracts of unalienated, unsettled, even virgin country, the mecca of visitors and tourists from far and wide, the pivot of south-western Victoria and yet a region with nothing to offer the citizen of this rich state but the prospect, in the years to come, of vistas of roof-tops, bitumen and gravel roads, cultivated fields, pine plantations and, of course, the ocean and its harbour; the nearest national park 200 miles away. It was a poor prospect surely in a region so generously endowed by nature with some of the best concentrations of wildlife and some of the most noteworthy geological and physiographic formations to be seen anywhere.

Portland's wildflowers have long been famed among botanists and field naturalists, and one may be sure that their diversity and profusion was a major reason for the formation of the Portland Field Naturalists Club. It was my good fortune to be present as a visitor at the inaugural meeting when, with the support and encouragement of men such as A. H. Chisholm, and the late W. H. Nicholls and F. Bishop, the foundation was laid of a body which was to shape events in the steadily growing movement for nature protection in that region. The club was fortunate in having among its members men with unbounded energy and a capacity for acute and accurate observation. Under their guidance the south-western corner has been thoroughly surveyed and its national park potential well assessed.

The first major project in which the club was involved—undertaken in collaboration with the F.N.C.V. and the R.A.O.U.—was an attempt to bring about the permanent reservation of more than 70,000 acres of wilderness which flanked the Glenelg River in its lower reaches. An account of the proposed reserve was discussed at length in the *Victorian Naturalist* of August 1947 (Vol. 64, pp. 62-91). Had the scheme been adopted there would have been no lament of a national park desert in

the south-west. Instead, that region of the state would have been endowed with a magnificent and spacious national park. However, it is not lost as a nature conservation area because it is now administered as State Forest by the Forests Commission.

Since the end of the Great War large tracts of Portland's best wildflower gardens have disappeared before the blades of earth-moving machinery. Hosts of rare orchids, boronias and other botanical treasures have been swept away. Gone are major habitats of *Microtis orbicularis*, *Prasophyllum beaugleholei* and *Burnettia cuneata*. (In 1936 I had the joy of seeing the last growing and flowering in its thousands, to be supplanted a few years later by tomatoes—which failed to crop successfully anyway). Happily, the Portland club has used its influence to save remnants here and there—small roadside sanctuaries (whose only enemies are fire and vandal), and Mount Richmond.

The dedication of 1534 acres of the mount and its environs as a national park by an amending Act passed in June 1960 is the culmination of more than five years of effort and it is a tribute to the energetic enthusiasm of Mr. N. F. Learmonth, Mr. A. C. Beauglehole and their associates. Through them not only south-westerners but all Victorians now possess one of the choicest of wildlife sanctuaries. It is not to be a tourist resort but rather a strict conservation area where visitors may go to see but not to stay.

Mount Richmond National Park is about 14 miles west of Portland and five miles north of the lovely Bridgewater Lakes. It is bisected by a bush track which is the old telegraph road from Portland to Nelson—a track running parallel to the present Portland–Nelson main road. The terrain of the park appears to be mainly of Tertiary sands and gravels overlying the massive Miocene limestone deposits which are so frequently exposed in the region. Because of the nature of the soil the area has been entirely unattractive to settlers, from even the earliest days of settlement. In 1840 land nearby was selected but Mount Richmond remained unoccupied—even unsurveyed—a neglect which has been to the advantage of the wildlife communities inhabiting the area.

Among more than 450 native plants (excluding algae, fungi and bryophytes) recorded by Beauglehole, there are, in the national park, rare or uncommon flowering plants such as *Gymnoschoenus sphaerocephalus* (Button Bog-rush)—a species sparsely distributed in Victoria in such places as Yanakie near Wilson's Promontory and East Gippsland, *Wolffia arrhiza* (Tiny Duckweed)—often cited as the smallest flowering plant in the world, *Lepyrodia tasmanica* (Branching Scale-rush) which is recorded elsewhere only from the Grampians, *Prasophyllum beaugleholei* in its type locality, *Microtis orbicularis* — an orchid known from very few other localities, *Pterostylis foliata* — the graceful Greenhood of rather rare occurrence, *Cunoxpermum mitchellii*—the Grampians Smoke-bush, *Pultenaea mollis* (Soft Bush-pea)—a shapely species seemingly restricted to the Portland–Nelson region, *Eucalyptus kitsoniana* (Gippsland Mallee) in its most westerly habitat, *Haloragis digyna* (Prickly Rasp-wort)—the only known Victorian occurrence, *Logania ovata* (Oval-leaf Logonia)—its only known habitat, and *Ixodia achilleoides*—the handsome "everlasting" which grows wild only in the south-west and north-west of the state.

In all, the new park is known to harbour 58 species of orchid, 35 rushes and sedges, 34 composites, 33 grasses, 29 legumes, 14 epacrids, 5 eucalypts, 3 boronias and 9 ferns. With such a wealth and variety of plants it is not surprising that more than 90 species of birds have been listed as residents or visitors in the park. Among them are at least ten honeyeaters and eight predatory species. No entomological survey has yet been made, but one may expect the enterprising Portland Field Naturalists Club to undertake that task.

It was unfortunate indeed that in autumn last year the sanctuary was devastated by fire, but it is reported to be recovering very rapidly. Now

in the control of the National Parks Authority there is hope that, in the years ahead, such fires will be rare in Mount Richmond National Park, and that its inhabiting wildlife, especially its varied avifauna, will return to the sanctuary they are entitled to enjoy in a region where the once vast tracts of secluded wilderness are being gradually withdrawn from them and transformed into settled places.

The East Gippsland Field Naturalists Club

By C. BARFIELD

On November 25 last a meeting was held at Bairnsdale to form a Field Naturalists Club. Interest had spread widely and people attended from as far away as Wulgulmerang, Maffra and Sale. Mr. Norman Wakefield addressed the meeting, tracing the history of the Field Naturalists Club of Victoria back to 1880 and describing some of the work it had done. Mr. Wakefield demonstrated the natural history potential of the district with colour slides of the Snowy River gorges and of caves in the Buchan area.

The East Gippsland Field Naturalists Club was duly formed that night, with Mr. Murray Elliott as president; Mr. F. R. Drake, vice-president; Mr. B. M. Nicholson, secretary; Mr. H. F. Lousada, assistant secretary; Mr. E. H. Illidge, treasurer; and Mr. P. T. C. Morrison, excursion secretary.

The club decided to hold a field excursion each month, and it has already held two. In December over thirty members went by boat from Paynesville to the national park at Sperm Whale Head. Mr. Southon, of Paynesville, was leader, and took the party over the eastern end of the promontory. Members of the new club were unanimous that the day was most interesting and the excursion highly successful.

In January an excursion was made to the western end of Lake Tyers. The club was fortunate in having with it Mr. H. C. E. Stewart, a well-known member of the Field Naturalists Club of Victoria. He was a helpful and inspiring companion, and his knowledge of flora and of birdlife was of great assistance. Two members were successful in finding specimens of aboriginal implements, on the hill overlooking Lake Tyers at Cross's Bend. Their discoveries included a little finger axe, a large pounding or polishing stone and a sharpening stone.

Other excursions planned are for February, Nunniong Plateau; March, Den of the Nargun; April, it is hoped to link up with the Bird Observers Club on the Gippsland Lakes; May, Lake Wellington (Strathfieldsaye and Roseneath). Possibilities are for June, the Metung area; July, a project afternoon; August, a geology excursion; in the spring months, to Musk Gully (Melwood), Providence Ponds, Orbost and Sperm Whale Head; November, to the Buchan area; and December, Mt. Skene.

The club has decided to hold meetings monthly, and it is hoped to have a speaker at each one. At its January meeting it was fortunate enough to have Mr. John Béchervaise as guest speaker. The club was most appreciative of the honour accorded it. Mr. Béchervaise spoke on Antarctica and showed coloured slides depicting twelve months in that region.

On February 17, Mr. Norman Wakefield has kindly promised to speak at the monthly meeting. His subject will be "In Quest of the Rock-wallaby". In March, Dr. Clive Disher will speak on the early Gippsland aborigines. In April, it is hoped to have a speaker on birds; and in May, on geology.

The East Gippsland Field Naturalists Club now has fifty members and has affiliated with the F.N.C.V. It considers that it covers one of the most interesting parts of the state. It hopes that as knowledge and experience are gained it will be able to do much to increase interest in natural history and to preserve and protect our fauna and flora.

Field Naturalists Club of Victoria

General Meeting—January 9, 1961

Mr. D. E. McInnes presided and about a hundred members and visitors attended, at the January general meeting of the club. On the motion of Messrs. E. H. Coghill and E. S. Hanks, the application for affiliation of the Warragul F.N. Club was approved.

The president read a report from Miss M. Argo of a meeting of the Landscape Preservation Council of the National Trust. It was decided that the F.N.C.V. be affiliated with the Landscape Preservation Council.

The Girl Guides Association has asked if suitable articles from past issues of the *Victorian Naturalist* may be reprinted in their magazine *Matilda*. This was agreed to, and a member is to be found to select appropriate items.

The Botany Group invited members to attend its meetings. Dr. M. Chattaway will speak on eucalypts on February 9, and Mr. J. R. Garnet is to begin a series on the plant kingdom on March 9. As the tide will not be right on February 4, the Marine Biology Group is to postpone its proposed excursion of that date until February 12.

Ten members contributed pictorial items to the main proceedings of the evening: Mr. F. S. Colliver gave an account of the Glasshouse Mountains of south-eastern Queensland, Miss J. Woollard showed colour slides of several species of Hakea and Grevillea, Mr. W. L. Williams demonstrated some of his impressions of the vegetation of New Zealand, Mrs. Z. Lee showed some excellent colour photographs of the Buchan Caves, Miss J. Blackburn showed a varied series which ranges from Wyperfeld National Park to the Bogong High Plains, Mr. W. Hanks outlined the age of old volcanoes nearest Melbourne and explained the types of rock derived from each, Mr. N. A. Morrison showed a fine series of orchids, Mr. D. McInnes screened examples of slides provided by a Public Library photographic service. Mrs. E. Bennett showed pictures of the contour of the Grampians and examples of the natural history of the area, and Miss G. Neighbour a slide of a freak butterfly—part male and part female—in the Sydney Museum.

Nature Notes. Mr. H. Stewart brought specimens of Common Reed, *Phragmites communis*, from a patch near the King Street bridge where, he said, Reed Warblers could be found. Mr. J. Willis pointed out that this reed grew in Australia and Europe but not in New Zealand; on the other hand, *Arundo conspicua* is found in Europe and New Zealand and the Maoris use it in their artistic pattern weaving. Mr. F. S. Colliver told of a Curlew that had nested in the same spot in a Brisbane garden for fourteen years. Miss E. Dickson told of two albino magpies seen near Yarram, and Mr. E. S. Hanks recalled an albino Tree-creeper. Mr. J. Haines reported countless Soldier Crabs at McLoughlin's Beach by Corner Inlet; Mr. J. Willis reported myriads of eels under Lal Lal Falls—with apparently no hope of ascending them; and Mr. J. Quirk told of many Red and Grey Kangaroos dead along the Mildura to Euston road.

Microscopical Group—November 16, 1960

Fifteen members attended this meeting and the club president, Mr. D. E. McInnes, gave a talk entitled "Freshwater and Marine Bryozoa". The discussion was illustrated by many excellent 35 mm. slides showing details of the simple anatomy of these interesting creatures. Each slide projected was obtained from the Melbourne Public Library by giving the title and page of a book to a member of the staff in the inquiry room, the cost being threepence per exposure. This service, probably unknown to most members, may be of great value to many.

The speaker explained that bryozoa, unlike *Hydra*, live in colonies, though each individual has a distinct

alimentary canal. He showed samples of the freshwater *Plumatella*, found in the Alexandra Gardens, marine species such as *Retepora* or "lace coral", and fossil species from the blue clays of Mornington.

Botany Group—December 8, 1960

The speaker at the group meeting was Miss L. M. White whose subject, "Dispersal of Seeds", was designed to tie in with the F.N.C.V. exhibit at the forthcoming Moomba Nature Show. The main methods of dispersal were explained and specimens illustrating these were shown. Miss White mentioned two books of interest—*Australian Nature Studies* (Leach) and *Geography of Plant Population*—which are available in the club library.

It was decided to begin a series of lectures on the plant kingdom, commencing with a general introduction then dealing with the divisions of the kingdom. This will, it is hoped, give anyone without very much knowledge of botany an introduction to this fascinating subject. Besides those of the Botany Group, other F.N.C.V. members are invited to attend these lectures, and outside visitors will be welcome, too.

Geology Group—December 7, 1960

Twenty-four members were present, with Mr. R. Dodds in the chair. Miss P. Carolan reported on a visit to the Jumping Creek Reserve, Warrandyte, with a representative of the National Fitness Council, in connection with the geological survey of the area. Miss I. Dixon discussed the growth of pines in the plantations in the south-east of South Australia, where sudden bursts of growth had taken place when the roots penetrated to the volcanic deposits underneath. Mr. A. Angior mentioned difficulties experienced with the foundations of the new City Mutual Assurance building in the city. Mr. J. Blackburn gave firsthand information about attempts to cope with flooding in a new sewer tunnel at Spotswood. Mr. P. Fisch displayed an article on fossil man from South Africa, in the *National Geographic Magazine*.

The subject for the evening was Exhibits Night, and the following members explained their exhibits: Mr. A. Cobbett: Tourmaline crystals, obsidian (Lipari Is. and U.S.A.), agate (Uruguay), fluorite (U.S.A.), pitchstone (Scotland), calcite crystals and fossil wood (Nevada). Mr. R. Davidson: fossil tooth or claw (Upper Cretaceous, Qld.), tin crystals (N.S.W.), fossil wood, agates and pebbles (Qld.), zircons and sapphires. Mr. Hairstow: quartz crystals (A.1 Mine, Gaffneys Creek), tourmaline (Brazil). Mr. J. Blackburn: microscopic double terminated quartz crystals in brown coal and fossil gastropods (old coal mine, Altona), Australites, aragonite (Spotswood), rock phosphate. Mr. D. McInnes: polished basalt and quartzite from Bayview Quarries (Tullamarine). Mr. Fish: Tertiary fossils (Aireys Inlet), calcium crystals, calcite and banded limestone (Buchan), sponge fossils from Middle Devonian.

The secretary farewelled Mr. R. Tinekam who had been transferred to Sydney.

Fauna Survey Group—January 12, 1961

Eleven members attended the meeting, with Mr. R. McQueen in the chair. The major part of the evening was spent discussing Christmas field trips. Mr. Wilkinson reported work done at Buchan in early December, illustrating this with a number of slides at the end of the meeting. Mr. Simpson gave an interesting account of an excursion made with Mr. D. Woodruff to Lady Julia Percy Island over the Christmas period. Mutton-birds and Fairy Prions were banded, and the seal colony of 4000-5000 Fur Seals provided much entertainment. Penguins were reported to be nesting at the top of the island which is surrounded by cliffs and rock platforms. The Elephant Seal seen on an earlier trip had gone again, and observers state that it does this each year, appearing for a few weeks before Christmas and then going.

Mr. G. George outlined a week's field work that had been carried out in the Otways area, in company with

Mr. K. Dempster of the Fisheries and Wildlife Department. A Swamp Rat colony was found to be re-establishing itself in a road reserve south of Colac, from which they had been burnt out a few months previously. A search was made in gullies along the Gellibrand River for runways of Potoroos, and live trapping was carried out over several nights yielding a total of twenty Allied Rats. Ringtail Possums were numerous, two Sugar Gliders, a Feathertail Glider and a Phascogale were seen. A report was received from Mr. T. Pescott of Geelong, who found Allied Rats and Yellow-footed Phascogales in a patch of scrub between Lavers Hill and Beech Forest in the Otways.

Mr. Woodruff had recently visited the Jumping Creek Reserve at Warrandyte, and members discussed the forthcoming survey there. Plans for the organization of the group exhibit at the Moomba nature show were finalized, and the meeting was rounded off with the screening of slides of Lady Julia Percy Island and miscellaneous others.

F.N.C.V. Library

As much of the literature in the library caters for the specialist, the club's study groups should make full use of it and should inform the librarian of new publications that should be acquired.

A list of periodicals received is posted on the periodicals display rack; and a complete list of holdings will shortly be issued, both for members' information and for inclusion in indexes of scientific periodicals in Australian and overseas libraries.

The library is at present being reclassified and recatalogued according to the Universal Decimal System, and the librarian would be glad to explain this system to members and to direct them to books newly acquired and ones on special subjects. Lists of these may be published in the *Naturalist* from time to time. As well as specialist publications, others of more general nature are being acquired continually for members with wide interests.

The librarian wishes to hear from members willing to assist in the library on club meeting nights. Previous library or office experience would be desirable but is not essential. Mr. T. F. Zirker has consented to act as deputy librarian for the Botany Group, and it is hoped that members of other groups will volunteer for their respective meetings. Help is needed on general meeting nights too, including the services of a member of the Entomology and Marine Biology Group which does not meet at the Herbarium.

Loans. Members are reminded that loans of books and periodicals must be renewed after two months (maximum loan period is six months). Current periodicals may be borrowed for one month. Members holding copies of *The Microscope* and *Journal of the Queckett Microscopical Society* are asked to return them at the next meeting.

Country F.N. Clubs

Frankston F.N. Club

This club had a membership of 45 seniors and 11 juniors at the beginning of its present year. Mr. R. Marriott is president and Mr. E. J. Kent secretary.

Meetings are held in Willard Hall, Frankston, on the fourth Wednesday of each month. The programme for 1961 is as follows: March 22—Aborigines; April 26—Geology; May 24—Marine Biology; June 28—Members' Night with films; July 26—Annual meeting and exhibition of work and projects; August 23—Birds; September 27—Travel; October 25—Members' night with films; and November 22—Entomology.

These are the excursions that are planned: March 25—Country ramble (south-east Frankston); April 29—Heatherhill and Outlook Road (Flora and fauna sanctuaries); May 27—The Dandenongs; June 24—Gem hunt; July 22—Robinson's Road, Langwarrin; August 26— Display of shells, Beaconsfield; September— Nature exhibition; October 21—Bird watching; November 25—"Arcoona" museum. The pick-up point for excursions is the Frankston Post Office, at 1.30 p.m.

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F.N.C.V.

March 9, 1961

The Victorian Naturalist

Editor: NORMAN WAKEFIELD, B.Sc.

CONTENTS

Front Cover:

By the early 1920s, Koalas had been so reduced in numbers in Victoria —by epidemic diseases, bushfires and shooting—that only about two hundred remained in the State. The Fisheries and Game Department embarked on a campaign of re-establishment which was so successful that we now have many thousands of these popular little marsupials in the forest areas of Victoria. The late Fred Lewis, one-time Chief Inspector of the Department, told the story of this project in the *Victorian Naturalist* of March 1954, in an article entitled "The Rehabilitation of the Koala in Victoria" (Vol. 70, pages 197-200). The picture on the cover is one of Lewis's photographs of a shipment of Koalas about to be released on French Island, where they increased by breeding to provide animals for the restocking of mainland habitats.

A Common Victorian Nudibranch

By ROBERT BURN

Ceratosoma brevicaudatum Abraham (1) is the commonest nudibranch of southern Australia. It ranges from Sydney Harbour (3) in the east to the Abrolhos Islands off Western Australia (5) but has not yet been recorded from Tasmania.

The species attains a length of six inches, and it may be recognized by the bright pink body with red, blue and purple spots along the sides and on the back. Just behind the gills there is a short but very conspicuous reddish-purple appendage from which the specific name is derived: *brevicaudatum* means "short tailed".

The habitat of this animal is from between tide levels to depths of twenty fathoms (3). In Victoria it is very common in the confined waters of Port Phillip and Western Port Bays; in South Australia it is abundant in the stiller waters of Spencer and St. Vincent Gulfs; it is not so plentiful along the open shoreline but can almost always be found at any such locality.

The juvenile stage of *C. brevicaudatum* was described by Basedow and Hedley as *C. adelaidae* (3). Since then this stage has been found twice. I collected it once at Portarlington

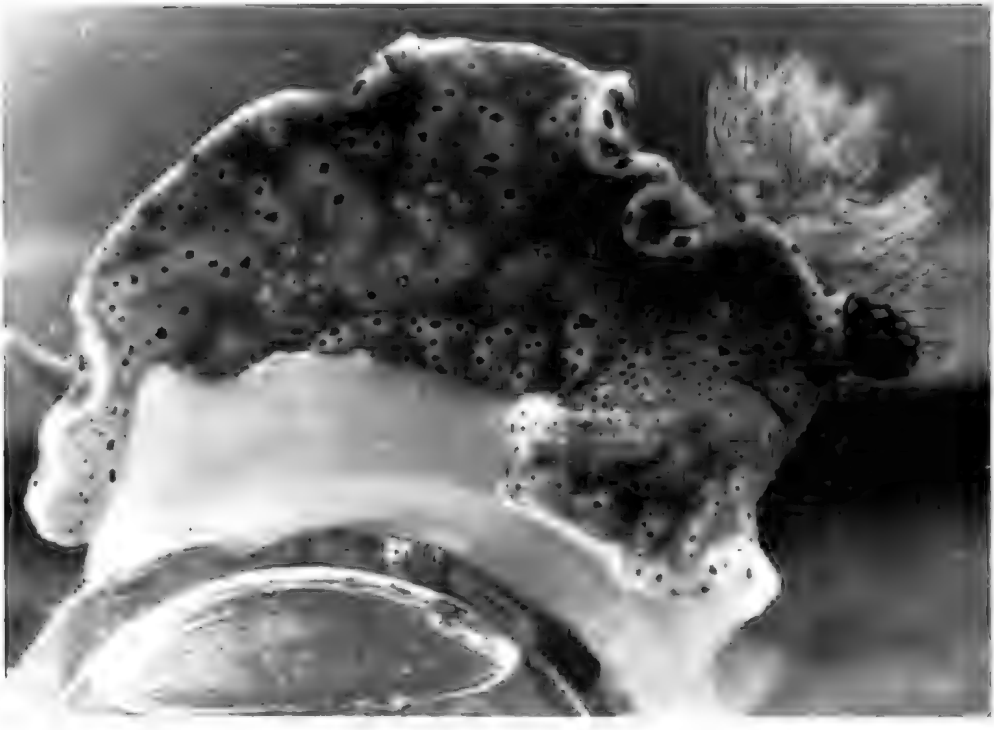

Photo: Zillah Lee

Nudibranch, *Ceratosoma brevicaudatum*, laying its egg ring on a small jar. The jar, about 1½ inches across, has the bottom towards the camera.

in Port Phillip Bay in October 1954, and Mr. and Mrs. R. Plant of Frankston dredged it from about three fathoms in Western Port Bay in March 1959.

There have been two recent observations of the longevity of the species in captivity. A specimen about two inches long was taken by Mr. E. F. Burn in Corio Bay on April 22, 1959. It was placed in a 5-ounce jar of water and kept in a cool position. On July 1, 1959, the last movements of the specimen were noted, and later that day it was placed in preservative. During the ten weeks of captivity, the water was neither changed nor aerated.

The second observation came to my notice through the kindness of the president of the F.N.C.V., Mr. D. E. McInnes, who collected the specimen, and Mrs. Zillah Lee, who lent me her notes and photographs of it, made during its captivity. This animal was about 4½ inches long and was collected at Ricketts Point, Port Phillip Bay, on February 21, 1960. It was alive in captivity for 30 weeks 2 days, and died on September 20, 1960. During this period an egg ring was laid, but it failed to hatch. The accompanying photograph is a view from the left side, of the specimen laying the egg ring on the side of a small jar in the aquarium where it was kept. The bushy gills and "short tail" are very conspicuous in this photograph, and the horn at the left of the animal is one of the pair of rhinophores (smelling organs) that retract into cavities in the back when the nudibranch is disturbed.

I am particularly indebted to Mrs. Lee for a series of fine photographs of the specimen and for allowing the publication of the one which appears with this note.

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Obituary: Francis Erasmus Wilson

By A. N. Burns

It is with deep regret that we record the passing of F. E. Wilson on July 30 last year, at the age of seventy-one years. His passing deprives us of yet another of the older naturalists of this State.

"Ras" Wilson, as he was affectionately known to his many friends, was indeed a great naturalist, and one whose knowledge covered many branches of natural science. He was an excellent and keen ornithologist, a botanist of no mean ability, especially in connexion with our native plants, and best of all was his very wide knowledge of entomology. The last included specialized knowledge in the Orders Coleoptera, Lepidoptera, and several families in the Orders Diptera, Hemiptera, and Neuroptera. In the Diptera he specialized in the Tipulidae (Crane Flies) and Tabanidae (March Flies), in Neuroptera in the Myrmelionidae, and in the Sub-Order Homoptera of the Order Hemiptera, in the Cicadidae. He possessed a very sound general knowledge of the other orders of insects and was a competent authority on the bibliography of entomology. Over half a century he gathered together a magnificent library of books and reprints on the subject. Amongst his books are many real "gems" and rarities.

He never lacked enthusiasm, and

delighted in field collecting, of which he did an enormous amount during his lifetime. He was a wonderful companion on a field trip; he had a very keen sense of humour and a genial personality which he radiated to those with him. Equally happy were the many delightful evenings spent by entomologists—both Australian and from overseas—at his home at East Malvern. Many beginners and present-day collectors owe much to him and his untiring energy and willingness at all times to render help and kindly advice.

Born at Beechworth, Victoria, on November 25, 1888, he was the son of the Rev. James Wilson, who was later transferred to the parish of Beaconsfield. He received the major portion of his education at Wesley College, and after leaving school joined the firm of Moran & Cato. He served with them as an analytical chemist and manufacturing department manager for forty-seven years, until his retirement a few years ago. On October 30, 1924, he married Miss Vera Durward, B.A., Dip.Ed., and at the time of his death left his wife and three married daughters to mourn his loss.

He was vice-president of the Field Naturalists Club of Victoria in 1924, having been a member for a number of years, and was elected president in 1929. In the Royal Australasian Ornithologists Union he held the position of honorary secretary for 1912-13. Prior to the last war there was in existence an Entomological Society of Victoria, and of this he was president for the years 1928, 1929, 1934 and 1936.

He published much important work on entomology, the principal papers being: In the *Proceedings of the Royal Society of Victoria*, in three parts, between 1921 and 1926: "New Australian Coleoptera with notes on some previously described Species". These embraced the Families Pselaphidae, Endomychidae, Oedemeridae, Byrrhidae, Erotylidae, Staphylinidae, Scarabaeidae, Chrysomelidae, Cerambycidae, and Malacodermidae. Several papers appeared in the *Victorian Naturalist*: 1918-19: "An Ornithological Trip to the Nhill District", and "New Species of Dryopidae—Coleoptera"; 1926-28: "Inquilines from New South Wales"; 1928-30: "Australian Pselaphidae", "The Froggatt Entomological Collection", "Australian Pill Beetles", and "Report on an Excursion through the Western District of Victoria" (Supplement); 1931: "Australian Tiger Beetles"; 1932: "Entomological Gleanings from the Otways", an obituary on Arthur M. Lea, entomologist at the South Australian Museum, and "A New Victorian Sawfly". In the *Emu* (the journal of the Royal Australasian Ornithologists Union), 1910: an article on the Bell Miner; 1912: "Oologists in the Mallee".

Noteworthy field trips made by Ras Wilson were to southern Queensland (Blackall Range), Tasmania, South Australia, Western Australia (two trips, the second in 1949), New South Wales (a number), and many parts of Victoria. In this State he visited the Little Desert in the west, the Otways in the south-west, the Bogong High Plains and Victorian Alps (these he knew from end to end), east and eastern Gippsland, the Omeo–Glen Wills–Tallangatta country, and—one of his favourite haunts—the Donna Buang and Ben Cairn mountains near Warburton. It was my pleasure and experience to accompany him on many of his Victorian rambles and also to share with him a delightful three weeks' sojourn in Western Australia (1949), where most of the coastal country between Bunbury, 100 miles south of Perth, and Geraldton, 300 miles north of Perth, was covered by car.

His magnificent collection of insects, all beautifully mounted and fully documented, has been bequeathed to the National Museum of Victoria. It is rich in type specimens; there are over 800 of these—and it is safe to say that its 50,000 specimens represent the orders of insects more fully than any collection previously received by the museum.

It is an honour to relate these few details of an old friend of over forty years' standing, and to be able to place them on permanent record—a small tribute indeed to a man so well and so long known in the field of natural history.

By JEAN GALBRAITH

Kybean Wattle—*Acacia kybeanensis*

Far in the east, about Wulgulmerang, on the way to Suggan Buggan "by the Black Mountain", there is a dry, stony land, a high area of low rainfall, where Kybean Wattle grows. The only other Victorian record is of specimens collected above Freestone Creek (on the way to Dargo from Briagolong) by Baron von Mueller.

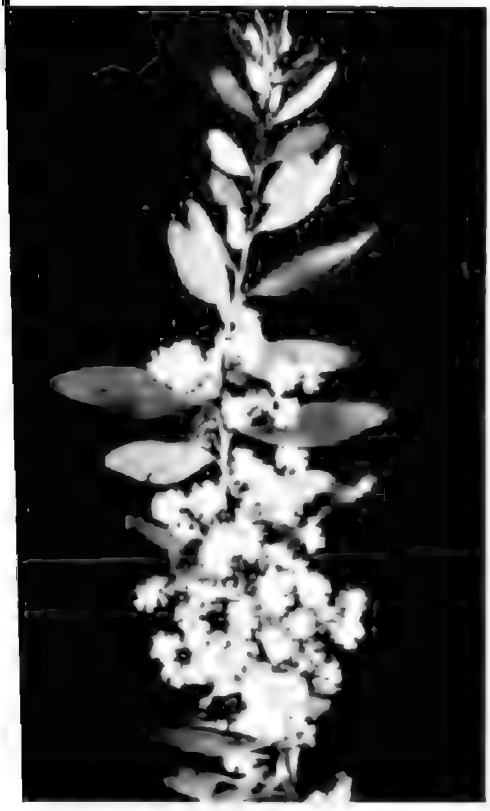
Stony soils and exposure, low rainfall, and steep mountain-sides only increase its beauty. When it grows under easier conditions, as in parts of New South Wales, it is more slender and luxuriant, and a less distinctive shrub, but in that stony land in the east it is a low bush, as rounded as if it had been pruned, as blue as a young Blue Gum tree, with firm phyllodes and abundant bright golden bloom. There it is a wattle that, once having seen it, one can never forget. It dots the ridges and cuttings along the road with its symmetrical little bushes.

This Victorian form has rather spreading, very bluntly pointed phyllodes, one or two inches long, and about a quarter of an inch wide, rather firm and smooth, blue-green, with one conspicuous central vein. The rather small globular flowerheads are in racemes an inch or more long. They are on short stalklets strung in a double row along the yellow rachis, and the shining racemes form intricate clusters toward the ends of the branchlets where the phyllodes, being small and scattered, are almost hidden by the gold.

Acacia kybeanensis flowers in October, when its foliage is bluest. By midsummer it has dulled to grey-green: a background for the pods which are longer than the leaves, about half an inch wide, flat and somewhat wavy-edged. They are dark, with a bluish bloom, and the seeds lie across them, not longitudinally as in most species of wattle.

"If you want it to grow like that," said a naturalist from Wulgulmerang, "don't be kind to it. Give it poor dry gravel, good drainage, a hot, exposed position, and it's beautiful. Shelter it, water it, give it rich soil, and it will be quite an ordinary, straggling bush."

I took his advice—and the plant died. But on the hills of Wulgulmerang it does not have a pine tree ten yards away.



Kybean Wattle

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.

Decoration by Ants

The chapter entitled "Ants and Shells" in last December's *Naturalist* has provoked some interesting comment. A letter from Professor J. B. Cleland of Adelaide reads thus:

I am surprised at the statement that "ants are apparently not known to have any decorating tendencies" (*Vict. Nat.* 77 (8): Dec. 1960, p. 225). The fine gravel round Meat Ant nests is carefully selected for size. The late Dr. R. H. Pulleine used to raid the nests of this or a similar species in the Mt. Lofty Ranges for the coarser lateritic gravel covering the bare space round their holes. The largest particles of this (of which I have a sample by me) are nearly 4 mm. in diameter and smaller ones 3 mm., so the size is fairly uniform. With a surprise movement, he would scoop up a shovelful and he used it to cover the surface of the soil round succulents in pots with good effect.

On the Adelaide plains another species arranged sparrow droppings very effectively (if I may say so). A very small species, also on the plains, collects clover (?) seeds or those of Salvation Jane (*Echium plantagineum*) to form little mounds round the openings.

At McDonald Downs, 150 miles N.E. of Alice Springs, another very small ant collects the seeds and chaff of a panic grass on the flood plains into heaps. The native women go out with a coolamon, gather handfuls in a few minutes, winnow these by yandy-ing after treading on them in a hole in the ground to dehusk the grain, grind the clean seeds between stones into a paste, and cook this in the coals. A larger species in the Adelaide hills uses short pieces of dead fallen twigs to strew over the surface. At one time I thought that the seeds were collected for food, but the gravel and the little sticks seem indigestible and the sparrow dung a doubtful food, so I now think that even the seeds are perhaps more an adornment than a food supply.

Mrs. J. Loveday has written from Toowoomba in Queensland, drawing attention to a note and query published in the *Darling Downs Naturalist* of November 1956. The note referred to

> a number of Bulldog Ants (*Myrmecia gulosa*) nests almost completely covered by the blossom of Lancewood (*Acacia ?aneura*) and some possum droppings.

Then there was the query:

> What is the reason for this? Does the blossom retain enough nectar to provide a larder for the adult ant?

Some interesting points have been raised, but is there definite evidence yet that any of these activities of the ants is not of purely utilitarian significance?

Are not the particles, 3 to 4 mm. in diameter, the largest that the Meat Ants can handle and therefore the ones that finally cover the mound when excavating has been carried out? Perhaps sparrow droppings and those of possums were in fact collected because of some food value in them. Might not the panic grass chaff constitute some form of protection for the ants' homes, in the same way as does the chaffy plant material which forms the homes of some species of *Iridomyrmex* in the grass on both lowland and highland bogs in Victoria? And could the dead twigs, or even those gravel particles, help to prevent erosion by wind of the carefully formed mounds over the ants' nests?

If these various ants have indeed collected those materials for decorative purposes, from what vantage point do they appreciate their art and with what quality of vision?

The Ears of Long-eared Bats

Since attention was drawn to these animals by the recent article in the *Naturalist* on cave bats, Mr. Ellis M. Tucker of Brit Brit has sent along these observations on one of the common forest bats of the state:

> One morning last winter, after a heavy frost, I picked up a dead bat on the floor of the woolshed. From Troughton's *Furred Animals of Australia* and Wood Jones's *Mammals of South Australia*, I identified it as the Lesser Long-eared Bat (*Nyctophilus geoffroyi*).
>
> Later, another bat was found in a stack of timber, this time alive but in a completely dormant state. The two bats seemed to be identical, except for the ears. The first one had long shovel-like ears, typical of the species, but the living bat had very short, insignificant ears. After ten or fifteen minutes, the latter began to come to life, shivering spasmodically and shuffling about. Then the puzzle of the ears was solved—they gradually extended until they were the size and shape of the first specimen. The bat soon became airborne and eventually crept into a dark place under the roof capping of the shed.
>
> From Troughton's notes it appears that the Long-eared Bat habitually folds its ears tightly when dormant, to lessen the effects of disturbing sounds.

In this connexion it is interesting to recall that a few years ago in the Buchan area, a certain dead specimen of Eastern Horseshoe Bat (*Rhinolophus megaphyllus*) had the ears fully extended whilst another — quite live and active—had them partly folded back while being handled.

Errata

Vict. Nat., December 1960, p. 228—Figures for *Isoodon obesulus* should read "9 (1)".

Vict. Nat., February 1961, p. 284, col. 1, line 21—For "north-western" read "north-eastern".

Victoria's Rock-wallabies

By NORMAN WAKEFIELD

In March 1954, in the *Victorian Naturalist* (1), a report was published on the Brush-tailed Rock-wallaby *(Petrogale penicillata)*. Details were given of the abundance of the species in north-eastern Gippsland up to about 1906, its rapid decline and disappearance by about 1915, then its rediscovery — between 1937 and 1953—in three localities in the Snowy River district.

Since 1954, more precise information has become available of the Rock-wallaby's original range, and several additional colonies have been found in East Gippsland. These matters will be dealt with in the present article, and notes will be given of the characteristics of the species and of its Victorian habitats.

Original Distribution

In 1958, R. J. Marlow (2) wrote that the Brush-tailed Rock-wallaby formerly extended from Queensland to Victoria, and that it occurred as far west in New South Wales as Deniliquin and Coombie. He states that it still persists near Armidale and in the Blue Mountains. The latter include the Jenolan Caves area, where the animals have become so tame that they seek food from visitors.

Old residents report that, in the extreme south-east of New South Wales, Rock-wallabies were formerly abundant in the mountains about the eastern scarp of the Monaro Tableland, in the vicinity of Rocky Hall, Pericoe and Nungatta. Possibly they occurred too in the rugged sandstone country of the Genoa River, on the Victorian side of the state borderline.

With the 1954 article (1) there were two photographs, which had been in the possession of the late Fred Lewis, of Rock-wallabies sitting possum-like on the limbs of trees. One of the pictures is reproduced on the opposite page. As Lewis could not recall their origin, the photographs could not be acknowledged, and in the caption it was simply stated that they were taken many years before in the Snowy River district. Later, an entry was found in the report of exhibits at a meeting of the Field Naturalists Club of Victoria in September 1895 (3), making reference to a photograph by W. H. Ferguson of Rock-wallabies in trees. The photographer was contacted—an old man in his 95th year—and he stated that the pictures were taken, not in Gippsland, but near Tintaldra in the upper Murray River district of north-eastern Victoria.

In a short note in the *Victorian Naturalist* in 1931 (4), Fred Lewis wrote that he had ascertained that there was still a small colony of these wallabies at the Pyramids, on the Murrindal River near Buchan. The source of this information is not known, but it is improbable that the Rock-wallaby survived in that

Brush-tailed Rock-wallabies in Tree, near Tintaldra, about 1895.

Photo: W. H. Ferguson

locality until the 'thirties. Present local opinion is that it disappeared from the Murrindal district by about the First World War.

However, the Brush-tailed Rock-wallaby was originally distributed over the Buchan limestones. In 1960 the Fauna Survey Group of the F.N.C.V. found the skull of one in Clogg's Cave at East Buchan. Rock-wallaby "droppings" (faeces) are to be found in the Pyramids Cave by the Murrindal River—still intact after a period which probably exceeds sixty years—and jawbones have been obtained from cliff recesses in the same locality.

Members of the Speleological Society have dug numerous mammal bones from the cave they call "M3" or "Shades of Death", at Murrindal. This was a "death trap"—a more-or-less vertical hole about a hundred feet deep — into which various animals fell but from which they could not escape. The cave is well removed from any cliff system, and the remains in it of a number of Rock-wallabies indicate that these animals used to range widely, away from the cliffs, through the undulating lightly forested parts of the Murrindal district. This is of interest because the groups which survive now seem to stay in—or very close to—the rugged rock outcrops which provide them with refuge.

In 1958 Langham's Bluff was investigated. This is a rugged tract of rock outcrops above the Turnback Road east of Wulgulmerang. It was known that Rock-wallabies had been abundant there about sixty years ago, and the polished runways and roosting places are still to be seen amongst the rocks. However, it is evident that none of these animals has lived there for a very long time.

Last year the Lighthouse was visited—a small isolated crag in a bend of the Suggan Buggan River. This was one of the two

places where Rock-wallabies were seen in 1915 by Mr. Keith Rogers of "Rockbank", Wulgulmerang—the last records he had until his rediscovery of them in about 1937 at the spot now known as the Wallaby Rocks. The Lighthouse is about two miles NNE. of the Stradbroke Chasm, where W. B. Hitchcock found a second Victorian colony of Rock-wallabies in 1953.

At the Lighthouse there are still droppings of the animals beneath a large stone slab in one shelter—a dry situation where material may have remained for several decades. Rogers found no sign of Rock-wallabies there in 1953. However, in December 1959, he discovered signs of them over a considerable area, fairly low down, on the great scarp about a mile NNW. of the Chasm.

As far as is known, no recent check has been made in the upper Murray area or on Mount Tambo and in other parts of the Omeo district, where Rock-wallabies originally lived. There is also a place along the Moroka River where the late C. E. Bryant reported seeing these animals in 1923. It is intended that these localities will be examined in the near future.

Colonies Recently Discovered

In the 1954 article the opinion was expressed that further colonies of Rock-wallabies would be found about the upper Buchan River and the lower reaches of the Little River. The prophecy has been fulfilled, and we now know of three places along the upper Buchan and two in the Little River Valley where the animals still live. Most of these discoveries have been made by Mr. Keith Rogers.

In September 1958, he and I rode to the Buchan River, seven miles due west of "Rockbank", and examined the other locality where he had seen Rock-wallabies in 1915. There was ample evidence that a colony of the animals had survived there and, though none was seen, we found roosting-places in recesses in the cliffs which were obviously currently occupied.

The main habitat in the gorge of the Buchan is a small area of scrubby cliffs on the eastern side of the river. Across the stream, on the western side, there is a series of rock outcrops up the very steep hill-slope to about a thousand feet higher than the river. In January 1960, Rogers and I found evidence that the wallabies grazed about the top of those outcrops. The elevation of the Buchan Gorge habitat is about 2200 to 3200 feet.

In about mid-December 1959, Rogers found signs of Rock-wallabies about four miles south-east of the Gorge, in cliffs high above the Buchan River, 2½ miles north of Mount Seldom-seen. The status of the colony at this spot has not been determined however.

Then in May 1960, he investigated an isolated rock outcrop of several acres, about three miles north-west of the Gorge, on the south-western side of the river, slightly downstream from where Bentley's Creek joins it. This resulted in the discovery of the third of the Rock-wallaby colonies now known in the upper Buchan River area.

Formation above upper Buchan River near Bentley's Creek.
Rock-wallabies roost in the "window".

Two months ago I accompanied J. K. Dempster, of the Fisheries and Wildlife Department, and Rogers, to the last site. The river there is at about 2600 feet above sea level and the rock outcrop extends up a slope with a northerly aspect to perhaps 300 feet higher. Signs of Rock-wallabies were found on each side of the river, but their strong-point was amongst a mass of huge rocks high up the slope. Several well-used roosting-places were found, and Rogers obtained a good view of one animal as it moved across an open area to a new refuge amongst the rocks.

Due to the almost vertical strata, much of this outcrop comprises an assortment of weirdly-shaped formations: chimneys, razor-backs and pinnacles. For example one rock is twelve feet long, three feet wide and twenty feet high, and right through the middle is a "window" in which Rock-wallabies roost.

East of the Wulgulmerang area, the Little River descends into the spectacular gorge which it has cut back into the scarp of the tableland. Wulgulmerang Creek goes down through one of the lateral cliff sections to join the river 1500 feet below. This part of the valley is ringed by a series of precipitous cliffs, and the few ways of access involve considerable rock climbing.

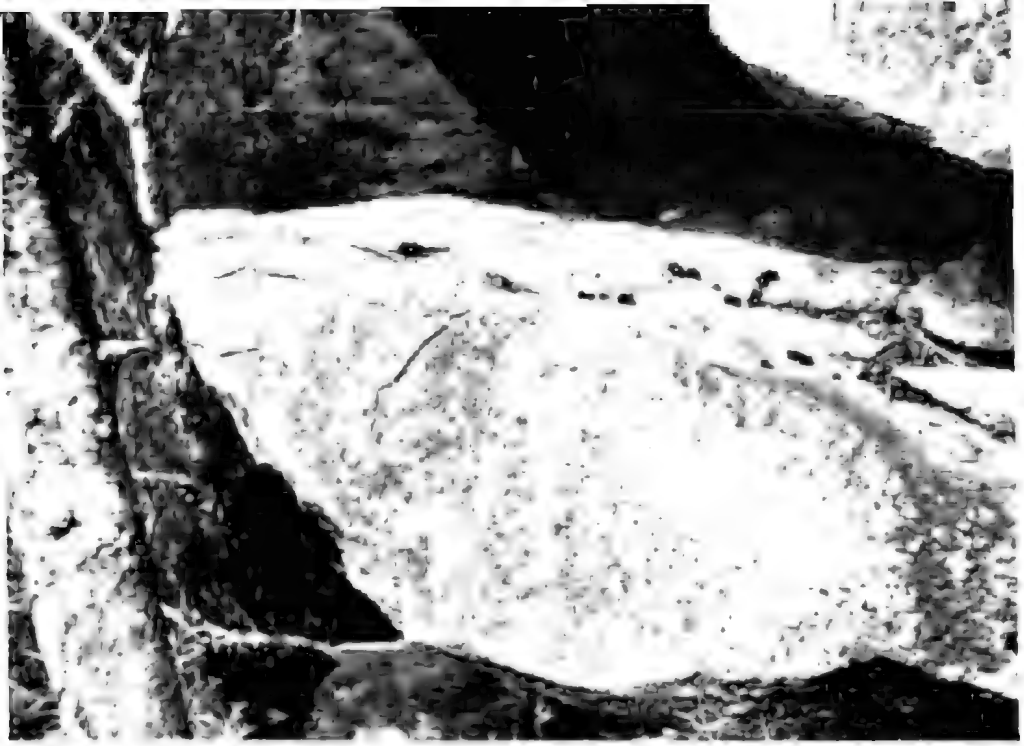
Locality Plan of Rock-wallaby Areas. Colonies are shown thus —.—.—.

Early in December 1959 Rogers explored the main gorge, about where Wulgulmerang Creek joins it, and found signs of Rock-wallabies over a considerable area. Further evidence of them was found in other parts of the gorge when a second trip was made there later.

In August 1960, Rogers, Dempster and I examined outcrops downstream from the main gorge and found that the wallabies' habitat extended to about half a mile below the junction of the creek and river. The bones of a Rock-wallaby were found in a small cave, and on the river gravels were the remains of an animal—probably of that species too — which had been killed recently by a fox. Only some internal organs were left and the stomach contained reconizable leaf-fragments of *Clematis microphylla*.

Early in September, seven members of the Fauna Survey Group of the F.N.C.V. climbed down into the Little River Gorge. Their observations confirmed that the wallabies were comparatively plentiful and well distributed along the river and about the lower sections of the lateral cliffs in the general vicinity of Wulgulmerang Creek.

In November, Rogers examined the high rocky ridge, known as "Beaver Castle", about two miles east of the main gorge of



Rock-wallaby [illegible] in Little River Gorge [illegible]

the Little River. He reports that there were signs of Rock-wallabies along the various crags there. This is the eighth locality in which the animals are now known to survive in Victoria.

It is gratifying to note that the Rock-wallabies in the Little River Gorge were not annihilated by the terrific bushfire that swept the area in 1952. An impression was gained locally that no mammals could have survived there, but apparently the wallabies have suitable rock shelters in which to take refuge in such circumstances.

Because of the extent of suitable habitat—a mile or more of river gorge—that tract of the Little River probably harbours about as many Rock-wallabies as does the Snowy River Gorge east of Butchers Ridge. The colonies in these two places are undoubtedly the strongest numerically of those known in Victoria. In the Snowy River Gorge, signs of the wallabies have been noted on the east side of the river as well as the west.

Observations at Wallaby Rocks

The actual rediscovery in Victoria of the Brush-tailed Rock-wallaby occurred when Rogers saw one of them sitting on a conspicuous pinnacle of rock just outside the boundary fence of one of the eastern paddocks in the Black Mountain area. That was in about 1937, and soon afterwards he found evidence of

the animals here and there amongst rock outcrops to the south-east. He established that the colony extended as far as the huge crag known as the Hanging Rock, which is two-thirds of a mile south-east of the original pinnacle.

For easy reference the pinnacle has been named the Lookout Rock. It is the highest point of a very broken series of ledges and small cliffs which carry numerous White Box trees *(Eucalyptus albens)* and masses of one of the shrubby everlastings *(Helichrysum conditum)*. A hundred feet or so below, the cliffs give way to a steeply sloping woodland of White Box, which leads down to Buchan Creek—a dry watercourse running east to the Suggan Buggan River a little over three miles from the rocks. The Hanging Rock is reached by a circuit of nearly two miles from the Lookout Rock—south then east then north—to avoid a deep valley in between.

During the twelve years to the end of 1960, I have been about twenty times to the Wallaby Rocks, in the general vicinity of the Lookout Rock, but on only five occasions was a Rock-wallaby seen. There was always plenty of evidence that they still lived there, but the rough scrubby nature of the outcrop usually enabled the extremely timid animals to keep out of sight. During the past two years, a strong impression was gained that the status of the colony was declining. In particular, the wallabies ceased to frequent a particular roosting-place which had previously been in permanent use. This may have been due to foxes, for two lots of the droppings of the predators were noted recently in the spot.

At least one Rock-wallaby from the colony was caught, by a rabbit-trapper, under the boundary fence, at a hole kept open by wombats and used by rabbits. The victim had died in the trap and it was sent to the National Museum.

In early January this year, Dempster and I spent four days trying to assess the numbers in the colony. It was found that they had disappeared completely from about the Hanging Rock and from the outcrops on the way to it. Wallabies now range over only about 300 yards of the cliff tract about the Lookout Rock.

This inhabited section was baited with a few dozen cubes of carrot, strands of cotton were placed across runways between rocks and on ledges, and small twigs were set up in roosting-places. There was very little disturbance of these items, and some of the interference may have been due to possums. In only two places were we reasonably sure that a Rock-wallaby had touched our indicators. Apparently very few animals are left there now, and the colony may die out in the near future.

During the examination of the Wallaby Rocks, we saw a wallaby three times, presumably the same individual. The first encounter was early one afternoon, not far from the Lookout Rock. We had just ascended a large chimney-like crevice and the wallaby was on a flat area of rock slightly above us. It seemed unconcerned at our presence and we watched it for several minutes. At one stage it plucked and ate, with the aid of its paws, some flower clusters of *Helichrysum conditum*, and it used its paws also to "wash" its face, almost as a cat does.

Most of that afternoon was

Rock-wallaby Den near the Lookout Rock.

This was in constant use until very recently.

spent examining less than a hundred yards of the outcrop, and towards evening we came upon the wallaby again. For a quarter-hour or so it browsed about at the base of a small cliff. It spent some time eating at a clump of Nodding Saltbush *(Rhagodia nutans)*, then it moved along and nibbled some Saloop Saltbush *(R. hastata)*. In one place it fed at a patch of grass, and later examination revealed that Weeping Grass *(Microlaena stipoides)* had been eaten in preference to Wallaby Grass *(Danthonia semiannularis)*.

As it was feeding, I climbed down from our vantage point, by a necessarily circuitous route, and approached carefully to within several yards of the wallaby. It then sat for some time on a rock, with its back against an overhanging wall, and finally, jumping from rock to rock, it disappeared round a corner of cliff.

Next day, two cameras were set up and left at the spot, with flashlight and trip devices, but nothing came that way during the following forty-eight hours.

On the final day at the Wallaby Rocks, Dempster came upon the wallaby resting under a clump of *Helichrysum*, at the top of the rock chimney. He had been making considerable noise, crawling over rocks and breaking through dead twigs, but the animal had not been alarmed. Coming round the corner of a large rock, he saw it sitting quite relaxed, with the tail underneath and extended forward. Occasionally it looked at him—only six feet away—and then relaxed once more.

The wallaby stood up and moved a few feet when Dempster withdrew to get in touch with me, but it was still there about ten minutes later. A colour photograph was taken from about six feet away as the animal stood with ears pricked, intent on the apparition half-emerged from the rocks that almost blocked the top of the chimney. It moved round then and sat on a large platform about fourteen feet away and two more exposures were obtained of it in silhouette against the distant Suggan Buggan valley. Then the wallaby disappeared round a huge boulder. In tracing its subsequent path, we noted that as it jumped from point to point down the cliff face, one of its steps was the horizontal limb of a White Box tree.

The observation of this animal was of particular interest for several reasons. As far as is known, only about a dozen persons have seen a Rock-wallaby in Victoria during the past forty-five years. Of those observed in this state in recent years, this is the only one that has been unconcerned by close proximity of observers. In this regard its behaviour was practically that of members of the species fifty years and more ago, when they were still abundant.

General Notes

Nowadays the Victorian Rock-wallabies are extremely wary. Though several parties have examined their two main habitats —the gorges of the Snowy River and Little River—none of them has sighted a Rock-wallaby in either place, despite much evidence of their presence.

PLATE 1

Brush-tailed Rock-wallaby *(Petrogale penicillata)*.
Photographed at Wallaby Rocks, Wulgulmerang, on January 7, 1961.

Changes which have taken place during the past fifty years in our Rock-wallaby population can be attributed to the introduction of the European fox. According to old residents, foxes arrived in the Buchan-Wulgulmerang district between 1904 and 1906. Within about ten years the wallabies were eliminated from areas where they could not elude foxes. Now they survive only in the limited habitats where the rock formations enable them to avoid those hunters. And, logically, in the survivors we find developed a wariness which matches the foxes' stealth and cunning.

The Brush-tailed Rock-wallaby is probably as colourful as any marsupial. The general body colour is bluish-grey. There is a blackish area behind each forelimb, and the flanks, rump, belly and much of the tail are light reddish-brown. Feet and paws are black and appear to be clubbed, due to the length of the hair. Ears are black outside and fawn inside, sides of the face and a longitudinal forehead stripe are blackish, and cheeks and under the chin are whitish-grey.

A full-grown specimen is eighteen inches or less in height, and the tail is slightly longer than the combined length of head and body. The hair of the tail is very long, especially towards the tip, so that the organ appears to be about four inches wide and square at the end. When the animal is at rest, the tail is sometimes held horizontal, off the ground, and in such a position the wallaby may bend the rear part of it a little to right or left.

Though capable of quite prodigious leaps, the Rock-wallabies normally move about by taking very short jumps—usually of only a foot or so. Their movements are rapid and, according to the rocks and ledges available, the course is erratic. Occasionally they "touch down" with the fore-paws as they travel, evidently when necessary for balance. However, they do not creep along, using fore-paws and tail, as the larger wallabies and kangaroos do.

Conservation of Rock-wallabies

Rock-wallabies are still preyed upon by foxes, and efforts should be made to reduce the numbers of the latter in areas where the wallabies are. At the Wallaby Rocks there are also the hazards of traps, at holes made by wombats in the boundary fence, and of poison laid nearby for rabbits.

The Victorian Fisheries and Wildlife Department is considering these points, with a view to possible remedial measures. It would be an excellent thing if the Wallaby Rocks and an adjacent tract of suitable country were to become a Wildlife Reserve and be managed by the Department. It might then be possible for the animals there to increase and recolonize the outcrops to the south and about the Hanging Rock. Were such a programme to succeed, Langham's Bluff might also be repopulated eventually.

At Jenolan, Brush-tailed Rock-wallabies are admired by tourists who visit the caves there. It would be a wonderful thing if visitors to East Gippsland were able similarly to meet and appreciate these remarkable and beautiful little animals.

General view of section of Wallaby Rocks.

The chimney above which the wallaby was seen twice and photographed is in the rock stack at the middle of the top of the picture. The animal was seen also at base of the cliff low on the left.

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Acknowledgement

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The Sydenham Organ Pipes

By J. Ros Garnet

The average traveller, speeding over the roads which criss-cross the Keilor Plains west of Melbourne, probably has little conception of the fascinating geological history of the area, nor is he likely to be aware of the many interesting spectacles hidden from his view. These plains supply much of Melbourne's hay and straw and some of its needs in cereals. Their grazing lands support many sheep and cattle, but the same plains have long been a dispersal centre for noxious plants—Box-thorn, Furze, Fennel and thistles.

The fisherman who casts his line into the quiet pools of streams which flow through the plains, knows their quietude, but it is the geologist or botanist who gains the most satisfaction from excursions to their nooks and corners. Naturalists have long deplored the virtual extinction of the highly-specialized native flora, so well adapted to the veneer of rich soil which rests on and is derived from the enormous sheet of lava forming the plain. Small pockets of this vegetation still persist, but how much longer will they survive amongst the foreign invaders?

Geologists may feel less gloomy than botanists, because the things which interest them are more substantial and enduring—although they too have their hazards. Take for example the Sydenham Organ Pipes. They seem permanent enough, but quite recently they were under threat of destruction to provide road metal! They are amongst the many hidden wonders of the plains—out of sight of the highway and approachable only through private property.

Jacksons Creek, in its course from the mountains beyond Gisborne to the Maribyrnong River, has carved many a minor gorge in the lava plain. Near Sydenham it enters a valley flanked on the north by a massive wall of basalt and, to the south, by softer rocks which, in the higher ground, are overlain by a thin layer of the same basalt.

About half-a-mile upstream from the Organ Pipes, the creek is deflected sharply east by a rampart of basalt, on the summit of which a tuff cone reminds one of the source of the lava lying below.

During summer, when the level of the stream is low, one may stand on pavements of giant hexagons of basalt, worn smooth by rushing water. Above high water mark, Fringe-myrtles and Bulbine Lilies have established themselves in rock crevices, and along the banks are Swamp Bottle-brush, an occasional Blackwood or eucalypt, and a mass of weeds and other introduced plants. At the foot of the rocky hill, Blanket-leaf, Necklace Fern and Rock Fern are tucked away in pockets of the basalt, while on the steep slopes, amongst the Box-thorn, there is a wealth of Bursaria and a few plants of Hop-bush, Tree Violet, Cassia and Myoporum—all that is left of the once-abundant native vegetation.

In its short easterly course, the creek has been contained on the north bank by a wall of basalt on which, midway, there is a curious cone-like formation which might have been a core or plug, tipped by subterranean pressure through 90°. Midway in its face is a rosette of rock, distorted like the surface of a bubbling pool. Perhaps it once was a bubbling pool—of molten lava. The face of the cone is covered with herbaceous plants, conspicuous amongst which are Basalt Daisy and Bulbine Lily. This must surely be one of the last strongholds of the daisy.

The narrow alluvial flat, between the two bends of the creek, is excavated here and there to reveal the calcareous rock over which the Pliocene lavas flowed. This small area has yielded relics of a departed race, for, sheltered in a valley one hundred feet below the plain, it was a favoured camping place of the aborigines of the district.

And what of the Organ Pipes them-

The Sentinel Pine of Jacksons Creek, a specimen of Murray Pine, *Callitris hugelii*.

Photo: W. H. Nicholls

selves? A private lane, north from the highway near the 16-mile post, leads down into the gorge where they stand opposite at the east bend in the creek. There is an impressive spectacle of perpendicular hexagons mingled with pentagons and heptagons. The columns are upwards of 60 feet long and about 18 inches in diameter—much weathered, and often transversely jointed and cracked. The tips of some of them have cracked right off and tumbled into the creek. Old photographs indicate that falls have been fairly recent, for some columns seem to be shorter now than 40 or 50 years ago. Above the formation rests a mass of lava from a later flow, raising the wall to some 180 feet above the water. Downstream from the perpendicular columns, bundles of them lie at various angles, including a conspicuous horizontal group.

Few places in Victoria show this natural phenomenon to such perfection. The organ pipes of the Campaspe Gorge are perhaps the nearest approach to those of Jacksons Creek. It is odd that a site of such interest should have remained so long in private ownership. If ever there were an object of outstanding scientific interest, worthy of being classed as a national geological monument, the Sydenham Organ Pipes and their environs merit that classification.

In recent years the property has passed through several hands. Successive owners have been willing to discuss sale to the Crown of the area in which the columns stand, but the cost has apparently been considered too great. Even the prospect of lease to a quarrying company failed to bring about any action. However, the death of the most recent owner has created a situation by which this national monument may become public property by gift. The price proposed is that it should be known as the "E. A. Green Memorial Park". If this proposition eventuates —as we hope it will—Victorians may be grateful to a man they never knew and even more grateful to his executor and trustee*, for the perpetual preservation of an outstanding physical feature of the Keilor Plains.

By providing an access road to the land between the two bends of the creek, a pleasant picnic ground can be created, capable of restoration to something like its original state of rugged charm. Everyone can then share with geologist and field naturalist the pleasure of a visit to the Organ Pipes of Sydenham.

*It is unlikely that any such offer would have been made had not the matter been raised with the Trustee by Mr. J. H. Quirk, an F.N.C.V. council member who has for some time been interested in the fate of the Organ Pipes.

Writing Down a Bird's Song

By K. C. HALAFOFF

INTRODUCTION

Though man's desire to capture in some form of notation the passing beauty of a bird's song is not of recent origin, the progress of the search for a suitable medium for the purpose has been remarkably slow. The orthodox method used by the ornithologists was the substitution for the bird's utterances of similarly sounding words, and this device is by no means dead even now. How unsatisfactory it is could be easily realized by comparison of the verbal representations of the rooster's crowing in different languages, each of these using an entirely different combination of syllables and vowels in the attempt to imitate it. Again, quite dissimilar words were used by different ornithologists to describe the call of the same species, as happened with the Boobook Owl and some other birds.

Not much better were other attempts like the combination of ascending and descending dashes. At their best, they could have been a useful reminder to their authors but hardly to anyone else, as they failed to register the pitch of each note and therefore were incapable of recording the main feature of the song —its melody.

The use of the note scale alone offers the possibility of taking down correctly the tune of the song and all its other musical characteristics: time signature, variations of tempo and volume, position in the frequency range, and so on. The usual argument against the note scale method is that the birds utter not only pure tones but also noises and indefinable sounds. But if such argument were to be applied to a symphony orchestra, the same logic would compel us to deprive the orchestral scores of most of the percussion instruments—drums, snare drums, cymbals, triangle—because they also produce noises without a definite pitch, not to mention a lot of noise-producing devices in a jazz orchestra.

In fact, there are very few calls which could be classed as indefinable (like the call of the Wattle Bird), and they mostly belong to birds the musical value of whose calls is of no interest whatever. As for true song-birds, the amount of percussive sound in their songs is usually very small in comparison with the melodious material, and many among the best songsters—Grey Thrush, Butcher Bird, Magpie, etc.—do not use noises of any kind at all in their songs. Within a given species, the number of percussion items is limited usually to a few, and they could be marked in the note score in a similar way to percussion in the orchestral score, substituting the notation of the instrument with a short concise description. There is no reason why the Lyrebird's peculiar sounds of that kind cannot be marked as "clicks", "cymbals", "castaneta", "ricocheting stick", etc. The same may apply to the Bower Bird's "motor rumble". Therefore, there is actually no reason why the bird's song cannot, in the overwhelming majority of cases, be fitted into a conventional note score. The more, as a surprisingly large number of "noises" in the bird's song may, on exact analysis, prove to have a hint of a definite pitch.

It was also pointed out by some authors that the birds sometimes use the quarter-tone scale. It remains to be seen whether the exact analysis of the song described later in this article will prove this opinion to be correct. But even if it is so, the melody could be written down even in such a case. There are, by the way, some contemporary musical compositions written in such a scale. For all practical purposes a notation of a quarter tone by a sign flat/2 or sharp/2 preceding the note sign will make it possible to use the conventional note score in such cases.

The real difficulties encountered in writing down a bird's song are of a more general nature. First of all, the usually rapid tempo of the song makes it very difficult to catch correctly each individual note of the tune, as they often blend together, the metronome ratio of the song sometimes being a manifold of our "prestissimo". Even what seems to the ear a comparatively slow call may contain some adornments indiscernible at the normal tempo. Then again, the bird's timbres are often different from our instrumental timbres, and the recognition of the correct tone is often not immediate. In most cases it is necessary to hear the phrase several times before it is noted down, and unless the song is composed of the repeated identical calls, such opportunity may not occur again. But it is much worse with the birds whose sustained song consists of many different musical episodes following one another, and writing down a complete song of a Magpie, Blackbird or Lyrebird is practically impossible to do on the spot.

An even more formidable difficulty is that the bird's range of frequencies is displaced in relation to our piano scale towards much higher frequencies, lying partly beyond the top of that scale and even beyond the human hearing range. Therefore it is possible for some notes uttered by the bird in the course of song to be inaudible to the listener and these may be missed. The obvious result would be that the record of the song would be incomplete, with some gaps occurring now and then near the upper end of our hearing range.

After being hampered by all these obstacles for years, I finally adopted a method which makes it possible to take down a bird's song of any length with the utmost completeness and precision and to eliminate practically all the difficulties described. This method, which is simple enough to be used by anyone with an elementary knowledge of musical notations and a correct (not necessarily absolute) sense of pitch, will be referred to in this article as the "slowed-down playing" method. I shall try now to explain the basis of this method and its application.

Speed and Sound

It seems obvious that if the bird's song could be slowed down sufficiently to make every note of it quite distinct and separate from the adjoining notes, it could be written down easily. In practice this could be done by recording the song on a magnetic tape and then playing back such a tape, or a disc made from it, at a suitable slower speed. However, there are no means of simply slowing down the tempo of the song. By reducing the playing speed, the pitch is also lowered and the song will be heard lower down the scale. Nevertheless this obstacle could be turned into a great advantage if use is made of certain properties of sound.

It is known that every note corresponds to a certain frequency which determines its position in the note scale. It can be easily ascertained from frequency figures that by halving such a figure the pitch descends by exactly one octave.

On the other hand, the frequencies are proportional to the speed of playing. Therefore, by slowing down the playing speed of a tape or of a disc to half (say, from 33⅓ r.p.m. down to 16⅔ r.p.m.) the melody is lowered by one octave. Slowing down to a quarter would mean a drop of two octaves, and so on.

It follows, therefore, that as long as the slowing-down factor is a multiple of 2 (2, 4, 8, 16) the key of the tune will not be changed and consequently the melody could be written down during slow playing in the original key, indicating in the score the needed lift back to the initial frequency by the conventional sign (8.... for one octave, for instance).

In the great majority of cases, however, slowing down to half will prove insufficient. Unfortunately, the higher conventional turntable speeds (45 and 78 r.p.m.) are of no use, as the slowing-down factors $\frac{78}{16\frac{2}{3}}$ or $\frac{45}{16\frac{2}{3}}$ would have placed the melody somewhere between the existing half-tones of the piano scale and consequently outside any definite key, which would make the writing-down of the retarded tune impossible.

There is, however, a simple remedy: the original tape could be re-recorded, say, at a quarter of the original speed, which alone would slow it down four times. Cutting the disc from that tape of 33⅓ r.p.m. and playing it at 16⅔ r.p.m. will result in a total slowing-down factor of 8, which will be found sufficient except in the case of the most rapid passages. There is actually no limit to further retardation down to 16, 32, etc., which could be done by repeating the procedure, but it is not recommended to go further than necessary, as it could seriously impair the clarity of the sound.

The advantages of this method are numerous, as it offers the following facilities:

(1) The task of writing down the song is done by playing the record under home conditions, independent of weather, limited time, etc. Any portion of the record may be played as many times as required, checking the pitch by a tuning fork or a piano, until the whole desired part of the song is written down.

(2) Slowing down the pitch brings the whole range of the bird's voice within the limits of our piano scale more familiar to the ear than the extremely high-pitched notes often used by the birds, and the tone of each note and its position in the piano scale become easier to discern.

(3) Last but not least, by choosing a suitable slowing-down factor, even those bird notes which normally are beyond the upper limit of the human hearing range become audible. The thrill of listening to hitherto unsuspected and inaudible high-frequency sounds and messages cannot indeed be sufficiently emphasized.

One word of warning is, however, necessary. By lowering the pitch of the sound its timbre is somewhat changed, as both the basic notes and their harmonics descend down the scale. A very large retardation may make the timbre hardly recognizable —for instance, a human bass voice would sound like a grunting hog. Therefore all considerations concerning the timbre of song, such as comparison of it to a certain orchestral instrument (flute, clarinet, etc.) should be based on the timbre as it appears at the original tempo of song.

It goes without saying that, while writing down the song, not only notes themselves but all the other notations, indicating time signature, tempo, volume and their variations, as well as signs indicating staccato notes, glissandos, accentuations, etc., should be simultaneously entered in the score. The correct position of the melody in the frequency range should be shown by marking down the number of octaves by which it is to be lifted, which, as was explained, depends on the slowing-down factor used.

It is also very important to mark the correct speed of the melody—that is to say, the metronome ratio (the number of crotchets per minute). Provided that the melody has been already dissected into bars in accordance with the time signature, playing time needed for one bar could be found by counting the seconds. Then the number of crotchets in the bar has to be multiplied by sixty seconds and then by the slowing-down factor, and the result divided by the playing time in seconds. In the case of very rapid passages the result may be beyond the metronome scale, but the speed indication will still be perfectly correct. However, if the score is to be played, the note signs will have to be replaced by those of correspondingly shorter duration, in reverse proportion to the reduction of the metronome reading.

Up to now the references have been made to the piano scale, as most people are more familiar with it than with any other. In fact, however, the violin note score would be much more suitable for interpretation of the bird songs, so often including continuous glissandos, which cannot be correctly reproduced on the piano due to the semi-tone gaps between the notes. Unfortunately the violin scale may prove to be too short for birds with a great range of voice like the Lyrebird.

Once the simple principles listed here are mastered, one should hardly experience any serious difficulties in completing the score of the song. The task is facilitated by the fact that

nearly all bird tunes are solo melodies; the case of accompaniment or chords may occur only occasionally. Some problems may arise in cases of counterpoint, as used sometimes by the Lyrebird, but by taking down the sounds strictly in succession as they are heard, instead of following each melody separately, the problem may be more easily solved in some cases.

It could be said with certainty that anyone who hears for the first time a familiar bird's song slowed down many times becomes immediately aware that hitherto he had missed a lot of now audible sounds when listening to the song at its normal tempo, and would be astonished by the intricacy and complex structure of some sounds which previously seemed to be single notes or calls of a peculiar timbre. It was by this method that the author found that the "cymbals" item in the Lyrebird's repertoire is accompanied by a repeated staccato note, preceded by a downward glissando, immediately following the "clash", and that the "trills" usually concluding the Lyrebird's stanza are, in fact, not trills at all but short glissandos within an interval of a fifth. The phenomenally regular, nearly geometrical construction of the chatter of Rosellas has become obvious only on being slowed down considerably; the Whipbird item disclosed the existence of a short percussive clatter occurring sometimes at the start, or between the long-drawn-in whistle and the crack glissando. But the most thrilling of the author's experiences was the disclosure of the structure of the Lyrebird's well-known double call, which proved to consist of not less than seven staccato notes, forming a complex downward arpeggio preceded by a single lower note, one of those arpeggio notes being repeated thrice before the final note is struck. The total duration of the call was found to be ½ of a second, followed by a pause between calls of ⅓ of a second duration. To make every note of this call clearly discernible, a slowing down factor of about 12 proved to be necessary. I believe that the computing of the note score of that song is a quite original achievement.

(To be continued)

Legal Protection for Kangaroos in Victoria

Statement by Fisheries and Wildlife Department of Victoria, November 1960

Over the past few years a great deal of publicity has been given to the problem of kangaroos causing damage to crops, pastures and farm fences. This damage is accentuated by the increased acreage being brought into agricultural use with consequent restriction of the animals' native habitat.

There are two species of kangaroo found in Victoria—the Grey Forester (*Macropus major*, Shaw) and the Red Kangaroo (*Macropus rufus*, Desmarest). The Grey Kangaroo is numerous and widely distributed throughout the State where it lives in timbered country, while the Red Kangaroo is not so plentiful. The latter is found on plain country and is restricted to the north-west of Victoria.

Control methods in Victoria have been designed chiefly to cope with the problem created by the dominant Grey Kangaroo in fairly intensively developed areas which are adjacent to forest country.

In the bush, natural food begins to become scarce late in autumn or during winter, just when crops are showing through the soft earth. The kangaroos then invade the farmlands in search of food, and can cause severe damage. They retard the crops by nipping off the leaders, and worse, by trampling other young plants into the soil. In a ripening cereal crop, the brittle stalks are snapped and flattened as the animals move through. Fencing also suffers. Only the larger kangaroos will jump a fence; the smaller ones prefer to force their way underneath, straining the netting up with their shoulders,

and making holes through which rabbits, foxes and dogs may follow.

Where these agricultural problems exist, landholders can apply to the Fisheries and Wildlife Department for permits to destroy some of the offending animals under prescribed conditions. The carcases cannot be removed from the property, although the skins may be sold. Except when destroyed under permit as described above, the Grey Kangaroo is strictly protected in Victoria at all times.

The Red Kangaroo is found in great numbers on the plains throughout the pastoral areas of New South Wales, Queensland and South Australia—areas which are more sparsely settled than Victoria. Until recently it was fully protected in Victoria throughout the whole year, but in 1959 a complex situation arose which had to be met by an adjustment of the regulations.

The legal mechanism for protecting mammals and birds in Victoria is to name them in the Third Schedule to the Game Act 1958 and alongside their names to state the period of the "close season". The close season for the great majority of wildlife species is the whole year. Under Sections 8 and 9 of the Game Act, penalties are prescribed for possessing or trading in skins or flesh of any animal during the close season, which meant in effect that, while kangaroos were fully protected, the possession of skins or flesh was an offence.

As a control measure over the excessive numbers of the Red Kangaroo in our neighbour states, open seasons have been declared in various districts. In this animal management procedure, the authorities are relying on professional shooters who will take advantage of the commercial value of skins and meat from the animals thus killed. Melbourne is the normal export outlet for the areas of southern New South Wales and parts of South Australia where much of the shooting is taking place.

Rather than let the kangaroo carcases rot where they had been shot in other states, it was decided to allow the use of the meat. In order to permit this meat of interstate origin to be exported through and sold in Victoria, it was necessary to reduce the close season on Red Kangaroos to a nominal period of ten days in each year.

It was never intended that the products should originate in Victoria or that our own rather restricted population of Red Kangaroos should be in any way endangered. To protect the animals during the long open season necessary for the handling of the interstate meat, a simultaneous proclamation prohibited the hunting or killing of Red Kangaroos in Victoria by means of a gun or bow and arrow. The use of nets to take kangaroos had been rendered illegal by an earlier proclamation so that, in practice, by limiting methods of killing, the Red Kangaroo is still afforded almost complete protection as far as legal processes can so provide. In fact, the situation has not been changed by the new regulations, in so far as Victoria is concerned.

Special Film on Microscope

Readers are invited to attend the screening of a sound and colour film entitled "The Microscope", at the Microscopical Group Meeting at the National Herbarium at 8 p.m. on March 15. Details of the film are:

"By pictorial representation the function of the magnifier is explained in a clear and comprehensive way. A short historical retrospective review leads from the first, simple microscope to the modern, compound microscope. Its most important optical and mechanical parts are demonstrated and an insight is given in the manufacturing process. In the following, the path of rays of the microscope is set up on an optical bench and explained. Conceptions such as numerical aperture, resolving power, diffraction and even the illustrated theory of Abbé with its interference appearances are being represented so as to be easily understood. With a view of the microcontrol of the Wild Herrbrugg factories the film comes to an end."

The showing of the film, which runs for 27 minutes, is being sponsored partly by N. H. Seward Pty Ltd., and there are to be other supporting films.

Field Naturalists Club of Victoria

General Meeting—February 13, 1961

Mr. D. E. McInnes presided over a gathering of about 200 members and visitors at the National Herbarium, on the occasion of the February general meeting of the club.

An extraordinary general meeting was held first, for the formal approval of the application for affiliation with the F.N.C.V. of the Bairnsdale Field Naturalists Club. Mr. H. Stewart spoke of the enthusiasm of this new group and of the great variety of natural habitats available to them for attention. He asked too for speakers at their monthly meetings. The affiliation was effected on the motion of Messrs. E. Coghill and J. Wilson.

The death was announced of Mr. Ray Littlejohns. Mr. E. S. Hanks spoke of his work as an author and nature photographer, and those present observed a minute's silence as a token of respect.

General business included arrangements for the manning of the Moomba Show exhibit, a request for members qualified to examine Boy Scouts for nature badges, and consideration of membership of the Landscape Preservation Council. The editor's request for helpers to sort old stocks of the *Victorian Naturalist* and to work on preserving blocks was answered by several members. Miss E. Chisholm's offer to represent the club at A.N.Z.A.A.S. was accepted, excursion details were announced, and the librarian invited members to peruse unwanted publications prior to their being discarded.

Dr. Donald Thomson of the Department of Anthropology, University of Melbourne, gave an illustrated lecture entitled "The Bindabu Country". He told of a journey by jeep, in 1957, into central Western Australia, and contact with primitive nomadic people who have never been touched by mission or station life. Dr. Thomson described the adaptation of these people to their desert environment, particularly as regards the obtaining of food and water. An excellent series of colour slides illustrated these aspects and also the vegetation of the country. A vote of thanks to the speaker was carried enthusiastically.

A certificate of honorary membership was presented to Miss Florence E. Smith, who has been a member of the club for forty years. In responding, Miss Smith presented a number of books to the club library. The twenty nominations for membership of the club, as set out on page 309 of the February *Naturalist*, were approved, and these new members were welcomed to the ranks of the F.N.C.V.

Microscopical Group—February 15, 1961

Dr. R. M. Wishart read a paper entitled "Insect Wonders of the World". He explained that insects are one of the most successful forms of life—a fact obvious to even the casual observer, who finds them in every nook and corner and using as food substances ranging from blood to wood. Dr. Wishart spoke of beneficial insects and ones that destroy crops and spread fatal diseases. He told too of fossil dragonflies which show little change from present forms right back to the Carboniferous age. The speaker gave details of structure, growth and physiological functions, and comparisons were made with man in the matters of brain, sensory organs and instincts.

Geology Group—February 1, 1961

Seventeen members attended, with Mr. A. Angior in the chair. Mr. A. Cobbett reported that the *Amateur Mineralogist* was ceasing publication, to be replaced by the *Gemmologist Magazine*. Mr. D. McInnes mentioned an excellent series in *Life* magazine on mapping of the floors of oceans.

The evening was devoted to "Holiday Reminiscences" by members. Mr. Cobbett spoke on a visit to the Omeo district and his examination of basalt capping of the mountains there. He exhibited specimens of fossil wood from the area. Mr. McInnes told of the xenoliths or basic segregations in the granites at Yanakie, noted during the Christmas excursion. Miss P. Carolan sought information on certain treeless areas visited in the Lake Mountain area; these were considered to be

natural and not caused by human agencies. Mr. Bairstow exhibited tourmaline crystal, collected during a visit to No. 3 Hill, Anakie. Mrs. Stubbs described the musical sounds made by sands at Squeaky Bay, Wilson's Promontory; they are believed to be due to friction between fine grains of uniform size. Mr. J. Blackburn had visited the Bellarine Peninsular and he exhibited travertine from there; and fossils, believed to be Balcombian but in a new area for this series, were collected from tertiary deposits. Mr. P. Fisch reported on a trip to Mount Buller and the large scree slopes at the foot of the mountains.

Exhibits included aboriginal chippings and scrapers from near Wentworth in New South Wales (Mr. K. Shepherd).

Fauna Survey Group—February 9, 1961

Eight members attended the meeting, with Mr. R. McQueen in the chair. Regrets were expressed at the resignation of the group secretary, Mr. G. George, who has moved to Sydney. Mr. George was mainly instrumental in having the group formed, and he has done a great deal of work in connexion with its organization. Miss J. Furphy was elected to the vacancy.

Arrangements for the group exhibit at the Moomba Show were discussed. This will take the form of a display of animal specimens, with photographs and illustrations of their homes and habitats.

Reports of excursions during the past month included an investigation of the Jumping Creek Reserve at Warrandyte. Seven mammal species were listed and it is likely that several more are in the area. Mr. N. Wakefield reported that the Rock-wallaby colony at Wallaby Rocks, near Suggan Buggan, is becoming smaller and that conservation measures are being considered by the Fisheries and Wildlife Department. Further bone material has been removed from the Pyramids Cave, Murrindal, and this awaits sorting. It was suggested that members of the group should explore the Mount Tambo area to determine whether Rock-wallabies survive there; and there should be further work in the "death-trap" caves of the Buchan limestones.

At the conclusion of the meeting, slides were shown by Messrs. D. Woodruff and N. Wakefield, the latter including some excellent colour pictures of a Rock-wallaby.

Fauna Survey Group Excursion to Buchan District—December 4-9, 1960

Only two members attended and this limited the amount of work that could be done. The purpose was to investigate the mammal fauna still surviving in the vicinity of the bone deposits recently worked upon at East Buchan and Murrindal. While driving between Bruthen and Buchan early one morning, one Red Wallaby (*Wallabia rufogrisea*) and several Black Wallabies (*W. bicolor*) and Kangaroos (*Macropus major*) were seen.*

The first night was spent at the roadside hut at Murrindal River, eleven miles north of Buchan, and the only animal caught was an Allied Rat (*Rattus assimilis*). The following day was passed in the Mount Tara area, south-east of Buchan, and twenty-seven cage traps were set that night and the following night along the valley of Tara Creek. A total of nine Allied Rats resulted for the two nights, and the first lot was caged for the day to prevent their re-entering the traps the second night. It was hoped that this procedure would increase the chances of obtaining other ground mammals such as Phascogales.

Spotlighting near Mount Tara revealed Sugar Gliders (*Petaurus breviceps*), a Dusky Glider (*Schoinobates volans*), a Feathertail Glider (*Acrobates pygmaeus*), Black Wallaby, occasional bats and a Wombat (*Vombatus ursinus*). Ringtail Possums were heard but not seen. In this area a local resident had felled a tree which was found to contain a nest with nine Sugar Gliders. The spot was visited and four of these animals observed in the forest adjacent to the original home tree. The same evening the two members were

*The vernacular names used here are the local ones in East Gippsland.

shown a spirit specimen of Yellow-footed Phascogale (*Antechinus flavipes*) which had been accidentally killed in the area about three years before.

Wombats and Kangaroos were seen during a night drive to Timbarra, and next morning a good example of a "glider tree" was noted beside the road.

Several of the caves in the district were visited, to check the status of the three species of cave bats known to inhabit the Buchan limestones, and a few of the bat clusters were photographed. In the Maze Cave in the reserve, a Brushtail or Silver-grey Possum (*Trichosurus vulpecula*) was sleeping in a cavity near the roof inside the first chamber.

Botany Group—February 9, 1961

The February meeting of the group took place at the National Herbarium, and Dr. Margaret Chattaway spoke on eucalypts. She dealt with aspects upon which she had carried out research, as well as touching on the shapes of trees, root structure and peculiarities of some species. The lecture was illustrated by a series of fine pictures. In answer to a question, Dr. Chattawy said that eucalypts were not among the longest-living trees and it had been estimated that the age to which they lived would be 100 to 200 years, with a maximum, rarely, of 400 years. The chairman thanked the speaker for what he described as "a fascinating talk on a fascinating subject".

Arrangements were made for an excursion, on the subject of eucalypts, to the Royal Botanic Gardens on Saturday afternoon, February 18.

Following the opening talk, by Mr. J. Ros Garnet, on the Plant Kingdom, on Thursday, March 9, a series will be given as follows:

April 13—Algae and Fungi (Miss A. Hooke).
May 11—Liverworts and Mosses (Mr. G. Thompson).
July 13—Ferns and Clubmosses (Mrs. Webb-Ware).
August 10—Cycads and Conifers (Miss M. White).
September 14—Introduction to Flowering Plants (Mr. G. Thompson).

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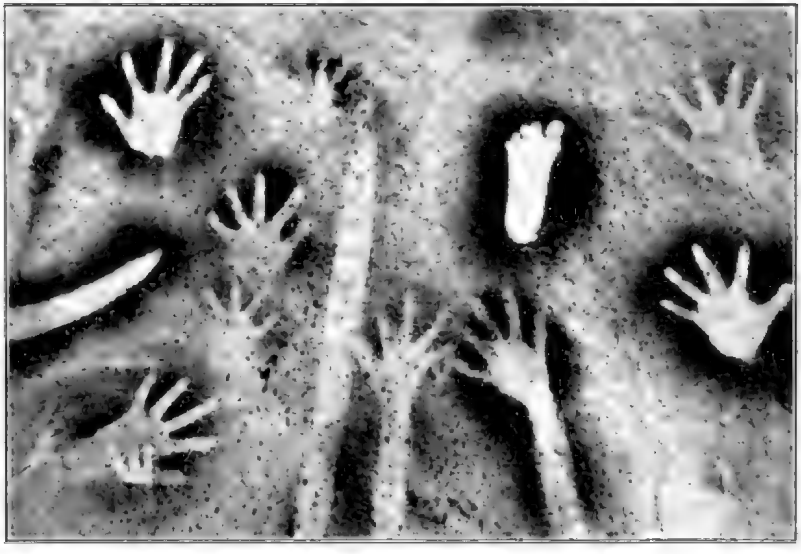

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Front Cover:

The picture shows part of the aboriginal decoration on the walls of an enormous recess in sandstone of the Carnarvon Range in south-western Queensland. The stencils were made by placing the hand, foot or other object against the rock and spraying it with water and pigment from the mouth. This is a Queensland Forest Service photograph which accompanied an article entitled "A Scenic Wonderland", by S. R. Mitchell, in the *Victorian Naturalist* of March 1941.

The Victorian Naturalist

This is the final number of volume 77 of the *Victorian Naturalist*, and its issue concludes the magazine's second year in a popular format. It is gratifying to look back over the past twelve months and to note continued expansion both in the Field Naturalists Club and in its journal.

It is interesting to carry the retrospect further and to assess present trends in the light of the more distant past. The *Naturalist* attained its maximum size in 1926-27. Taking various supplements into account, that year's volume contained over 400 pages, and it incorporated almost fifty illustrations.

The ensuing quarter-century saw a gradual decline in the magazine, until quite recent years. Volume 69 contained barely 200 pages. Illustrations were very few, and some issues had none at all.

Two years ago, a new *Naturalist* replaced the old one. Excluding advertisements, volume 76 ran to nearly 300 pages and it had almost one hundred illustrations. Approval of this departure was indicated by a substantial increase in club membership and in subscriptions to the magazine.

Volume 77 followed, with an increase in the average size of individual numbers as well as in the amount of illustration. The 32-page issue which is now produced regularly is economic to print. Moreover it is the size that accomodates the quantity of suitable material at present being submitted for publication.

This year we have again seen gratifying increases in club membership and in circulation of the *Naturalist*. The higher income which these brought in has helped offset a substantial increase in general printing costs. Help came too from a vigorous sales campaign in connexion with back numbers of the *Naturalist*, and the scheme of supporting membership has been maintained. The actual improvements seen in volume 77 were made possible by a grant from the M. A. Ingram Trust, for the publication of matter, which could not otherwise have been accommodated, relating to Australian mammals.

During the forthcoming club year it is hoped to maintain the *Naturalist* at its present size and standard. The F.N.C.V. finance committee considers that this may be done if the present rate of increase in both membership and subscription continues. Therefore, the idea of supporting membership is again placed before you, and you are asked to advertise the activities of the club and its magazine to your acquaintances. Leaflets are provided for use in these connexions in the centre of this month's *Naturalist*.

Let us this year consolidate our gains in preparation for further improvement in the near future.

Australian Wattles No. 23

Cinnamon Wattle—*Acacia leprosa*

By JEAN GALBRAITH

The cool spicy aroma of Cinnamon Wattle greets visitors to the Dandenong Ranges soon after they reach the foothills. This is a wattle of cool mountainous places, and its scent is part of that fragrance which people speak of as "sweet mountain air". It is only slightly reminiscent of cinnamon, but the title Cinnamon Wattle, used in New Zealand for the species, is preferable to its previously accepted name of Leper Acacia with its unhappy association.

Cinnamon Wattle is one of the most graceful trees I know, growing up to fifteen feet high, with narrow phyllodes on its branches. It usually has only one main stem and the relatively short branches hang down as they lengthen. So the whole tree is clothed to the ground with light foliage and, in season, with fairy-like flowers as well.

Cinnamon Wattle
Photo: R. D. Lee

In the Dandenongs, about Upwey and Belgrave, a very narrow-leaved form grows. It has thin resinous phyllodes, up to three inches long but only about $\frac{1}{12}$ inch wide. The drooping willowy tips, with their young leaves, are as sticky as those of Varnish Wattle. However, the latter has broad phyllodes with two main veins and the flower-heads are large. The normal form of Cinnamon Wattle has phyllodes up to $\frac{1}{4}$ inch wide and sometimes over three inches long.

In both forms of *A. leprosa* the phyllodes are one-nerved, slightly sickle-shaped, tapered very slightly towards each end and rather dark green. Young growth is yellowish, and at all stages the leaves are pitted with minute glandular dots.

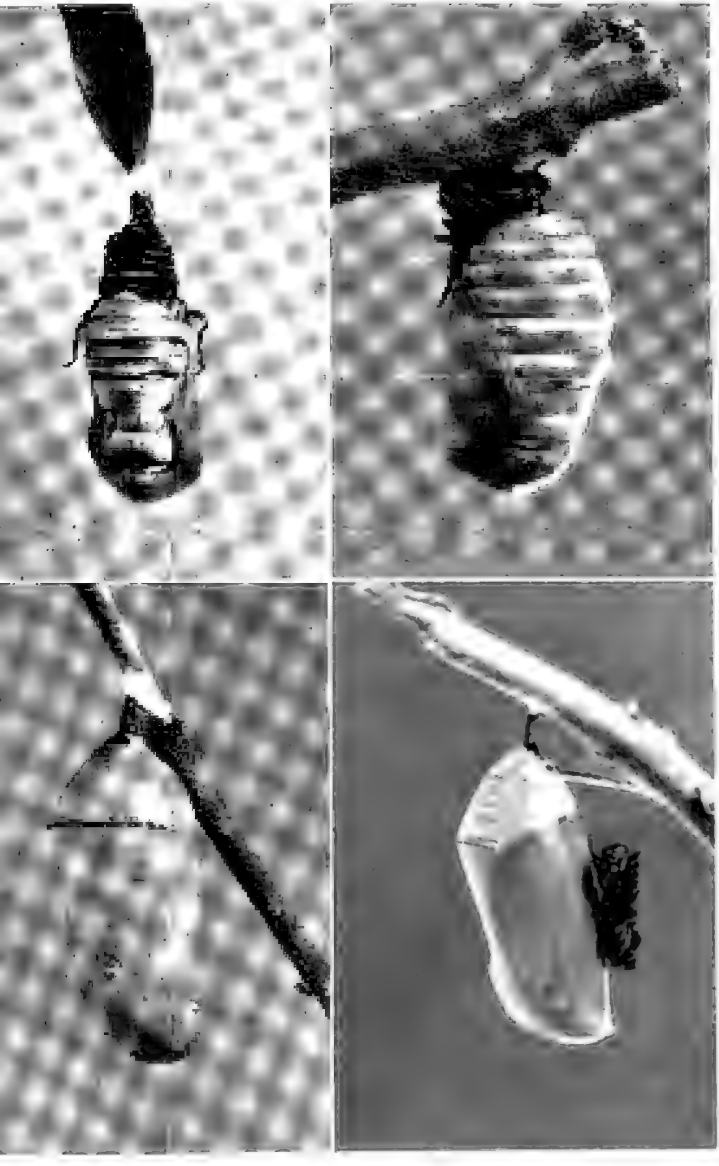
The globular flower-heads are primrose or lemon-yellow, several together and each on half-inch stalks from the leaf-bases; they are never in racemes. When in bloom, the little trees—or large shrubs—seem to be filled with pale yellow light, streaked with the broken lines of slim hanging phyllodes. Close examination reveals that the flower stalks are minutely hairy. The sepals, which are seen best at the bud stage, are fringed.

Cinnamon Wattle is not only a lovely wayside or forest tree but, because of its weeping habit and fairy-like blossom, it is also valued in cultivation. It is not too large for the small garden and it grows very quickly. Staking is necessary, however, because of the willowy habit and shallow roots.

Baron von Mueller recorded the species from "between Goulburn and Broken Rivers". It extends north into New South Wales and may be seen near Sydney.

Life History of Wanderer Butterfly

Pictures by the Late Edith Coleman



2. Four stages in the pupation:

Above:
Larval skin worked up towards tail.

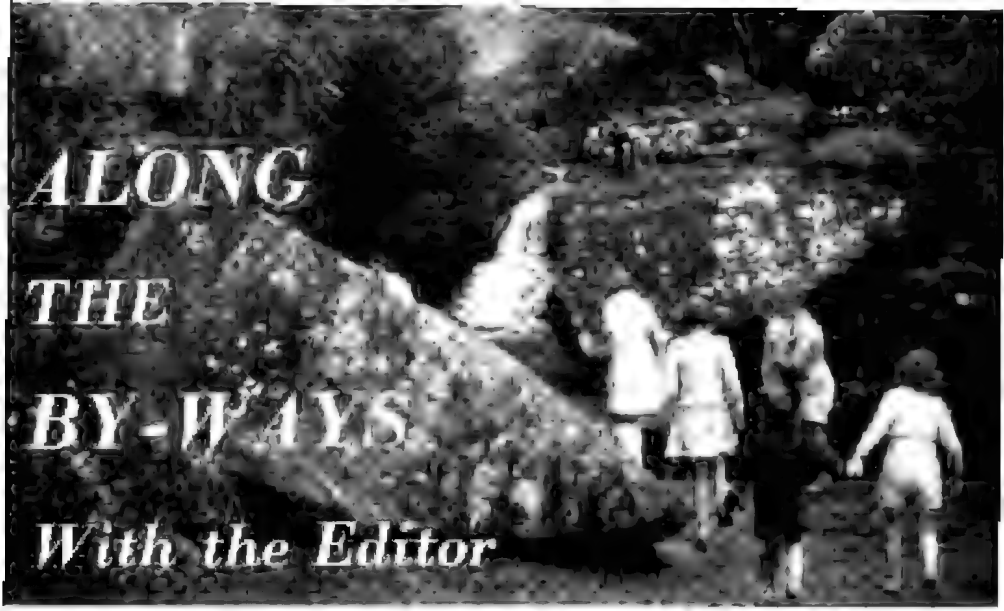
Below:
Finally, the skin is shed.

Reproduced from *Vict. Nat. 55* 202-8 (April 1939).

1. *Above:*
Larvae on Swan Plant, *Asclepias fruticosa*, preparing to pupate.

3. *Right:*
Pupae in various stages.

4. *Top right:*
Emergence of adult. The crumpled wings are inflating.



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.

Fly Agaric at Shoreham

A year ago, Mr. J. H. Willis, of the National Herbarium of Victoria, contributed a resumé of the Australian records of the deadly *Amanita muscaria*. This appeared in the February 1960 issue of the *Victorian Naturalist* (Vol. 76, p. 265). Now Mr. R. D. Lee has given us an additional record of the species, the more interesting because of the season of his observation. Mr. Lee writes:

On Saturday, December 3, 1960, when approaching Shoreham from along the Red Hill road, my wife asked that we stop to look at some fungi growing under pine trees. Great was our astonishment when we saw that they were the Fly Agaric, *Amanita muscaria*—not just one or two but dozens, ranging from "buttons" to fully matured specimens six inches and more across.

A week later, on December 10, when driving again along this road, we noticed many sections where they were also growing. The numbers in evidence suggest that they have been established in the area for a long time.

This record adds another Victorian district to the known distribution of an attractive but poisonous fungus introduced from the Old World. Previous records are from Emerald, Macedon, Upper Beaconsfield, Kallista in the near Dandenongs, and Doncaster.

It was interesting to see the Fly Agaric in early summer; it usually appears in autumn.

Mueller's Blackberries Again

An interesting point is raised by Professor J. B. Cleland of Adelaide who writes:

In *Vict. Nat. 77* (*9*), p. 258, Jan. 1961, there is a reference to "blaeberries", seed of which Baron von Mueller is supposed to have obtained from Scotland. My Scotch dictionary says "blaeberries" are bilberries. Did the Baron and Mr. Elliott ask for "blaeberries" and did they get blackberries? It is a great pity that blackberries—two species—were ever intro-

duced into South Australia. Valleys are made impassable and the danger from fires accentuated. A Viceroy of India said once "Save me from zeal".

Commenting on the subject, Mr. J. H. Willis of the National Herbarium of Victoria says that while travelling in Great Britain he met with the Victorian strain of blackberry only in western Scotland. So the original stock evidently was from the north.

Tiger Cats on Wilson's Promontory

Several years ago, any news of the Tiger Cat (*Dasyurus maculatus*) in Victoria was of outstanding interest, for this large carnivorous marsupial had become very rare on the Australian mainland. Recently, however, quite a number have been seen, and many have been caught in various parts of this state, especially south of Colac and in Gippsland.

Though apparently on the increase the Tiger Cat is not yet commonplace enough for us to pass over news of it without comment. Here then is a note, sent to the *Naturalist* by David Fleay, from the pen of Mr. D. Jenkins of Brisbane:

> I have just returned from a visit to Victoria, including a short trip to Wilson's Promontory. On the return trip from Tidal River, on the last of the hills before leaving the reserve, we came quite suddenly, on rounding a curve, upon what was undoubtedly a Tiger Cat.
>
> We had quite a good view of the animal, which was on the side of the road, although it lost no time in scaling the bank and disappearing into the bush

That letter was written in November 1960, and very recently an almost identical report came from Mr. G. T. Thompson who saw what he believes to have been a Tiger Cat, at night in the headlights of his car, on the road "just the other side of the Darby River".

Cattle Eating Stringybark

Further to the note on this subject in the *Naturalist* of February 1961, Mr. Claude N. Austin of Casterton writes:

> This is a common practice in late winter and spring, when the pastures are green and there is no old dry food available to the cattle for roughage. They probably prefer the rougher-barked trees as these are easier for them to deal with, but they will eat almost any bark when it is the only available roughage. They do not often actually kill the trees, as the deeper layers of bark are harder for them to chew, and they usually move to another tree before the ring-barked stage is reached. Cattle must have roughage in their diet and, if the deficiency of it is so bad that they chew bark, they will do a lot better if they are fed some dry hay.

These comments are followed by some from Mr. Keith C. Rogers of Wulgulmerang:

> It seems that the habit is not unusual. At our Wulgulmerang property last May we turned 70 eight-months-old Hereford calves on to fifty acres of pasture recently sown down with rye-grass, clover and turnips. In the same paddock the remaining thirty acres comprised lighter ground under green timber and only a little grass. The trees were Broad-leaf Peppermint (*Eucalyptus dives*), Red Stringybark (*E. macrorrhyncha*) and three species of gums. On one hill there is a dense growth of peppermint and stringybark together.
>
> The calves grew and did very well but, on turning them out after three months, we noticed that they had stripped every Red Stringybark tree to as high as they could reach, though it doesn't appear as if many trees will die. No peppermint or gum bark was touched. Apparently it was roughage these cattle needed.

National Parks and National Monuments—16

Werribee Gorge: A National Geological Monument

By J. Ros Garnet

A mental picture of the surface of a considerable part of Victoria, as it was in Permian times, may be gained from photographs of Australia's Antarctic territories. Of course there would be no mammals or flowering plants of any kind, and fishes were the highest development in the animal life that inhabited the cold seas. In the plant kingdom there was nothing more highly evolved than pteridophytes, such as lycopods, horsetails and ferns—an interesting situation but hardly one of aesthetic appeal.

In that chilly age, a vast ice sheet extended from somewhere away to the south-east of Tasmania far into the north-east of what is now our continent. Tongues of ice pushed forward, inexorably grinding away earth and rock beneath, gathering up the debris formed by their passage and dropping it again, scooping out huge channels, forming moraines—in fact, behaving just as glaciers do today.

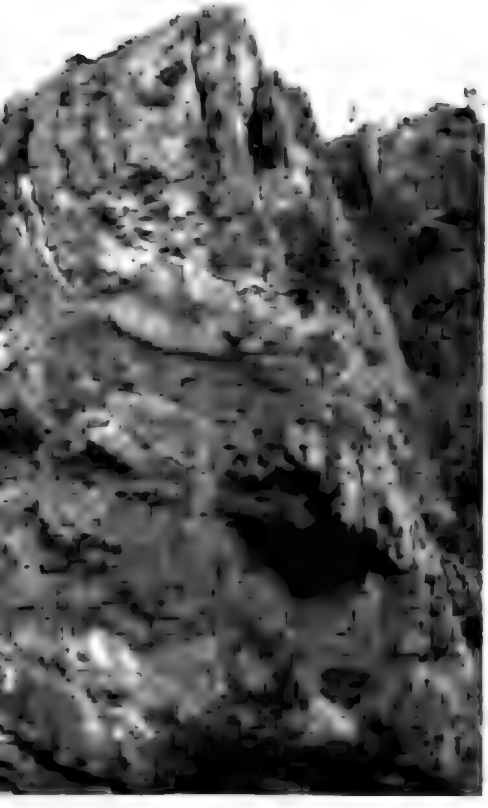
In the intervening ages, most of the evidence that such conditions existed has been obliterated, but enough remains to show that there was indeed such an era. One needs journey no further than forty miles from Melbourne to see such evidence.

Werribee Gorge National Park is a favourite haunt of naturalists, particularly those with a leaning towards geology. These informed people seem to have no trouble in reading the history of the gorge in the amazing series of rocks there. Sections dating back to the Lower Ordovician period lie cheek by jowl with formations belonging to almost every succeeding period of the Palaeozoic era and, literally to cap it all, there are Tertiary deposits of the Cainozoic era. To bring things nearer to our own times, the geologist will point to the Werribee River itself and comment perhaps that its course through the gorge was determined possibly less than forty million years ago—in Pleistocene times. With one broad sweep he will have covered something like 400 million years of history.

A visit to this remarkable place is rewarding even if one is not a geologist. The photographer finds there many scenes of colourful grandeur. Wildflowers, handsome native trees and showy shrubs blossom in their season. The flowing streams are turbulent in places and in others placid, full of reflections. All these features contribute to a thoroughly enjoyable ramble along the Werribee Gorge.

For vehicles, the approach to this 578-acre reserve is along a private lane leading from the Western Highway near the 38-mile post, a few miles west of Bacchus Marsh. So far, no Government has seen fit to acquire a public right of way to it. No doubt because of this circumstance this "public park for the preservation of geological formations" (to quote the citation in the *Government Gazette* when it was reserved in December 1907) was excluded from the schedule of national parks named in the National Park Act of 1956-60. It remains under the control of the Department of Lands and Survey, neglected by all but a few who prefer the byways and remote places which hold much of Victoria's treasury of natural wonders.

Thirty-six years ago, when an addition was made to the reserve, a committee was appointed to manage it and to supervise such developments as were considered necessary in the public interest. The committee worked with enthusiasm. Tracks were cut to vantage points, shelter sheds and conveniences were built in suitable places, and people were encouraged to visit the park. But, as so often happens, interest waned and enthusiasm abated. The committee lapsed into inactivity and finally disintegrated as too did the amenities which it had provided. In 1959, the local Shire Council effected a few temporary repairs to the latter, for the benefit of a large party of visitors, but, apart from this, the famous national geological monument remains neglected—for how long, time will tell.



Pyramid Rock: Synclinal folded Ordovician [illegible] River.

Fortunately, if one can judge from the results of his activities over the past hundred years, Werribee Gorge is the kind of natural feature which man would find hard to destroy or damage. The citizens of Victoria may expect that it will eventually come under the control of the National Parks Authority and be made accessible to all. Then it may be visited by people other than students, naturalists and walkers. Werribee Gorge is worthy of wider recognition as one of the natural wonders of the world.

Footnote: As an adjunct to a public excursion to the gorge, arranged in 1959 by the Victorian National Parks Association, a pamphlet was prepared on the geology and special features of the park. This includes comments on wildlife and vegetation, and it is illustrated with a photograph and a map —the latter to facilitate the finding of the place. Copies are available, at sixpence each plus postage, from the Secretary of the V.N.P.A., 23 Camdon Street, Pascoe Vale, or through the F.N.C.V. Those conducting school excursions to the gorge should find the pamphlet useful.

Spider Cohabitation

By R. M. WISHART

Arachnologists agree that the life of an average male spider is fraught with danger, particularly when he dares approach a female. The lady has earned a reputation for cannibalism, for she frequently devours her mate. In most species, the male is considerably smaller than the female, and he may be a different colour or even a different shape, as with the Tailed Spider *(Arachnura higginsi)*.

Recently I came across colonies of two of our smaller orb-weavers, where members of both sexes appeared to be living amicably together or in very close proximity. I was searching for specimens along drains cut through a swampy area in South Gippsland, when I noticed first a community web of the Spiny Spider *(Casteracantha minax)*—called also the Six-thorned or Thorny Spider—and found numbers of the males on the same portions of the webs as those occupied by the females.

The female Spiny Spider is strikingly coloured, in pale cream and black, with reddish-brown legs, and she bears six prominent spines covered with fine hairs on her abdomen, two on each lateral margin and two widely separated posteriorly. With extended legs she measures up to half an inch in length, but while at rest on her web she tucks her legs in close to her body and thus appears smaller and com-

pact. She usually remains motionless in the centre of her snare and is easily captured.

The male is approximately half her size and is sombrely coloured, his legs being black. He exhibits a different, less conspicuous arrangement of light cream on his abdomen, while his six spines are shorter and blunter. Like his feminine counterpart, he stays bunched up on the web and looks more like a piece of dark-coloured debris than a living object.

I have occasionly seen the female of a larger, entirely black Spiny Spider, but that species seems to be comparatively rare.

The second community consisted of Large-jawed Spiders *(Tetragnatha)*—known also as Water-lovers or Stilt Spiders. These almost invariably establish themselves over water or close to it and, in contrast to the Spiny Spiders, they are protectively coloured in light brown and fawn. They possess huge down-jutting jaws, which appear almost too bulky for their thin, cigar-shaped bodies. While waiting for some unfortunate insect to fly into their silken traps, they place their long spindly legs fore and aft, the first two pairs outstretched in front and the third and fourth pairs to the rear, so that legs and body form an almost straight line. Aided by their colour, in that position they resemble small twigs or pieces of coarse dry grass; they are therefore wonderfully camouflaged. The body is about half an inch long, but with legs extended the whole arachnid measures considerably more. There were no communal webs of this species, but snares were placed quite close together, attached to grass-stems, weeds and rushes, along the banks or across the miniature canals.

The males of *Tetragnatha* were hardly distinguishable from the females, being similar in size and colouration, but examination with a 10x lens revealed their characteristic bulbous-tipped pedipalps. Each male obviously forms his own silk snare and is not dependent on the spinning efforts of the female.

These two examples of the Arachnida are quite harmless, despite bright colours, spines and large jaws, and they may be handled with impunity. Anyone interested in microscopy may find that they make excellent subjects for micro-slides. The Spiny Spider males are quite tough and require considerable time in potash solution; but the females and the Large-jawed Spiders have soft bodies and need only a short period in the softening medium in preparation for mounting.

What reasons may be advanced for the males and females of these two species of spider residing close together in apparent harmony?

Judging by the the length of time necessary to soften the male Spiny Spider in *Liq. Potassae*, I think that his hard exoskeleton provides all the protection he needs if, or when, the female attacks. I doubt whether with her armanent she could pierce his tough hide.

K. C. McKeown states in *Australian Spiders* that the male Large-jawed Spider carries an accident insurance policy in that he is furnished with spurs on his chelicerae (bases of fangs) by means of which he can wedge his partner's jaws apart while mating and so escape probable annihilation. This may be confirmed by examining microscope preparations of the two sexes.*

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Wimmera F.N. Club

At the annual meeting, on February 16, the following office-bearers were elected for the ensuing year:

President—Mr. K. Jordan.

Vice-Presidents—Messrs. W. Middleton and C. Crouch.

Secretary—Miss A. Jordan, "Lister Vale", Kiata.

Meetings are held, in rotation at various centres, on the third Thursday of each month.

*W. S. Bristowe gives an interesting description of mating in this family, on pages 252-56 of his book, *World of Spiders*. He illustrates the matter also on page 28 of his booklet, *Spiders*.—Editor.

Writing Down a Bird's Song

By K. C. Halafoff

(Continued from last month)

Determining A Bird's Voice Range

As with each note of any musical instrument, a note of a bird's song usually consists of a basic note and its several harmonics whose frequencies are multiples of that of the basic note. The cases of use of a single frequency by birds are, contrary to popular belief, comparatively rare.

The range of a bird's voice is determined by the range of these basic notes as distinct from the range of overtones, the latter being the difference between the highest harmonic and highest basic note frequency. However, the fact that a basic note is accompanied by its higher overtones does not mean that that note is the loudest—the reverse is often the case. For instance, according to G. S. Briggs, the fundamental of a violin A-tone (frequency 196) radiates only 0.1% of the total sound energy, the remaining 99.9% of the volume being occupied by harmonics of which the third (45.2%) and second (26.0%) are responsible for more than ⅔ of the total loudness of the note. One would expect that the weak basic note would be completely drowned by those strong harmonics; yet it does not happen, due to a wonderful ability of the human ear to establish the correct frequency of the fundamental note by its different tones—the note which it will hear in this medley of overtones will be the correct A note of the frequency of 196 c.p.s.

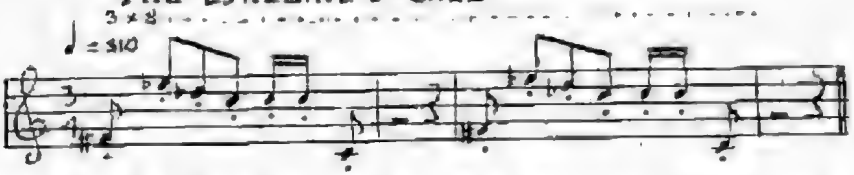
It follows that in establishing a bird's voice range which, as was explained, is defined by the difference between the highest and the lowest basic note which the bird is able to utter, one can rely fully on one's ear. As the slowing-down method allows the lowering of the pitch by three octaves at a s.-d. factor of 8, it means that the highest frequencies up to 33 k.c./sec. will be brought within the piano scale range and therefore no basic sound, however high, will be missed by the ear.

It is, however, quite different with overtones or harmonics, accompanying the basic note. The ear interprets them only as a timbre of that note; it cannot hear the harmonics separately. To establish their existence and also their range, use could be made of the oscilloscope, which converts the sound energy into visual sound curves shown as bright green lines on a black screen. A single frequency would appear as a regular smooth sinus curve, but those containing harmonics will appear as a wavy complex curve, being the sum of a number of sinus curves with different periods and amplitudes. By measuring the distance between the nearest peaks the frequency of overtones could be easily established. This range of overtones in the bird's voice is no less important than the range of basic notes, as its length is a characteristic of the timbre of that voice. The shorter this range, the purer and more sonorous the bird's voice would seem to the listener, but the same effect may be noticed if the volume of those overtones is low compared with that of the basic tone. Loud overtones may be the cause of the sharp or piercing quality of the high-pitched notes.

As for the volume of the sound which is indicated by the amplitudes of the sound curve, measurement of it may sometimes be of interest. It is known, for instance, that the volume of the already mentioned Lyrebird call exceeds by far the loudest other items of the song. However, it is rather better and simpler to use a noise-meter in such cases, which gives the loudness of the sound in decibels (units of the volume).

By combination of the slowed-down playing and the oscilloscope analysis some long-standing problems concern-

THE LYREBIRD'S CALL



ing the Lyrebird's song are likely to be solved. First of all, the faithfulness of the bird's mimicry can be examined. It is naturally impossible to compare it with the original sources, but it is still possible to compare the acoustic properties of the imitated version with a similar call of the mimicked species, and if the harmonic structure and range of overtones are approximately the same in both cases, the imitation could be considered correct.

For myself, I have no doubt about *ability* of the Lyrebird to give the most perfect imitation of any sound, especially after having heard an astounding "high fidelity" imitation of a movie camera mechanism of a certain make from an immature male.[6] However, it must be admitted that some young males may be guilty of crude imitations on occasions. Probably the Lyrebird's habit of abbreviating some imitated items also gave rise to the accusation of imperfect mimicry, but the accusers forget that they are not dealing with a copyist but with an artist who regards these songs and calls purely as musical raw material for his composition.

The other problem—whether the Lyrebird's "stanza" is, as some authors think, a glorified version of the Grey Thrush call—can also be tested. The melody of the stanza (apart from its abbreviations) varies very little from bird to bird, or within the repertoire of the same bird, while the Thrush's melodies are numerous, but, apart from the final bar, there is no likeness to the stanza. But there is a very marked similarity in rendering the melody, as the same combination of glissandos and single notes is used both in the concluding bar of the typical Grey Thrush call and the whole of the stanza, except already-mentioned trills which, I can say with certainty, bear no marked resemblance to any of the Kookaburra items with which they are sometimes compared. This is quite obvious when both calls are played at a slow speed. As for the mentioned partial likeness, the analysis of harmonics in both the Lyrebird's and the Thrush's items could probably throw more light on this rather complicated argument.

Finally, the intriguing riddle of the so-called "telepathic message" can now be expected to be solved soon. This term is applied, presumably in absence of a more scientific definition, to a message inaudible to the human ear but apparently audible to the Lyrebird, which receives it from another Lyrebird in the neighbourhood and runs to meet its sender. It occurs mostly during morning "playtime", in a pause between mock chases. During the reception of the message, the Lyrebird stands still, except that the head is jerked and turned in various directions, with the beak pointing mostly upward. If, as the author thinks, this message is a sound of very high frequency, then the bird's behaviour is easily explainable. The higher the frequency, the narrower is the sound beam, and to catch it the ear must not only be directly in its path but also at a certain angle to it depending on the construction of the membrane. And that is exactly what the Lyrebird appears to be doing on such occasions, trying to catch the narrow beam of sound by placing the ear, by a trial and error procedure, at different angles to it. Provided that the response of the tape recorder is sufficient to record the high frequency of such a message, it can later be slowed down sufficiently to be

[6] See "Sherbrooke Diary", *Vict. Nat.* 75: 106-12 (November 1958).

brought within the hearing range, and the prospect of actually hearing an otherwise inaudible, mysterious, Lyrebird male-to-male message may soon become an exciting reality.

Analyzing the Note Score of the Song

Once the song is written down the result can be subjected to the analysis of its content and characteristics, examining its composition and its thematic structure, its tonal properties, its metric texture, its variations of tempo and volume and, last but not least, any occurrence of counterpoint.

The first thing is to find out whether the song has been sung in a definite key—major or minor—or if different keys were used in the course of the song. It is quite common for a species to render its melody or call in the same key every time. However, conclusions made on the basis of one or even of several records may lead to a premature generalization. Not only the key may vary sometimes in the same species, but the same bird may utter the same call, even if repeated immediately, in a different tone, as sometimes happens with the Lyrebird call, which may vary from the preceding call by as much as a full tone. Some birds, such as Magpies, seem to be so fond of tonal dislocations that their song appears to be rather atonal. The character of melodies (diatonic or chromatic or a mixture of both) could also be established. It is presumed that the question whether the song fits into a half-tone scale or uses a quarter-tone scale will have been solved when taking it down.

It is also easy to find from the written score whether the song is based on main and subordinate themes, or whether the different themes appear on an equal footing. In both cases the structure of the song will be similar to that of a complete musical piece; such is the case with the Lyrebird, Blackbird, Nightingale, etc. As for birds like the Grey Thrush, which compose only separate musical phrases, it is rather variations of the basic theme which would have to be scrutinized. The length of each unbroken song can be established, paying attention to the pauses between episodes, which are no less important.

The metric texture is the variation or the persistence of the time signature which gives the song a lively character or a steady "beat". A surprisingly large number of birds' tunes are strictly rhythmic, though it may not be obvious unless or until the score is analyzed. The variation of tempo (as distinct from the variation of the time signature) and variations of volume are also of interest—birds are known to use both.

In the case of counterpoint it is especially interesting to establish the beginning and the end of each component melody and the duration of their overlapping. Separate attention should be paid to the use of percussive sounds and noises and their tempo and time signature. In a bird's song such items have the same place as the percussion has in an orchestral composition, and they account in no small measure for the total effect of the song. It should be mentioned that the difference between "noises"—sounds without a definite pitch—and "sounds proper" is that while in a sound the harmonics are multiples of the basic note, in a noise the frequencies are mixed at random.

Relationship between Frequencies and Harmony

It is known that combinations of sounds whose frequencies are in a simple ratio are most satisfactory to the human ear. Of these, the most harmonious effect is produced by a full octave, the ratio being 2 : 1. A new proof of a close affinity between birds' ideas of harmony and our own is that the octave occurs often in bird song. It is used mostly in swift glissandos or rapid arpeggios—the bird's nearest approach to a chord. For example, the crack of the Whipbird is an upward glissando exactly one octave long; another octave-long glissando occurs in the Lyrebird's stanza, and the Lyrebird's call is concluded by a downward arpeggio of two staccato notes forming an octave. One of the Lyrebird's courting song items consists exclusively of

octave-long upward and downward glissandos repeated many times. It is also interesting that the interval of the fifth, common in songs of primitive tribes, is used in the Lyrebird's trills, the rapid glissandos of which have exactly the length of that interval.

Some Technical Hints

To ensure complete success from the start, the sound equipment used both for recording and playing back should be of a high fidelity quality. It is particularly important that the response of the tape recorder should stretch up to 20 k.c./sec., even if in hi.-fi. range the response is not flat but attenuated. As for playing-back equipment, the requirements are not so severe, and a set capable of reproducing audibly the range from say 40 c.p.s. up to 14 k.c./sec. may be regarded as ideal. A normal "3/10" hi.-fi. amplifier would be quite sufficient for the task.

The point to watch is the speeds—the recorder speeds and the turntable's slow speeds (33⅓ r.p.m. and 16⅔ r.p.m.). They should be checked with a stroboscope and, if not strictly correct, adjusted painstakingly. Even a small discrepancy in the ratio of speeds will be magnified by slowing down and will result in an incorrect key. However, by recording, along with the bird's song, a sound of a tuning fork, the mistakes in speeds will be eliminated provided that this recorded sound should be relied upon in determining the key of the melody.

A speaker with a good, clear treble range is essential; its response should cover the high frequencies up to about 14 k.c./sec. Even some cheap 5-inch speakers would comply with that condition, but they must be reflex-loaded to extend their bass response, which in such small units is usually poor. An 8-inch speaker with a high flux density (14,000 lines) would be ideal for the task both for its wide range and good transient response.

A frequency test gramophone disc like Decca LXT 5396 is a priceless help in locating the song in a proper octave, if played immediately after some steady note in the song, trying band after band until the sound nearest to that note is obtained. Once one note is properly located in a certain octave and its exact pitch determined with a tuning fork (the adjustable type capable of giving a choice of several notes is preferable), it is easy to determine and locate other notes of the melody.

Conclusion

At long last, the song of a bird is now attaining its proper prominent place—among the creative activities of living beings. A number of articles and books has been published on the subject of late, and several authors of world repute—E. A. Armstrong, Thorpe, C. Hartshorne—are at present completing new books on bird song. The author hopes that his modest addition to this voluminous work may prove to be of some value and use.

From its subordinate rôle as an attribute of mating activity, the song has been raised during this century to being the means of proclaiming territorial rights. It would not be surprising if this theory, too, were found soon to be on the wane like many other attempts to explain natural phenomena in a way too specific and too narrow. It has been pointed out already by many authors that some established facts do not fit into this theory, and the time may come when it will be stored in the index file of secondary purposes which the song may serve, and the song's primary significance, that of creative art, will be recognized as predominant. It cannot be denied that some of Nature's children have a gift of creative impulse. While some of them are pursuing practical aims—like beavers with their dams—there is evidence of other activities in this field which cannot be attributed to a single utilitarian purpose. Playing bowers of the Bower-birds, dances of Lyrebirds and Brolgas, and singing of the song-birds cannot be explained by such a purpose alone, and they seem to be in the same line as man's creative activities. There is not a utilitarian purpose alone behind the exquisite architecture of some nests, any more than there is behind human

architecture which far surpassed in its search for beauty the limits of the dire necessity of providing shelter from the elements.

For the purpose of playing, the Bower-bird should have been satisfied with erecting the bower without adorning it, yet it goes to great lengths to make it look beautiful according to its taste, painting it inside and providing a multi-coloured display on the surrounding ground.

It is not a utilitarian motive alone that compels the Lyrebird to arrange the medley of heterogeneous imitations into a harmonious whole, composed similarly to human music. There were enough proofs that many a bird sings in a state of trance akin to the ecstasy of the artist's inspiration, but nobody cared to notice the analogy.

Fear of anthropomorphism retarded for too long our broad-minded approach to these smaller brothers and sisters of ours in this world, and now, having shaken that fear off, we find ourselves in a new wonderland of their visual arts and music. Is it not the most interesting, the most absorbing and significant feature of their life, to which we have been blind for so long? And entering that new realm of one of life's fairylands, is not one likely to remember the immortal words of that great architect, Frank Lloyd Wright: "Give me the luxuries of life and I will do away with the necessities"?

RELATIONSHIP OF PIANO NOTE SCALE TO FREQUENCY

Octave	Piano Note	Frequency (c.p.s.)
10th	—	16,000-8192
9th	—	8192-4096
	Top C	4186
8th	B	3950
	A	3520
	G	3138
	F	2794
	E	2636
	D	2348
	C	2093
7th	B	1975
	A	1760
	G	1568
	F	1397
	E	1318
	D	1174
	C	1046
6th	B	987
	A	880
	G	784
	F	698
	E	659
	D	587
	C	523
5th	B	494
	A	440
	G	392
	F	349
	E	330
	D	294
	Mid. C	261
4th	B	247
	A	220
	G	194
	F	174
	E	165
	D	147
	C	130
3rd	B	123
	A	110
	G	98
	F	87
	E	82
	D	73
	C	65·4
2nd	B	61·7
	A	55
	G	49
	F	43·6
	E	41
	D	36·7
	Bottom C	32·7
1st	B	30·8
	A	27·5
	—	32-16

(Concluded.)

By C. S. and G. J. MIDDLETON*

Establishing a Micro-Aquarium

Pond life hunters return from excursions with bottles containing their catch. Some specimens die soon after reaching home, a few may last several days, but usually all die. Efforts to keep these microscopic organisms—both plant and animal—alive in aquariums are often disappointing despite the regular addition of fresh water to the containers. How have some amateurs solved the problem?

Some basic principles must first be understood:

1. Not all micro-organisms found in ponds or streams can be kept alive away from the natural environment. For example, *Volvox* rarely lives more than a few days. About half the micro-organisms taken from running streams do not survive under any condition.

2. Clean water taken directly from the town water supply contains dissolved gases—due to the pressure—and finely divided iron oxide from the pipes. These are not present in the water of streams or ponds, and are injurious to many organisms.

3. The professional research worker keeps organisms he is studying in water of the same acidity as their natural environments. As the average amateur has no access to a pH meter or other means of testing the water, he must do the next best thing. Of course the best water would be a large quantity from the particular pond or stream, but only until evaporation has reduced it to ½ of its original volume. Then it needs topping up as described later.

For a successful micro-aquarium, the volume of the vessel should be at least half a gallon. Glass battery jars, when thoroughly washed, are very suitable. Round fish bowls are not as satisfactory as straight sided vessels because it is difficult to pick out micro-organisms with a pipette from the former.

The aquariums sold for fish in pet shops are quite satisfactory but must not be used as micro-aquariums until they have held water for at least three months. A little pond weed (and perhaps a fish) can be put in this water for appearance and interest in watching the weed grow. At this stage, though it is not suitable for stocking from ponds, much of interest can be placed in it. While some pond weeds will grow well in water alone, others do better when a layer of sand covers the bottom. This sand must be thoroughly washed in at least six changes of water. A convenient method is to quarter fill a bucket with sand from either beach or garden, fill with water, stir well, and when the sand has settled, decant as much water as possible.

Whatever container is used for the aquarium, one should start by putting in a layer of sand, cleaned as above, but washed finally in pure water. Distilled or rain water may be used, or tap water that has stood for at least three days but preferably a week. This clears it of foreign gases that would be injurious to the micro-organisms from ponds or streams, and it should be decanted without disturbing the sediment that has settled.

To the sand add clean water—rain water if procurable but otherwise freshly distilled water. Defrost water from the refrigerator will do (but not melted ice blocks) or tap water purified as above.

Small pieces of unwashed weed, direct from a pond, may then be embedded in the sand, or pieces used during the initial clearing period may be used if first washed thoroughly in clean water. Suitable weeds include *Chara* (an alga), *Vallisneria* (Eelgrass) and *Myriophyllum* (water-milfoil). Small pieces will soon grow to fill the aquarium. Leave everything for a week to settle. Then add your gathering after preliminary observation.

Always maintain volume of water by adding, very gently, clean water as described above, but *never* use untreated tap water.

Note: Queries, suggestions and articles are invited. For personal replies enclose stamped envelope.

* 68 Victoria Street, Sandringham, Victoria.

Field Naturalists Club of Victoria

General Meeting—March 13, 1961

About 150 members and visitors attended, with the president, Mr. D. E. McInnes, in the chair. It was announced that nominations for F.N.C.V. office-bearers and council should be made, either in writing or orally, by the April general meeting.

The excursion secretary asked for suggestions from members for places suitable for excursions during the combined weekend with country clubs. The librarian reported that more help was now available in the club library, and suggestions were invited as to suitable new books for acquisition.

The secretary announced that Mr. J. H. Willis had been awarded the Australian Natural History Medallion for 1960, and it is to be presented to him at the July general meeting by Mr. R. T. M. Pescott.

Mrs. Z. Lee spoke of plans of the Victorian Association of Photographic Societies for a Central Australian trip, to begin on August 4 next and to follow the same route as last year's. Some places will be available for F.N.C.V. members.

The main item for the evening was a series of colour slides, by F.N.C.V. members, covering the trip to Central Australia in August last. Ayers Rock, the Olgas, Palm Valley, the MacDonnell Ranges and Alice Springs were visited and pictures dealt with the varied plant and animal life encountered.

The seven nominations for membership, listed on page 343 of the March *Naturalist*, were approved, and the new members were welcomed by the president to the F.N.C.V.

There was some discussion about propositions to set up cement works in an attractive piece of countryside near Geelong and to establish a hotel on Wilson's Promontory. It was agreed that the club council should enquire into both items.

Fauna Survey Group—March 9, 1961

Eight members attended the meeting, and the chair was occupied by Mr. N. Wakefield. Mr. E. Wilkinson reported that personnel of the National Museum had been to the Hamilton district, where they had collected bones thought to be about 25 million years old.

There was some discussion of a proposed F.N.C.V. excursion, led by the Fauna Group, to the Healesville area. Arrangements have yet to be made. Mr. D. Woodruff reported on a visit to the Portland district and told of useful information gained and contacts made with members of Field Naturalists Clubs in south-western Victoria.

Although the primary purpose of the group is field research, it was decided to devote some meeting time in the future to academic discussion of species or groups of Australian mammals. For the April meeting, Mr. Wilkinson, who is attached to the palaeontological section of the National Museum, is to provide data and lead a discussion about prehistoric marsupials.

Geology Group—March 1, 1961

Twenty-two members were present, with Mr. A. Angior in the chair. Mr. R. Hemmy asked what was meant by the press statement that a basalt covering was to be used on part of the tower of the new Melbourne Art and Cultural Centre. From information brought forward it was probably a reddish-brown basalt, the same stone used in the new St. Paul's Church at Gisborne. Mr. R. Davidson mentioned that a travertine from overseas was being used inside some city buildings and was very effective when polished. Mr. R. Dodds drew the attention of members to a statement by Dr. Thomas, State Government Geologist, before the Kangaroo Ground quarry enquiry, that the deposits of Older Basalt around Melbourne suitable for quarrying would be exhausted in another twenty-five years. This stone is most suitable for roadworks owing to its hardness.

The secretary was instructed to write to Mrs. E. Davies congratulating her on the very fine article, "Manganese Nodules", in the February issue of the *Naturalist*. Miss I. Dixon was appointed group librarian.

Subject for the evening was "Features of Australian Geomorphology", by Miss P. Carolan. The lecture was well illustrated by colour slides dealing with coastal areas of eastern Australia, north to Cairns, and a comparison of the glacial areas of Tasmania with those of the Kosciusko region. To close the lecture, a few slides of the arid inland were used to explain various weathering factors.

Moomba Nature Show, 1961

The show was again a great success, due partly to the excellent exhibits arranged by the F.N.C.V.: Mammals (Fauna Survey Group), Fruits and Dispersal of Seeds (Botany Group), Life Cycle of the Cicada (Entomology and Marine Biology Group), and Reptiles (from Mr. Dickison's collection). The club played a major role in stocking and staffing the publications stand, the keen interest by both children and adults brought several nominations for membership, as well as gratifying financial results, auguring well for the club nature show to be held in spring at the same place—the Lower Melbourne Town Hall. Thanks and congratulations are due to all workers connected with the Moomba Show.

F.N.C.V. Library

Several members have recently presented books and periodicals to the library; large collections of valuable volumes came from Miss Florence Smith and Miss Nancy Gross. We are deeply grateful for these, and to members who have contributed towards the stock and upkeep of the library.

The librarian announces that there are good prospects of regular assistance in the library. Miss S. Apted will assist on general meeting nights, and the following deputy-librarians have been appointed for the groups: Botany Group: Mr. T. F. Zirkler; Fauna Survey Group: Mr. D. Woodruff; Geology Group: Miss T. Dixon; and Microscopical Group: Mr. J. Blake.

Title Page for Volume 77

A title page will be published with next months issue of the *Naturalist*.