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The Author of each Article is responsible for
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PROCEEDINGS

The ordinary meeting of the Club was held at the Royal Society's Hall on Tuesday, April 11, 1939. The President, Mr. R. H. Croll, presided, and about 80 members and friends attended.

The President referred to the death of Miss Eileen Mason, and members stood in silence as a token of respect.

The President welcomed to the meeting Mrs. Caldwell, daughter of the late Dr. J. A. Leach, a past-president of the Club. A country member, Mr. Bond, was also welcomed.

NATURE NOTES

The evening was devoted mainly to "Nature Notes," after Mr. A. H. Chisholm had given a short illustrated address on "The Bird Life of the Bass Rock, Scotland."

Mr. P. Crosbie Morrison described the beauty and interest of Black Rock cliffs, and showed natural colour photographs; Mr. F. S. Colliver spoke on "Archaeopteryx, the Earliest Bird"; Mr. T. S. Hart on "Plants of N.W. Victoria showing effects of dry weather" (note from Mr. W. J. Zimmer); also on the plants near Cheltenham; Mr. Charles Barrett gave the history of a very rare shell, "The Glory of the Sea," (*Conus gloria maris*); Mr. G. N. Hyam referred to Sandhill Snails at Mt. Gambier; Mr. R. H. Croll gave a note on the Red-back spiders; Mr. Ivo Hammett, said that *Wahlenbergia gracilis* was very abundant along the Heidelberg and Reservoir railway lines; and Mr. H. C. E. Stewart stated that Bluebells were plentiful in the Carlton Cemetery.

GENERAL BUSINESS

Trees at Chelsea.—The Secretary reported having received a letter from the Chelsea Council stating that no trees were being cut down; on the contrary it was proposed to plant a number of additional ones.

Biological Survey of Port Phillip Bay.—The Secretary said that the survey had been suggested by Mr. J. Searle. Mr. P. Crosbie Morrison was in favour of the Club undertaking some ecological survey, not necessarily that of Port Phillip Bay. The matter was referred to the Committee for further consideration.

CORRESPONDENCE

From Miss C. C. Currie, of Lardner, with reference to specimens of Earth-stars.

REPORTS OF EXCURSIONS

Excursions were reported on as follows: Flinders, Mr. S. R. Mitchell; Dromana, Mrs. Charles Barrett; Drouin, Mr. C. Barrett; Tawonga, Mr. H. C. E. Stewart.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as Ordinary Members of the Club: Miss Dorothy Cornell, Miss Rose Pinim, Mrs. Alice Osborne, Dr. Kevin O'Day, Mr. C. J. Matthews.

GENERAL BUSINESS

Mr. C. Barrett urged necessity for vigilance to save Gang-Gang Cockatoos around Melbourne from vandals. He suggested that the Club ask the Fisheries and Game Department to broadcast the fact that these birds are protected all the year round.

Mr. F. S. Colliver said that a party of German scientists at present in Australia intended to collect mammal and fish fossils. He thought the Club should ask the Commonwealth Government to prohibit the export of specimens until museum authorities had examined them, any of value to be retained here.

Mr. Ivo Hammett offered to make inquiries regarding the export of fossil material.

EXHIBITS

Mrs. M. E. Freame.—Pipe-fish, Sea-spider carrying 12 or 14 bundles of eggs.

Miss Wigan.—Portion of web of the Australian Labyrinth Spider, (*Corasoides australis*), and portion of web and egg-sacs of a spider described by Mr. L. S. G. Butler in *The Naturalist*.

Mr. S. R. Mitchell.—Aboriginal artifacts from Indented Head; possibly yielding a clue to the migrations of the aborigines.

THE MICROSCOPICAL SOCIETY OF VICTORIA

This Society exists for the "promotion of all branches of microscopy, to associate its members for mutual assistance in all matters pertaining thereto, and to stimulate microscopical research generally." Meetings are held on the third Tuesday of every month (except December and January), at which papers are read, lectures given, and objects are displayed under microscopes. Excursions take place on Saturday afternoons previous to the meetings, except in June and July, when technical demonstrations are given instead. The Society will be glad to welcome new members. The subscription is 15/- per annum for ordinary members, 10/- for country members, 7/6 for ladies and junior members. Visitors are always welcome. Any further information will be given by the Hon. Secretary, Microscopical Society of Victoria, Royal Society's Hall, Victoria Street, Melbourne, or 58 Bryson Street, Canterbury, E.7.

APRIL FUNGI OF THE FOREST GULLIES

WITH PARTICULAR REFERENCE TO RESUPINATE FORMS AND THE
GENUS *PORIA*

By J. H. WILLIS

Our far-famed Dandenong Ranges can offer trophies in season to a devotee of almost any branch of natural history, be it flowers, ferns, fungi, bird, beast, or lesser creature. A ramble through Sherbrooke this Easter was of more than usual interest, if only to note how the lowly forms of plant life had responded to bountiful rains following a summer of unprecedented dryness and heat waves. Although several inches of rain had fallen, a moisture deficiency in the forest floor was still apparent in that many species of fungi, which are usually abundant at this time of the year, had not yet emerged from their summer rest.

On the contrary, splendid patches of a few rather uncommon species were observed to advantage:

The delicate "Bleeding Parasol" (*Lepiota haemorrhagica*) reached up in stately numbers, with its cousin, *L. parvannulata*, from tangles of fallen branchwood and debris, the thin white cap beset with crimson, fibrous scales and the whole plant assuming stains as of fresh blood when handled.

The "Mealy Amanita" (*A. farinacea*—incorrectly determined as *A. mappa* in *The Naturalist* for April, 1934), grew in numerous small colonies, replete with basal cup, ring, and lacerated marginal veil, bespecking the adjacent leaf mould with snowy fragments of its loose and friable meal—an elegant picture in glistening white, belying the unpleasant odour and nauseous taste which seem to have quite escaped the notice of our mycological writers.

A comparative rarity was *Strobilomyces floccopus*, close relative to the common smooth yellowish *Boletus*, which is invariably associated with pines; in this curious genus, however, the cap is clad in ragged and somewhat wart-like scales, hence the Greek designation *Strobilos*, a pine cone, and *Myces*, a mushroom. *S. floccopus* has a honeycomb-like pore surface of light buff, the remainder of the fruiting body being ash-grey and deepening to sooty-purplish at the centre of the cap, which bears fragments of a torn grey veil around its periphery.

Strobilomyces pallescens is much the commoner representative of its genus in Victoria, but was not observed (possibly overlooked) in the Dandenongs this Easter-time. Here the prevailing colour scheme is straw-yellow to tawny and the white flesh exhibits singularly beautiful peacock hues immediately upon being broken—an instance of rapid organic oxidation which not infrequently leads to vivid momentary colourations in certain groups of the fleshy fungi.

Not so attractive as their terrestrial cousins, yet forming a very conspicuous feature of the fungal flora, were the "*resupinates*"—those effused and thinly encrusting growths on trunks, logs, twigs and all manner of woody litter. On closer inspection the resupinate fungi, though possessing neither cap, stem, nor ornamental receptacle, are found to have a quite surprising diversity of colouration and surface contour. Briefly, we may refer them to three families of the higher, basidial fungi, excluding several small and relatively uncommon groups (e.g. the yellow, punctate cushions of *Hypocrea* and purple crusts of *Hypoxyton*—both ascid types, also certain of the peculiar "slime moulds" such as *Ceratiomyxa*, which produces a good illusion of white hoarfrost on the under surface of sodden logs);—



Poria macrospora, showing large pores to the extreme, strongly defined margin.

1. The *Hydnaceae*

Some encrusting members of this rather small family are commonly met in the Dandenongs and other hill districts. All are at once distinguished by having the hymeneal or pore-bearing layer spread over a succession of tiny protuberances—nodules, teeth or spines; *Acia subceracea*, with minute blunt teeth, is a golden form and perhaps the commonest in our fern gullies. Resupinate *Hydniums*, *Mycoleptonia*, and *Mucronella* have also been found, these bearing long, spinular teeth of paler colour.

2. The *Thelephoraceae*

The hall-mark of the family is a smooth or slightly wrinkled fertile surface and here belongs the large, ubiquitous genus *Stereum*—a primary factor in the decay of dead wood, for almost every log, stump or fallen branch in Sherbrooke (if not completely rotten) can show one or more of the leathery fringing brackets.



Photo by H. T. Reeves.

Poria merulina, in situ on a decaying trunk, showing dark, irregular pore surface and pale growing margin.

Stereum lobatum is the giant of the family, its very decorative, buff-yellow fans sometimes extending for feet along a mossy branch. Very few Stereums are entirely resupinate, some indeed are stalked with regular funnel-shaped sporophores, e.g. the ground-loving *S. elegans*; however, as an example of a completely effused type we may cite

S. unbrinum, which grows abundantly in the Dandenongs and elsewhere on Silver Wattles, the indeterminate, cocoa-brown and usually pale-edged patches contributing to the delightful mottled appearance on the trunks of these trees.

Peniophora is often so thin that it resembles a mere splash of white-wash on twigs and sticks.

3. The *Polyporaceæ*

Among the species of this enormous family, embracing all of the non-fleshy poriferous fungi, are many resupinate kinds, which reach the apex of development in the genus *Poria*—a self-explanatory name.

Of all polypores, *Porias* are undoubtedly the most difficult to classify and it is possible that the whole genus is an artificial assemblage. The context varies from a thin mycelial web to a hard stratified body several millimetres in thickness, thereby recalling the perennial genus *Fomes*; the texture is from cheesy to corky or woody; the hyphæ may be hyaline or deeply coloured, and setæ may be abundant or absent from the pores, which in turn show an amazing range in size, colour, and consistency.

Many fungi hitherto described as true *Porias* have been proved merely the resupinate forms of well-known species of *Polyporus*, *Polystictus* and *Trametes*, e.g. the exceedingly common brick-red "shelf fungus" *Trametes cinnabarina* may be occasionally quite resupinate and *Poria*-like, but here the fact that the individual pores penetrate to *varying* depths in the context is the accepted criterion for recognizing *Trametes*. Really, a *Poria* may be considered as a *Polyporus* which *never* displays the tendency to separate from its host and form a bracket at the free margin; if this tendency appear in any member of the genus, then the plant concerned must be removed from among the *Porias* and classed as a *Polyporus*.

Fifty species have been described in Great Britain, and Cleland, in his *Larger Fungi of South Australia* (1935) has recorded 34 species of *Poria* for Australia (excluding the *Poria*-like forms of related genera, which he distinguishes in his Key). In our Sherbrooke Forest one may gather at least a dozen of these interesting fungi, or more than *one-third* of the Australian total! and they offer no difficulties to collection or preservation—it is merely necessary to shave off a piece of bark or wood with the fungus

intact and dry in the sunlight for a few days, preparatory to labelling and storing with naphthalene.



Poria carneo-lutea, with minute round pores.

Poria merulina, figured in the accompanying plate, is probably the most remarkable one; it is very common in the Dandenong gullies and commences activity as wrinkly brown medallions edged in cameo-pink; later, nearby individual growths on a trunk coalesce and form superimposed patches, showing purplish and orange tints toward the centre of the individuals; finally the pores appear in the darker portions as extremely shallow, irregular pits often broken into teeth as in the *Hydnacca*. The fungus retains

its pale growing edge throughout life and is a most attractive object.

The following key, based on colour and pore size has been drawn up for the benefit of anyone who may be interested to gather and name these little plants in the course of a bush ramble; *P. contigua*, *P. vaporaria* and *P. medulla-panis*, though Victorian, have not been recorded for the Dandenongs and are omitted:

KEY TO THE COMMONER *PORIAS* OF VICTORIA,

All of which may be found in the Dandenong Ranges

A.—PALE SPECIES (white to pinkish-buff).

1. Pores large, irregular ($\frac{1}{2}$ to 1 mm. diam.), in sharply defined patches; context firm and corky (spores unusually large for the genus) *P. MACROSPORA*
- Pores small, regular (less than $\frac{1}{2}$ mm. diam.); context various 2.
2. Context soft and cheesy, pores 2-4 per mm. (growing on charred wood, with a strong not unpleasant odour, as of phosphorus *P. DICTYOPORA*
- Context firm or papery, pores smaller 3.
3. Forming free, web-like sheets which pass into white strands of mycelium attached to fallen wood; pores sinuous, 4-5 per mm. *P. VAILLANTII*

- Forming closely appressed, inseparable patches; pores rounded and very small, 6-8 per mm. 4.
4. Pure white to creamy; pores with thin, minutely bristled walls P. MINUTIPORA
- Pale pinkish-buff; pores with smooth, rounded and thickish walls (often in sharply defined cushion-like patches on fallen branch-wood P. CARNEO-LUTEA
- Cream to clay, or approaching tawny-olive; pores rather polygonal with extremely thin, hyaline walls, giving a characteristic sheen to the small patches P. HYALINA
- B.—MEDIUM COLOURED SPECIES (ochraceous to dull gold or apricot).
5. Patches hard and toughish, sharply defined tending to separate at the edges on drying; pores minute, 6-10 per mm., pinkish cinnamon to ochre yellow P. VINCTA
- Patches soft, indeterminate, closely adherent; pores about 4 per mm. 6.
6. Old gold to dull orange. 2-4 mm. thick and somewhat stratified, with regular pores to the edges of the patch (often completely enveloping fragments of dead wood) P. SUBAURANTIACA
- Apricot, with salmon or purplish colouration in parts, about 1 mm. thick, unstratified; with irregular slanting pores and a white sterile edge of felted texture P. ARCHERI
- C.—DARK SPECIES (rusty cinnamon to liver brown and purple).
7. Uniformly russet to cinnamon-fawn, with deep stratified pores, 4-5 per mm. . . . P. FRIESIANA
- Dark brown; pores minute, 6-8 per mm. (common in large, tightly adhering patches on under side of old logs) P. BRUNNEO-ADHERENS
- Dark brown to purplish, with strongly contrasting paler margin and shallow unstratified pores, 2-4 per mm. 8.
8. Pores regular, rounded, often distant, maroon to deep purple-drab P. PURPUREA
- Pores very irregular, often broken; chestnut to liver brown, with orange and purple tints P. MERULINA

THE YELLOW BOX, AND A LOST VEGETATION

By T. S. HART, M.A., B.C.E.

The Yellow Box, *Eucalyptus melliodora*, is not recorded in the F.N.C. Census, 1928, for the sandy country of the southern suburbs of Melbourne. There remains, however, a small timbered area at Highett, in which it is the chief tree, and search has revealed scattered examples over a considerable area. There is valuable information also, in old plans kindly shown to me at the Lands and Railway Departments. It may at once be mentioned that all the Yellow Box remaining is in places which were away from usual routes of botanical excursions even fifty years ago, being in a class of country which soon went under cultivation.

Apart from the coastal strip and the valleys, the sandy soils of the district occur under two very different conditions. First, in a great part of this district the subsoil rests directly on the so-called "red beds," weak sandstones containing some clay and variously coloured by iron oxides. Ferruginous nodules and clay usually occur in the subsoil. Second, in other places there is a considerable thickness of loose or feebly coherent sands, no doubt old dune sands. On these the conditions are less favourable. These sands are well seen in the numerous sand pits about Cheltenham and elsewhere.

The original plan of the Brighton Estate, Henry Dendy's purchase, 1841, gives a general description, "Open forest land, timbered with Gum, Oak, Cherry, Honeysuckle, etc. Soil sandy. Country gently undulating." This lies between the North Road and South Road, extending four miles inland. There is very little of the poorer class of country within this area. But the original plan of Moorabbin (H. B. Foot, surveyor, 1852), marks a strip of country east of Sandringham and Black Rock "Heath with occasional patches of Gum scrub." This area and the vicinity of Cheltenham Park, which is partly dune, were the chief excursion localities, and hence our general idea of the district is largely influenced by the poorer land. Parts of the old dunes carry trees and these have become more noticeable, as there was little inducement to clear this land early.

The timbered patch at Highett, as the last of its kind remaining in these parts, seems worth description. It is about half a mile directly south of Highett station, and a little north of the junction of Bay Road and Reserve Road. The land is nearly level and relatively high (120 feet), the valleys on each side being distinct but not deep. An old ditch and the post-holes show the ferruginous nodules which occur over the red beds, and these beds are indicated also on Bay Road on the same ridge, to the south-east, and in recent works to the north-west. Four Eucalypts are

present, Yellow Box, *E. melliodora* (most numerous), Red Gum, *E. rastrata*, Manna Gum, *E. viminalis*, and even a few Swamp Gum, *E. ovata*. The other trees are Lightwood, *Acacia implexa*, Black Wattle, *A. mollissima*; abundant *Bursaria*, and a few *Casuarina stricta* and Cherry Ballart, *Exocarpus cupressiformis*. One Boobialla, *Myoporum insulare* remains in the hedge row. The Hedge Acacia, *A. armata*, is, of course, introduced.

The ground is mostly grassy, but the smaller plants noticed include the smooth Flax Lily, *Dianella laevis*, a Mat rush, *Lomandra filiformis*, Sheep's Burr, *Acacia ovina*, the common Flat Pea, *Platylobium obtusangulum*, Creeping Bossea, *Bossiaea prostrata*, two Pimeleas, *P. humilis* and *P. curviflora*, Ground Berry, *Acrotriche serrulata*, Kidney Weed, *Dichondra repens*, Sweet Houndstongue, *Cynoglossum suaveolens*, and a few plants of a Sword sedge, *Lepidosperma* sp.

The woodland extends in a narrow strip beside a house to Bay Road, where the *Cynoglossum* is appreciated as a choice plant in a garden. Eastward at the railway is clearly old dune with different shape and vegetation. In fact most of the hill has been removed for building sand. But beyond this at Point Nepean Road the red beds are again indicated in the telephone trench, and the land is high and fairly level. Four records a Box as a marked tree at the corner. None remain now, but there is Lightwood in a hedgerow, plenty of *Bursaria* and some Wattles, and both Flax Lilies and the Houndstongue. Yellow Box seems to have been present also some distance north-west of the present timber.

The other examples of Yellow Box in this district occur under very similar conditions, all on the rises between the valleys, most of them with the red beds clearly indicated and practically certainly present in every case. On the Moorabbin ridge are four poor trees near the Moorabbin station, two of them on railway land, about four in the grounds of a house and nursery (beyond some planted trees) on what was originally the same block, and a couple near a house on Point Nepean Road, about half a mile north-west. On the next parallel ridge at Dane's Road a few remain. (I was told the place was once called Box Hill.) One was recently cut down north-east from Highbett station, and in the other direction there are several in a small paddock at South Road. From here the higher land spreads out towards the south-west round the head of a valley. A Yellow Box remains near Bluff Road.

Rounding the head of the valley, another ridge runs to the north-west and carries Yellow Box in a paddock near the municipal golf links, and small second growth on vacant land opposite. Even on the next ridge there were a couple of Yellow Box in the grounds of the house (now Haileybury College), east of

Hampton Street. They were possibly planted, but Foot records Box within half a mile on the same ridge, near Hampton High School. All these ridges extend into Brighton, but the land was cleared early.

The railway plans record a Yellow Box at Glenhuntly station. Farther north-west there were formerly several in a paddock at the south-east corner of Glen Eira and Bambra Roads. The original plan, again one of Foot's, has box here and extends it northerly a short distance. Near here also, there are still some Red Gums on relatively high land. Another plan has Box at the corner of Wattletree and Burke Roads. The position is fairly level and high (150 feet). There are still two old Red Gums at this corner of Central Park and one to the west. Easterly along Wattletree Road the grounds round a house have Yellow Box, Red Gum and Manna Gum. A post hole seems to indicate red beds, but their occurrence is practically certain otherwise. The same three Eucalypts occur at Hedgley Dene Gardens, a little to the south, and are skilfully worked into the design.

Box is often mentioned on plans from near Oakleigh to South Yarra, but many of these are near the edge of the red beds and may be on the Silurian area. A few Yellow Box remain in Alma Park, Windsor, west of the railway. The land is relatively high and fairly level. There is Silurian rock in St. Kilda Hill, but the deep railway cutting alongside these trees is in the red beds. I knew it well before the slopes were trimmed and soiled, and the Silurian rock only occurs at the north end of the cutting.

An old plan of 1849 of the area from High Street, St. Kilda, to East Prahran records many Box trees as marked trees, but the list is damaged and the numbers of the allotments lost. Plans also record Box near Balaclava Road, at the corners of Hawthorn Road and of Hotham Street, East St. Kilda. Another plan by Foot, 1850, has two marked Box trees on what is now Cochrane Street, north-west of Gardenvale station. This occurrence is not on the ridge, but is south of the narrow strip of swampy land, where the "creek" developed later. Foot only uses the name "Box," but I find Yellow Box at the many places where I have been able to repeat his observation.

It seems not unlikely that the Yellow Box on the flat-topped ridges may be favoured by slow run-off of water rather than elevation, especially in view of the frequent occurrence of Red Gum on high land near them, and the exceptional Swamp Gums at Highett. A slow run-off on these soils does not involve serious swampiness. Red Gums also occur on rising land between the two main branches of the creek west of Bentleigh. The occurrence of the Red Gums outside the valleys means that the Red

Gum is a real constituent of the flora, not merely extending into the valleys. I would here amend some information I gave to Dr. C. S. Sutton, used in his second article (*Victorian Naturalist*, Vol. XXIX, October, 1912). I was in error as to the supplier of certain old Red Gum posts, but omitted to say that they were obtained quite near; about half a mile south-east of Caulfield Town Hall. Also the absence of Red Gums on the main road began at Balcombe's block "near Cheltenham Cemetery," not Brighton, Balcombe's well-known block at Mentone being near enough considering the early date. There is Red Gum still on the main road just north of Balcombe's Road.

Besides the trees at Highett, the red beds carry at other places *Casuarina suberosa* and the Silver Banksia (*B. marginata*). A peppermint occurred near Caulfield Town Hall, but I do not remember it in Moorabbin. The Blackwood (*Acacia melanoxylon*) belongs partly to the valleys, but, rather strangely, on the dune area of Cheltenham both Blackwood and Lightwood run high up the hill.

The wooded parts on the dune sand have quite a different character from those of the red beds, though Manna Gums occur on both. Among the smaller plants it is possible to name some which seem to prefer one type of country, and we may incidentally notice some other red beds localities.

As to *Bursaria*, Dr. Sutton recorded it from the coastal scrub and I had it as "Woodlands, Hampton." Neither of us seems to have noticed it on the heath. It occurs, however, in the wooded dune at Cheltenham Park, but not so abundantly. The Curved Riceflower (*Pimelea curviflora*) was not in Dr. Sutton's first list, but was added from the hill north of Brighton Beach station—typical "red beds." It may have disappeared there, but is abundant on the railway at Elsternwick station, and on the next hill near Ripponlea. An *Acacia* on the Elsternwick cutting is apparently Lightwood by its flowering season in summer.

The narrow-leaved Bitter Pea (*Daviesia corymbosa*) occurs on the red beds at the west side of the Victoria Golf Links, Cheltenham. It is of limited occurrence in this district. It is natural that plants common in the forest lands of the eastern suburbs should appear here in the better and more timbered areas.

The Sheep's Burr (*Acaena ovina*) occurs on the red beds at many places. The Houndstongue (*Cynoglossum suarcolens*) found also in grassy land elsewhere, is probably a plant of the red beds in this district. It is flowering this autumn as I have never seen it before, not only in the timber at Highett, but on roadsides near and even on the headlands of a market garden. The Smooth Flax Lily (*Dianella laevis*) seems to favour the red beds. *Dianella revoluta* is on both classes of country, sometimes abundant on the poorer sands.

Podolepis acuminata occurred on the red beds at Brighton Beach hill, but I was unable to locate its position on the Victoria Golf Links, though kindly allowed to explore that area. Among the plants of the poorer sands is the Hill Sword Sedge (*Lepidosperma concavum*). It rarely occurs on the red beds at their boundary. On the other hand it flourishes on nearly bare sands on broken ground. On the red beds we often find another *Lepidosperma* on the higher flat land as well as valleys.

In a general way the country direct on the red beds seems to run easily to grass under occupation; the dune sands run easily to bracken, but this point should perhaps not be pressed too rigidly. Certainly many paddocks at Brighton as I knew them first (say 1886) were grass with scattered trees, mainly Manna Gums on the rises and Red Gum in the valleys and, at places Black Wattle, but the treatment they had received would be involved. There are, of course, transitions from one kind of country to the other, and the limiting conditions may differ for each species. A foot of dune sand might affect some; tree roots might penetrate many feet if they could start in the poorer sand.

-It was noticed that the Mound Ant (*Iridomyrmex detectus*) avoids the lighter and looser dune sand.

The last extensive timbered area was a block of 155 acres at Hampton along the whole length of the south side of what is now Ludstone Street, a mile and a quarter, starting at Hampton Street near the school. The east end, besides the Box tree at Bluff Road already mentioned, had recently both *Casuarinas*, *Bursaria*, the Houndstongue and the same *Lepidosperma* as elsewhere on the red beds. This area was cleared about 1890 and later.

SANDHILL SNAIL IN VICTORIA

Recorded originally from Geelong many years ago, the Sandhill Snail (*Helix pisana*) spread through the Western District and across the border of South Australia. It has long been very abundant in the Mount Gambier district; and indeed, is flourishing in many parts of its Victorian range. A whitish or yellowish-white shell, about $3\frac{1}{2}$ inches in diameter, it has on its larger whorls numerous linear colour bands, more or less incomplete. In Britain this snail is confined to sandhills near the sea; but on the Continent it occurs far inland; and possibly was introduced into England from a Mediterranean country. Its chief food plants in the British Isles are the Sea Holly (*Eryngium maritimum*) and thistles.

LARDNER, PAST AND PRESENT

Some by train, some in cars, about twenty-five members of the Club arrived at Lardner on Sunday morning, March 26 for a general excursion.

Following Lardner's Track, unrecognizable now through helpful deviations, the party entered the farm of "Brandir Braes." The site of the original post office is just opposite, also the second and third Lardner offices. A splendid view to the Strzelecki Range, (old MacDonald's Track now Ridge Road), to the south and east; Baw Baw to the north-east; and the Dandenongs to the north-west, and south-west to the high land at Poowong.

Another mile and we reached the homestead where this pioneer family have built homes since 1875, when the parents first started on the herculean (and heartbreaking) task of mastering the forest. This has never been done because we were just off the Hazel (*Pomadernis*) country which, when burnt, grew only grass. But ours—with its *Acacias* (*A. verticillata*), Prickly Moses, and *A. stricta* (Hop Acacia) grew again and again if left alone. Before Drouin or Warragul were formed (1878), we went to Melbourne by road, horse and dray, over such roads, twice a year.

A very large chestnut tree remains in the first garden of the district, planted in 1876. Here are remnants of huge Cherry trees, the joy of our youth; a row of Corsican (Nul) pine trees and a clump of *Euc. globulus*; one of two patches sown in 1886, surely unusual where trees were everywhere. Very many orchids have been found on the farm, subject to seasonal conditions. During the cycle of hot dry summers, our world was a barren place; but following the wet cycle, we would get great numbers, and unusual variety and size. Lyre-birds were plentiful; Magpies followed the clearing of the land; also Parrots. The poor Koalas suffered cruelly at holiday time when city visitors showed their want of skill with a gun. Bower-birds by the hundred ate everything grown in the vegetable garden if left alone, and Possums and flying Phalangers (four species) worked the bush at night.

Meanwhile, the clearing went on despite bad years, drought conditions, bank failing (1893), and bush fire deprecations. (there were no relief funds then), until both "Brandir Braes" and the neighbouring "Yuulong" (where we rented for 14 years), were the lonely homes they are now.

That our happy hunting grounds for native flora were spoilt by the entrance of the rabbit in 1903, and their following hunters, whose attraction is also larger game, is the natural outcome of the different phase of labour conditions. To-day's writers on fauna destruction all blame the early settlers for the destruction of our native fauna and flora. This is incorrect. Following the

land owner there is always a class eager to pick up easy money with the help they can get from conditions prevailing. We have suffered from this for sixty-two years, and more acutely to-day when motor cars make it so easy for the aggressors.

C. C. CURRIE.

[Every member of the party has a pleasant memory of the Lardner excursion. The Misses Currie and their brother made it a happy day for us. We were entertained in the true Gippsland manner. We delighted in rambles round the spacious old garden, rich in beautiful and interesting flowers and shrubs and trees. Then down the road and across green paddocks, where scores of giant toadstools (*Boletus portentotus*) received special attention. Our thanks to our hosts, who could not have been kinder or more thoughtful to make the excursion enjoyable for everybody.—C.B.]

BUSH FIRES AT MOUNT BUFFALO

Several readers of the article "Flower and Feather at Mount Buffalo," appearing in the March issue of *The Victorian Naturalist*, were surprised at the statement "the mountain escaped the conflagrations that have swept vast expanses of the North-East." It was obvious, of course, that the notes were written on observations made prior to my departure from the locality, a few days before "Black Friday." Unhappily fires did subsequently occur on the plateau, and were not prominently reported in the daily press. It is regretted that some of the botanical features written about were destroyed.

It is not suggested that the grazing licence recently granted on the mountain had any connection with the fires, but the following extract from a letter by a friend of the Club, recently on holiday at "The Chalet," makes a telling commentary: "Am very sad at the havoc caused by the bush fires, and so near The Chalet. The bridge by the Lake being burnt spoils my favourite walk by road right round the Lake. The lovely walk to View Point is also quite spoilt. The way to the Horn is a scene of great desolation; without the kindly softness of the green trees, the rocks stand out in queerer shapes than ever, like petrified prehistoric monsters. Under fallen trees I saw the skeletons and partly burnt remains of cattle—and was so upset over it all I had dinner in bed and read a nonsensical book to try and forget it."

A brighter outlook is promised in a note lately to hand from Mr. Fred. Chalwell, more intimately associated with the Buffalo than anyone else. He writes: "Now that there has been so much rain, over 20 inches, the Lyre-birds are active and making themselves heard in many directions. Many of the visitors have mentioned seeing the birds frequently."

H.C.E.S.

PORT PHILLIP SEA-SERPENT

As though Nature were aware of the proposal revived recently by Mr. J. Searle for an ecological survey of Port Phillip Bay by Club members, a most interesting find has arisen literally "out of the blue." On April 18 Mrs. E. A. Hills, of Mentone, sent me a letter containing a description, and also the actual tail, of a creature her husband had killed on the Mentone beach that morning. The tail was unmistakably that of a Yellow-bellied Sea-snake (*Pelamis platurus*), and the description fits. As far as I have been able to discover—and I hope to be corrected if I am wrong—this is the first record of this, or of any other, sea-snake within Port Phillip.

Contrary to general belief, true sea-serpents are by no means rare, though they seem to prefer warmer waters than ours, and records from the seas around Victoria seem to be largely accidental. Three or four months ago I had one described to me from Cape Everard, in far eastern Victoria, and others have been recorded from the same region, though not in any numbers, but farther north they are not uncommonly found stranded on the beaches. It would appear, then, that the Victorian specimens have been swept down by currents from the north.

Surveying in the waters of the Great Barrier Reef, between Cairns and Cooktown, we used to see numbers of them, and on one occasion we ran into a school of a brown type of the genus *Aipysurus*. More than a hundred were in sight at once, basking lazily on the surface of the water and occasionally darting with lightning speed at a fish below. We managed to strike one with a boat-hook and bring it in-board; it was about 4 ft. 6 in. long, and by comparison with this measured specimen I would say that the largest in the school approached 6 ft. in length, with a body as thick as a man's forearm. The specimen mentioned is now in the Melbourne University Zoology Museum.

Most of the sea-snakes have a keel running the full length of the belly to give stability in the water. In the Yellow-bellied species recorded from Mentone this character is extended to a complete lateral flattening of the body, and in all cases the tail is considerably flattened laterally to form a paddle, for these creatures, being true snakes, have no fins. This specialization makes them helpless on land, but they are nevertheless air breathers, and though they may remain under water for long periods they must rise from time to time to breathe.

All the sea-serpents are of the venomous type, with truefangs and poison glands, and this raises an interesting question. It has been stated that snake venom has little or no effect on cold-blooded animals—recently I had a case, from quite a trustworthy observer, of a frog which hopped away apparently none the worse after it had been rescued from the mouth of a tiger snake. Of what use, then, is the venom of the sea-snakes against cold-blooded fishes? It may be, of course, that this idea that cold-blooded creatures are immune to snake venom is wrong; the point requires clearing up. But be that as it may, the general impression among seaside Queenslanders is that the venom of the sea-snakes is more virulent than that of any land reptile.

CROSBIE MORRISON.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, May 8, 1939. The President, Mr. R. H. Croll, presided, and about 120 members and friends attended.

The President extended a welcome to Mr. Russell Grimwade and Mr. P. R. H. St. John. He referred also to an honour conferred upon Mr. A. H. Chisholm, a past President of the Club, who had been elected a British Empire member of the British Ornithologists' Union.

The President referred to the death of Mr. G. Gossip, a well-known Ararat naturalist. Members stood in silence as a token of respect.

"Finding Australia in England" was the title of a lecture given by Mr. A. H. Chisholm. He stated that a number of valuable documents relating to John Gilbert and John Gould were brought back to Australia by him and had been presented to the Mitchell Library, Sydney. (See article in this issue.)

The President drew the attention of members to a case containing pressed specimens of the Flora of Mt. Buffalo, the gift of Mr. Russell Grimwade to the Chalet.

Mr. Grimwade spoke on the purposes of the collection, and how it was formed by Mr. St. John.

Mr. St. John described the collecting of the specimens and stated that 130 species, in 87 genera and 43 families, were represented.

Consideration of the Proposed Biological Survey of Port Phillip Bay and the subject of "Cats as Vermin," was deferred until some future meeting.

REPORTS OF EXCURSIONS

Reports of Excursions were given as follows:—Macedon, Mr. G. N. Hyam; Zoological Gardens, Mr. S. R. Mitchell (for Mr. H. Kendall).

ELECTION OF MEMBERS

On a show of hands the following were duly elected: As Ordinary Member, Miss Marjorie R. Robertson; as a Country Member, Miss G. Auchterlonic.

GENERAL BUSINESS

Questions by members relating to Hawks and Eagles, and Pigeons and Doves, were answered by Mr. A. H. Mattingley.

New Excursion List.—The Hon. Secretary asked for suggestions for suitable places to visit in the coming year. The President announced that a vote regarding the number of excursions to be held would be taken at the next meeting.

The President mentioned that Messrs. J. and W. H. Ingram had recently presented a large aviary to Badger Creek Sanctuary.

NOMINATIONS FOR OFFICE-BEARERS (1939-40)

The following nominations were received:

President, Mr. A. S. Chalk; Vice-Presidents, Mr. Geo. Coghill, Mr. L. W. Cooper; Hon. Treasurer, Mr. J. Ingram; Hon. Librarian, Dr. C. S. Sutton; Hon. Assistant Librarian, Mr. W. H. Ingram; Hon. Editor, Mr. C. L. Barrett; Hon. Secretary, Mr. F. S. Colliver. Hon. Assistant Secretary, Mr. L. W. Cooper; Committee, Mrs. C. L. Barrett, Messrs. Ivo Hammett, H. T. Reeves, A. H. Chisholm, A. S. Kenyon, G. N. Hyatt, H. C. E. Stewart, S. R. Mitchell, J. W. Audas, E. E. Prescott, A. C. Frostick.

GENERAL BUSINESS

Mr. Underwood moved and Mr. S. R. Mitchell seconded a motion that Mr. W. R. Grant, of Kallista, be accorded a vote of thanks for his action in showing people Lyre-birds.

Mr. C. French spoke on the Cabbage Butterfly (*Pieris rapae*), stating that it had been collected in several suburban areas, thus making a first record for Victoria, and almost certainly for Australia.

EXHIBITS

Mr. T. S. Hart.—*Chenopodium triangulare*, a new record for Victoria (grown from seed from a plant collected by Mr. F. Robbins near Orbost); also Kangaroo Grass 4 ft. 6 in. high, and other vigorous autumn growth from the red beds, Point Nepean Road, Cheltenham.

Mr. P. Crosbie Morrison.—A case of Victorian Wasps illustrating various modes of life, including the use by mud-building wasps of glass tubes as sites for nests; parasitized caterpillar, with wasps hatched from it; parasitized butterfly pupae; paper and mud nests. Also the tail of a Yellow-bellied Sea-Snake, from Mentone; believed to be the first record of the species for Port Phillip Bay.

Mr. V. H. Miller.—Orchid, *Cypridedium Harrisianum*.

Mr. H. C. Stewart.—*Notolaea ligustrina* (Privet-leaf Mock Olive) from Mt. Buffalo; altitude 4,000-5,000 ft.

Mr. A. A. Baker.—Specimens of Analcite, Natrolite, Gmelinite, Stilbite, Sphaerostilbite, Calcite, Magnetite, Hornblende, Chabazite and Limestone, collected at the Flinders Excursion.

Mr. T. Dodds.—Zeolite specimens from Flinders. Collected at Flinders Excursion.

Mr. S. R. Mitchell.—Zeolite specimens from Flinders. Collected at Flinders Excursion.

Mr. F. S. Colliver.—Zeolite specimens from Flinders. Collected at Flinders Excursion.

THE LOWAN

By F. LEWIS, Chief Inspector of Fisheries and Game, Victoria.

That Australia is a land of unique animal life is a platitude often expressed, and most people on hearing it at once think of the lowly monotreme—the egg-laying Platypus; perhaps the lovable Koala, or *Manura* of the magic voice. Into the minds of few comes a picture of the Lowan or Mallee Fowl, the southern representative of the mound-builders, confined to the Australian region which, ornithologically speaking, includes Australia and some of the islands to the north.

The scientific name given to the Lowan is, contrary to many scientific names, most apt and pleasing. The generic name, *Leipoa*, comes from the Greek and means to "leave the eggs," while the specific name, *ocellata*, is from the Latin and means "marked with little eyes." "Mallee Fowl" was also well chosen, because, in its general behaviour and in many of its characteristics, the bird closely resembles an ordinary domestic fowl, and it does not live away from the country where the different species of dwarf eucalypts forming the "Mallee" thrive.

The area known as the Mallee country of Victoria has, in recent years, been greatly reduced. Thousands of acres have been rolled and burned in preparation for wheat growing, the principal crop grown in this territory. Much of the remaining uncleared country of the north-west of Victoria (referred to commonly as "desert") is entirely unsuited to the Lowan because it has no eucalypts growing thereon. For the same reason, much of the Wyperfeld National Park is not suitable for the Lowan, although additions made thereto in recent years have included more of the typical Mallee country in which, it is sincerely hoped, the Lowan will find a refuge.

Unlike the kangaroo, wallabies, emu and opossums, which can survive to a certain extent the "ravages" of settlement, the Lowan, once its Mallee habitat is cleared, can live no longer in that locality. Every effort should be made, therefore, to have existing sanctuaries extended to include as much of the original Mallee as possible before it is too late and our only mound-builder in Southern Australia goes the way of the Dodo.

The preparation and building of the nesting-mound is almost a whole-year job for the Lowan. Both male and female take an active part in the task, although later, when the eggs are laid, most of the work involved in daily attendance on the mound, opening it up to allow the sun's heat to penetrate to the eggs, building it up and thatching it when weather conditions threaten to become unfavourable, is done by the female.

Almost as soon as the hatching season has finished, the birds set to work to scrape out the old mound, and this is no light task because an average mound is about 45 feet in circumference and 2 feet below and 3 feet above the surface of the ground. Several tons of sandy earth and debris are contained in such a mound. The birds seem to scratch out the mound thus early to prevent it consolidating, which would render the work of opening it out much more difficult.

Mounds must be completely cleaned out in order to incorporate a fresh supply of vegetation therein. The old vegetation has, of course, rotted away and is of no further use, so a fresh supply must be used each season. The purpose of this vegetation is not, I think, to supply heat for the incubation, but to hold the moisture necessary for the successful hatching of the eggs. Every owner of an incubator knows that his fowl eggs must have a certain amount of moisture regularly supplied, otherwise they will not hatch; and it is the function of the vegetation to supply and hold this moisture for the eggs in the mound. The necessary heat is obtained from the sun, and to enable this to penetrate to the eggs, the mound is opened up about 10 o'clock every morning, but should conditions be unfavourable—that is, should the weather be cold or dull, or if rain is falling or threatens to fall—the mound is not opened. If cold, wet weather is likely to be experienced, the Lowan heaps up the mound and even thatches it to facilitate the run-off of the rain. Inherited instinct no doubt teaches the Lowan when and how to build the mound; but when it comes to regulating the heat of the mound it seems that reasoning power of a high order, almost amounting to intelligence, is manifest.

Reference is made above to the part played by the vegetation incorporated in the mound. It can be appreciated that in the case of the Scrub Fowl or the Scrub Turkey, whose nesting-mound is composed almost entirely of vegetation and is often built in dense forest country, the sun would have little chance of penetrating the mound. Furthermore, the heavy tropical rains would keep the mound moist and facilitate fermentation with consequent heat. When the Scrub Turkeys built at the Melbourne Zoo, their mound was composed entirely of vegetation, and it was necessary to hose this every day to encourage fermentation and provide the heat necessary for the successful incubation of

the eggs. The Lowan lives in a dry, arid country where rain falls seldom during the hatching season, and therefore hatching conditions are entirely different from those of the Scrub Fowl and the Scrub Turkey.

The period of egg-laying of the Lowan varies according to the season. If no or little rain falls in the spring to moisten the vegetation incorporated in the mound, the bird may not lay at all. This occurred in the spring of 1938, in Victoria, when very few birds completed their mounds and laid, but in a good year, with abundant spring rains, egg-laying commences in November, and usually about 10 eggs are laid. These are set, pointed end down, in the mound, and weigh from 5 ounces to 6½ ounces each. The hatching period varies from 6 weeks to 9 weeks, 6½ weeks being the average. When the young hatch they scramble out through the sand of the mound without assistance and are at once able to look after themselves. It is extremely doubtful whether they ever know their parents, or that the parents and chicks associate.

What are the chances of survival of this interesting member of Australia's native fauna? In Victoria, the Lowan suffers from many disabilities. Most of the country in which it originally lived and bred has been cleared for wheat growing. Much of the remaining Mallee country, which is too poor for wheat growing, is leased for grazing and is frequently burned to provide sheep feed. The human element is still a serious menace. The eggs are, unfortunately, good to eat, and many are stolen and birds shot for food. Rabbit trapping goes on very largely in the Mallee country, trappers placing their traps at holes in the wire netting. If the Lowan can get through a hole in the fence it will do so in preference to flying over, and many birds are unfortunately caught in these traps. Eucalyptus distillers cut down the Mallee to provide young growth, thus removing the cover and shelter required by the Lowan. The greater portion of the so-called "desert" country is entirely unsuitable for the Lowan, because it lacks eucalypts. Damage by the fox is extremely doubtful. I have evidence of a big fox warren close to some nesting-mounds, but no damage was done by the animals.

It appears that, as is usually the case, man is the principal enemy of the Lowan. If a public conscience in favour of the Lowan could be cultivated, in the same way as has been done in the case of the Koala and the Lyre-bird, the chances of survival would be greatly increased. The principal hope for a survival in Victoria is the Wyperfeld Sanctuary. This is closely watched and guarded, and if extended as opportunity offers, to include more of the typical Mallee country, should ensure the Lowan's future in at least this State.

THE STORY OF ELIZA GOULD

BY A. H. CHISHOLM

Because I talked to some extent, at the May meeting of the Field Naturalists' Club, on the valuable old documents relating to John Gould the Bird Man which I discovered in England last year, the Editor of *The Naturalist* has developed the idea that he should have a contribution on the subject. He refuses to be put off by a reminder that a nice exclusive article, with copies of four of the century-old letters, was sent him from London for publication in the Gould centenary issue of last October.

There would be no point, of course, in traversing the material contained in that article. Perhaps it would be best, in the brief time at disposal, to write a few words more about Mrs. Gould, and to publish for the first time one of her letters from Australia to her mother in London.

Eliza Gould, in my opinion, was in some respects a "better man" than her famous husband. At any rate, she has never had sufficient credit for what she endured and the work she did in the cause of bird-study in Australia one hundred years ago. That injustice has prevailed simply because we did not know much about her until these revealing letters were discovered. We did not even know her age or her Christian name.

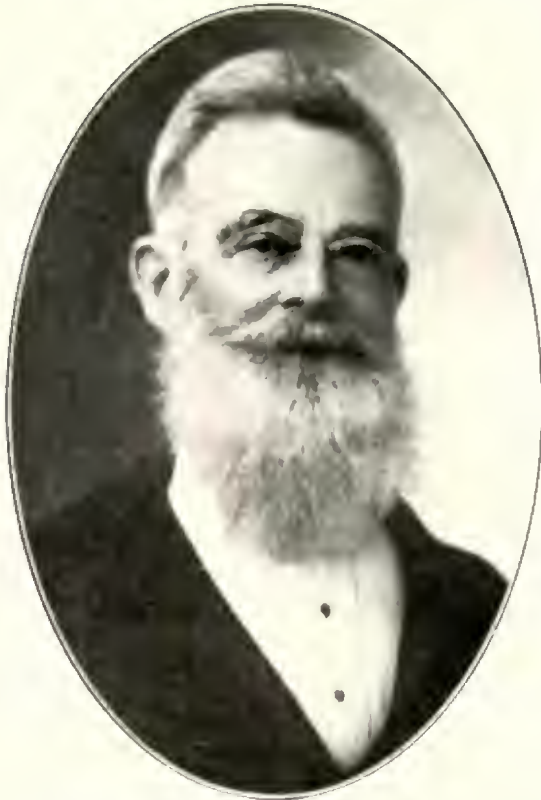
Mrs. Gould, who was born in 1804 (the same year as her future husband), was a daughter of Nicholas Coxen, and her birthplace was, I think, Ramsgate, in Kent. How she came to meet John Gould is not revealed, but she married him in 1829, and in May of 1838 she sailed with him for Australia.

That was no light decision. Mrs. Gould had to leave behind three young children—Eliza, Charles, and Louisa—in charge of her elderly mother. Obviously, therefore, she put her husband's interests before her own inclinations, for Gould wanted her in Australia to sketch both birds and plants.

All of Mrs. Gould's letters are interesting. She discusses features and conditions in both Tasmania and New South Wales, her husband's work, and other interesting topics. But throughout the letters rings the cry of the mother absent from her young children. In every letter she returns again and again to this subject. In every letter, too, she reveals anxiety regarding the health of her own mother.

Not the least distracting circumstance for Mrs. Gould was the time occupied in the transport of letters. Four months being required for the voyage each way, any question she asked—regarding her 14-months-old child, for example—could not be answered within less than eight months. Meanwhile, she had time to fret, for, while her husband was busy in the bushland, she was in Hobart awaiting the birth of another child.

Mrs. Gould stayed in Hobart about 11 months—from her arrival on September 19, 1839, until August 20, 1840—and for the greater part of that time lived in a cottage at Government House. It was there that her fifth child, Franklin, was born. Then the four members of the family—John, Eliza, Henry (a son of eight years, who had been brought on the tour) and the new



Henry W. Coxen, who came to Australia, as a lad of 15 years, with John Gould (his uncle) in 1838, became a Queensland pastoralist, and died in Brisbane in 1915. (Photo. taken Jan., 1906.)

baby—left for Sydney. They stayed in Sydney ten days and then passed on to the home of Mrs. Gould's brothers, Stephen and Charles Coxen, on the Hunter River, near Maitland. There Mrs. Gould and the children dwelt for about seven months, and there many of the paintings for Gould's *Birds of Australia* were executed.

Leaving New South Wales in April, 1840, the Goulds reached England in September. How joyous must have been the reunion between Mrs. Gould and her three children, from whom she had been absent 2½ years! Sadly, however, the reunion was not of long duration, for Mrs. Gould died, soon after giving birth to another child, in August of the following year. She was then only 37 years of age.

In the twelve years of her married life Eliza Gould had presented her husband with six children and at least 600 paintings.

Mrs. Gould's first letter from Australia has not been recovered. The second one appears herewith. It shows the warm-hearted woman's anxiety for her children and her affection for her mother and her friends. The Henry Coxen mentioned was a young nephew of Mrs. Gould's who came out with the party on the *Parsee*, was sent on to his uncles in New South Wales, and afterwards became a well-known Queensland pastoralist. "Stephen" is Stephen Coxen, Mrs. Gould's brother in New South Wales. "My Henry" is young Henry Gould. E. C. Prince, who is charged in the letter to buy a book of sermons, was Gould's able secretary, who managed his affairs in England and also assisted greatly in the preparation of the Gouldian books.

Here follows Mrs. Gould's letter:—

Hobarton,

Oct. 8th 1838.

My dear Mother,

I wrote to you about a fortnight since but take this opportunity of sending by the *Hove*, which will leave this town to-morrow; lest my former should have miscarried. We arrived safely on the 19th of September in excellent health, and but for the thoughts of those we left behind should also be in good spirits as our prospects here are in many respects cheering. The country is very fine, teeming with beautiful natural productions, both in the animal and vegetable kingdom. Persons to whom we have been introduced are exceedingly kind and John is acquiring a vast fund of information in the ornithological department, which must, I think, prove interesting to the lovers of that science.

We got here just in the right season, and I assure you he has already shown himself a great enemy to the feathered tribe, having shot a great many beautiful birds and robbed various others of their nests and eggs. Indeed John is so enthusiastic that one cannot be with him without catching some of his zeal in the cause, and I cannot regret our coming, though looking anxiously forward to our return. Could I be sure of meeting you all again in health I could be content, but there is the anxiety. We have been expecting to hear from you and hope we shall not be disappointed in the next vessel.

John wrote to Stephen directly we got here, and is daily expecting an answer. The boys are quite well. H. Coxen has been out with his uncle several times into the bush, with which he is highly delighted. I wanted him to write but he is not fond of it, and would rather I should say everything for him. He sends love to Grandmamma, Mother and Father and all other friends. My Henry also sends love to Grandmamma, Charley, Louy and Lizzy, and Mitchy, and hopes they are all well. Henry

Plate I



E. C. Prince, secretary to John Gould for many years, and manager of Gould's affairs in London while the Bird Man was in Australia in 1838-40.

Coxen will, I think, write the next time. He is in high glee with the thoughts of driving hulloak carts.

I hope, my dear mother, you will take care of your health. As for the dear children, I feel perfectly satisfied that they will not miss me, for I well know that both you and my dear Mrs. Mitchell will do all for them that I could wish done. I hope my dear little Louisa is not suffering from her teeth. How does my Charley like school and does Lizzy look as rosy as before her illness? I hope my dear Mr. and Mrs. Mitchell are both well and comfortable—I mean I hope that their prospects have brightened. Write every particular to me, I am most anxious to hear from you all. I trust we shall be back in two years from the time we left England. Give my kindest love to Mr. and Mrs. Mitchell, also to Elizabeth Bunkles, Miss Whitney, hoping she is better, Mrs. Gould and the girls, Mrs. Trigg, Mr. Martin. Present our remembrances also to Mr. and Mrs. Russel, whose kindness in coming to Gravesend I remember with pleasure. John has many times made use of the camp kettle. We often used it on board the *Parsec*, when in want of a cup of chocolate or some hot water.

John has written to his mother by the same vessel. How do they all get on? Remember us to all our friends who take the trouble to think of us. Is poor old Mrs. Catamole yet living? I need not ask if she has her shilling a week. Do not, my dear Mother, hesitate to draw money from Mr. Prince when you require any. I told you, my dear Mother, that John while in the *Parsec* read prayers on Sundays and Mr. Kerr read a sermon from an excellent work. John will thank Mr. Prince to purchase that work (Sermons by the Revd. Alfred Williams), Rivington, Paternoster row, as we think you will feel interest in the book as well for the beauty of the sermons as in knowing how we occupied ourselves sometimes.

Once more, dear Mother, love, kindest love to you, kisses to the children. Love also to Mr. and Mrs. Mitchell.

Sincerely hoping you are all well and happy.

Your affectionate daughter,

ELIZA GOULD.

I will write soon to Mrs. Gould of Eton. Regards to Mrs. Gould of Rochester, Mrs. Joseph Gould, etc., etc. There is a man out here somewhere of the name of Gould, such a scamp.

[This letter was addressed to Mrs. Coxen, 20 Broad Street, Golden Square, London. Endorsed, Received 12 Feby., 1839.]

ACKNOWLEDGMENT

The two illustrations accompanying Mr. Chisholm's article are from photographs kindly made available by Major-General W. A. Coxen, of Melbourne, who is a son of Henry Coxen, the pioneer who came out as a boy with John Gould.—Editor.

CABBAGE BUTTERFLY IN AUSTRALIA

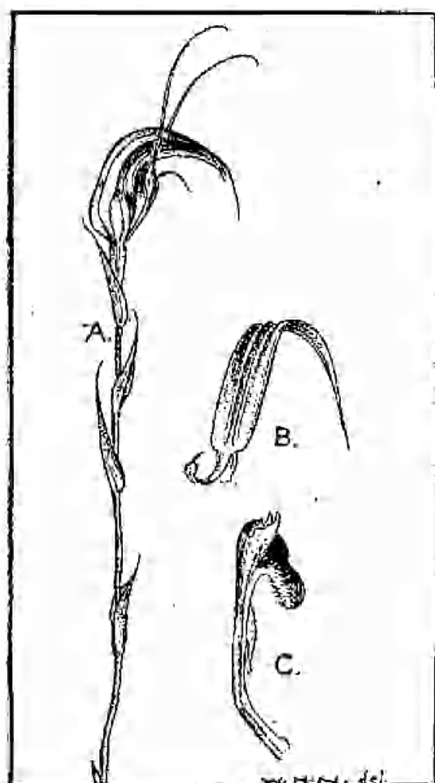
At the meeting of the Club on May 3, Mr. C. French stated that the Cabbage Butterfly (*Pieris rapae*) had reached Victoria, probably from New Zealand, where it has long been a serious pest, introduced from Britain. This is the first record of the species for Australia. Mr. French captured a specimen at Canterbury; Miss J. Raff collected the Cabbage Butterfly in the University Grounds; and Mr. C. C. Brittlebank took specimens at Elsternwick.

A NEW ORCHID RECORD FOR VICTORIA

By W. H. NICHOLLS

From Norman A. Wakefield, I received recently typical specimens of Robert Brown's *Pterostylis reflexa*. Both Norman and his brother, Allan, are keenly interested in the study of native plants, and are doing splendid work throughout the Croajingolong area of far-eastern Victoria. These collectors report this Greenhood orchid as abundant on Mt. Raymond—in the Orbost district, where they reside.

Pt. reflexa is a slender plant from 4 to 8 inches high, having small bract-like stem-leaves. Radical leaves small, in a rosette (not present during the flowering season). The solitary flower is firm, of small size, about one-third that of *Pt. revoluta*, Br., with which it is often associated and sometimes confounded. The galea



Pt. reflexa, R. Br.

- A. A typical specimen (natural size) (lower portion of plant not shown).
B. Labellum. C. Column.

of *Pt. reflexa* is gibbous at the base, with green and red-brown or purplish markings—chiefly prominent longitudinal striae—on a translucent white ground. All the segments of the flower end in long, fine points; these features of the flower, combined with the small size of the galea, easily distinguish it from all others. Furthermore, the labellum is narrow, with a long thread-like, much-reflexed point, which protrudes a long way through the acute sinus of the lower lip.

Flowering period: April, May, June.

Distribution: Queensland, New South Wales, and Victoria.

Bentham, in *Flora Australiensis* (VI, 359), embraces a number of forms under *Pt. reflexa*—all of which are now rightly regarded as valid species. He, however, made due allowance with these remarks:

"I have been unable to separate the specimens into distinct varieties. It is possible, however, that their study in a fresh state may point out more appreciable characters."

R. D. FitzGerald, in his *Australian Orchids* (Vo. I), bracketed *Pt. revoluta* with *Pt. reflexa*, but wrote: "Mr. A. G. Hamilton, writing from Guntawang, near Mudgee (N.S.W.), says: 'I can scarcely credit that they (meaning *Pt. revoluta* and *Pt. reflexa*) are not different species. Both grow in groups. On one range of hills I found both varieties growing in clusters side by side; on other hills on the other side of the river the larger variety (*Pt. revoluta*) only grows.'" I give the foregoing references because the present collectors of this interesting orchid in Victoria at first suggested that the specimens of *Pt. reflexa* were a diminutive form of *Pt. revoluta*, which Greenhood was eventually found in the same vicinity.

Pt. reflexa is sometimes associated with moss-covered hill-slopes in New South Wales, hence has been called "Moss Greenhood," but on Mt. Raymond it occurs on fairly dry granite country. A more appropriate vernacular, I think, would be "Small Autumn Greenhood," on account of its invariable association with *Pt. revoluta*—the "Autumn Greenhood."

The outstanding characteristic of *Pt. reflexa* is the comparative length of the labellum—to the size of the galea—it is exceptional. In Victorian lists, prior to *The Flora of Victoria* (1930, A. J. Ewart), *Pt. robusta* Rogers was known and recorded as Brown's *Pt. reflexa*. Bentham also included the form which subsequently became *Pt. falcata* Rogers, the Sickie Greenhood.

PORT PHILLIP SEA-SERPENT

Following the note on this topic published last month, I have received two further references to the yellow-bellied sea-snake in southern waters. The first was from St. Mary's (Tasmania), in which Mr. G. Bolton remarks on a specimen stranded at St. Mary's, on the east coast of Tasmania, which he recognized definitely from the broadcast description of the yellow-bellied sea-snake. The second, even more topical, was from a fisherman at Geelong, who wrote:—"Several years ago in Corio Bay we found a peculiar creature which we examined and then threw away; we had never seen anything like it before, but we thought no more of it at the time. However, from your description I am sure it was the same kind of creature as you described from Mentone. I have never seen another, before or since."

Unfortunately this note bears no reference to the season at which the creature was found; it would appear, also, that no record was made at the time of its occurrence. The report is nevertheless interesting, as this sea-snake is so distinctive in appearance that even on superficial appearances it could scarcely be confused with any other creature, on sea or land.—CROSBIE MORRISON.

EYES OF INSECTS—NOTES ON FACET DIMENSIONS

By C. DEANE

This paper is written with the object of drawing attention to certain details of the structure of the eyes of insects, and in particular those of the order Coleoptera, which do not commonly appear in print. Indeed, so far as the author is aware, some of the observations have not appeared at all, and some of the views expressed as to the causes will also be distinguished in the same way. This will be obvious, since we cannot expect reasons to be forthcoming which account for phenomena which have not been recorded. In making my study I have consulted the works of eminent authors and have discussed the notes and theories in detail with prominent Australian entomologists. This checking up on past records and present opinions has not been exhaustive in the true sense of the word, but there remains the possibility that somewhere and at some time the subject may have been taken up. Opportunity is therefore hereby taken of extending the enquiry in the hopes of obtaining from readers their further views on the matter.

When the late Mr. A. M. Lea sent over to me for examination from the South Australian Museum their entire collection of Trichopterygidae, I had been looking forward to studying these creatures and attempting to anticipate some of their characters. I was expecting that creatures so minute would differ in structure from the larger forms of insects, and in this was only partly right. The rather big mistake was in thinking that their structure would be simpler than that of larger insects. On the contrary, it was found that in most characters the complexity was evident. For instance, the tarsi are composed of three segments, the apical one being armed with a claw. The antennae have from eight to eleven segments, just as commonly is found in large beetles. The dorsal and ventral sternites present a picture which in no way suggests the simplicity of structure I had imagined. No, the usual complexity, or multiplicity of parts, was there truly enough, as regards most of the external anatomy. Note the emphasis on the word "most." This prepares the mind of the reader to listen to an exception to the general rule. And it is to be found in the eyes. The eyes, though compound, of course, are nevertheless composed of fewer facets or Ommatidia or eye elements than is commonly found in large insects. In my paper on Corylophidae, read before the Linnean Society of New South Wales in 1932, is given a table which shows the number of facets in some of the insects' eyes. In the examination of the Trichopterygidae (Ptiliidae) this was a very noticeable feature. The eye itself was in quite normal proportion to the rest of the body of the insect, and yet the facets were few.

This last-named fact can be expressed in another way. If the eye as a whole is of normal dimensions, but with a small number of elements, it means that those elements must be large in proportion. The reader must see this point. Let us examine a large number of insects of all available sizes from the huge tropical beetles right down to the smallest beetles we know, namely, the Trichopterygidae. In proceeding with this dimensional descent, we find that various parts of the insect's external anatomy accompany us on the downward trend. The segments of palpi, tarsi and antennae keep on getting smaller and smaller, and always in proper proportion. But in the case of the Ommatidia this does not happen. In descending the ladder of sizes, nearly all the anatomical parts keep in step, the only exceptions being the Ommatidia. They alone do not conform to the rule. Let us consider the extent of their non-conformity. In the sizes of bodies examined there is a range of 300 to 1 on the lineal dimension, or 90,000 to 1 on the projected area, or, in volume, 27,000,000 to 1 if the proportions remain similar. Against the 300 fold ratio we have a maximum of 6 to 1 over the entire range. This is very important. All the parts have a 300 fold range, whilst the eye elements alone break away from the habit and stand aloof from their anatomical relatives with a range of only 6 to 1.

This condition can now be expressed again in another way, which is this: *There is a limit to the size of eye elements beyond which they cannot go.* We must see now if we can account for this. The author tried out various theories, but the Wave theory of light seems to best explain the phenomenon. The wave-length of light in the visible spectrum ranges from about 4,000 angstrom units in the violet to about 7,000 in the red. In microns these figures would be 0.4 and 0.7 respectively.

In any light-receiving mechanism there must be sufficient capacity in the apparatus to admit the rays, whilst at the same time allowing space for those rays to enjoy their full and free amplitude of vibration, in order that they be not "damped." In the absence of this condition the vibrations will be interfered with, and if all entering rays are so affected, these will be destroyed. The eye element is such a piece of apparatus. In the production of images by optical means, we usually find the image to be imperfect. The distortions suffered are due to diffraction, chromatic aberration and other causes. In our manufactured lenses chromatic aberration can be corrected by special construction, namely, by compounding with the use of chosen media of different properties. And in nature there might be some way of overcoming this difficulty, although I am not aware of it. But with diffraction there is apparently no corrective, and in very small lenses the effect will be more pronounced the smaller the lens. Without attempting

to wade too deeply into the realm of physics, which might justly be adjudged to be outside the scope of the present article, we may cut the story short and say, briefly, that the effect of incapacity in the lens is manifested by lack of definition or clearness in the image. That this want of capacity is threatened, should we reduce the dimensions any further, in the case of the smallest Ommatidia, will be evident from an analysis of the dimensions.

We thus arrive at a theory to account for the observed limit on facet sizes, namely, that the "maintenance of the size and dimensions existing is necessary for useful vision; if these were smaller the images would be too blurred for any practical purposes."

As is well known to students of light, the term "diffraction" refers to the splitting up of light rays due to mechanized interference at sharp edges. This is one of the commonest phenomena in nature, but probably one of those least noticed at all consciously by the average citizen. It occurs whenever a beam of light strikes or grazes the edge of an opaque object, and therefore plays a part in destroying the sharpness of outline in nearly all shadows. From such commonplace illustration, let us now turn to an apparatus or structure known by the very appropriate name of "diffraction grating." In this, the "edge" phenomenon is utilized or played upon to the extent that some thousands of edges are crowded into a very small space; in fact, it is now possible, by using methods introduced by Grayson, Stone and Merfield, to construct gratings having 120,000 lines or bars or edges, parallel and equally spaced, all within the width of one inch.

Houston describes diffraction in the following terms: "If a plane light wave comes through an opening, it forms an image of that opening on a screen behind it, but the edges of the image are not sharp. Similarly, if a shadow is cast by an object, the edges of the shadow are never perfectly sharp, no matter how parallel the incident light is. The light always encroaches, to some extent, on the geometrical shadow, and in the light near the edge of the beam there is a rhythmic variation in the brightness. If, for example, a very narrow slit is parallel to the straight edge of an obstacle and a screen is placed on the opposite side of the obstacle to receive its shadow, then the geometrical shadow is bounded by the plane through the slit touching the straight edge, and it is found that some light from the slit bends round behind the obstacle and meets the screen in the geometrical shadow, also immediately outside the geometrical shadow and parallel to its edge there are several dark bands. Such phenomena are said to be due to diffraction. . . . Diffraction phenomena are due to the interference of the direct light with itself. They are more difficult to produce and measure than interference bands."

A factor, then, it is suggested, which places a barrier to further reduction of facet dimensions, is the very same one which microscopists have had to contend with, as an obstacle to the obtaining of any further improvement in resolving power in their microscopes. This factor is the wave-length of light. Discussions on resolution are given by Edser, Houston, Bray, Abbé and others, wherein it is shown that

$$\text{Resolving power} \propto \frac{1}{\lambda}$$

where λ is the wave-length of the light used, and \propto is the sign of proportionality.

Another factor which may affect the problem of vision is the particles of dust which adhere to the eyes of ground and water beetles (terrestrial and aquatic forms). These particles are commonly seen under the microscope and are quite large by comparison. They are invariably present, and must have a scattering effect on the light rays.

Packard, 1903, says: "The size of the facets seems to bear some relation to that of the insect, but even in the smallest species none have been observed less than $\frac{1}{20000}$ inch in diameter." These statements, in the light of my observations, appear to be inconsistent. The minimum facet diameter, however, which was observed by R. Thomas Lowne, viz., $\frac{1}{80000}$ of an inch, which is approximately 0.0125 mm., is very close to my figure of 0.0117. It is sufficiently near to show that in descending to smaller sizes than those examined by Lowne, the reduction in facet diameter is inconsiderable.

There is, of course, a want of exactness in the use of the term "diameter," without qualification.

The outline of a facet may be:

- (a) *hexagonal*, which is the normal arrangement, where the elements are crowded, due to multiplicity of their numbers;
- (b) *circular* in the absence of crowding, due to paucity in the numbers, there being spaces between the elements;
- (c) *trapeziform*, a malformation, sometimes manifested in a portion, even a large portion, of the eye, but not the whole;
- (d) *square*, a special case of (c), the group of square facets being bordered by trapeziform ones, beyond which the form reverts to the normal hexagonal. This type only occurs in highly developed compound eyes, and is an abnormality.

In the case of the normal hexagonal formation, therefore, there is a major and a minor diameter to consider.

(To be concluded.)

DEATH OF MR. GEORGE GOSSIP

Members of the Field Naturalists' Club of Victoria join with their colleagues of Ararat in mourning the passing of Mr. George Gossip, who died on April 27 at the age of 66 years.

Mr. Gossip, a retired business man with quiet but persuasive ways, was a driving force among the nature lovers of his district. The only public or semi-public position he permitted himself to take was the presidency of the Ararat Field Naturalists' Club; in that capacity, as well as privately, he did excellent work for the town and the State. He was largely responsible for the founding of the Wild Nature Park at Ararat; he organized movements to save the beauty of the Grampians; and from year to year he achieved much success in the cultivating of native plants. Every wild-flower garden in the district was a source of pride to him, as much so as the charming garden at his own home.

The Wild Nature Park was Mr. Gossip's especial care: he tended that reservation with the affection of a father for a child. His honorary working staff was a quaint one; it consisted mainly of old fossickers of the district—veterans of the goldfields who liked the idea of "making things grow," and who, moreover, were glad to serve George Gossip. Those old fellows, familiarly known as "George Gossip's troops," will sadly miss their leader.

It might almost be said that Mr. Gossip died in serving the Wild Nature Park. During the heat of last summer the plants there suffered badly. Water was so scarce that, in desperation, the nature-lovers sunk a shaft in a garden. It was while lowering one of the "old-timers" down that shaft that Mr. Gossip suffered a heart attack, and from that he never really recovered. In his state of health then he should not have been doing such hard labour, but the thought of plants dying urged him on.

Looking over Mr. Gossip's last letter, dated March 29, I see this passage: "Been out at the Park all day with 'the troops,' watering the plants. We have had a bad spin; watering has been hard work during the last six months. And out in the Grampians my old Red Man and nearly 40 miles of the mountains, as well as many homes, have gone in the fires. Fortunately, the northern end from Hall's Gap is all right. We had a delightful trip there last week-end."

In the same letter Mr. Gossip revives his plea for the Grampians to be proclaimed a National Forest, and he ends with a suggestion that some members of the Victorian F.N.C. should visit the Ararat body at intervals, perhaps once a quarter. We should, I think, adopt this suggestion, not only as a gesture to the Ararat F.N.C., but as a gesture of honour to the memory of George Gossip.

A. H. CRISHOLM.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The Annual Meeting of the Club was held at the Royal Society's Hall on Tuesday, June 13, 1939. The President, Mr. R. H. Croll, presided, and about 120 members and friends attended.

WELCOME TO VISITOR

The President welcomed to the meeting Mr. T. Anderson, of Ballarat.

CORRESPONDENCE

From Microscopical Society of Victoria with reference to its next meeting.

From Zoological Society of Victoria regarding a prize offered by the Society for an Essay on any scientific aspect of the Australian Fauna.

From Mr. H. Jenkins, thanking the Club for its letter. Mrs. Jenkins recently underwent an operation and was still in hospital.

From Mrs. Gossip, Ararat, thanking the Club for its letter of sympathy in her recent bereavement.

From Mr. P. Crosbie Morrison, thanking the Club for its letter of sympathy in his bereavement.

REPORTS OF EXCURSIONS

Reports of Excursions were given as follows:—Lilydale, Mr. F. S. Colliver; Sherbrooke, Mr. H. C. E. Stewart.

ELECTION OF MEMBERS

On a show of hands the following were duly elected:—as honorary member—Mr. J. Wilcox; and as ordinary members—Miss L. Bryant, Mr. and Mrs. J. Skinner, Mr. W. R. Cover, and Mr. Percy H. Woodhouse.

ANNUAL REPORT AND BALANCE SHEET

The Annual Report, read by the Hon. Secretary, and the Balance Sheet, explained by Mr. A. G. Hooke, were received, and adopted on the motion of Mr. R. H. Croll, seconded by Mr. A. S. Chalk.

ELECTION OF OFFICERS, 1939-40

Mr. R. H. Croll announced that as only one nomination for President had been received, he had much pleasure in declaring Mr. A. S. Chalk elected. He then vacated the chair. Mr. Chalk thanked members for the honour, and stated that as President he would further the interests of the Club to the best of his ability. He asked for the full co-operation of members.

The following were declared elected:—

Hon. Vice-Presidents—Messrs, Geo. Coghill and L. W. Cooper.

Hon. Treasurer—Mr. J. Ingram.

Hon. Librarian—Dr. C. S. Sutton.

Hon. Assistant Librarian—Mr. W. H. Ingram.

Hon. Editor—Mr. C. L. Barrett, C.M.Z.S.

Hon. Secretary—Mr. F. S. Colliver.

Hon. Assistant Secretary—Mr. L. W. Cooper.

Committee—Mrs. C. L. Barrett, and Messrs. G. N. Hyam, H. C. E. Stewart, A. H. Chisholm, and S. R. Mitchell were elected.

ILLUSTRATED LECTURE

Mr. R. H. Croll gave an address on "A Visit to the Great Barrier Reef," illustrated by the epidiascope and a motion picture film. Mr. Croll was accorded the thanks of the Club for a very interesting and instructive lecture.

GENERAL BUSINESS

Members were asked to submit localities for the new excursion syllabus.

A ballot regarding the number of excursions to be held per month resulted in a great majority of votes for two excursions.

Mr. E. S. Hanks referred to the proposed stocking of the Derby River, Wilson's Promontory, with Rainbow Trout, and moved "That this meeting protests against this action." Mr. S. R. Mitchell seconded the motion which was carried.

Mr. F. L. Barkla spoke on Malings Quarry, Surrey Hills, and suggested that possibly the Club could do something to help those interested in the preservation of the geological features. Mr. Barkla will submit his ideas to the Committee for consideration.

DONATION OF BOOKS

The President announced that Mr. Charles Barrett had presented to the Club fifteen books for the library, and on the Club's behalf thanked him for his gift.

NATURE NOTE

Mr. Ivo Hammet remarked on growth of seedlings of *Boronia* at Labertouche.

QUESTIONS BY MEMBERS

Mr. Stewart submitted a question contained in a letter from Mr. F. V. Chalwell, at Mt. Buffalo Chalet, with reference to a bird new to the district:—

A nectar-feeder about the size of a starling, greenish in colour, with a very small crest and short legs. The most noticeable thing was the spreading of the tail, fan-wise, when flying.

EXHIBITS

Mr. A. R. Varley:—Collection of Coral, shells, etc., from the Great Barrier Reef.

Mr. H. C. E. Stewart:—Fungi collected at Club excursions to Sherbrooke Forest; garden-grown specimens of *Acacia podalyriaefolia* (Mount Morgan Wattle), *Chorizema cordatum*, and *Viola hederacea*; from plants in bloom on the grave of Baron von Mueller, St. Kilda Cemetery.

Mr. S. R. Mitchell:—Specimens from Cave Hill Quarry, Lilydale; also iridescent iron coating on sandstone from Northcote Quarry.

Mr. A. A. Baker:—Collection of crystalline forms of Calcite fossil shells, corals and a stromatoporioid, from Cave Hill, Lilydale.

Mr. F. L. Barkla:—Photographs taken at the Club excursion to Macedon.

Mr. F. S. Colliver:—Various specimens of minerals and fossils from Cave Hill Quarry, Lilydale.

FIFTY-NINTH ANNUAL REPORT, JUNE, 1939

To the members of the Field Naturalists' Club of Victoria, Ladies and Gentlemen,—

Your Committee has pleasure in submitting the fifty-ninth annual report.

The membership is as follows:—Life members, 6; Honorary members, 4; Ordinary members, 236; Country members, 69; Associate members, 24; Total, 339; this being an increase of 9 on the figures of the last report.

We record with sorrow the death of the following Club members:—Mr. O. Gray (1906-1939), Mr. Edwin Cox (1916-1939), Mr. Chas. Croll (1929-1938), and Miss Eileen Mason (1936-1939).

Attendances at the meetings has been well sustained, although bad weather did reduce numbers on one occasion. The second room is still in use for the display of exhibits and some good displays were staged during the year. Nature Notes are given and questions asked at nearly all meetings, and on one occasion the subject was enlarged to take the whole lecture period. Again all of the meetings were held at the Royal Society's Hall, and the epidiascope has been fully used to illustrate the various lectures.

The Committee considered the installation of a microphone unit, it being felt that both the lecturer and the audience would be greatly helped by this. Further consideration of the matter is left to the incoming Committee.

The following was the program of lectures for the year:—
"The Alluring World of Fungi" by Mr. J. H. Willis; "Nature Notes and Queries," by Mr. P. Crosbie Morrison; "The Cultivation of Australian Wild Flowers," by Messrs. Ivo Hammet and H. T. Reeves; "Wanderings in Central Australia," by Mr. R. H. Croll; "Lyre-birds and other Forest Dwellers," by R. T. Littlejohns; "The Early History of the Genus Eucalyptus," by Dr. R. T. Patton; "A Naturalist in Bali," by Mr. C. L. Barrett, C.M.Z.S.; "Birds and the Bush," by Mr. C. E. Bryant; "The Lowan, its Breeding Habits and Life History," by Mr. F. Lewis; "Nature Notes," opened by Mr. A. H. Chisholm, C.F.A.O.U.; and "Finding Australia in England," by Mr. A. H. Chisholm, C.F.A.O.U.

The December meeting again took the form of a social evening and was enjoyed by the members. The lecture is still retained as the second item on the agenda and the idea remains popular. Owing to unforeseen business the meetings on two occasions have been prolonged, but generally the arrangement works very well.

During the year numerous excursions were held but owing to the drastic bush fires there were several cancellations and alterations. A feature of this year's programme was the inclusion on trial of six Sunday excursions, which were well attended. Further discussions have been held on the advisability of reducing the number of excursions and a ballot will be taken to decide the matter finally.

Volume 55 of the *Victorian Naturalist* has been completed and is up to the usual high standard. The Committee still aims to increase the number of pages and illustrations and increased membership will allow this to be done. We are pleased to report that the journal is receiving more attention from overseas bodies—Russia, Belgium, Sweden, and Minnesota being recent additions to our foreign mailing list. Some societies in the British Empire have been added to the list this year.

The publication of papers of popular and scientific interest has been maintained and similar papers are hoped for this year. Our Journal is still the leading publication of its kind in Australia, and it is the constant aim of the Editor to make it more comprehensive and to maintain its place in scientific literature.

The Club continues its activities in preserving the wild life of Australia, and from time to time the Committee has had reports of various Protection Act breaches, acts of vandalism and unwise policy. These various matters have been referred to the proper authorities for action. Matters that have been inquired into include:—Preservation of Wild Life in the Merbein District, Export of Native Birds, Grazing on National Parks, Trap Shooting, Tree Cutting, Possum Shooting, Destruction of Koalas at Cowes, Orchids being taken from Forest Reserves, Reintroduction of a Grazing Lease at Mt. Buffalo, Cats gone Wild, Shooting of Gang-gang Cockatoos, Export of Fossil Material, Additional Sanctuaries, etc.

Suggestions have been made during the year for further protection of native birds and animals, and we record with pleasure that the Whittlesea Shire Council has stopped the bonus on wombats, and we hope that this is a turn for the better in Shire Council practice. The National Monument Movement with which the Sub-Committees are merged, is in the hands of Mr. G. N. Hyam, and matters are gradually taking shape toward the proclamation ideals. Again we ask members and others to notify us of objects or places they consider worthy of consideration as National Monuments. We record with pleasure, added interest by the authorities in the National Park question and that additional areas are under consideration by them.

We are represented on the Council of the League of Youth, and the Victorian Advisory Council for Flora and Fauna; we are affiliated with the Victorian Horticultural Council and have membership in the Australian and New Zealand Association for the Advancement of Science. With these and various other societies we have combined to investigate such questions as Grazing on National Parks, with particular attention paid to Mt. Buffalo.

Members of the Club attended special meetings of the Bird Observers' Club, Entomological Society, Historical Society, C.E. Convention, and the Federation of Melbourne Walking Clubs combined hike. At this last mentioned a Club member gave an address.

The following societies were assisted at their annual shows:—the Rangers' League, North Queensland Naturalists' Club, Gould League, and the South Australian Naturalists' Club. Again we have had inquiries re the formation of Field Naturalists' clubs, and helpful information has been passed on.

The Wild Nature Show was held last year, and a feature of it was the appointment of an Official Show Secretary. This position was ably filled by Mr. A. D. Hardy and much of the credit for the success of the show is due to him. Owing to the bad time and lack of advertisement only a small profit was made, but other things considered, the show was very successful. This year we have agreed to hold our show as part of the Spring Carnival Celebrations and better results are expected.

Under consideration is the suggestion of Mr. J. Searle that the Biological Survey of Port Phillip Bay be undertaken. A sub-committee has been formed to go into the matter and endeavour to arrange a scheme whereby all members can participate in the work.

The Club was asked to convene a meeting of interested societies to discuss the advisability of making an annual medallion award for the best work on the Elucidation or Preservation of the Australian Flora and/or Fauna. A very successful meeting was held and it is expected that an award will be made this year.

The Hon. Librarian reports that additional books and pamphlets have been bought during the year, and that trial subscriptions were paid to the *Chronica Botanica* and *The Microscope*, two very good periodicals.

During the year we have welcomed to our meetings overseas naturalists and members of interstate Naturalists' Clubs, and we have been pleased to see some of our own country members from time to time.

Interesting activities of Club members during the year include trips to Central Australia by Mr. and Mrs. C. L. Barrett, Mr. R. H. Croll, and Mr. F. S. Colliver; the transfer from Royal Botanic Gardens, Kew, to Munich Botanical Gardens, by Mr. Noel Lothian; a trip abroad by Mr. and Mrs. E. E. Prescott, and also a visit to Europe by Mr. A. N. Burns. During the year Mr. and Mrs. E. S. Hanks, Miss Chisholm, and Mr. A. H. Chisholm returned from abroad.

Mr. H. T. Reeves was invited to stage a display of his coloured photographs at the Kodak Galleries, and this show proved very popular.

We record with pleasure that a New Year's Honour was accorded to Professor W. E. Agar, O.B.E., and that Mr. A. H. Chisholm was elected a British Empire Member of the British Ornithologists Union. The Club elected Mr. A. D. Hardy an Honorary Member.

During the year the adjoining block to Baron von Mueller's grave was purchased by the Club. This means that the memorial will not now be crowded. Special botanical species will be planted here in due course and further pilgrimages will be held to the grave.

Suggestions for members to visit country districts are under consideration, and if this can be arranged much benefit to the country Field Naturalists' Clubs may be expected.

Grateful acknowledgments are tendered to the following benefactors:—For cash donation, Mr. Dixon; for books, pamphlets, botanical specimens, photographs, etc., Mrs. J. O'Bryan, Miss Alice Henry, Miss Marion Agnew, Paul Black, Esq., the Mines Dept., Melbourne, the Federation of Melbourne Walking Clubs, and the W.A. Trading Agency.

A comprehensive expression of thanks is extended to all members and friends of the Club who have given of their time and energies toward the advancement of the Club and its activities. Their reward lies in the knowledge that their efforts are of no little national importance.

During the year eleven ordinary and one special Committee meeting was held and the attendance of Officers was as follows:—

Mrs. C. L. Barrett, Messrs. Geo. Coghill, J. and W. H. Ingram, L. W. Cooper, F. S. Colliver, and Dr. Sutton, 11; Messrs. G. N. Hyam, H. C. E. Stewart, 10; Mr. S. R. Mitchell, 9; Messrs. R. H. Croll, A. S. Chalk, C. L. Barrett, 8; Mr. E. E. Pescott, 7; Mr. A. H. Chisholm, 1.

During the year Mr. A. H. Chisholm, R. H. Croll, Mr. and Mrs. C. L. Barrett, Mr. F. S. Colliver, and Mr. E. E. Pescott were granted leave.

R. H. CROLL, *President*.

F. S. COLLIVER, *Secretary*.

13/6/39

THE EDITOR RESIGNS

After twelve years as Honorary Editor of *The Victorian Naturalist*, Mr. Charles Barrett is resigning a position which, he says, has given him pleasure as well as work. He thanks the Club for having entrusted him with the conduct of its journal for so many years, and wishes his successor as long a period of service. The Committee has asked Mr. A. H. Chisholm to fill the editorial chair. Mr. and Mrs. Barrett, in August, will leave for the Northern Territory and expect to be absent for several months. Early in 1940, they propose to visit America, then Europe, returning to Australia by way of the Cape.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR 12 MONTHS ENDED 30th APRIL, 1939

RECEIPTS		
Balance at Banks, 30/4/38—		
State Savings Bank	£28 12 5	
E.S. & A. Bank	21 2 6	
	<u>49 14 11</u>	
Less Unpresented Cheques ..	39 17 8	£9 17 3
Subscriptions—Arrears ..	£33 6 0	
Current ..	193 19 0	
In Advance ..	10 5 0	
	<u>237 10 0</u>	
Cash Sales of—		
<i>Victorian Naturalist</i> ..	3 5 0	
Shell Book	1 13 0	
Fern Book	1 3 2	
Census of Plants ..	2 18 1	
Badges	18 6	
	<u>9 17 9</u>	
Hire of Epidiascope	10 0	
Donations—		
Baron Von Mueller Grave Fund	10 5 0	
General	1 0 0	
	<u>11 5 0</u>	
Interest Received—		
“Best Fund”—£50 at 3%	1 10 0	
Fixed Deposits—£200 at 3%	6 0 0	
Savings Bank Current A/c	12 3	
On Commonwealth Loan—£600	23 13 9	
	<u>31 16 0</u>	
Wild Nature Exhibition	98 13 3	
	<u>389 12 0</u>	
	<u>399 9 3</u>	
E.S. & A. Bank Overdraft on 30/4/39	60 0 0	

EXPENDITURE		
<i>Victorian Naturalist</i> —		
Printing	£176 5 3	
Illustrating	73 5 0	
Despatching	6 5 0	
	<u>£255 15 3</u>	
Reprints	2 13 0	
Postage and Freight	5 11 9	
General Printing and Stationery	4 13 7	
Rents—		
Royal Society's Hall	16 0 0	
R.A.O.U. for Committee Meetings	2 15 0	
Caretaker for Royal Society's Hall	1 10 0	
	<u>20 5 0</u>	
General Expenses, Insurance, Bank Charges, etc.	4 10 4	
Cost of Club's Conversazione	6 12 6	
Library	11 9 4	
Donations—		
A. & N.Z. Council for Advance- ment of Science	1 1 0	
Horticultural Council	1 1 0	
Von Mueller Grave Fund ..	10 0 0	
Hcalesville Sanctuary ..	10 0 0	
Advisory Council for Fauna and Flora	4 4 0	
	<u>26 6 0</u>	
Wild Nature Exhibition's Expenses	88 14 1	
	<u>426 10 10</u>	
State Savings Bank at 30/4/39	32 18 5	

BALANCE SHEET ON 30th APRIL, 1939

LIABILITIES		ASSETS	
Late Mr. Dudley Best Fund	£50 0 0	Arrears of Subscriptions, £100, estimated to realize	£50 0 0
Subscriptions paid in advance	10 5 0	Bank Current Accounts—	
Special Trust Fund	12 15 3	State Savings Bank—General A/c	£32 18 5
E.S. & A. Bank Overdraft	60 0 0	State Savings Bank—Special Trust A/c	12 15 3
	<hr/>		<hr/>
	133 0 3		45 13 8
Balance of Assets over Liabilities	1,513 13 5	Investments—	
		E.S. & A. Bank Fixed Deposit "Best Fund"	50 0 0
		E.S. & A. Bank Fixed Deposits	200 0 0
		Commonwealth Bonds	600 0 0
			<hr/>
			850 0 0
		Library, Furniture and Epidiascope at insurance value	650 0 0
		Stock of Books and Badges at valuation—	
		Fern Books	30 0 0
		Plant Census	2 0 0
		Shell Books	14 0 0
		Club Badges	5 0 0
			<hr/>
			51 0 0
			<hr/>
	<hr/>		£1,646 13 8
	£1,646 13 8		<hr/>

Statement of Receipts and Expenditure

Examined and found correct on 9th June, 1939.

A. S. CHALK }
A. G. HOOKE } Honorary Auditors.

J. INGRAM, Hon. Treasurer.

EYES OF INSECTS—NOTES ON FACET DIMENSIONS

(Conclusion)

By C. DEANE

In addition to deposits of dust and grit, the surface of the eye is commonly fouled by a coating of dried out or hardened slime, or mud of a semi-transparent nature and whose particles are of colloidal dimensions at most. Whilst the obstructive effect of this material may not be so great when wet, since the insect may be actually moving in the slime as in the case of such genera as *Ocithnebius* and *Hydraena*, nevertheless some disadvantage to vision would probably accrue. If the habits of the insect were predacious this might be more of a disadvantage than with vegetarian forms.

The factors, then, which seem to place a limit to further reduction of eye facet dimensions, may be enumerated, namely:—

- (a) Wave-length of light and resolving power;
- (b) Diffraction at edges, i.e., interference;
- (c) Chromatic aberration;
- (d) Dust and other fouling.

It is desirable that we should pause for a moment to consider what would be the state of affairs if the size of facet were not limited in this way. Under those conditions, can we say with certainty that smaller facets would be used in some cases? I think we can. These smaller facets would be adopted by Nature in small insects where acuity of vision was required. We can argue this from our knowledge of what appears in the larger forms. It has been shown by Lowne (1884), Foral (1900), and Packard (1908), that multiplicity, not size, of eye elements makes for clear vision. Therefore, it seems reasonable that multiplicity of eye elements and the seeing faculty consequent upon this feature would go hand in hand to develop in nature some small insects endowed with great alertness for locomotion and the other activities which we behold in some of the larger creatures.

To finalize, now, on the subject of wave-length, some of the formulæ are here submitted to the reader, which were put forward by leading physicists to show the relation which the wave-length of light bears in optical phenomena. These are as follows:—

Houston: radius of first dark ring, in the resolving power of telescope,

$$r = \frac{1.22 F \lambda}{d}$$

where F = focal length

d = diameter.

Martin & Johnson: resolving power of microscopes

$$h = \frac{0.61 \lambda}{n \sin U'}$$

where λ = wave-length of light.

h = diam. of Airy disc.

U' = angle the marginal rays make with axis.

Bray (Telescopes):

$$\text{Resolving power} = \frac{1.22 \lambda}{D}$$

where D = diam. of object glass.

Bray (Microscopes):

$$\delta = \frac{0.61 \lambda}{\tan \theta}$$

Abbe (Microscopes):

$$\delta = \frac{\lambda}{2 \mu \sin \theta}$$

where θ = $\frac{1}{2}$ angle subtended by object glass at image.

μ = refraction index of immersion oil.

Edser (microscopes):

$$\delta = \frac{v \lambda}{2 r}$$

In all these formulae x , h and δ are distances which require reducing to get better resolution, and in every case we are directly dependent on λ , namely, the wave-length of light.

Statistics of number of facets and their diameters for various species set out in tabular form show clearly the relationships that exist. These are more convincing than verbose sentences. Table I gives the particulars for a number of species.

TABLE I.
Number of eye facets in some beetles

Item	Genus	Number of facets in one eye	Remarks diam. mm.
	<i>Hydrochus multicolor</i> , Lea	307	0.0148
	<i>Hydraena</i> , National Park, Carter (McPherson's Range)	25	0.0117
	<i>Ochthebius</i> sp., Cairns, per H. J. Carter	81	0.0117
	<i>Barrelthydrus geminatus</i> , Lea	775	0.0133
	<i>Hydrophilus pistaceus</i> , Castelnau ..	32,100	0.0242
	<i>Eutermes exitiosus</i> , Hill	127	0.01103
	<i>Aeserina australis</i> , J.A.C.	480	0.0288
	<i>Mecynodera coxalytica</i> , Boisd	600	0.0201
	<i>Xylotrupes australicus</i> , Thoms ..	17,700	0.030
	do. ♀	24,300	

<i>Diamma bicolor</i> , Wood	5,120	0.0185
do. ♀	3,800	0.0229
<i>Lamprima rutilans</i> , Erichson	2,900	0.025
do. ♀	1,170	0.024
<i>Pamborus</i> Glen Innes (fig. 3)	3,180	0.0263
<i>Pamborus alternans</i> , Latr.	4,180	0.024
<i>Pamborus viridis</i> , Gory	4,720	0.024
<i>Pamborus pradicri</i> , Chaud	2,100	0.024

In the Hydrophilidae the number of facets of each eye varies in the different species from 32,000 in *Hydrophilus* down to 25



Lucanus cervus Linn. ♂



Lucanus cervus Linn. ♀

in *Hydracna*. Note the enormous range, whilst in the other characters there is no range at all.

Table II sets out the figures to show this. There is no reason, however, to select Hydrophilidae for an example, because any other group will show the same trend.

TABLE II.
Comparison between *Hydrophilus* and *Hydracna*.
Ratio of number of segments or elements.

Item	Name of part	Number of segments or elements	Ratio
1.	Antenna	9 : 9	1
2.	Palp (Max.)	4 : 4	1
3.	Tarsus	5 : 5	1
4.	Eye	32,000 : 25	1280

In *Eutermes exitiosus* Hill, the facets are not crowded together into the minimum possible area, that is to say, they are not contiguous; which means that there are spaces between. This leaves

them free to assume a circular outline. Indeed this is in all probability the primitive condition, but not now the normal arrangement for insects generally, where the advanced stage, to which eyes have evolved, has given rise to crowding, necessitating the staggered alignment with a hexagonal outline to each facet. The wide spacing, however, is somewhat typical for termites, for instance.

In the above remarks on eyes of termites (white ants), the reader will understand that it is the alate forms mainly to which reference is made, together with their derivatives, the kings and queens. He will know that other castes, such as soldiers and workers, are usually without eyes. The workers are always blind, but in a few instances small eyes composed of only a few facets have been observed in the soldiers.

In *Calotermes* (? *Glyptotermes*) *perangustus* (Hill 1926) the soldier caste is endowed with eyes, the following words appearing in the original description: "Eyes small, sometimes faintly pigmented, well separated from the posterior margin of the antennal foveolae." Other species in which soldiers have eyes are *Calotermes oldfieldi* Hill, *C. claripennis* Hill, and *Entertermes apiocephalus* Silvestri, according to their authors.

Sexual dimorphism, which refers to the difference in outward physical form or character which exists between the two sexes of the one species, has been dealt with by P. J. Darlington (1936), of America, writing on development and atrophy of wings in ground beetles, and by A. d'Orchymont (1938), of Belgium, working on the labrum of Hydrophilidae.

Sexual dimorphism is not conspicuously manifested in the eyes of insects of most orders. An apparent exception is to be found in those species in which the male is considerably larger or smaller than its corresponding female. In a case of this sort the smaller insect has fewer facets usually but this is not altogether due to sexual dimorphism, but rather it is an example of the law relating to the maintenance of size of eye elements. Instances of this are to be found in the following species listed in Table III.



Barretthydrus gemminatus
Lea.

TABLE III.

Item	Name	Number of facets	D.O. ♀
1.	<i>Lucanus cervus</i> , Linn. (fig. 1) ..	9,562	4,131
2.	<i>Lamprima rutilans</i> , Er.	2,900	1,170
3.	<i>Xylotrupes australicus</i> , Thoms	17,700	24,000
4.	<i>Diamma bicolor</i> , Wwd.	5,120	3,800

In *Pamborus* the eyes are mainly fovate to glacial. Here we have an example of highly developed compound eyes in an insect which is preclacious, fleet on foot, and in addition it is of large size, a circumstance which gives opportunity for great multiplicity of eye element. In addition to these activities it is preyed upon by its enemies, conspicuous among which are the ground spiders, there being at least one literally enormous ground spider on the Northern Tablelands of N.S.W. On the road from the ridge of mountain peaks that lie between Glen



Pamborus sp.

Innes and Laverell, going towards the former town in 1913, I had the interesting experience of seizing several examples of the large and beautiful *P. viridis* in association with these large spiders. Being strong and athletic at the time I was able to roll away some huge logs, about seven or eight, at the side of the road. Every one revealed a sight for the naturalist. Plenty of live, healthy specimens of the *Pamborus*, scattered body fragments of the same brilliant species, dark caverns covered by a muslin-like web and here and there a huge black monster. I can still, to some extent, after a lapse of a quarter of a century, experience the feeling of awe as I beheld these dark monsters.

But we must not digress too much. Suffice it to say that in order to carry out its own programme of activity the insect has to cope with and elude successfully its enemies. For this purpose a highly developed eye might be an advantage, although Forel (1900) on the ants appeared to show that ants, deprived of the use of their eyes, were able, when confronted with their enemies, to deal with them almost as effectively as if in full possession of the faculty.

Some of the Trichopterygidae (*Colcoptera*) are apterous, for example *Rodwayia* (Lea) and *Cochliarion* (Dean 1930) which live under stones and in the nests of ants; while the true cave-inhabiting beetles according to Lea (1910) are not blind but have small eyes, notably *Idacrabus troglodytes*.

In conclusion my thanks are due to the following, viz.: Mr. F. E. Wilson and Mr. John Clark for checking over the manuscript; Dr. W. Baldwin and Prof. Agar for advice on optics and biology respectively; Mr. Allan Budge for discussions on resolution; Mr. C. A. Melhuish and Mr. Louis Williams for allowing me to take part in their Snowy Hill and Mt. Buller expeditions; Mr. R. M. Harvey for collection of insects from Mt. Cobberas.

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LEAFLESSNESS IN ORCHIDS

(*Cryptostylis*)

By EDITH COLEMAN

Leaflessness at the time of flowering is noted in a number of Australian terrestrial orchids. *Spiculaca Hunteriana* and *Cryptostylis Hunteriana* appear to be entirely leafless in normal conditions. In *Spiculaca irritabilis* leaves are rarely found at the time of flowering, but when so found they are extremely small.

Certain autumn-flowering Prasophylls are practically leafless at the flowering period. In *Eriochilus cucullatus* a very small leaf appears before, or at the appearance of the scape, increasing in size when the flower fades. Five years ago I came across a leafless *Cryptostylis subulata* with a four-flowered scape. On March 9, 1939, I had under observation three leafless plants of *Cryptostylis*: *C. erecta*, kindly sent to me from a New South Wales locality by Mr. E. Nubling; *C. Hunteriana* from Mr. Wakefield's wonderful patch at Marlo, and *C. leptochila*—a plant which flowered in the previous season, but produced no leaves.

Remembering a chance experiment with *Spiranthes sinensis*, I decided to place the plants in water. After photographing the flowers of *C. Hunteriana*, and watching their pollination, I carefully washed the soil from the roots—not an easy matter. They consisted of one not very large vertical tuber and one very small one, and two thin, horizontal tubers under one inch in length, one of which bore a small bud. From this plant the scape rose. In the soil was another small bud which appeared to have become detached from one of the thin tubers, although I could find no trace of its "bed."

I sifted the soil carefully, but it is possible that I missed other buds, or that Mr. Wakefield may have done so in lifting the plant. It was evident, I think, that new plants in this species are developed from adventive buds produced on the tubers of the parent plant, as in *Spiranthes sinensis*. I placed the roots in a glass jar on a window-shelf beside the others. By April 10 the leafless *C. leptochila* had developed a leaf, and a few days later *C. erecta* had produced a leaf-bud. This has since developed into a normal leaf. *C. Hunteriana*, however, showed no sign of leaf-bud.

Plate II



The same plant photographed a year later



Syntherisma chinensis growing in water

Having made use of a plant-growth hormone on other subjects, I decided to test it on *C. Hunteriana*. I treated it on May 5. On June 4 a leaf-bud appeared beside the withered scape. This is now fully developed, but small. The plants were removed from the water and thoroughly washed to remove slime. They were then potted in ordinary soil. They all appear to be growing. To-day I lifted *C. leptochila* for examination, and found the tubers looking healthy, but greenish in colour. I did not disturb the others. Whether the leaf of *C. Hunteriana* has resulted from the hormone treatment, it is not safe to conjecture, as both *C. erecta* and *C. leptochila* produced a leaf without treatment.

Plants of normally slow growth are slower in their response to the synthetic hormones than plants of more rapid growth. One assumes that these chemical preparations simulate animal manures which are rich in plant-growth hormones; but one does not think of wild orchids as requiring such foods! I offer this preliminary note in the hope that botanists who have access to some of the so-called leafless orchids, may be induced to make fuller investigation.

As there is always a risk in lifting tubers, especially of an apparently gemmiparous species, I would suggest treating them *in situ*, by gently loosening the surface soil, and watering with the hormone solution, following the instructions very closely (I used Hortonone A, supplied by Imperial Chemical Industries Ltd.).

As plant culture in chemically treated water, without soil, is now practised in Australia, my experiment with *Spiranthes* is worth recording. This plant flowered, in ordinary water, without soil, for two successive seasons. It had been placed, unnoticed, in a vase with cut flowers from New South Wales (December 2, 1929). When about to throw out the faded flowers, I found a robust root of *Spiranthes sinensis* with a two-inch-high scape. I replaced it in the water. The fully developed scape, photographed on January 6, 1930, is shown on Plate II.

Water was added as it evaporated. In spite of a slimy growth of algae (due, I have since learned, to too much light), the plant lived on, and flowered again in the following January. This was not so fine a spike. The leaves, too, were drawn up to the light. See Plate II.

It will be noted that no new tubers were formed, nourishment being drawn from the dwindling tubers of the past season. It is possible that the submerged, decayed leaves of the previous season provided some growth-producing substance. It is not improbable that the growth of algae may have been in some way beneficial.

INDEX TO FERN BOOK

Many purchasers of *Victorian Ferns* have asked for an index. To publish it separately would have cost considerably more than to give it a place in the *Naturalist*, so the latter course has been followed.

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The Victorian Naturalist

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PROCEEDINGS

The ordinary meeting of the Club was held at the Royal Society's Hall, on Monday, July 10, 1939. The President, Mr. A. S. Chalk, presided, and about 90 members and friends attended.

The President welcomed several visitors, including Mr. Gilbert Rogers, of Hall's Gap, one of our Country Members.

SUBJECT FOR THE EVENING

As arranged, this was a symposium on "Caves and Cave Hunting in Australasia." Mr. C. L. Barrett opened the subject and showed fine views of some of the Nullarbor Plain caves and petroglyphs.

Mr. S. R. Mitchell discussed chemical methods of the formation of caves, mainly in limestone country, and showed various formations of stalactites, stalagnites, "shawls," etc.

Mr. G. N. Hyam dealt with cave hunting in New Zealand, England and Australia, and referred to discoveries made in some of the caves. Slides and photographs of the Buchan Caves and some New Zealand districts were used as illustrations.

Mr. F. S. Colliver dealt with discoveries of fossil animals found in Australasian cave deposits, mentioning, birds, marsupials and snake remains. It is of interest to note that the Wombat (living) *Phascogale Mitchellii*, was first described from fragmentary remains found fossil in the Wellington Valley Caves of New South Wales.

Mr. D. A. Casey spoke on the archaeological side of the subject. He emphasized the importance of scientific investigation, stating that in the past much evidence of unique value had been destroyed by cave explorers.

The Rev. Woolf, whose parish was at one time portion of the Nullarbor Plain, and with whom Mr. Barrett explored some of the caves of the district, was invited to speak. He showed some highly interesting slides of cave interiors, and promised a lecture for some future meeting.

The President expressed the thanks of the Club to all who had contributed to the symposium.

CORRESPONDENCE

Mr. J. Wilcox, expressing thanks to members for his election to Honorary Membership.

Royal Zoological Society, stating that a prize was being offered for an essay on some scientific aspect of the Australian fauna.

REPORTS OF EXCURSIONS

Mr. J. Ingram reported on his excursion to Eltham and Warrandyte.

ELECTION OF MEMBERS

On a show of hands the following were duly elected:—as Ordinary Member—Miss Elsie Digby; as Country Member—Mr. Paul Fish.

GENERAL BUSINESS

The President referred to the forthcoming departure of Mr. and Mrs. C. L. Barrett, and thanked both for the work they have done for the Club. He expressed the good wishes of the Club to them. Members supported these sentiments with acclamation.

Mr. Barrett in his reply, thanked the members, and expressed the hope that the new Editor (Mr. A. H. Chisholm) would enjoy the position as much as he had done.

NATURE NOTES

Mr. Hyam showed a photograph of a natural graft in some street trees at Ararat. (Photograph forwarded by Miss Lorna Banfield.)

Mr. C. Gabriel spoke on a letter he had received, asking for information as to how some shell-fish bored holes in other shells. Mr. Gabriel showed photographs of the lingual ribbon of many different shells, but stated that he did not know the actual procedure.

EXHIBITS

Mrs. Fenton Woodburn:—Ivory nut from the Solomon Islands.

Mr. H. P. Dickins:—Native orchids in watercolour.

Mr. H. T. Reeves:—Enlargements (160) of flora and fungi for the Photographic Library.

Mr. S. R. Mitchell:—Calcite specimens to illustrate his remarks.

Mr. G. N. Hyam:—Moa bones from New Zealand.

Mr. F. S. Colliver:—Fossil marsupial remains from cave deposits.

A SUBURBAN SANCTUARY

By BLANCHE E. MILLER

For long years, the old-fashioned rambling garden next door had intrigued us with its serenity. Situated in one of the most populous parts of St. Kilda, within three miles of the metropolis measured by crow-flight, a little farther by thoroughfare, it was unique in its unconventionality.

Like most good things, it was not for sale—the owner was adamant in her decision not to part with even the few feet frontage that we desired to widen our entrance. That, perhaps, was just as well, for when in the fullness of time the property came on the market, our ideas had developed out of all recognition, and the statement of requirements included the *whole* of the garden!

Legal machinery is slow and exacting, and there were many days of doubt before the surveyors were able to assure us that a particularly fine old mulberry tree would be on our side of the new boundary fence. Men of three-score years had known it in their youth; a few remembered when, as quite a big tree, it had been transferred from the nursery across the road, and survived the removal. Being past their prime, many of the other fruit trees and shrubs had to be sacrificed.

We planned to make an all-Australian garden, with a half-hearted hope that some native birds might find sanctuary therein. Almost beyond belief, the first native bird arrived even before the gardener had finished regrading, and when the garden-that-was-to-be was painfully Australian—with its vast, empty spaces! The Field Naturalists' Club had arranged a tree-planting day in the St. Kilda public gardens. The day proved to be exceedingly wet, and I suggested to my husband that if the party cared to come along to our home, after the planting, refreshment would be awaiting them. That was the auspicious day chosen by a Flame-breasted Robin to visit us. He stayed a full week, his bright breast gleaming like a beacon of hope as he fluttered from the newly-turned soil to some convenient perch. During the autumn of the following year we were again honoured by a flame-breast, but not since.

The scarlet bottle-brush was quite a small shrub when the first White-plumed Honeyeater mysteriously discovered its whereabouts, and it did not selfishly keep the information to itself. Others of its kind patronized it, besides finding much else of attraction in the garden. The *Callistemons* retain their seed-pods from year to year, the new flowers being produced at the end of the branch, so that if the blooms are not gathered the young shrubs give the illusion of being quite large. Very soon our scarlet bottle-brush was spreading long fingers even into the bathroom window, which is usually wide open.

Exactly opposite the window is a large wall mirror, and it was a favourite joke of mine forecasting that some day a "Greenie" would take the wrong turning, and fly into the reflection. It actually happened one day, and only quick thinking and suitable action prevented havoc that would certainly not have been a joke. This year the vine leaves had been stripped from the clusters of grapes, and these brush-tongued Chick-a-wees found new autumn revelry at a time when there were few nectar-bearing flowers. How they managed to pierce the ripe outer skin was not determined.

The most gratifying feature of our new garden has been the prodigious growth made by all the Australian trees and shrubs. When a friend gave us a sturdy seedling of the Queensland silky oak, it brought to mind the sight of Red Wattle Birds feeding from the bright orange racemes of these trees in the streets of Maffra. *Grevillea robusta* is appropriately named. So rapid was the growth of our specimen that in five years the bole measured several inches in diameter, and it was deemed wiser to remove it.

Much happier has been our experience of one of the *Eucalypts*—the lemon-scented gum. *Citriodora* has been a gracious host to some of the most notable visitors to our garden. Black-faced Cuckoo-shrikes, Eastern Shrike-Tits, and two species of Cuckoos are a few of the native birds that at times frequent it.

When I told a well-known bird man that there had been a Budgerigah in our gum tree, he replied: "A blue one, of course!" Naturally, the escaped cage-birds make for this tall slim, graceful tree, particularly the Parrots and Cockatoos. Wild Rosellas of two species are frequently about, but they are always in pairs or small parties, and never, at any time, wishful of engaging one in conversation!

The purple-berried lilly-pilly, *Eugenia Smaythii*, is popular in many gardens, but in our garden *E. floribunda* has been an even greater attraction. Not only is it frequented by the honey-eating birds when in flower, but it bears edible berries of bright rose that are relished by birds and boys. It is exceeded in popularity only by the ancient mulberry-tree which bears fruit for nearly three months. Woe betide the unwary stroller in the garden who ventures into its deep shade during the hot summer months, for a flutter of wings precipitates a shower of ultra-ripe berries that find their way inside one's collar with surprising results.

The flowering of *Templetonia* is heralded annually by the arrival of the Spinebills. They linger if the fuchsias have not been pruned too drastically, and then pass on until next year. The Grey Fantail comes and goes, but never had we seen an *Acanthiza* until one managed to stray through the ventilator into the glass-house, whence it was released almost exhausted from fright and heat. Silveryeyes find constant employment on the lemon trees.

Plate III



Ferns and Sassafras, Tarra Valley, South Gippsland. (This photograph is typical of a beautiful series executed and presented to the Club by Mr. H. T. Reeves.)

There is a hardy remnant of earlier days in a bamboo-like clump, commonly known as the ginger plant. Greenies seem to relish the nectar from the quaint red-and-yellow flowers. The seeds are pill-shaped, bright and black, and one year the Silvereyes made desperate attempts to swallow them—more often without success.

Blue Wrens stay with us for the greater part of the year, and for their especial benefit there is a long border of box flanking the drive that is never primly trimmed. But our hopes of encouraging the native birds to nest by the provision of desirable nesting-sites, both natural and artificial, have largely been frustrated by marauding cats, many of them apparently ownerless. Every effort made to keep our garden cat-proof has eventually proved futile, and the law forbids the laying of poison baits, or the discharging of firearms in suburban areas. The indigenous birds seem to have the wisdom not to attempt to nest. Of the several introduced species that are resident, scarcely any manage successfully to rear their broods. When a fine old Kookaburra took to pole-sitting in a strategical position, just at the time that the Thrushes and Blackbirds were brooding, neither of us commented on the fact. There was a tacit agreement that if the fledglings were doomed, it might as well be by Kookaburra as cat.

Melodious and dapper Magpies and Magpie-larks bring the present total of visitors to twenty, plus seven introduced aliens. To this list may be added the birds that are observed passing over: Swifts, and recently, Gang-gang Cockatoos. Once, a large raptorial bird followed the Tasmanian plane, but was out of sight before it was possible to obtain the field-glasses. Then there are birds that "pass in the night." Particularly at the full of the moon we hear the honk of the Black Swans.

From a financial standpoint it must be admitted that the attempt to establish a suburban sanctuary has been extremely costly, seeing that the results are almost negligible. Yet, despite every disappointment, there is the compensating knowledge that we aimed to reproduce in miniature the soul-satisfying ideal of the nature lover:—

*"Wide quiet places, trees, and wind, and wings,
And intimacy with elemental things."*

The Club would be glad to hear from any Country Member who is willing to form a group of local residents interested in Natural History. The Committee proposes to organize such groups where sufficient interest exists.

THE ABORIGINES OF AUSTRALIA

By JAMES BROWNE, Toronto, Canada

(Read before the Canadian Institute, February 16th, 1856, and published in the *Nautical Magazine and Naval Chronicle* for 1856.)

It was my good fortune to pass the greater part of my boyhood at King George Sound, a settlement on the western coast of Australia. There the aborigines were my companions and play-fellows, and thus the following account embodies facts which came under my own observation, or were related to me by the natives themselves.

It narrates principally the result of my observations on those with whom I sojourned; but it may be added that the manners and customs of the aborigines of the western, southern, and eastern coasts of Australia vary so little that a description of one may answer for all.

The first impression produced by a sight of the grinning native in the bow of the harbour master's boat—black as coal, but with a pair of keen sparkling eyes, and a row of teeth disproportionately prominent from the large size of his gaping mouth—was that we were looking on a baboon or some strange creature of that new world, rather than on a human being. A short cloak of kangaroo skins, the invariable costume of the natives, as we afterwards found, was his only garment, reaching about half-way down his thighs, and exposing the lower limbs, which were disproportionately small and shapeless. His arms were sinewy though lean, but, as is invariably the case with the Australian savage, larger and better developed in proportion to his general figure, than the meagre shapeless lower limbs.

He was, as I ascertained, about thirty years of age, but looked much older, of low stature and slight figure. His hair, which was thick and curly, grew far down over a low and poorly developed forehead. His eyes were small, deep-set and lively; his nose delicate, though somewhat flattened, and his mouth large and protruding.

Such was Wan-e-war, the first of the aborigines of Australia it was my fortune to see, and no unmeet type of his degraded and doomed race.

We soon had further opportunities for observing the aboriginal owners of the land in which we proposed to sojourn.

They assembled round the large fire kindled for the purpose near our dwelling, and the proceedings of the evening commenced. The cloaks of the dancers, instead of being thrown over their shoulders, as usually worn by them, were fastened round their middles, leaving their bodies completely bare, which, with their faces, were painted in the most grotesque manner with red ochre, and shining with grease. Some had bunches of feathers or

flowers stuck in their hair, while others completed their head-dress with the tail of the wild dog. One or two had a small bone of the kangaroo passed through a hole in the cartilage of the nose; all carried their spears and wamers; and as they thus stood gathered round the fire, which threw a vivid glare on their greasy and shining bodies, the effect was truly picturesque and savage.

Those who intended to take a part in the dance ranged themselves on one side of the fire; on the other side sat the old men and the women and children. The coroberry commenced by the dancers breaking out into a sort of mournful chant, in which the old men and the women occasionally joined. The whole burden of the song consisted in the words, "Yunger a bia, mati, mati," which they repeated over and over again, beginning in a loud and shrill tone, the voice gradually dying away as they proceeded, until at last so low and soft was it, as to be hardly distinguishable from the breeze which rustled amongst the bushes.

Whilst thus chanting, the dancers remained in a bending posture, and kept time to their voices by lifting their feet with a sort of jerking step from the ground, and at the same time pulling the two long ends of their beards through their hands. Suddenly, they would change their music into a loud "Haugh heigh, haugh heigh, haugh leigh," whilst they clashed their spears and wameras together, and stamped their feet with full force against the ground: then drawing themselves up with a sudden jerk, a loud and startling "Garra-wai" was shouted. Then again they would resume their first movement, but in double quick time, the whole rank now moving quickly up and down side-ways, shoulder to shoulder, now going round in a circle, and all to the same music, and with the same stamping steps.

Tiring of this, the sport was changed to the "Kangaroo dance." This dance is very similar to that already described, but with the difference—that, in the midst of the uproar, one of the men came bounding and jumping like a kangaroo between the dancers and the fire; this movement put a sudden stop to the dancing, and one of the party started off as if in pursuit of the game, the two then went through the whole proceeding of hunting down and spearing the kangaroo, which being at length accomplished they all once more joined in the dance, and in the midst of the uproar—the stamping of feet, the clashing together of spear and wamera, and their shouting and yelling, the fire died away, darkness covered the scene, and the entertainments of the evening were brought to a close.

Thus also closed the first day of my sojourn in Western Australia.

The country in the immediate vicinity of King George Sound—an arm of the sea on the western coast of Australia—is inhabited by four tribes of the aborigines. These are the Murray the Weal, the Cockatoo and the Kincannup.

As each tribe is distinct in appearance, so too is it noted for some one article or weapon, in the manufacture or use of which it is famous. The Murray man possesses the best wood for spears; the Weal man is envied for his long, full, and beautiful kangaroo skin cloak, and also for his hammer of stone; whilst the Cockatoo man excels in making and throwing that most eccentric and wonderful of all weapons, the boomerang or kilec.

I have already stated that each tribe occupies its own separate division of territory. The district thus occupied is again subdivided into vaguely defined portions, every family or individual of the tribe having its or his recognized tract of country. This property descends in the family, from one to another, and is considered in every way private property, and the proprietors of such are boastful and proud of their hunting grounds in proportion to their extent and nature.

Although thus divided into tribes and families, yet nothing resembling a set form of government exists among the Australian aborigines; nor have they either chief or ruler to guide or advise them. Occasionally, however, they might be heard talking of some one great and distinguished individual, who, to judge from their manner of describing him, held a high and influential position in the tribe; and this had induced many to believe that a sort of chieftainship was recognized amongst them.

It was always found, however, when the subject became thoroughly sifted, that this great personage had acquired his influence over his fellows, as perhaps an expert and ready spearman, solely from being more bloodthirsty and domineering than his neighbours, and from having killed all—men, women and children—who were unfortunate enough to fall under his anger. And thus, knowing from bitter experience that to contradict so dangerous a character would be anything but prudent, the respect paid to him by the rest of the tribe was altogether a matter of policy on their part, induced by fear, and not from his having any distinct right to dictate or command.

I have stated that each tribe is celebrated for the manufacture of some weapon or other article. In order to exchange these different articles, as well as to have a sort of jollification and grand kangaroo hunt, the different tribes assemble by appointment at a given spot at certain seasons of the year. The scenes here enacted are exciting and varied; they generally begin in harmony and good fellowship, and end in quarrels and an angry dispersion.

The place of rendezvous is usually in a part of the country where the kangaroo is plentiful, and in the vicinity of a small lake. When all are collected, operations commence by the tribes forming an immense circle, having the lake for its centre. The hunters at first are a considerable distance from each other, and extend over a large tract of country. - At a preconcerted time, they all

gradually draw in towards the lake, shouting and striking their spears and wameras together.

The kangaroos are thus driven from all quarters into the centre, where they find themselves blocked in and completely surrounded by the natives. The kangaroos now make a general rush to escape, and a scene of confusion and noise ensues which baffles description. Spear, kilees, and other weapons are thrown in from all sides, and immense numbers of the game are killed in their vain efforts to clear the boundary. Some in desperation take to the water, but these, being out of their element, are soon despatched.

The natives return to their bivouac laden with spoil, and do nothing but eat, drink, dance, and sleep until hunger again drives them forth for a further supply.

All would appear to be going off smoothly and amicably enough at these general assemblies of the various tribes; nevertheless, something most frequently occurs to put an unpleasant stop to these jovial proceedings. There is some old quarrel to be settled, some old sore to be healed, and thus the evil disposed contrive to get up disputes, or to recall wrongs still unsettled and unrevenged. Each party has his friends and relatives about him, who feel themselves called upon to take a part in the matter, and thus the whole camp gets involved in a general quarrel. From wrangling, matters proceed to blows, the wamera is seen to flourish in the air, spears begin to fly about; pierced legs and broken heads are the consequence, and the parties separate vowing vengeance against each other.

These fights, however, rarely prove fatal to anyone, for the belligerent parties generally contrive to make a great noise without doing much damage, beyond perhaps one or two wounded legs and a broken head or so, which are looked upon as mere trifles.

The reader must not come to the conclusion, however, from the description of such a scene, that the natives of this part of the world never kill each other. Far from it. When one of the tribe dies, either from natural causes or otherwise, the nearest relation of the deceased is expected to take the life of one of another tribe; they, in their turn, retaliate in the same manner; they are, therefore, in a continual state of dread and warfare.

Their huts are chiefly formed of long grass, rushes, the bark and branches of trees. Each one is sufficiently large to admit of two or three persons curling themselves up inside like so many hedgehogs. Their shape is that of an arch, the highest part of them being about three feet from the ground, with the front completely open, and sloping down gradually in the rear.

To give a better idea of one of these establishments, imagine a bowl or tea cup turned with the bottom upwards and then cut down through the centre, each half will be a miniature model of an Australian mansion.

At all seasons, summer and winter, this is their only shelter; with but a small fire in front, men, women, and children, each one coiled up in the cloak of kangaroo skins, sleep through storm and tempest, and set all weather at defiance.

In their ordinary mode of living, and when in their own district, the tribe is usually broken up into small parties or families, each party forming an encampment of some six or eight of these wigwams. It is seldom that the tribe musters except when about to leave its own territory for a distant part of the country, or when some mighty question, having reference perhaps to a general expedition against another tribe, has to be discussed and planned.

During the summer months the tribes of the interior generally make towards the sea coast for the purpose of enjoying a feast on the various kinds of fish which are there to be obtained. They have several methods of proceeding in this sport, but that usually adopted is for the whole of the natives in the neighbourhood to assemble together near some shoal or sandbank which at low water is left covered with but a few inches of water.

Early in the fine mornings of summer, just as the sun breaks forth, these sandbanks may be seen sparkling with innumerable fish, which seem to frolic about in sportive glee, now darting along and chasing each other with the speed of an arrow, now flinging themselves far out of the water as if to exhibit their bright armour in the shining rays of the sun. But man, the universal enemy of creation, has to satisfy the cravings of nature; he also is up and stirring, and cannot permit so tempting an opportunity to pass, and so, calling to his companions, they all pull armfuls of branches from the trees and then hurry to the beach intent upon the sport.

The attack is commenced by erecting a sort of weir with the branches and twigs; this is made in a semi-circular form with one end touching the beach and the other towards the edge of the shoal. The whole party now wade into the water and spread themselves over the shoal at some distance apart from each other, then gradually drawing in toward the open side of the weir, their splashing and noise cause the fish to rush into the snare laid for them.

Thus entrapped, spears pour in from every point, each man trying to outdo his neighbour in shrieking, kicking, and splashing; here some may be seen probing right and left with their spears within the weir, there others are skipping through the shoal water in chase of runaways who have managed to dart through or over the bounds, and thus in a short space of time an immense supply of food is secured. It is astonishing, indeed, to see the quantities of fish taken in this manner.

(To be continued)

A BEAUTIFUL SUN-ORCHID

(Thelymitra chasmogama, Rogers)

By W. H. NICHOLS

This pretty *Thelymitra*, for some obscure reason, is not at present, as far as I am aware, recorded in Victorian botanical literature. My records show that it occurs in several districts in this State, as well as in New South Wales and South Australia. It was described from South Australian material.

Thelymitra chasmogama resembles somewhat closely *Th. luteociliata*, Fitz., a mountain form, but in the former the flowers are larger; there are also other marked differences. *Th. chasmogama* appears to belong to the plains.

The structure of the pollinarium in Rogers's plant is adapted for cross-pollination, the flowers expanding widely even on dull days. In *Th. luteociliata* self-pollination is accomplished very early in the bud stage. Only under the most humid weather conditions does the perianth expand, then but for a brief interval.

Th. chasmogama is a slender, glabrous plant from 25-32 cm. high; leaf, narrow-linear: about 10-22 cm. long, rather thin, rigid acute, channelled; stem, pinkish, with a tendency to angulation; stem-bracts, 2, subulate, sheathing; flowers, 2-4, on slender pedicels, each with a small acute sheathing bract below, pink in colour, opening freely; segments of perianth about 1.3 cm. long, elliptical, the inner ones widest; the perianth sometimes marked with fine dots; column about 6.5 mm. long, the lateral wings carried forwards and upwards into two yellow penicillated processes, as in *Th. luteociliata*; the hood produced forwards into a yellow tube, the margins of which vary from smooth to toothed; apex of anther prominent and blunt; anther-case carried high above the stigma, dehiscing and leaving the pollen masses attached to the viscid disc; stigma semi-oval, viscid disc in a slot in its upper border; dollinio attached directly to the disc.

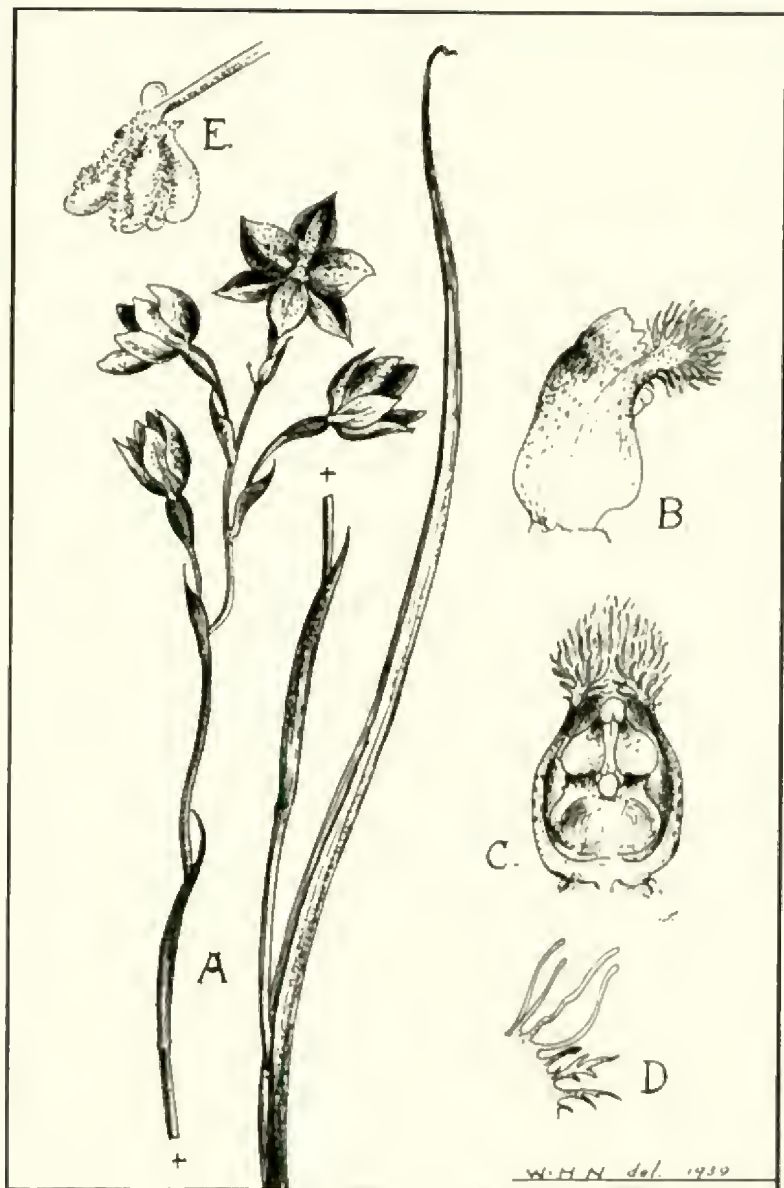
Flowering-time: September-November.

Distribution: South Australia, Victoria, New South Wales.

Habitats: S.A.—Golden Grove, Dr. and Mrs. Rogers, Oct., 1921, Vic.—Croydon, F. G. A. Barnard, Oct., 1929; Devil's Garden, (Granpians), Clarence Lang, Oct., 1932; Wonthaggi, E. H. Homann, Nov., 1934. N.S.W.—Kurri Kurri, M. W. Nichols, Sept., 1934.

A suitable vernacular for this species would be "Golden-plumed Sun-Orchid." The colour of the flowers of this *Thelymitra* is described as pink, but the colour varies from a bright rosy-pink to a delightful salmon-pink. It is undoubtedly one of our most beautiful forms.

The drawing which accompanies these notes was taken from a specimen forwarded from Wonthaggi by Mr. Ernest E. Homann.

*Thelymitra chasmogama*.

A Typical specimen from Wonthaggi, Victoria. B Column from side. C Column from front. D Character of penicillate processes. E Pollinia removed from anther case. (For natural size of A, see description here-with.)

Plate IV



Photos by A. H. Chisholm

August's Bird. The Yellow Robin is beginning now to shape its pretty nest. Here are two neat

SOME BIRDS OF MELTON

By D. DICKISON

For over fifty years the Melton district has been one of the most interesting fields near Melbourne for the ornithologist. It was there in the 'eighties that the late G. A. Keartland did much of his collecting, and for many years afterwards he conducted excursions of the F.N.C. through the district. In latter years other bird men worked both the Melton and Parwan districts.

My first trip to Melton took place in 1915, when several interesting belts of box trees existed within a few miles of the railway station. Since then, however, much of the timber has been either grubbed or ring-barked, and it is now necessary to travel several miles from the station to reach suitable areas of timber where bird life is plentiful. Apart from the destruction of the timber through the axe, there appear to be other agencies at work, as quite a large number of the trees have gradually lost their foliage and died, although there is apparently no accounting for it.

In a season following a wet winter the district is particularly rich in bird-life and many interesting species have been noted from time to time. Even in a dry year several of the rarer birds from the north have appeared for a brief while and then departed. Quite a number of the species noted there by Keartland do not occur now, but there are others which appear now that did not come under his notice.

One of the commonest birds, though not nearly as plentiful as it was twenty years ago, is the Banded Plover (*Zonifer tricolor*); it still occurs in numbers in the open stony country around Mount Cottrel and on the plains at the rear of Parwan railway station. This bird, as is so well known, breeds very early, and even on those cold bleak plains young ones, just hatched, have been found as early as the first week in August.

The beautiful Yellow-tufted Honeyeater (*Meliphaga melanops*) is extremely plentiful in the scrub country between the Djerriwarrah and Coomadaï creeks. This is the southern limit of these birds near Melbourne, though they have been noted down near the Gippsland lakes. Like most birds of a dry area, Yellow-tufted Honeyeaters commence nesting early. Most of the nests that have been found in the district have been during August and September, and very few of these birds seem to breed after the end of October. Their attractive plumage makes them showy birds, and, being of a pugnacious type, they are always on the move, seldom remaining still for more than a few seconds.

Both the Brown-headed and White-naped Honeyeaters are numerous and are easily recognized by their calls. On one occasion, in the belt of timber below Mt. Cottrel, a small party of Black-chinned Honeyeaters were seen, but their visit was only

temporary and they were not seen again. Their large size makes it impossible to confuse them with any other members of the genus.

For several months a Barn Owl (*Tyto alba*) occupied a hollow of a dead tree near the Ballarat road. Seemingly, this bird used to camp some distance down the hollow, as on tapping the tree it could be heard fluttering some time before it emerged at the entrance. Some time after it disappeared from the hollow the remains of one of these birds were discovered a short distance away, so probably it was the same bird which had died, as so many of these birds do at certain times of the year.

Although both the Barn Owls and Boobook Owls are heard frequently during the night, it is rarely that they are disturbed from hollows. Occasionally the Owlet Nightjar is flushed, but it is not plentiful. Several years ago two nests, each containing three eggs, were found on the same day: this was the first and only occasion on which I have found a nest of this bird in the district.

Both the Rosella and the Red-backed Parrots are very numerous and nest freely in the hollows of the dead box trees during the months of October and November. The latter bird appears to spend much of its time, just prior to nesting, in searching for suitable hollows, as it is not an uncommon sight to see a pair fly into a dead tree and, after examining every suitable hollow, fly on to another tree to continue their inspection. Although so numerous in the Melton district, the Red-backed Parrot does not appear to come much closer to Melbourne, and it is only on rare occasions that it occurs on the eastern side of the city. A regular visitor to the district is the White Cockatoo (*Kakatoë galerita*), which comes down daily from the ranges to feed on the plains near Toolern Vale. About 4 p.m. they commence their flight back into the ranges again, but it has been noticed on many occasions that on days when there are strong north winds quite a number of the birds remain the night in the timber on the edge of the plains. Usually they fly very high, and they must travel a considerable distance back into the ranges.

Every year a few Rainbow-Birds (*Merops ornatus*) appear along the Coomadai Creek, where they remain long enough to rear their young. Efforts to photograph these birds have not met with any success, as the adult birds will make no attempt to approach the nest (even when there are young ones in it), when a camera is present. Within seventy-five yards of one nesting tunnel, which contained young, a swarm of bees had a hive in a hollow branch, but the bees continued to fly in and out, without, apparently, being molested by the birds.

One of the most interesting birds in the district is the Grey-crowned Babbler (*Pomatostamus temporalis*), which has a strange

but fascinating call. These birds are confined to areas of large box trees, where they build their large partly-domed nests at the very extremity of the long branches. They breed as early as July, but as they may have as many as ten nests in the same tree it is not always easily ascertained which nest is being used. The White-browed Babbler (*Pomatostomus superciliosus*), which is also plentiful, and has similar habits to its larger relative, is found only in the short brushwood. Its calls may be described as cat-like.

There are numerous other interesting species in the district, which I will deal with at a later date.

Mr. and Mrs. Charles Barrett were entertained by members of the Field Naturalists' Club at a largely attended luncheon on July 26. A presentation was made to each of the guests, appreciation was expressed of the valuable work they have done for the Club during many years, and cordial wishes were extended to them for a pleasant holiday in Northern Australia and on their subsequent tour abroad.

The President (Mr. A. S. Chalk), Messrs. G. Coghill, A. H. Chisholm, G. N. Hyam, and Miss Wigan, Mrs. V. H. Miller and Mrs. E. S. Hanks spoke for the Club, and Mr. and Mrs. Barrett both made cheery and appreciative replies.

A STORY OF THE AGES

Dear Motorist—If you are going touring you may have gone to Hall's Gap in the Grampians. Possibly you noticed the sun shining gloriously on the wild and rugged peaks and ranges. You are sure the sun shone that day, and I am sure it shone like that in the Gap about a couple of hundred million years ago.

Possibly you think that is a statement very easily made but remarkably hard to prove. Well, come with me up the Gap and I will show you something. Up near Bellfield we approach a little gully coming out of the massive sandstone mountain. This is Suncrack Gully. Just here the rocks are not all sandstone; they have a little mud in their composition. There is a good surface exposed, and it is much scarred by little ridges, many of which run more or less at right angles to each other. These were formerly little cracks and they have been filled with sand, etc.

Now, to understand this bit of rock structure you should visit a dam which has just dried up. You will see that the muddy surface is cracked. As the water in the mud evaporated, the mud shrank and contracted, and you can pick up the dried mud in little squares or triangular flakes. The sun dried the mud at the top and caused it to crack and peel off the lower mud. Away back in the Lower Carboniferous period, the sun blazed down on sandy muddy beds in shallow water where Hall's Gap is now located. The sun dried up the shallow water, and dried the sandy muddy bottom so that a thin top layer shrank and cracked just like a dried up dam.

That is how and why I know the sun shone brightly in Hall's Gap a couple of hundred million years ago.

Yours, etc., W.H.F.

CARNIVOROUS PLANTS

The Field Museum of Natural History of Chicago issues from time to time leaflets—really pamphlets—usually of local but sometimes of general interest. The latest, No. 23, is devoted to "Carnivorous Plants and the Man-eating Trees," by Sophia Prior, and, inasmuch as it includes some Australian species, has a special interest for us. These extraordinary plants, which have acquired the ability to ensnare and digest the bodies of living things, are confined to five families, and are, strictly speaking, insectivorous, although the illustration representing a small frog clutched by a leaf of the Venus Fly-trap (*Dionaea muscipula*), which it would surely be unable to digest, almost justifies the other term.

In the *Droseraceae*, of five genera numbering about a century of species, about ninety belong to the genus *Drosera*, nearly half being Australian, and the great majority in the West. The leaves are set with sensitive glandular tentacles secreting a sticky fluid, which retains intruding insects which are further held by the bending tentacles. Only in the case of the *Dionaea* of California are the leaves themselves active, for on each half of these are three long trigger-hairs which when touched cause the two halves of the toothed leaves to come together, tightly holding the insect.

The largest of the five families, the *Lentibulariaceae*, with six genera and 250 species, includes the *Utricularia*, or Bladderworts, numbering 210. In these the death-traps are minute bladders provided with irritable and entangling hairs around the mouth. The bladders are contracted in the resting stage, but when any insect comes in contact with the hairs at the opening the bladders expand and the victims are literally sucked in.

Of the pitcher plants our only representative, *Cephalotus follicularis*, Lab., has the lower leaves of the rosette forming the pitchers, while the upper are flat and green. The entire leaf forms the pitcher in the American family of the *Sarracenaceae* (nine species), but only part of the leaf in the larger family of the *Nepenthaceae* with the single genus *Nepenthes*. Perhaps half the latter are Bornean, and in some the pitchers are of monstrous size. In *Nepenthes rajah* the mouths of some are said to be twelve inches across, and to hold as much as seven pints of water, in which small animals and birds may drown.

The existence of Man-eating Trees in Madagascar, Guiana, Mexico, Nicaragua and Mindiao is believed only by the superstitious natives of those places, or the credulous and imaginative traveller.

A copy of Johan Mauritson's "Contributions to the Embryology of the Orders Rosales and Myrtales" has been sent to the Club by the author, with his best thanks for all the help given him by our members. Dr. Mauritson spent six months in Australia in 1936, and the colossal and well-nigh hopeless task he and other embryologists are engaged in will eventually lead to a more correct taxonomic arrangement of the members of the plant world.

Incidentally, it may be mentioned that he considers the family *Saxifragaceae* "heterogeneous from many points of view," and "a dumping-ground for a number of genera which cannot be safely placed for certain," and that our well-known and attractive *Baurax* could well be removed from it and placed in the *Camoniaceae*.

Mr. Frederick Chapman, an old member of the Victorian Field Naturalists' Club, is to be congratulated on his appointment as an Honorary Member of the Royal Society of New South Wales in recognition of his services to geological science and his valuable researches in palaeontology. Mr. Chapman was awarded the Clarke Medal by the same society in 1932.

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PROCEEDINGS

The monthly meeting of the Club was held at the Royal Society's Hall on Monday, August 14, 1939, at 8 p.m. The President, Mr. A. S. Chalk, presided, and about eighty members and friends attended.

The President referred to the death of Mr. J. E. Dixon, one of the Foundation Members of the Club, and all present stood in silence as a mark of respect. Messrs. Geo. Coghill and Chas. French spoke of Mr. Dixon's work in the early days of the Club, and stated that he was one of the best field entomologists the Club had ever had. It was reported that Mr. Dixon's collection had gone to the National Museum.

SUBJECT FOR THE EVENING

As arranged, this was a lecture on "The Vegetable Food of the Australian Aboriginal," given by Mr. C. N. Hyam. The speaker mentioned that something like 300 species of plants were in use as food by the various tribes over Australia, and some of these had quite a complicated preparation owing to toxic properties present. Further, the native tribes had knowledge of the medicinal value of some of these plants, and used them to this end.

Several questions were asked by members on matters mentioned by Mr. Hyam, and after these were answered, the thanks of the Club were extended to the lecturer.

REPORTS OF EXCURSIONS

Reports of Excursions were given as follows:—Mr. Evelyn Mr. A. C. Frostick; National Museum (in place of Melbourne University), Mr. F. S. Colliver.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as Ordinary Members: Miss Mollie Elder, Mr. R. Bury, and Mr. A. Stone; and as Associate Member, Miss B. Stone.

QUESTIONS BY MEMBERS

A question regarding the difference between lampreys and eels was answered by Mr. P. Crosbie Morrison. It was stated that the lamprey was a lower type than the true fish group to which the

eel belonged. The lamprey has no separate jaws, but has chitinous teeth all around the open mouth. By means of these teeth it attaches itself to some other fish and with other teeth on its tongue it rasps away at the flesh of its host to such an extent that the head is often completely buried in the flesh.

GENERAL BUSINESS

Mr. A. H. Chisholm, Editor of *The Naturalist*, invited members to contribute articles or notes to the Journal.

Mr. Chisholm extended an invitation to Club Members to attend the R.A.O.U. Camp at Leeton, New South Wales.

Mr. Chisholm stated that Sir Stanley Argyle was introducing a Bill to amend the Fauna and Flora Protection Act, and moved that letters be sent to the Premier and Sir Stanley Argyle suggesting that this Club be consulted before any such legislation was enacted. The motion was seconded by Mr. G. N. Hyam, and carried.

EXHIBITS

Mrs. M. E. Freame:—Marine Shell (*Salinator fragilis*), and egg girdles.

Mr. V. H. Miller:—Aboriginal grinding mill.

Mr. S. R. Mitchell:—Aboriginal mills, nardoo stone, and samples of vegetable food.

Mr. G. N. Hyam:—Various vegetable samples to illustrate the lecture.

Mr. H. P. Dickins:—Greenhood orchids (*P. grandiflora* and *P. nutans*) from bush fire areas.

Mr. A. A. Baker:—Silurian trilobites (*Dalmanites meridianus*) from the Kinglake district.

Mr. F. A. Salau:—*Eriostemon obovatus*, double form and garden grown.

Mr. L. W. Cooper:—Scoria and tuff from Red Rock.

Mr. H. T. Reeves:—Lichens.

Mr. F. Chapman:—Cretaceous sea urchin in flint, collected from the foundations of the Victoria and Albert Museum, London.

Mr. F. S. Collyver:—Palaeolithic stone axes from Dorset, England; also honey-pot ants and cycad seeds from Central Australia.

An addition has been made to the list of Australian lizards by Hobart M. Smith's description in the Zoological Series of the Field Museum of Natural History (U.S.A.), Vol. 24, No. 3, of *Egernia carinata* from Toolbrunup, Western Australia. This is a scincoid form, one of a family common to all the continents and popularly known as "skinks." The previously inadequately described *Hemiergis initiale*, Werner, also from the same locality, is more fully dealt with in the paper.

WINTER RAMBLINGS BEHIND BARRINGTON TOPS

By THE REV. H. M. R. RUFF, Sydney

In June of the present year I spent a fortnight on the Upper Hunter at the back of the Barrington Tops, New South Wales. The time of the year was unfavourable for botanising, and in any case, the Upper Hunter district is well stocked with sheep and cattle; nevertheless I found the native flora very interesting.

The area consists mainly of rough mountainous country, between Barrington Tops and the Liverpool Range. Soil erosion is terribly in evidence, and some of the hills have been reduced to barrenness which seems past recovery. In past years ring-barking has been recklessly carried out, with no regard whatever to its probable effects. I did not take a camera, or I could have brought back striking pictures of sheet and gully erosion.

Although the Barrington plateau is not more than ten miles in a direct line from Belmont station, where I was staying, the vegetation along the Hunter Valley is very different, and it was difficult to believe one was so close to the dense rain-forests on the southern Barrington slopes. The Upper Hunter flora has little in common with that of the coastal area, and is far more like that of the western slopes of the Dividing Range. There is no trace of anything approaching brush forest.

High up on some of the rocky bluffs are a few plants reminding one of the coastal area—e.g. *Vitis Baudimiana* (a native grape), and *Pittosporum undulatum*. On one occasion my son-in-law, Mr. A. C. Cox, manager of Belmont, took me up to the head of Oaky Creek, and in the rocky gorge at the top these two plants were in abundance. It was good to see many fine kurrajongs (*Brachychiton populneum*) flourishing there. Mistletoes, however, are taking heavy toll of the trees that still remain on these mountains. I was interested to notice the occurrence of *Notothixos subaurens*, a mistletoe that lives on, and destroys, other mistletoes—good luck to it!

Mr. Cox pointed out to me a small grove of cypress-pine high up behind Belmont homestead; upon investigation, I was surprised to find this to be *Callitris robusta*, a characteristic pine of the western plains. The Belmont grove must be nearly 3,000 feet up. But still more surprise was occasioned by a native oak which attracted my attention in this high country. It looked like the Swamp Oak (*Casuarina glauca*), but it was abundant in such dry places that I could not accept this. It proved to be *C. Lushmannii*, the "Bull Oak" of the western plains!

On Oaky Creek we found a tall, soft-leaved shrub which turns out to be an undescribed species of *Berlya*: it is shortly to be named and described by Mr. W. H. Blakely of the New South Wales National Herbarium.

I was very pleased to find many plants of the "Barrington Violet," a giant form of *V. betonicifolia*, which has excited the admiration of many visitors to Barrington Tops. An odd flower or two out of season proved its identity. This fine flower certainly merits a varietal name.

Ground-orchid plants were abundant all over the hill-country—chiefly *Pterostylis*. I was able to identify, from withered flowers and other features, *P. reflexa*, *P. revoluta*, *P. truncata*, and *P. curta*, while rosettes were common, probably belonging to *P. nutica* or *P. cynocephala*. *Acianthus reniformis*, with buds, was literally in myriads. *A. formicatus* was found flowering, and *A. exsertus* with withered flowers. Leaves of *Corysanthes* and *Eriochilus* were seen in several places. The only epiphyte was *Cymbidium canaliculatum*, at about 2,500 feet.

Near the track to Barrington Tops I noticed a few *Caladenia* leaves. I dug a tuber up, and after many vicissitudes, gave it a resting-place in a pot at my new Sydney home. It declined to rest, however, and has now produced a flower revealing its identity, to my delight, as *C. clavigera*—a species which I have never found in New South Wales before.

About 14 ferns were seen: none of them (not even the Bracken) abundant. They were the following: *Pteris tremula*, *Pteridium aquilinum*, *Histiopleris inciso*, *Aspidium aculeatum* (head of Oak Creek), *Asplenium flabellifolium*, *Pleurosorus rutifolius*, *Pellaea falcata*, *P. paradoxo*, *Notholaena Brownii*, *Cheilanthes tenuifolia*, *Adiantum aethiopicum*, *A. hispidulum*, *Doodia aspera*, and *D. coudata*.

NEW SPECIES OF EUCALYPTS

In the first number of "Contributions from the New South Wales National Herbarium" Mr. Blakely describes in *Eucalyptus crenulata* a species new and perhaps confined to Victoria. This is a scrubby tree up to 30 feet high, growing in swampy country near Buxton in the Acheron Valley, and also in similar marshy ground near Narbethong. Its bark apparently is smooth, thin, and leaden or grey-brown in colour; its orbicular to cordate-lanceolate, sessile, stem-clasping to shortly petiolate leaves are opposite and glaucous beneath, and the venation is rather obscure with the intramarginal vein distant from the crenulate margins. The buds have short pedicels, are ovoid and pointed or beaked, the fruits campanulate or somewhat ovate and the valves enclosed. The species is said to be most akin to *E. Krussona*, F.v.M. (of W.A.) and to *E. cordata*, Lab., which is endemic in Tasmania, differing from the latter in its smaller petiolate leaves and its much smaller buds and fruits which are up to nine in the umbels, those of *cordata* being in threes. Apparently the tree is ornamental, with its silvery foliage, and well worth growing in our gardens.

Mr. Blakely also describes *E. Burdettiana* and two new varieties of other Eucalypts from W.A., *E. Forthiana*, from Mookerai in N.S.W., and *Angophora dichromophloia* also from that State.

In the same issue there is a revision of Australian Festucas, with a key, by Joyce W. Vickery, M.Sc., and a list of the "Naturalised Flora of New South Wales," not including the grasses, by R. H. Anderson, M.A.G.S.C.

Plate V



FIELD NATURALISTS' CLUB PRESIDENTS — From left: Mr. R. H. Croll (1938-39) and Mr. A. S. Chalk (1939-7)

OUR TAME-WILD FRIENDS OF THE BUSH

By GRAEME THOM

[The writer of these notes, Mr. Graeme Thom, and his wife, were country members of the Field Naturalists' Club. Mr. Thom is a retired British naval officer who was badly wounded during the Great War. About twelve years ago, they sought quietness and peace, and eventually found it in the heart of the Australian Bush, amidst delightful surroundings at Kowat, in East Gippsland, a few miles from the New South Wales border. There they took up a selection in a delightful situation, bounded by the Camo River and by hills, gullies and jungle, far from any other human habitation; and there they built a comfortable home while preserving most of the natural Bush. They became keen naturalists and were closely interested in the preservation of native flora and fauna. It was through them that the Club was able to secure the reservation of a considerable strip of country on both sides of the Canberra Highway, as a permanent sanctuary. Mr. and Mrs. Thom policed this area with great assiduity, and also planted many native trees and shrubs. Unfortunately, ill-health made it imperative that they should return to England, and, rather than see their little Eden fall into unappreciative hands, they made over the property to another of our country members, Mr. W. Hunter, of Bairnsdale. These notes are from a letter to Mr. Hunter (dated 1938) giving him details of their bird friends and animal guests at "Dilkusha," as their home was called.—G. N. HYAM.]

We must tell you that, if you ever find on "Dilkusha" a native animal which does not move away when you approach, you can take it for certain that, if it is not actually tamed, it has at least become accustomed to the presence of my wife and self, and has a certain amount of trust in *Homo sapiens*. With this generality over, let me give you a list of our many friends in the animal kingdom, with a summary of their varied accomplishments and idiosyncrasies.

"Big Jock" is a male Kookaburra who has come morning and evening, during late autumn, winter and spring, for something like six years. My wife succeeded in getting him to take pieces of bacon-fat, rabbit's livers and kidneys, raw meat, lizards, mice, rats and small snakes from her hands. He can swallow a full-sized rat without much difficulty.

About five years ago, "Big Jock" was gradually persuaded to take similar food from my hand, but, just over four years ago, I was about six weeks in bed from war injuries, during which period I grew a beard. "Jock" did not at all approve of the beard, and refused to accept any further dainties from me when I got up, although he had fed from my hand for over a year previously. He has not forgotten about the beard to this day, and although he occasionally relents and accepts a tit-bit from me when he is particularly hungry, he still has doubts about the human being whose face was once covered with a grey-tinged ginger whisker.

It is an interesting fact that, at all times of the year, when a Wedge-tailed Eagle is soaring around, "Big Jock" immediately flies to the house fence, making a peculiar "danger" call and

looking intently up in the sky. Frequently, it takes me quite a few minutes, with binoculars, to find the Eagle, so high is it flying. On these occasions "Jock" will sometimes submit to being stroked lightly on the breast, but never otherwise will he suffer to be touched. He will come out of the bush whenever he is called to be fed, and he knows his name.

For two years past we have had a Blue Crane around the building, and this year she has become very tame, and we can regularly get within ten feet of her, often much nearer. In fact, my wife and I have taken photographs of her at about 8 feet. We call her "Connie." She spends a fair amount of time in the poultry-run with the fowls, which do not seem to mind her in the least; but "Connie" does not eat poultry food, merely searching for worms and grubs. She hardly moves out of our way when we are walking past where she is feeding in the grazing paddock. She seems to spend more time insect hunting in the paddock than fishing in the creek.

There are a pair of Grey Currawongs which live in the bush to the west of the house. The female, "Charlotte," or "Chattie" as she is more frequently called, will come into the kitchen door and eat pieces of cheese thrown on the kitchen floor. She will come within 30 inches or so to pick up such dainties, and, with a little trouble, could be trained to feed from the hand. "Chattie" has come for three winters to be fed.

You have seen our three White-backed Magpies, "Marmaduke," "Maggie" and "Squeaker," the last-named, this year's female chick. Poor old "Maggie" is feeling the weight of years; she, with "Marnie," has been here since before we came, ten years ago. "Maggie" has a damaged foot—mayhap from a rabbit-trap or from a shot—and does not trust humanity very much; but "Marmie" comes as far as the back door-step for pieces of cheese. All their chicks have been tame, this year's one, "Squeaker," especially so. "Squawker," a female, comes right into the kitchen, and flies up on to my wife's lap or my knee for cheese.

Studying these two parent Magpies has shown us the appalling mortality amongst bird-life. In 10½ years they have reared only five young ones. When the chicks are tiny they are taken by Kookaburras, and when they are larger, but still unable to fly, by Wedge-tailed Eagles. They seem to be more or less safe once they have left the nest.

Possibly our hardest birds to handle, but at the same time our most interesting ones to study, are a pair of Spur-winged Plovers, which have nested here every year for five years. They are about all the year except between March and June, when they seem to have an annual "walk-about." In a grazing paddock it is very easy to find their nest, and we have done so for five years,

using the binoculars to watch the broody female settle and run on to her eggs.

While "Mr. and Mrs. Tod Sloane" (as we call the Spur-wings) have become accustomed to us, at nidification they are just the whole Plover family—they practise all sorts of tricks, such as limping, pretending to have a broken wing, or diving at one from the air, sometimes actually touching one's headgear. We are always able to handle the young ones, however, as if one is patient one can locate the chicks by binoculars from a distance, and observe where they squat when the parents give the danger call. We observed that the function of the parent birds is that of guardian only, and that young Plovers "scran" their own food from hatching. The eggs are generally four—we once observed three, and once five—and are laid at 24 hours intervals, in the afternoon. The incubation period is exactly 28 days, and the young ones are 49 to 50 days old when they first fly.

The mortality and wastage among Plovers is ghastly. Last year our pair had four nests between July and October, and in all laid 17 eggs, three 4's and a 5. Crows, Kookaburras, and possibly snakes, accounted for thirteen eggs, and four chicks resulted from the last setting. Even then, one of the eggs was thick-shelled, and the chick would not have hatched out had I not used a nail-file to aid nature. After a few days only two chicks were to be seen. These grew to maturity, and left with the parents in March for the annual "walk-about."

We have observed that if sheep or other animals tread on a nest and break only one of the eggs, the Spur-winged Plovers immediately abandon nest and eggs, and commence afresh.

One of last year's chicks had been flying for a week or so when it flew on to a barbed wire fence and impaled a wing at the joint. It apparently had been impaled for a little time as the wound was beginning to be fly-blown. We removed the Plover and took it up to the house, where I held it while my wife removed the tiny maggots with forceps, disinfecting the wound and afterwards patching up the damage with court plaster. Knowing the bird's feeding habits, we released it immediately to enable it to find its own food. Within about $3\frac{1}{2}$ days it was on the wing again.

You have often seen "Fifi," "Fatty" and "Garbo," our tame Grey Thrushes, although the latter appears to suffer from the "I-want-to-be-alone" complex, and does not regularly come to be fed. "Fifi" has been a "boarder" for over five years, and "Fatty" and "Garbo" for four. "Fifi" and "Fatty" feed out of our hands, and "Fifi" takes a small piece of cheese from between my lips when I hold the back of my hand on my chin. The latter trick "Fifi" will not do for my wife—apparently because my wife wears

spectacles. The "open sesame" to a Thrush's heart—as with many other birds—is cheese.

The senior "boarder" amongst our birds is "Bluey," the superb Blue Wren. He has been a delightful little guest for eight years now, and has introduced wife, family, grandchildren, and many times great grandchildren to the ever-open kitchen back-door—the lure again being grated cheese! At present, we feed about two dozen of "Bluey's" progeny, probably twenty times a day! They come from all directions when I call to them. Five only of them eat grated cheese out of the hand, but all of them will eat it off my boot toe. If the Wrens are not promptly fed in the morning, when they first come, they treat my wife to a chorus of avian "bad language," which soon causes amends to be made for her neglect!

Three Yellow-tailed Thornbills have come for grated cheese for about the same length of time as "Bluey" (eight years), but they do not come so regularly. They also eat grated cheese off our shoes, but not out of our hands. While the Blue Wrens fly right into the house and on to the kitchen table (as also do "Squawker," "Fifi," and "Chattie"), the Thornbills only come as far inside as the door-mat.

Every year, about August, when the seeds are getting scarce, we feed about a baker's dozen of Firetails (Waxbills) with grated cheese. They are pugnacious little fellows and fight amongst themselves, just as the Blue Wrens do. The Firetails will come on to the back door-mat, but not inside the house unless they are scared by the arrival of, say, a Thrush, when they fly inside and get very excited until put out.

About the end of July, for the past three years, a pair of Jacky Winters (Restless Flycatchers) come to be fed—again on cheese—and remain until spring.

Now and again "Abie" and "Sidi," a pair of black-and-white Mudlarks, come to the back-door with the Magpies, and, very occasionally, will take a little cheese; but their natural food seems to be closely akin to that of the Spur-winged Plovers, i.e. snails, etc.

In the adjoining Bush, we have a pair of young Grey Kangaroos, "Joe" and "Jean," who were orphaned two years ago. We had got the confidence of their mothers when "Joe" and "Jean" were still in the pouch. A passing Orbost lorry-driver shot "Joe's" mother and left her to die by the roadside; and, within a fortnight, a tourist ran down and killed "Jean's" mother with his car. The two young ones were very forlorn for a long time, and I conceived the idea of imitating the kangaroo grunt, and getting close enough to catch them to keep for pets. Fortunately, I did not succeed in catching either, but the wee things got to know both my wife

and myself, and ever since have allowed us to come as close as six feet. I have taken many people as close as ten feet. They have absolutely no fear of us, and I have an excellent series of photographs of both "Joe" and "Jean" lying sunning themselves on the path down to the creek. They also seem to know their names.

Three years ago, we had an eel, "Egbert," and some perch and trout in a rocky pool in the creek. They came to the edge of the pool for worms and grubs after a bit of patient feeding. All of them, and especially the eel, seem to have as much intelligence as some of the birds have. "Egbert" and Co., unfortunately, failed to survive the visit of some shags, which terminated what was, to me, one of the most interesting episodes in nature study I have ever had.

When we were having tea the other afternoon, "Percy," the pink-bellied black lizard, waddled in at the back door and betook himself along the kitchen wall, over the wood-box, and into his comfortable quarters behind the kitchen stove. "Percy" is my wife's accomplishment; she taught him to eat grated cheese. He will come in answer to a low chucking noise if he is not replete.

"Dora" and "Dave" are Gippsland Water Dragons, who live near the big rock when the *Adiantum formosum* has been established on the creek bank. "Dave" is rather a fine specimen, with the bigger and rougher head of his sex, and with the yellow sex colouration on his neck. "Dora" is about 22 inches long; "Dave" is about 25 or 26 inches. They are becoming tamer and tamer each year, and my wife has succeeded in establishing friendly contact, so that, now, either of us can walk within three feet of either Dragon, provided that we move slowly and deliberately. I have never succeeded in getting either "Dave" or "Dora" to take any food of any kind.

Each of these Dragons has been caught in the wire-netting at various times, and we have had to release them. They get their heads and fore-legs through, but the splay of their hind-legs causes them to jamb there, and they do not seem able to "go into reverse gear" and to extricate themselves. Our experience is that they do not attempt to bite. As a matter of fact, the last time "Dave" got so entangled, he wriggled to attract my attention, and actually seemed to look to me to extricate him! After I had worked him loose, he just went about four or five feet away, cocked his head on one side, and looked up at me with an expression that seemed to say, "Thanks very much, Old Bean!"

My wife has tamed a number of bronze lizards, but we seldom have them for more than a couple of months, at most, before a Kookaburra seems to get them.

Two or three years ago my wife tamed a little water lizard, which she called "Lennie." He is shaped somewhat similarly

to the Gippsland Water Dragon, but is only about $7\frac{1}{2}$ to 8 inches long, with brownish-grey reticulations, and an erect head; he runs very fast. In hot weather we often sit by the creek in the shade of the kanooka trees where the tangle orchid grows. This is "Lennie's" domain. We only see him in the very hot weather, when the March flies are troublesome. He runs up the leg of my trousers and will take flies or pieces of cheese out of my hand, and he will run up my wife's stocking and on to her lap for similar dainties. During the last two summers, when we went to sit under the kanookas he has come at once to be fed, without hesitation—which seems to indicate that "Lennie's" kind have a capacity for memory.

For about nine years we have watched a pair of goannas, "George," a 7-ft. sooty black male, and "Mary," a 5 ft. 9 in. speckled female, with yellowish band markings. They are not tame, but they will take pieces of raw (and preferably "high") meat thrown to them from about twelve feet or so. In fact, they will look now for something to be thrown to them, and will come down a tree to get such tit-bits, but only provided that we are about twelve feet away.

Lastly, and with sorrow, I must mention "Sandy," a beautiful big red-bellied black snake, whose headquarters are in the rocks by the creek. He is the largest but one of the black snakes I have seen around here—he must be at least seven feet long, and thicker than my wrist. We call him "Sandy," but he may actually be "Alexandrina" for all I know. He is very quiet and inoffensive, and will let me pass within a yard of his head. He has been here for about ten summers, and has had some narrow squeaks from visitors and passers-by, who are unaware that he is a member of the Thom family!

"Sandy" is rather partial to a paste of sugar, butter and flour done into small balls, but will only accept my hospitality at a range of a yard or over. I can stroke him along the back with a leaf of the Tasman flax-lily, or with a very thin branch of the slender tea-tree, but only if the stroking is done from the head towards the tail, not otherwise. It must not be done too near the head, either. To see "Sandy" lying basking on a lichen-covered granite rock on a sunny day, just after he has moulted his skin, would surely convert the most hardened herpetophobe! In my eyes he is beauty and grace personified.

* * *

Thus ends my task. I cannot write how much my wife and I feel at leaving our little home in the Bush, where we have spent ten and a half idyllic years with all our animal friends. But we hope to come back and see them before many years have

passed. Meanwhile, our thoughts will often return to the little botanical and zoological paradise we have left behind us.

To make an adaptation from Byron's "Clilde Harold":

*Farewell a while to Thom and Thee,
Dear Austral friends, Good-night.*

[Readers will agree that the foregoing article, apart from its interest as natural history, is a striking example of what may be accomplished by kindness—coupled with judicious offerings of food—among creatures of the wild. Mr. and Mrs. Thom's success among birds rivals that of the late Harry Wolstenholme, who, by the use of grated cheese, caused four species of wild birds to feed from his hand and four other species to take food at his feet or catch it in the air; moreover, he listed in all 45 species of birds that drank from a vessel beneath a tap near his back door—all this in Wahroonga, a suburb of Sydney. But Mr. and Mrs. Thom have gone further; they have tamed mammals, fish, lizards, and even a snake. It is a pretty record, and members of the Field Naturalists' Club will join in congratulating our English friends, wishing them well, and hoping to welcome them back to the Land of the Sun. One or two notes may be added: Free Kookaburras and Magpies have been tamed fairly frequently, and Grey Thrushes, Blue Wrens, and Jacky Winters were among Mr. Wolstenholme's guests; but there do not appear to be any previous records of the taming of a Blue Crane, Spur-winged Plover, Grey Currawongs, and Yellow-tailed Thornbills. Jacky Winter, by the way, is not the Restless Flycatcher, but the Brown Flycatcher; "Jacky" is a matey fellow, and very fond of cheese (which he will catch in mid-air), but his "Restless" cousin (sometimes called the "Scissors-grinder") is an aloof bird. Not the least interesting of Mr. Thom's notes is the statement that young Magpies are sometimes taken by Wedge-tailed Eagles. It is unlikely that the Wedge-tail ever takes a bird on the wing, and it was thought to be almost equally unlikely that it ever took birds from a nest.—EDITOR.]

"AN AUSTRALIAN BIRD BOOK"

Somewhere about thirty years ago a Victorian country school teacher who had become an inspector realized the need for a cheap guide to native birds, and issued a sixpenny booklet as a Descriptive List of the Birds of Victoria. The welcome accorded that small production was encouraging, and a few years later there was compiled and published, by arrangement with the Education Department, a much more ambitious work—a volume entitled *An Australian Bird Book*, which, containing a descriptive list, a "lecture," and many coloured and half-tone figures, served as a general guide to the birds of the continent.

Now, several years after the death of its author, Dr. J. A. Leach, the *Australian Bird Book* has appeared in a new (eighth) and revised edition. It is in some sense a memorial to Leach, and as such, and because of its merits, it is very welcome. Whether or not the publishers (Whitcombe and Tombs) are justified in claiming that it is "still the leader with the bird-lovers of Australia," the fact remains that Leach's book is, as it always has been, a highly useful guide. It was very helpful to present-day ornithologists in their apprentice period twenty years or so ago, and is apt to be equally helpful to young people of to-day.

This new edition is the best of the series, since it gives the "lecture" in larger type and in a separate section, includes a number of good illustrations from photographs, and carries also a biographical notice by Charles Barrett. Mr. Barrett's sketch is sympathetic, but some of the points he makes are open to argument. The book itself would have been further improved had some minor errors and inadequacies been adjusted.

AUSTRALIAN STAG BEETLES

By F. ERASMUS WILSON

Stag beetle is a popular name applied to members of the family *Lucanidae*, and owes its origin to the fact that in many species the greatly developed mandibles of the male are furnished with salient prominences resembling somewhat the antlers of a stag. This development is particularly noticeable in members of the exotic genera *Lucanus*, *Hexarthrus*, and *Cladognathus*.

The family is world-wide in distribution, but seems to reach its greatest development in Eastern Asia and the East Indies, and some of its representatives are amongst the giants of the beetle world. Australia has a fair representation of stag beetles, some seventy or so species being found here. Many of our species are comparatively small in size, but what we lack in that respect, is more than compensated for by the possession of undoubtedly the most beautiful *Lucania* in the world; the glorious *Phalacrognathus muelleri*, of North Queensland. A splendid coloured figure of this beetle, together with notes upon it, was privately published in 1886 by P. Dattari, an early member of the Field Naturalists' Club, and distributed to members. This publication is very rare nowadays, and I much treasure the copy in my possession.

It was the late F. P. Dodd, of Kuranda, who discovered the breeding habits of *P. muelleri*, and many overseas museums and collections obtained their specimens from him. The three examples in my own collection were a present from that grand old naturalist. Only odd examples had been taken until Dodd found that the breeding location was in old logs of the red Cedar Tree. The Melbourne Museum has a fine specimen of the very rare black form of this beetle.

The genus *Lamprima* contains some gorgeously coloured beetles, the predominating colours being green, blue bronze, copper and shades of gold. Being plentiful and widely distributed throughout Australia and Tasmania, they are the best known of our local *Lucanidae*. Although not often seen on the wing, they are frequently met with when old timber is being broken up. I once took 65 beautiful specimens, out of a log of paper-bark tea-tree, about six inches in diameter, and three feet in length. In some species of this genus considerable colour variation is not infrequent; some examples are rich golden copper, others metallic blue, and some almost black. The brilliant-coloured species seem to be confined to the eastern side of the continent, and Tasmania, the drier parts like the Mallee, South Australia and Western Australia, producing coppery bronze species. The dull-coloured *virians* is found in western Victoria and South Australia, and

micardi is a denizen of Western Australia. *Varians* occasionally produces a bluish variety, but I have not seen a similar variety of *micardi*.

It is interesting to note that one species of this genus is found in the isolated little Lord Howe Island; this species being known as *insularis*.

As is pretty generally the rule with all *Lucanids*, the mandibles of the male are much more developed than in the female. In North Queensland is found a handsome species, *Mandibularis*, and because of an enormous mandibular development, a separate genus, *Neolanprina*, was founded for its reception. However, the new genus was uncalled for, as this species is a typical *Lanprina*, and many examples may be taken with quite small jaws. Another species, *adolphinae*, occurs in Papua; it is not as handsome as our species, but is one in which similar great development often takes place.

One of our largest genera is *Lissotes*, of which no fewer than fifteen species are found in Tasmania, whilst three are known from Victoria. All are dowdy-looking beetles, and rarely exceed about $\frac{1}{2}$ inch in length. They are mostly found under rotten logs, and some species are very common indeed in Tasmania. Our sister Dominion, New Zealand, also has several species of *Lissotes*, some of them being much more attractive-looking insects than ours.

One of our rarest stag beetles is *Hoplognus simsoni*, which was described by Major Parry. It is a black insect, the male of which is about an inch in length. Amongst the *Lucanids* it is rather remarkable in possessing armed shoulders, each shoulder being furnished with a sharp, upright spine. The late Aug. Simson, a well-known Tasmanian entomologist, once took about twenty examples. Only once previously had a few examples been taken, and, as far as I know, none has ever been taken since. The fine pair in my collection were captured by Simson.

The genus *Lissopterus* contains three fine specimens, one of which, *Howittanus*, may often be met with in the Warburton district. I have bred this species from a larva found under a rotten log on Mount Ben Cairn. When walking from Donna Buang to Warburton, the American entomologist, Dr. Darlington, and I found several examples of this beetle crawling about on the road. Another species, *tetrops*, is confined to the Barrington Plateau, in New South Wales, but is not met with until one reaches the zone of *Nothofagus* trees, at an altitude of about 4,000 feet. To obtain our examples we had to turn over very big logs, as the smaller ones seemed to have no attraction for them. The third species, *hopsoni*, favours this locality, and also at Dorrigo, but on my visits there I was not fortunate enough to capture specimens.

The fine genus, *Rhyssonotus*, has four representations, three of which are found in this State. A broad flattened species is *jugularis*, which has been taken in numbers at Mt. Macedon by our fellow-member, Mr. H. W. Davey, in January and late December. Another species, *parallelus*, equally flat, but narrower than the preceding, occurs in the Victorian Alps. The handsome species, *nebulosus*, fresh examples of which are beautifully mottled in appearance, is rather rare in Victoria. Mr. J. Clark and I took a fine example under a huge log at Gellibrand, in the Otway Forest, and on another occasion I found a dead one at Millgrove. Mr. H. J. Carter described a highly-glossed species under the name *politus*; this also is an inhabitant of the Barrington Plateau, New South Wales.

We have only one representative of the genus *Eurytrachus* in Australia, it having been described, under the name *arfakianus*, by Lansberge. This genus contains many fine big species, and its distribution ranges through New Guinea and the East Indies as far east as the Himalayas, and north into Japan.

Another genus which we share with New Zealand is *Ceratognathus*. All its representatives are small beetles, either black or brown, and some of them being amongst our rarest *Lucanidae*. I have taken four species in Victoria, including *ocularis*, a recently-described species from New South Wales. This I got under the bark of an old log at Bendoc, in far eastern Gippsland.

One of the commonest Victorian *Lucanidae* is the little brown, highly-sculptured *Syndesmus cornutus*, the male of which has a strange triangular tooth on the upper surface of its mandibles. It is also common in Tasmania, and ranges north into Queensland, where I have taken it at Stanthorpe.

Perhaps our most interesting species is *Eucartia floralis*, remarkable from the fact that it visits flowers of one of the *Hakeas* growing on the Barrington Plateau. It was first taken at Dorrigo by the late Dr. Tillyard and W. Heron. The late John Hopson made the interesting discovery that it was a flower frequenter.

We have also several *Lucanids* of the genus *Figulus*, all black or brown, and all resembling small editions of the allied family, *Passalidae*.

Other Indo-Malayan genera that impinge into Australia are *Hegeus*, with two species; *Cladognathus*, also with two; and *Dorcus*—although I am not too sure as to the distinction if any, between *Dorcus* and *Eurytrachus*.

Finally, we cannot dismiss the subject of *Lucanidae* without mentioning the monotypic genus, *Cacostomus*. The single species, *Squamosus*, is a brown insect, thickly speckled with greyish squamula. I met with it when collecting in the Palmwoods district, about 70 miles north of Brisbane.

THE ABORIGINES OF AUSTRALIA*

By JAMES BROWNE, Toronto, Canada

(Continued)

On the approach of winter, the tribes draw off from the coast into the interior of the country, where, encamped in the depth of the forest, they lie sheltered from the severe storms with which the Australian shores are then visited. The fact of the kangaroo, their principal source of sustenance, also seeking the shelter of the interior at this season, has, of course, great influence in attracting them from the coast.

When hunting individually, which is the ordinary method, the hunter sallies forth alone, without even a dog, and armed with only one or two spears and his wamera. He is not long in coming upon the track of the game he is seeking. This he follows up sometimes for miles, with a sharpness of vision and noiselessness of movement which to the white observer is extraordinary; but he is now gaining on the prize, and symptoms of its close vicinity are evident; with breathless caution and with spear poised, he gradually advances upon his victim, taking advantage of every stump or bush to cover his approach; at length, a glimpse of the game is gained, which may be quietly grazing, or perchance enjoying a siesta under cover of some thicket, unconscious of danger; a sharp and whizzing sound in the air is all the notice it gets, and the next moment it lies transfixed with the spear.

On my first landing amongst the savages of Australia, on the beach of Albany, I observed that some of the men had small bones, or pieces of wood, passed through a hole in the cartilage of the nose. These, I afterwards learned, were persons of some consideration in the tribe, men of distinction, who sported this conspicuous badge with no small degree of ostentation. The hole is pierced through the nose when the individual is young, and for the following purpose.

The tribe wish to communicate with the neighbouring tribes on some particular subject, or to send a complimentary message of peace and goodwill to those around them. The chosen messenger is a boy between twelve and fifteen years of age; but before starting on his embassy, it is necessary that the individual thus honoured undergo the operation of having his nose bored. This is performed with a small bone of the kangaroo, sharpened and made almost red hot, which being forced through the cartilage just below the nostrils, is there allowed to remain until the wound heals. But in the meantime the boy proceeds on his mission, and as long as the wound remains unhealed, his person

*Read before the Canadian Institute, February 16, 1856, and published in the *Nautical Magazine and Naval Chronicle* for 1856.

is held sacred, and he is treated with the greatest friendship and respect wherever he makes his appearance.

In speaking of ornamentation, I have to mention another and no less barbarous method of the Australians for beautifying their persons. I allude to the custom amongst the men of lacerating their bodies in order to produce long welts or protrusions of the skin. This is done with a sharp stone or flint, and the incisions are made on the breast, shoulders, and upper part of the arms; they vary in length and thickness, some being about an inch long and raised the thickness of a straw, others perhaps three inches in length and as thick as one's finger. The operation to produce these marks consists simply of cutting the part quickly but slightly with the sharp point of the stone; the blood is allowed to dry on the wound, but the welts soon appear, and never diminish in size through life.

From the scantiness of an Australian's wardrobe, he is prevented from exhibiting his taste or expending his vanity in a variety of costume, he consequently falls back to the one course left open to him, that of painting his body and decorating his head. The greater part of the time he devotes to his toilet is altogether taken up in plastering his uncut hair with a thick cement made of red ochre and grease. A diversity of style is adopted in its dressing; some have the head covered with quantities of small and shining red ringlets, some have it bound around with cord, and then covered with a solid mass of stiff and clay-like pomatum, giving the head quite an Asiatic appearance; this is generally surmounted by a bunch of feathers from the emu or cockatoo, or by the tail of the wild dog, and sometimes encircled with a wreath of flowers. Others, again, have innumerable small lumps of clay appended to the ends of the hair, which keep up a rattling accompaniment to the movements of the wearer.

But of all outward adornments the beard is the one most coveted and prized. Nor is it merely as an adornment to the outward man that a beard is so much an object of solicitude; there are also certain rights attached to it, not the least important of which is, that no man can get married until in the possession of one, nor is he allowed to kill an emu. In their combats, too, no inconsiderable part is assigned to the beard in producing an effect, and it is next to impossible to make an impression in an affair of this kind without such an accompaniment.

The dress of the female, like that of the men, consists solely of a kangaroo skin cloak; but to this is added a large bag, made of the same material, and which hangs at the back by a strap crossing the shoulders. In this bag is generally deposited the smallest child, along with any other portable articles it can hold. For the purpose of digging up roots, upon which they in

great measure subsist, the women are armed with a long stout stick, formed into a blunt point at one end.

There is nothing like a marriage ceremony in any case, a simple bestowal on the part of the girl's father, or other guardian, concludes the transaction. As soon as a female child is born, nay, sometimes for years before that event, she is promised to some one of the tribe, without reference to his age, although his years may exceed those of her own father. She remains with her parents until old enough to be able, in some manner, to shift for herself, when she is transferred to the care of her future husband, under whose protection she is then brought up. But as this, in most cases, is too long a process to go through, the method usually adopted by the Australian native to obtain wives is that of seizing the first favourable opportunity of running off with those of another. It is absolutely necessary to the Australian that the stock of wives on hand should always be considerable, as the whole domestic labour devolves on them, and consequently on their number depend the comforts of his wigwam and fire.

Their affections for their offspring is strikingly evident on all occasions, and it is sometimes painful to hear the wailings of the bereaved mother as through the long night she sorrows over the loss of her infant. The reverse, however, is the case in those general melees which so often disturb the peace of the encampment, and they are not slow in entering into the spirit of the affair, raising their voices to vindicate the honour of their belligerent spouses.

The extent of the knowledge of the arts and sciences existing amongst the Australians may be gauged by their weapons and implements. These are the spear, the wamera or throwing stick, and the kilee or boomerang: a stone hammer or tomahawk, a short and heavy club or stick, and a rude description of stone-edged knife.

The spear is merely a straight rod some nine feet in length, as thick as an ordinary walking-stick, rather smaller at one end than the other. The sharp and needle-like point, at the heaviest end, is hardened in the fire. Rather more than an inch from the point of some is fixed a neat wooden barb of about two inches in length. Others again have small and sharp pieces of quartz, fastened in gum, extending some six or eight inches from the point.

The spear is thrown by means of the wamera or throwing-stick, which is a flat piece of wood hardly thicker than the cover of a book, some two feet in length, about four inches in breadth in the centre, and gradually decreasing in width, and running to a point at either extremity. At the end held in the hand is a lump of hard resinous substance, obtained from the grass-tree, which

prevents the wamera slipping from the grasp when throwing from it the spear; at the other point is fixed a little piece of stick, about an inch in length, forming a sort of hook, and which fits into a shallow hole at the small end of the spear. When fixed for throwing, the spear runs along the length of the wamera, and passes through the fore-finger and thumb, which, from the manner in which the wamera is held, are left free for that purpose. The spear is therefore hurled from the wamera somewhat on the same principle as a stone from a sling, and is sent with much greater force than if merely thrown from the hand. In the use of these weapons the natives exhibit surprising dexterity.

The wamera never leaves the hand of the native; when his spears are exhausted he makes use of it in close combat, as a sword or battle-axe, and its sharp and hard edges lay open gashes in the heads of the combatants hardly less severe than those produced by the sabre of a heavy dragoon.

But of all weapons, the Australian kilec or boomerang is the most wonderful. Its form is nearly that of a crescent. It is made from the crooked limb of a tree curved naturally in the form required—this is nicely scraped down, and made flat on one side and slightly convex on the other; its size is about fifteen inches from point to point, and nearly two inches in width. Its course through the air is eccentric and very varied, greatly depending upon the skill with which it is thrown.

Some have more command over the weapon than others, and an experienced thrower can almost make it take any direction he may please. He will throw it with all his force against the ground, some ten or twelve feet in front of him, when it will rebound, and taking a circular course, will fall at an immense distance to his right or left. Again, he will dash it to the earth in the same manner, and it will ascend from it with the speed of an arrow, until almost out of sight, when, remaining poised some instants in the air, it will return with fearful velocity and fall probably some distance behind the thrower.

The boomerang is the most dangerous weapon used by the Australian. Its course through the air is so swift that it is with difficulty one can follow it with the eye, and its ever varying movements render it nearly impossible to get out of its way; it is the only weapon that the natives themselves find a difficulty in avoiding; those who fancy themselves quite safe, and clear of its manoeuvres, are not unfrequently the ones hit, and it is no unusual thing to see the native, from whose hands the weapon has sped, obliged to throw himself on the ground to avoid being struck by it on its return.

The quickness of vision and dexterity exhibited by the Australian savage in avoiding the different weapons, are truly astonishing.

This is particularly the case as regards the spear; so much so, indeed, that it seldom occurs that one is struck by it, if he be at all prepared for the assault. Five or six spears will be thrown at a man in rapid succession, and without moving from the spot, he will escape them all by a slight bend of the body. From his childhood, practising with the spear and boomerang is the principal pastime of the Australian, and for hours together mere infants may be seen amusing themselves by throwing their tiny weapons at each other.

AUSTRALIA'S PITCHER PLANTS

There is a slight error in the article on pitcher plants (*Victorian Naturalist*, August, 1939), wherein it is stated that "Of the pitcher plants our only representative, *Cephalotus follicularis*," etc. F. M. Bailey, in Vol. 4 of *The Queensland Flora*, lists eight species of *Nepenthes*, and I believe others have been discovered in the thirty-seven years since that volume was published. Herewith the Key used in Bailey's work:

Stems long, climbing.—Pitchers inflated below the middle 3" to 6" long, green; anterior ribs without any crest; stalk with a curl in the centre. 1.—*N. Kennedyi*.

Stems shortly climbing.—Pitchers inflated near the base 3" to 6" long, pinkish; anterior wings ribbed, the wings one to two lines broad and more or less prominently ciliate-toothed without any curl in the centre of the stalk. 2.—*N. Bernaysii*.

Stems elongated scarcely climbing.—Pitchers narrow at the base, then cylindrical to the top 6" to 7" long, green with white streaks; anterior ribs prominent at the base, but not winged; stalk flexuose without a curl. 3.—*N. albo-lineata*.

Stems not climbing, rather slender.—Pitchers slightly enlarged at the base 3" to 4½" long, judging from the dried specimen, more or less reddish when fresh; anterior ribs prominent, but not winged; stalk slender, not forming a curl. 4.—*N. Moorci*.

Stems not climbing, rather stout.—Pitchers inflated below the middle 5" to 7" long, more or less purple stained; anterior ribs, with narrow purple wings; stalk straight. 5.—*N. Jardinei*.

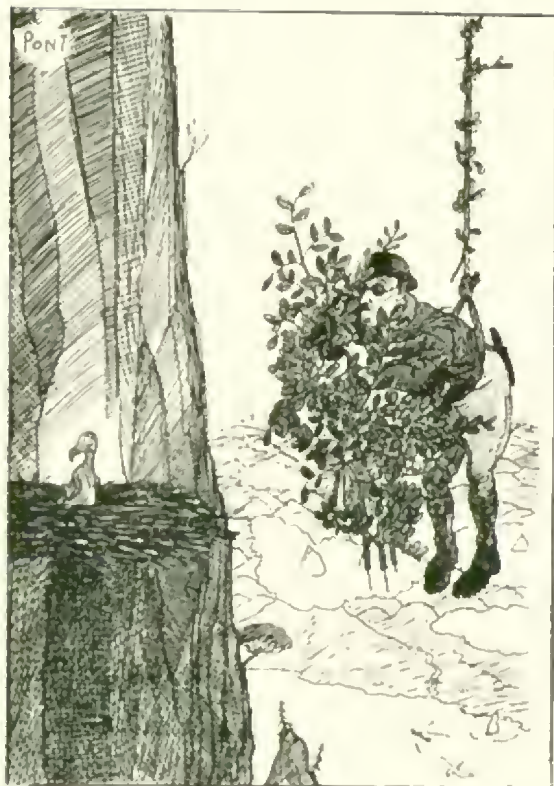
Pitchers enlarging from the base to a diameter of about 3" at the top, length about 6"; marked with reddish purple colour; anterior ribs hard, scarcely winged; stalk straight, somewhat flattened. 6.—*N. Rowanae*.

Stems not climbing, very short.—Pitchers numerous, slightly inflated above the base and enlarging again at the top, 1½" to 2½" long; anterior ribs with entire wings about ¼ line broad; stalk slender, no curl. 7.—*N. Alicae*.

Pitchers numerous, 9 to 13 lines long; diameter above the base, 2½ to 4 lines; anterior ribs toothed. 8.—*N. Cholmondeleyi*.

—R. E. PAINTER.

The Club would be glad to hear from any Country Member who is willing to form a group of local residents interested in Natural History. The Committee proposes to organize such groups where sufficient interest exists.



SPRING FEVER. Now that Spring has come again to Australia, we may glance at artists' impressions of its effects in other lands. The drawing on the left (from the *Vic. Yorker*) purports to show the Audubon Bird Walkers adding a *Coccyz. Tringoides* to their list, and that

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PROCEEDINGS

The monthly meeting of the Club was held at the Royal Society's Hall on Monday, September 11, 1939, at 8 p.m. The President, Mr. A. S. Chalk, presided, and about 80 members and friends attended.

SUBJECT FOR THE EVENING

This was "An Evening with the Microscope," given by Mr. O. H. Coulson. A large number of lantern slides, covering many subjects of microscopic research, were used as illustrations, and a great deal of information was given. Mr. Coulson was accorded the thanks of the Club by the President.

ELECTION OF MEMBERS

The following were duly elected as Ordinary Members:—Mrs. Beale, Miss C. E. McClelland, Miss G. V. Bramley, Miss Gill and Mr. T. G. Molyneux.

GENERAL BUSINESS

Welcome to Visitors.—The President welcomed to the meeting a visiting naturalist (Mr. Mules) from South Australia, and a one-time member of the Club, Mr. Armitage.

The President reported having written to the authorities regarding legislation for the preservation of fauna, as resolved at the last general meeting. The Bill had not been accepted by Parliament.

NATURE NOTES

Mr. R. E. Painter showed a series of figures to illustrate the article on "Australian Pitcher Plants" in the current issue of the *Naturalist*.

Mr. F. S. Colliver gave a note (using slides and specimens) on Crinoids.

EXHIBITS

Mrs. M. E. Freame:—Hermit crab and leopard fish from Portland.

Misses I. and F. Knox:—Collection of garden-grown native shrubs.

Mr. S. R. Mitchell:—Minerals from Queensland, including lead-zinc ore from Mt. Isa, also jaspers, muscovite, tourmaline,

epidote, dolomite, calcite, etc., from the same district; chalcopyrite and hematite from Cloncurry; sulphide and oxidized ores from Mt. Morgan; and Cambrian trilobites from near Mt. Isa.

Mr. C. French:—Large plant of the rasp fern (*Doodia (Woodwardia) aspera*), grown in the glass-house. Plant from Rubicon River, Victoria.

Mr. V. H. Miller:—Two native orchids (*Dendrobium teretifolium* and *D. tetragonum*); also a framed group of exhibits at the Jubilee Show in 1930, to remind members that next year will be the Club's Diamond Jubilee.

Mr. R. E. Painter:—Sundry native orchids.

Mr. W. H. Nicholls:—*Dendrobium acmilum* (white feather orchid) from Queensland, showing 28 racemes of bloom.

Mr. F. S. Colliver:—Feather stars from South Australia, crinoid from Atlantic Ocean (dredged), and fossil crinoids from America.

NATURE NOTES

Mr. A. S. Chalk reports that, on September 23, in the vicinity of Eltham, he found three kinds of birds breeding in one gum tree—a Magpie, a Cuckoo-shrike, and a Bronzewing Pigeon. A Frogmouth was perched (or squatted) in the same tree.

* * *

The Chairman of the Victorian Forests Commission, Mr. A. V. Galbraith, states that a Mountain Ash (*Eucalyptus regnans*) which fell on Mount Tooronga (near Noojee), this year, was found by exact measurement to be 330 ft. high, minus about 10 ft. of the crown, which was broken. Mr. Galbraith hopes shortly to conduct a search in the area for living trees of about the same height. As far as is known to the Forests Commission at present, the tallest Australian tree is a Mountain Ash in the Cumberland Valley (Marysville); it is 301½ ft. high.

* * *

"My husband found in a swamp recently what we think is a Bittern's nest," writes Mrs. R. Lack, of "Runnymede," Whorouly South. "It was discovered through the cattle stampeding through the swamp and startling the sitting bird. Otherwise, we would not have found the nest, as the birds twist themselves until they look like sticks or roots in the water. A fortnight later I visited the nest and saw the two young birds, which were about the size of pullets and covered with stubble. They were very savage, making a throaty rattle at us and fighting like furies. We had to wade into the swamp to see them, but it was worth it. These birds visit this district only in very wet years."

The Club would be glad to hear from any Country Member who is willing to form a group of local residents interested in Natural History. The Committee proposes to organize such groups where sufficient interest exists.

Plate VI



ARARAT'S WILD NATURE PARK, an area of 160 acres, is to be visited by Ararat and Melbourne naturalists on October 14, when a Memorial to the late George Gossip will be unveiled. Mr. Gossip (who died a few months ago) was for years a splendid worker for the Park and for the Ararat Naturalists' Club. He is shown at the right of the top picture, and the Memorial is shown in the lower picture.

A NEW SPECIES OF THE GENUS *PTEROSTYLIS*

By J. ROS. GARNET

PTEROSTYLIS ALVEATA, spec. nov.

Planta terrestris, sub-gracillis, glabra, 6-18 cm. alta. Folia 3-4, erecta vel sub-patentia, amplexicaulia, alterna, ascendente, ovata-lanceolata interdum linearum—lanceolatum, acuta, 10-25 mm. longa. Unus bractus parvus apud basem scapi. (Folia plantarum juveniliū, 3-6, petiolata, ovata, fusco-viride, stellatis.)

Flos solitarius, interdum duo, parvus, pallens et albus; Galea erecta, circiter 15-18 mm. alta, leviter incurvata, breviter acuminata; labia inferior erecta, galea amplectans, marginibus superioribus anticis turgidus et prominens; sinus comparate latus cum media rima tenuia sed acuta; cuspides (cornua) laterales gracillimi, erectae, galea supereminens.

Labellum unguiculatum, erectus cum extremitate aliquantula depressa, summa altior quam columna, paulum per sinum sepalorum-lateralium protrusans; lamina pallens cum marginibus et medio-costa et apice spadicibus, 9 mm. longa, ovata-oblonga paulatim ad summa contracta, parva quatenus summa concavo, 2-3 mm. lata ad medium quum extensus est. Apex habet acutus et plerumque minute bifidus, tota similis in formae cymbae vel alveolo est. Appendix linearis, semi-circularis, apex obscure tripartitus, fasciatus.

Columna 11 mm. alta, partes superiores alae cacumini extendentes, cacumen altius quam anthera, inferiores partes alae oblongae, obtusae, cum marginibus introrsa, dense stipata cum brevissimi villi tenuissimi.

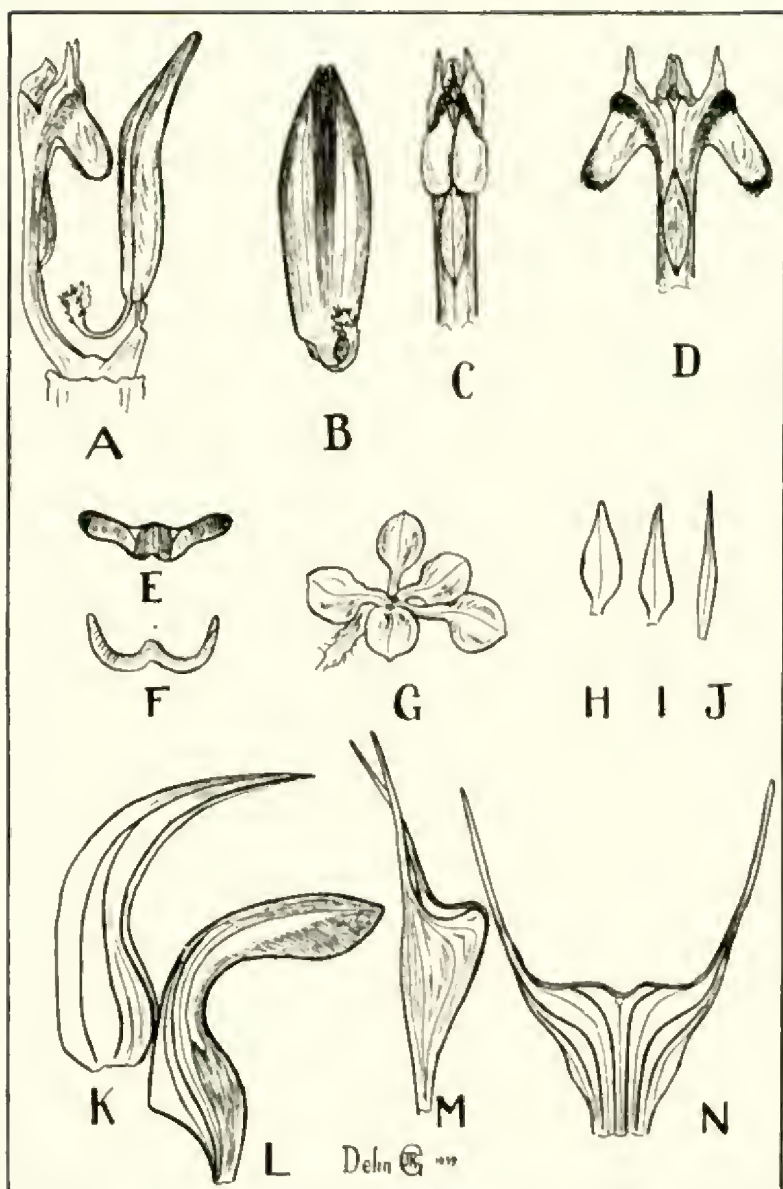
Stigma columna angustior, elliptica, prominens, 2.5-3 mm. longa. Planta per autumnum et in fine hiemis floret.

Plant terrestrial, moderately slender, glabrous, from 6 to 18 cm. high.

Leaves three or four, 10 to 25 mm. long, erect but with a tendency to spread, clasping the stem at their bases, ascending one above the other and arranged alternately; mostly ovate-lanceolate, but, in occasional specimens, linear-lanceolate, tips pointed; a small bract at the base of the scape. Leaves of juvenile and non-flowering plants three to six, petiolate, ovate, dark green and arranged in a radical rosette.

Flower solitary, sometimes two, small, pale green and white, sometimes with a yellowish tinge.

Galea about 15-18 mm. from base to summit, erect for half its length and then incurved horizontally and terminating in a very short point; lateral sepals erect, clasping the galea and almost obscuring the lower half of the petals; filamentous points erect, produced upwards towards the back of, and extending well above, the galea; upper frontal margins inrolled, swollen and

*Pterostylis alvata*

(Key to illustration on Page 94)

prominent; sinus relatively wide with a shallow but acute median cleft; petals flexed at almost a right angle near the level of the sinus and flattened horizontally towards the tip of the galea.

Labellum on a short claw, erect, the distal end being more or less deflexed, tip very slightly higher than the column, and, when at rest, protruding through the sinus of the lateral sepals; lamina pale green or cream coloured with margins, median keel and apex dark brown, 9 mm. long, in the distal one-third contracted towards the tip, ovate-oblong, concave as far as the angle of the deflexion and to a depth of almost 1 mm. at the middle, 2-3 mm. wide at the middle when flattened; apex bluntly pointed and usually minutely bifid. Appendage semi-circular, obscurely three-lobed with fasciate tip.

Column 11 mm. high, upper lobes of wings produced to a short point extending a little above the level of the anther; lower lobes oblong, obtuse, with inrolled inferior margins which are densely beset with very short and fine cilia.

Stigma narrower than column, elliptical and rather prominent, 2.5-3 mm. long.

We are indebted to Miss Elése Rossiter, of Hedley (South Gippsland) for this interesting addition to the already large genus *Pterostylis*. Among her happy hunting-grounds Miss Rossiter includes Snake Island, a small island off Corner Inlet, Wilson's Promontory (Victoria). The orchid flora of this tiny island is extraordinarily rich. Included among specimens which she sent to me early in June, 1939, were nine flowers of the new species, including four well-preserved specimens. Two of the remaining plants exhibited teratological variation, and the rest of the specimens were dissected, the segments being preserved.

A second visit to Snake Island, in the first week of July, 1939, resulted in further specimens being obtained. One flower was freshly expanded; the rest were either withered or fruiting. Miss Rossiter has kindly furnished field notes which will be of interest.

There were quite a number of colonies of the plant spread over the island and growing abundantly in patches of about five to eight square yards, in black coastal sand among messmate and bracken fern. At the time of the June visit, most of the many flowers had passed their prime, showing that it is primarily an autumn-flowering species.

Growing in association with it were *Acianthus asperus*, *Ac. reniformis*, *Pterostylis nutans* and *P. pedunculata*. Other *Pterostylis* noted as growing on the island were *grandiflora*, *nana*, *alata*, *vittata* and *parviflora*.

A study of the description and line drawings will indicate that the new plant has a number of very distinctive characters, which immediately separate it from the three congeners, *P. obtusa*, *P. alata*, and *P. Toveyana*. The general appearance of the labellum,

suggesting, as it does, the shape of a canoe or shallow trough, has led me to assign the name *alveata* to the species.

The type specimen is preserved in the author's herbarium, while a co-type example is deposited in the National Herbarium, Melbourne.

Key to Plate Illustrating Dissections of P. alveata

- A.—Column and labellum—in profile (4).
- B.—Labellum—fully extended (4).
- C.—Column—front view (4).
- D.—Column with lateral wings extended—showing shape and position of stigma (4).
- E.—Tip of labellum.
- F.—Cross section of labellum at middle.
- G.—Leaf-rosette of non-flowering plant.
- H, I, and J.—Stem-leaf forms. I = leaf form of type plant.
- K.—Dorsal sepal (2).
- L.—Petal (2).
- M.—Lateral sepals in profile, showing the prominent and bulging lip (4).
- N.—Lateral sepals, extended, showing inrolled margins (2).

BOTANICAL EXCURSIONS

Though the afternoon of August 19, 1939, was overcast, with a strong wind, a good number of members visited East Sandringham. Going easterly by Spring Street past the site of the old lagoon, we soon entered the heath land. Here we first stopped to examine the flowering of a Prickly Geebung (*Persoonia juniperina*). It usually flowers in mid or late summer. This plant, however, had evidently flowered in summer but set little fruit, numerous old flower stalks being present. Its flowers occur singly in the angles of the lower leaves of a leafy shoot. Probably the dry season up to February had influenced the normal flowering adversely, and the rains had then encouraged a new growth. Another plant nearby had no flowers.

A cone bush of *Isopogon crottophyllus*, with a young flower-head forming, directed attention to the great diversity of aspect attained in the Protea family flowers by different arrangement of the flowers and bracts, ranging from the separate flowers of *Persoonia* to the showy bracts and flower clusters of the Waratahs elsewhere. The shrubby form of Silver Banksia, also in flower here, further illustrates the same feature. In this case the blooms seen on the Banksia were late flowers of a normal flowering season.

Abundant leaves were found of the Fringed Hair Orchid (*Leptoceras fimbriatum*). It was too late to expect flowers, but no indication was seen that they had flowered. It seems a very shy flowerer, though the leaves remain visible long after flowering season. Flowers May or June; leaves up to October. The locality is not far from the place where it was first found for Victoria, described in a Club excursion report as behind the Red Bluff.

Diminishing light and threatening rain, which soon began, caused us to omit the remoter part of the route planned, but gave an opportunity of looking at some native plants at the East Sandringham School, at the suggestion of Mrs. Hill.

Many interesting plants also were seen on an excursion to Moorooduc on September 2.

T. S. HART.

THE VEGETABLE FOODS OF THE AUSTRALIAN
ABORIGINES

By G. N. HYAM

The history of the rise or fall of any branch of the human race is largely a history of the abundance, variety or deficiency of food supplies, and this is a factor still present in relation to the highest cultures of modern times. Politics, economics, health and population are still controlled to a very great extent by the food factor.

It is, indeed, only during the past decade or so that man has even commenced to rise above the limitations set by supplies of food provided by Nature, or by agricultural methods slowly evolved from a primitive agriculture, which was limited by climatic conditions and natural fertility, unaided by modern chemical, electrical and engineering science.

Passing from the relation of food to man in general, it would perhaps be well to review other factors of environment and heredity which surrounded the aborigines of Australia prior to their contact with the white man. These are important, as they throw light on the absence of agriculture, and the nature of and the supplies and variety of food, as well as the methods they used in its collection and preparation.

It is agreed that the Australian aborigines arrived in Australia from some other part of the world—whence and how does not concern us here. They were, and still are, a nomadic race and this trait appears to be an inherited factor rather than the result of environment. All nomadic peoples—and there are many of a relatively high culture—have an inborn gift for "living on the country" which they traverse or occupy. They have the true hunting instinct, whether in pursuit of animals or in the search for vegetable food. They must of necessity be great experimenters and adventurers in gastronomy, and there must have been many unknown martyrs to the science of dietetics during the development of their culinary arts. Those men (or women) should surely be numbered amongst the world's heroes!

In entering new territory, necessity ruled, and the only method of testing the edibility or wholesomeness of probable foodstuffs was by the method of trial and error. In order to maintain adequate supplies of animal food they had to develop efficient weapons—such as the spear-thrower and boomerang, and a tracking instinct, as well as a gift for observation in relation to plants.

Our aborigines appear to have brought these weapons and gifts with them, as well as a knowledge of the use and preparation of fire, and the skill and methods necessary for making stone implements; but they did not bring, nor later develop, any rudiments of agriculture or a technique of food storage against times of scarcity.

The lack of knowledge or practice of agriculture does not

necessarily imply a low mentality or intelligence, since agriculture, apart from the pastoral grazing of herds, is more or less absent amongst many other nomadic races such as the Tartars, Bedouins, Eskimos, American Indians and various African races. All these were in contact with agricultural races and therefore could have been expected to have developed the cultural raising of food. This phenomena points to the theory that mankind can be classified into two groups, Food Producers and Food Gatherers; and this is fully accepted by ethnologists.

The preponderance of the former is due to the fact that the agricultural peoples are usually a fecund people, whilst the nomads or gatherers are slow in increase or quite stationary in population. Agriculture arose amongst the inhabitants of river or mountain valleys amongst tribes surrounded by hostile neighbours. The development of agriculture was probably stimulated by pressure of population in a restricted area, combined with an inborn desire to remain and settle in one place. Even amongst our own race and civilization there are two definite strains—the stay-at-home and the roamer, the latter never being an agriculturalist, though he may become a pastoralist.

The aboriginal arrived in this continent, presumably from the north, to find a luxuriant growth of plants, plenty of game and fish, and an uninhabited country. His previous wanderings and environment had taught him the technique of hunting and the use of plant food collected from Nature, and as primitive man does not seek to perform unnecessary labour, even to increase his comfort, his relatively small natural increase no doubt prevented any development of agriculture.

Coming to the specific vegetable foods of the aboriginal, one is surprised by the wide range of both vegetable and animal food they selected. They had no fastidious or aesthetic inhibitions. If the food tasted well, and if they did not suffer from internal discomfort after eating, all was well. Appearance, which to such a large extent rules our diet, did not apply, even in the best tribal circles.

One cannot help admiring the number of empirical experiments in cooking and preparation that must have taken place to discover methods of removing deleterious principles and to render some very unpromising foods palatable. There are many instances of their using vegetable foods, which, if they are not cooked or pre-treated in a certain way, are highly poisonous.

Most authorities refer to this extraordinary diversity of food supplies, which must be greater than that of any other primitive race. Baldwin Spencer, for instance, says: "He (the aboriginal) lives from hand to mouth without any thought for the morrow. Nothing comes amiss! Acacia seeds, lily-roots and stems, yams, honey of the wild bee and honey-pot ant, kangaroos, emus, snakes, rats and frogs, in fact, everything edible is eaten."

The latter part of this statement may be questioned, as the

study of more detailed lists of aboriginal foodstuffs seem to indicate that when food was abundant, a choice was made. The almost entire absence of deficiency diseases such as rickets, scurvy, beri-beri and malnutrition generally, leads to the suggestion that a selection of food-stuffs, guided by taste and appetite, was made, and only in times of scarcity was food eaten entirely haphazardly.

As any stock-raiser knows, even cattle and other livestock on free range and mixed pastures cause no concern as to whether they are obtaining the so-called balanced ration; their natural tastes and appetites stimulating the proper selection and balance of diet. Similarly, primitive man, with no depraved or jaded tastes, may be expected to possess the same instinct.

The list of aboriginal vegetable foods (so far as we know of them) with the plenitude of animal proteins and fats, suggest that a completely balanced range of food was available, replete with all the alphabetical vitamins that are so much in the public eye to-day.

The supplies of native animal and vegetable food were, of course, more abundant in pre-settlement days and more than sufficient in most parts of Australia to maintain the relatively small aboriginal population on a nomadic basis, except possibly during the worst drought years, and even then, the bare means of sustenance were available. Water was probably the main concern in such years, but there is no evidence of any great mortality from starvation or thirst. Any tendency to over-population in a given tribal area was artificially checked by well-known methods, or by the surplus population "hiving-off" in family groups to some uninhabited area.

It is thought by some authorities that the arrival of the aboriginal in the southern parts of the mainland of Australia was comparatively recent and occurred not many generations prior to the arrival of the white man. In fact, it is doubtful whether Australia had even nearly reached its maximum population on the basis of the requirements of a nomadic race, when the white man arrived. If there had been any pressure of population in any area for any considerable length of time, the appearance of a rudimentary form of agriculture could be looked for. The only alternative to this would have been wars of extermination—the remedy seemingly favoured by modern civilized man. General warfare and tribal hostility do not seem to have been instruments of policy amongst the aboriginals!

In regard to the number of species used as food, W. G. Roth notes 240 plants so used in North Queensland; Sir Geo. Grey mentions about 200 in S.W. Australia; and Brough Smythe suggests about the same number as being used in Victoria. All of those lists are admittedly incomplete.

A good collection of food plants used by the Queensland blacks was exhibited by M. Thozet in an exhibition held in Melbourne in 1866. E. M. Officer, in the same exhibition, showed what was

said to be an almost complete range of plants used by the Wimmera tribes in Victoria. Both of these lists appear in Brough Smythe's *Aborigines of Victoria*.

It was the general rule that the collecting and preparing of vegetable food were entirely the function of women. An exception, perhaps, was the climbing of trees for purpose of collecting the seed cones of the bunya-bunya pine (*Araucaria Bidwellii*), and even that work was sometimes undertaken by women.

Implementations were few and simple. The yam-stick was used for digging yams and other roots, the dillybag for carrying, and the pitchi for carrying or for kneading the grist of seeds after they had been ground in the stone mills.

The plant foods may be roughly divided into the following sections and in the same order of preference as to use:—Seeds, seed-pods and nuts; fruits and berries; roots and pith; stems and flower stalks.

Most of them required some treatment, preparing or cooking varying from simple pounding to rather elaborate washings and cooking. Fruits and berries were mostly eaten raw. Some had poisonous principles that had to be removed before eating; as, for instance, the fruit of the Cycas or nut palm, and also that of the *Zamia* palm of North Queensland.

The preparing of such foods consisted of pounding and maceration in running water and, afterwards, baking or desiccation. Other fruits and seeds are poisonous at certain stages of growth and not at others—facts that are well-known to the aborigines, who harvested them accordingly.

Vegetable foods do not appear to have ever been placed under any form of taboo or restriction, such as occur in the reservation of certain animal food for initiates or old men. There was, however, a kind of close season proclaimed in connection with certain grasses, and notably the bunya pine, presumably to ensure continuity of supply.

Vegetable foods, in common with animal food, provided the basis and reason for many of the corroborees and other rites, the objects of which were to ensure plenty. Some tribes adopted edible plants as totems and they appear as such on rock carvings and other decorations. The Katisha tribe studied by Baldwin Spencer at Barrow Creek had a grass-seed totem and ceremonies very like those devoted to the death and rebirth of Ceres and Demeter in early European folk lore. The custom of "singing" the grass-seed in the Kimberleys also is reminiscent of some of the customs connected with the grain harvest which, even now, persist in Europe. This clearly indicates that the aboriginal was thoroughly familiar with the function of seeds being the parent of the plant and the plant life cycle generally, so it was not ignorance of the potentialities of the seeds to make an increase that prevented the aboriginal from becoming a cultivator.

CHARLES GOULD TO JOHN GOULD

[Letters written in Tasmania about 100 years ago by Lady Franklin and Mrs. John Gould have been published recently in the *Naturalist*; they were among a considerable number of valuable early documents brought from England early this year. Now a later letter from the group is submitted. It was written by Charles Gould, second of the three sons of John Gould the Birdman, from Hamilton (Tasmania), on October 21, 1861, to his father in London. Interesting notes are given on birds, on the Tasmanian "tiger" (now very rare), and on other matters. Charles Gould was a geologist who worked in many lands (including Tasmania and New South Wales), and was the author of a book entitled *Mythical Monsters*. He died, unmarried, at Monte Video (Argentine), in 1893, at the age of about 60 years.—A. H. CHISHOLM.]

"My Dear Father,—You will be glad to learn that I have great hopes of being able to get for you, at last, the eggs of the Eagle, or as it is universally called here the Eagle hawk, as I have only yesterday seen a shepherd who tells me that he knows of a nest with eggs in, which he believes he can reach. He had intended to leave them until hatched, so as to secure the young bird, but promised that he would go this very day to get them. I have also shepherds on the lookout over a considerable district.

"The little bird like a lark, common on the open grassy plains, and commonly known as the lark, builds on the ground, and a few days ago I found a nest with two eggs in it. The poor foolish bird called my attention to it by being too clever, for she rose up from nearby under my horse's feet and then went tumbling and fluttering along on the ground to deceive. I threw my hat down at the spot and then followed. After leading me about 60 yards in this way, she suddenly took to her wings and flew away, whereupon I returned to the place and found her nest. Delighted, however, with this maternal instinct, which I thought was peculiar to a very few birds, I spared her nest, feeling certain that I shall be able to find others very easily.

"It is really astonishing considering the abundance of the wattle bird, how difficult it is to find its nest. I have not yet had much chance this season of doing so myself, but I have largely engaged boys and shepherds, who have not yet brought in a single one.

"Great complaints are being made by all the sheep holders about Marlborough of the increasing number of Tigers (*Thylacinus*) and some have been compelled to withdraw their flocks in consequence. They are very destructive and appear to hunt sheep not merely for food, but also for sport, as a single Tiger will kill a considerable number of sheep in one night. I have to bear the blame of a good deal of these losses, for they say that the abundance of the Tigers is caused by my having burnt them out of their haunts in the back country during my expedition, and destroyed their food so that they were driven to the settled districts. We certainly gave the country a pretty good scorching, and this may have had something to do with it.

"I have an emu's egg (I mean a Tasmanian emu's egg) which I will send home, that you may be able to compare it with those from Port Phillip. There is still a pair of indisputable Tasmanian emus at St. Paul's Plain, on which I keep a watchful eye. They generally breed each year and I am promised a pair of the young ones this season. A pair were sent to me last season but died before I obtained them.

"There are many interesting points connected with the breeding of the sea owl on the islands in the Straits and round the western coast, such for instance as the arrival of the mutton birds at a regular date each year, even to the very day, with which you may not be aware, and of which I am making a few notes, not however as yet sufficiently ample or substantiated to send home. If I go as I expect to Port Davey this summer I shall hope to make some interesting observations.

"I have not received a letter from you for several mails and am anxiously expecting one. I shall be glad to hear at any time what Sir Roderick thinks of my work and how the English Survey progresses. I was in hopes that my friend Drew would have come and seen you occasionally, but as his name is never mentioned in any of the letters I receive I suppose he has not. I hope that you will show him attention whenever he does do so. I have not heard from Milligan for some mails. I suppose he is beginning to look forward to his return. Ewing has just been over on a visit to Port Phillip, and will I suppose when I see him have plenty of news from Selwyn and McCoy. Morton Allport has been lately instructing me in photography, and I hope that during the summer I shall be able to get views of the lovely scenery which I constantly meet with in my excursions. I am beginning to like this country more and more, and I am afraid that a stay of a few years longer will almost make me prefer it to England. The climate is certainly far superior.

"I do not hear any reminiscences of you in this part, so I suppose it was one unvisited by you. Among other persons who remember you well is a gunmaker in Hobart Town called Connell, who appears at one time to have been an enthusiastic naturalist. I suspect however that a good deal of this was due to your society, for after your departure he seems to have fallen off very considerably.

I am terribly disappointed with regard to shells. Land shells are really rare, and it is difficult to get any good marine ones without spending more time than I can spare in dredging. I got one very good one, a large and rare *Cypræa*, on the north coast, which I have given to Ewing, as he had none in his collection.

"The news from New Zealand of the discovery of a rich gold-field has created a great commotion here. Numbers of the working classes have been leaving for weeks past, foolishly as

it appears, for the reports prove to have been much exaggerated, and the crowd of *soi disant* gold diggers are in great distress, unable to get gold or employment there, and unable to return here.

"Sir Henry and Lady Young will soon be leaving, much to the regret of all the respectable portion of the Colonists. They are much esteemed, and it is felt that their return will be a great loss to Society.

"I have written to my sisters by this mail, to whom and Frank I send my love, together with kind regards to Miss Yates and Mr. Prince.

"Believe me, Your affectionate son,

"CHARLES GOULD."

THE MAKING OF AN ENGLISH HEDGEROW

By EDWARD E. PESCOTT*

Much of the charm of the English landscape is created by the hedgerow, and the wonderful and beautiful criss-cross pattern of the hedges attracts the attention of all visitors. A photograph taken anywhere in England, showing the hedges, could be labelled "England," for this feature is undoubtedly bound up with the beauty of the English landscape.

The "rows" are not at all symmetrically placed: the fields are of all shapes and sizes, so that there is no gridiron effect. Not only do the hedgerows make for scenic beauty, but they provide the delightful shady "lanes"—"for lingering lovers long delayed." Also, they provide a haven for wildflowers and wild birds. It is no wonder, therefore, that the hedgerows of England are beloved by everybody.

The hedgerows are seen all over the British Isles. They are at their best in Devon, and they are nearly as lovely in Northern Ireland. But the loveliness of the hedges in Devon is not to be surpassed. The work was begun many years ago—hundreds of years it took to make a hedgerow. First the hedge was planted: it might be holly, oak, elm, hazel, beech, or any other tree, but it was mainly of beech. In many cases a rough stone wall was built between the young plants.

They grew away in their first year; and when winter came they received from the "hedger and ditcher" a sharp nick a foot or two from the ground. Then he bent the plants over at the nick and intertwined the growths. Clearing out the drain parallel with the hedge, he would throw up the cleanings among the stones and the plants.

Next winter he would again nick and bend the stems over, twining them as before, perhaps trimming the tops; more drain cleanings would be added.

*Mr. Pescott, a stalwart of the Club, has just returned from a tour of Europe. Members cordially welcome him home.—Editor.

And so the process would proceed—laying down the upright shoots and throwing in the soil—and thus, year after year, a solid and compact hedge would slowly develop. The soil would provide a firm wide base, and the plants would grow freely.

Here and there the hedger would allow a plant to grow upward, ultimately to become a tree. Thus the hedge, with its tree sentinels, would become a protection, and a beauty in the landscape.

As the years passed, seeds were blown by the wind or carried by the birds—seeds of grass, spores of ferns, and seeds of flowering plants; and thus, gradually, the hedgerow became brilliant and beautiful masses of spring flowers; and the lovely flowers below, among the grass, with the rich green beech leaves above, produced some of the loveliest beauty spots that can be seen anywhere.

Here crowd the bluebells, growing along with the primroses and the forget-me-not; white ox-eye daisies stand up everywhere, while the red-pink campion gives the final touch. Occasionally one will find a spotted or a tree orchid, while ferns of many species add a gracefulness and joy. For sources of sheer delight and happiness, the hedges of Devon, hundreds of years old, are among the most beautiful things of England. They *make* England, and as one views the lovely undulating landscape—("God's finger touched but did not press in the making of England")—one is compelled to say, they *are* England.

AUSTRALIAN PLANTS AT BARON VON MUELLER MEMORIAL

Of the eleven species of Australian flora planted last year at the Baron von Mueller memorial, in the St. Kilda Cemetery, all except two have thrived. Several have come into flower this season. The casualties have now been replaced, and further plantings completed in the adjoining area recently acquired by the Club.

The additional plants set out are *Eucalyptus caesia*, *E. Preissiana*, *Correa rubra* (two plants), *Banksia ericifolia*, *Eparris longiflora*, *Banera sessiliflora*, *Boronia ciliaris*, *Prostanthera melissifolia*, and *Acacia Drummondii*, making a total of 18 native species now at the memorial plantation. Plants were kindly supplied by Messrs. Chas. French, I. C. Hammett, R. G. Painter, and Gill and Searle. There is still room for one or two more miniature plants, which will be planted temporarily, as it is intended that as the specimens mature, the weaker growing ones will be eliminated to avoid over-crowding.

The Club is indebted to the trustees of the cemetery, through Mr. A. C. Dowse, the curator, for the preparation of the soil for planting, the repainting of the iron railing, and the provision of cemented rock kerbing to the garden area.

It is hoped that the nectar-producing shrubs planted will attract honey-eating birds. Several White-plumed Honeyeaters ("Greenies") were observed recently in the cemetery grounds, also a number of Flame-breasted Robins.

AN ANYAMATANA LEGEND OF THE PLEIADES

By C. P. MOUNTFORD

(Honorary Assistant Ethnologist, South Australian Museum)

In the steep-sided and rugged hills of the northern Flinders Ranges live the remnants of the Anyamatana Tribe, whose members have been in contact with Europeans for over three generations. These aborigines no longer lead the life of primitive food gatherers and hunters, but are playing a useful part as skilled and unskilled labourers in the development of the surrounding stations.

In spite of their association with the white intruder for more than three-quarters of a century, they have retained an almost complete pattern of their tribal life. Every boy is initiated in the same manner as his forefathers; all are married according to the age-old customs—there are no "wrong" marriages even to-day—and the older people, particularly, have kept intact their tribal history and associated myths.

One legend centres around the stars of the Pleiades and Orion, two mythical sky men, and the ritual carried out by children to ensure their future growth.

The Anyamatana folk believe that many beings inhabit the sky. Among them are two women, the Maudlangami (*ngami*—mother) from whose breasts originate the spirit children, the future babies of the tribe, and two men, the Wundukara, who endow the growing boys with beards, and the adolescent girl with breasts. These mythical beings live in Wikarutana, a place in the zenith far beyond the vault of the sky. There are also the women of the Pleiades, the Makara, and the men of the constellation of Orion, the Miariditja.

In the autumn evenings the stars of the Pleiades and Orion are visible on the western horizon, the former of which set about an hour earlier than the latter. This early setting, so the natives explain, was necessary so that the star women could prepare the night camp for the men of Orion, before the latter went over the hill, i.e., the horizon.

The Pleiades are visible about the time of sunrise, for a short period in each year¹ and this coincides with the arrival of the hoar frost, and the freezing over of the springs in the creek. Because of coincidence the natives believe that the frost comes from the women of the Pleiades. They are supposed to resemble earthly women, except that they have a pouch like that of a kangaroo. This, and the body of each star woman, is filled with the fine white crystals of frost, and as each one passes across the sky, the icy powder streams from the pouch, as well as the eyes,

1. In Adelaide the Pleiades rise at 5 a.m. on June 25.

nostrils and vulva. The aborigines have a song which describes this belief.

The Pleiades Song

Arlapa	munduku	artuna	jadmungga	jundzuru	wilkwari.
Frost	keep in pouch	wife	them	nostrils	vulva.

At the same time as the star women sprinkle the earth with hoar frost the sky heroes, the Wundukara open a door in the firmament. The medicine men of the tribe (*wungi*) affirm that they, and they only, can see the two Wundukara through this opening.

At these times the children perform an interesting hoar frost ritual. Before sunrise all the children approaching adolescence assemble at a nearby waterhole, and make a fire of the wood of the dead finish tree, *rada* (*Acacia tetragonophylla*). At sunrise one boy snatches a stick and throws it at the sun—to ensure that the day will be warm and pleasant,² while everyone runs around the trees and fire, eating the ice from the water hole and rubbing their bodies with the hoar frost. All children must keep running, for should a sunbeam, *Vundu artji*, strike them when they are standing still, their growth will be stunted, likely as not, and they will not develop at all. When the Wundukara see the ritual is properly performed they untie their abundant hair from the net that keeps it in place, and allow it drop through a hole in the sky. The end, which is so long that it reaches to the earth, touches the boys beneath, and thus ensures that they will have luxuriant beards when they grow up. At the same time the Wundukara endow the girls with breasts.

Summary

This paper describes the myths surrounding the constellations of Pleiades and Orion, two mythical women, the Maudlangami, and two sky men, the Wundukara, and the Hoar Frost ritual performed by children to ensure their future growth.

NOTE.—The mythical beings mentioned in this paper are divided into the two fundamental classes of the Anyamatana tribe, *i.e.*, Araru and Mathuri. Thus, some of the Pleiades and the Orion are Mathuri, some Araru. One Maudlangami, and one Wundukara belong to the former, and the other two to the latter class. An Araru Maudlangami will only produce children of her class. Similarly an Araru Wundukara only gives beard or breasts to Araru children. The converse is also true. There is no evidence that the Maudlangami and the Wundukara were married or connected in any way.

2. This wood, *rada*, is associated with heat, feverishness and drought. It is likely that this wood is used in belief that it will help to make the day warm.

The Victorian Naturalist

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No. 671

PROCEEDINGS

The monthly meeting of the Club was held at the Royal Society's Hall, on Monday, October 9, 1939, at 8 p.m. The President, Mr. A. S. Chalk, presided and about 100 members and friends attended.

CORRESPONDENCE

A letter from the Federation of Victorian Walking Clubs, containing a report of the recent delegation to the Minister of Lands in the matter of National Parks. The Club's representatives were Messrs. A. S. Kenyon and G. N. Hyam.

REPORTS OF EXCURSIONS

Reports of Excursions were given as follows: Taradale, Mr. Ivo Hammett; Maranoa Gardens, Messrs. F. Chapman and F. Barkla.

ELECTION OF MEMBERS

On a show of hands the following were elected as Ordinary Members of the Club: Dr. W. M. Carne, Mr. E. M. Webb, and Mr. R. W. Armitage.

DONATIONS

Messrs. C. French and S. C. Richardson presented a number of books to the Club Library, and, on the Club's behalf, the President thanked these two members for their donation.

GENERAL BUSINESS

(a) Wild Nature Show.—Mr. A. D. Hardy outlined arrangements that were being made, and asked for helpers to assist in arranging exhibits.

(b) Questions by Members.—Two questions were asked. 1. How did the name *deformis* come to be applied to a species of *Caladenia*? (Answer by Mr. W. H. Nicholls: Owing to a particular structure in the labellum.) 2. Do Honeyeaters often feed on flowers of the Grass-tree? (Answer by Mr. V. H. Miller: They have not been noticed feeding on the Grass-tree at any time.)*

*Various species of Honeyeaters frequently feed on Grass-trees in various areas; some have been photographed in the act.—Editor.

NATURE NOTES

A note on Broken Hill (illustrated with lantern slides) showing growth of vegetation, due to enclosure against stock and rabbits, was given by Mr. T. B. Dodds.

Notes on birds nesting in a private garden at Essendon, and a note on the fossil club moss (*Lepidodendron*) and its structure, was given by Mr. F. S. Colliver.

SUBJECT FOR THE EVENING

This was a lantern lecture on "Problems in Plant Distribution," given by Prof. J. S. Turner, M.A., PH.D., of the Botany Department, Melbourne University. The plant group dealt with was the *Primulas*, and the very restricted grouping of Cow-slips, Ox-slips, etc., with the hybrids along the margins of the groups, as shown by slides and mentioned by Prof. Turner, gave members an insight into some research work that could be done here in Australia with some of our native flora.

The President expressed the thanks of the Club to Prof. Turner.

EXHIBITS

Mrs. Fenton Woodburn.—Tunicate from Western Port Bay, and snails from her garden.

Miss Young.—Plant of *Grevillea alpina*.

Mr. C. French.—Specimens of "Sheoke" (*Casuarina*) twigs showing remarkable scale insects (Coccids), *Frenchia casuarinae*. Also coloured drawings showing the life history of the insects. Specimen from the Anglesea district. Garden-grown specimens of *Olearia (Aster) teretifolia*. (Slender Aster) from the Anglesea district.

Mr. V. H. Miller.—Orchids, *Cymbidium lowii-schroederi* with 59 blooms, and the native orchid *Sarcochilus falcatus*, commonly known as the Orange-blossom Orchid.

Mr. R. G. Painter.—*Sarcochilus falcatus*, and 17 varieties of native shrubs.

Mr. A. A. Baker.—Large specimens of crystalline limestone coloured by iron, fossil wood (?), and quartz crystals in limestone, from Lilydale.

Mr. D. J. Paton.—*Utricularia dichotoma*, collected at Boronia.

Mr. F. S. Colliver.—Fossil club mosses (*Lepidodendron*) from Europe and America.

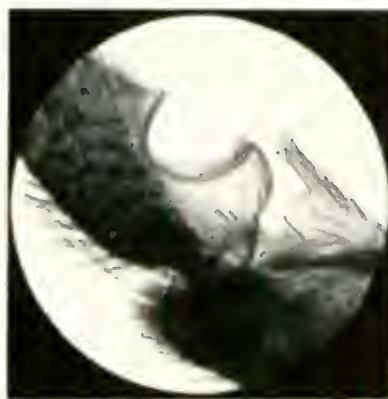
Plate VII



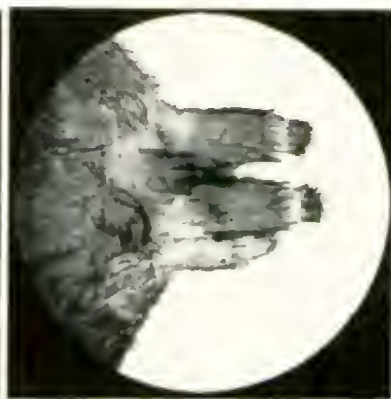
Foot of House Fly, approx. 80X.
showing hooks for walking on
rough surfaces and pads for cling-
ing to smooth surfaces.



Proboscis of Blue Fly, 35X.
This is the tip of the tongue of a
fly which he sticks out on a lump
of sugar.



*Antennae Comb on front leg of
Bee, approx. 50X.*
Used for combing the pollen grains
from the antenna and hairs on
the body.



Spinnerets of Spider, approx. 35X.
Most spiders have three pairs of
spinnerets, but some have only
two pairs. The ordinary silk line
of the web is composed of numer-
ous smaller lines joined after
issuing from the spinneret.

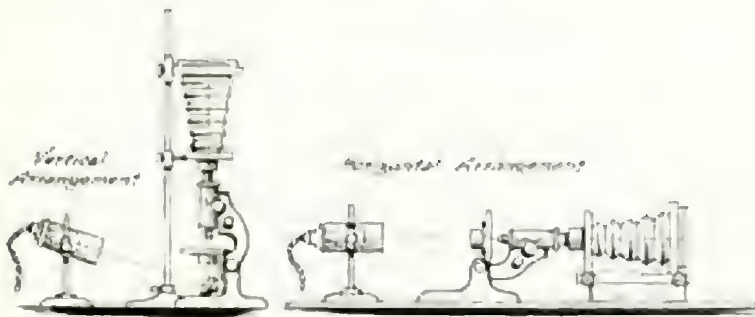
SIMPLE PHOTO-MICROGRAPHY

By O. H. COULSON

Following an exhibition of photo-micrographic lantern slides shown recently at the Field Naturalists Club, I have been asked to write a few notes on the above subject.

The best and most accurate method of delineating an object is by photographing it, for then you are sure that all the detail is reproduced as seen. Then, again, in the form of lantern slides, photo-micrographs are invaluable to illustrate lectures, where the audience is too large conveniently to use the microscope—and a photograph is certainly more convincing than a drawing.

The apparatus for taking a low or medium power photo-micrograph need not be either elaborate or expensive. The requirements are: The microscope, some form of camera, lamps or light source, and occasionally a condensing lens. Special cameras for this work may of course be purchased, but a cheap and efficient one may be made by any keen worker. For a demonstration recently I made one out of stout cardboard in the shape of a cone to fit on the top of the microscope. This, being light in weight, needed no support; but if the camera available is fairly weighty, then means to support it over the microscope must be devised if it is used in a vertical position. If the microscope is used horizontally the whole can be arranged on a firm table, all the units running in guides or slots so that they can be kept in perfect alignment and the distance between each varied if necessary. The two sketches will give an idea of each arrangement.



The light may be an oil lamp or an electric globe, an opal or pearl one for preference. The centre of the light must be in the optical centre of the microscope parts and give an evenly illuminated disc of light on the ground glass of the camera.

The lens of the camera is removed from the front not being required, and some sort of light trap connection made between the

camera and microscope, such as two tubes of cardboard sliding one over the other.

Having got all the units in optical alignment and secured an evenly illuminated disc of light over the field by moving the lamp or mirror (and this is most important), place an object on the stage and focus the image on the focussing screen of the camera, using the coarse and fine adjustments of the microscope and extending or contracting the bellows of the camera—the longer the extension the greater the magnification.

For critical focussing, cement a cover glass on the centre of the ground glass of the camera, thus making a transparent disc of glass, then use a focussing magnifier to examine the fine detail through the clear disc.

With the image sharp and central on the screen and evenly illuminated, without any "glare" (due to reflection from inside surfaces of the tubes of microscope or other surfaces of camera, etc., all of which should be dead black) you are ready to try an exposure. A piece of black card interposed between the light and microscope will do for a shutter. The white light of the lamp is seldom used, better results being obtained by using filters in the sub-stage of the microscope, such filters or colour screens giving more or less monochromatic light.

The colours usually employed are green, yellow and orange, and, according to the subject, they give more transparency or more contrast, depending on which result is required.

For most subjects orthochromatic plates are used and they must be "backed" to prevent halation. For exceptional subjects, when using an orange or red filter, a panchromatic plate is necessary.

With regard to exposure, one cannot give any definite idea owing to the many factors to be considered—such as strength of illuminant, nature of subject, screen and make of plate used, degree of magnification, etc. Experience and judging the appearance of the image on the ground glass of the camera, count most.

The best way is to make a series of trial exposures on one plate by withdrawing the slide of the plate-holder a quarter of the way out and expose for, say, thirty seconds; shut off the light; draw the slide out to half way, make another exposure, shut off the light again, and draw the slide out to three-quarters of the width; again expose and finally withdraw the slide altogether and make another exposure; so that you have given 30-60-90-120 seconds exposure to the plate, which when developed will show four strips of different degrees of density, from which you can get a good idea what exposure to give the final negative.

Absolute steadiness is essential when making the exposure as any vibration of the parts will result in double images.

Magnification depends on the power of the objective used, the power of the eye-piece, and the camera extension. If the exact

magnification is required to be shown or recorded, the most accurate way is to replace the object you have photographed with a stage micrometer (a cover-glass ruled with lines by a diamond usually $1/100$ and $1/1000$ of an inch apart and fixed on an ordinary 3×1 slip) without moving any of the apparatus other than the object; then examine the image of the lines on the screen of the camera, where they can be measured or even photographed on the same plate as specimen.

M.Q. (Metal Hydrokinone) is a good all-round developer suitable for both plates and papers. In developing the negative continue to develop until the image shows fairly well through to the back of the plate for good density.

Make the prints on a glossy bromide paper for preference, various grades of which may be had to suit different densities of negatives. For instance, if the negative is rather dense, use a soft grade of paper; that is, a paper which will give a grayish print full of detail. But if the negative is rather thin or weak, then use a contrasty or extra-contrasty paper. Aim at getting a good bright result.

An album of good photo-micrographs for reference, or to show your friends, will well repay you for your time and trouble and becomes a book of scientific value as time goes on.

EXCURSION TO MARANOA GARDENS AND MALING'S QUARRY

Although the afternoon of October 7 was inclined to be showery, about 40 Club Members attended, and spent an enjoyable time amongst the spring-flowering plants in the native garden adjoining Beckett Park.

The collection now numbers about 470 species and varieties and comprises, besides the smaller groups and genera, 52 Eucalypts, 12 Banksias, 17 Grevilleas, 11 Hakeas, 12 Mint-bushes, 25 Melaleucas, 50 Acacias and 14 Leptospermums.

Probably the most admired flowering plant was the *Micromyrtus ciliatus*, a gem amongst native plants, with its radiating spread of brown, pink and white flowers, nearly two feet across the plant. Another striking bush now flowering is *Melaleuca incana*, the Hoary Tea-Tree from Western Australia, having delicate pale lemon flowers, with touches of chocolate brown on its unopened buds. The early flowering wattles had come and gone, but from now on through many weeks there will be a steady succession of the later flowering ones. Of the Mint-bushes, *Prostanthera ovalifolia* of New South Wales and *P. rotundifolia* of the Grampians, as well as Tasmania, South Australia and New South Wales, are both represented in the Gardens by well-grown healthy plants, and are now at their best as regards flowering.

In the east border a noteworthy *Grevillea* now in flower is the brilliant scarlet *G. coccinea*, whilst the pendulous *G. macrostylis* will soon be a special attraction. Every week now shows some novelty in the display of flowering plants in steady succession, whilst a fine bush of *Indigofera australis* and the various species of *Boronia*, yellow and brown, are conspicuous in the centre bed.—T. CHAPMAN.

NOTES ON CHEILANTHES TENUIFOLIA

By N. A. WAKEFIELD, Graytown

The species needs no introduction to fern-lovers, for it is found throughout our state, and is generally very abundant on most rock outcrops. It is extremely variable in form; in parts of Gippsland attaining nearly two feet in height, whereas it is often less than an inch in height in less favourable conditions. "Rock Lip Fern" is now accepted as the vernacular name. However, the "Parsley Fern" and "Curly Fern" of the older generation are equally appropriate.

The two Victorian forms have at various times been regarded as two species, but most botanists now regard all our material as coming under *C. tenuifolia*. In 1930, Ewart¹ described *C. Sieberi* as near to *C. tenuifolia*, but the rhizome creeping though short and stout, the fronds oblong, the sori round or oblong and usually less closely confluent around the margin of the pinnule. But Bailey² described this form (under *C. tenuifolia*, var. *Sieberi*), as having a short, almost erect rhizome. In the field it is found that whatever the shape of the frond and the disposition of the sori, the shape of the rhizome depends entirely on soil and rock conditions, (see Figs. 1 and 5); while the shape and density of the sori vary indiscriminately. (See Figs. 2 and 8.) Further, it is found that the shape of the frond depends directly on the class of soil, the degree of moisture and the disposition of the vegetation in association. Benthani³ quoted *C. Sieberi* Kunze only as a synonym with *C. tenuifolia*, which he described as having a horizontal or shortly creeping rhizome, and fronds narrow lanceolate to broadly ovate-triangular in shape.

Although the fern originally described as *C. Sieberi* cannot be regarded as a valid species, it is worthy of varietal rank, for superficially it appears very distinct. To quote Dobbie:⁴ "Excepting *Notholaena distans*, which it closely resembles, this quaint little species is quite unlike any other fern in New Zealand. . . . The trim fronds, standing in serried ranks on their glossy brown stalks, have the appearance of miniature pine-forests." This is illustrated by a photograph of a specimen from Auckland, identical with that in Fig. 1. This form attains a height of eighteen inches, in moist soil under bushes of *Daphne Heath* in Central Victoria; while in Gippsland it favours drier situations and there rarely exceeds six inches, the width of the frond being often only one inch. Another form of this variety, abundant in South-east Queensland, has narrow triangular fronds up to two feet in height and with a width of up to five inches. This is the form illustrated by Bailey⁵ as *C. tenuifolia*, var. *Sieberi*. It has been gathered at Combiobar in East Gippsland, on shelves of a rock cliff where humus and moisture were abundant.



Cheilanthes tenuifolia
(For Key see Page 112)

Typical *C. tenuifolia*, as illustrated in Mueller's Key,⁶ is our best known form; it is as abundant throughout the drier parts of Victoria as on the Basalt Plains near Melbourne. It has short broad fronds, inclined to be leathery (as in Fig. 5). In Gippsland (Tambo, Bemm, Snowy and Cann Rivers), on granite outcrops, it grows at its best, being very large but not dense. In less favourable conditions plants are small. On exposed sandstone at Combiobar it is rarely above four inches in height (Fig. 7), while in parts of the Goulburn Valley, on flat pastures away from rock outcrops, it matures at about an inch in height (Fig. 6). The specimens illustrated by Dobbie,⁴ as this form, correspond to that in Fig. 4. Of these he says: "The New Zealand specimens I have seen approach *C. Sieberi* much more closely than specimens gathered in Samoa and Fiji."

The species is found throughout Eastern Asia, the Malay Archipelago and Australasia, including New Caledonia and New Zealand.

References:

1. *Flora of Victoria*, by Professor A. J. Ewart.
2. *The Fern World of Australia*, by Fred. Manson Bailey.
3. *Flora Australiensis*, by George Bentham.
4. *New Zealand Ferns*, by H. B. Dobbie.
5. *Lithographs of Queensland Ferns*, by F. M. Bailey.
6. *Key to the System of Victorian Plants*, by Baron Ferd. von Mueller.

Key to Illustrations:

1. *C. tenuifolia*, var. *Sieberi*—Central Victoria.
2. Pinnules of *C. tenuifolia* var. *Sieberi*.
3. A juvenile plant.
4. *C. tenuifolia*, a small frond—East Gippsland.
5. *C. tenuifolia*—Central Victoria.
6. *C. tenuifolia*, tiny form—Central Victoria.
7. *C. tenuifolia*, small form—East Gippsland.
8. Pinnules of *C. tenuifolia*.

Figs. 2 and 8 much enlarged. Others two-thirds natural size.

On October 5 I saw a blackbird fly into a bush near one of the doors of the MacRobertson Girls' High School, fairly in the heart of Melbourne. When I looked in this bush, I noticed a nest almost finished. On the following Monday the bird was sitting but I did not disturb her. After three days, I just had to know what was in the nest, so I approached and extended my hand. To my surprise, the bird did not move until I was within eighteen inches of her. She is sitting on three eggs. The amazing part of this story is that there are hundreds of girls each passing there at least a dozen times a day but the bird never stirs. Even when some of the girls lean over to look at her, she watches them without the least sign of fear.—NITA MACINTYRE (South Yarra).

Plate VIII



Photos, V. H. Chisholm.

Club members who visited Ararat on October 14-15 admired the tree-climbing ability of the President of the Ararat Naturalists' Club, Cr. H. J. Blackie, who is also ex-Mayor of Ararat. He is here seen (right) high up at the nest of a White-winged Chough built on top of the old nest of a Magpie; and his small son (left) is seen with the nest, which, being empty, was taken for Museum purposes.

A PARDALOTE PUZZLE

By JEAN GALBRAITH, Tyers, near Traralgon

For years we had been quite sure that the Yellow-tailed Pardalote (*P. xanthopygas*) nested here, before it was pointed out to us that it is recorded as from North-western Victoria only. At once we were puzzled. If our friends in the garden were not *P. xanthopygas*, what were they? That is the question that we are still asking.

We first noticed them in 1927, when a pair nested in a heap of potting soil in the garden. Until then the Yellow-tipped, Red-tipped, and Spotted Pardalotes were the only species which we had seen in the district, and these did not usually come to the garden. Not knowing that Gippsland is "out of bounds" for them, we at once identified the new-comers as Yellow-tailed Pardalotes, not by any means to be mistaken if one could see the tail (as we often could), for our spotted friends who had nesting tunnels half-a-mile away.

When our record was, quite reasonably, questioned, we did not know what to do. That a bird should be killed merely to prove a record was a crime that we did not consider. They were our friends and our guests. Nevertheless we wanted to clear away any doubts if we could, and I decided to catch one and examine it closely.

It seemed easy to do that. It was some years after we first noticed them, and after drilling their way through half-a-dozen fern baskets in our bush-house they found a basket of *Plectranthus parviflorus* large enough to accommodate both their tunnel and nest. There they made their home, spending many weeks over the work, for it was a showery spring and they worked only on fine days—and not always then.

I could sit in the bush-house, within arm's reach of the tunnel opening as the birds flew in and out, yet did I but lift my hand, ever so softly, to cover the opening when the bird was inside, there was a flash of wings, and Yellow-tail was away. This close observation satisfied me that he really was Yellow-tail, but could not be expected to convince anyone else. Even the most voracious of us make mistakes!

Although the Pardalotes hatched two broods in the *Plectranthus* basket that season, I was not able to catch one bird. We do not know what became of the fledglings, as, except for a week or so after the first flight, we saw and heard only two birds in the garden; but the parents—or the two we assumed were parents—never left us. Though they were usually silent in winter we often heard them, even in June and July, on warm days.

Every year we found their nest; twice under a *Callistemon* hedge, once on a bank between two clumps of Forget-me-not; again, in the orchard, but until last year we were not able to catch a bird.

For some reason, both Pardalotes and Blue Wrens fought their reflections in our windows and mirrors in 1938 as they never had before. I had to cover the wall mirror in my sleep-out lest the male Pardalote hurt his beak on it; but even then he would fly on to the books below it; then, clinging to the mirror frame with wings lifted, so that I, less than a yard away, could see his yellow tail quite plainly, he would creep up under the curtain to attack the rival he knew was hidden there.

Several times, also, he flew into the house, and one day I caught him against a fly-wire window. Holding him carefully I measured the coloured feathers above his tail, wrote down the measurements, with a rough sketch, and released the bird. The colouring of the upper base of his tail was this: first half an inch of brown feathers, then a quarter of an inch of deep yellow feathers, with a single red feather on the right hand edge.

If our friend of many springs is not *P. xanthopygos*, who is he? A short time before the bird was caught indoors we had another happy experience with the pair, watching them as they drilled a burrow in a basket of hyacinths near the house. They were not at all disturbed when we stood near enough to catch the soil as they threw it out, and it was pretty to watch them waiting for each other; one would never attempt to enter the tunnel while the other was within, but would cling to the outside of the basket with an occasional comradely note.

When they had drilled right through the basket they deserted it, and, after trying several other nesting sites, appropriated what seemed to be a ready-made hole in the orchard.

Now they are nest-hunting again and we speak of them non-committally as "the Pardalotes," because if there are no Yellow-tailed Pardalotes in Gippsland we do not know what they are.

R. H. CROLL LOOKS BACKWARD

Members of the Field Naturalists' Club will be interested in the fact that an ex-president, Mr. R. H. Croll, has written a little book of breezy reminiscences, under the title *I Recall* (Melbourne, Robertson and Mullens). It is not a book of natural history, but we may perhaps agree (in our expansive moments) that stories of poets, artists, authors, and other human oddities can be almost as interesting as gossip about birds, flowers, and insects! And certainly this book contains many bright tales of the kind. It also contains a drab confession: we learn from it that the name of R. H. Croll is chiselled on a rock-face in the Grampians. Had we known that earlier —!

As a matter of course (Mr. Croll having been to Central Australia several times) there is a sympathetic chapter on "The Inland and the Native"; and, as another example of the touch of Nature that makes the whole world more or less kin, there is this uplifting verse by Shaw Neilson:

REMARKABLE CLARITY OF EXPRESSION

A lecturer whom we love dearly
Was stung by some bees most severely.
Did he swear or get narked?
Not at all—he remarked.
They express themselves rather too clearly!

THE VEGETABLE FOODS OF THE AUSTRALIAN
ABORIGINES

By G. N. HYAM

(Continued from October Issue)

There are some representative plants out of the many used for food that deserve some detailed reference, but it should be emphasized that these or any other are not staple foods for daily use in the same sense that wheat, rice, potatoes, maize, etc., are to other races.

The most frequently used were various grass-seeds, nardoo and other edible seeds. These, generally, correspond in some degree to our grains and cereal foods. Unfortunately, here the authorities—even such careful observers as Baldwin Spencer and Gillen—are vague in recording the species and genera of the grasses used. It is certain that Mitchell Grass, Flinders Grass and some of the *Danthonias* would be amongst the most favoured, on account of their relatively high starch content. The seed of the former is being considered as a cereal food for stock, if not for human consumption, by investigators in several parts of the world, provided that the yield could be made more prolific by breeding and selection.

In Victoria, according to Baron von Mueller, the native millets or panicums were the seeds principally used, and no doubt they would be as nutritious as the millets so largely used in China.

Seeds were generally harvested by shaking into a pitchi or coolamon and winnowed to remove husks and awns. This winnowing was mostly carried out by a process known as yandying. This is performed by a dexterous shaking of the pitchi after the style of the dry-blowing of alluvial gold-bearing sands well-known in Kalgoorlie and Coolgardie days. It also resembles the skilled seedsman who is able to separate seeds of a like size in a sieve which allows only the smaller seeds to pass.

Ernestine Hill, in her *Great Australian Loneliness*, describes the gins being employed in yandying sand from tin in Marble Bar area of Western Australia, and she states that there is an expensive mechanical separator lying idle there because it could not do the same work so efficiently. She also mentions a test given to a gin. In this case, tea, sand and sugar were mixed together and in a very short time the mixture was divided into its original components, in three separate heaps.

The cleaned seed and food like the sporocarps of the nardoo are invariably ground in the familiar stone hand-mills, which in themselves are interesting as an implement of great antiquity and world-wide use. The resultant meals are kneaded into cakes and baked in ashes, making a nutritious, though possibly to us a somewhat indigestible food. This represents the starch food that we take

in the form of bread, and is one of the few portable foods of the aboriginal that could be used when travelling.

Nardoo is well-known and often referred to. It is a fern-like plant (*Marsilia drummondii*) which grows in damp places, clay-pans and pot-holes. In addition to the sporocarps the root is eaten. This plant has a very wide distribution, extending from Central Australia well up north and down to Victoria. It survives the greatest drought, or rather, it starts abundant growth within a few days from rain. It is celebrated by the fact that Burke and Wills starved on it, whereas King survived, probably because he was fed on other food as well by the blacks who found him. The tragedy was that Burke and Wills did not realize that nardoo was not a complete food, and that the aboriginals would have supplemented it, probably by some loathsome-looking grub or snake, and thus make a more balanced diet.

The seeds of the purslane or portulaca, the parakylia (the stockman's friend in dry areas), the munyera, a species of *Claytonia*, are also used in a similar manner and are not infrequently referred to as nardoo by some writers. The seeds of acacias, crotalarias, cianthus, castanospermums and other legumes were the source of the vegetable proteins like our peas and beans. Their preparation was more frequently roasting, but they were also milled and baked into cakes. The seed-pods of *Acacia sophora* (coastal wattle) were frequently roasted by the coastal tribes.

Roots were much used, particularly as they were available even in drought times. Many species were used, the chief amongst them being the yams and allied species.

Queensland cookery included boiling, which method does not appear to have been used for any purpose in the south. The vessel used was a form of coolamon. The pitch of tree-ferns and rushes and other plants, including palms and cycads, were treated by roasting. They are usually gelatinous and starchy, but in a form different from the starch in seed, but similar to that in sago, tapioca and arrowroot. These roots and piths may be said to have a dietetic principle similar to our carrots, parsnips, potatoes and other root vegetables, but varying in mineral content.

Passing on to the fruits, nuts and berries, Australia possesses many quite palatable and edible species, but their fruits and berries are not so juicy or fleshy as those used for food in other parts of the world. Of the nuts, those of the Bunya Pine (which is really a conifer, with a cone of large and nut-like seeds) were almost a staple food in that part of Queensland where they flourish. So much were they prized that groves of these trees were the exclusive property of certain tribes—one of the few examples of vested interests amongst the blacks. There is evidence of trade by barter

with a portion of the crop, and there is also evidence of a trace of primitive agriculture in the theory that the seeds were sometimes deliberately planted to secure a continuity of supply.

The same suggestion has been made to account for the curious isolated grove of the Cabbage Palm near Orbost, as this species was also highly valued for its fruits and young shoots. The fruits of the Quandong, *Eugenia* (lillypillies), the *Exocarpus* (Wild Cherry), the berries of the Native Raspberry, Currant and Cranberry, as well as other fruits of the *Epacris* order, the Kangaroo Apple and the Native Elderberry were also used in Victoria.

Further north, there was a much wider selection, including the fruit of the Native Banana, Native Pomegranate, the Jujube Tree, Pandanus and at least twenty other species which they regularly used. The Poppel Nut (*Macadamia tenuifolia*) was almost as favoured as the Bunya. This is the only Australian fruit or nut that has been domesticated and grown commercially; it is becoming quite an important crop in Hawaii, plantations there having been established from seed sent from Queensland. Its flavour is more than equal to the Brazil nut, the only drawback being that the shell is extremely hard to crack. The enterprising American, of course, sells his crop already shelled and they are not infrequently imported into Australia from Hawaii so prepared.

All this class of food was eaten in a raw state, except the rather unattractive-looking fruit of the mangrove, which was heated and baked, probably to remove a deleterious principle, and was much used by the coastal tribes from the north to as far south as Altona Bay.

It will be seen from this very brief review that the aboriginal had access to a selection of plants which gave him plenty of variety and which were likely to supply the essential features of a vegetable diet in conjunction with good supplies of animal proteins and fats. He had available farinaceous food, starches, various fruit acids and sugars, and vegetable proteins. Sugars may have been lacking, but he made up for this by the use of wild honey, or in Central Australia by eating the honey-pot ant. Lerp or manna was also collected as a sweetening agent. This is a saccharine exudation of certain trees caused by insects and is not infrequently found on the Myoporiums, the Mallees and particularly on the Manna Gum, *E. viminalis*.

Plants also provided water in times of drought or in the absence of wells or soaks. The lateral roots of the Mallees such as *E. dumosa* and *E. oleosa* are storage reservoirs for the plant, and it is quite easy to obtain a pint or so of cool pure water from 8 or 10 feet of root. The Baobab tree (*Adansonia Gregorij*) of the Kimberley district, has a bottle-like trunk which is most appropriate to its water-storing capacity. Water stored in its knotty hollows

from the wet season is found fresh and clear after weeks or even months of dry weather.

The aboriginal has also discovered a narcotic in *Duboisia hopwoodii*, the Pituri. This plant grows throughout the Centre and another *Duboisia* of similar attributes farther north. The leaves are rolled and sucked without preparation; or if, as they frequently are, carried long distances or traded, the leaves are dried by heat, cut up and mixed with the ashes of acacia or cassia wood and made into a plug. It is then chewed or sucked and it is said to be a stimulant, to check hunger and fatigue and to excite courage in warfare. The general effects seem to be similar to those produced by the use of coca leaves in South America.

Brough Smythe records that the peoples of the Cape York district were addicted to smoking, using the leaves of a species of *Eugenia*. Probably this is the result of contact with Malays or other voyagers.

Fermented liquors were also not altogether absent. The Queensland blacks are said to have made a fermented drink from the Pandanus. The Victorians also compounded drinks from the flowers of the *Banksia omata*, which are full of nectar. The latter produced a much-esteemed drink known as "Beal," which was compounded in a large wooden bowl made from the excrescence made by galls on gum-trees.

Digressing from vegetable foods nearly all the authorities note the custom of eating certain clays, such as Kopai and Koalin, particularly in Queensland. Clay-eating has been noticed in many parts of the world, and it is usually looked upon as a very primitive or decadent habit. It can now be suggested that the reason is a far more logical one. Amongst the recent treatments given by our doctors for gastric complaints is the prescribing of colloidal clays, kaolins and precipitated chalk, to be taken internally as a relief to the damaged walls of an affected stomach. It is therefore reasonable to suggest that the clay-eating habit is really an important discovery made by the aboriginals and other primitives as an antidote to the effects of indigestion and coarse food. They were careful to free them from all grit and to remove any organic matter by roasting before use.

The aboriginals were also thoroughly acquainted with the therapeutic value of eucalyptus oils, and it is known that they used Melaleuca leaves in the healing of wounds. Quite recently, it has been discovered that at least one of these (*M. alternifolia*) has a very highly germicidal principle in an essential oil, contained in its leaves, now known as ti-trol.

The natives also used an infusion of the bark and juices of the mangroves in the treatment of burns. As mangroves contain a high percentage of tannin, this is quite in accord with modern medical practice. Probably a detailed investigation of more of their

herbal remedies would reveal an equally sound basis for their treatments.

One cannot but come to the conclusion, after this brief review of the food plants of the aborigines, that the subject is worthy of more attention than has been given to it by the early authorities. The methods of preparation should be investigated and more details are required as to the manner they were able to survive during the worst dry periods. Investigation is being made at the Melbourne University by Mrs. Dadswell, into the chemical and bio-chemical nature of some of these food-plants, and a preliminary paper which she read recently before the Royal Society indicated that, from a dietetic point of view, their use as food was completely justified.

Indeed, it would appear that the aborigines' diet, vegetable and animal, was better balanced than our own, and that the impressions recorded by early settlers and explorers were based upon a repugnance to, and the strangeness of, the food they saw used. Anglo-Saxons are particularly conservative in matters of diet and cooking. If our early explorers had been of the Latin race—French or Italian, for instance—their conclusions might have been different. These peoples are great adventurers in gastronomy: it is the taste and succulence of the prepared food that counts with them rather than the appearance or species of the raw material.

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Report on the Melbourne Exhibition of 1866-67.

EXCURSION TO TARADALE

About forty members attended an excursion to Taradale on September 17. Leaving Taradale railway station at 11.30, we proceeded west along the Fryerstown Road about one mile and stopped for lunch at the water-race in very picturesque surroundings.

About one mile beyond the water-race a real wild-flower garden was reached, with clumps of Wax-flower (*Eriostemon obovatis*), *Grevillea alpestris*, *Leucopogon* and *Acacia dealbata*, making the landscape gay with their varied colours. Orchids in flower were almost non-existent, although last year, the flowering was well advanced by this time. The Wax-flower was found chiefly on the ridges; as one descended the gullies, it thinned out.

The road was left at the cutting on the crest of the range with the object of finding some plants of *Leucopogon biflorus*, which were known to be there, and they were found in full flower. In Bentham's *Flora Australiensis*, it is noted that Mueller records *biflorus* from this locality. There is only a small patch, and one could not help admiring the Baron's skill in locating plants.

About fifteen species of birds were noted in the valleys, but it was remarked that stringybark country is not favourable for birds.—I.C.H.

EXCURSION TO ARARAT

The Field Naturalists' Club excursion to Ararat was very interesting and enjoyable.

Some members of the party arrived in Ararat on Friday, October 13, and for these the leader, Miss L. Banfield, arranged for a short trip to a bush paddock about three miles from the town, in the late afternoon. Here we were delighted with a good display of orchids, particularly *Glossodia major*. These were of many tints of blue and included some that were pure white.

Other members arrived by the express in the evening, and on Saturday morning we visited the aboriginal rock paintings at the "Cave of the Serpents," Laugi Ghiran, Mt. Mistake. We were pleased to see that the protective fence, sponsored by this Club and other interested bodies, has so far protected this interesting relic from vandals. Birds and lizards also added to the interest of this trip. Returning to Ararat for lunch, we were joined by the rest of the party, which now numbered seventeen.

In the afternoon we went to the nature reserve, MacDonald Park, for the purpose of participating in the unveiling of the memorial cairn set up there to the late Geo. Gossip. The unveiling was performed by Mr. A. H. Chisholm in the presence of the Ararat Field Naturalists' Club and many prominent citizens of Ararat and district.

Our members were hospitably entertained to afternoon tea by the Ararat naturalists, after which we were conducted round the park. This is an eloquent example of what could and should be done by every municipality in safeguarding the local flora. Those of us who had visited the area before were amazed at the regeneration that had taken place, and the planting done in a short space of three years, through the enthusiasm of the late Geo. Gossip and his willing helpers.

On Saturday evening, Mr. Chisholm showed the Commonwealth Government Lyrebird film at the Town Hall to a large assembly of naturalists and friends. Afterwards, we attended a special meeting of the Ararat Field Naturalists' Club, under the presidency of Cr. H. J. Blackie. There were extensive exhibits of the local flora, especially of orchids, and a very fine exhibit of orchid paintings by an Ararat lady member (Miss E. Holmes).

Mr. Chisholm gave the principal address, relating his experiences as a naturalist in Europe last year. He also showed some very fine slides of various natural history subjects. His contribution was much appreciated by the Ararat Club. Mr. Hyatt followed with a short talk on the history of botany in Australia and took the opportunity of presenting the Ararat Club with some copies of the *Tern Book* and the *Victorian Naturalist*, for the use of Ararat members, as a slight return for the hospitality we had received. Mr. W. H. Nicholls gave some interesting and useful comments on the species of native orchids exhibited.

On Sunday morning, the Misses Banfield arranged for the party to visit their property at the foot of Redman's Bluff, near Pomonal. We thoroughly enjoyed our roam through the bush at the foot of the Mt. William range, though the recent fires had devastated the area. After lunch, we moved on to another area on the Hall's Gap-Pomonal road. This area had likewise been burnt out, but the abundance of orchids seen compensated for the absence of the other Grampians flora.

At 5 p.m. the party left for Ararat on their return, with the exception of four members who went on to Hall's Gap for a few days. These members noticed great devastation in the Wannon Valley and elsewhere by last season's fires, but are pleased to say that there is evidence of a good regeneration of the flowering plants, as well as in the Pomonal area.—G.N.H.

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PROCEEDINGS

The monthly meeting of the Club was held at the Royal Society's Hall on Monday, November 13, 1939. The President, Mr. A. S. Chalk, presided, and about 120 members and friends attended.

SUBJECT FOR THE EVENING

A Lantern Lecture on "The Nullarbor Plains" was given by the Rev. Geo. Woolf, who was stationed in that region for some years. Unique interior views of some of the caves and a fine general series of the coast and various parts of the plains gave members a good insight into this very interesting portion of Australia. A number of questions were answered by the lecturer. A vote of thanks was proposed by Mr. Geo. Coghill, seconded by Mr. A. H. Chisholm, and carried by acclamation.

CORRESPONDENCE

A letter from the Federation of Victorian Walking Clubs invited Club members to attend their Annual Meeting.

REPORTS OF EXCURSIONS

Reports of Excursions were given as follows:—Ararat, Mr. G. N. Hyam and Mr. A. H. Chisholm; Burnley Gardens, Mr. P. F. Morris; Pound Bend, Mr. A. S. Chalk.

ELECTION OF MEMBERS

The following were elected as Ordinary Members of the Club:—Mrs. C. French, Miss Lynette Young, Mr. Ern. Baker, Mr. H. S. Parris, and Mr. D. C. Geddes.

GENERAL BUSINESS

(a) Welcome to Members.—The President welcomed back to the Club Mr. and Mrs. E. E. Pescott and Miss Vi. Fletcher, who had recently returned from overseas.

(b) Wild Nature Show.—A brief report of the Show was made by Mr. A. D. Hardy, as Show Organizer, and the President thanked all who had helped in making the Show a success.

NATURE NOTES

Miss J. W. Raff spoke on the Argentine Ant, giving its history and the reasons that made its control so necessary. A foot of ant gallery investigated showed 37 productive females.

EXHIBITS

Mrs. M. E. Freame:—Sea-Hare and egg-masses with embryos.

Miss J. W. Raff:—Specimens of Argentine Ants.

Miss L. Young:—Garden-grown specimens of the Red-pink Campion (*Lychus dioca*), an English wilding mentioned in Mr. E. E. Pescott's "The Making of an English Hedgerow," in the October issue of the *Naturalist*.

Mr. W. Abrahams:—Emperor Gum-Moth.

Mr. L. W. Cooper:—Emperor Gum-Moth.

Mr. H. C. E. Stewart:—*Neurachne alopecuroides* (Foxtail Mulga-grass), collected at Pomonal; *Burchardia umbellata* ("Milkmaids") and *Caladenia angustata* (Musky Caladenia), collected at Lower Macedon ten days previously, and showing the lasting qualities of these specimens. Also garden-grown *Callistemon coccineus*, *C. pallidus*, and *Leptospermum scoparium*, var. *Nichollii*. (Crimson Tea-tree).

Mr. A. D. Hardy:—One of three blue-tongued lizards newly-born in captivity at Mr. Thomas Campbell's residence, Kew.

Mr. E. E. Pescott:—The Alpine Edelweiss (*Leontopodium alpinum*) from Montreux, Switzerland, June, 1939; *Prasophyllum odoratum* (the Sweet Leek-Orchid), two flowers showing two labella each; collected by Mr. Opperman.

Mr. C. French:—Garden-grown flowers of *Leptospermum rotundifolia*; also an Orchid, *Thelymitra fusco-lutca* (Blotched Sun-Orchid) from the Grampians; this orchid is a comparatively rare species.

NOTES

It is regretted that the report of the Field Naturalists' Club Exhibition in Garden City, in October, is not yet prepared. It will be ready in time for the January issue of the *Naturalist*.—A. D. HARDY.

An error, overlooked earlier, occurs in my article on Eliza Gould (Mrs. John Gould) in the *Naturalist* for June, 1939. It is stated that Mrs. Gould stayed at Hobart "from her arrival on September 19, 1839, until August 20, 1840." Actually, as is shown by later references in the article, she arrived at Hobart on September 19, 1838, and left for New South Wales on August 20, 1839.—A. H. CHISHOLM.

FIVE NESTS IN ONE TREE

The present season has been, and still is, very prolific in the matter of birds' nests. Cr. H. J. Blackie (President of the Ararat Naturalists' Club) reports that on a recent Club excursion the nests found included a White-fronted Heron's nest with six eggs (usual number, four), a Rosella's nest with five young, a Currawong's nest with two eggs, a Cuckoo-Shrike's nest with three eggs, and also nests of the Wagtail (three), Restless Flycatcher (two), Dusky Wood-Swallow (two), Frogmouth, Mud-lark, Chough, Wattle-bird, and various Honey-eaters. Cr. Blackie adds that in MacDonalld Park there are five nests in one tree: a Chough's, a Heron's, two Mud-larks', and a Wagtail's. This is most unusual.

A NEW *CALADENIA* FOR VICTORIA

By W. H. NICHOLLS, Melbourne

The handsome orchid *Caladenia arenaria* was described and figured by R. D. Fitzgerald in his work *Australian Orchids* (1878), Vol. I, Pt. 7, Tab. 1.

He found it "in pine scrubs on sand hills" at Yanko Creek in the Riverina, New South Wales, and later it was reported from the Mudgee district (A. G. Hamilton).

It is pleasing now to record it from a Victorian habitat—an initial find for this State—for it was discovered near Hedley, in South Gippsland, by Miss Elése Rossiter. It was growing in fairly open country—a clay ridge—carrying messmate, tea-tree (*Leptospermum*), etc., on October 5, 1939.

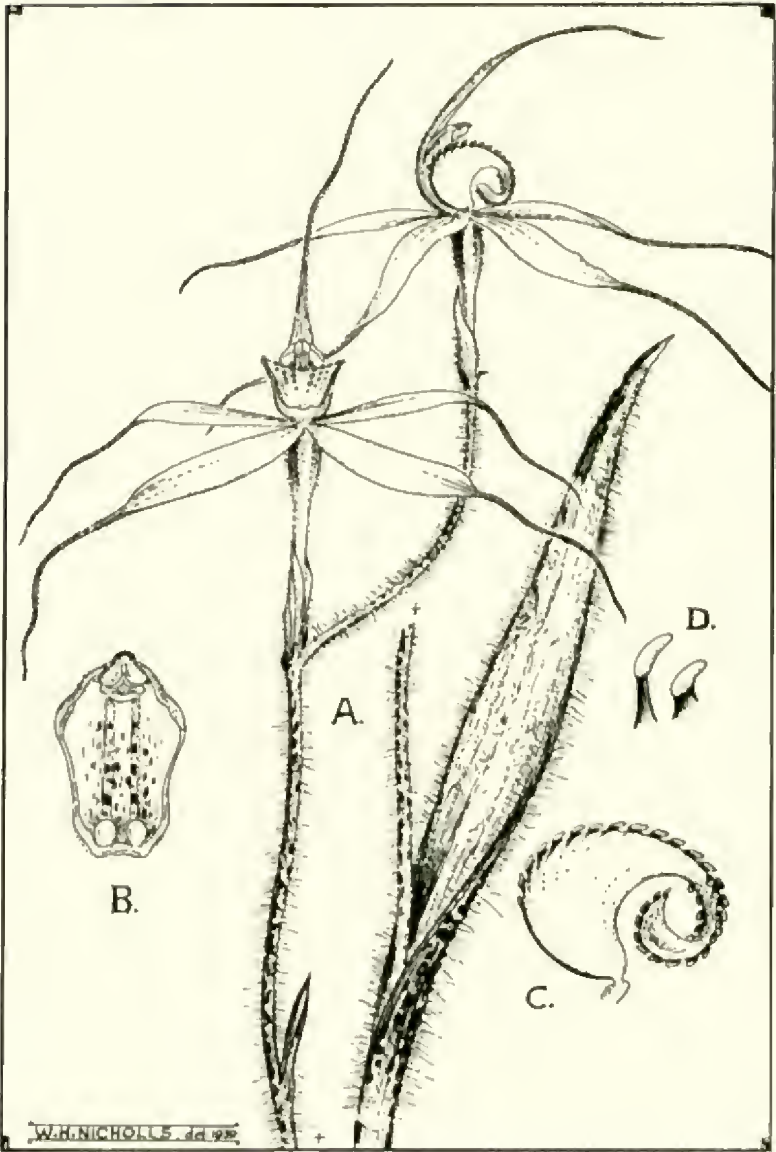
I cannot find other records of this *Caladenia* having been collected, but recall that it was reported some little time ago by Dr. R. S. Rogers of Adelaide, though I have failed to locate the reference. I recollect that one of his remarks was somewhat as follows:—"Fitzgerald's fine figure of this *Caladenia* does not overrate the beauty of this splendid 'Spider'."

Caladenia arenaria has a close ally in *Cal. Patersonii*, R.Br., the large white "Spider," which occurs so abundantly in many parts of Victoria and elsewhere. Notable habitats are Portland, Pomonal, Ocean Grove, and Clayton. But Fitzgerald's fine "Spider" has a stately bearing—"the dignity of an aristocrat"—not apparent in so marked a degree in any other *Caladenia* species.

The author of *C. arenaria* describes the labellum-margins as "crenate," but they may be referred to much better as runcinate—marginal calli—the teeth retrorse. They are very regular indeed and extend to the extreme apex. Individually, these calli are marked with a dark-coloured, collar-like band. These particular features are alone sufficient to differentiate this form from *C. Patersonii*, its ally, and from all other known species of *Caladenia*.

The Hedley specimen was received in perfect condition. Plant, 34 cm. high; leaf, 14 cm. long, linear-lanceolate, densely-clothed with very short fine hairs (almost blanket-like). Flowers, two, large; sepals, 7 cm. long; petals, 5.5 cm. long. The colour a light biscuit-yellow with a touch of gray; the markings confined to obscure reddish lines, chiefly on the petals and on the reverse of the perianth-segments; the long caudæ dark-reddish with minute glands. The calli on the labellum-lamina in six rows, of the golf-stick type, but varying in degrees of stoutness—those towards the base longer. Column very stoutly winged throughout and dotted somewhat sparsely with small longitudinal red blotches; two conspicuous sessile yellow glands at the base.

The specific name is an allusion to its original habitat, and means "growing in sandy places."



Caladenia arenaria

Flowering period: September-October. Distribution: New South Wales, Victoria.

Miss Rossiter is to be congratulated on her find, thus adding an additional name to the list of Victorian *Caladenias*.

KEY TO ILLUSTRATION, Page 124

Caladenia arenaria, Fitz.

Figure A.—The Hedley (Vic.) specimen.

B.—Column from front.

C.—Labellum from side.

D.—Calli from the Labellum-lamina.

(For natural size of Figure A see description.)

THE BEAUTIFUL *DIURIS BREVISSIMA*

By W. H. NICHOLLS, Melbourne

Diuris brevissima is known to science—to few workers only—from R. D. Fitzgerald's printed but unpublished colour drawings in the Mitchell Library, Sydney. It is an undescribed form.

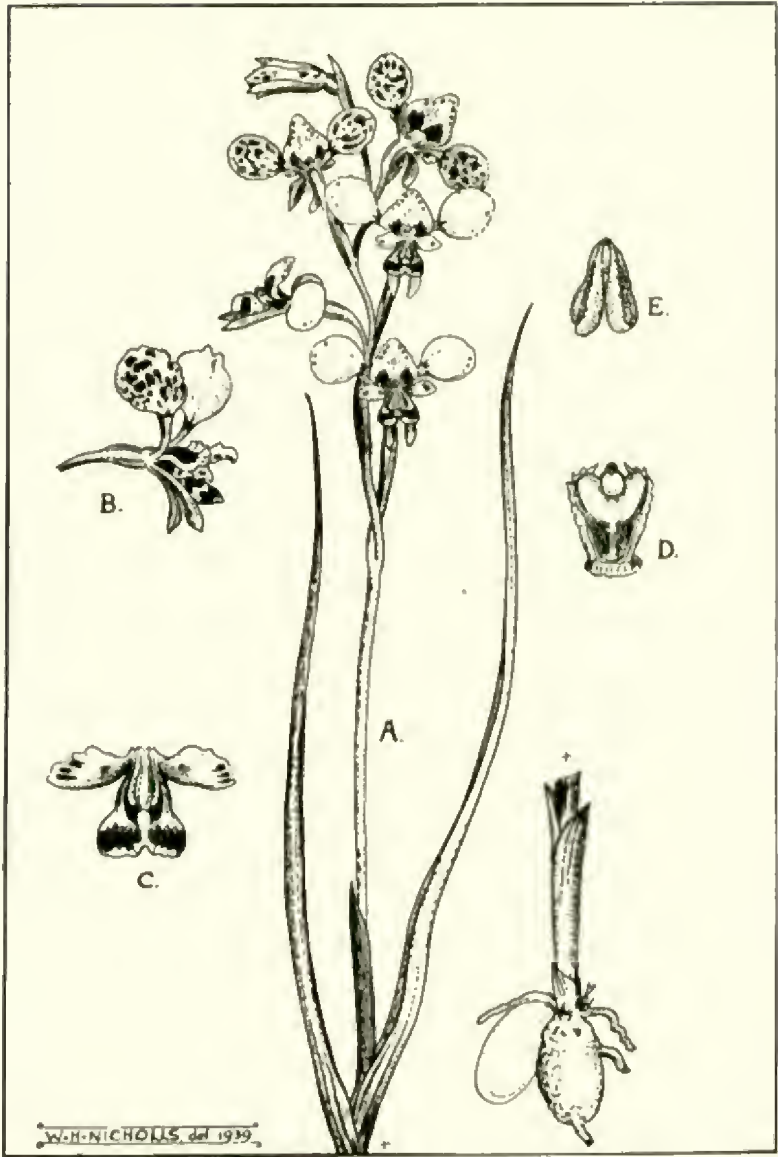
I am indebted to Mr. R. H. Anderson, Government Botanist, National Herbarium, Sydney, for copies of a number of these plates (printed in 1894); included among them is one of *D. brevissima*. I am indebted also to Dr. R. S. Rogers, of Adelaide, for a copy of his report on the collection in the Museum. *D. brevissima* is referred to as No. 74; fig. a. (Fig. b on the same plate is undoubtedly *D. maculata* Sm. "drawn from an indifferent specimen"). Fitzgerald's specimen of *D. brevissima* was collected in the Lawson district* of New South Wales on September 28; the year not given.

Among *Diuris* species *D. brevissima* is, in my opinion, an outstanding and beautifully marked form, and, despite its obvious affinity with *D. maculata*, it is well deserving of specific recognition, for it is an established form throughout the Ararat district of Victoria. It is more robust than *D. maculata*, and the flowers are more attractively mottled.

D. brevissima was observed by the writer growing *in situ*, in the McDonald Park, Bridal Hill, Ararat, on the occasion of the unveiling on October 14, 1939, of the George Gossip Memorial. It was growing in association with abundant specimens of *Glossodia major*, *Diuris maculata*, and *D. sulphurea*, in lesser quantity.

I have specimens of *D. brevissima* collected by Miss J. Anderson

*In a letter received from Rev. H. M. R. Rupp of Northbridge, New South Wales, dated 31-8-39, "Woodford, Blue Mountains, October," is given as locality and month of collecting for Fitzgerald's material.—(W.H.N.)



Diuris brevissima

(Devil's Garden, Pomonal, September 27, 1932), and others have known this fine form over a long period and have passed it over as a robust form of *D. maculata*, also as *D. palachila*. But *D. brevissima* is well separated from *D. maculata*, its closest affinity in a number of important particulars, as can be seen by a glance at the accompanying plate of figures.

Intermediate forms between (presumably) *D. maculata* and *D. brevissima*, or *D. palachila*, occur in the Ararat district. Though closely resembling Fitzgerald's species in general appearance, they are easily distinguished by the very different labella, and the length and character of the lateral sepals, and less sturdy habit, etc.

Description of *D. brevissima*, Fitz.—Plant slender, about 35 cm. high. Leaves usually two, linear, channelled, about 20 cm. long. Flowers six to nine (in my specimens) in a flexuose raceme, on long, slender pedicels, and subtended by long, usually purplish, sheathing bracts; yellow, conspicuously blotched with dark-red-brown—the markings similar to those in *D. maculata*, though more pronounced. Dorsal sepal 8 mm. to 1 cm. long, broadly ovate, prominently marked with deep red-brown and dotted along the upper margin. Lateral sepals *short*, broad linear, obliquely-pointed, *parallel*, 1.9 cm. long. Petals stalked, the lamina more or less orbicular, irregularly blotched on the under surface. Labellum about 1 cm. long (as long as the dorsal sepal), a brighter yellow than the other segments, with prominent dark red-brown markings; lateral lobes obliquely-oblong, almost as long as the mid-lobe; middle-lobe oblong-curveate (wider towards the tip than in *D. maculata*); tip retuse; lamina with two raised parallel or incurved raised plates ending about the middle in two blunt teeth: a more or less broad keel extending to the tip. Anther with an obtuse point as high, or a little above, the viscid disk.

Flowering period: September, October, November. Distribution: New South Wales, Victoria.

Habitats: McDonald Park, Ararat (the Misses Banfield), Pomonal (Miss J. Anderson).

KEY TO ILLUSTRATION, PAGE 126

Diuris brevissima, Fitz.

Figure A.—A typical Ararat specimen.

B.—A flower from a luxurious form (4 cm. in dia. across the petals).

C.—Labellum from above.

D.—Column from front.

E.—Pollinia.

(For natural size of Figure A see description.)

THE VARIABILITY OF *PRASOPHYLLUM FRENCHII*

By W. L. WILLIAMS, Melbourne

The Stout Leek-Orchid, *Prasophyllum Frenchii*, has been extremely plentiful during the current spring in certain areas near the Grampians that were swept by the bush fires of last summer. Other *Prasophylls* also were in comparative abundance, a fact which was noted after a less serious fire of some six or seven years ago. It seems that this genus of orchids is among those that are stimulated into particular activity in the following spring by a burning-over in the summer.

Ten specimens of *P. Frenchii* collected from this area were closely watched from the time the spikes broke through the leaf until they were in full bloom, and some interesting variations were noted.

Height and robustness were the least constant of all characteristics, one specimen being extremely slender and eleven inches in height, while another, also slender, measured twenty-two inches from the ground to the tip of the flower-spike. The height of the other eight specimens lay between these two extremes, but only one could reasonably be called stout. This latter specimen was perfectly erect, very rigid, and of medium height (seventeen inches), contrasting very strongly in general appearance with one or two taller specimens which were inclined to curve gracefully.

The spacing of the flowers on the spikes also varied considerably, those of the more slender specimens being very widely spaced, while on the stoutest plant they were crowded quite densely. Three-inch sections in the centre of each of several spikes were selected for a flower-count, and the extreme results were found to be fourteen flowers and twenty-five flowers respectively. Counts were made only on spikes at least six inches in length.

In colouration also a good deal of variation was noted. The stoutest spike held flowers of the deepest pigmentation, labellum fringe, petals, and the tips of the sepals being quite purple. Another fairly robust specimen, however, was quite pale, the only suggestion of purple colour being a line of mauve running along the junction of the fringe and the callous portion of the labellum; for the rest, the flowers of this specimen were a pallid green.

Lateral sepals displayed their usual variability. In some specimens they were united almost to the tip, in others they were entirely free, though usually lying parallel and fairly close together. Variability in this respect was noted often in flowers of a single specimen.

Perhaps the most striking specimen was a slender, dusky plant with lateral sepals quite divergent, and, unlike its fellows, heavily scented. For some time it was felt that this plant was not a specimen of *P. Frenchii* at all, but possibly an unusually large

and not very typical form of *P. fuscum*. However, the lateral constriction in the membranous portion of the labellum was quite marked on all flowers, and the structure of column and appendages agreed with that described for the appropriate parts of *P. Frenchii*. To clear the matter up, the specimen was submitted to Mr. W. H. Nicholls, who was good enough to confirm the identification. The chief characteristics of this specimen, some of which have already been mentioned, were its divergent lateral sepals, its even, dusky-green colouring without a trace of purple, its powerful and sweet scent, and its lip, rather more deeply channelled than might have been expected.

To sum up, it would appear that *P. Frenchii* may or may not be marked with purple, that it may be short or tall, slender or stout, that its lateral sepals may be almost entirely conjoined or quite widely divergent, that it may be with or without scent, and that the basal half of the labellum may be only gently concave or deeply and sharply channelled.

CHARLES BARRETT'S NEW BOOK

During recent years Mr. Charles Barrett has written a number of useful booklets on various phases of natural history, but *Koonwarra* (Oxford University Press) is much more ambitious; it is a book of over 300 pages, with some 50 excellent illustrations. Mr. Barrett offers the title-word as an aboriginal name for the Black Swan, whereas the Rev. E. I. Watkin (in his booklet on Australian Native Words) gives it as a Victorian aboriginal name for the oyster. Other writers have rendered the word "Conowar" and "Goonawarra."

In some respects this book is autobiographical. In general it is a gossipy, discursive account of wanderings in Australian wilds—and few of us have had the good fortune to wander over so much of Australia as Charles Barrett has seen. In general, again, the book is quite unlike the author's earlier writings. If you look to it solely for quiet, reflective, analytical natural history, in the Hudsonian tradition, you will be disappointed. If you prefer breezy "travelogues," with snappy dialogue in something of the manner of Ion Idriess, you will probably enjoy the book throughout. It is not like the Charles Barrett of old, you know, to write (of mosquitoes) "They worried me to a frazzle": (of a North Queensland "pub") "You could easily buy a fight there"; (of the weather) "It was hot enough to broil a brass monkey"; and to proclaim, in respect of a certain area, "Knowledge that others had been there before me took the gilt of discovery off my gingerbread." Nor would the Charles Barrett of old have given, in a nature book, dialogue sprinkled with "Damn" and "What the hell!"—to say nothing of "lazy cows" and other such oddities!

Possibly I am growing old, but my personal preference is for the quieter portions of *Koonwarra*—the portions that treat of nature and man sagely, in the restful manner. I wanted more of the story of Walden Hut (where Barrett, Brooke Nicholls, and Kinane followed the Nature trail long ago), more of the interesting story of the Nullarbor Plain, more of the various inviting islands of which we gain glimpses, and more of the real essence of the scores of other fascinating spots into which the author has wandered. But this is only an individual viewpoint. Readers who relish "action" will find *Koonwarra* arresting from start to finish. Certainly it "moves" (almost rushes), and certainly it covers a wide canvas—wider, perhaps, than that of any other Australian nature book.—A.H.C.

BOTANICAL JOTTINGS FROM ARARAT

By H. C. E. STEWART, Melbourne

Langi Ghiran, with its aboriginal rock paintings, lured us to pay a visit soon after our arrival at Ararat on the morning of October 14. A few miles from the town and a short distance from the main road to Ballarat, these are the most accessible of the few known examples of native art in Victoria.

The vicinity is not without botanical interest. It comprises in the main a timbered forest with evidences of a more extensive flora existent in the past. Apart from the various Eucalypts, remnants only of a major vegetation—*Casuarina*, *Exocarpius*, *Acacia*, and *Leptospermum*—remain. Stunted examples of dwarf shrubs and herbaceous plants that formerly covered the forest floor show deterioration through grazing. Fires apparently had not touched the locality in recent years, yet the process of gradual denudation of native growth is assuredly taking place.

Near the road, smaller bulbous plants have resisted extinction, and many were in flower, principally the orchids *Diuris maculata*, *D. sulphurea*, and *D. pedunculata*. One grassy expanse presented a picture of charm in the morning sunlight with that bluest of Victorian flowers, *Chamaecilla corymbosa*, in association with the clear yellows of *Hypoxis glabella* and *Bulbine bulbosa*, set amid species of glistening *Drösera*. The Twining Fringe-lily (*Thysanotus Patersonii*) and the Chocolate Lily (*Dichopogon strictus*) were also abundant. A tiny Common Maidenhair ventured lodgment in a crevice at the foot of the native art gallery, but the only other fern noticed consisted of patches of the Rock-lip Fern (*Cheilanthes tenuifolia*).

The commemoration at Bridal Hill in the afternoon was a pleasurable surprise to those members visiting the Nature Park for the first time. Here was a large area in process of reclamation, and a unique demonstration of what can be achieved by the adequate reservation of bushland, with fencing, protection from fire, the absence of grazing, and a proper understanding of the value of native flora preservation. Professor A. J. Ewart years ago pointed out that the flora of Victoria was in a rapid state of flux and forecasted the probable disappearance of more than half of the original flora within a century. The destructive forces of the past year or so, with fires, sand drift, and river and mountain erosion, cause many to believe the process has been accelerated. Thus the only hope for the preservation of many species of native flora and its dependent fauna lies in the conservation of special localities such as Ararat has provided. The experiment is of national interest. Other provincial towns might well emulate Ararat's commendable initiative.

Time permitted only a superficial inspection, but sufficient was seen to whet the appetite for an extended botanical survey. The sight of Waxlips (*Glossodia major*) of great size and in every shade of blue and mauve, with occasional white forms, was one to be remembered. Other orchids flowering freely were species of *Diuris*, *Thelymitra*, *Lyperanthus*, *Caladenia* and *Prasophyllum*. The Eucalyptus forest on portion of the reserve fortunately escaped fires, and the undergrowth was luxuriant with *Correa rubra*, *Grevillea alpina*, *Tetratheca ciliata*, *T. ericifolia*, *Platylobium obtusangulum*, *Stackhousia monogyna*, *Leucopogon virgatus*, etc., besides Cyperaceous plants and grasses. Special mention is made of the predominant epacrid, Daphne Heath (*Brachyloma daphnoides*). Another feature was the Grass Trigger-plant (*Stylidium graminifolium*), in white and pale pink forms.

The memorial to the late George Gossip is set on the highest point of the park. From this coign of vantage a fine panorama of Ararat district is obtained—the bold silhouette of Langi Ghiran in the distance and the bronze spring foliage of tree-tops in the valley below. Of Mr. Gossip's work in the park it can be said: "If you seek his monument, look around." Reclamation of waste portions of the reserve has been undertaken, with extensive plantings. The soil around the lagoon, disturbed by former mining operations, is set out with many species of Acacias. The natural forest section would make an ideal spot to restore as a primitive area. Experience elsewhere has shown how the original flora will "come back" if let alone. The judicious elimination of alien plants is all that is necessary. A list of plants in this area as they occur would prove of considerable ecological value.

The second day was spent botanizing near the Graupians. A stop was made near Moyston to view the profuse flowering of *Diuris* (several species), the scented *Prasophyllum Branci*, and *Thelymitra Macmillanii*. Prostrate growth of *Pultenaea* and *Grevillea* showed baneful effects of constant eating back by stock. The journey continued through a glorious show of the Austral Grass-tree (*Xanthorrhoea australis*), extending for miles until the foot of Red Map's Bluff was reached. A walkabout in the burnt bush in this area revealed a sad picture of devastation, redeemed by eucalypts venturing a timid mantle of green, and the resurrection of the Grass-trees. The latter were in thousands, and double-headed or fasciated forms were frequently met with. Orchids and rhizomous examples, such as *Burchardia umbellata*, of the more ephemeral ground flora were quickly rehabilitating the scene of desolation.

Later Pomonal was passed, through a stretch of fire-swept country, where rain had subsequently caused considerable silt erosion. At a point off the road between Pomonal and Hall's Gap

another halt was made. Here was seen remarkable growth of *Caladenia Patersonii*, individual specimens measuring six inches from point to point of the sepals. The forest floor had commenced regeneration and disclosed many miniature plants in the ascendant.

A delightful hour was spent in the examination of *Stuartina Muellerei* (the greyish Spoon Cud-weed), *Scirpus antarcticus*, the Hairy and Pointed Centrolepis (*C. strigosa* and *C. aristata*), *Hydrocotyle capillaris* and *H. hirta*, *Heteroglossis teurrioides*, *Rubidosia pumilis*, *Mitrasacme paradoxa*, *Lomandra glauca*, *L. sororia*, *L. filiformis*, *Millotia tenuifolia*, *Crassula Sieberiana*, *Brachycome scopigera* and *Goodenia geniculata*. The showy yellow *Podolepis acuminatus* and *Helichrysum scorpioides* formed an interesting contrast to the tinnest of Victoria Everlastings, *Helipterum pygmaeum* (Pigmy Sunray).

Other finds were the miniature *Styloidium despectum*, the diminutive *Microtis atrata* (*M. minutiflora*, F.v.M.), and a hybrid Spider Orchid that looked like a cross between *Caladenia Patersonii* and *C. dilatata*. *Morchella conica* (Common Morel), an edible fungus, was also found. Among the many grasses the Foxtail Mulga-grass (*Neurachne alopecuroides*) attracted attention.

Some of the party made a detour to see the Sister Rocks, near Stawell. These Rocks have been wantonly defaced by individuals who have used gallons of paint and even ladders to outdo each other in emblazoning obscure names and initials. The practice is said to have become a tradition. What should be a geological and scenic feature is now an example of depraved vandalism.

The Melbourne members were still further privileged to examine a comprehensive display of local flora at the evening meeting arranged by the Ararat members. A visit was paid to the Public Gardens to see many well-grown Australian plants, and there a brilliant bush of *Grevillea algoides* compelled admiration. Mrs. Gossip's garden, with two adjacent private gardens, was also inspected. These contained a plenitude of Australian subjects, among which a giant size *Prostanthura rotundifolia* in a mass of purple bloom excited special notice. A stroll along the railway line near the town was well repaid to see the many species of orchids and wayside flowers.

Much of natural interest occurs in Ararat and environs, so that the week-end by the Club should be retained as an annual event.

A book entitled *A Garden in a Valley*, written by Miss Jean Galbraith, is on the press, and will be published early in December. Miss Galbraith has contributed many articles on plant and bird life to Australian and overseas papers, and here she has woven her knowledge into a charming human story. *A Garden in a Valley* is being published at 2/6 by the Horticultural Press Pty. Ltd., Melbourne.

THE LIFE OF "BLUEY"

By KATHLEEN CONWAY, Eskdale, Victoria

[Kathleen Conway is a competent young naturalist, who now works at Wangaratta but whose home is at Eskdale, where all her life she has been on good terms with all creatures of the wild except snakes—on a return visit there recently she saw three big tiger snakes and killed two of them! "Bluey," about whom Miss Conway has written this article by invitation, was a Dormouse-Opossum, or Dormouse-Phalanger, or Possum-Mouse, technically *Dromicia nana*. Five species of these quaint little marsupials are known: *D. nana* is recorded for south-eastern Australia and Tasmania, and the other four species belong respectively to South and Western Australia, Queensland, Tasmania, and New Guinea. None of the species is familiar. All spend the day curled up in hollows of trees, but at night they become very active, and behave very like the English Dormouse. Like their English namesake, too, they spend part of the winter hibernating, a characteristic which appears to be unique among Australian mammals. Mr. A. H. Mattingley records that a Possum-Mouse which he captured in a dormant state, years ago, curled into a ball and slept for six weeks.—A.H.C.]

For just four years and four months I had the nicest little pet one could wish to have—"Bluey," my Dormouse-Opossum.

This tiny possum was brought to me on September 8, 1934, and was then very thin. I took the little creature in my hand and got some honey on my finger. She soon licked that up, so more was produced. "Bluey" soon became quite tame and waxed very fat.

She did not like being handled by strangers, and would always bite and try to escape. Once back to me, she would curl up and lick my hand.

One morning I went to "Bluey's" box and found her cold. Her ears were drooped and she could hardly move. I thought she was dying, so I kept her in my hands and warmed her by the fire till she was herself again. A few days later I found her in the same condition, so just left her in her nest. She was soon curled up tightly and stayed that way till night, when she came out for her food. I knew then that it was quite natural for her to become cold and go to sleep.

On May 12, 1935, "Bluey" slept all day and all night. She did not sleep again till June 29, 1935, and again on July 1, 1935. On August 8 she slept all day and all night, and all next day and all that night—five nights in all.

During the following winters she did not sleep one night. Regular feeding must have been responsible for that. "Bluey's" diet consisted of grasshoppers, wood-grubs, moths, honey (thinned down with water), lollies, banana, orange, peach, coconut, sultanas, cream, all fruit juice, and preserved fruits. She would drink plenty of water, too.

In January, 1937, I went away to work, leaving my pet in my sister's charge. On returning for the day, three months' later,

I found that "Bluey" no longer knew me. I was a stranger to her. She bit me and was not a scrap at ease in my hand.

During the last year "Bluey" became very fat and on January 6, 1939, when the temperature was 112° in the shade, she died.

I had tried for those four years to secure a mate for my little pet, but failed. Then, just three months after she died, we got another Dormouse-Opossum, so now "Bluey the 2nd" takes the place of the old "Bluey."

THE STORY OF "TWINKLE"

By J. M. BOCKING, Lawson, New South Wales

[This article has been lying aside (unpublished) for ten years. It was sent by Mrs. Bocking (mother of the writer) to a friend of mine in Sydney in 1929; he mislaid it at the time and afterwards passed it on to me, and I have been awaiting an opportunity to use it. This opportunity has arisen with the receipt of Miss Conway's article, to which it makes an appropriate companion. Indeed, it is a pleasant coincidence that two Bush girls, in two States, should have made these interesting notes on one of our least-known mammals. One presumes that, since the writing of this article, "Twinkle," like "Bluey," has been gathered to his fathers.—A.H.C.]

Having lived for years on the banks of the Murrumbidgee (New South Wales, Australia) and now on the Blue Mountains, we have always been keenly interested in the bush life about us.

Great was our excitement one morning when our neighbour's cat, "Digger," brought in two tiny bush creatures. These we decided to keep as pets. One was a Pigmy Feather-tail, which unfortunately did not live long in captivity. The other, "Twinkle," as we called him on account of his bright, black, beady eyes, was a tiny Dormouse-Opossum. He has lived with us now for over a year.

His house is a large box with gauze sides and a little upstairs room, where he sleeps all day curled up in his blanket. As nearly as possible, we give him all natural conditions and foods with turf and sand on the floor, and gum boughs, dripping with water or dew (and up and down which he climbs at night with quite a noise of rush and scurry), blossoms of any wild flowers blooming, and fruit and berries.

"Twinkle" is a pretty wee animal; he weighs only about half an ounce. His coat is soft and grey, and white underneath. The ears are large and fine in texture, but when he sleeps they are folded close to his head. His tail is long, and when not in use he carries it coiled up behind him—like a spare wheel. He has a pretty trick of hanging from a finger by his tail and then climbing it.

All his ways are fascinating and clean. He is very particular about his ablutions, which are performed, each evening and after

Plate IX



"Twinkle"



"Bluey"

he has eaten, by spitting into his little pink hands and washing his face, body and tail, till all are sleek and glossy.

The children love to watch him eating flakes of oatmeal, which he holds, one in each hand, like biscuits. They also raptly watch him eating a mantis, a grasshopper, or a small spider, or lapping the honey from some wild flower such as the red bottle-brush.

We have taken "Twinkle" inland and to the seaside, and often he goes visiting in a small box lined with flannel. Everywhere, he excites great interest and amusement.

While writing about him we have been nursing him and talking to him, and he seemed to understand what we were saying! And now, as though tired of the subject, he has rolled himself into a ball in my hand and gone fast asleep.

EXCURSION TO LABERTOUCHE

Perfect weather favoured the excursion to Labertouche on November 19, and twenty-five members and friends made the trip by car, or by train to Longwarry, the owners of private cars taking the train passengers the seven or eight miles to Labertouche.

The excellent roads in the district made the excursion really a motor run, with stops at the most flowery spots.

Orchids were mostly past the flowering stage, though many beautiful *Thelymitras* were seen in full flower, as also were several plants of *Caladenia cornuta*, *Calochilus Robertsonii*, *Microtis porrifolia* and *Prasophyllum brevifolium*.

One noticeable feature was the abundance of blue-coloured wildflowers, a rather rare feature of our countryside; in places the fields were blue with hundreds of plants of *Styphandra caespitosa*, while *Dampiera stricta*, *Wahlenbergia gracilis*, *Lobelia anceps* and *Dianella laevis* added their touch of blue colour to the landscape. Two varieties of *Stylidium* were collected, namely, the grass trigger-plant (*S. granulosum*), and the small trigger-plant (*S. despectum*), the latter only about two inches high. The pretty holly tomattia, *Lomatia thicifolia*, was in full flower in the State forest. *Tetratheca pilosa*, rare in this district, was also found. The pink boronia, *B. Muelleri*, was past its best, though many flowering plants were seen in the forest. From the number of bushes that have been cut back it is easy to believe the reports that truck-loads of this lovely plant have been taken to the markets.

Of the birds seen those that attracted the most attention were the black cockatoos.
C.C.C.

STUDY OF GRASSES

An Excursion to Burnley, under the leadership of Mr. P. F. Morris, was made on November 4, for the study of grasses. An examination of the grass test plots was made and the value of the work to the public was explained by the leader. The chief work was on long lived strains of Perennial Rye Grass (*Lolium perenne*). The chief point of interest was that the Victorian-grown seed gave superior produce to that imported. Members studied bowling rink and golf green grasses, as well as many species of Clover. An Excursion was made along the banks of the Yarra, where thirty-five or more species of grasses are to be seen.

THE CHILD AND THE SNAKE

The coming of the "Snake Season" impels me to relate a remarkable experience I had as a child of about six years, when my family was living close to a river which had a bad name for snakes.

On this particular day I was amusing myself on a swing ("letting the cat die") with the dog, tied up, sleeping close to me. That is as far as I can go with the story from personal knowledge.

My mother was returning to the house, after gathering kindling wood, when she saw me on tip-toes, as far back as I could get on the swing, and a large snake with about half its length raised up in front of me. Mother gave a scream, which woke the dog; he charged the snake, but his chain prevented him from reaching it. Then the snake dived towards the river and disappeared down a hole, and I fell off the swing and ran screaming to Mother.

She pacified me and looked for bites, but could not see any; but I was in a lather of perspiration. She then took me to Father, who satisfied himself that I had not been bitten. He then examined the ground and saw where the snake had come from the river and was making towards the house when it had turned towards the swing.

Father questioned me as to whether I had seen the snake coming towards me, and when I said I had not, he came to the conclusion that the snake must have fixed me when about ten yards away, which I think was correct as I do not remember seeing it until it reared up in front of me, and even then it was very faint, as my vision seemed blurred, like looking into a fairly dark night. I could just discern the outline of it, but when I struck the ground, my vision cleared, and it was bright sunlight in a moment.

I seemed to suffer no ill-effects at the time, but about three months later I began to sicken and had a very long illness, which puzzled the doctor. He could not diagnose the trouble until Mother told him about the experience with the snake, and he blamed the illness to that.

All old bushmen are puzzled as to why I backed away from the snake. Several of them had seen one bring a possum or frog right up to them, whereas I unconsciously backed away. I myself have watched a snake attract a frog to him, but I ended the episode by shooting the snake and rescuing the frog.

It was predicted that I should always be very nervy with snakes, but I have not found it so. I have had the usual thrills—have felt my flesh creep and hair stand on end, and have walked over snakes on three occasions—but have always been able to return the attack, providing I could get a stick and light enough to see what to do.

"OLD BUSHMAN."

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PROCEEDINGS

The monthly meeting of the Club was held at the Royal Society's Hall on Monday, December 11, 1939. The President, Mr. A. S. Chalk, presided and about 100 members and friends attended.

SUBJECT FOR THE EVENING

Mr. S. R. Mitchell spoke on various ornamental objects, and the minerals used in their manufacture, by various aboriginal races and previous civilizations. The talk was illustrated by various specimens of weapons, etc.

Mr. A. H. Chisholm spoke on "Anting by Birds," and gave the history of the discovery. Observations from many countries were mentioned, and a selection of correspondence received by him after a broadcast in England was read.

Mr. Ivo C. Hammett spoke on plants in the western parts of Victoria, more particularly those of the drier areas. We noted the extensive root-systems of some of the species.

Mr. F. S. Colliver spoke on "Coal Plants." Using specimens and diagrams, he showed that many of the genera listed as ferns were seed-bearing plants of fern habit. These are now placed in a separate group—"Pteridosperms."

Mr. Chisholm reported that he had seen the Black-faced Flycatcher nesting at Ferntree Gully, and mentioned that the orchid *Sarcochilus parviflorus* was fairly common in the same area.

Mr. Berriman showed a film of some scenes at Pound Bend, taken at the Club excursion.

GENERAL

The President read a telegram from Mr. and Mrs. C. L. Barrett, conveying greetings to members.

Excursions were reported on as follows: Mornington, Mr. T. S. Hart; Kinglake, Mr. A. A. Brunton.

The following were duly elected as ordinary members of the Club: Miss D. Moore, Mr. Keith Kiddle, and Mr. Arthur Bourke; country members: Messrs. Keith V. Hateley and H. G. Taylor.

Question: Is it a fact that the Straw-necked Ibis nests only once in seven years?

Answer (by Mr. A. H. Chisholm): "No."

This being the end of the agenda, the President extended the season's greetings to members and adjourned the meeting for the conversazione.

EXHIBITS

Mrs. M. E. Freame: Doris (n. sp.) and egg girdle.

Mr. A. A. Baker: Smoky quartz crystals collected recently near Nar Nar Goon.

Mr. V. H. Miller: Two sprays of an Orchid (*Cymbidium* sp.), and one plant to be named.

Mr. H. T. Reeves: Several coloured photographs of native flora.

Mr. F. S. Colliver: Coal Age plants, including such genera as *Annularia*, *Sphenophyllum*, *Alethopteris*, *Pecopteris*, *Pseudopecopteris*, *Sigillaria*, *Lepidodendron*, *Calanites*, etc. Specimens from U.S.A. and England.

Mr. E. E. Pescott: Flowers of the Blue Berry Ash (*Elaeocarpus cyaneus*), and *Pelargonium australe* (Australian Stork-bill). Flowers of *Sarcochilus Fitzgeraldi* and *S. Hartmani* (orchids native to Queensland); flowering plant of *Ophrys asifera*, the Bee Orchid, a native to the British Isles and the first time recorded flowering in Australia. All plants cultivated at Canberwell.

RABBIT VITALITY

When out shooting at Maude, near Bantockburn, I fired at a rabbit (No. 3 shot) at a distance of 37 yards (measured). It jumped and ran for 50 yards at right angles to the warren, 100 yards away; then it turned towards the warren and ran for 10 yards, then stopped, lifted its right front foot in the air and waved it a couple of times, then fell dead.

I examined it and found three pellets high up on the left thigh and one pellet in the heart; it was slightly lower than half-way down the heart. My brother-in-law, who has considerable experience in rabbit shooting, told me it was not uncommon for rabbits to run up to 100 yards and then fall dead, during long-distance shooting.

On another occasion a hare was put up 30 yards ahead and going straight away. I fired; the hare stumbled but kept going at a reduced pace for some 40 yards. Then it paused, lifted up its right front foot and waved or shook it, went on for about 20 yards, stopped, waved the right foot two or three times, then fell dead.—C.B. (Canterbury).

Plate X



New species of Greenhood, *Pterostylis alveata* Garnet, found by Miss Elise Rossiter, at Little Snake Island. See description in *Victorian Naturalist* for October.



Photo. by A. O'Brien.

Daspa cphippium, with nest.

NOTES ON THE MASON-WASP AND ITS NEST

By JANET W. RAFF, M.Sc., F.R.E.S.

The large mason-wasp, *Abispa ephippium* Fabr., is one of our most beautiful forms of mud-daubers. It is a solitary wasp belonging to the family known as Eumenidae, the members of which work in pairs only, there being no "worker" caste. In some species of the family the petiole or "waist" of the adult is short and inconspicuous as in this species, and so the body appears thick-set and robust: in others the petiole is long and narrow, giving the abdomen, or gaster, a stalked appearance.

Abispa ephippium measures over an inch in length, and about $1\frac{1}{2}$ inch across the wings. It is light brown in colour, banded with black. The wings are light yellowish with dark tips, the fore-wings being folded lengthwise, when at rest, as is typical of the family (see photograph). The male has a yellow "face," while that of the female is light brown. Identification of the wasp has been verified by Mr. J. Clark, Entomologist of the National Museum, Melbourne.

The nest is shown in the accompanying photograph taken by Mr. A. O'Brien, to whom my thanks are due. It was brought to me in January, 1932, by Mrs. H. G. Andrewartha, who had collected it near Narrandera, N.S.W. It had been built under the eaves of a building, and measured roughly $2 \times 2 \times 1\frac{1}{2}$ inches. It was placed in a breeding cage in the Insectarium at the School of Agriculture, University of Melbourne, and was held in a warm situation to await emergences, a humid atmosphere being maintained by keeping damp sawdust in the cage. The nest was composed of three chambers or cells and carried a beautifully constructed thin-walled funnel, directed downwards from the front chamber. Unfortunately, the lip of the funnel was slightly broken before the photograph was taken. The clay texture of the nest was very fine and hard and consolidated, and parts of the outside surface had a "rough-cast" appearance.

As no emergences occurred during that summer, towards the end of November the surface of two of the chambers was carefully pared down with a scalpel in order to see what was happening within. Sufficient material was removed to reveal the presence of a large soft cream-coloured larva in both of the chambers. The gaps made were immediately sealed over with gummed paper, and the nest was replaced in the breeding cage.

On March 2, 1933, an adult *Abispa ephippium* (female) emerged from one of these chambers, and a scraping noise was detected from the adjacent cell. Seven days later a male adult emerged from this cell.

These two cells were then opened still further, as seen in the photograph, for the purpose of examining the contents. Frag-

mentary remains of lepidopterous caterpillars were found, these having been stored as food for the developing wasps. Each cell was lined by the thin, papery light-yellow cocoon of the wasp.

A year later, as no further emergences had occurred, the third chamber was cut open for inspection. It was found to communicate directly with the funnel, and appeared at first sight to be empty, there being no caterpillars stored. On closer investigation, however, a minute object was located on the floor of the cell, and after a detailed examination this proved to be a broken egg-shell with a transparent larva protruding from the break. At the tapering end of the eggshell, there was a short stalk or filament. This minute object was probably the hatched egg of the *Abispa*, and reference to it will be made later.

Regarding the funnel structure, some interesting notes have been made by Mr. K. C. McKeown in the *Australian Museum Magazine* for 1932 (Vol. 4, p. 381). He explains that this is made by the female wasp as an entrance tube to the particular chamber under construction. He states that when the cell is completed and is provisioned with caterpillars the wasp lays an egg and then proceeds to plug the cell; this she does by breaking down the funnel and using the "masonry" with which to close the cell. Further, as each new cell is formed, another funnel is constructed, only to be pulled down later in the same way. That such a "thing of beauty" should be so destroyed does indeed seem to be a waste of energy.

This destruction of the funnel at the completion of building will account for the large massive nests of *Abispa*, composed of six to eight cells, so frequently found, which possesses no such entrance tube.

Mr. McKeown notes that the female was seen to rest in the empty cell at night, backing carefully in through the funnel-entrance.

Referring to the points noted above, that the third chamber of the nest, when examined, was found to be open to the exterior through the medium of the funnel entrance, and that it contained what was apparently a wasp egg but no store of caterpillars, an interesting question is opened up.

This finding gives support to the statement made by Wheeler and others that some of the Eumenid wasps, instead of first storing their nests with caterpillars and then laying an egg, after which the cell is closed, reverse this usual procedure, and lay an egg first, and keep the cell open while provisions are brought in to the developing wasp larva. The first method is the general one for solitary wasps and is the method usually stated for *Abispa*: the second method is that used by the more highly evolved social wasps, such as the paper-wasps. In these latter the worker caste

is developed and the cells are kept open, the young larva being fed by the workers with food such as masticated caterpillars, the cells being closed only after the larva is fully grown and ready to pupate.

It appears to me that there is a probability that *Abispa ephippium* might be included (contrary to the usual idea) among those Eumenids that exhibit this tendency towards the "social" method of feeding the young. The funnel entrance curving from the open cell would then have a further significance, in that it would form a definite check on parasites or other intruders that might enter the open cell during the absence of the female gathering provisions. However, only by careful and patient observation of *Abispa* during the actual processes of building and provisioning of the chambers, could this question be definitely settled, and my hope is that such an opportunity may come my way.

It was of great interest to find a paper by E. Roubaud, entitled "The Natural History of the Solitary Wasps of the Genus *Synagris*," in the annual report of the Smithsonian Institution for 1910. Here Roubaud gives a most interesting account of three species of this genus from the Congo, Africa, where a definite transition was seen from the solitary to the social mode of feeding. Thus, firstly, in *Synagris calida* the female provisions the cell, lays an egg, and closes the chamber, taking no further care of her offspring; secondly, in the case of *S. siceliana*, an egg is laid in the empty cell, and caterpillars are provided from day to day until the wasp larva is about three-quarters grown, when some surplus caterpillars are stored and the cell is closed; thirdly, in *S. cornuta*, the female guards and feeds her offspring from the time of hatching, until it is full-grown and ready to pupate, feeding it, not with whole caterpillars, but with masticated food, in exactly the manner of the true social wasps.

MAGPIES AS MIMICS

I have no doubt now that vocal mimicry is quite common among Black-backed Magpies. In the vicinity of Tallangatta I saw frequently two wild Black-backs that could mimic most of the sounds that I used to hear from a bird of the same kind at Eskdale—and that Magpie used to mimic the bark of the dog fox, the neigh of the horse, the whistling call of the swamp-harrier, and the calls of the mud-lark, grey thrush, and many smaller birds. I have also found two more mimicking Magpies in the Mitta district. I wonder if the White-backed Magpie is a mimic, too?—KATHLEEN CONWAY, Eskdale.

INTERESTING BOTANICAL FIND

At Rushworth (north-eastern Victoria), Mrs. Edith Rich, the finder of quite a number of interesting plant forms (including *Calochilus imberbis*, and purple-marked forms of *Diuris maculata*), has now discovered attractive pink flowers of *Cheiranthus linearis*, the "Finger-flower." This beautiful plant, which normally bears dark blue flowers, would doubtless be an acquisition to our rock-garden subjects.—W.H.N.

A NOTE ON TWO TASMANIAN CALADENIAS

By the REV. H. M. R. RUPP, Northbridge, N.S.W.

A.—*C. pallida* Lindl.

In the course of a review of the Australian Orchidaceae in the National Herbarium of New South Wales, I have come upon a large number of specimens collected by Archer and Gunn in Tasmania long ago, some of Gunn's dating as far back as 1836. They are, with few exceptions, in an extraordinarily good state of preservation, even distinctions of colour being quite perceptible; and it is clear that great care was exercised in pressing them.

In these old collections, as might be expected, under the name *Caladenia Patersonii* there were included several forms now recognized as well-defined independent species. Here I desire to call attention to one which was accorded specific rank by Lindley, but was considered by Bentham to be a mere variety of *C. Patersonii*. With all due deference to the opinion of the great botanist, I venture to think that this orchid is as distinct from *C. Patersonii* as *C. dilatata* or *C. reticulata*. I suggest that it be recognized as *C. pallida* Lindl., on the following grounds:

1. In all specimens the whole flower, even to the calli on the labellum, is consistently of a "pallid" hue, in contrast to other forms.
2. Stem and leaf inconspicuously and sometimes sparsely, beset with very short pale hairs, often appearing glabrous to the naked eye.
3. Sepals under 3 cm. in length: the laterals very narrow at the base, then broadening, then rather suddenly contracting into filaments: the dorsal one and the shorter petals linear.
4. Labellum less than twice as long as broad: entire from the base for nearly a third of its length, then shortly "combed" like *C. dilatata*, the teeth soon abbreviated, but continuing as a crenulation of the margins right to the apex. Central calli in 4 to 6 rows.
5. Column as long as labellum, slender with narrow wings.



Caladenia pallida, drawn from one of Gunn's specimens in the National Herbarium, N.S.W.

The specimens chiefly used for the purposes of this note were collected at Circular Head by R. C. Gunn on Nov. 4, 1837. Fresh material from Tasmania would be very desirable for confirmation of the above details.

B.—*C. Patersonii* var. *rosea*, n. var.

In 1921 I received from Miss T. Bethune, of Ouse, Central Tasmania, a form of *C. Patersonii* of a beautiful heliotrope colour. This gave the flower a very distinctive appearance, but I could find no other variation from the average form except that the flower was smaller than usual. In Gunn's collection referred to above, there are numerous specimens corresponding with Miss Bethune's, from various localities. The colour is still quite perceptible in many, from heliotrope to rose-pink; in fact, it is more pronounced than in my Ouse specimen of only 18 years ago. I suggest that this form be known as var. *rosea*.

PLANT INVASIONS IN THE MALLEE

By W. J. ZIMMER, DIP. FOR., Mildura

In the more arid sandhill section of the Mallee country north of Hattah an interesting example of a temporary invasion by annual and perennial plants has been under observation during the past several months. Some natural regeneration of the shrubby climax vegetation has also occurred within the same space of time. This new growth is attributed to an unusual accumulation of soil-moisture; defoliation of the vegetation by fire has very materially reduced the transpiring leaf-surface.

On January 10, 1939, an extremely windy day with a maximum shade temperature of 117 degrees, a fire traversed some twenty-five acres of mixed Mallee scrub and porcupine grass, completely killing the aerial portions of the plants on the area. Towards the end of February, a splendid downpour of 373 points occurred; and subsequent rain has enabled the defoliated root-stocks to put forth a new growth that commenced in mid-winter. Before the advent of the fire, the 25-acre fire-area was identical with the contiguous country; the soil, contour, and density of species were alike. Now (early December), the areas exhibit a marked vegetal contrast. The unburnt zone remains unchanged but the fire-swept piece is so well delineated by a mass of flowering annuals, perennials and seedlings of the "scrub," that the entire periphery of the burn can be followed without any hesitation whatever.

A census of the plants has revealed the presence of 63 species. This total includes the root-stocks that are sending out a vigorous regrowth. The Mallee regrowth of *Eucalyptus angulosa*, *E.*

oleosa, *E. dumosa* and *E. viridis* is, in no instance, greater than one foot high; it represents not more than 0.01% of the original foliage area, and that of the Porcupine Grass (*Triodia irritans*) is probably less than 15%.

Under natural conditions, this particular zone is one in which small seasonal plants are always extraordinarily sparse and seedlings of the "scrub" rarely appear. Normally, the ground is overshadowed to an extent of approximately 26% by Mallee which attains an average height of 8 feet. About 5% of the ground is occupied by *Triodia irritans*, thus leaving an area of roughly 69% available for the growth of smaller plants.

Perhaps, to the uninitiated, it may seem that the unoccupied land-surface should carry a more abundant growth of plants than the miserable and scanty specimens of *Halgonea cyanca*, *Gahnia lanigera*, *Westringia rigida*, *Bassia parviflora*, *Goodenia geniculata*, *Tricoryne elatior* and *Stipa variabilis* that are present. However, investigation of root-development in the first 12-15 inches of soil, coupled with the rate of transpiration, of the foliage of the scrub-type of vegetation in occupation of the land, reveals that the inability of small plants to survive can be ascribed to the deficiency of soil-moisture in the surface-horizon.

Some very illuminating observations concerning the ramifications of Mallee root-systems can be made in road-cuttings, wash-outs and other excavations in the earth. There it can be seen that two main forms of root-developments, namely, a shallow or surface system and a deep-seated system, are relied upon for the conduction of moisture to the transpiring leaf-stomates.

The shallow system operates in close contact with the soil-surface, where it is able immediately to absorb all precipitations of a light to moderate character. This system forms a network of small roots that even penetrate the root-masses of the Porcupine Grass without being deflected from their course. Owing to the fact that many of the smaller roots are often dead, it is suspected that these finer arteries are sometimes killed during periods of prolonged drought in very hot weather, because the exodermis is not thickened in the manner adopted by the Porcupine Grass. The roots of the latter species are incased with an extremely hard, metallic-like exterior that is capable of withstanding the terrific temperatures of the surrounding sand in mid-summer. The Porcupine Grass pushes out a dense mass of lateral roots that extend as far as 4 feet from the base of the plant.

When it is known that, upon an average, an area of one square chain of land supports 30 clumps of Mallee and 70 plants of Porcupine Grass, it is not surprising that such a colossal network of roots is in possession of the surface soil-layer. Further, the

deep-seated root-system of the Mallees gives them an advantage, for they are able to draw upon supplies of moisture not within the reach of the Porcupine Grass.

During the summer of 1938-39, which followed a year of unusual aridity—the total annual precipitation amounting to only 5.17 inches—(the average annual rainfall is 10.58 inches), and record shade temperatures were established (January, average for first fourteen days 108.7 degrees, average for month 100.7 degrees; February, average for eleven days 106 degrees), it was noted that the Mallees put on a remarkable new growth. This indisputably denotes that the roots were in contact with ample moisture at depth. On the other hand, Tea-tree (*Leptospermum coriaceum*) which does not root so deeply, received a severe set-back and some deaths occurred.

That the foliage of the Mallees is capable of transpiring enormous quantities of water has been demonstrated by a series of experiments carried out with the leaves of *Eucalyptus dumosa*. It was found that between 11 a.m. and 12 noon (cloudy day with a slight breeze and a sun-temperature of 95 degrees F.) eight leaves with a surface area (both sides) of 42 square inches transpired 2.9 c.c. of water. Under similar conditions, approximately 1,800 leaves would transpire one litre of water in one hour. It was also found that in 17 hours 42 square inches of leaf-surface transpired 11.9 c.c. of water, i.e., between 7 p.m. and 12 noon the following day.

Thus it can be determined with safety that, in 24 hours, an estimate of 36.8 c.c. would not be an exaggeration, because, firstly, the major portion of the experiment was carried out during the hours of darkness, when the rate of transpiration dropped to 0.1 c.c. per hour, and secondly, the part of the 24 hours not actually measured—that is to say, 7 hours (12 noon to 7 p.m.)—is one which would constitute a period of very active transpiration. A conservative estimate for the full 24 hours is in the vicinity of 24.3 c.c. which, when reduced in terms of leaf-number, would be roughly equivalent to the transpiration of 1 litre or 1.76 pints of water in 24 hours by 329 leaves.

It must, however, be remembered that the above estimate is offered only to show the amount of water the leaves are able to transpire. It is not a dogmatic statement of the amount the leaves will transpire in actual practice, because, in the field, a multitude of factors come into operation that cannot be introduced into an experiment. There is, nevertheless, sufficient proof that the Mallees can, and do, use large quantities of soil-moisture when it is available.

The foregoing discussion enables one to conceive why it is that, when fire has swept such an area, an unusual growth of

small plants appears. After such an event, when seasonal conditions are agreeable, the seeds of plants are able to germinate and develop quickly if an opportunity is afforded them to do so. The enormous mass of inactive roots in the surface layers of the soil—inactive because of the arrested transpiration—temporarily assists in maintaining the necessary conditions.

The following root-measurements (to the nearest inch) of small plants taken at random on the "burn" throw some very significant and instructive light on the matter and, at the same time, provides a comparative illustration of the aerial and subterranean developments of annuals, perennials and shrub-growths:

Species	Habit	Height of stem Inches	Average for group Inches	Depth of root Inches	Average for group Inches
<i>Stenopetalum lineare</i>	Annual	14		10	
<i>S. sphaeracarpum</i>	Annual	5		6	
<i>Velleia connata</i>	Annual	8		15	
<i>Waitzia acuminata</i>	Annual	10		14	
			9.25		11.25
<i>Goodenia geniculata</i>	Perennial	3		12	
<i>Helichrysum sepipapposum</i>	Perennial	5		14	
<i>Pelargonium australe</i>	Perennial	4		13	
<i>Stackhousia flava</i>	Perennial	3		9	
			3.75		12.00
<i>Acacia obliqua</i>	Shrub	2		20	
<i>A. acanthoclada</i>	Shrub	1		14	
<i>Eucalyptus acanthoclada</i> . .	Shrub	$\frac{1}{2}$		12	
<i>E. viridis</i>	Shrub	1		11	
			1.12		14.25

The above table shows that the average height of the plants decreases as one passes from annuals to perennials and thence to shrubs, but that an increase in root penetration takes place in the opposite sequence. Of the plants measured, the annuals were mature, the perennials had completed their seasonal growth, but the shrubs will continue development.

The ensuing list comprises a complete census of the vegetation at present appearing on the "burn":

Compositae
Gnaphalium japonicum
Vittadinia australis
Myriocephalus Stuartii
Helichrysum semipapposum
H. leucopsidium
H. bracteatum
Podosperma angustifolia
Waitzia acuminata
Calocephalus Sonderi
Podolepis capillaris
Olearia rudis

Pinoideae
Callitris verrucosa
 Cyperaceae
Gahnia lanigera
 Goodeniaceae
Goodenia geniculata
Velleia connata
 Chenopodiaceae
Bassia parviflora
Rhagodia crassifolia
 Liliaceae
Dianella revoluta

<i>Calotis erinacea</i>	<i>Lamandra leucocephala</i>
<i>C. hispidula</i>	<i>Tricoryne elatior</i>
<i>Senecio brachyglossus</i>	<i>Bulbine semibarbata</i>
<i>Brachycome ciliaris</i>	<i>Thysanotus tuberosus</i>
<i>Gnaphalodes uliginosum</i>	Umbelliferae
<i>Helipterum corymbosum</i>	<i>Didiscus pilosus</i>
Gramineae	<i>Daucus glochidiatus</i>
<i>Triodia irritans</i>	Crassulaceae
<i>Amphipogon strictus</i>	<i>Crassula colorata</i>
<i>Stipa mollis</i>	Polygonaceae
<i>S. variabilis</i>	<i>Muehlenbeckia dichina</i>
<i>S. cymophila</i>	Cruciferae
<i>Bromus rubens</i>	<i>Stenopetalum lineare</i>
<i>Danthonia semiannularis</i>	<i>S. sphaerocarpum</i>
<i>Schismus carbatulus</i>	Thymelacaceae
Portulacaceae	<i>Pimelea simplex</i>
<i>Calandrinia calyptreata</i>	Euphorbiaceae
Boraginaceae	<i>Poranthera microphylla</i>
<i>Halimica cyanea</i>	vat. <i>diffusa</i>
Phytolaccaceae	Myrtaceae
<i>Gyrastemon australasicus</i>	<i>Eucalyptus oleosa</i>
<i>Codonocarpus cotinifolius</i>	<i>E. angulosa</i>
Solanaceae	<i>E. viridis</i>
<i>Solanum simile</i>	<i>E. dumosa</i>
Halorrhagidaceae	<i>Leptospermum coriaceum</i>
<i>Halorrhagis odontocarpa</i>	Leguminosae
Stackhousiaceae	<i>Acacia acanthoclada</i>
<i>Stackhousia flavo</i>	<i>A. sclerophylla</i>
Caryophyllaceae	<i>A. obliqua</i>
<i>Scleranthus minusculus</i>	<i>Aotus villosa</i>
Convolvulaceae	Sapindaceae
<i>Convolvulus crubescens</i>	<i>Dodonaea hirsutifolia</i>

The new plants fall into the following divisions: 26 species of annuals, 14 species of perennials and 13 species of shrubs. This makes a total of 53, which, together with the old-established vegetation, brings the grand total to the number of 63 species on the 25 acres swept by fire. The aggregate is rather astonishing when it is noted that the adjoining unburnt area supports only 18 species.

This phenomenal growth, however, is only a passing phase—one that has been seized upon as opportune. Year by year, as the permanent shrub-growths gradually regain their former strength and dimensions, so will the decline in number of small plants become greater and greater, until, finally, the scene becomes indistinguishable; for nothing will remain to indicate that, in the spring, this small area was once, temporarily, a bush-garden filled with bright blooms of yellow, white, pink and blue.

WHY DO BIRDS "ANT" THEMSELVES?

(Portion of an address broadcast from London on Nov. 10, 1938)

By A. H. CRUSHOLM

I have told you previously something of the extraordinary habits of certain Australian birds. Let me tell you now something of an extraordinary habit of one of your own British birds, as discovered in Australia. I refer to the common Starling, which is, in fact, rather too common in Australia.

Did any of you know that the Starling has, or appears to have, a habit of placing live ants beneath its wings? I certainly did not know this until a year or two ago, and then I learned of it in a curious way. A small boy living in a Melbourne suburb wrote me that he had seen Starlings actually picking up ants and stowing them beneath their wings. Frankly, I doubted the evidence of the boy's eyesight. But it chanced, just afterwards, that I was looking through some notes I had written years earlier, and among them I came on a paragraph, long forgotten, to the effect that a man in Sydney had once seen certain soft-billed birds placing live ants beneath their wings.

That started me on a search through the bird books and journals of both Australia and Britain, and of America as well. Finding nothing on the subject in any of them, I began to wonder if the practice was confined to Australia, perhaps because of the nature of certain ants there. Anyway, I mentioned the matter in a book soon afterwards. Then events began to happen—and they have been happening ever since, in four continents. There have been, so to speak, international complications: and all because of that boy who spied on the Starlings!

Firstly, a New Zealand woman wrote stating that when in England she was told by an Essex man that he had seen Starlings stowing insects beneath their wings, and, as the period was autumn, he surmised that the birds were storing food for use during migration. That struck me as a far-fetched idea. I am not so sure now that it is. The next development was a note in a bird journal in Germany; Professor Stresemann, of the University of Berlin, quoted what I had written on the subject and asked for further information. He recalled that a German zoologist had reported the practice with Crows several years earlier, and had jumped to the same conclusion as I did—that is, that the object of the birds was to use the formic acid in the ants to get rid of parasites among their feathers. Here I should say, that what puzzled me was, how did the birds know that the ants possessed formic acid? And how did they know that the formic acid would rout parasites?

At any rate, the result of Dr. Stresemann's inquiry was astonishing. It drew letters from all over Germany. Most of

the writers had noted the practice chiefly with Starlings, but their list of birds which had been seen to place ants among the feathers included Jays, Crows, Ouzels, Magpies, and Thrushes. In some instances the birds have been seen to "bathe" in ant-hills. "I noticed," says one writer, "that towards evening a pair of Starlings would come and sit on an anthill, dig as deep as possible with their beak, feet, and wings, and throw ants over their feathers, whereby they showed every sign of comfort."

Not all of the birds observed used living ants. Some crushed the insects in their beaks before applying them to the plumage. But the living "spray" appeared to be mostly favoured. One writer declared that he saw Jays stand on ants and intentionally excite them, so that the plumage was sprayed all over with acid.

Various odd sidelights are given in the correspondence. One is that young Starlings, just taken from a nest, and on which no parasites could be found, immediately on seeing ants began to apply them to their feathers. Another strange point is that when ants are not available some birds use queer substitutes. One man says that his tame Magpie rubbed itself with cigar-butts. Another reports Jays having rubbed themselves with meal worms. Another says that cage-bred Starlings rubbed their feathers with the flesh of a lemon, and later with vinegar obtained from a dish of lettuce. These Starlings appear to have been very enterprising: on one occasion they used beer on their feathers.

All these notes made it clear that the application of ants to the feathers was both widespread and deep-seated amongst birds. But what was its purpose? There seemed to be something in a suggestion that the bird takes pleasure in a prickling of the skin and in strong odours. Similarly, another German writer suggested that the crawling insects may give the bird the same pleasure that it enjoys when its feathers are ruffled by a human hand. Professor Stresemann thought, however, that the routing of parasites was the chief motive. In any case, he suggested the adoption of a new word, meaning "anting," or "to ant oneself."

The scene of discussion changed soon afterwards to India. There a writer named Humayan Abdulali reported that he had seen certain birds rub ants beneath their tail feathers and then swallow the insects. From this the suggestion was made that, apart from external use, formic acid might benefit a bird internally, since it is said to give tone to muscles and abolish fatigue. That seems to be why ants are eaten by the Santals, a Dravidian tribe of Chota Nagpur.

The next entry in the argument came from America. A zoologist there, who had seen the Australian-German-Indian contributions, found one or two old notes of interest in bird journals. In

one of these the writer suggested that a bird seen placing ants among its feathers was practising its own method of "food transportation." In two other cases live snails were said to be found under the wings of newly-arrived migratory birds. That statement lent some colour to the "food storage" theory, mentioned earlier as having been suggested by an Englishman.

Finally, we come to a contribution from Sweden. A writer there, quite recently, argues that the ants are not used to combat parasites. His idea is that the birds' action is merely to wipe away formic acid before using the ants as food. Well, you may please yourselves on the point. Personally, I toyed with the Swedish idea long before it was a Swedish idea; but my trouble was to account for the birds actually "bathing" in ants and acidulous liquids. There is no suggestion of food or drink in such cases.

It is all very puzzling and there is as yet no definite answer to the question: "Why do birds 'ant' themselves?" It is rather odd that Britain has not already supplied contributions to the discussion. As I have said, the only note from this country was one given me by a New Zealander, that an Essex man, some years ago, saw Starlings place ants beneath their wings, and surmised that they were storing them for food. Curiously, a few weeks ago an Australian on a visit to England told me that he recently saw the same thing. He denied strongly that the Starlings were using the ants as food.

There is the problem. It remains unsettled. I shall be very glad if anyone interested can help us with either evidence or suggestions.

[The foregoing address is published here for three reasons: firstly because it gives a general account of the problem; secondly because the point contained in the last sentence still holds good; and thirdly because the present season is the period to watch for birds "anting" themselves. It should be added, however, that as a result of the B.B.C. broadcast I received many letters from various parts of England, which indicated that "anting" had been seen on several occasions in Britain, though never recorded. One of the most interesting notes concerned a tame Magpie, which made a practice of picking up ants, flying on to the shoulder of a man smoking a pipe, dipping the ants in the tobacco-ash and then applying the mixture to its body. This supports the conclusion I have now adopted: that "anting" is practised by birds, not to wipe off formic acid, and not to expel parasites, but as a kind of body tonic—something in affinity with the human use of oils in massage. I am still ready, however, to receive further evidence and suggestions.—A.H.C.]

The Club would be glad to hear from any Country Member who is willing to form a group of local residents interested in Natural History. The Committee proposes to organize such groups where sufficient interest exists.

F.N.C. ANNUAL EXHIBITION

By A. D. HARDY, Organizer

The F.N.C. held its annual exhibition for 1939 as part of the Melbourne City Council's "Garden City" display in the Treasury Gardens, Melbourne, in aid of Red Cross funds. Excepting the living animals, the exhibits were "housed" in two large marquees; the animals were in wire-fenced enclosures on the lawn.

"Garden City" was conducted for a month, commencing on Monday, 23rd October. It included many attractions—floral carpets, illuminations, etc., and a small group of aborigines. The Club, with several other societies assisting, and the Anthropological Society in association, was in occupation during the first week. Some anxiety was expressed, at the outset, because of the longer duration and the later date than had been experienced for wild flowers. The indication was that a wild flower show can be staged to last a week under canvas, but only with considerable risk, in late October. The exhibition as a whole has been pronounced, by experienced observers, a success and the best of the Garden City indoor attractions.

In the floral marquee there was a 20-foot-base pyramid of Waratahs, *Telopea speciosissima*. The crimson mass dominated the scene, but a grand entry was provided with flowers brought from far parts and staged by the Shell Company. Here were gathered together the best seasonal flowers of Australia and Tasmania, with splendid garden-grown native blooms from Mr. W. Burdett, of Basket Range, and Mr. E. Ashby, of Blackwood, both near Adelaide, S.A. Successfully grown by Mr. Burdett were the Kangaroo Paw (W.A.), Waratah (N.S.W.), and magnificent Protea, several species (Sth. Africa). Also among Shell exhibits were interesting specimens of tropical vegetation from North Australia, including varieties of Sugar-cane, the inflorescence and fruit of the Coconut, a Pineapple plant in fruit, etc.

A separate collection of West Australian flowers arrived by National Airways from "Frapes," Perth. This fine collection included the showy Eucalypts, *E. tetraptera* and *E. Forrestiana*. From Broken Hill came three boxes of named and well-packed flowers sent by Mrs. Morris and Miss Harding; typical sub-desert flora included Sturt's Desert Pea, *Chianthus Dampieri*, *Cassia* (5 species), *Dodonaea* (4), *Eremophila* (6), and *Acacia* (5). From the Naturalists' Club of South Australia came a varied and welcome collection; and from the Rangers' League, N.S.W., another nice lot, notwithstanding the preceding very dry weather.

In the Victorian sub-section it was evident that the districts

which were fire-ravaged in January, 1939, will need years for the restoration of their floral wealth. The Grampians, drought-stricken and badly burnt, yielded a comparatively poor lot, but the collectors sent of their best. The flowers were gratefully received and were of use in classification as well as being essential in any Victorian display.

The Classification Section, under the direction of Miss Jean Galbraith, held an important place in the scheme. Miss Galbraith was well satisfied with material received. Mr. T. S. Hart assisted with plant naming. Miss Smith took charge in Miss Galbraith's absence, and Mr. Angus Galbraith assisted. This section is indebted to the University Botany School for the loan of large models of many flowers, and to the Forests Commission for specimens of Eucalypts and other forest flora from many districts. Aquatic plants were sent from the Kerang district, by courtesy of the State Rivers and Water Supply Commission.

Cultivated natives were mainly from Burnley Gardens (Dept. of Agriculture), thanks to Mr. Jessop and his students, but Mr. Robinson exhibited sixty bunches of natives cultivated at Dutton, near Sale. From the Sperm Whale Head peninsula Mr. Fred Barton and Miss Erica Barton sent representative flowers. The Orchid tables were arranged and superintended by Mrs. Coleman, who was able to display sixty species.

In the other marquee were staged exhibits in Ornithology, Conchology, Anthropology, Ichthyology, Marine Zoology, Nature photography (coloured prints), and X-ray photography. At the entrance was a Meridian Ant's nest, brought from North Australia by the Shell Company. Behind it, on a special stand, a mounted Lyre-bird peered from an improvised shelter of fern and moss. It was lent by the Department of Fisheries and Game, having been confiscated, as part of a penalty. A Wedge-tailed Eagle, with outspread wings, marked the centre of a group of birds, in cases and single mounts, from the collection of the Royal Australian Ornithologists' Union. A mounted Kiwi from New Zealand (put in by Mr. B. Bentley "for company's sake") looked friendless and alien. Next was a delightful construction, "Quiet Places," designed and modelled by Miss Daisy Coleman. Here, Robins, Tits, etc., guarded their well-modelled eggs in real but discarded nests amid mossy banks and ferns and little pools. Next, by way of contrast, was a nest of Green Tree-Ants (fortunately confined) brought by the Shell Company from Darwin.

Continuing the circuit of the marquee, one came to the illuminated negatives and positives of Australian animals, exhibited by Mr. Fergus. Then, Lizards from Central Australia, and Frogs and Toads from North Australia. The Lizards were brought to Melbourne by Mr. O. Gratio, and were lent by the

Zoological Gardens and the Aquarium. The aborigines were delighted with this reminder of a quiet home life!

Victorian marine shells in five cases were shown and described by Mr. C. J. Gabriel. In addition to many other interesting exhibits the minute gasteropod (1/30 inch) dredged from Western Port at 40 feet, played a "star" part. The circuit was completed by geological exhibits, and forms of marine life. He who would look casually in passing had but to see the label "Flexible Sandstone" to find time for that, and further examination of Mr. Collier's six cases of minerals and fossils.

The 'marine life' specimens were mostly from Altora, the happy hunting-ground of Mr. and Mrs. Freame, whose section this was. Along the centre of the marquee were the exhibits of the Aquarium Society.

Finally, in this marquee, there was the hexagonal kiosk of the Forests Commission, with each side illustrating a phase of forestry, silviculture, etc., and erosion, by means of photographs and maps.

The animals in the outside enclosures supplied a distinctive note. The Club is grateful to the Sir Colin Mackenzie Sanctuary Committee for again entrusting us with "Wenda" (the popular little Flinders Island wombat) and other animals, and was glad to have under its banner the animals from Fauna Park, Dromana, brought by Mr. D. Picking.

It is almost superfluous to acknowledge what was so obvious to all—the splendid work done by Mrs. Sarovitch and her team of lady assistants. The success of the floral exhibits depends on them, and on that success the whole show was to a certain extent dependent. The Publications stall was cared for at different times by Mr. C. Daley, Mrs. Miller, and Mr. C. Shewan. Among the members who gave general assistance Messrs. H. P. Dickens, W. Ingram and H. C. E. Stewart deserve special mention.

Exhibits not previously mentioned included the following: Mr. Hammet, Graupian flowers; Mrs. McDougall, Anglesea orchids; Miss Laycock (Sassafras), *Telopea oreoceras*; Miss A. Ladson, Beechworth orchids, etc.; Mr. Clarke, Castlemaine flowers; Mr. F. Robins, flowers from Whipstick Scrub, near Bendigo; Mr. J. B. Hodgson (Hedley) flowers, Foster district; Mr. W. J. Sangreed, flowers, Ararat environs; Miss L. Banfield, Ararat orchids, etc.; Miss G. Brook, Maldon orchids, etc.; Mr. C. French, Croydon orchids, etc.; Mr. C. Lewis and Mr. H. W. Bond, Wonthaggi orchids; Mrs. McInerny, Bendigo flowers; Budgerigar Society, 35 cages of birds, exhibiting induced colour variation in Budgerigars, and one crested specimen; Mr. A. D. Hardy, Trap-door Spider nest from Queensland.

AN INTELLIGENT POSSUM

By HILDA DOWN, Melbourne

A beautiful Possum has been with us, in the suburb of Auburn, for some years. It sleeps in the half of a chimney which is really a ventilator shaft—a very well-selected spot. For a long time it has come along to the kitchen verandah for its evening meal of bread and sugar. It takes the slice in its hands and sits up exactly like an old man reading the paper. We are allowed to stroke and tickle it, but have never picked it up.

The Possum knows *our* voices, but is very shy if our friends talk while we are watching; nevertheless, so long as they keep quiet it will sit and eat and is quite untroubled by candle or torch. Our Australian terrier has always taken a great interest in the Possum. He has a special bark to herald its appearance. We call it "the Possum bark," for he only uses it then and he keeps it up till we come and feed it.

Last year we used to hear wild yells and great excitement from Skipper (the terrier), and at last we watched and found the pair enjoying a sort of game of "tiggy." The Possum would run a few yards, then stop and look at the dog, then a few more yards and a dash and a yell from Skipper and Possum would rush up a tree, just out of reach, then turn and growl. The dog would move off, and down would come the Possum and run towards him; then off up another tree, wildly pursued. It deliberately dares the dog. I have watched it repeatedly. Skipper seems half-scared, but enjoys the excitement. Twice I have seen Possum go for him, and they have rolled together with wild yells and grunts. Then the Possum has made for the trees again.

There must be rules to the game, I think, for Skipper always seems to give it a bit of a start. Perhaps he takes it to be some sort of cat and thinks discretion the better part; but he makes no attempt to play with the cat. They are not friends and he gives it a wide berth—doesn't even chase it.

He's rather a cunning little beast, by the way. Sometimes we hear the "Possum-bark" and go out to find Skipper gazing up at the verandah roof—but no Possum. It's just a trick to get a little company, we think.

The Possum likes bread damped with water and rolled in sugar better than anything else we offer it. Sometimes it will eat a bit of carrot; it is not fond of apple, just takes a nibble and drops it. Other things it just sniffs at and won't even bother to take hold of. It definitely will not eat fruit. We have tried it often and there are plums, figs and apricots growing and it won't look at any of them. I don't know if it eats the blossom, but we have very good crops, and we never see any damage to the garden plants. I incline to think that folk who want to shoot Possums because of damage to gardens just want to kill Possums and any reason serves.

Visitors are always interested in the game. Country men say they have never heard of such a thing. The only bother is that we don't know when the ghost will walk and visitors might have a fruitless trip.

"ONE OF NATURE'S GENTLEMEN"

Mr. A. O. Thiele, who recently passed away at the advanced age of 94, was one of the oldest members of the F.N.C. I made his acquaintance soon after joining the Club, on arrival from London with my wife and family, in 1902. Towards the end of the same year the Club organized the Shoreham Camp-out under the successful leadership of the late S. W. Fulton, when both A. O. Thiele and his son Edmund (now Sir Edmund O. Teale, K.B., of Tanganyika) attended.

From that time onward Mr. Thiele joined me in many cross-country trips, and it was a great pleasure to share the company of so keen an observer. Mr. Thiele was an excellent bushman and observer. Two outstanding instances of the results of his close observation are before me, embodied in descriptive papers.

In 1905, whilst fishing in Hobson's Bay, Mr. Thiele noticed that the bait was luminous. In drawing this between his partly closed hand he noticed that it was covered with a granular substance, which was strongly luminous, and later was found to consist of swarms of a species of Ostracoda belonging to the genus *Cypridina*. Another member of the Club (happily still with us), Mr. J. A. A. Shephard, had previously, in 1894, found similar ostracods on the beach at Brighton and recorded that "a dozen or so in a little water, when shaken, emitted sufficient light to read a watch dial." The luminous ostracoda, which Mr. Thiele permitted me to describe as *Cypridina thielei*, formed the subject of a paper published in the Proc. Roy. Soc. Vict., vol. xix (n.s.), pt. ii, 1907 ("Description of a New Species of *Cypridina* from Hobson's Bay, Melbourne").

The second paper I refer to was written by Mr. Thiele and myself. It described a remarkable basic rock found in a paddock at Balwyn North. Mr. Thiele had, many years before, noticed a quarry of "bluestone" in the midst of the hardened Silurian mudstone of the district. This had formerly been excavated for road metal. So hard was the rock, however, that the workmen had struck for higher wages, and thus the work was abandoned. The paper was published in the Proc. Roy. Soc. Vict., vol. xxiv (n.s.), pt. 3, 1911 ("On a Limburgite Rock occurring as a Volcanic Plug at Balwyn, near Doncaster").

One other far-reaching observation that I remember Mr. Thiele to have made was the fact that the Red Gum (*Eucalyptus robusta*), represented now by only a few scattered though giant specimens, occurred in the past in groups ranged along an approximate line from "Red Gum Flat," as Hawthorn was then called, through Canterbury to Templestowe and Doncaster. This general SW. to NE. trend seems to coincide with one or more possible fracture lines or shatter zones in the bed-rock. Exposures of these movements are seen along the Mont Albert Road and in Maling's Quarry, Balwyn. On One Tree Hill (Beckett Park) there still stands one of the venerable Red Gums to mark the former trend of this species. From the peculiar distribution of the species we may reasonably infer that such an occurrence has been induced by the earlier tectonic disturbances ensuring a permanent hydrostatic condition required by such well-developed Eucalypts.

In concluding this appreciation of my friend, no more fitting description can be given of him than that he was truly "one of Nature's gentlemen."

F. CHAPMAN.

BOTANICAL NOTES FROM MORNINGTON

About seventeen members and friends were present at an excursion to Mornington on December 2, 1939, and by the kindness of those who came by road all were quickly taken to the cliffs about a mile north of the township.

Descending by a path through the tea-tree we noticed some introduced plants, a shrubby *Polygala*, which has long been abundant in the coastal scrub of this district, no doubt derived from garden plants of earlier settlement; the larger *Pittosporum*, *P. undulatum*, not native so far west, but now frequent from bird-carried seeds from gardens; and a couple of *Olives*.

We then ascended by a well graded path in partially decomposed granite with ferruginous sandstones above. Among the plants noticed were the two *Myopores*, the common *Boobialla*, and the attractive small shrub, *Myoporum viscosum*. This shrub, which had nearly finished flowering, was perhaps never common on the coast near Melbourne, but is now quite rare there.

The white *Correa*, *C. alba*, was quite abundant on this steep slope, flourishing in full exposure, and now with strong fresh shoots. A few flowers were found on search, as well as fruits. There are almost always some flowers on this plant, but the main flowering season is the winter.

The Sea-hox, *Alyxia buxifolia*, still carried a few flowers, and the small *Clematis*, *C. microphylla*, was in seed. The Hoop *Goodenia*, *G. ovata*, was also plentiful.

Among the smaller plants were the *Eutaxia*, *E. microphylla*, with unripe seed, sometimes in dense masses against wire netting in a fence; *Plantago zosteria* with stout spikes; two *Groundsels*, *Senecio lantus* in quantity, and the less common *S. odoratus* with no ray flowers; and a fine example of the Native Carrot, *Daucus glochidiatus*.

Near the top of the cliff there was a considerable patch and scattered plants of a small shrubby *Pomaderris*, *P. racemosa*, in its smaller form. Three weeks earlier it had been covered with flowers, now with young fruit. This plant is not listed for the coast near Melbourne, but occurs toward Sorrento, and also on Schnapper Point itself, not near granite.

A small plant of the *Portulacca* family *Calandrinia calyphrata*, was plentiful on a slope near the top.

Very few, if any, of the plants mentioned are limited to the granite, but it may be mentioned that there appear to be no available lists of the plants of the granite areas near Melbourne, probably because they often merge into the surrounding country with little difference evident, and, moreover, differ so far from one another that each would need separate treatment. In this Mornington example the physical conditions are no doubt more effective than the actual nature of the rock, though this gives more stable conditions, more plant food and better retention of moisture than the sands.—T.S.H.

BLACK DINGO WITH EIGHT PUPPIES

An unusual sight is reported by Mrs. Herbert Curtis (Miss Hilda Geissmann), of Tamborine Mountain, Queensland. She states that a *black* dingo has been attacking her fowls, and when she saw the animal recently it had *eight* half-grown puppies; three were black like herself, four were tawny, and one was tawny with a dark head. "They played and gambolled and rolled on the grass just like a lot of tame puppies, and it was saddening to have to shoot at them."

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PROCEEDINGS

The monthly meeting of the Club was held at the Royal Society's Hall on Monday, January 8, 1940, at 8 p.m. The President, Mr. A. S. Chalk, presided, and about 100 members and friends attended.

WELCOME TO VISITORS

The President welcomed to the meeting Mrs. Albert Morris, of Broken Hill, Miss Thistle Harris, of Sydney, and Mr. and Mrs. C. L. Barrett, who had returned from a trip to North Australia.

SUBJECT FOR THE EVENING

The subject for the evening was three lecturettes dealing with the Botanical Affinities of West Australia and South Africa. Dr. Sutton spoke on the West Australian flora and gave a comparative list of the various groups; Mr. G. N. Hyam spoke on the South African flora and pointed out how well suited for cultivation in Australia the African plants were, and *vice versa*; and Mr. F. S. Colliver spoke on the fossil flora of the two countries, mentioning that a number of species were common to both places and tracing the history of the old Land Bridge, known as Gondwana-Land.

These various lectures were illustrated with slides and the epidiascope.

A number of questions were asked by members, and were answered by the speakers. The President expressed the thanks of the Club to the lecturers.

CORRESPONDENCE

A letter from Mr. Noel Lothian, at present in England, expressing the season's greetings to members.

REPORTS OF EXCURSIONS

Mr. H. C. E. Stewart gave a preliminary report on the Mt. Buffalo excursion.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as Ordinary Members: Miss E. V. Bennetto and Mr. A. M. Steinfort, and as Country Member, Mr. Edward W. J. W. Smith.

NATURE NOTES

Mrs. Albert Morris gave a very interesting description of the regenerated areas of Broken Hill, and illustrated her remarks by a striking series of photographs.

Mr. R. G. Painter drew attention to the damage caused to the orchid *Dipodium punctatum* by cut-worms.

EXHIBITS

Mr. V. H. Miller: Three orchids in bloom (*Dendrobium* spp.) and flowers of the "Night-flowering Cactus."

Mr. H. C. E. Stewart: Fifty species, in flower, of native flora from Mount Buffalo National Park, altitude 4,000 to 5,600 feet, including *Orites lancifolia* ("Alpine Orites"), *Podocarpus alpina* (showing male inflorescence), and the following species (determined by the National Herbarium) not hitherto recorded for the locality: *Helichrysum rosmarinifolium*, var. *purpureseens*; *Olcaria Gunnraua*, var. *flavesceus*; *Myriophyllum pedunculatum*; *Leucopogon lanceolatus* (in fruit); *Fissidens rigidulus*; and *Prasophyllum Archeri* (identified by Mr. W. H. Nicholls).

Mr. A. A. Brunton: Flowers collected between Woods Point and Warburton.

Mr. A. M. Steinfort: Leaves of the Long-leaf Box (*E. gonio-calyx*) grown at Ascot Vale.

Mr. C. French: Specimens of the Banksia Borer (Buprestid) beetles (*Cyria imperialis*) collected at Seaford on 5/1/40; also, plant of *Mesembrianthemum crystallinum* ("Ice Plant") collected at Portarlington.

Mr. F. S. Colliver: A series of Australian, Indian and African fossil flora specimens.

Mr. W. Abrahams: Fossil flora from Queensland and India.

GOULD LEAGUE PROGRESSING

The F.N.C. extends congratulations to the Victorian Gould League of Bird Lovers, which now has a total of 500 branches throughout the State, and which has enrolled, in all, some 130,000 protectors of native birds.

At the annual meeting of the League, held recently, under the chairmanship of Inspector G. A. Osborne, an enlarged portrait of Mrs. John Gould, wife of the famous birdman, was presented to the League by Mr. A. H. Chisholm, who brought the portrait from London last year on behalf of Mrs. Helen Edelsten, the Goulds' grand-daughter. This is the first picture of Mrs. Gould seen in Australia. (See "The Story of Eliza Gould." *Victorian Naturalist*, June, 1939.)

BREEDING OF THE TIGER-CAT

By DAVID FLEAY.

Director, Badger Creek Sanctuary, Healesville

In the absence of other records, and taking into account the savageness and rarity of the marsupial concerned, it can probably be claimed with safety that these notes describe the first and only three cases of the breeding in captivity of the Spotted-tailed Tiger-Cat (*Dasyurus maculatus*).

Existence to-day of the Tiger-Cat—largest marsupial carnivore on the mainland—is precarious indeed, and only in Tasmania can this spotted and primitive-looking creature be said to exist in any numbers at all. In Victoria, where it is totally protected, the Tiger-Cat is now almost confined to the Otway Ranges, though odd specimens have been seen occasionally in the bush of Gippsland. However, following the tremendously widespread fires of January, 1939, the numbers of this forest-loving animal have probably been decimated still further.

The Tiger-Cat exhibits that curious preponderance of the male sex so typical of other carnivorous and insectivorous marsupials such as the Native Cat (*D. viverrinus*) and the Brush-tailed Phascogale (*Phascogale penicillata*). Consequently, though I was successful in capturing Tiger-Cats and keeping them under observation from the year 1930 onwards, all were of the male sex. I think this was also the experience of Mr. C. W. Brazenor, of the National Museum, Melbourne. Male Tiger-Cats, by the way, are more heavily built than and almost twice the size of the females, and Tasmanian representatives of the species are, as usual, the giants of their kind.

One very light brown and exceptionally large male Tasmanian Tiger-Cat, which arrived at the Melbourne Zoological Gardens in 1933, measured four feet from nose to the end of its tail. With its gleaming canine teeth characteristically projecting beyond the closed lip of the upper jaw, and its powerful crouching body, this pink-nosed animal was dangerous—indeed, with its quickness perhaps more dangerous to handle than a Tasmanian Devil. The pattern of white spots is also of very small size in these Tasmanian Spotted-tailed *Dasyures*, in marked contrast to the huge and profuse white blotches of *Dasyurus gracilis*—the north Queensland Slender Tiger-Cat—a specimen of which I saw near Townsville several months ago.

However, to return to the matter of the scarcity of females of *Dasyurus maculatus*, this was a peculiarity which had been impressed upon me in the case of *Dasyurus viverrinus*, the smaller Native Cat, for both in catching these little animals and in breeding them I had found that males outnumbered females in the proportion of about ten to one. To obtain a female of *D. maculatus* in

order to endeavour to breed the species, every incentive had been put in the way of inhabitants of the Otway region. One day an enthusiastic telegram heralded the arrival, as stated and as we fully expected, of the long-sought "lady." Alas, though, "unpacking" following the arrival of the Colac train revealed a simple but all-important mistake in identification! It was our fifth "gentleman" Tiger-Cat.

However, like most long-cherished ambitions, our hopes were eventually realized, and, thanks to the Fry family of Lavers Hill, a female Tiger-Cat was captured in the late summer of 1935. So ended five years of difficult quest.

Actually, the animal was accidentally caught in a rabbit trap, and on arrival it was necessary to amputate an injured fore-limb right to the elbow. Fortunately, being of a hardy disposition, and permitted to retire into seclusion in a comfortable hollow log, the animal made a good recovery.

With no lack of fresh rats, rabbits, and occasional birds the Tiger-Cat soon learned to accept the curtailment of her usual hush wanderings as a fairly kind fate.

On the fifth of April, 1935, with considerable trepidation (justifiable in view of the feat, two years later, of a male Tiger-Cat killing and partly devouring his mate), a male Tiger-Cat was placed in the same enclosure. Clashes between animals of this species are sharp and may be almost instantly fatal. Accompanied by a series of the sharpest and most peculiar ear-splitting sounds of "ssh," almost like a blast on a circular saw so forcibly are they uttered, one animal may spring on the other and sink its keen teeth into the unfortunate's neck. One such killing occurred before our eyes in the case of two male Tiger-Cats at the Melbourne Zoological Gardens in 1934.

At any time a Tiger-Cat, whether male or female, "greet" all and sundry with slightly gaping jaws and repeated threatening low-pitched hissing undertones. It is definitely a warning to heed! Thus it can be understood that a certain amount of nervousness accompanied the risking of the first and only female Tiger-Cat with another of her own rather unsociable kind. Fortunately, all went well, possibly due to the extreme quietness of the crippled female.

According to observations spread over the three successful breeding seasons 1935, 1938 and 1939, the pairing season is very clearly marked in Victoria and extends over June and July. This is the period when (whether young are born or not) the pouch develops from its inconspicuous resting condition and becomes a glandular, pocket-like area. Actual pairing of the animals is a prolonged activity, during which the female suffers severe lacerations about the neck and shoulders. During such times piercing, ear-splitting shrieks are frequently heard by night and day.

The gestation period occupies approximately three weeks. In the case of the crippled female, five minute pink joeys appeared in the pouch on August 10, 1935. Usually, however, offspring appear in the pouch during July.

Arranged in two curved rows on each side of the longitudinal median line of the pouch, there is a total of six mammae, compared with eight in the smaller Native Cat and four in the case of the Tasmanian Devil. Not so well developed as in the case of the Devil, the Tiger-Cat's pouch is nevertheless more developed than in the Native Cat. It is a fairly deep receptacle and opens into a pocket anteriorly—in other words, unlike a Possum's pouch, it opens forward and not backward.

I was unable to witness the actual arrival of the embryo Tiger-Cats in the pouch, but the position and actions of the mother in this (1935) season were described to me by Ernest Walsh, an observant keeper in the Australian Section of the Melbourne Zoo. Subsequently, on July 17, 1938, when young actually arrived in the case of the female Tiger-Cat, which has successfully produced and reared the two successive broods during 1938 and 1939 at Badger Creek, I watched most carefully, noting restlessness on the part of the mother, and being particularly interested in the attitude of these carnivorous marsupials at such a time as compared with the known posture of the herbivorous Kangaroos and Wallabies. During mid-morning on this date the mother sat, or rather stood, in a corner of her enclosure, with her back quarters raised slightly from the ground. She remained in this rather stiff, strained position for an hour and a half. The tail was simply curved round beside her body, and not under it as observed in Wallabies and Kangaroos. Apparently the young were born and betook themselves to the pouch during this period. It was impossible to make closer observations and the foregoing is only assumption. Still, the young were in the pouch later in the day and the attitude described corresponds with that observed by Mr. Walsh at the Zoo in 1935.

Knowing the cannibalistic traits of the smaller and larger carnivorous relatives of the Tiger-Cat, I removed the male parent immediately on seeing that the mother's pouch was occupied.

The 1935 litter of five young animals consisted of three males and two females, and it is of interest to indicate the outstanding features in the gradual development of the little fellows. Measuring 7 mm., or roughly a quarter of an inch in length in their curled-up posture, and coloured pink, the offspring are literally mere dots at birth.

It was most difficult to follow out observations at any time, for an inspection meant lifting the mother up by the tail, and anyone who has seen (and felt!) the business-like teeth and ever-gaping

jaws of a Tiger-Cat will realize that this is not easily done. Moreover, for the welfare of the young, it was unwise to repeat such performances too frequently.

At four weeks of age the babies had increased to one and a half inches in body length, and though still well anchored to the mammae, they showed considerable movement of their limbs. One or more of them would now hang outside the pouch when the parent was suspended by her tail.

At seven weeks dark brown fur, which had gradually been making its appearance—first of all on the large and well-formed heads (young marsupials all develop from the head end backwards)—was well developed, with the relieving pattern of lighter spots. Most important of all, the eyes were beginning to open. The young Tiger-Cats, though still tenacious in their grip of the mammary glands, were no longer constantly attached to them and frequently now lay sleeping in the nest. The attachment of the young to the mother until reaching this age is in its later stages a tremendous handicap in her nocturnal forays in search of food. It is during this period, as I have noticed in several related marsupials, that mortality is liable to occur. One or more of the many offspring is apt to drop off and become lost and the mother herself has no speed to escape from pursuers.

Approaching and at the age of twelve weeks, the young *Dasyures* displayed a surprising and rather attractive colour "phenomenon," typical, as far as I have seen, of all three "broods" in 1935, 1938 and 1939. The future creamy white body and tail spots were now definitely pinkish, with the abdominal region of a similar tinge. This is a phase that gradually fades, until within a few weeks it is not noticeable.

From twelve weeks of age onwards the little Tiger-Cats became increasingly lively and interesting, though any fright or unusual happening was the signal for them to cling tightly to the fur of the mother's sides and back, gripping tenaciously with all four feet and teeth as well.

Though handled a great deal, the "broods" in all cases remained unremittently savage and wild. In order to observe the many delightful antics of the "play age" it was essential to remain quiet and hidden from view. The little fellows, with bristling tails, would sneak furtively on some object and then bolt erratically away. They also indulged in fast wrestling and biting bouts, tackling each other chest to chest.

About the furtive retiring nature of this species and its savagery when cornered there is no room for doubt, and though it is frequently stated that the Spotted-tailed *Dasyure* is indifferent to danger in the presence of food, I would say, from long experience, that the animals observed have been very old or else in a

Plate XI



Spotted-tailed Tiger-Cat (♀) with baby clinging to her back, using all four feet and teeth as well.



Young Tiger-Cats, born in the Healesville Sanctuary, 1938, at 12 weeks of age. (Spots pinkish at this stage.)

state of starvation. Feeding themselves from whatever food the mother brings in from the age of 14 weeks onward, the young also still drew spasmodically for a time on the mother's own nourishment. However, at 18 weeks, or roughly $4\frac{1}{2}$ months, of age, they were entirely independent and self-supporting and one-third grown as far as the size of the mother was concerned. Ungrateful, as is so often the way in life, they even moved their quarters and "camped" away from the mother who had tended them so long and carefully.

The differentiation in size between males and females does not show in any marked degree until the Tiger-Cat is some eighteen weeks of age. From then on the male develops into a stronger, more robust and larger animal altogether. Maturity is reached within twelve months, but young animals appear to occupy nearly two years in reaching their full size.

The mother of the two later batches of young in 1938 and 1939, which were born at Badger Creek, Healesville, is a Tasmanian specimen, whereas the father is a mainland example captured three years ago near Tallangatta (V.). It is interesting to first note that in contrast to the dark brown of the parents' coats, the two offspring, now eighteen months old, are not only larger and finer animals (the male is three feet in length), but their colour is the very light tiger brown and small spotted type frequently found in Tasmanian Tiger-Cats.

DOUBLE LABELLUM IN *PRASOPHYLLUM*

The burning-out of the scrub by the bushfires, and the clearing up of forest land generally, followed by the copious winter rains and various unknown causes, have had an interesting effect on the native flora generally. Orchids especially have been particularly abundant in all parts of the State.

At the Grampians, Mr. Lloyd Williams found a stem of *Prasophyllum adavatium*, Rogers, having one flower with two labella. At Kilsyth Mr. Opperman collected a specimen of the same species which had two flowers, each having two labella. In both flowers the dorsal sepal was of normal size and shape; and in both flowers the four labella were of normal structure, except that they were somewhat smaller than those of the other flowers on the same spike. The petals were normal. One flower had two sepals, with a fragmentary third adherent to the lower side of one of the labella. The second flower had three distinct and separate sepals. In both flowers the column, with stigma and anther, were normal, and in both the ovaries were normal.

Lower down on the stem, two normal flowers were almost connate on the stem, and both grew out of the same blunt stipular bract. With all of these abnormalities, there should have been some sign of fasciation; but there was none; casually, the stem had the appearance of a normal spike.—E. E. PESCOTT.

THE REMARKABLE NULLARBOR PLAIN

By REV. G. C. WOLF, Drysdale

It is almost 100 years since the white man made his first acquaintance with the Nullarbor Plain. Eyre then had but a glimpse of this mysterious region, for he was making his second unsuccessful attempt to skirt the Great Australian Bight, but he turned back when he was within twelve miles of the Head of the Bight. That was in 1840. Although he successfully accomplished his task on the fourth attempt in 1841, it does not appear that he made any journeys into the interior, and so he did not become really acquainted with the true character of the Nullarbor.

Two residents of Fowler's Bay made a short journey actually on the plain in 1857, but it was left to Major Warburton, three years later, to be the first white man to travel for any appreciable distance into the interior. From a point 85 miles beyond the Head of the Bight he made several journeys in a north and north-westerly direction for about sixty miles. He described the plain as a dreary waste, destitute of food or water.

Until the year 1866 the plain was nameless. Then it was that Captain E. A. Delisser, in the employment of the South Australian Government, made a series of surveys and explorations in the vicinity of the Great Australian Bight. One of his journeys took him from the Head of the Bight to a point about 100 miles north from Eucla. It is to Delisser that we owe the name *Nullarbor*, as given to the plain. Being impressed with the absolute treelessness of the region, he decided that *Nullus arbor* (*ne* not, *ullus* any, *arbor* tree), contracted to Nullarbor, would be the most appropriate name for the region.

Standing at the Head of the Bight, one sees two sights of very great interest. To the east stretch great sandhills of considerable height, ever changing as the wind and even gentle breezes send the gleaming white sand drifting off to other locations. The whiteness of the sand is due to tiny fragments of the bleached shells of *Donacilla elongata*.

To the south-west there is presented to our gaze one of the grandest sights that anyone could wish to behold. Great towering cliffs, presenting a precipitous front to the sea, stretch away as far as the eye can see. Wherever I have seen those cliffs at various points between Sponge Bay (near the Head of the Bight) to Wilson's Bluff on the Western Australian border, they have presented the same characteristics, with the exception of one stretch sixteen miles from Wilson's Bluff, where there is a beach at the foot of the cliffs, and their face is covered to a large extent with consolidated brown sand.

The imposing and majestic cliffs, with their mighty buttresses, would indeed be an attraction for tourists if they were nearer the

Plate XII



The Cave of the Hands. Native hand impressions on the wall at the entrance to one of the Nullarbor Caves.

Photo. by G. C. Wood

large centres of civilization, for they are the most awe-inspiring sight that I have ever seen. No traveller on the overland route to Western Australia should pass through the gateway to Nullarbor Station at White Wells unless he or she has taken the short run down to the Head of the Bight, and walked along the top of the cliffs to Sponge Bay.

If the traveller be interested, he may attempt the hazardous descent which can be made down the cliff face at this point, and so become acquainted with the white polyzoal limestone which is the *pièce de résistance* of the Nullarbor Plain. This white band or stratum is visible for the whole length of the cliffs, but its width varies from 20 feet at the Head of the Bight to 188 feet at Wilson's Bluff. Very little work has been done on the fossils of the Nullarbor, and the man who goes out there properly equipped will, if he is regardless of danger, be amply rewarded, for not only the cliffs, but caves and blowholes, present inexhaustible opportunities for investigation.

Space will not allow me to give an account of many of the interesting features of the Nullarbor, but reference must be made to the caves for which the plain is famous. They have appealed much to the popular imagination, and in some cases imagination has run riot when speculation has been made concerning them and the waters contained in some of them. Any stories of there being streams of fresh water flowing under the Nullarbor Plain can be disbelieved, for all the known pools of water exposed in caves have been either analysed or tested by hydrometer, as have also the ground waters tapped in the various bores that have been sunk in the limestone of the plain, and in almost every instance the water has been so highly charged with dissolved solids that it has been merely recorded as "salt." In no instance has really fresh, pure water been struck in any bore sunk on the Nullarbor.

I know of only three caves where water is exposed—the Weebabbie Cave in Western Australia, and the Warbla and Koonalda Caves in South Australia. No life of any kind is evident in the waters of these caves, but there is some scope for the naturalist in the caves themselves, for I have observed spiders, beetles and bats, besides the distinctive Nullarbor Cave Owl, inhabiting them.

Unlimited scope, with the chance of fresh discoveries, is also presented by the whole of the plain. Even the natives, who may be expected to be familiar with all forms of life there, sometimes find spiders, etc., which are new to them. Mr. Symons, of Eucla, told me of this when he referred to a collection which was being made by a lady at (I think) Madura homestead, which is 116 miles westward from Eucla.

The entrances to the deep caves just referred to are to be found at the bottoms of pits, which are about 100 feet in depth. This first stage in the descent has to be made with the aid of a stout

rope. A rope ladder is indispensable for the descent to Koonalda Cave, which is to the north of Guimewarra Bore, near the 130th meridian on the overland route near the coast.

After negotiating the entrance to Weebabbie, one descends over a steep sloping mass of fallen limestone in fragments large and small. After about 180 feet further depth has been reached (that is, 280 feet below the ground surface), one has to be very careful, for it would be easy to fail to discern the perfectly still crystal-clear water which lies in two distinct pools in the cave. At water-level, if a good light is carried, the full extent of a long tunnel can be seen. In the distance there is an opening.

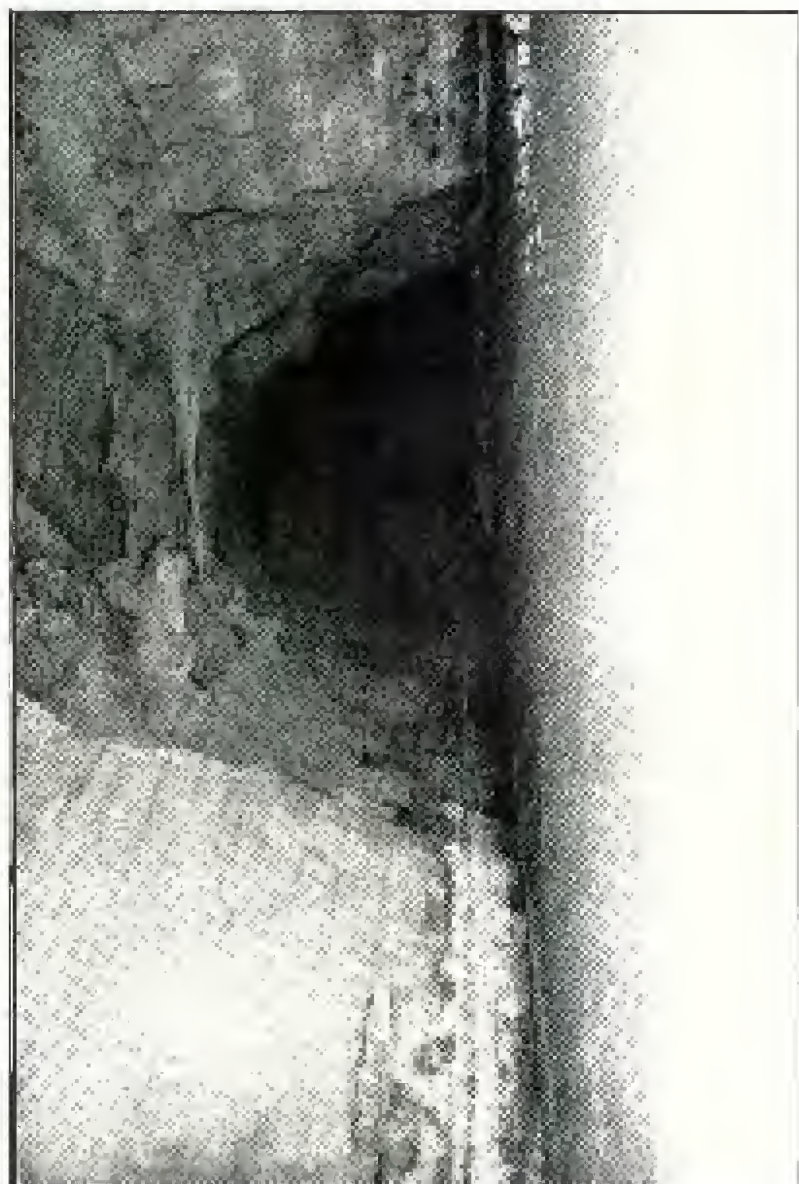
In the year 1900 three adventurous men from the Eucla Telegraph Station built a raft and on it they explored the tunnel. Going through the opening, they entered a large circular chamber 1200 feet across. The names of the men concerned were Juncker, Clayer and Simmons. Weebabbie and another deep cave in the Eucla district, Abrakurrie, were, in Eucla's heyday, favourite haunts for picnickers. The waters of the Weebabbie were again sailed, this time in a boat, in 1935, when measurements were made and the depth of the water sounded. One hundred feet was the maximum depth recorded in the large circular chamber.

The greatest number of the known caves of the Nullarbor are much shallower than the deep caves of Eucla. Typical shallow caves may be seen on Nullarbor sheep station. Three at least of these are very interesting, one because it is the only one of two known caves where stalactites and stalagmites are intact, and the other two because of their aboriginal hand paintings.

No native questioned has been able to throw any light as to when or why the hand impressions were made. It is possible that the two caves where they are found were merely rain-shelters, or perhaps they had uses connected with aboriginal ceremonial. Excavations have never been made in the floors, so the use of the caves must remain for the present a matter of conjecture. Both of these caves have perfectly flat floors, and are lit by daylight. The hand impressions have most likely been made by wetting the surface of the rock, then placing the left hand upon it; finely powdered red ochre was blown over the hand, thus leaving its impression upon the cave wall or ceiling, whichever place was selected.

It is impossible to give a comprehensive survey of the Nullarbor Plain in such a short article as this, but if I have succeeded in stimulating the desire of some to go out into the vast treeless spaces of the Nullarbor, there to endure the unearthly silence and loneliness for a time, to take some risks in investigating the cliff face at various points where it is accessible, and in descending some of the many blowholes and caves which are to be found almost anywhere on the plain, then my aim will have been fulfilled.

Plate XIII



Black stone hole in the wall of the house at the site of the
the house at the site of the house at the site of the house

W. G. & J. G.

THE VICTORIAN RASP FERNS

By N. A. WAKEFIELD, Orbost

Since Robert Brown published his three species of *Doodia*, there has been much confusion as to their delimitation and as to the validity of *D. media* as a species.

The information embodied in the type descriptions is as follows:

<i>D. aspera</i>	<i>D. media</i>	<i>D. caudata</i>
Fronds lanceolate-pinnatifid.	Fronds pinnatifid.	Fronds pinnate.
Pinnules linear-ensiforme, pointed, spinulose-serrulate.	Tips produced linearly. Pinnules linear-oblong, blunt, spinulose-serrulate.	Tips produced linearly. Pinnules linear-oblong, mostly distinct, obtuse, serrulate.
Sori distinct, lunulate, irregularly in two rows.	Sori distinct, lunulate.	
Stipes rough.	Stipes slightly pubescent.	

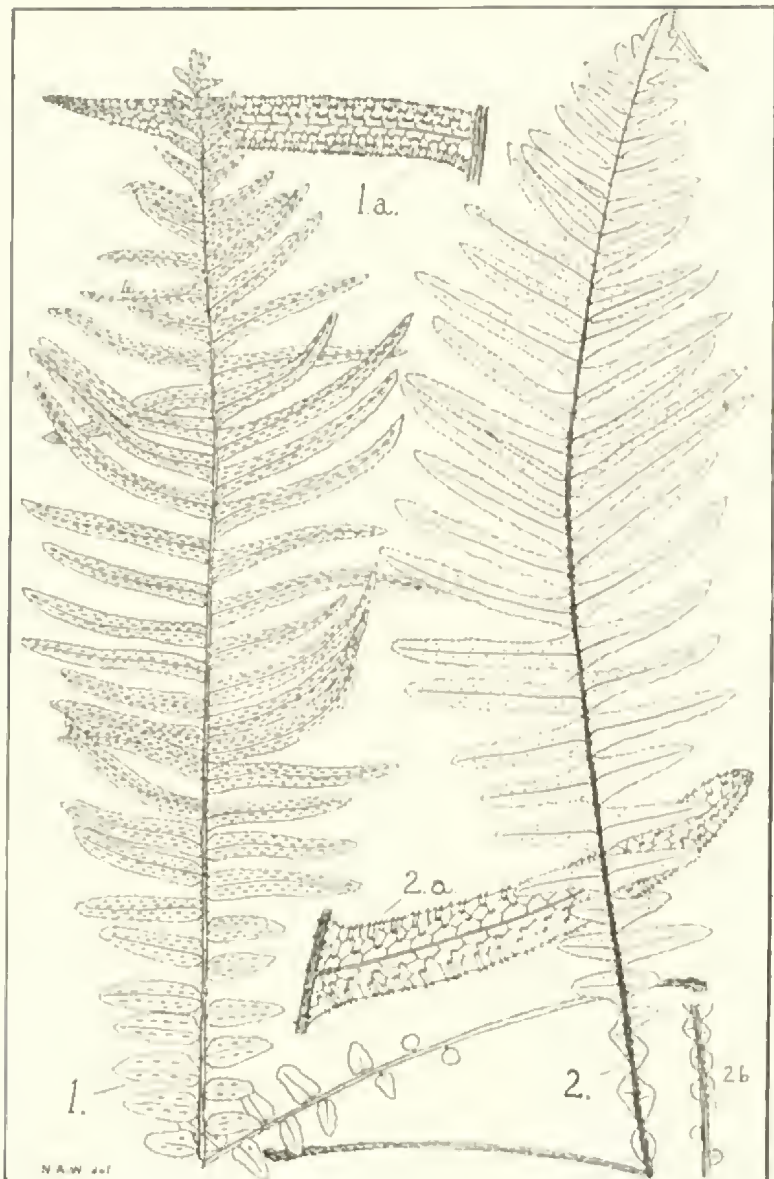
There has been comparatively little trouble with *D. aspera*, but, right from the first, small specimens of *D. media* were labelled as "*D. caudata*." Hence Bentham, in *Flora Australiensis*, reduced *media* to a variety of *D. caudata*, because he could find no difference, except in size, between the two species. It is to be regretted that he did not have access to Brown's type specimens.

Botanists followed Bentham's revision of Brown's species until C. Christensen, in *Indev Filicum* (1906), again raised *D. media* to specific rank. In New Zealand and Queensland, *D. media* was recognized, but in Victoria and Tasmania, where the true *D. caudata* is rare, there was no such recognition. Ewart, in *Flora of Victoria*, simply paraphrases Bentham's descriptions.

The Victorian species are as follows:

- All pinnules of lower half of frond distant and stalked 1. *D. caudata*
- Pinnules of lower half distinct, but only lowest few stalked 2. *D. media*
- All pinnules (except rarely lowest pair) attached by a broad base 3. *D. aspera*

1. *D. caudata*, R.Br. Small Rasp Fern.—Fronds weak and generally decumbent, with glabrous stipes to which the pinnules, excepting the uppermost few, are attached by their mid-ribs only.

*Doodia media*, var. *Moorci*.*Doodia aspera*.

Pinnules broad and blunt, bearing two rows of sori. Tip of frond large and undivided. Distribution: N.S.W. and Q'land.

var. *dimorpha*, Domin.—Barren fronds short with close-set broad pinnules; fertile fronds over twice as long with narrower, longer pinnules bearing long, almost confluent sori close to the midrib. (See Figs. 3, 3a, b and c.) The vernacular name "Rasp Fern" is inappropriate for this species, which is one of our most delicate ferns. It grows in wet, shaded spots near the Genoa River and in cool rock crevices at Combienbar in East Gippsland, and is recorded also from Cape Schanck, Dandenongs and Buchan. Distribution: Q'land, N.S.W., Vic., Tas., N.Z. and N. Cal.

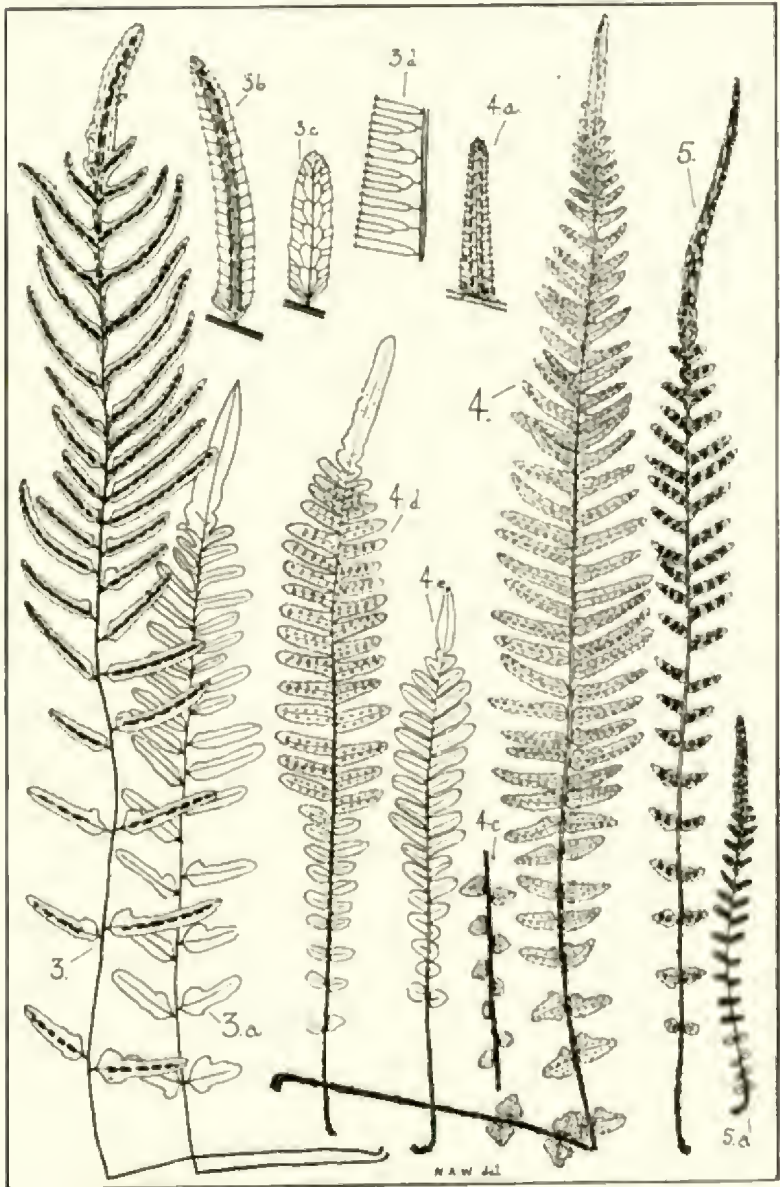
var. *laminosa*, F.v.M., the fronds of which consist mainly of one long segment, is found in N.S.W. and Q'land.

2. *D. media*, R.Br. Common Rasp Fern.—Fronde erect, rough, rigid, with dull stipes sparingly clothed with black scales; height from less than six inches to over two feet. Pinnules rough, blunt, with one or two rows of short sori. Tip elongated but often serrate. (See Figs. 4 and 4a.) Fronds of younger plants are less harsh and have less sori (Fig. 4d), while fronds from very young plants do not fit the key given, but must be judged by their associates or left until mature (Fig. 4e). Widespread and abundant in Victoria, generally in shaded gullies of all but the dry districts, Cape Schanck, Frankston, Berwick, Snowy River, etc. Distribution: Q'land, N.S.W., Vic., Tas., N.Z. and Polynesia.

var. *Moorci*, Baker.—The largest form of this species (Figs. 1 and 1a) often occurring with the normal form, and apparently only a luxuriant growth.

D. caudata, var. *lamarina*, F.v.M., is, according to Domin, in *Prodromus einer Farnflora Queensland* (1913), the form illustrated in Figs. 5 and 5a; but Mueller's original specimen has the typical veining and sori of *eu-Blechnum*. Actually, it is a specimen of *Blechnum procerum*, var. *laevigatum*, so the above variety is invalid and must be deleted from all lists. The specimens illustrated here are a form of *D. media* from rock outcrops where there is a scarcity of moisture and soil.

3. *D. aspera*, R.Br. Prickly Rasp Fern.—Fronde erect, rigid, very rough, with stipes clothed with rough black scales. Pinnules harsh, attached by a broad base (except rarely the lowermost pair on comparatively young plants. See Fig. 2b, cf. Fig. 4c), margins spiny. Tip serrate, sometimes elongated. Sori generally in two rows, very short and distant (Figs. 2 and 2a). Young plants are less harsh, with less acuminate segments, bearing only two rows of sori. This species grows by the roadside at Mount Drummer and is not uncommon in the Genoa River district in creek jungles, and is recorded also from Frankston and Orbost. Distribution: Q'land, N.S.W., and Vic. (The record of *D. aspera* for Tas-



Doodia caudata, var. *dimorpha*.

Doodia media.

mania in Ewart's *Flora of Victoria* was based on a mislabelled specimen of *D. media* in the Melbourne National Herbarium.)

The other species of the genus are:

D. blechnoides, A. Cunn. Shaped like the above species, but with sori longer and appressed to the midrib. Distribution: N.S.W.

D. heterophylla, Donin. Pinnules short, with confluent bases and sori almost confluent. Distribution: Q'land.

The vernacular names given here are suggestions by the writer for use in Victoria.

KEY TO ILLUSTRATIONS

1. *D. media*, var. *Monrei*, Orbost; a, Pinnule.
2. *D. aspera*, Genoa; a, Pinnule; b, Variation in lower pinnules.
3. *D. caudata*, var. *dimorpha*, Combiobar; a, Sterile frond; b, Fertile pinnule; c, Barren pinnule; d, Veining of *Blechnum*.
4. *D. media*, Orbost; a, Pinnule; c, Variation in lower pinnules; d, Frond of younger plant; e, Frond of immature plant.
5. *D. media* from rock outcrop, Orbost; a, A small specimen.

All fronds illustrated half natural size. Pinnules natural size.

MAGPIES' "MIXED MARRIAGES"

Each day for the last fortnight I have had a visit (at Hawthorn) from three Magpies, evidently parents and an offspring. I have seen a parent feeding the young one in the approved manner, though the youngster is as big as the parents. One of the parents, probably the female (it is the one that does the feeding) is a White-back, while the other, which stands back and does nothing in the best masculine manner, is a Black-back. Junior appears to be a White-back, but seems to have been smoothed down with a black-lead brush.

Questions: Does the Black-back usually come as far south as this? Is it usual for a White-back to mate with a Black-back?—L. W. COOPER.

NOTES ON ORCHIDS

On January 9, 1937, Mr. Charles French and I found many examples of the fantastic and pretty Orchid *Spiranthes australis*, casually known as "Lady's Tresses," flowering in swampy ground at Woori Yallock. On January 8 of this year I went to the same spot and, although conditions apparently were favourable, failed to find one of the plants. Why?

On the hills between Woori Yallock and Healesville there were many fine specimens of *Dipodium punctatum*, the Hyacinth Orchid, in full bloom. I notice that these flowers near Melbourne are much less strongly spotted than those customarily found near Sydney.

It may be noted, in passing, that the only species of epiphytal Orchid found near Melbourne, *Sarcochilus parviflorus*, has flowered well at Ferntree Gully this summer. In the same area (though in open forest) on December 10, Mr. W. H. Nicholls and I found 14 specimens of *Gastrodia sesamoides* (Potato Orchid) in the one group; the flowers were just opening.—A.H.C.

THE BOUNTIFUL SEASON

Not only has the spring-summer of 1939-40 been a "good season" for Orchards; it has been most prolific in the matter of nesting birds. Even now (January) several species are still breeding. On January 13 the President of the F.N.C. (Mr. Chalk) and I saw at Beaconsfield the nest of a Black-faced Cuckoo-Shrike (Blue Jay) containing young, and in the same locality was a nest of a Rufous Whistler with two eggs.

These are open-forest species. Jungle birds frequently nest later, and so it is not surprising that many nests have been found recently in the heavy vegetation at Ferntree Gully. Within a radius of fifty yards there we discovered, in December, a nest of the Rufous Fantail with eggs, a nest of the Grey Fantail with young, a nest of the Whip-bird with young, and, most interesting of all, a nest with eggs of the Black-faced Flycatcher.

The stronghold of this pretty Flycatcher is the tropics. It has, however, frequently been known to breed near Sydney, and once, about ten years ago, a nest was found in the east of Gippsland. The recent discovery is the first record of the bird's breeding near Melbourne. In this case the brooding bird was so tame that she refused to stir off the nest; she merely pecked at any finger placed near her.

Not far from the spot mentioned Mr. Chalk found a nest with young of the Golden Whistler, and I found one of the dainty little nests (with three eggs) of the Rose-breasted Robin: this last was some 15 feet up in a tree beside a path over which scores of visitors pass at week-ends.—A.H.C.

MEMORIAL TO DONALD MACDONALD

Victoria now has two distinctive memorials to champions of the fauna and flora of Australia. Following the unveiling of a cairn erected in Macdonald Park, Ararat, to the memory of George Gossip (sometime President of the Ararat Naturalists' Club), a memorial was unveiled at Black Rock recently in commemoration of Donald Macdonald.

For many years Mr. Macdonald did splendid work in fostering popular appreciation of natural history. Soon after returning from the Boer War, early in the present century, he began a column of "Nature Notes" in the Melbourne *Argus*. The popularity of that column caused a second feature of the kind, "Notes for Boys," to be launched a few years later, and both of these columns were conducted by Mr. Macdonald until his death in November, 1932. Early in 1933 Mr. Alec Chisholm (a boyhood correspondent of Mr. Macdonald's) returned from Sydney to take over the features, which he conducted until appointed Editor of the *Argus* in July, 1937; then Mr. Crosbie Morrison did the work until, a year later, he was appointed Editor of *Wild Life*; then Mr. Norman McCance took over, but soon afterwards, very ill-advisedly, the features were dropped; now one of them has been revived under the control of Mr. David Fleay.

Mr. Macdonald's healthy influence was not restricted to his excellent work in the *Argus*; he wrote also several notable books, among them *Gum Baughs and Wattle Blooms*, *The Bush Boy's Book*, *At the Foot of the Rainbow*, and a charming series of sketches (collected posthumously) entitled *The Brooks of Morning*. Donald Macdonald has, indeed, left a fine record, and it is no more than fitting that a memorial in his honour should stand among the tea-tree of the suburb where he lived for many years.

The memorial, which is surmounted by the figure of a Brolga standing upon a bird-bath, is situated in a reservation on the fringe of Black Rock. It was unveiled by Mr. Macdonald's daughter, Mrs. Elaine Whittle, and a tribute to the naturalist-journalist was paid by Sir Edward Cunningham.

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PROCEEDINGS

The monthly meeting of the Club was held at the Royal Society's Hall on Monday, February 12, 1940. The President, Mr. A. S. Chalk, presided, and about 120 members and friends attended.

CORRESPONDENCE

A letter from the Entomological Society, inviting members to attend an exhibit night, on March 7th, at 170 Latrobe Street, City.

REPORTS OF EXCURSIONS

Excursions were reported on as follows:—Mr. Crosbie Morrison, Black Rock; Mr. G. N. Hyam, Blackwood; and Messrs. H. C. E. Stewart and S. R. Mitchell, Mt. Buffalo.

ELECTION OF MEMBERS

The following were duly elected:—As Honorary Member, Mr. J. A. Ross; as an Ordinary Member, Mr. H. Hunt.

GENERAL BUSINESS

Natural History Medallion Award. The President announced that Mr. A. H. Chisholm, F.R.Z.S., our nominee, who was also nominated by other bodies, had been successful in the ballot. The President congratulated Mr. Chisholm, who returned thanks.

SUBJECT FOR THE EVENING

The subject, as arranged, was "Abroad with a Motion Picture Camera," by Mr. K. G. Luke. Outstanding photography of scenes in different parts of the world, and unique telescopic and night photographs, together with a running commentary, made the evening an outstanding one. Mr. Chisholm moved a vote of thanks to Mr. Luke; this was seconded by Mr. E. E. Pescott and carried by acclamation. Thanks for assisting Mr. Luke were accorded Mrs. Luke and Mr. H. A. Wolfe.

EXHIBITS

Mrs. M. E. Freame: Marine biological specimens.

Miss C. C. Currie: *Spiranthes sinensis*.

Miss E. Campbell: *Chianthus speciosa* ("Sturt's Desert Pea"), garden-grown at South Hawthorn.

Mr. R. G. Painter: *Hibiscus Hucgellii* var. *Wrayae*, *Isotoma axillaris*, *Ajuga grandiflora*, *Melaleuca hypericifolia*, *M. lakerita*, *Swainsona galegifolia*, *Goodenia ovata*.

Mr. E. E. Pescott: New South Wales Christmas Bush (*Ceratopetalum gummiferum*), cultivated at Camberwell.

Mr. A. A. Baker: A collection of the common variety of opal from the deposits at Gelantipy, East Gippsland; collected December, 1939.

Mr. W. H. Nicholls: Lawyer Palm from Northern New South Wales.

Mr. V. H. Miller: Orchid in bloom.

Mr. J. T. D. Pescott: A collection of Agates in the rough, polished and manufactured articles, stained and unstained.

Mr. S. R. Mitchell: Aboriginal stone weapons and tools from Mt. Buffalo.

Mr. F. S. Colliver: A series of recent Mollusca, sectioned to show interior structure.

Mr. H. C. E. Stewart: Specimens of Mount Buffalo National Park flora, altitude 4,000 to 5,600 feet, of *Plantago tasmanica*, *Microseris scapigera* ("Yam"), coppice foliage of *Eucalyptus niphophila* ("Snow Gum"), and the following species not previously recorded for the locality—*Trachymene humilis*, *Mitrasacme serpyllifolia*, *Pratia surrepens* ("Mud Pratia"), *P. gelida*, *Juncus acutiflorus* ("Sharp-flowered Jointed-rush"), and *Dicholene crinita*.

AN ORCHID PROBLEM

Like Mr. A. H. Chisholm ("A Note on Orchids," February *Naturalist*) I have been asking "Why" all the week. We have been watching for *Spiranthes sinensis* in the paddocks where we have found it (about January 26) without any sign of one. This week, however, the tractor and plough entered the next paddock, where we had not seen the orchids before, and they were there in numbers, at their very best.

A great grief to me was that the tractor would keep going on. I dug as many as I could, and have been wondering why they were not in either of the places we found them during the last 12 years.

We have not found *Dipodium punctatum* this year in our groups, but *Gastrodia sesamoides* were most numerous in the tiny hell of scrub cut for the fire break. We picked over a dozen before we burnt it. Do you know that *Gastrodia* indicates fertile country and *Dipodium* the most barren?—C. C. CURRIE, Lardner.

A KANGAROO-LIKE FOSSIL REPTILE

By FREDERICK CHAPMAN, A.L.S., F.G.S., Melbourne

Some of the tiny fossil Dinosaurs of North America, such as *Hallopus*, or "the Leaping Foot," from Colorado, as well as our own agile Wallabies and Kangaroos, unrelated in other ways to one another, show Nature in her versatile and ingenious moods. In our own bounding marsupials the extended calcaneum or heel-bone forms a strong point of attachment for the springy leg-muscles, as well as helping the animal to maintain a firm grip on the ground before jumping off.

A similar modification of leg-structure is strikingly shown in the extinct *Hallopus*, described many years ago by the late Dr. O. Marsh, in which it was seen that the mechanics of the limb were so devised as to cope with the animal's need, under exceptional circumstances, of annihilating distance in search of food.

The type specimen of this kangaroo-like fossil skeleton from America was unearthed eight miles north of Canyon City, Colorado Springs. The original specimen cost its purchaser, Mr. Baldwin,



One of the leaping reptiles (*Compsognathus*) to which *Hallopus* is related. From the Upper Jurassic of Bavaria. One-quarter natural size.

three dollars; Professor Marsh gave him twenty for the priceless relic. On being told by Baldwin that he thought it might have been a bird, Marsh exclaimed, "To get a real bird from the Jura I'd walk half across the continent!" However, the fossil proved, although reptile, quite as sensational as if it had, indeed, been the remains of a bird.

Baldwin's surmise about its being a bird, though only a guess, proved half-way true, for this leaping reptile, *Hallopus victor*, is

now classified with another light-bodied and bird-like reptile, *Compsognathus*, of the Lithographic Stone of Bavaria, which the late Thos. H. Huxley showed, on scientific grounds, to indicate the closest link with the lizard-like bird, *Archaeopteryx*.

Within the last few days a paper has come to hand (published in the *American Journal of Science*) from Emeritus Professor Charles Schuchert, of Yale University, the purport of which is to settle once for all the exact geological age of the leaping reptile, *Hallopus*. Formerly regarded as a member of the desert fauna of the Triassic beds in Colorado, at the same period when the Hawkesbury Sandstone of New South Wales was being gathered up in huge drifts, the horizon of *Hallopus* has now been re-determined as belonging to a later series of rocks forming the Upper Jurassic. This horizon approximates to that of the Bavarian Lithographic Stone in which *Archaeopteryx* occurs. It was during



Camarosaurus (restored) from the Upper Jurassic of Colorado.

this period that the black coal forests flourished in Victoria, in the carbonaceous muds of which was held preserved the claw-like toe-bone of a flesh-eating dinosaur of a much larger build than *Hallopus*.

The matrix of the rock enclosing the Colorado skeleton is of reddish-brown sandstone. At the time of its discovery it was assumed to be on the horizon of the older red beds (Triassic), beneath. The difference between these beds in age, although not a mere trifle, is yet not very considerable, geologically speaking, the Trias having been laid down 170,000,000 years ago, according to modern methods of computation. Now this skeleton has become more youthful by 42,000,000 years, having lived in Upper Jurassic times.

Another little nimble-footed reptile, *Nanosaurus*, lived side by side with *Hallopus* in the red bed deserts of Colorado, but, although of tiny dimensions and no larger than a rabbit, it was more closely related to the giant dinosaur *Iguanodon*. In other lands, in Wealden times, the *Iguanodon* roamed over country that was lush in herbage such as that now occupied by the Ardennes in

Europe. Undoubtedly the poor little *Nanosaurus*, on the other hand, had a hard row to hoe in Colorado.

This induced activity reminds one of the story of an Irish jarvey who gave a very apt description of the wilds of Mayo. He had two passengers with him, one of whom lived in a very rich grazing district, and was astonished at the bleak aspect of the country through which they were passing. Thus, he began questioning the driver as to its quality, powers of production and what it would feed to the acre. "Well, sorr," replied the driver, "it might feed a hare to the acre in summer, but in winter she would have to run for her life!"

To some extent this need for activity applies to Wallabies and Kangaroos, especially in times of drought, and probably did more so to the Leaping *Hallopus* of Colorado.

Two remarkable kinds of the lizard-footed Dinosaurs have in recent years been described by Mr. H. A. Longman, Director of the Queensland Museum. Both were bulky, herbivorous animals; one of them, *Rhatosaurus browni*, lived in the Upper Jurassic or Walloon forests and is estimated to have attained a length of forty feet. Its nearest ally appears to be *Camarosaurus*, of the Upper Jurassic of Colorado. The second one described, named *Austrosaurus machillopi*, was obtained near Clutha, Flinders River, Queensland. The matrix of the fossil showed it to belong to the Cretaceous Tambo series, of Upper Albian (Gault) age. Mr. Longman concluded that its relationship is with *Celiosaurus* or some closely allied genus; its length may have reached fifty feet.

Up to the present we have no record of any fossil remains of the smaller, leaping and bird-like saurians on our continent; but a few years ago the same might have been said as to the absence of the great bulky herbivores that have since been discovered in Queensland.

MR. GREGORY MATHEWS

Mr. Gregory Mathews, author of a monumental work on the Birds of Australia, arrived in this country from England recently. The chief object of his visit is to arrange and catalogue the valuable collection of ornithological books which he has presented to the National Library at Canberra. He expects to be here until about the end of the year.

Mr. Mathews, who was born in New South Wales and had experience on the land in Queensland, went to England early in the present century. At the British Museum he met Dr. Bowdler Sharpe, and it was through the encouragement of that distinguished zoologist that he began work on the birds of Australia. In addition to the main series of volumes, he published a Manual and a Handlist relating to our birds.

At time of writing Mr. Mathews is in Canberra. He is to be entertained later by naturalists in both Sydney and Melbourne.

THE ESTUARINE SHELL AND EGG-GIRDLE

By (Mrs.) M. E. FREAME, Melbourne

One of our most interesting molluscs is the small Estuarine Sand-Snail, *Salinator fragilis*, found living in quantities at Altona and at many localities along the Victorian coast-line.

Too little is known of these curious brackish-water forms and the present note is offered as a contribution to its history, which it is hoped will prove of interest and serve to bring before members the pleasures awaiting short-life enthusiasts for studying the habits of these interesting animals.

Altona provides excellent specimens of the species, which, as the tide recedes, will be seen burrowing through the sand.

"Tracking" for a short distance, these small animals deposit their eggs, cementing them with grains of sand to form a small band or girdle. The eggs take from fourteen to sixteen days to hatch. On the return of the tide, the animals disappear in the sand; they crawl fairly quickly, and when contracted enter their shell, which they close with their horny operculum.

Associated with the girdles of *S. fragilis* are small groups of red eggs containing a *Nebalia*-like shrimp with a large carapace. Generally there are about ten eggs in each group.

The girdles were first found in 1936.

It is possible that this is a first record, at least for Victoria, of the hatching of these eggs, as a good search has failed to reveal previous references.

KEY TO ILLUSTRATIONS

1. Tracks and Shells of *Salinator fragilis*.
2. Ciliated Embryos of same.
3. Shells formed in envelopes.
4. Adult Shells and Egg Girdles of *S. fragilis*.

BADGER CREEK SANCTUARY

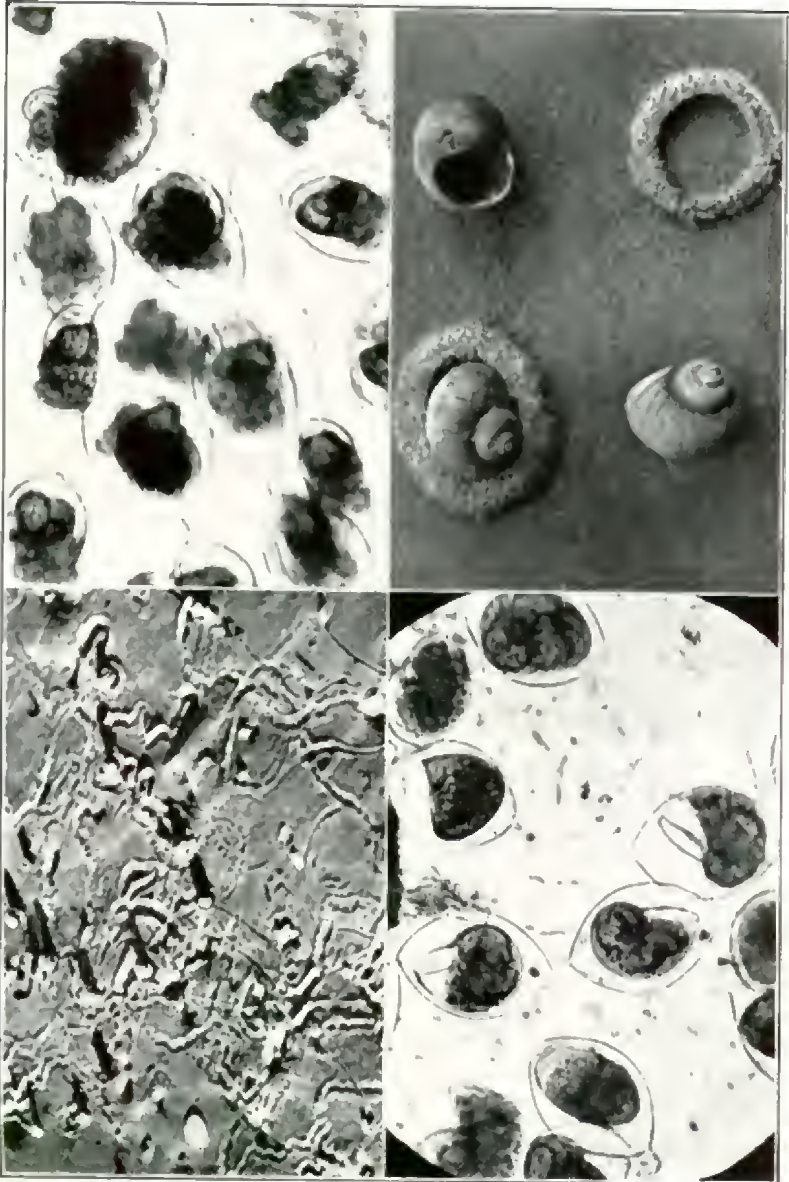
On the suggestion of the Royal Australasian Ornithologists' Union and the Healesville Shire Council, the Lands Department of Victoria has approved of the reconstitution of the Committee of Management of the Badger Creek Sanctuary, Healesville, in order to include Melbourne representatives.

The Committee now comprises members of the Healesville Shire Council and the following Melbourne members: Professor P. MacCallum, Messrs. A. H. Chisholm, V. F. Letcher, and K. Byron Moore. At the first meeting of the new Committee, held recently, Cr. W. J. Dawborn was elected Chairman and Mr. Letcher Vice-chairman.

OUR 60TH BIRTHDAY

The 60th Anniversary of the formation of the Field Naturalists' Club of Victoria falls due in May next, and it is hoped to celebrate the occasion in worthy fashion. Particulars will be announced later. Meanwhile, suggestions from members in regard to the celebration will be welcomed.

Plate XIV



For key see page 178.

Photos. by O. Coulson.

PLANTS OF MT. BUFFALO

By H. C. E. STEWART, Melbourne

The fourth trip arranged by the Field Naturalists' Club of Victoria to Mount Buffalo National Park, early in the New Year, was signalized by the inclusion in the small party of Mr. and Mrs. Geo. Coghill, who both took part in the Club's first official visit to the mountain thirty-six years ago. The detailed report of that excursion, made on foot long before the construction of the road or the present Chalet, forms a classic in the Club's history, and continues to inspire interest in this alpine wonderland (see *The Victorian Naturalist*, Vol. XX, No. 11, March, 1904, pp. 144-159).

The first impression of the present visit was one of sadness, to observe the extensive damage of last year's bush fires. Much of the vernal glory of the "Garden of the Gods" seems to have departed. The lush bushland on the walk to Lake Catani is now a scene of desolation, and around the unique Monolith is a blackened waste—an area that will take a long time to recover its former forest loveliness. However, in other parts of the Plateau, lightly affected by fire, marvellous rejuvenation is in process, whilst those areas that escaped the flames have responded to bountiful rains in a riot of botanical wealth.

Around the famous Gorge to Reed's Lookout, the characteristic Buffalo forest flora has donned spring's gayest garb. The White Sallee Gums, *Eucalyptus pauciflora*, and the rare Buffalo Weeping Gums, *E. Mitchelliana*, were laden with blossom. The Blotchy Mint-bush, never failing to show curious grey-green inflorescences; the brilliant Mountain Shaggy-pea, *Oxylobium alpestre*, a little later than usual; the Silver Daisy, *Celmisia longifolia*, in the crevices of the precipitous walls of the Gorge; the delicate creamy Alpine Rice-flower, *Pimelea alpina*; the dazzling yellow Thyme Guinea-flower, *Hibbertia serpyllifolia*; the aromatic-foliaged Alpine Westringia, *W. senifolia*, and the Mountain Pepper, *Drimys lanceolata*, were among the predominant species present.

Farther on, the open spaces showed expanses of the Crimson Kunzea, *K. parvifolia*; the Shrubby Trachymene, *T. Billardieri*; and the Tufted Lily, *Stypandra caespitosa*; all were in customary floral plenitude. Near Reed's an occasional clump of Guinea-flower Bush-pea, *Pullenaea hibbertioides*, was a leathery mass of golden bloom, whilst in several sheltered spots the white orchid, *Caladenia alpina*, was seen.

Temporarily gone from the Long Plain at the head of Lake Catani towards Mount Dunn are the wonderful alpine shrubs that formerly skirted the stream—the Mint Bushes, the Tea Trees, the Heath-myrtles and the Daisy-bushes—but in their place has come an initial abundance of golden Billy-buttons, mauve and white Alpine Daisies, several species of Buttercups, and the ubiquitous

Grass Trigger-plants. Later, the permanent herbaceous plants will surely be re-established. Already the tender green of shoots from roots of shrubs not entirely incinerated has appeared, together with incredible hosts of seedlings.

On the forest slopes in this region the eucalypts have commenced vigorous coppice growth, and the carbon in the soil has wrought a miracle with thousands of prostrate plants of the Prickly Starwort, *Stellaria pungens*, and two species of Woodruff, *Asperula Gunnii* and *A. scorparia*, whose pure white flowers covered the ground like hoar-frost.

At the Horn, also, a profusion of new growth was in evidence. Where fire had not penetrated, particularly striking were the Rosemary Everlasting, *Helichrysum rosariumifolium*, var. *purpurescens*, differing with its unopened lavender-pink buds from the off-white form abundant on other parts of the mountain; the Alpine Daisy-bushes, *Olearia flavescens* and *O. alpicola*; the Tall Rice-flower, *Pinus ligustrina*; and the heavenly-scented Alpine Boronia, *B. algida*. The descent from the summit by the old original steep track near the "Wall of China" afforded opportunity to note how the vegetation on the southern side contrasted with that on the northern aspect. Here were the Mountain Plum-pines, *Podocarpus alpina*, hoary with age and covered with male inflorescences which when touched threw off a cloud of purple pollen; the Snow Aciphyll, *Aciphylla glacialis*, with dainty umbelliferous flowers and fern-like foliage; and a little lower down the gnarled dwarf Snow Gums, *Eucalyptus niphophila* (Maiden and Blakeley) in flower and with last season's seed-vessels still crowding the branchlets.

The Crystal Brook valley and the vicinity of the Reservoir, practically untouched by recent fires, showed native plants in almost overwhelming profusion and thus commanded chief botanical interest for the New Year week, also the Australia Day week-end, when two members re-visited the Plateau, accompanied by other members who came for the first time. The main course of the stream runs through typical tundras featuring an alpine flora, separate from the forest vegetation of the granitic slopes, or the more familiar types on the silurian foothills. One or two uncommon species of this distinctive type call for special mention.

Of the several Epacrids in flower, *Richea Gunnii* (named after Richard Gunn, the Tasmanian botanist) dominated the open spaces. This species is the only one of the genus found in Victoria, and all are confined to Alpine localities. Its nearest botanical relative is a tree, *Richea (R. pandanifolia)*, on the Cradle Mountain in Tasmania. Except in the Australian highlands, *Richea* is not found elsewhere in the world. The species is well adapted to be covered by the thick blanket of snow in winter. The recurved, sharp-pointed, deep green leaves are sheathed at the base and the unusual creamy-yellow flowers, bell-shaped, are

carried in terminal clusters on tall pale stems. The flower-clusters are furnished with a brown bract, conspicuously placed, that falls off as the flowers mature. In places the plants completely covered patches a hundred or more square yards in extent, and being always in open situations the numerous flower-heads presented an attractive spectacle.

Another Epacrid very plentiful was the Alpine Heath, *Epacris barbawiensis*, just past zenith of bloom, and succeeded in turn by the Short-flower Heath, *Epacris breviflora*, robust in growth, with numerous branches of foliage that carry pure white flowers, sometimes flushed a faint pink in the stamens. Less conspicuous was the Coral Heath, *Epacris microphylla*, which also flowers earlier.

This year was notable for the splendid display of that rare Protead, the Alpine Orites, *O. lancifolia*, free-flowering shrubs covered with massed spikes of deep cream filamentous bloom. Belonging to a distinctively Australian genus, except for a single South American species, *O. lancifolia* is the only representative found in Victoria. Though not strictly a tundra plant, it thrives in rich marshy soil, near water, and never away from granite boulders. It has a remarkable habit of "hugging" the granite, possibly to shelter from snow and ice in winter. The plant was also seen in flower in a declivity below the scenic shelter at the Horn.

Rare, even for the Buffalo, the Alpine Bottle-brush, *Callistemon Sieberi*, flowered near the Reservoir. The small, pointed linear leaves, erect with the miniature flower "brushes," differentiate the species from other Victorian Bottle-brushes.

The open marshes were given detailed attention. Among conspicuous plants were the aristocratic Alpine Phebalium, *P. podocarpoides*; the dense mats of Yellow Kunzea, *K. Muellert*; the brilliant blaze of the Golden Everlasting, *Helichrysum bracteatum*; and compact cushions of the Twin-flower Knapel, *Scleranthus biflorus*. Several species not hitherto listed for the Plateau were located in these areas.

New for the Buffalo, though listed by Mr. A. J. Tadgell for Mt. Hotham, was the Alpine Trachymene, *T. humilis* (syn. *Diliscus humilis*), with the long tapering root typical of the carrot family. Other new discoveries for the locality included the tiny Thyme Mitre-wort, *Mitrasacme serpyllifolia*, bringing the interesting order *Loganiaceae* into the Buffalo flora; the Stalked Water Milfoil, *Myriophyllum pedunculatum*; the Snow Pratia, *P. gelida*; the Long-haired Plume-grass, *Dichelachne crinita*; and the Alpine Groundsel, *Senecio pectinatus*. Further additions (determined by courtesy of the National Herbarium, Melbourne, and not recorded in A. J. Ewart's "Flora of Victoria" or the Club's "Census") were the Mud Pratia, *P. surrepens*, and the Sharp-flowered Jointed-rush, *Juncus acutiflorus*; the last-named was noted in several places.

In common with the bountiful season for Orchids elsewhere, the number noted for Mount Buffalo disproves the general idea that the mountain is undistinguished by *Orchidaceae*. An interesting find was the beautiful maroon *Prasophyllum Archeri*, the "mulberry-on-a-stick" of the cattlemen, in numbers at the head of the Lake. There, too, were hundreds of the Veined Sun-orchid, *Thelymitra venosa*, coming into flower. A robust solitary specimen, with two heads, of the common yellow Snake Orchid, *Diuris pedunculata*, was found at the Long Plain. These two species, not previously recorded for the Plateau, bring the total of the Buffalo orchids to fifteen, the Leek-Orchids predominating. Fine specimens of *Prasophyllum brevilobre*, also many spikes of the Bogong Leek-Orchid, *Prasophyllum alpinum*, were located by Mr. Coghill, and later an early spike of the Tiny Greenhood, *Pterostylis parviflora*. Another gladdening observation was the Alpine Leek-Orchid, *P. Suttonii*, in several places.

Of the general forest flora, the Acacias, by some prank of Nature, have not seeded this year. No pods could be seen on the typical Buffalo species, *A. penninervis*, *A. plebophylla*, *A. Dallachiana*, and only occasional seeds on the plentiful *A. alpina*. A similar strange absence of seed was observed on the forest heaths. Of many bushes of *Leucopogon lanceolatus* around the Gorge, one only was found to show a sparse crop of fruit. Likewise, the Mountain Peach-heath, *Lissanthe montana* (syn. *Leucopogon montana*) has also failed to crop. These shrubs attract birds at fruiting time, and formerly were to be found in aboriginal menus.

Plants on the decrease are the Small Poranthera, *P. microphylla* (once very common, but two plants only seen), and the Owens River Everlasting, *Helichrysum Stirlingii*, apparently dying out even where fires had not been. The loss of so many fine trees of *Eucalyptus gigantea* is tragic, and disquiet is felt at the practical decimation of *Podocarpus alpina*, excepting a few plants below Lake Catani wall, and the isolated examples at the Horn already referred to. A compensating feature is the many seed-vessels set on the eucalypts and other myrtaceous trees. Mr. C. H. Stewan located near the Leviathan Rock a sub-species of Snow Eucalyptus, *E. pauciflora*, var. *cylindrocarpa*, that occurs in New South Wales, though not previously on record for this State.

The discovery of aboriginal relics on the Plateau recalls the presence of many vegetable items of native diet. The Yam, *Microseris scapigera*, dotted most of the plains with its canary-yellow flowers. Other foods of the blacks that thrive are the Veined Sun-Orchids, many in flower at the foot of the Cathedral, the Potato Orchids, *Gastrodia sesamoides*, various Leek-Orchids, and the common Fringe-Lily, *Thysanotus tuberosus*, producing edible tubers, with the blue Wild Flax, *Linum marginale*, much sought after for the mucilaginous seeds.

Plate XV



Myrica Orites (*Orites lanceolata*).



Myrica Bottle-brush (*Callistemon Sieberi*).

Photos. by H. T. Reeves.

Another plant that flourishes everywhere, the Grass Trigger-plant, *Styliidium graniniifolium*, is also recorded in aboriginal association. With their perennial sense of humour, the blacks found the pollinating mechanism of the flower an endless source of delight, even as sophisticated whites nowadays do. The extreme purity of the air, light and water on the high altitudes imparts to these plants a vigour and vivid colour unequalled elsewhere. Stems 40 inches long and carrying 100 flowers are not unusual for Mount Buffalo.

The Bogong moths in myriads and the bush murmurations on the mountain would undoubtedly afford to entomologically minded members a wide and practically uninvestigated field for insect study.

GEOLOGY OF MT. BUFFALO

By S. R. MITCHELL, Melbourne

The outstanding geological characteristic of Mount Buffalo is not so much its vast size, and its remarkable rocks, as the enormous amount of denudation that has taken place since the intrusion and solidification of this granite mass in the sedimentary rocks of this part of Victoria; considerably greater than that indicated by its elevation above the present river system. The highest point of Buffalo is the Horn, 5,645 feet above sea-level, and 4,725 feet above the Ovens River at Porepunkah.

We know that the cooling of a granite like that of Buffalo was spread over long periods of time and under great pressure, the latter being due to the weight of the overlying sedimentary rocks into which the highly heated magma was forced. This covering has since been completely removed, together with much of the upper portion of the granite. Some indication of the amount of this denudation, largely due to stream erosion, can be gained by the study of a much earlier river system, remnants of which occur in the vicinity of the present divide some 25 miles to the south-east.

Many of the mountain tops and such areas as the Bogong and the Dargo High Plains are capped by basalt, which in places covers river gravels more or less auriferous, and a well-defined lead has been proved trending from Mount Fainter in a southerly direction for some 25 miles. These gravels have been protected from complete removal by the harder volcanic rock, that filled in the old valleys, and now forms flat-topped cappings in places 2,500 feet above the present rivers, the higher gravels occurring at elevations over 5,000 feet. The fall of this lead is 100 feet per mile, where the old valleys were fairly wide, and a steeper grade can be expected towards the source, so that the head waters of this system were on high land much farther north of the present divide.

Fossil plant remains found in these old river deposits indicate a

Middle Tertiary age. The Buffalo granite possibly formed part of the core of this earlier divide, and we thus have evidence of great changes, particularly the removal of many thousands of feet of hard rock. It is reasonable to expect that this earlier divide was many thousands of feet higher than the present divide.

The disintegration of the Buffalo granite was greatly accelerated by the very pronounced jointing of the rocks, aided by the many destructive geological agencies, among them being the disruptive effects of alternations of heat and cold causing expansion and contraction in the rock—expansion through freezing of contained water, and the effect of water containing weak acids that exert a chemical action on the more susceptible components of the granite. These are the silicates of soda and potash of the feldspars and micas which are dissolved and removed in solution, leaving a friable kaolin, accounting for much of the disintegration along joint planes and the rounding of the angular blocks. Many examples are to be seen of masses of rock converted to rubbly heaps of quartz grains and kaolin.

ABORIGINES ON MT. BUFFALO

By S. R. MITCHELL, Melbourne

Although the Buffalo Plateau has an elevation of over 4,500 feet above sea-level, and is covered by snow for portion of the year, it does not lack interest of an ethnological nature.

During the recent Club re-visit, members found evidence of the former presence of aborigines in the numerous flakes and chips of white quartz, stone axes, and other artifacts of materials foreign to this area of granitic rocks, and obviously carried there and used by the natives. The source of the quartz was the waterworn pebbles derived from the quartz reefs of the sedimentary rocks traversed by the present streams. A few fragments of quartzite and jasper only were found, but none of the smaller conventionalized types. Five ground-edged implements were collected, including two chisels made from a very hard metamorphosed mudstone or chert, on which in both cases a very keen cutting edge had been ground.

Eight examples of sharpening stones were found, either thin slabs of sandstone or flat elongated river pebbles of the same material, all showing depressions made in sharpening axe-heads. One chipped-edge hand-axe of metamorphic sandstone was found, also quite a large number of elongated sandstone pebbles, six inches or more in length. All these relics were found in the vicinity of rock masses like the Horn and the Cathedral, in well-sheltered spots close to water.

Probably the principal reason for the aborigines frequenting such a high altitude was to feed on the Bogong moths, *Agrotus suffusa*. During our visit, thousands of these moths were seen

PLATE XVI



Artifacts from Mount Buffalo.

- | | |
|--|---------------------------|
| 1-4. Axe Grinding and Sharpening Stones. | 9. Hammer Stone. |
| 5. Ground-edge Axe Head. | 10. Ground-edge Knife. |
| 6, 7, 8. Quartz Flakes and Chip. | 11. Ground-edge Axe. |
| | 12. Chipped Hand-chopper. |

hanging to the walls of certain rock crevices, and one can readily appreciate the larger quantities that were available to the natives.

Comparing these relics with those found on other camping grounds, it would appear that only men and boys visited these places, and for a limited period only. The locality would be eminently suitable for initiation ceremonies, and on account of the plentiful but temporary food supply would carry quite a large number of visiting tribesmen.

The following extract from R. Brough Smythe's *Aborigines of Victoria* (page 207) relating to the Bugong moths, can be profitably quoted.—

"The Bugong moths collect on the surfaces of granite rocks on the Bugong Mountains of New South Wales, and in such manner as to admit of their being caught in great numbers. Mr. G. Bennett says: 'To procure them with greater facility, the natives make smothered fires underneath those rocks about which they are collected, and suffocate them with smoke, at the same time sweeping them off frequently in bushfuls at a time. After they have collected a large quantity, they proceed to prepare them, which is done in the following way—A circular space is cleared upon the ground, of a size proportioned to the number of insects to be prepared; on it a fire is lighted, and kept burning until the ground is considered to be sufficiently heated, when, the fire being removed, and the ashes cleared away, the moths are placed upon the heated ground, and stirred about until the down and wings are removed from them: they are then placed on pieces of bark and winnowed to separate the dust and wings mixed with the bodies; they are then eaten or placed in a wooden vessel called *Walbum* or *Calibum*, and pounded by a piece of wood into masses or cakes resembling lumps of fat, and may be compared in colour and consistence to dough made from smutty wheat mixed with fat.

"The bodies of the moths are large, and filled with a yellowish oil, resembling in taste a sweet nut. These masses (with which the *Netbuls* or *Talabats* of the native tribes are loaded during the season of feasting upon the Bugong) will not keep more than a week, and seldom even for that time; but by smoking they are able to preserve them for a much longer period. The first time this diet is used by the native tribes, violent vomiting and other debilitating effects are produced, but after a few days they become accustomed to its use, and then thrive and fatten exceedingly upon it. These insects are held in such estimation among the aborigines that they assemble from all parts of the country to collect them from these mountains. It is not only the native blacks that resort in the Bugong, but the crows also congregate for the same purpose.'

"The natives attack the crows, kill them, and eat them, and like them very much after they have fattened on the moths. Eyre mentions this moth. Not only the natives but their dogs also fattened on it."

WHAT CAUSES ORCHIDS TO FLOWER?

By EDWARD E. PESCOTT, Melbourne

It has been generally admitted that the past season has been a wonderful one for orchids. From every district of the State reports have come of the abundance of bloom. The general reports say that many species have blossomed by the thousand. South and East Gippsland, the Mallee, the Little Desert, the North-East, the Grampians, and the districts nearer Melbourne all tell the same tale. And in some places, orchids have flowered abundantly where they were previously very rare.

The average collector accepts this as an evidence of a "good season"—whatever that may mean. A very large number of people give credit to the bush fires. "The fires," they say, "cleared out the country and stimulated the plants, and hey, presto! they came in their thousands." But the thinker still says "Why?"

The bush fires certainly have cleared out the undergrowth; and incidentally they have done what they rarely get credit for doing—they have destroyed large numbers of slugs and snails, as well as other predatory creatures, that generally destroy large numbers of young growing plants, orchids and others.

But then we are led to ask, "Did the bush fires cause this interesting result of orchid abundance?" I know that it is an old and accepted story, but what truth is there in it? If this be the stimulating cause of floral abundance in orchids, then we would expect to collect thousands of orchids each year in the vacant spaces along the railway lines in the State; but we certainly do not. Orchids are generally no more abundant there than anywhere else.

One year Mr. Charles French and I went to collect some flowers of *Lyperanthus nigricans* (the "Undertaker" Orchid) in a patch at Sandringham where we knew there had been a fire. There were thousands of vigorous plants, but no flowers. Such a circumstance can be multiplied many times.

If we accept it to be a fact, and we must do so, that the majority of orchids live in symbiotic relationship with certain fungi, then the heat of the bush fires would certainly destroy all of the fungi, and then how could the orchids grow? Or, *does* the heat destroy the fungi? When potting orchids we are advised not to sterilize by heat the fern fibre in which we plant the orchids. Again, I ask, where are we in this consideration?

What *does* stimulate orchids? In 1914 I collected a fine series of *Gastrodia sesamoides* in the Grampians. No flowers appeared at the same spot during the next three years. In December, 1937, Sir Arthur Streeton found in his garden at Olinda eight clusters of this orchid in bloom, one of which had 39 flower-stems, the clump occupying three feet square. In addition to these, others were flowering in rough ground outside the fence. Although Sir

Arthur had lived at this home for twelve years, he had never before seen this orchid.

Years ago a correspondent sent me flowers of *Prasophyllum flavum*, from a paddock near the house, which grew and flowered in a spot where they had not been known before. A similar experience occurred with me, and with the same orchid, at Belgrave.

Last winter was an exceptionally wet and cold winter, so wet that many soils were waterlogged. Observers say that this was the cause of killing out many slugs and snails. If that be so, can we not regard this as one factor also contributing to the abundance of orchids?

Or do orchids react to some circumstance which results in a sporadic increase, as is the case with some insects, rather than going along in regular flowering lines like, say, the cape weed or the wattle? At any rate, I fail to see that the bush fires can be given the credit for all of the superabundance of orchid flowers in 1939.

EXCURSION TO BLACK ROCK

Between 60 and 70 members and visitors assembled at Black Rock on January 20, for the study of shore life. The weather was ideal and the party made straight from the tram terminus to the beach.

When the path ended near Quiet Corner, the excursion proper began with a few remarks on the sea as the cradle of life on this planet, its gradually increasing saltiness, and the theory that the salinity of mammalian blood represents the concentration of the salt in the sea at the time the ancestors of the mammals stepped ashore. Advantage was taken of the presence of the stratified cliffs rising from the shore-line to point to the origins of the fossil records from which our present knowledge of extinct life of earlier ages has been obtained.

Among the rock pools in the shallows from Quiet Corner to Rickett's Point, living specimens were obtained of practically every natural phylum of creatures that live in the sea. Because of the large percentage of beginners in the party, remarks were confined to the general characteristics of the creatures found, from sea anemones and coral (not living) to bony fishes, and no attempt was made at detailed classification of the specimens found. For anyone who is specially interested in shore life, however, this stretch of beach may be thoroughly recommended for variety and accessibility, especially if the precaution is taken (as in the present excursion) to ensure that the visit is timed for low tide. Much dried and dead material of considerable interest was found among the weed and rubbish on the sand at high tide mark.

One of the features of the excursion was the noble effort of Mrs. Woodburn, of Black Rock, who offered to provide afternoon tea for the party. She had probably expected to cater for about a dozen people, or for twenty in the event of good weather. The sight of nearly 70 people on the trip, however, left her undismayed, with the result that the excursion was rounded off, somewhat after 5 p.m., with most welcome refreshments at Rickett's Point. Our very hearty thanks are due to Mrs. Woodburn—CROSSIE MORRISON.

SEX-RATIO AND EVOLUTION

By M. KATHLEEN WOODBURN, Black Rock

In an article on *Dasyurus maculatus*, in the *Victorian Naturalist* of February, 1940, Mr. David Fleay makes the statement that *D. maculatus* and other carnivorous and insectivorous marsupials exhibit a preponderance of the male sex. This opens up a range of interesting speculation.

The science of sex-ratio, as applied to the decadence of a species, is still in its infancy. Anthropologists are working on the matter in regard to the passing of certain races in the Pacific and elsewhere, and are slowly reducing a large quantity of data to tentative theory. Amongst this the problem of sex-ratio looms importantly.

J. R. Baker, writing of the Melanesians of Sakau, Espiritu Santo, in the New Hebrides, blames, amongst other things, the nature of the sex-ratio, which shows a great preponderance of males, for the serious de-population there. This factor, however, is what might be termed a secondary result. The primary issue concerns the cause of the preponderance of male births.

Some factor is obviously at work. When a species reaches a certain point, the condition of "running-out" appears. Amongst artificially bred animals inbreeding, resulting in debility and general weediness, may account for it, but amongst naturally bred species, where inbreeding is not prevalent, the same running out of stock occurs at times. One of the indications of this is the rise in the sex-ratio of males to females.

In his observations in the New Hebrides, Baker instances a sex-ratio 100:160, taking the females as 100. This condition, combined with the contact with the whites, is lowering the population to an alarming extent. But it is not so much the effect as the cause with which we are concerned here. Mr. Fleay's instance of a sex-ratio, in which the males predominate by 10 to 1 amongst the *Dasyures*, is very interesting when one thinks along these lines, and several queries arise.

Is there any sign of decadence of species among the *Dasyures* and other carnivorous and insectivorous marsupials where the sex-ratio is so much higher than ordinary? Is that section of the marsupials nearing the end of its day? (This does not apply to the disappearance of species due to the inroads of civilization, but to the inherent characteristics which produced the inimical preponderance of the male sex.) Is there any indication of a transition stage?

Could Mr. Fleay give us further information on a subject which opens up a hitherto unstressed aspect in the evolution of our marsupials?

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PROCEEDINGS

The monthly meeting of the Club was held at the Royal Society's Hall on Monday, March 11, 1940. The Senior Vice-President, Mr. Geo. Coghill, presided, and about 60 members attended. The small attendance was due to the excessive heat.

APOLOGIES

Apologies for non-attendance were received from Messrs. A. S. Chalk (President) and J. and W. H. Ingram.

SUBJECT FOR THE EVENING

The lecture for the evening was given by Mr. A. E. Anderson, Guide Lecturer at the National Gallery, on the subject, "Australian Flora and Fauna in Art." Mr. Anderson, using the blackboard to illustrate his remarks, showed the application of natural objects to applied art, and pointed out the difference between such works and so-called modern art, etc. Mr. L. W. Cooper moved a vote of thanks, which was seconded by Mr. A. D. Hardy and carried.

BUSINESS FROM MINUTES

The Jubilee Meeting and proposed plan for the celebration were outlined by the Secretary, and suggestions from members were invited.

REPORTS OF EXCURSIONS

Reports of Excursions were given as follows: Healesville, Mr. F. S. Colliver; Oakleigh Golf Links, Mr. A. H. Chisholm; Cheltenham, Mr. L. W. Cooper (for Mr. Butler).

ELECTION OF MEMBERS

The following were duly elected as Ordinary Members: Miss A. Martin and Mr. K. Edwards; and as a Country Member: Miss Edna Walling.

GENERAL BUSINESS

I. Country Subscriptions.—On the motion of Mr. Chisholm, it was agreed to call a special meeting for 7.55 p.m. on April 8 to discuss a proposal to reduce the subscription for country members from 15/- to 10/- a year. Mr. Chisholm, for Mr. Colliver, gave notice of motion to this effect.

2. Re poisoned seed being sown to poison birds.—Mr. H. C. E. Stewart and others spoke on this matter. Mr. V. H. Miller stated his belief that no seedsman had ever sold seed for such a purpose.

EXHIBITS

Mrs. M. E. Freamer: Coral Fish, Whale Barnacle (*Chromodoris*, sp.) and a Chiton with seven valves.

Mr. R. G. Painter: *Calanthe veratrefolia*, *Pinellia decussata*, and *Ajuga grandiflora*; all garden-grown.

Mr. F. S. Colliver: A series of the various forms of the mineral pyrite.

RED-BACKED SPIDER

Among the exhibits at the March meeting was a glass tank containing a family of red-backed spiders (*Latrodectus hassellii*), including a large female, the rarer male, very small by comparison, several egg sacs, and a large number of baby spiderlings. This family has been kept for some time for purposes of photography, the spiders being fed with insects through a safety aperture in the cover of the tank. The spiders were exhibited primarily to show members the general untidy appearance of the web nest, and the distinctive form and coloration of the dangerous female, in view of the interest aroused by another death (of a man in Young, N.S.W.) from the bite of this small spider.

Members may not realize quite how fortunate they were in seeing the male alive. During the night, after they had been exhibited, the spiders apparently completed their nuptial ceremonies, and in the morning the male was found dead and sucked dry at the bottom of the tank—obviously killed by his spouse. Three nights later, the female constructed another egg sac, which she hauled from the bottom of the tank to the top (apparently for additional security)—a distance of nine inches. From these incomplete observations it appears that most of the activities of this spider take place at night.

If the colony survives, a more detailed note will be contributed later.—Crosbie Morrison.

ERRATA

"Plants of Mt. Buffalo," *The Victorian Naturalist*, Vol. LVI, No. 11, March, 1940:—

Page 179, line 24: "has domed" should read "had domed". Page 180, line 10: "*A. scorparia*" should read "*A. scoparia*". Page 180, line 14: "*var. purpurescens*" should read "*var. purpurascens*". Page 180, line 27: "(Maiden & Blakeley)" should read "(Maiden & Blakely)". Page 180, line 43: "Alpine localities" should read "alpine localities". Page 180, line 44: "tree, Richea" should read "tree Richea". Page 181, line 43: "*Dichelachne crinita*" should read "*Dichelachne crinita*".

—H.C.E.S.

OBSERVATIONS ON THE POLLINATION OF ORCHIDS

By J. ROS, GARNET, Melbourne

The observations I am about to record concern the pollination, by a tiny fly, of a group of four species of the relatively large genus of Australian terrestrial Orchid, *Prasophyllum*, R. Brown.

The four species, *Pr. Morrisii*, Nicholls, *Pr. Archeri*, Hooker f., *Pr. nigricans*, R.Br., and *Pr. despectans*, Hk.f., have been in cultivation for several years and my interest in the progress of the plants from year to year was soon coupled with an interest in the process of pollination that went on in the flowers.

A point that was soon noticed was that the pollinia of a number of flowers of each of the species was missing when I came to examine them. Occasionally the missing pollen was traced to a stigma, where its presence was recognized by the altered appearance of the stigmatic surface. Normally smooth and glistening, it becomes rough and frosted after pollen absorption and no trace of the original pigment of the pollen remains.

As an explanation of this pollen transference it was thought that, as the plants were growing in small pots out of doors, agitation by wind may have caused the pollinia to spring from the anther in the manner not unusual with some of the larger members of this genus. Further agitation during transference of the plants to a place suitable for further examination may then have dislodged the pollen masses and caused their fortuitous deposition on the stigma.

That this conclusion was improbable was demonstrated later, when it was seen that several flowers on plants of each of three species which were, at that time, in cultivation, and which had not been cut, began to exhibit fruits. These, in course of time, dehisced and produced fertile seed. Thus it seemed that some external agency was responsible for the fertilization of the flowers.

In the following autumn a careful watch was kept to determine the identity of the mysterious agent. *Prasophyllum Morrisii* was the first of the group to bloom—a sturdy specimen with fourteen flowers. With all the satisfaction of one who has induced profuse bloom in a shy exotic Orchid, I was wont to stand and admire this bewhiskered *Prasophyllum* with its comically tremulous labellum; and one crisp sunny morning in March, 1934, I had the satisfaction of having the problem of the plants' pollination solved for me.

Several tiny flies appeared to be greatly attracted by the flowers, climbing over them, and often some, evidently more daring than others, made their way on to the labellum, where they appeared to browse in a leisurely fashion. Once on the surface of the labellum they seemed to lose interest in the outside world.

and the pot containing the plant could be lifted up and inverted to permit of examination with a hand-lens of their further manoeuvres. It was then seen that the flies became more eager the further they progressed, until, reaching the dead-end of the column, they settled themselves for two or three minutes, evidently feeding on the glandular excretions that occur at the base of the labellum. Here they assume a position similar to that shown in Fig. O, Plate XVIII.

After satisfying myself that this was not merely a chance occurrence, a large test tube was lowered over the flower-spike, and in due course three flies, each of which had pollen adhering to the dorsum of the thorax, were collected and subsequently examined.

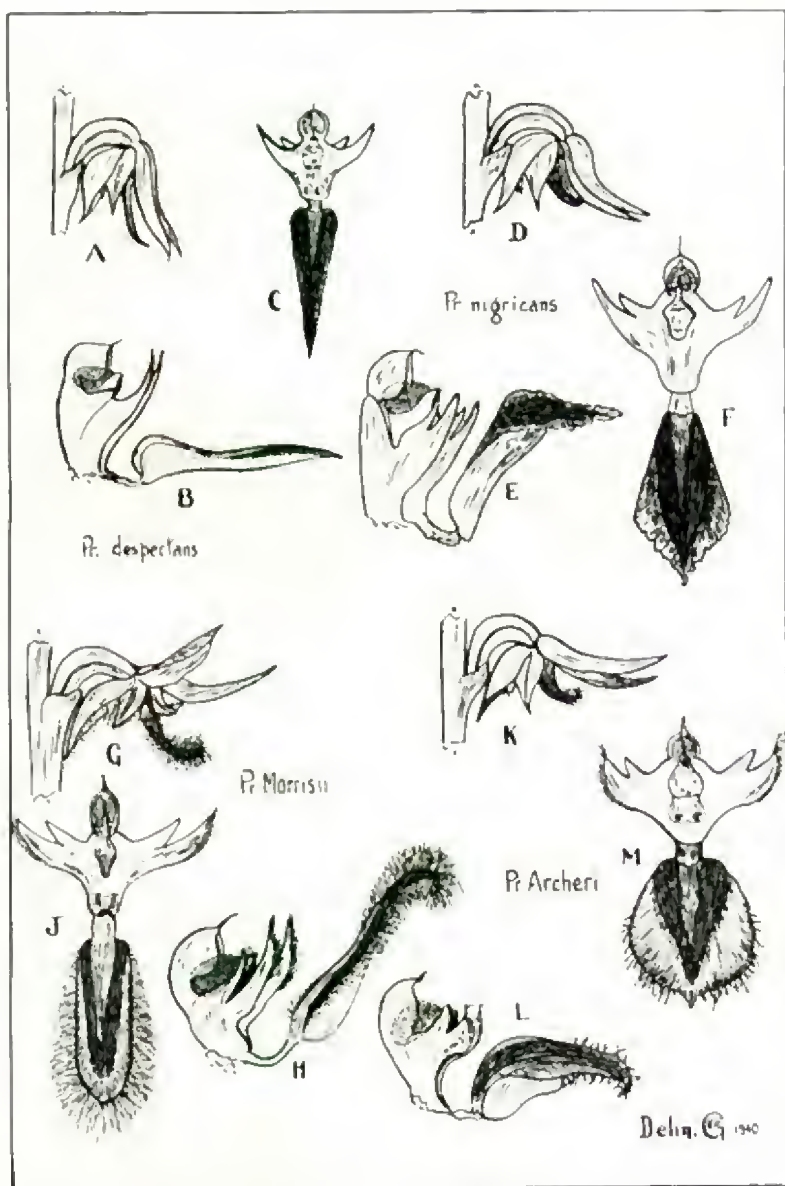
During the ensuing fortnight these visitations were frequently observed, until the several anthers of the plant were bereft of their pollen. Two flowers, evidently pollinated, were removed and examined under the microscope, and it was seen that the stigma of each showed the characteristic signs of pollen absorption.

Later in March, and during the first half of April, *Pr. Archeri* and *Pr. despectans* bloomed, together with other plants of *Pr. Morrisii*. It being Easter, there occurred ample opportunity for keeping them under observation, and it was found that the flies established a definite order of preference of one species of flower to another, the order of favour being *Morrisii*, *Archeri*, *despectans*. It seemed that only when the feeding grounds on the first two were exhausted did they visit *despectans*. In 1934, I saw no flies visit the latter; nevertheless, in two plants which were permitted to die a natural death, pollination had occurred in 8 of the 10 and 4 of the 15 flowers, respectively. In two plants of *Pr. Archeri* pollination had been effected in 14 of the 15 and 4 of the 5 flowers—a quite high percentage! The popular *Pr. Morrisii*, despite the marked hospitality it afforded its visitors, gave a relatively low yield of fruits. For the two plants which were not cut and pressed the results were 6 of the 10 and 3 of the 11 flowers pollinated.

It is interesting to note here that the fruits are observed to take just over two months to ripen and dehisce. This is an average period and naturally the process of ripening is governed to a large extent by weather conditions. A further point of interest is that seed dispersal thus takes place in the late autumn or, in general, during the frosty weather and before the onset of the winter rains.

In the autumn of 1935 the same set of Prasophylls was again kept under observation, and as *Pr. nigricans* had been added to the collection in 1934, flowering plants of this species were also available for study. One specimen bloomed early in March—almost a fortnight in advance of plants of the three other species

Plate XVII



For Key see page 197

—and it was seen that this species also attracted the tiny flies. In seven days the twelve flowers had expanded and two fruits had set, and when the plant was cut and examined at the end of this period it was seen that all but three of the anthers were bereft of their pollen.

Later in March and during April, as representatives of the three other species flowered, it was again seen that *Pr. Morrisii* was first, while *Pr. Archeri* and *Pr. nigricans* seemed to share the honours for second place. During this season the flies were observed to enter the somewhat smaller flowers of *Pr. despectans*, and that pollination was effected was soon evident by the swelling fruits of 4 of the 23 flowers on one sturdy plant. The smaller and narrower opening to the inner structure made observation of the progress of the flies rather difficult, but it was seen that much the same course was followed as in the other three species—tentative browsing at the entrance and on the lamina of the labellum, followed by a more determined penetration into the interior, where a short stay occurred, the fly finally backing out with pollinia adhering to the dorsum of its thorax.

While carrying out these studies I realized the significance of the column appendages and the hinged labellum. Reference to the figures in Plate XVIII will show that one of the differentiating features of the four species is the shape and structure of the column appendage. It is easy to imagine that the characteristic shape of these processes has been evolved to meet a definite contingency, and if one compares flowers of each of the four species under discussion it will be seen that the angle of the sinus formed by the margins of the petals and dorsal sepals varies from species to species, being from 60 to 70 degrees in *Pr. Morrisii* and *Pr. Archeri* from 45 to 55 degrees in *Pr. nigricans*, and quite acute—from 30 to 40 degrees—in *Pr. despectans*. In each type the appendage to the column is modified in such a way as to prevent lateral movements and egress through this sinus by a visiting insect.

As part of the marvellously contrived mechanism the labellum plays its important part. In each of the species the callus plate of the labellum is represented by two parallel elongated glands arising at and occupying almost the whole of the proximal end and extending in decreasing width to the distal apex, near which they fuse and merge with the non-glandular lamina. These raised lines of the callus plate evidently constitute the preliminary feeding-grounds of the visiting insects. Experiment showed that a tiny drop of fluid exuded whenever the plates were stabbed with a fine needle, and it was also seen that the labella of freshly expanded flowers were liberally bedewed with minute drops of glandular exudate arising from the elongated gland.

Further examination of the labella showed that at the base of each there is a smooth, somewhat glistening and roughly triangular depression between the two raised lines. This area is connected to the hinge-like claw and it is possible that pressure on this area assists in maintaining the labellum in a rigid position when the visiting insect is properly installed on it. This is mere supposition, but the observable fact is that the labellum swings down on its hinge as the fly penetrates into the flower and while feeding at



Microphotograph of dipteran responsible for pollination of *Prasophyllum Archeri* Hk. f. Pollinarium of orchid attached to dorsum of thorax of fly.

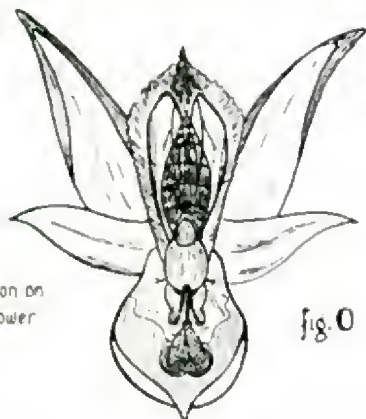
Photo. by J. Ros. Garnet.

the base of the labellum the segment remains poised rigidly in a position that appears actually to confine the fly, the dorsum of its thorax being in contact with the rostellum. The few short bristles on the thorax are directed backwards and the slightest movement on the part of the visitor suffices to rupture the membrane covering the viscid disc of the rostellum. The exuding fluid adheres to the thoracic surface and when the fly finally backs out of the flower it carries with it the pollinarium firmly attached.

Plate XVIII



Column & labellum of *P. Archeri* with lateral appendages of column removed to show position of rostellum in relation to the dorsum of the thorax of the fly.



Fly shown in position on the labellum of a flower of *P. nigricans*.

The accompanying microphotograph shows two flies, both of the same family, collected from the flowers of *Pr. nigricans*; the larger one, to which is attached the pollinarium of the Orchid, being actually 2 millimetres long.

From curiosity, an attempt was made to weigh the fly; however, the sensitivity of the balance at my disposal was such that I could only estimate its weight to be of the order $1/20$ th of a milligramme (i.e., 0.00005 gramme). This is a point of interest when considering the possible mechanical effect of the weight of the small dipteran on the balance of the labellum. When the flower is open to visitors the labellum is invitingly directed upwards, and it swings down towards the dorsal sepal only after the fly has passed into the interior of the flower. Whether this movement of the labellum is due entirely to the weight of the insect or to irritation of the basal triangular depression to which I have previously referred, is a matter for speculation. It is possible that the proboscis of the fly brings about an effect on the claw of the labellum in much the same manner as the claw of the labella of the genus *Pterostylis* is affected by the visitors to the flowers of that genus (vide O. H. Sargent, *Vic. Naturalist*, 1934, I, 82).

It is difficult to imagine what, in the first instance, attracts the flies to the flowers of these four Prasophylls. To the human eye the general appearance is far from showy, the colours being subdued tones of red and green, the red component ranging from maroon to purplish black. It may be mentioned in passing that *Pr. despectans* evidently occurs in two varietal forms, distinguishable mainly by their general aspect as being green or purplish-black. Of the four species under discussion, *Pr. despectans* alone appears to emit perfume, and it is interesting to note that, in my experience, the green form of that species is more noticeably fragrant than the dusky variety. Both forms have been in cultivation in the same pot over a period of more than six years, and although there have been variations from year to year in robustness, slenderness, size and the number of flowers on the spike, the characteristic hue of the flowers has remained constant.

Since the possession of colour and perfume are features that are not shared alike by the four species, it is safe to assume that the attraction for these little flies does not lie therein. Such characteristics, more obvious to our senses, may serve their purpose by attracting other insects (for visits by other insects do certainly occur). During March, 1937, I came across a robust specimen of *Pr. Morrisii*, near Heathmont (Victoria), in one flower of which a small dipteran was found evidently stupefied, in which condition it remained for sometime afterwards. This fly, somewhat larger and sturdier than the usual visitants, was easily withdrawn with a pair of forceps. Having removed the insect, I was rather dis-

appointed to find that no pollinarium was attached to it. It may, of course, have been a mere chance visit by this insect, which was subsequently identified by Mr. J. Clark of the National Museum (Melbourne) as a species of *Drosophila*, commonly known as "ferment flies."

The identification of the flies that definitely pollinated the flowers of the four Prasophylls proved rather difficult. The late Mr. A. L. Tonnoir, of the C.S.I.R. (Canberra) examined a number of specimens which I had submitted to him, and he stated that there were "four species (perhaps five), three genera and two families represented in the series." It appeared that the flies so frequently observed on the plants included *Cuviceps flavipes* Malloch, *Oscinosoma subpilosa* Beck, and an as yet undescribed species of *Oscinosoma*, all of the family *Chloropidae*.

That the visits of *Oscinosoma* are no mere chance is evident by the regularity and frequency of the occurrence and by the fact that they have been observed in districts as much apart as East Malvern and West Brunswick, in which places most of the observations I have recorded were made; and much further afield at Bayswater, where, in the autumn of last year (1939), a number were collected from the numerous specimens of *Pr. Morrissi* and *Pr. Archeri* that grew in the district.

No reference has as yet been made to the mechanism of pollen transference. The minuteness of the flowers makes observation of the process impracticable, but with the aid of the microscope the course of events can be deduced with reasonable certitude. Without unduly reiterating the points stressed by Edith Coleman in her several papers on the pollination of our native terrestrial orchids, emphasis must again be laid on the importance of the caudicle in the process. Careful examination suggests that the pollinia is partly withdrawn from the anther while the flower is expanding or immediately after it has opened. The effect is facilitated by the contraction of the stigma-rostellum structure, which bends forward slightly. As the flower ages the beak of the rostellum describes a larger arc and the almost muscular action of the caudicle comes into play, with the frequently observed result that the pollinia are "sprung," i.e., rotated through an angle of more than 90° until poised either above or in front of the column. Once this stage is reached, removal of the pollinarium by insect agency becomes unlikely—a supposition supported by the observation that freshly expanded flowers prove the most attractive to the diptera, and one which explains the fact that on those occasions when I waited until the whole raceme of flowers had opened, nearly all but the terminal flowers had lost their pollinia.

The fly, having withdrawn from the flower burdened with its load of pollen, appears to be in no way daunted nor satiated, for almost directly it has been observed to commence browsing on

another flower and following the same procedure. During the quite short interval between exit and re-entry the caudicle of the pollinia attached to the fly functions in a remarkable manner. At first almost erect, it quickly collapses, with the result that the pollen mass is rotated so that it lies almost horizontal in relation to the head and thorax of the fly. This aspect is illustrated in the micro-photograph, which was taken some long time after collection of the specimen. In this position the pollen is correctly poised for implantation on the stigma of the flowers next visited. This process is illustrated in Fig. N, Plate XVIII.

Among multi-flowered species, such as those of the *Prasophyllum* genus, autopollination may be taken as the most common form of fertilization, and the fact that pollination of at least four of the autumn-flowering species is occasioned by the same type of insect invites speculation as to the likelihood of cross-pollination occurring among them. If such does happen it seems doubtful that fertile seed is produced. Field observations have not, in the experience of myself and others, revealed any plant forms that could be regarded as hybrids, although in a number of localities two or three of the four species mentioned are sometimes found growing together. In such circumstances one might expect to find some evidence of hybridization should it chance to occur.

SUMMARY

The pollination of four autumn-flowering species of *Prasophyllum*—a genus of terrestrial Orchid—by various small acalyptratae Diptera of the family Chloropidae and especially of the genus *Osemosoma*, is reported, and attention is drawn to the significance of certain structural features of the flowers in relation to the mode of pollination.

EXPLANATION OF PLATE XVII

- A, D, G & K.—Flowers of *Pr. despectans*, Hook. f., *Pr. signicans*, R.Br., *Pr. Morrisii*, Nicholls and *Pr. Archeri*, Hook. f., in profile. (Approx. $\times 4$.)
- C, F, J & M.—Column and labellum (extended) of each of the above four species showing the characteristic shape of the lateral appendages to the column and the peculiarities of the lamina and glands of the labellum ($\times 5$.)
- B, E, H & L.—Column and labellum of each of the same four species showing the relation of the labellum to the lateral appendages, rostellum, pollinia and anther, in profile. ($\times 5$.)

PITCHER PLANTS

Dr. H. Flecker, of Cairns, sends the following correction to a note, by R. E. Painter, on page 87, of the September issue of *The Naturalist*:—

Mr. Painter lists some eight species of Pitcher Plants from *Queensland Flora*, Vol. 4, by F. M. Bailey. However, it should be stated that all such plants (those called Pitcher Plants in Australia) have since been shown to belong to the same species, namely *N. mirabilis* of Druce.

DO WE KNOW AUSTRALIA?

By A. H. CHISHOLM, Melbourne

A provocative note has been struck by an English visitor to Australia.

"I think this is a glorious place," she says, "but, oh! I am astonished at the ignorance of people in regard to their birds and trees. When visiting the Blue Mountains recently I kept asking what was this and what was that—and nobody knew!"

How should one meet such a charge? Supposing I confess to having had a similar experience—to having found that the persons most fond of proclaiming "I know my Sydney" were usually the ones who knew least about the "real" Sydney, as manifest in the ancient sandstone upon which its beauty is based, and in its curious plants and birds—supposing this to be confessed, can I fairly add that persons in other parts of the continent are better informed? Can I assure the astonished Englishwoman that Australians generally are not content to know their country only from the geographical aspect? I pause for advice!

After all, it is perhaps natural that visitors should react to Australian features rather more than Australians themselves. The same point prevails in every land. The visitor comes with a fresh and inquiring mind, and because everything is so novel he (or she) must needs "stop, look, and listen" at every turn. Add to this consideration the fact that notable visitors are usually regarded as public or semi-public guests, who must be given informed guidance, and you have an explanation why certain British men and women know more of Australia's fauna and flora than do most Australians.

In my experience the most understanding of visitors who have gazed upon the Australian Bush were Britons and a German; the most blasé were Americans, and the most volatile were Frenchmen.

The German was Hans Bertram, the aviator, who, in spite of his dreadful experience in the wilds of Northern Australia, appreciated fully the rugged beauty of Sydney's National Park; the Americans were the champion tennis players of a few years ago (Vines, Allison, and others), who were more interested in lunch than scenery or fauna; and the Frenchmen were members of the trade mission that visited Australia in 1918.

How those former soldiers of France revelled in the "colour" of the country as they swept across the Downs of Southern Queensland! Old General Pau, the leader, spoke quietly, but his secretary, Commandant d'Andre, shouted and capered like a boy as he told me of his yearning to see a Platypus ("ze or-nith-or-rhynchus") and "ze bird zat laughs at you." Moreover, he exploded

Plate XIX



Sir Hugh Poynter with a baby Lyre-bird
Photo. by A. H. Chisholm.



Sir Philip Game at the Bird Club, National
Park, N.S.W.
Photo. by Sydney Morning Herald.

with glee as he clung to the tail of a tame Kangaroo at a station homestead. And when, at a place near Roma, we came upon some tame Koalas, it was difficult to persuade those delighted Frenchmen that they had a time-table to observe.

Lord Northcliffe descended upon us in Queensland with the avowed intention of "going bush" (he, too, wanted to see a Platypus), but at the last minute he forsook natural history for golf. It was not so with Sir Arthur Conan Doyle. He took every opportunity of getting out of Brisbane, and he asked so many questions about the birds and trees of the wayside that I had difficulty in stealing in a few inquiries about Sherlock Holmes. How much the famous author enjoyed those outings, and in addition a visit we paid to a large aviary in a Brisbane suburb, is shown in his book on Australia.

Other eminent visitors came to Queensland and passed on, but the only one whom I accompanied for any length of time was the Prince of Wales (the present Duke of Windsor), and to take His Royal Highness afield among birds, although doubtless he would have found that a pleasant change from meeting humanity in the mass, appeared somehow to be out of the question!

No such restriction prevailed, however, with the Governor of the day, Sir Matthew Nathan. He has been described in *Nuda Veritas*, a book by Clare Sheridan (a cousin of Winston Churchill) as a man "whose austerity of life and uncompromising directness render him almost fearful." But if Sir Matthew Nathan led an austere life, he was not necessarily austere of manner. He loved Australian birds and trees, and whenever he went among them he was not only appreciative, but happy to the point of joviality.

Sir Matthew Nathan used to say that British peoples were much the same everywhere, but that in no other land could he see the fantastic fauna and flora of Australia. Thus animated, he went so frequently on tour and asked so many questions that he became a well-informed amateur naturalist. Once, on a jungle-clad mountain, he slipped away from an official party to examine a Bowerbird's playground and a Logrunner's curious nest. One result of that sortie was a torrent of reproach that descended upon my more or less innocent head, from an angry politician, for allegedly "upsetting the programme by taking His Excellency away to waste time on birds!" Over many years I can still hear the scorn in the voice of that witless politician as he uttered the word "birds." For all his annoyance, however, he was not enterprising enough to accept my advice to go and try his protest on the Governor!

Here, perhaps, the remark should be interpolated that not all politicians are necessarily beyond hope from a naturalist's viewpoint. For example, when Mr. E. G. Theodore was Premier of Queensland he once stole away from a political party to listen

to Bell-Miners tinkling. For another example, Mr. Peter Loughlin, when Minister for Lands and Deputy-Premier of New South Wales, enjoyed nothing better than crawling on hands and knees through the scrub of National Park in search of Lyre-birds. And for a Victorian example, there is the present Premier (Mr. Dunstan), who, when Minister for Lands, once wriggled along face downward through a portion of Sherbrooke Forest in order to gaze at a Lyre-bird on its mound.

To return to Sir Matthew Nathan. His fondness for birds extended to those of Britain. I called upon him, in November of 1938, at his home in a pretty little village in Somerset, and I had no sooner entered the old house than he announced with glee that twelve species of birds had been listed in his garden that morning. For evidence on the point, he called in the maker of the list, his friend Sir Cyril Hurcomb. (Sir Matthew Nathan died soon afterwards. Sir Cyril Hurcomb has now, unfortunately, little time to watch birds: he has become Director-General of Shipping in Britain.)

In New South Wales, too, I saw further evidence of the appeal that Australia's fauna and flora have for visitors. Vilhjalmur Stefansson, the Arctic explorer, was eager to see a Platypus when he came to Sydney. So was Lord Burnham, that remarkably able Englishman who led an Empire Press delegation to Australia several years ago. Stefansson had to be content with mounted specimens and eggs of the Platypus, but Lord Burnham saw a living example—Harry Burrell, "the Platypus Man," sent me one from the north of New South Wales, and this was temporarily released at Government House, Sydney, first in a bath and later in a fishpond. Ten or twelve English men and women crowded into that small bathroom to watch the curious animal, and those who did not see it there were informed on the subject by the alert Lord Burnham. He repeated, after a lapse of half an hour, every scrap of information about the Platypus which he had acquired in reply to numerous questions in the bathroom, and he did not make the slightest error. When the animal was swimming in the fishpond and a resting-place for it became necessary, Sir Harry Brittain (a member of the House of Commons) produced a neat quip. Seizing a cane chair from a lawn, he threw it into the pond and shouted, "I move that the Platypus take the chair!"

Keen interest in Australian fauna and flora was taken also by Sir Hugh Poynter (a cousin of Stanley Baldwin and Rudyard Kipling) and by his wife, who was an American, the daughter of a former United States Consul-General at Constantinople. Sir Hugh Poynter used to regard it as an honour to nurse a baby Lyre-bird. Lady Poynter was extremely fond of all our birds and flowers—right up to the time of her death, which occurred in

Plate XX



Dr. Warren Harding (nephew of a former President of the United States) with tame Lyre-birds on the Blue Mountains, N.S.W.



Sir Matthew Nathan at the nest of a Logrunner in the jungle of Tambourine Mountain, Queensland.

Photos. by A. H. Chisholm.

Sydney some ten years ago. I recall, however, that she lost much of her admiration for the lordly male Lyre-bird when she learned that he left all the house-keeping to his "wife"!

In my Sydney experience, however, the Englishman who was most thoroughly appreciative of the Australian scene was the then Governor of New South Wales, Sir Philip Game, who is now Commissioner of Metropolitan Police, London. Soon after his arrival in New South Wales, early in 1930, Sir Philip Game made it known that he was eager to see other things besides humanity, and when he repeated that statement he and his family were taken to a Lyre-bird's nest in a deep gorge above Middle Harbour. Three bird-students acted as escorts, and each of us was agreeably surprised by the manner in which the Governor, in spite of a permanent lameness, accomplished the rough journey.

That expedition was the first of many of the kind. Sir Philip Game and Lady Game were apt "pupils." They undertook hazardous and tiring scrambles over sandstone hills and gullies, and in time they acquired a sound knowledge of wild birds and flowers. Possibly the Governor found solace from his political worries in the peace of the Bush. But he really loved the free spaces, and he was no less happy in watching Robins on the slopes of Mount Wellington (Tasmania)—where he had a holiday in 1933—than he was in listening to Lyre-birds near Sydney. Sometimes he rambled alone. Sometimes he had a naturalist or two for company. More often he organized parties. One "Lyre-birding" group included an Indian army officer and Lady Murray of Papua, so that four countries were represented in the expedition.

Frequently, too, the Governor went farther afield. He liked to see the country and its people. He went, for example, on a long tour of western New South Wales, and he returned full of the sense of "expansiveness" that comes to one who gazes upon wide, free spaces.

"I knew that charm in South Africa," he said, "and as I looked out upon the vast expanse of western New South Wales I almost imagined myself back in Cape Colony. What is it that gives to these plains such a compelling influence? Perhaps it is because they have something in affinity with the spaciousness of sky and sea that we feel both a sense of awe and a sense of restfulness when we gaze upon them."

The love of countryside shown by Sir Matthew Nathan and Sir Philip Game is typically British. It is akin to that manifested by the Prime Minister, Mr. Chamberlain. Doubtless this spirit will grow in Australia with the passing of the years; and then, perhaps, we shall no longer hear complaints of the "ignorance" of Australians about their birds and trees.

ORCHIDS OF THE GRAMPIANS

By GILBERT F. ROGERS, Half's Gap.

This list of Orchids is offered as a contribution to the botanical literature of that very interesting part of Victoria, the Grampians Range.

Lists of Grampians plants have been compiled and published by F. M. Reader, St. Eloy D'Alton, D. Sullivan, A. G. Campbell, J. W. Audas and others, and these are mostly recorded in the earlier pages of the *Victorian Naturalist*.

The study of Orchidaceae is one of the popular sides of botany, and it is felt that orchid-lovers, as well as other botanical students, will welcome this latest Grampians plant-list.

Especially are such lists valuable in view of the disappearance of certain plants, which are lost because of their popularity (being freely gathered), or which are unable to survive the competition of weeds. Further, feeding stock and bush-fires take a big toll.

In days gone by, even twenty or thirty years ago, Orchids, especially those of the *Caladenia* and *Dianris* genera, carpeted the ground in places in very large numbers. Now in such localities they are not nearly so numerous, and often appear only as individuals.

Some of the Orchids are exceedingly rare. Such species as *Caleana Sullivanii*, *Thelymitra fusco-lutea*, and *Thelymitra apifactoides* are very seldom seen. It is quite possible that, within a few years, some of these plants may disappear altogether. *Grevillea Williamsoni* has gone, having been eaten out by stock. Undoubtedly stock-grazing in forest and mountain areas is a cause of plant extinction.

The Wild Flower Protection Act can be applied only to human beings, and although visitors to the Grampians generally respect the provisions of the Act, stock, bush-fires, drought and weeds are serious enemies of the Orchid flora.

Much assistance in the compilation of this list has been given by Messrs. Charles French and W. H. Nicholls, and to them appreciation is here recorded.

The list is as follows:

*Orchids peculiar to the Grampians.

†Rare.

DIPODIUM

punctatum Hyacinth Orchid

GASTRODIA

sesamoides Potato Orchid

PRASOPHYLLUM

Archeri Archer Leek Orchid
Australe Austral Leek Orchid
brevilabre Short-lipped Leek Orchid
Braucei Green

CHILOGLOTTIS*Gunnii* Common Bird Orchid**GLOSSODIA***major* Waxlip Orchid**LEPTOCERAS***fimbriatum* Fringed Hare Orchid**CALADENIA***alpina* Mountain Caladenia*angustata* Musky "*congesta* Black-tongue "*caerulea* Blue "*cordiformis* Small Spider Orchid*carnea* Pink Fingers Caladenia*cucullata* Hooded "† *deformis* Blue Fairy "† *dilatata* Fringed Spider Orchid† *filamentosa* Tailed Caladenia† *viridescens* Bronzy "† *Menziesii* Hare Orchid*Petersonii* Common Spider Orchid*reticulata* Veined Caladenia**DIURIS*** *brevisissima* Short-tail Diuris*punctata* Purple "† *palustris* Swamp "*maculata* Leopard Orchid† *palachila* Spade-lip Diuris*pedunculata* Snake Orchid*sulphurea* Tiger "*longifolia* Wall-flower Diuris**ORTHOCERAS***strictum* Horned Orchid**SPIRANTHES***australis* Austral Lady's Tresses**PTEROSTYLIS***acuminata* Pointed Greenhood*alpina* Alpine "*alata* Purplish "*barbata* Bearded "*concinna* Trim "*curta* Blunt "*cycnocephala* Swan "*falcata* Sickle "*longifolia* Tall "*mutica* Midget "† *Mitchellii* Mitchell "*mutans* Nodding "*nana* Dwarf "*obtusa* Blunt-tongue "*parviflora* Tiny "*pedunculata* Maroon Hood*pusilla* Ruddy "* *rufa* Rusty "*revoluta* Autumn Greenhood† *Toveyana* Mentone "*vittata* Banded "