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PROCEEDINGS

The monthly meeting of the Club was held on April 8, 1946, at the Lecture Hall of the Public Library, the President (Mr. H. C. E. Stewart) and about 150 members and friends attending.

The President referred to the death of Mr. F. H. Salau and mentioned his interest in the Club and its members, emphasising the useful excursions held in his district under his leadership. The President also referred to the death of Mrs. Richardson (the wife of our member, Mr. S. C. Richardson) and mentioned the hospitality given Club members on visits to Mt. Dandenong during their residence there.

The Honorary Secretary briefly reported on the results of the questionnaire, and stated that from the next meeting an alteration in the Club meeting programme would be instituted. Meetings would be started at 7.45 p.m. and closed for the conversazione at 9.30 p.m.

A letter was received from the Ararat Field Naturalists' Club inviting members to visit Ararat early in May, when the Club would be reorganized. It was expected that an excursion would be arranged to the Grampians during this visit.

Mr. David Fleay wrote thanking the Club for a donation received after the excursion to the Healesville Sanctuary, and advising members that although no success in capturing a Thylacine had been achieved, traces of the animal had been found, and he had every hope of eventually succeeding in the capture of specimens. Traps were still being operated in Tasmania by local bushmen, and a further trip into even more remote areas of South-West Tasmania was being arranged.

Excursions held since the last meeting were mentioned by the President and a brief report of the last meeting of the Geological Discussion Group was given by the Hon. Secretary.

The following were elected as ordinary members of the Club: Miss W. Warren, Mr. R. Kershaw and Mr. G. Johnson.

SAFEGUARDING FLORA AND FAUNA

Mr. P. C. Morrison referred to damage caused at Wilson's Promontory by Commandos in training during six years of occupation, and suggested that now was the time for a stocktaking of our National Parks in general, in order to ascertain how

much time and work would be required to bring them back to the state that should obtain. He further suggested that the Club should take a lead in this matter.

Miss Wigan, speaking from personal observations made during a recent visit to the area, stated that only one Koala was seen and no other animals were noted at all. The area around Waterloo Bay and Cape Wellington was all burnt out.

Mr. A. H. E. Mattingley, speaking as one of the Committee of Management, stated that the Defence Department had promised in writing that there would be no damage to flora and fauna. This promise had not been kept. Moreover, much damage had been done to the Chalet and some of the contents had been stolen.

The following motion, moved by Mr. C. Morrison, and seconded by Miss Wigan, was carried unanimously:—"That the F.N.C.V. registers its abhorrence at the destruction of protected fauna in the Wilson's Promontory National Park, as reported in the Press and witnessed by some of its members, and stresses the need for a comprehensive plan for post-war rehabilitation of this and all our other fauna and flora sanctuaries; and that this motion be passed officially to both State and Federal authorities."

Mr. G. Coghill reported that animals at the Sperm Whale Head National Park were doing well, but Mr. Stewart stated that this report was at variance with one given by a member living in the district. He suggested that the matter be left to the Committee for investigation.

Mr. Mattingley referred to a report of two women stealing Lyrebirds, and suggested that some punishment was needed. It was further stated that forest rangers and the Committee of Management had no power to arrest, and hence could not do a great deal in policing the areas.

Messrs. A. G. Hooke and A. S. Chalk were re-elected as auditors for the year.

NATURE NOTES

Mr. E. J. Cope asked when was the Red-whiskered Bulbul last seen in Melbourne. Miss Wigan replied that the bird was in Toorak for two or three weeks at the beginning of the year.

Mrs. E. E. Hill exhibited a small marsupial and asked its identity. Mr. Morrison said it was the Pigmy Possum-Glider (*Acrobates pygmaeus*), better known as the Feather-tail, which was found in eastern Australia in timbered country and was becoming rarer through the ravages of cats.

A question, "Are Sooty Oyster-catchers common"? was answered by Mr. Mattingley, who stated that the species was fairly familiar.

Mr. Colliver stated that a great variety of fungi was seen in

the gullies of the Kinglake National Park, and puff-balls were very common, even in the wettest parts of the area.

Mrs. E. E. Bennett reported having seen the Fly Agaric at Olinda.

Mr. Morrison gave some notes on the school of whales—141 in number—that were stranded on the west end of the Ninety Mile Beach. They were Black Fish Whales, toothed and about 20 feet long, and were known to follow their leader blindly, so that it was a case of one in trouble all in trouble. It seemed that death was due to suffocation owing to the weight of the animals' own bodies and lack of strength in the intercostal muscles.

LECTURE AND QUESTIONS

The lecture for the evening was given by Mr. Morrison, the subject being "The Mystery of the Bandicoot's Toe—a Study in Syndactyly." It was illustrated by motion pictures showing the Koala, Kangaroo and Bandicoot using their syndactylous toes. Museum specimens of the animals and skulls and feet also were used during the lecture.

The following are some of the questions and answers given:—

Question: How near to Melbourne is the Bandicoot found? Answer: The pictures shown were taken at Clayton South; the animal was also known at Frankston, Black Rock, Ivanhoe, Darebin and in the Dandenong Ranges.

Question: Why are marsupials considered primitive? Answer: Because of body temperature, anatomy and the near-reptilian mode of reproduction. The body temperature in all marsupials that have been investigated is lower and fluctuates more than that of the Eutheria (higher mammals). In the egg-laying monotremes this is even more marked.

Question: Is the toe used as a toilet adjunct only? Answer: Yes, syndactylous toes have no other use than hair-combs.

Question: To what purpose does the Kingfisher put its syndactylous toe, and is this condition common in human beings? Answer: The condition in the toe of the Kingfisher is not the same as that in the animals mentioned, and in human beings the state is really webbing, which means that the skin joining the fingers with the palm in a normal hand extends in an abnormal case for a considerable distance. This state is of interest as it is hereditary, but it differs entirely from the syndactylous digits of the Kangaroo and similar animals.

Question: Is there any relationship between the small toe of the crayfish and the Bandicoot's toe? Answer: The nipper of a crayfish is not comparable with the limb of a vertebrate.

Question: Do any animals other than the Australian marsupials possess the syndactylous toe? Answer: Yes, the Cuscus, which goes out of Australia and extends to the islands farther north.

Mr. V. H. Miller stated that dogs destroy Bandicouts but do not eat them. Mr Morrison said that cats do not eat them either. One cat that did eat Bandicoot brought it up again: apparently there is something in the Bandicoot that is distasteful and upsets the stomach.

The thanks of the Club were accorded Mr. Morrison for his very interesting address.

EXHIBITS

Miss Eulalie Hill: Pygmy Possum (*Acrobates pygmaeus*).

Mr. T. Griffiths: Common Club-Moss (*Lycopodium clavatum*) which was sold in Melbourne as the true Coral-Fern.

Mr. C. J. Gabriel: Marine Shells—*Ianthina communis*, Lam, Lord Howe Island; *I. globosa*, Sby, New South Wales; *I. exigua*, Lam, New Zealand.

Messrs A. P. and R. A. Dunn: Orb-web Spiders of the genus *Argiope* (*A. aemula*, *A. protensa*, *A. syrmatica*).

Mr. A. N. Carter: Giant "Pear Shells," *Busycon canaliculatum*, Linn and *B. carica*, Gmel, from the East Coast, U.S.A. Also fossiliferous Jurassic sandstone from Capa Paterson, Victoria.

Mr. P. C. Morrison: Photographs of the stranded whales at Ninety Mile Beach, also X-ray photos of syndactylous toes.

Mr. H. C. E. Stewart: A large series of fungi from Emerald.

EXCURSION TO KALLISTA

Among the forty-five members and friends who came to see the ferns of this area on March 16, we were pleased to welcome Mr. Fred Barton, of Paynesville. Mrs. Barton and Miss Erica Barton were there, but were unable to join the search.)

In the morning each leader took charge of a party. Mr. Court's party covered the hillside on the right-hand bank of Clematis Gully. Mr. Griffiths' group followed the bed of the creek, while Mr. Swaby took the left bank. In all cases the ferns were in very good condition and all the vegetation seemed to have come through the very dry spring and early summer well.

During lunch at the picnic ground, younger members made a good collection of fungi among which were some very large specimens of the rare brilliant lemon-yellow *Polyporus citreus*. One of the small beautiful red-and-blue crayfish was found wandering in the creek and was brought in for admiration.

After lunch, Hardy's Gully was inspected. Here, again, it was pleasing to note the absence of interference with the natural beauties. Several members came for the late afternoon and a rather rough journey down Clematis Gully completed a good day's work.

The following twenty-six ferns were identified: *Adiantum aethiopicum*, *Asplenium bulbiferum*, *Blechnum cartilagineum*, *B. fluviatile*, *B. lanceolatum*, *B. nudum*, *B. procerum*, *Cyathea australis*, *Dicksonia antarctica*, *Diplazium australe*, *Dryopteris shepherdii*, *Histiopteris incisa*, *Hymenophyllum cupressiforme*, *Hypolepis rugosula*, *Mecodium australe*, *M. flabellatum*, *Polyphlebium venosum*, *Polypodium australe*, *P. diversifolium*, *P. grammitidis*, *Polystichum proliferum*, *P. adiantiforme*, *Pteridium aquilinum* var. *esculentum*, *Pteris comans*, *Sticherus lener*, and *Todea barbara*. *Tmesipteris billardieri* was noted in at least three places.

A. J. Swaby, T. Griffiths, A. Court.

TAIL-WAVING BY LIZARDS

By T. V. GIVENS, Melbourne

Edith Coleman, in "Random Notes" (*Vic. Nat.*, July, 1945) refers to the habit possessed by some small lizards of waving their tails, presumably as a tempting bird-bait.

On the island of Bougainville in the Solomons at least four species of lizard have developed this habit to a greater or lesser degree. Among nocturnal species it is well seen in the small gecko *Gymnodactylus pelagicus*. This uniformly coloured species is almost exclusively terrestrial, favouring fallen logs and similar rubbish in which it seeks both food and shelter. At night in the rays of a torch it may frequently be observed standing motionless in the typical posed manner of geckos with its tail held aloft like that of a dog. When it moves, as it does in short questing runs, this member, still held on high, is characteristically waved slowly and deliberately from side to side.

Another small gecko of similar size, the common, active and arboreal *Gehyra oceanica*, also possesses the habit, but the tail is not held aloft, and is curled from side to side rather than waved. As in the foregoing species, the body and tail of this lizard are of uniform colour.

Two larger geckos, *Gymnodactylus louisiadensis* and *Gecko vittatus*, both of which are arboreal, though the former frequents trees and the latter shrubs, have long tails banded black and white. I have not observed *G. louisiadensis*, which is comparatively rare, to have the tail-waving habit, but *G. vittatus* often slowly curls and uncurls its tail as it moves about in search of insects. In both species it is noticeable that the banding of the tail is more conspicuous in young specimens and that it is toward the tip of the tail that the colour-contrast is most marked.

In order to obtain some idea of the possible attractiveness of this colour-scheme the experiment was tried of placing individuals of both species in a large cage together with one of their natural enemies, the tree boa *Enygrus carinatus*. On at least two occasions they were observed to lose their tails to the boa before finally being taken by it. With the same object in view a count was kept among lizards collected of the state of their tails. Of six specimens of *G. louisiadensis* collected, four had previously lost their tails and only two had undamaged tails. Of ten specimens of *G. vittatus*, six displayed evidence of having regrown their tails and only four had undamaged tails. In this last lizard the former loss of the tail is peculiarly recognizable even when completely re-grown, for the reptile seems incapable of reproducing a tail banded like the original, but effects only a compromise in which the tail is white streaked with black.

In all, of thirty-two lizards of six species collected, comprising both geckos and skinks, only thirteen had undamaged tails. There is, therefore, some evidence on Bougainville at least to show that the tail of these lizards is not infrequently lost in the natural state.

But it is in a diurnal lizard, the Blue-tailed Skink (*Lygosoma* (*Emoa*) *cyanurum*), a small, active, and sun-loving skink having a body length of about two inches and a tail length of about three, that the tail-waving—in this case, tail-twitching—habit may best be observed. Among island skinks this species is remarkable not only for this well-developed tail-twitching habit but also because that member is coloured a brilliant metallic blue. By contrast the body is glossy black, with three narrow golden stripes running parallel the length of the body from the head to the base of the tail. This body colour and pattern is similar to that exhibited by the young of a small tree frog (*Hyla thesaurensis*) inhabiting the same area. Since this colour-scheme is displayed by the frog only in its immature form, when mortality in the species is presumably greatest, it seems not unreasonable to suppose that, like the similar striped pattern in the young of so many game birds, it is a form of protective colouring, and hence by inference in the lizard also.

L. cyanurum's choice of a habitat—open situations at ground level having plenty of logs, fallen boughs, and similar rubbish, with not too much shading vegetation—makes it inevitable that its quick and active movements in search of insects will be noticed by its enemies: hence as a first line of defence it is markedly alert and agile. A good demonstration of this alertness and agility may be obtained if you attempt to catch one of these lively skinks, for unlike some other skinks of the same genus inhabiting the gloom of the jungle, it does not attempt to escape capture by immediately hiding, but, preferring to rely on its agility, skips nimbly out of reach, brilliant blue tail twitching provocatively, as though to say: "Catch me—if you can!"

At such a time you notice five facts about this small lizard. Firstly, the tail is twitched only when the lizard moves; that is, when it is most likely to be seen and attacked by its enemies. Secondly, it is the end of the tail only that is twitched; that is, the portion most remote from the body. Thirdly, it is the end of the tail that is most brightly coloured; again the portion of the tail most distant from the body. Fourthly, it is in young specimens (when presumably they have the greatest need of such a protection, if protection it is) that the tail is most dazzingly blue. Fifthly, by contrast with the scintillating tail, the body of the lizard is protectively coloured, as though to heighten the distracting effect of the already brilliant tail.

After a consideration of these facts, and remembering the tail-waving habit in the geckos *G. pelagicus* and *G. oceanica*, and the

banded tails of the geckos *G. louisiadensis* and *G. vittatus*, the theory suggested by Mrs. Coleman seems to fit admirably. Particularly in the case of *Lygosoma cyanurum* is it difficult to avoid the conclusion that the twitching, scintillating tail is, after the marked alertness and agility of this colourful skink, a second line of defence, designed in the event of a sudden or close-pressed attack to divert the attention of the attacker from the lizard's vulnerable but protectively coloured body to its distractingly brilliant and entirely dispensable tail.

THE EGGS OF THE BAG MOTHS

There is not any mystery about either the eggs of Saunders' bag moth, or the behaviour of the female, nor even the conduct of the male. I have had hundreds of the cases—bags, purses, what you will—under close and critical observation over the years, and have reliable witnesses to vouch for all of the following facts:

The female larvae were never once observed to come entirely out of the case; only about one-third of the creature protrudes as it feeds and moves about. I have tied the mouth of the bag with wire—she bites cotton easily—to ascertain whether the wingless female adult would come right out when it was re-opened, but she never did, nor could she return should she ever do so. She leaves the bag to die.

She is impregnated while still in her bag. She opens the other end—*not the feeding* end—and when a male arrives he clings to the end of the case, and inserts his extraordinarily extensile abdomen into the bag, and fecundates the female *in situ*. I have seen a male abdomen extended for nearly four inches in length.

The tiny eggs, many hundreds in number, are certainly deposited *inside the brownish pupal case*; the bulk of the females dwindling as the eggs are deposited, makes the space available, since the pupal case cannot be enlarged.

Soon after all the eggs are deposited the depleted female, now considerably smaller, slides down out of the bag and soon expires, for death comes upon her quickly after her life's work has ended.

Should readers desire actual proof of these statements, both Owen Dawson, of Clyde, Gippsland, and myself would be glad to display clear photographs, together with a bottle of preserved eggs. I trust that this note will clear all doubts from the mind of my friend Mrs. Coleman.

TARLTON RAYMENT.

VALUABLE COLLECTION OF AUSTRALIAN ORCHIDS

The Rev. H. M. Rupp advises that his large private orchid herbarium of 470 species (including about 27 types) has been presented to the National Herbarium of New South Wales. While congratulating the Sydney Herbarium upon this splendid acquisition of priceless material, the F.N.C would echo the eulogies that have already appeared in the Sydney press and express its pride in a fellow-member whose scientific contributions to our *Naturalist* have been so welcome over many years.

THE MYSTERY OF THE BANDICOOT'S TOE

By CROSBIE MORRISON, M.SC., Melbourne.

One of the earliest things noticed about the kangaroo was that the toes of its hind foot were very ill-assorted. It had one enormous toe. On the outside of that was a much smaller toe, and on the inside of it was a toe that was smaller still—so small as to appear in the last stages of degeneration, but remarkable nevertheless because it possessed two claws side by side.

One might regard that as an unimportant detail of such a large animal as a kangaroo; and indeed no importance seems to have been attached to it for quite some time after its discovery, even though it was established that there was more behind that claw than appeared at first sight. Not only was the claw or toe-nail double, but the bones in the toe were double, too. Indeed, what appeared to be one small, attenuated toe proved to be two even more attenuated toes, complete with the appropriate bones and muscles, bound together in one toe-skin. The effect was rather akin to what botanists term fascination in a plant stem.

This condition was undoubtedly normal and constant in the kangaroo, and accordingly a scientific term was invented for the condition. It was called *syndactyly*, and one apparent toe which consisted in reality of two toes bound together in the one skin was termed a *syndactylous* toe (Gk. *syn*, together; *daktylos*, a finger).

The next development in the story is that this syndactylous condition was found to be common not only to all kinds of kangaroo (using the term in its widest sense to include wallabies and wallaroos), but was also found in the various kinds of possum, in the koala, and the wombat, the phalangers and possum-gliders, and the tropical cuscus.

Zoologists looked for it again, or for signs of it, in the American opossum, and in the little marsupial selvas of South America, but there was no indication there, even in embryology, of any tendency toward syndactyly. It was not only confined to marsupials, but to marsupials of the Australian region and of the tropical areas so close to Australia as to be classed with it as far as the distribution of marsupials is concerned.

But not all the Australian marsupials possessed it. Roughly, the world's count of something like 150 species of living marsupials may be separated into two fairly well-defined groups, namely, the predominantly flesh-eating group which includes the North and South American types and the Australian native cats and so-called marsupial rats and mice, the Tasmanian Devil and the Tasmanian Tiger, the famous Numbat of Western Australia, one of the most primitive of all our marsupials, and the Bandicoot; and the predominantly vegetarian group which includes the kangaroos and wallabies and their smaller editions the rat-kangaroos, the possums,

PLATE I

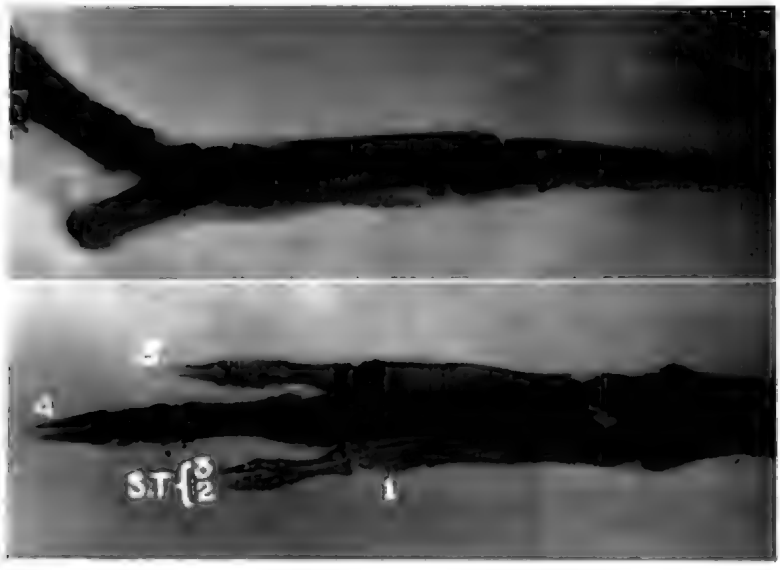
Southern Short-nosed Bandicoots (*Isoodon obesulus* Shaw and Nodder) showing type of habitat—tunnels through the base of thickly-growing matted grasses.

Photo by Crosbie Morrison.

Portrait view of the Southern Short-nosed Bandicoot (*Isoodon obesulus* Shaw and Nodder). The term short-nosed is merely comparative—the noses of the Long-nosed Bandicoots are even longer and more slender than this.

Photo by Crosbie Morrison.

PLATE II



Skiagram of right hind foot of bandicoot from side (above) and from top (below), showing the separate bones of the second and third digits which comprise the syndactylous toe (S.T.). The toes are numbered from inside ("big toe") outward, the "big toe" in this case being the smallest and almost suppressed.

Photo by Melbourne Radiological Clinic.

The "double claw" of the syndactylous toe in the living specimen, marked by the arrow. Its strategic position as a toilet implement is obvious.

Photo by Crosbie Morrison.

(including the possum-gliders or phalangers), the wombat, the koala, the cuscus, and so forth.

That division is a fairly natural one. There are sharply marked differences in the anatomy of the two groups—the structure of the teeth, of the feet, and of the digestive organs. All the carnivorous group (using the word in the widest sense to include the insect-eaters such as *Myrmecobius*, the Numbat, and the many small mouse-like and rat-like marsupials) possess large numbers of fairly small front teeth on both upper and lower jaw, with the canines emphasised much as they are in the *Carnivora* among the higher mammals. They have many front teeth, and so they were lumped together in a group as the Sub-order *Polyprotodontia* (Gk. *poly*, many; *protos*, first or front; *odontas*, a tooth).

The predominantly vegetarian marsupials, on the other hand, are all sharply differentiated in having fewer front teeth in the upper jaw, usually arranged with their sides pressed closely together to form an almost semi-circular cutting edge, and only two front teeth in the lower jaw—never more; there is no half-way house, no biological link, between the two sharply distinct types of marsupial dentition. So the two front teeth in the lower jaw give the name to the other sub-order of the Marsupials, the *Diprotodontia*.

So far, so good. We have a very natural, workable, logical basis for our primary division of the marsupials. Or we should have if it were not for the Bandicoot.

The Bandicoots form a distinct family of marsupials, the *Peramelidae*. There are 17 species of them, but they are all very alike in habits and in their essential anatomy. They are, like so many of the marsupials, mainly nocturnal, and during the day they live in burrows or under tree-stumps or in formes among long grass, and they often make tunnels for quite long distances through the grass—tunnels above the surface of the ground, but covered by the grass from above.

They are dainty little animals, with sensitive, pointed noses, sleek hair which is just a little too coarse to be called fur, and alert beady eyes; and they have the strange but rather captivating power of being able to twist the tip of the nose round as they feel, and probably also smell, for worms. The body is usually dark—the commoner forms are brown—but the feet are generally white, and as the little animal digs nimbly in search of grubs his white feet seem literally to twinkle. The terms in common use, "As miserable as a bandicoot" and "Lousy as a bandicoot" are both libels on a pleasant and fascinating little creature. I've never seen one that looked miserable, and as for literal lousiness, they seem to have remarkably little trouble with external parasites.

There is still quite a lot of difference of opinion about the bandicoot's diet. Some people blame him for stealing potatoes in a particularly insidious way by burrowing under the plant,

abstracting the potato tuber, and then covering up the ground afterwards—which accounts, by the way, for another piece of Australian slang, "handicooting," meaning to steal in such a way as to cover all traces of the theft for the time being—it is applied mostly to petty pilfering.

But even that, it seems, is unfair to the bandicoot. I have tried to coax them to eat potatoes, but have never succeeded, with our local variety, *Isoodon obesulus*, at any rate. On the other hand, they will never refuse a good earthworm or a cockchafer grub, and as you will see presently in a brief film—the only moving picture I know of showing the bandicoot in its native haunts—they will go avidly for cockchafer grubs.

But I think we must adhere to the general published data that the bandicoot is an omnivorous feeder, though it is certainly a polyprotodont.

Here's the rub, though. The bandicoot is a polyprotodont with a difference. All the other polyprotodonts have the normal type of hind foot that goes with polyprotodont dentition and all the rest of the polyprotodont anatomy. But the bandicoot's hind foot is distinctly a diprotodont foot, with the syndactylous inner toe.

Indeed, by moving the bandicoot over into the other Sub-order, and making no other alteration in the present classification, we could divide the marsupials into the Sub-orders that Wood Jones[1] uses—*Syndactyla*, for the diprotodonts plus the bandicoots, and *Didactyla* for the polyprotodonts minus the bandicoots. The diet does not help us much, because the definitely diprotodont possums eat large quantities of insects and grubs, and indeed as further evidence is gathered it seems that they are every bit as omnivorous as the bandicoots are. On the other hand, none of the other polyprotodonts as far as I have been able to ascertain, eats anything but animal food—flesh, grubs, or insects—so from the dietary point of view it is more logical to include the bandicoots with the possums than with the native cats.

The bandicoot's toe is, indeed, a puzzle. To determine finally whether we shall use it as the basis of classification of the marsupials it is necessary to determine which of the two characters—dental or digital—is the more fundamental, and even there we come to a dead end. Both are associated definitely with function. The teeth are related to diet; the claws, as Wood Jones[2] has clearly shown in his R. M. Johnston Memorial Lecture to the Royal Society in Tasmania in 1925, are related to toilet.

The small, sharp, multiple front teeth of the polyprotodontia are beautifully adapted for cleaning the fur and for removing vermin. Indeed, the hair tracts (the direction in which the hair grows on various parts of the body) are distinctly related to the direction in which various toilet adaptations are used—teeth, claws, or tongue. And since the diprotodonts have not the comb-like front teeth, they

have the comb-like double claw of the syndactylous toe to do their hair with.

As Wood Jones sums it up, "The syndactylous digits of the marsupials are definite hair-combs, put to no other use whatever. They are not degenerate or rudimentary digits; they are highly specialized and highly functional members adapted to the single end of being fitted to comb the particular type of hairy covering possessed by the animal."

He goes so far as to make the syndactylous toe, then, the determining factor in classifying the marsupials. Others[3] do not agree with him. But there is something to be said on both sides, and at present we may sum it up by saying that more must be learned about the bandicoot and his anatomy, and about his ancestry, before we can with any degree of confidence adopt one or other of the proposed bases of subdivision of the Order *Marsupialia*. We cannot, in other words, solve the problem of the classification of the marsupials until we have solved the Mystery of the Bandicoot's Toe.

REFERENCES

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2. Wood Jones, F.—"The Mammalian Toilet and its Biological Implications" —Chap. 9 of *Life and Living.*
3. E. LeG. Troughton—*Furred Animals of Australia.*

EXCURSION TO KEILOR

On Saturday, March 23, 1946, a party of about fifty, members of the Club, the Anthropological Society, and the Bird Observers, visited the creek terrace at Keilor in which the Keilor Skull was found. The leader (Mr. R. A. Keble) and Miss Hope Macpherson pointed out the exact spot in the face of the sand pit where a workman had driven his pick through it, and described the condition of the face when they and others first saw it—in layers with ashes, fragmentary bones, and red ochre. From a nearby eminence the leader pointed out the three terraces in Dry Creek near its confluence with the Maribyrnong River, and that the Keilor Terrace (so called because it was the terrace in which the skull was found) was the oldest of the three. He then explained how Miss Macpherson and he had taken the levels of all the terraces from Keilor to the mouth of the Maribyrnong River and in this way had correlated the Keilor Terrace with the 15-20 ft. raised beach on the shores of Port Phillip Bay, a raised beach that is generally recognized as having been formed at the maximum rise of sea level in the Post Glacial Stage. The Keilor Terrace was proved to belong to the Wurm Stage of the Pleistocene Glaciation.

R. A. KEBLE.

SCARCITY OF *NATURALISTS*

The Committee is concerned at the rapid depletion of the last March and April issues of the *Vic. Nat.*, and in order that the stocks held by the Club will not fall below "danger level" it would be much appreciated if those members who do not wish permanently to retain their copies would offer them back to the librarian for sixpence each.

NOTES ON THE IDENTIFICATION AND GROWTH OF CERTAIN DODDER-LAURELS

By T. S. HART, Croydon

Introductory

The Cassythas are aptly called "Dodder-laurels," having the manner of growth of the Dodders, but the floral characters of the true Laurel Family to which they belong, i.e., the Family of the Bay Laurel (*Laurus*)—*not* the poisonous Cherry-laurel and Portugal Laurel (species of *Prunus*) nor most other plants loosely called "laurel." The Camphor-laurel, however, belongs to the true Laurel Family, as also does the Avocado "Pear."

Both the Dodders (*Cuscuta*) and the Dodder-laurels (*Cassytha*) emerge from their respective seeds as independent plants, but soon make parasitic attachments onto other plants, the original basal portions being then lost. If no host plant is available, the whole seedling fails, but Cassytha, producing more considerable ground parts, can continue as a free plant for much longer than Cuscuta.

Although these two groups belong to widely separated families, it is noteworthy that each forms a parasitic genus in a family not otherwise showing parasitism. The twining growth of Cassytha is also exceptional in the Laurel Family, whereas the true Dodders (*Cuscuta*) do belong to a family of twiners (*Convolvulus* Family). *Cassytha* is mainly an Australian genus, the chief exception being a wide-spread tropical plant (*Cassytha filiformis*), which reaches also to central coastal Queensland (Rockhampton). Three of the four Victorian species extend to Tasmania, where they have been erroneously called "mistletoes." No true mistletoe occurs in Tasmania.

Confusion over Cassytha pubescens, C. phaeolasia, and C. paniculata

Some years ago I wrote on two species of *Cassytha* (*Vict. Nat.*, XLII, p. 79, 1925). In some way a part of my conclusion was omitted, perhaps by myself. Firstly, as there given, I concluded that *C. phaeolasia* (Rusty Dodder-laurel) is a species with brown hairy fruits, *definitely ribbed*—not merely longitudinal streaks or slight angles. Secondly (there omitted), that Mueller's variety "*macrostachya*" (i.e. long spiked) of *pubescens* is rightly to be retained in that species. The statement made, that shady conditions may favour elongation of the spikes, refers to *C. pubescens*, in which short spikes are normal. As mentioned in the former article, National Herbarium specimens fully support these conclusions. Bentham had not seen mature fruits of *C. phaeolasia* and, depending on the spikes, mistakenly transferred *C. pubescens* var. *macrostachya* to *C. phaeolasia*. Mueller in his *Key* followed Bentham's usage, probably not considering the *Key* as a suitable work to deal with it and explicitly stating that varieties within a species were beyond the scope of this work. A misplaced comma in the end of the 1925

article affects the meaning. The fruits of *C. pubescens* range from depressed-globular to ovate-globular—*no* comma after "depressed."

Later observations confirm my earlier views. I have never seen from anywhere about Melbourne a ribbed fruit at all like *C. phacolasia* of Wumboyne River, New South Wales (the type area) and of the Gippsland Lakes. Further occurrences of this species have been noted between these localities. The precise limits are uncertain from lack of information, for instance, I have no information from Port Albert. On the other hand, long-spiked *C. pubescens* is quite common about Croydon and near there and the fruits are clearly *C. pubescens*. All reputed occurrences of *C. phacolasia* near Melbourne or in western Victoria, so far as I know them, are *C. pubescens* the form (or variety?) *macrostachya*. The occurrence of patches of new growth resembling some seen in *C. phacolasia* may well be taken as having no specific significance; it is merely a growth-form at that stage.

Recently, among specimens kindly shown to me at the National Herbarium, was the example called "*Cassytha paniculata*," S. Jephcott, Hume River—a locality regarded as doubtfully Victorian. As the specimen now stands without fruits, I did not see anything to separate it from *C. pubescens*. Mueller, however, actually exhibited it as *C. paniculata* and new for Victoria (*Vict. Nat.* IX, p. 3, 1892). There may be some feature, undetected by me, which influenced Mueller. *C. paniculata*, Hume River, even if in New South Wales, would be a long way from other localities frequented by the species, and there is always the possibility that a correspondent may have collected a specimen far from his home address—the locality taken as a record. Mueller's "*C. paniculata*" (Wumboyne, New South Wales, 1860) was later definitely cited by him as *C. phacolasia*; thus, *C. paniculata* is a very dubious Victorian record.

Variation in Fruits of C. glabella.

Another species, the Tangled Dodder-laurel (*Cassytha glabella*), is common on dry heathlands and readily recognized by its filiform stems, without hairs, and flowers in small stalked clusters, but with no stalks to individual flowers. The succulent fruits are described as "ovoid" by Bentham, "ellipsoid" by Mueller in the *Key* and by Ewart in *Flora of Victoria*. Mueller figures the species in detail in *Plants Indigenous to Victoria*, plate 68 (without verbal description) and less fully in the *Key to the System of Victorian Plants*, 1885. He shows the fruit with width about half its length and tapering to both ends, an outline usually called elliptical in leaves (though more pointed than a geometrical ellipse). Ewart in his *Flora* shows a form of fruit more parallel-sided, doubtless referable (in part at least) to immaturity.

I am using the term "fruit" in the ordinary sense of the *whole* structure containing the seed, including the enlarged perianth-tube and not limited to the more central parts (Ewart in an elementary

work showed the curious results of a too limited application of the word "fruit").

An unusual, nearly *spherical* fruit shape was observed in *C. glabella* at Frankston on a recent Club excursion, October, 1945. (*Vict. Nat.* 62, p. 166). It had previously been noted on various occasions in that district, but I have found no mention of such a form in available literature. The October fruit was still immature, but early in January I visited a place near Frankston, between Hastings Road and the railway. It was late in the season, but fruits were obtainable in some numbers: yellowish or occasionally greenish, nearly spherical, to 5 mm. long by 4 mm. wide, and more or less marked by six vertical lines corresponding to the six-lobed perianth. All the *Cassytha glabella* fruits observed on this occasion were near spherical. An unexpected feature, very evident at that place late in the season, was *swollen stalks* from which fruits had fallen. This occasionally obtains, but to a less extent, with the ordinary fruit shape.

I then visited the nearer heath country close to Clayton Springs, at the Herald Street scrub near the Benevolent Home, near Olympic Avenue, Cheltenham, and a small patch (not burnt in recent years) near Tulip Street, East Sandringham. All the fruits observed at these places (January 1946) were the typical bulging, double-tapered form shown in Mueller's figures.

The shape illustrated in Ewart's *Flora* was not seen on this occasion, but it is quite well known to me and often seen on ordinary excursions. The nearest approach among my earlier specimens was found in immature examples taken in September, 1937, near the Olympic Avenue occurrence. These correspond to Mueller's figures of early stages in the *Plants Indigenous*, etc., but are omitted from the simpler figure of his *Key*. It remains to be seen whether this linear form ever attains maturity without expanding to the shape given by Mueller for mature fruit.

Two cautions are perhaps needed. Small spherical galls are not infrequent on Cassytha, but these are quite different from the fruits, being smaller, usually carried laterally on the stems on a short stalk, and bearing no remains of flower parts at the summit. (The flower remains on the top of the fruit may be compared as to position, with those seen on a gooseberry, though differing in detail.) There is also a slight possibility that swollen stalks might be taken at a cursory glance, for narrow fruits.

In dried herbarium specimens, comparisons of succulent fruits are less easy, particularly with often incomplete or immature material. Bentham was obviously at a disadvantage in this respect. I have an example of *C. glabella* from the Moorniurng sandhills, south-west of Bairnsdale (December 1919) in which the fruit is nearly the Frankston spheroidal form. The once succulent part is now appreciably translucent.

Through the kindness of the National Herbarium staff I was able to look through their examples of this species and others. As far as can be certainly stated from dried material, *Cassytha glabella* from the Upper Kalgan River, West Australia, has fruits near the Frankston form. One of M. Koch's from Pemberton, West Australia, has fruits rounder and flatter at the top than Mueller's shape; it is possible that a flatter top might be obtained in dried material by shrinking back of the succulent part. A specimen from W. Wools, "Port Jackson," has the fruits near the Frankston form, but stalks not appreciably swollen; this is a small, neat specimen, evidently carefully set out, and was perhaps sent on account of the fruit shape. Of the other Herbarium specimens of *C. glabella*, a few are near the Frankston form and some rather too plump for Mueller's form.

The Frankston form seems to be a well marked local condition, possibly worthy the status of a variety, yet with others from various places more or less approaching it. In a specimen collected by Walter at Cheltenham, November 1898, the fruits are near Mueller's figure, but some more linear, agreeing with my interpretation of the nearly parallel-sided form as being immature (in some cases at least).

As to fruiting season, direct observations of the degree of maturity is needed. The January specimens indicate a summer crop and at about the end of it, though the end might this season be earlier than usual. On the other hand, McLennan's from Emerald, May 1904, and C. W.'s (? Walter), from Portland, July 1892, both near Mueller's form, but possibly a little plumper, suggest an autumn or winter crop, as they are likely to be near maturity. Buds, some well forward, were abundant in January, 1946, on plants with summer fruits. There is very likely an all-season activity and the degree of succulence, and even shape, might be affected by local conditions. I have taken these dates as dates of collecting, not of receipt at the Herbarium.

Cassytha pomiformis of Western Australia is described by Bentham as showing swollen stalks to the fruits. In the few specimens seen at the National Herbarium the enlargement would not be sufficient for a clear distinction from the Frankston form of C. glabella, but as Bentham remarks, the inflorescence is manifestly different.

Germination and Early Growth in Cassytha

I have been able to refer to a valuable article by M. Marcel Mirande (*Ann. Sc. Nat. Botanique*, Series IX, Vol. 2, Paris, 1905) dealing with the development and anatomy of *Cassytha*, as based on experiments with *C. filiformis* from Saigon. I find that two features mentioned in my 1925 article, from external examination, had already been established by him with anatomical evidence.

The pair of marks just below the lowest scale leaf of the

seedling are the scars left by the detached cotyledons. The six-rayed appearance at the top of the non-fleshy part of the fruit ("fruit" in the limited sense) *does* actually agree with the existence of three carpels in the build of the flower, although only one forms the style. The existence of three carpels in the Laurel Family, had already been accepted, albeit some descriptions say "one." "Two or three" is even given by Meisner at an early date.

In the Cassytha seed, large cotyledons are found, just as with others of the Laurel Family, but even Bentham failed to observe them in dried material. Deferring to Robert Brown's definite statement of their presence, he approached Thwaites of Ceylon, who fully supported Brown—from the evidence of fresh examples. The cotyledons can be readily seen in seeds that are not too mature. Mirande adds the further point that they lie in the direction usual to the cotyledons of this family.

There are some interesting differences in the accounts of early growth as given by Mirande for *C. filiformis* and by Ewart for *C. melantha*. Mirande describes the tip of the shoot as emerging from the seed at or close to the time of detachment of the cotyledons, though occasionally the hard parts enclosing the seed are carried up on the growing shoot. Ewart shows several scale leaves present at the time the hard shell is thrown off, corresponding fairly well to the case Mirande regards as exceptional. The difference might be due either to the peculiarities of the species or to conditions of growth. Ewart himself suggested that other species besides *C. melantha* might well be observed at their germination.

The question of nutrition of the young plantlet is also involved. Ewart, no doubt attacking the problem as a physiologist, does not deal with the earlier formation of the seed, but regards the stored material as endosperm, *not* cotyledons, and the tip of the shoot as continuing to absorb it. He seems to infer this continued absorption from the continued growth. Both accounts give the early enlargement of the "hypocotyl" (axis below the cotyledons) especially in its basal part, and this growth must be supported by material stored in the seed. At a somewhat later stage, when the cotyledons are detached, Mirande regards the plantlet as capable of growth on its own account, having enough chlorophyll and sufficient ground parts in addition to the stores in the swollen hypocotyl. He has known it to grow for eight months without parasitic attachments.

It is not known to me who first established that Cassytha starts as a free plant with roots in the ground. Dr. W. Woolls has it in his *Plants of New South Wales* (1885), but does not mention it as a new fact. Ample observations on the germination of all species in the genus are highly desirable, and Field Naturalists can perform a useful service in this connection.

PLATE III

EGG-LAYING OF THE WATTLE GOAT-MOTH

By EDITH COLEMAN, Blackburn, Victoria

The finest things about nature study are its perpetuity and its illimitable facets. Each of us makes "new" discoveries, a source of wonder and delight to ourselves, even though to the trained biologist some of them may seem trivial.

I have several times bred-out Wattle Goat-moths from the fully-fed larval stage, and have seen hosts of tiny larvae emerge from incredible numbers of eggs; have marvelled at the silvery curtain of threads on which intrepid little creatures set out on their great adventure. Yet never, until recently, had I seen the mother moth deposit her full quivers.

Wattle Goat Moths, *Xyleutes eucalypti*, showing male with "feathery" antennae (upper) and female with flat, translucent ovipositor extruded.

On December 21, 1945, a male and female, identified by Mr. Burns as *Xyleutes eucalypti*, were taken from a telegraph post on which their mottled-grey bodies harmonized perfectly. This moth, as the specific name implies, is impartial in its choice of food plant, wattle or gum, on which to deposit her eggs.

The male soon died. When the female was placed on a small log of Messmate-stringybark she began a search for deep, sheltered crevices. Instead of a rigid ovipositor, possessed by so many insects, she extended a ribbon-like organ seven-eighth inch in length. Soft and flexible, it moved over the log with the precision of a seeing finger.

Many crevices were tested before the moth appeared satisfied; then the flat ovipositor became a swollen, translucent tube in which one could follow the passage of egg-capsules until they were extruded. The capsules resembled "chains" of squids' eggs, but were much shorter, with the eggs not in a single row, but in great numbers, and of course much smaller. The capsules were moist and mucilaginous and so adhered firmly to the crevice, a wise provision which ensures the safety of the eggs until their hatching period.

The process was repeated many times, some of the capsules being shorter than others, and occasionally two of these would be placed in one crevice. The moth moved over the log as far as she could

go, which suggests that, in normal circumstances, she would travel some distance along the chosen bole or branch, never depositing all of her eggs in one basket.

It was fascinating to watch the sensitive ovipositor swelling and contracting with the passage of eggs. A wonderful tactile organ it seemed as it slid into each hollow with the unerring accuracy of touch one notes in fingers of the blind. Under a lens it was seen to be tipped with stiff, apparently sensory, bristles which probably serve as organs of touch.

The larvae of English Goat-moths exude from the mouth an oily fluid of goat-like odour. Has anyone noted this odour in Australian Goat-moths?

On January 10 I examined the log and found incredible numbers of tiny but very active larvae, embedded under silken coverlets of their own weaving. Capsules which had dropped and adhered to a sheet of paper under the log were covered with nests of silk, like little heaps of downy mildew. Lifting the silk, more active larvae were disclosed. One wonders how long the tiny creatures could exist in non-living wood. In normal conditions they would feed under the bark until strong enough to commence excavations.

Had I not examined the log at this stage the first intimation of hatching should have been a curtain of silk with hosts of escaping larvae streaming down to table and floor.

The log was again wrapped up in a sheet of paper. Examined on January 14, there was no sign of the larvae. I lifted the silk from every crevice and prised up the bark, but all had vanished, doubtless to spread over the house in search of a living host, and to perish unless they were able to make their way out of doors.

GERMINATION IN COLD AND DARKNESS

Under "A Plant Oddity" in the February *Victorian Naturalist* Mr. J. R. Garnet mentions an occurrence which is interesting and might not often come under the notice of field observers. A little explanatory note may not be out of place.

Soil temperatures are often continuously below 10 degrees C. when peas are sown, and they do grow, but rather slowly, and with many weak seeds missing. In the jar, there must have been moisture to give the peas a start. Then their own chemical reactions would definitely cause much heating—especially when in the mass and enclosed.

Continued growth in complete darkness is not at all unusual where there is a store of oil, starch and/or sugar. Until the large food store in the pea seed is exhausted, it will grow. Try it with a carrot or a jonquil. On one occasion a Belladonna Lily (*Amaryllis*) was sent to me and left in an old-fashioned round hat-box. When flowering time came, it started off and coiled round the box, several feet. When discovered, it was about to open normal but very pale flowers.

A. J. SWABY.

NOTES ON INSECT LIFE AT MOUNT BUFFALO

By EVAN SWARBRECK, Melbourne.

As the result of a fortnight spent at Mount Buffalo during January last, a collection of some fifty species of insects was exhibited at the February meeting of the Club. Owing to the interest shown by members, and the paucity of records from the locality, a few notes might not be out of place.

The collection, though small, was a representative one. All the insects were taken on the Plateau, altitude 4,500 to 5,600 feet. That it was not also comprehensive is attributed to the collector having as companions two botanists, Mr. P. Bibby, of the National Herbarium, and Mr. H. C. E. Stewart, President of the Club, the latter a frequent visitor to the Mount. In such admirable company the opportunity to learn more of the alpine plants took precedence over my usual quest for spiders and insects.

The most numerous insects, eliminating the common houseflies, which were occasionally unpleasantly familiar, were the grasshoppers, in places so plentiful as to make the collecting of other insects difficult. Small brown and green hoppers were very prevalent, and good specimens of the large green (*Elephantodetra pinguis*), also the large brown (*Gastrimargus musicus*), were obtained.

The *Monistria conspersa* is generally plentiful in the spring, but only a few specimens were noticed at this period. The female is twice the size of the male, measuring nearly two inches in body length. Both sexes are purplish-black, freely spotted with yellow dots; embryonic wings of clear texture cover a red patch on the thorax but never grow more than a quarter of an inch long. The insects are incapable of flight, but jump long distances with ease.

In the same Order (*Orthoptera*) the native cockroaches are well represented. The large black one (*Panesthia laevicollis*) lives in burrows in the soil in strict family communities consisting of an adult male, a viviparous female, and from ten to twenty of their larval progeny in various stages of growth. Soon after reaching maturity the adults bite off their tegmina and wings, these organs being inconvenient for inhabitating the burrows. The female, *Oniscosoma granicollis*, a wingless species, like an enormous woodlouse, was frequently found, mostly under bark. The male of this variety is winged, dark brown, rather dull, but of more graceful shape.

The true-flies (*Diptera*) were represented by several specimens. About half-a-dozen species of *Tipulidae* (Crane-flies) were taken, including the somewhat rare *Clytocosmus edwardsii*, which, to quote Dr. Tillyard, is "the handsomest Crane-fly in the world." Both a male and a female were collected. The Crane-fly is known as the Daddy-long-legs in Europe, but this name seems to be

given, in Australia, to the long-legged spider, *Pholcus*, found so frequently in houses.

The large *Rutilia splendida*, with its metallic blue and green colouring, together with the dull-red species, always elusive, swift-flying and difficult to capture, was procured. The larvae of these flies parasitize those of other insects, especially beetles.

Robber-flies (*Asilidae*) are common in Australia, the dominant sub-family being *Asilinae*. A good specimen of *Asilus murinus* was taken in flight with a cockchafer in its claws. These flies are very quick, preying on other insects which they catch on the wing.

On the windows inside the stone hut overlooking Echo Point near The Chalet, one can generally find a rather beautiful fly, pale orange to yellow body, darker head and gauzy wings. These are one of the *Sapromyzid* species whose larva live in the decaying vegetation so plentiful in the bush.

Little collecting of the *Lepidoptera* was done. A few specimens of the Grass Moths (*Crambidae*) were taken, mostly of the Talis genus, having silver striped forewings. They are plentiful enough on the tundras and grass plains.

Larvae of several Anthelids were collected. The *Anthelidae* are confined to the Australasian region. The lush snow-grasses attract that large moth *Anthela acuta*, the hairy larvae of which is sometimes a serious pest on lowland pastures. This insect exhibits a remarkable pupation. The caterpillar after passing through several ecdyses spins a cocoon up to three inches long, in which it utilizes the larval hairs, thrusting them through the silky covering of the cocoon. If the cocoon be touched with the fingers, the barbed spines cause an irritation like a stinging nettle. These large cocoons are often found at Mount Buffalo clinging to the trunks of *Eucalyptus gigantea*. The large beautiful moth that emerges from the chrysalis is pinkish-fawn.

The caves where the Bogong Moths (*Agrotis infusa*) rest during the daytime were not visited on this occasion, but for visitors who have not hitherto seen the caves they are a memorable sight. These caves are situated near the summit of the Horn, at the Cathedral Rock, and the Meyer Galleries on Le Souef's Peak. Countless numbers of these moths hang in masses on the face of the rocks, one upon the other, until they are built out to a thickness of several inches. The whole is a dull-brown sheet of living insects, continually undulating like hanging vegetation in a breeze, making a peculiar indescribable shuffling sound, intensified as the beam of a torch strikes the mass and reflects the light from their eyes in thousands of pin-points. The darkness of the cave is redolent with a heavy pungent odour; any noise or sudden movement dislodges the insects, filling the air with their dust-like scales, making it almost impossible to breathe. The whole experience is worth while though not entirely pleasant.

In former days each season brought the aborigines to these caves, where they collected the moths in thousands, singeing off the wings and making a paste of their bodies. This they ate with apparent relish, arriving as they did in many cases after a long trek in an emaciated state. That the aborigines returned weeks later in a fat condition, after feeding on the Bogong Moths, would seem to demonstrate the nutritive value of the food.

The Dragon and Damsel Flies (*Odonata*) were prolific in most parts near the many creeks and pools, and no doubt several species were represented. I find them too beautiful in life to destroy for collecting purposes. The odd specimens collected were already dead when found.

Adult Ant-lions (*Myrmeleontidae*) were seen in flight, as also the familiar green Lace-wing (*Chrysopidae*), the enemy of aphis. Several winged specimens of Termites (*Isoptera*) were collected.

Beetles (*Coleoptera*) are numerous and varied, some twenty-two species being obtained. Of the *Hesthesis* a specimen of *H. ornata* was taken. These beetles have short elytra and long hindwings, and are remarkably like wasps of the *Thynnidae* family. As they too visit flowers, and move with the characteristic jerkiness of the wings, they are frequently mistaken for wasps.

Chafer Beetles, *Diphucephala*, some brilliantly coloured and others dull, are in thousands on the vegetation, especially on the leguminous *Bossiaea*. Many other cockchafers were found, but as Australia has four hundred named species, this was to be expected.

The Buffalo is the habitat of a rare Longicorne Beetle, *Tragocerus lepidopterus*. It lives on the snow gums (*Eucalyptus niphophila* and *E. pauciflora*), and is found only on the highlands of the north-east. Though not seen on this visit, the season being a little early, this beetle has been collected several times on the Plateau. The colour is a dull reddish-brown, and the wings are pencilled with grey markings. The body is long and slender, and the insect possesses short black feelers. The female attains a length of three inches; because of this, and its rarity, it is much desired by collectors. The male, however, is considerably smaller.

In a stream on the Blackfellow's Plain, Whirligig Beetles, *Macrogyrus latior*, were plentiful. These interesting insects are built for speed and have specially adapted legs for the purpose. The elytra divides the eye in half, thus giving a dorsal and ventral pair of eyes, so whilst swimming on the water portion of the eye is available for above-water vision and the other for simultaneous sight below.

An outstanding feature was the abundance of the Rutherglen or Sliver Bug (*Nysius vinitor*), every sweep of the net in the lower bushes catching thousands of these small insects. Evidently altitude was no deterrent. No preference for any particular plant

was noticed, except that the *Compositae* were never free of the pests.

Prominent among the insect larvae and worthy of mention from the *Hymenoptera*, Fam. *Tenthredinidae*, were the Saw-fly larvae, so aptly called "Spitfires" Masses of these blackish grubs were all too prevalent, and repulsive to look at. When disturbed they raise their bodies into the air and exude a viscid yellow matter from the mouth, which has a nauseating odour, smelling strongly of eucalyptus, evidently a protective measure to save them from insectivorous birds. Fortunately they are kept within bounds by hymenopterous and dipterous parasites.

These "Spitfires" rest in clusters during the day and scatter over the branches to feed at nightfall, returning at dawn to the same situation. They do this until the foliage is stripped off, or until they are full-fed and ready to pupate. Then they crawl to the ground and, massing together, find a suitable place, usually at the butt of a tree, burrow in the soil to a depth of several inches, and there form their black papier-mache-like cocoons, piled in rows on top of each other, whence they emerge after undergoing their somewhat complicated metamorphoses as a true hymenopteron.

Perga dorsalis (the "Steel-blue Saw-fly") is popularly called "Saw-fly" because the female, which is the larger, has on the underside of the abdomen a fine saw-like ovipositor. With this she cuts the upper skin of the leaf and pushes her eggs beneath the epidermis. The eggs hatch out into tiny black larvae and mass together as already described. Incidentally, it is interesting to note that each species has its own type of saw, which when looked at through a microscope reveals a beauty and intricacy of design that has been incorporated in the fine saws used in modern surgery.

So numerous were the larvae on the wattles (*Acacia falciformis*) along the road from the Cathedral Rock to the Cresta ski-run that they were almost defoliated.

The Pear-slug so often infesting pear, cherry and plum, also hawthorn trees, in the cooler parts of Australia, is the larva of an introduced European Saw-fly (*Caliroa limacina*, de Geer).

Of the few native bees collected, a new one has, I understand, been determined as a subspecies of *Megachile macularis*, or true leaf-cutter bees. With their mandibles these bees cut circular pieces out of leaves, and use them in the construction of their nests, built in old stumps, or even under stones.

The collecting of the spiders and the pond-life is a story for the future. Let it suffice for the present to say the collection contained some very interesting matter.

This paper is not to be taken as a technical contribution to our knowledge of the natural history of Mount Buffalo, but, without being a propagandist, I can advise lovers of nature, be their

"ology" what it may, to visit our Mount Buffalo National Park. Having done so, they will return again and again. No effort should be spared to preserve the native ecology of this wonderful Park. It ranks as an outstanding holiday resort and naturalists' paradise, for no other State has anything like it.

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NATIVE BEES ON MOUNT BUFFALO

With Description of a New Subspecies

By TARLTON RAYMENT, Melbourne

Three Club members, Messrs. H. C. E. Stewart (President), Eyre Swarbreck, and P. Bibby, spent a fortnight from January 19, 1946, at Mount Buffalo; altitude 4,500-5,600 feet. Comparatively few of the native Eucalypts were in bloom, but the party obtained some bees. Most were found in the open alpine meadows, not far from running water. A botanical feature of these treeless expanses at the time of the visit was the predominance of the family *Compositae* in flower. Conspicuous was the orange-coloured Alpine Podolepis, *P. acuminata* var. *robusta*. The native bees seemed to have a predilection for these bright inflorescences.

The specimens sent to me proved to be of considerable interest. The most numerous formed a series of males and females of an earth-digging species, *Paracolletes chalybeatus* (Er.). These are about 14 mm. in length, highly-polished, with a black head and thorax, and a slight steely metallic lustre over the abdomen. The species was described from Tasmania in 1842, as *Andrena*, by Erickson, but the glossa of the mouth-parts is definitely wide and blunt, whereas that of *Andrena* is narrow and pointed. It is the type of the genus *Lamprocolletes*, Smith, with a conspicuous pterostigma. The ecology at this altitude is not unlike that of Tasmania in a more southerly latitude.

One small black Furrow-bee—it is only 6.8 mm. in length—proved to be a not quite typical specimen of *Halictus subplebeius*, Cckll., which was described from Mt. Tamborine, Queensland.

The third bee is a leaf-cutter, which is best treated as a new subspecies of *Megachile maculariis*, Dalla Torre (*maculata* of Smith). The species is widely spread over the three eastern States of Australia, and is easily known by several small spots of white hair on the mesothorax. The Buffalo specimen lacks these hairy maculae, and the mandibulae are quite differently sculptured. It approaches *M. ignescens*, which however has a red scopa. The Buffalo bee may later be given specific rank, but in the absence of

the male I shall treat it as a new subspecies and append a description of the female:

MEGACHILE MACULARIS SWARBRECKI, subsp. nov.

TYPE: Female—Length, 11 mm., approx. Black.

Head transverse; face with reddish hair fading to pale straw-colour laterally; frons rugoso-punctate, with sparse long reddish hair; clypeus convex, anterior margin crenulate, a polished irregular median line, and large contiguous punctures; the large supraclypeal area with a median impunctate polished surface; vertex closely punctured, with sparse fine black hair; compound eyes large, anterior margins parallel; genae small, with long, loose silvery hair; labrum black; mandibulae exceedingly large, coarsely rugose, shining, with a peculiar sericeus area on the somewhat flattened apex; short antennae obscurely brownish below.

Prothorax with a few long fine black hairs intermingled with the white; tubercles black; mesothorax shining, but closely and coarsely punctured, with a few fine black hairs; scutellum similar; postscutellum with longer white hairs; metathorax with a scale-like sculpture over an area shaped like a Moorish arch; abdominal dorsal segments coarsely punctured, depressed medianly, with a few stiff black hairs; apex with a few appressed ochreous hairs, scanty white hairs not forming distinct bands; ventral segments with a dense white scopa.

Legs black, with rather dense fringes of white hair; tarsi black; claws blackish-brown; hind calcar blackish; tegulae blackish, closely punctured, with a large tuft of silvery hair just beneath them; wings smoky; nervures blackish-brown; cells; radial more suffused; pterostigma inconspicuous; hamuli seventeen.

LOCALITY: Mount Buffalo, Victoria, January, 1946, Eyre Swarbreck. Type in the collection of the author.

ALLIES: *M. maculoris*, which has white spots on the mesothorax; *M. igniscens*, which has a red scopa.

On flowers of *Podolepis acuminata*, R. Br., var. *robusta* (Maiden *et* Betche) Willis.

BLUE WREN NESTING ON THE GROUND

While walking along a track in the Waterworks Reserve, Hobart (Tasmania), on November 5, 1945, I observed a female Blue Wren with a feather in her beak fly to a low dead shrub. After resting there for a few moments she flew to the ground a short distance away.

Upon observing the bird depart I investigated and found the nest, which was built right on the ground at the foot of a small low bush about 12 inches high. There was a little grass growing through and about the bush, which was only five or six yards from the track. The dome-shaped grass nest with its side entrance was not easily located, in spite of the fact that the bird was seen to alight in the vicinity. So far as could be seen without touching the nest, only feathers had been used to line it.

While the female bird was seen to visit the nest on two occasions that afternoon, the male was not observed. On each occasion the approach to the nest was the same, the bird alighting on the dead shrub before flying to the ground near the nest.

Several pairs of these lovely birds were seen in this locality, and four pairs were noted together in the open near the Reservoir.

L. C. VINEY.

The Victorian Naturalist

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PROCEEDINGS

The monthly meeting of the Club was held on May 13, 1946, at the Lecture Hall of the Public Library, the President (Mr. H. C. E. Stewart) and about 150 members and friends attending.

The President referred to the death of Mr. C. C. Towle and Mr. J. E. Marshall, and members paid respect to their memory. Mr. Towle, who lived at Eastwood, N.S.W., was one of the most active of our interstate members. His special interest was ethnology, and on this subject he contributed to the *Victorian Naturalist* a number of valuable papers, mainly concerning the stone implements of the aborigines of certain parts of N.S.W.

A letter was received from Mr. Barton giving information on the present state of Sperm Whale Head National Park. Mr. Hardy, in commenting, said he was glad to note the regrowth of *Acacia mollissima* as this was the only source of revenue the park had.

The National Council of Scientific Societies wrote advising that a Conference on Atomic Energy would be held at the University on July 19 and 20, and inviting members to attend.

The forthcoming meeting (June 7) to discuss the future of National Parks was announced, and it was stated that delegates were invited from all allied societies and other interested bodies. It was hoped that something worth while would result from the meeting.

Excursions held since the last meeting were mentioned by the President.

The Hon. Secretary announced that owing to holidays and inability to obtain a suitable hall it had been necessary to cancel the June meeting and thus the annual meeting would be postponed until July.

NOMINATIONS FOR OFFICE-BEARERS

President, Mr. F. S. Colliver; Vice-Presidents, Mr. J. H. Willis, Miss Ina Watson; Hon. Editor, Mr. A. H. Chisholm; Hon. Assistant Editor, Mr J. H. Willis; Hon. Secretary, Mr F. S. Colliver; Hon. Assistant Secretary, Miss N. Fletcher; Hon. Treasurer, Mr. E. E. Lord; Hon. Librarian, Mr. A. Burke; Hon. Assistant Librarian, Mr. H. Preston; Committee, Mrs. J. J. Freame, Messrs. J. Ros Garnet, G. N. Hyam, Ivo C. Hammet, Colin Lewis, T. Griffiths, R. D. Lee.

The following were elected as Ordinary Members of the Club: Misses Jean Mather, M. Hatherly, Helen Kniep, N. Allen, May Imrie, Marion Fraser, Mrs. G. H. Marshall, Mr. and Mrs. S. A. Miller, and Mr H. H Oates; and as Country Members: Miss E. Barton, Messrs. Norman Laird, Noel Learmonth, Stanley White, H. Trethewie and Russell Harding.

VICTORIA'S HIGHLANDS

Mr. C. E. Bryant, with a fine series of lantern slides and a running commentary, gave members an insight into the highlands of Victoria. Some admirable views of Mt. Wellington, Mt. Buller, Bogong High Plains, Matlock, etc., were a feature of the lecture.

A vote of thanks was moved by Mr. A. D. Hardy, seconded by Miss Ina Watson, and carried by acclamation.

EXHIBITS

Miss M. Arguad: Collection of fungi from Sherbrooke.

Mr. T. Griffiths: Long-horned beetle and larva, Family *Cerambycidae*.

Mr. A. A. Baker: Sheared and impressed quartz pebbles from Cave Hill, Lilydale; also faulted sandstone block from the Lerderderg River, Darley.

Mr. V. H. Miller: Cocoon of processional caterpillar.

Mr. H. P. Dickins: Water-colour drawings of native flowers.

Mr. C. J. Gabriel: Marine shells (*Magilus antiquus*, Montf., from Mauritius).

Mr. T. S. Hart: *Hibbertia ovata*, a Guinea Flower, from North Croydon (with the query: "Is this the only locality near Melbourne?"): also various examples of *Cassytha*.

Mr. A. Hateley (Stawell): *Banksia prionotes* (magnificent orange bloom), *Eucalyptus leucoxylon* var. *macrocarpa* (deep red blossom), *Banksia quercifolia*, and *Melaleuca Steedmani*.

Mr. E. E. Lord: Native Flowers from Ringwood.

Mr. A. N. Carter: Teeth of *Carcharodon megalodon* (Charlesw., 1837) from the *Janjukian* of Flinders, Victoria.

Mr. J. Ros Garnet: *Prasophyllum fusco-viride*, an uncommon orchid of restricted distribution. Also pot-grown plants collected in the Mallee scrub, Dimboola (1945).

Mr. E. Muir (Dimboola): Various native plants of the area, including bluebushes, saltbushes, glassworts and twin-leafs.

Mr. P. Fisch: Juvenile and adult leaves from two separate trees of Lemon-scented Gum, transplanted two years ago. The former tree grows in poor soil in competition with other shrubs, is 4½ feet high, and produces *juvenile leaves only*, while the latter grows in good soil, is 6 feet high, and stopped producing its juveniles soon after transplantation.

Mrs. E. Lyndon: Nest of the Yellow-throated Scrub-Wren (*Sericornis lathami*), collected in rain-forest on the McPherson Range, southern Queensland; nest particularly interesting as it is constructed mainly of the fine brown threads of the Horse-hair Fungus (*Marasmius equicrinis*). Specimens of Alpine Ash (*E. gigantea*) and Snow Gum (*E. pauciflora*) collected on Mount Macedon. Specimens of the volcanic rock known as Solvsbergite from Hanging Rock. *Rumex hastatus*, the "Scrambling Dock," a noxious weed, but very handsome in its autumn colourings.

VICTORIA INCOGNITA*

By C. E. BRYANT (Editor *The Land*)

On a map the State of Victoria appears too small for lonely corners and rugged country, but as it contains a large part of the high alpine areas of south-eastern Australia, there is many a wild, almost unknown stretch, largely accessible only to the traveller on foot. It is to the eastern parts of the State, therefore, that the more venturesome wanderers proceed in order to "explore" the maze of river valleys, mountain peaks and snow plains that exist where official maps show only white spaces.

During the decade 1920-1930 I spent all my holidays in this region, using the vestiges of the old mining tracks, where available, to gain access, and then poking into the even wilder country that lay beyond. Occasionally our small party suffered the "martyrdom" of taking packhorses with us, but as some of the rocky ridges and steep valleys are too rough for those animals, we were more often our own beasts of burden, carrying half-hundredweight packs with a fortnight's hard rations, sleeping-bag, one-man tent and other essentials. In any event, packhorses may well provide a plethora of ordeals, for they stray away at night, except when belled, on which occasions they stay close at hand and maintain an incessant tintinnabulation throughout the small hours. They walk more slowly but run faster than the human; they have an abominable odour when wet; they roll on their packs, and they become engulfed in mountain quagmires.

There have been many changes in the more "moderate" parts of this countryside since the early twenties. The Bogong High Plains, to which we once toiled up steep spurs, have become the site of a hydro-electric scheme, and graded roads now take one to the table-lands. Numbered snow-poles make travelling comparatively easy, even under wintry conditions. Nevertheless the wide uplands still provide much of interest—prattling baby streams, and rocky monoliths and many a magnificent panorama.

The big-timber tracts of our State were devastated by the 1939 fires almost to complete disappearance. The mountain-ash country beyond Marysville and Warburton, across to the Baw Baws, and the wonderful timber stands of the Ada and the upper Tanjil and Tyers and Thomson rivers, and the beech forests of the Yarra at its source, were without peer in Australia. There, shaded glens, "forgotten e'en by eremites of men," formed bowers of beauty, albeit "jungle" conditions of hazel and musk, wire-grass, young wattles, blanket-wood and other tangled flora constituted formidable barriers to easy progress.

Coming to mid-eastern Victoria, the country to the east of Mansfield and south of Whitfield and Bright supplies the surprises.

*Summary of an illustrated talk given to the Club on May 13, 1946.

The early explorers avoided this section. Hume and Hovell sighted the ranges and swung west to miss them. Angus McMillan saw the high hills from the lower country of southern Gippsland, recording that from a camp on the Avon he had a fine view of the mountains, to the highest of which (so he wrongly considered) he gave the name of Wellington, in honour of the Iron Duke. But explorers rarely investigated the country with particularity, being more concerned with premeditated objectives and practicable routes. I claim, without fear of competent contradiction, that most of this country of which I tell, unalienated Crown lands, is now as wild and unsettled as when the continent was first made known to the white man. True, cattlemen sought out the high tops for summer grazing, and a few fossickers poked into the ravines, but the era of the latter was short and spasmodic, and the former, having established grazing pockets, neglected the remainder.

Let us take the narrow mountain track to Mt. Howitt. It is now sidling around the cliff-faces of the steep hills that encompass the turbulent Howqua valley, now slipping down to the stream itself, crossing and recrossing with never the suggestion of a bridge, often losing itself on the scrubby flats. The climb to the summit, when the river is left, is steep and full of excitement. Every step opens up vistas of jagged saw-tooth ridges, of precipices falling to immense depths, of range upon range "until the last faint ridge blends with clear ether in the azure sky."

The summit gained, an alpine high plain stretches for miles, fringed with snow gum and dotted with "the cattle of a thousand hills," for this is summer grazing country. For five months or so, from perhaps October to March, the beasts graze contentedly, visited, maybe a brace of times, by cattlemen from the lowlands with salt. Then, when autumn temperatures threaten heavy snow and its concomitant cold, the riders, men of the calibre of Paterson's horsemen, muster the herds and take them to winter in the river valleys—except those unherded few whose bones will whiten the high plateaux when the following winter and spring snows are melted.

Mt. Howitt is a pivotal point in the main mountain system. On its slopes the Howqua, Wonnangatta, Macallister and King rivers are cradled, the Jamieson, Delatite, Rose and Buffalo rise close by. Over a number of years I came to this favourite peak from each cardinal point of the compass. The Howqua valley is the western approach, but one year we followed the high divide, for several days, from the south, over the giants of Shillinglaw and Skene, Macdonald and Clear and Magdala—mountains of varied attractions, though constituting a section of country composed of red Devonian rocks and consequently lacking water on the tops as occurs in granite country. Other times we traversed the twisted

PLATE IV

Above the Dandongadale Falls, Mt. Cobbler.
Photo by C. E. Bryant.

PLATE V

Mt. Howitt from the South.

Photo by C. E. Bryant.

Tom Groggin, on the Upper Murray, here called the Groggin.

Photo by C. E. Bryant.

and broken Barry Range over the Razor and the craggy teeth of the aptly-named Cross-cut Saw, or plodded up or down the long Wonnangatta valley, laying a cattle-station ghost en route—but that is another story!

Greater detail cannot be given, but names come crowding fast—highlights in a scenic wonderland. There is the tiny tarn, Talikango-nigothoruka, on Mt. Wellington, an emerald gem in a setting of green mountains. The gorges of the Little Dargo River and of the Carey and the Moroka, the awful scarps of the Snowy and Bennison high plains, the whale-backed mountains of Reynard and Tamboritha, the tumultuous waters of the unmapped Caledonia River, the thundering falls of the Dandongadale on Mt. Cobbler, and of the Tin-mine coming off the Pilot and bringing tribute to the upper Murray, here called the Groggin—these are but a few, and this last has "sneaked" across the border into the Monaro.

The ramparts of Æ-nano and the Cobboras, the lonely highlands of Suggan Buggan, the queerly-named rivers—the Ingeegoobee, Jingallala and Toongkinbooka—are all to the east where the Murray rises, bringing its greatest head, the Limestone, from down south in our State. Northwards the wild country swings over Pinnibar and the Gibbo into the eastern tributaries of the Mitta. But this assumes the aspect of a mere list.

There is another facet of unknown Victoria, not topographical but historical. The eastern mining country was very different from and more difficult of access than the fields of Bendigo and Ballarat, of Clunes and Dunolly. Its history is practically unrecorded and now it is too late. In the days of our wanderings many of the old fossickers, as zealous as knights seeking the Holy Grail, still hung on, fired with amazing faith in the tiny shows they had washed and picked over for years. But twenty years or so have meant the passing of nearly all, taking with them the romance of the heyday of many a dead and forgotten town.

These eastern gold areas lay on the fringe of the wilder country I have dealt with and were nearer, generally, to "civilization," though still mountainous. Opened up mainly in the 'sixties, towns like Jericho and Aberfeldy and Grant and Talbotville were thriving towns of thousands of souls, even running to suburbs, with pack-horse teams continually coming and going—out with gold and in with supplies, including, it is understood (off the record), a little liquor—and with hope running high in every heart. In some a few scattered buildings still stand, with beams that "gape like a skeleton's sundered ribs," but others have entirely gone, leaving not a trace to mark their erstwhile existence. Not even site-locations appear on the maps.

Such a one was Edward's Hill, at the foot of Mt. Useful. In

his *Recollections of Early Gippsland Goldfields* (Traralgon, 1916), a worthwhile collation of snippets of information regarding the mining days and ways in these hills, Richard Mackay tells of a Christmas Day at Edward's Hill. Bob Mann's brewery was festooned with flags for the occasion: Barney Walker's dancing hall was gay with streamers and lanterns. A day of sport and jollity—and drinking—with the miners drifting in from up and down the creeks for forty miles, was followed by jigs at night and Irish reels, for Hibernia was well represented, the dancers whirling around in studded knee boots and wearing blue or red sashes in place of the traditional Connaught sugaan of twisted hayband.

In 1923 I stood in a small open space, on a lonely mountain ridge, last remnant of the clearings that once had been Edward's Hill, and pondered whether a single grey stump was some old building post, maybe of Mann's brewery, or merely a tree-root. Of the old town, as with the works of Ozymandias in Egypt, "nothing beside remained." I thought, sadly, of the concluding lines of Mackay's account—"There had never been such a day under the shadow of Useful, and it is altogether unlikely that there will again be another." How prophetic those words Mackay could never know. Ichabod! Ichabod!

And so has departed also the glory of Grant and Store Point, of Redjacket and Toombon, and the township where the crashing batteries of the Royal Standard Mine stamped and rattled. Now all is solitude and silence, save for the mournful call of the bell-magpies—"karrák, karrák"—a sound that is to me of the quintessence of mountain nostalgia.

SPRING IN AUTUMN

My sister sent me from Maryborough (Vic.) recently a fragrant spray of Golden Wattle, *Acacia pycnantha*, which was plucked on May 10; it is the first example of the kind that I have seen at this period, the normal flowering-time for the district being August-September. Further evidence regarding seasonal oddities due to recent heavy rains comes from Mr. T. Hart, also of Maryborough, who reports having seen Waxflowers (*Eriostemon obovalis*) blooming in May and having found a Wattle-birds' nest with young on May 5. Further, Mr Hart says that a local wood-cutter felled a tree recently and was astonished to find that he had wrecked a nest and three eggs of the Noisy Miner (Soldier-bird).—A.H.C.

IN MEMORIAM

The grave of Sir Frederick McCoy, which had fallen into disrepair, has been reconditioned, and on June 1 a ceremony was held at Brighton Cemetery. Native shrubs were planted on the grave on behalf of the University, the McCoy Society, the Field Naturalists' Club, the National Museum, the Historical Society, and the Advisory Council for Fauna and Flora.

THE RIDDLE OF THE MOCKING-BIRDS

By A. H. CRISHOLM

Anyone who gives attention to the birds of Australia, for a reasonable length of time, cannot fail to be struck by the "linguistic" ability of many species—the skilled manner in which they use a number of "languages" by helping themselves to the voices of their neighbours. All the evidence indicates that the practice is much more widely followed here than in any other country.

Why should this be so? What factors obtain to cause numerous Australian birds, of various habits and habitats, to be strongly addicted to vocal mimicry? What purpose does the practice serve? And why is it that some birds mimic frequently while others do so only in special circumstances?

Further to this last question, why is it that mimicry is used constantly by certain birds which are quite good singers in their own right; and why do certain other birds "store up" borrowed notes and use them only on particular occasions, yet with a skill that would seem to indicate close practice?

For another thing, why is it that some small birds, notably the Heath-Wren, are accomplished mimics while others of kindred habits, such as the Grass-Wrens (*Amytornis*), the Field-Wrens (*Calamanthus*) and the Fairy Wrens (*Malurus*) do not appear ever to indulge in imitations?

These questions and others in affinity have long interested me. I first approached the subject in detail in *The Nineteenth Century* (England) in 1925, then in *The Australian Encyclopedia* (1926), and afterwards in various books, especially in the discussions of the Heath-Wren, the Lyrebirds, and the Bower-birds, and in the chapter entitled "Stealers of Sounds," in *Bird Wonders of Australia* (1934). But the most thorough reviews of the subject I have been able to submit were those published in *The Ibis* (England) during the last decade, namely, "Vocal Mimicry Among Australian Birds" (1932) and "The Problem of Vocal Mimicry" 1937, and now the figure is up to 47 species, of which only four or five are regarded as "doubtfuls,"
available at the time, together with various theories, was presented.

Other references to the subject have been of a paragraphic nature and have appeared mainly in *The Emu*. In early issues of that journal the allusions, perhaps as a matter of course, related chiefly to the Lyrebirds and Bower-birds, but in recent years various writers, in several States, have contributed observations on vocal mimicry among quite a number of species. As a result, my *Ibis* list of 21 Australian mockers in 1932 had increased to 36 in 1937, and now the figure is up to 47 species, of which only four or five are regarded as "doubtfuls."

The total (which does not include any introduced species) is certainly impressive. Moreover it may well be increased later, so bearing out a prediction made in 1932, that Australia would be found to possess as many as fifty species of bird-mimics.

In the light of these facts, the time seems opportune to engage in a general discussion of the subject in an Australian journal, and to set out the case for each of the 47 species that appear on the list. Possibly such a review will serve to stimulate interest among those who have only a mild acquaintance with birds, but who nevertheless may be able to tender useful assistance. They, it is true, may be handicapped to some extent through being unable at times to distinguish between "natural" and "stolen" notes (and this factor often limits appreciation of even the wonderful mimicry of the Lyrebird) but, of course, no special knowledge is needed to detect imitations of familiar calls, such as those of the Wagtail and Mudlark.

The over-riding necessity, for ornithologists and casual observers alike, is factual soundness. This point has been mentioned in earlier writings, but it requires emphasis from time to time because of a tendency to mistake fortuitous resemblance for mimicry. Bear in mind, too, that in most cases you must actually *see* a bird calling before you can be sure of either the author or the nature of the call. Even experienced ornithologists have sometimes been misled by supposing a mimetic call to be "genuine," or by supposing a "genuine" call to be mimetic, or by hearing one species and flushing another. In any event, accuracy is a primary essential in all phases of natural history, and to urge its use in relation to vocal mimicry is merely to emphasise the obvious, and not to "scare off" potential students from a subject that has both practical appeal and marked entertainment value.

It should be added, perhaps, that our concern is with mimetic birds in the wild, and not those that learn to "talk" in captivity. The one subject is fresh, the other somewhat musty, dating back as it does about two thousand years. Pliny made some sage observations on the point then, with Magpies for text:

> These birds get fond of uttering particular words, and not only learn them but love them, and secretly ponder them with careful reflection, not concealing their engrossment. It is an established fact that if the difficulty of a word beats them, this causes their death.

An English writer who came upon that passage recently was struck by a grim thought. "Many a Magpie," he wrote, "may have died as a result of trying to pronounce *corollary* with the accent on the first syllable."

It is, of course, a striking fact that some birds, notably Parrots and Cockatoos, are rarely if ever known to imitate in a state of nature and yet reveal in some instances strong mimetic powers

in captivity. Biology tells us that unless an organ or faculty is of use it will assuredly degenerate. Why then is the little Budgerigar, to say nothing of certain other Parrots, able under tuition to acquire an extensive vocabulary, which in a particular case extended to about three hundred words? (That case, as the bird himself used to announce, related to "Mother's precious gorgeous beautiful darling Billy Peach.")

Possibly a good deal of interest attaches to the performances of "talking" birds. But, as I say, our concern here is with mimetic birds in the wild, a subject that has not had the general consideration which it merits.

"It seems a pity that vocal mimicry has not claimed a greater share of attention," wrote A. C. Cameron, of Queensland, in *The Emu* in 1936. "The subject, from its very nature, gives a greater promise of entertainment than perhaps any other bird-topic, whether to the layman or to the so-called expert." That comment is just. It might, indeed, have been made by many others in the same circumstances; for Mr. Cameron wrote it after listening in springtime to masterly mimicry by a Bush-Lark, which, he said, reminded him of a skilled musician blending old folk-songs, adding improvisations, and weaving them all into a harmonious whole by sheer artistry.

The probability is, I think, that all the more assertive and consistent mimics — the "professionals," so to say — have been recorded. What we have to listen for now are the less frequent and more delicate imitations, those melodies which for the most part are rendered in fragile whisper-songs, or sub-songs. Shelley knew such woodsy lyrics:

> under-notes,
> Which pierce the sense and live within the soul . . .

But it is not only in the forests, and not only in nesting-time, that whisper-songs may be heard. Possibly they are rendered more often, in this country and elsewhere, than some of us used to suppose. Many have been detected by householders who have given attention to birds making autumnal holiday in their gardens. Listen well for such melodies. They, perhaps in greater degree than more declamatory songs, express the spirit, the inner personality, of the singer.

Careful listening may easily result in our list of mimics being substantially increased. More important at this stage, however, is the gaining of evidence, either practical or theoretical, in explanation of the various problems surrounding the practice. Some of these problems are very puzzling, so much so that after wrestling with them you find yourself wishing it were possible to adopt the opinion of Douglas Dewar, an English author, who solemnly declared that birds really don't mimic at all but merely use notes that chance to resemble those of other birds!

The trouble with the evidence as a whole is that much of it is contradictory. For example, when assessing Australia's master mimics you find that most of them are birds of the ground. "Ah," you say, "here is a material point." But, looking abroad, you encounter the fact that in America the master mockers are birds of the trees. A similar difficulty arises from the consideration that most of our master mimics belong to groups containing only one or two members—further consideration reveals mimics that belong to groups that have a fair number of members and are widely spread. "Anyway," you tell yourself, "it is surely significant that although most of the birds of our largest group, the honeyeaters, are very noisy, not one of them is a mimic." Alas, though, another bubble bursts when you look at New Zealand books and find the Tui and the Bell-bird, both honeyeaters, recorded not only as mimics but the only ones in their country.

Why, it has been asked, do some species of birds mimic consistently while others do so only in special circumstances? I cannot answer this question with any assurance. Nor can I advance any adequate explanation for the curious fact that some individuals of a species use mimicry at times while other individuals of the same species do not appear ever to use the practice. The best that one can do, in reference to both questions, is to suggest that temperament varies both between species and individuals, or, to carry the point further, that certain individual birds, like certain individual humans, are better equipped vocally, or are more enterprising in voice-culture, than others of the same species.

At any rate, the fact is that the use of voice mimicry in Australia varies to such an extent that the mockers may be divided, however loosely, into three groups, namely: *Master Mimics* (species which use vocal mimicry consistently), *Minor Mimics* (species in which mimicry is used only occasionally, and not necessarily by all members), and *Casual Mimics* (species which have been known to use only fragments of mimicry).

The masters of the craft include the two species of Lyrebird, five species of Bower-bird, the Tooth-billed Cat-bird, the Chestnut-tailed Heath-Wren, the Yellow-throated Scrub-Wren, the Rufous Scrub-Wren, and the Redthroat. Possibly certain other species should be added to this select group. Some observers, no doubt—each choosing according to experience—would include the Bush-Lark, the Pipit, the Pied Butcher-bird, the Silvereye, and perhaps one or two additional species.

A difficulty in precise determination of ability is that mimicry appears to vary in strength in various parts of the range of certain species. The Satin Bower-bird, for example, seems to mimic better in Queensland than it does in southern New South Wales:

the Heath-Wren's remarkable vocal skill is more manifest near Sydney than elsewhere, and the performances of the Brown Flycatcher in Queensland apparently improve upon those of the same species in Victoria.

Master Mimics use "stolen" notes as part of their normal songs or calls. They are the Shakespeares of the bird-world. That is to say, they adopt and adapt whatever their fancy dictates, blend the borrowings with their own "native wood-notes wild," and make the whole performance so artistic that it becomes completely personal.

Minor Mimics use imitations in special circumstances, usually as tranquil whisper-songs, but occasionally, and in striking contrast, as agitated utterances when their domestic affairs are disturbed. Some of these whisper-songs, serene little symphonies, are among the truest of all our bird-melodies. Accordingly, the use of imitations in such circumstances—in such songs of tranquillity—strengthens my belief that mimicry is practised by birds largely because they are sound-lovers, and because song is their chief means of expressing their vitality, their high spirits, their joy in life.

What of the practical value of the habit? Personally, I think that with Master Mimics the use of mimicry, as a constant portion of regular song, may have a certain territorial significance. I believe, too (on a basis of experience) that imitations of the cries of birds of prey are apt to frighten certain small birds. But, contrary to some opinions, I do not believe that imitations deceive the birds that are being imitated.

An English writer who declared that imitations were "warning cries," used to drive away the birds imitated, was obviously not aware that Lyrebirds imitate Tits and Robins—and also timber-mill whistles! On the other hand, there is a theory that imitations are used, not to repel the birds imitated but to attract them—James Pollard, of W.A., advanced this belief when he wrote in *The Emu* (1930) of a Grey Butcher-bird that used the "tiny and beautiful warblings" of several small birds "in the hope that he would be drawing them inquisitively nearer to him." If a Butcher-bird ever cherished such a "hope" he would be unduly optimistic! As well expect him, in turn, to be misled when his own voice is imitated by the Lyrebird and other mockers. In any event, we cannot well accept the theory that a mocker *knows* that certain notes are imitations—as distinct from mere sounds—and uses them with malice aforethought.

Another Westralian, F. L. Whitlock, also advances the "attraction" theory, but in his case it is made to operate to the mocker's disadvantage—he suggests that a certain Thornbill's mimicry of a Bronze Cuckoo "attracts the female Cuckoo to the vicinity of the

nest." The fact appears to be that Cuckoo voices are imitated freely, by many birds, because of their penetrating and persistent nature, and not because of any factor relating to parasitism. In tropical Queensland both the Koel and the harsh-voiced Channel-bill Cuckoo have been known to be the subjects of mimicry, and in southern Australia A. J. Marshall has heard the Yellow-throated Scrub-Wren imitate, among many other voices, the calls of four parasitic species, namely, the Pallid, Fantailed, Square-tailed and Bronze Cuckoos. Moreover, the Heath-Wren's repertoire includes the calls of three Cuckoos, and the imitations of certain other birds near Sydney have been known to include the voice of the Koel, although this Cuckoo is rare in the south. It begins to seem clear that there is some compelling quality in Cuckoo voices.

Possibly, by the way, the appeal of the calls of Cuckoos gains strength in that they may frequently be heard at night. It is true, of course, that most of the sounds imitated by mimetic birds are diurnal, but there is at least some evidence—notably the Lyre-bird's imitations of the screaming of possum-gliders and the hooting of Owls—to indicate that mockers are receptive during darkness.

As far as can be learned, the only bird-vocalists fit to rank with any of the master mimics of Australia are the Mocking-birds, of the genus *Mimus*, in North and South America. Thrush-like birds, which possess very worthy songs of their own, the Mocking-birds sing both when perched and when flying, and in both circumstances some of them exercise mimicry, not only of birds but of frogs and crickets as well, to a marked degree. Dr. C. W. Townsend has credited the famous Mocking-bird of the Arnold Arboretum with imitating 21 species of birds in one hour and with having a total repertoire of imitations of 55 different birds. Further, in F. M. Chapman's *Birds of Eastern North America* a certain Mocking-bird is said to have imitated the notes of no fewer than 32 species of birds during ten minutes' continuous singing; and in Pearson's *Birds of America* the same species of Mocking-bird (*Mimus polyglottus*) is recorded as a mimic of a wide variety of sounds, ranging from the barking of dogs to the music of a gramophone.

It is curious, however, that the Mocking-birds seem to be, with the possible exceptions of the Cat-bird and the Yellow-breasted Chat, the only mimics of any consequence among the whole of the birds of the two continents. "In America," says Dr. R. W. Shufeldt, "there are no other birds that at all deserve the name of a mocking-bird." No less curiously, mimicry does not appear to be constant throughout the genus, which contains some fifteen species. The Mocking-bird of the United States (*Mimus polyglottus*) is obviously a highly skilled performer. So

PLATE VI

The Mocker of the Jungle. Lyrebird in display.
Photo by R. T. Littlejohns.

The Mocker of the Heathlands. Heath-Wren at nest.
Photo by K. A. Hindwood.

too is the White-banded Mocking-bird of South America (*Mimus triurus*), which W. H. Hudson says has a "matchless" song of its own and is able to imitate many species, including notes acquired on its travels in sub-tropical forests a thousand miles away from its springtime quarters in Patagonia. Certain other members of the group, however, appear to be mocking-birds only in name: some, it is said, do not mimic at all, and others reproduce only the style and intonation of various birds, without rendering imitations of the actual notes.

Why is it that the White-banded species possesses, as Hudson claims, "miraculous mocking-powers," while some of its near relatives mimic only in a slight degree? Similar problems obtain in Australia. They defy explanation.

Remarks on each of the birds on the list of Australian mimics are given in the present discussion. No special systematic order is followed, but in general the species are graded according to ability. I have in some instances repeated notes published in one or other of the *Ibis* papers (mainly because no other records are available), but on the whole the comments here are much briefer, particularly in relation to the better-known mimics.

MASTER MIMICS

SUPERB LYREBIRD (*Menura novae-hollandiae*).—Acclaimed by many people as the "wonder-bird" of the world, the Lyrebird is certainly a remarkable combination of display artist and vocal mimic. Not only is the male bird given to "thieving the ballads from his neighbours' throats," but he is able to imitate almost every "foreign" sound that he hears frequently. Achievements credited to various specimens include the imitating of the blasts of a timber-mill whistle, the misleading of surveyor's men by imitations of a shrill code of signals, and (this on the part of a semi-domesticated bird) the use of words and phrases under the tuition of farm-hands. Imitations of bird-voices range from the whisperings of small birds to the loud wailing of Cockatoos and the "laughter" of the Kookaburra; it is remarkable, indeed, that this large bird can use such a wide variety of sounds and blend them with perfect harmony. In brief, the Superb Lyrebird is a master mocker of the highest ability, one so addicted to mimicry—so remarkably sensitive to a wide variety of sounds—that imitations are used as freely in every performance as are its own resounding calls. Incidentally, Mr. J. Coyle, of Springwood, N.S.W., says that his captive Lyrebird, "Joe," began to "croon" at the tender age of three months, and when twelve months old was a competent mimic of many of the bird-voices heard near his Blue Mountains aviary.

Apparently this talented bird is able to acquire sounds by night as well as by day. A bushman at Mount Buffalo told me some years ago of a local Lyrebird that imitated the calls of the Boobook Owl, and David Fleay has since made a similar record, adding to it (through the same Lyrebird) faithful imitation of the nocturnal shriek of the large possum-glider.

It used to be supposed that the female Lyrebird had no imitative ability. That impression has been dispelled. The female is vocally less emphatic and resolute than her mate, but she is nevertheless a highly competent mimic. The late Tom Tregellas recorded a case in which a female Lyrebird barked like a terrier, yelped like a fox, and brilliantly imitated the calls of many birds.

PRINCE ALBERT'S LYREBIRD (*M. alberti*).—A smaller and very distinct species, restricted to the north-east of New South Wales and the south-east of Queensland (where the Superb Lyrebird finds the northern limit of its range). Prince Albert's Lyrebird lacks its relative's taste for building display mounds, but it, too, is a highly competent vocal mimic. A correspondent of Gould declared it to be the chief vocalist, stating that not only was its song louder and fuller than that of southern Lyrebirds, but its limitations were even more varied and accomplished. More mature judgment suggests that if a choice is to be made it should be in favour of the southern species. Nevertheless the Albert Lyrebird has a wide range of borrowings, among them the weird wail of the sub-tropical Cat-bird, the revelry of Kookaburras, and the croaking of frogs. On Tamborine Mountain (Queensland) we used to hear one or another Lyrebird render a whole corroboree of Currawongs, just as the Superb Lyrebird sometimes imitates the chattering of a complete flock of Crimson Parrots.

Miss Hilda Geissmann (Mrs. H. Curtis) recalls in particular a spring morning when she heard within the same hour or so an Albert Lyrebird and a Yellow-throated Scrub-Wren—the two master vocalists of Tamborine jungles—giving wonderful mimetic performances. The "Blacknest-bird" (Scrub-Wren) imitated the songs of the Grey Thrush and Golden Whistler, the explosion of the Whip-bird, and the "Quick-quick" of the Logrunner, together with many other calls, in an ecstacy of song; and the Lyrebird whistled like a Goshawk, shrieked like a flock of terrified Lorikeets, crooned like the Brown and Wonga Pigeons, screeched like a King Parrot, shouted like a flock of Currawongs, cried like a Cat-bird, laughed like a Kookaburra, and then turned himself into a glorified Grey Thrush, a flock of Crimson Parrots, a spirited Logrunner, and at the last a very assertive frog.

SPOTTED BOWER-BIRD (*Chlamydera maculata*).—In addition to the possession of remarkable skill as a bower-builder, decorator, and display artist, the Spotted Bower-bird is a vocal mimic of the highest order. It can and does mimic virtually every sound of its neighbourhood, from the twanging made by sheep or emus struggling through wire fences, the squealing of rabbits, the barking of dogs, the croaking of frogs, the chopping of wood, and the creaking of branches to the cries of many birds of the area. One individual has even been credited with a faithful imitation of the rolling of thunder. Always, it would seem, the preference is for harsh sounds; the screaming of Hawks and Eagles is rendered to perfection, and so too is the whirring noise made by the wings of the Crested Pigeon. I have heard no suggestion of singing on the part of the Spotted Bower-bird; it imitates sounds just as they occur, individually, and makes no attempt to create a definite song or symphony. Its specific notes are harsh nondescript sounds, reinforced by a cat-like cry that is supposed by many bushmen to be imitative but which undoubtedly is a natural note; I have shown in earlier articles that a similar call is occasionally used by several species of birds. Probably, however, the greater part of its vocabulary is mimetic. So strongly is it addicted to borrowings that some bushmen hold that it deliberately teaches its young to mimic—which doubtless is another way of saying that it teaches to its young the notes subconsciously acquired from other birds.

There can be no doubt that the Spotted Bower-bird is the finest non-singing mocker of the world.

WESTERN BOWER-BIRD (*C. guttata*).—Whereas the Spotted Bower-bird is moderately familiar because it ranges over a large portion of the eastern sub-interior, the Western Bower-bird is restricted to remote parts of Western and Central Australia and therefore is not at all well known. It

has, however, been reported upon by some few ornithologists, notably F. L. Whitlock, who describes it as a masterly mimic with a preference for harsh sounds. One imitation that struck him forcibly was that of the sound of rabbits pattering over a heap of dry twigs. He says also that this Bower-bird uses, as a natural note, a cry like a cat's meeowing.

GREAT BOWER-BIRD (*C. inchalis*).—This fine bird, which ranges from North Queensland across to W.A., is another expert bower-builder and decorator, and shares with its immediate relatives a marked degree of mimetic skill. Relatively little has been written about the species, but H. G. Barnard, who did much field work in the tropics years ago, recorded the bird as "an expert mimic." (Barnard, by the way, wrote of the species as *C. orientalis*, the Queensland Bower-bird, the impression being then strongly held, by several competent students, that this bird was distinct from *C. inchalis*.)

SATIN BOWER-BIRD (*Ptilonorhynchus violaceus*).—The chief calls of the handsome male Satin Bower-bird are a ringing "Whoooo," usually uttered from a treetop, and a number of curious whirring and grating notes, usually uttered in his play-arbour. But when he puts his mind to varied vocalism he becomes revealed as a highly accomplished mimic. The late Charles McLennan, a capable Victorian bushman, wrote once of a Satin-bird that "seemed to pour harmony from his very soul." He was a miniature Lyrebird, in that he imitated perfectly quite a number of birds (including the Kookaburra) and rounded off the performance with a clever rendering of the grunt of the koala.

Imitative ability in the species appears to vary in power. A. J. Marshall has written that whereas in the Sydney region he rarely knew the Satin-bird to be imitative, he found in the Macpherson Range, Queensland, that mimicry was quite characteristic. The quality of the imitations varied with individuals, and Marshall suggests that age may be an influential factor.

Females of the species also are competent mimics. In some instances they have been known to reveal extensive repertoires.

GOLDEN BOWER-BIRD (*Prionodura newtoniana*).—The most recently discovered of the Australian Bower-birds (it was described in 1883), this handsome species is of special interest because of its smallness and structural distinctions, because of the very large bowers it builds and decorates, and because it is the only Bower-bird to lay a white egg. The chief specific call appears to be a froglike croak, and to this are added imitations of various birds. The discoverer of the species (K. Broadbent) reported it to be "a grand mocker, imitating all the birds of the neighbourhood"; the discoverer of the eggs (G. Sharp) told me the same thing, and a later collector also has expressed warm admiration of the mimetic ability of this lovely little Bower-bird. The pity is that its restricted range (portion of the North Queensland jungle) prevents it from being at all well-known.

TOOTH-BILLED CAT-BIRD (*Scenopœetes dentirostris*).—When S. W. Jackson was collecting in northern Queensland, in 1908, he was continually impressed by this curious bird's imitative performances, which were usually given while the artist was perched in a tree above his "circus-ring"—the cleared space in the jungle which he decorates with large leaves. To one bird Jackson ascribed a masterly imitation of the whirring rattle of a cicada when held by a bird, and a striking reproduction of the distressed croak of a frog when held by a snake. Earlier, Kendall Broadbent had paid tribute to the Tooth-bill as "one of the grandest mockers in Australia." Its natural notes are a harsh jumble, but it does not appear to use the wailing cry of the Cat-birds proper.

(To be continued.)

THE LEGITIMATE SPECIFIC NAMES OF CERTAIN EUCALYPTS

(With some necessary changes and new varietal combinations)

By A. K. CAMERON, Melbourne.

1. *E. AMYGDALINA* Labill., "Black Peppermint."

W. F. Blakely adopted[1] the name *E. salicifolia* (Sol. ex Gaert.) Cav. as the specific name of this plant on the assumption that *E. salicifolia* Cav.[2] is synonymous with *Metrosideros salicifolia* Sol. ex Gaert.[3] which, in turn, he assumes to be identical with, and to have priority of publication over, *E. amygdalina* Labill.[4] *Metrosideros salicifolia* is based on a manuscript account by Solander of a plant that Banks and he had collected on Cook's first voyage and, as Botany Bay was the most southerly point then touched, the name could not possibly apply to a Tasmanian endemic. The published description covers fruit only, and of the two capsules illustrated, one is not *E. amygdalina* and the other bears only a remote resemblance to the fruit of that species. In my opinion, *E. salicifolia* Cav. is *not* a synonym of *M. salicifolia*, for Cavanilles' work has frequent reference to Gaertner's work, and under the description of *E. platypodos* Cav.[5] (*E. botryoides* Sm.) there is the remark "*an Metrosideros salicifolia* Gaertner, Vol. 1, Tab. 34, fig. 3a?" If Cavanilles meant his *E. salicifolia* to be the same as *M. salicifolia*—or even thought it bore a close resemblance to it—he would surely have said so; the quotation clearly indicates the contrary. The description of *E. salicifolia* Cav. is too brief and indefinite to apply with certainty to any eucalypt and must fall because of uncertainty. Even if we could determine now the identity of *M. salicifolia* Sol. mss. (in my view it is a composite of at least three species—possibly *E. racemosa* Cav., *E. microcorys* F.v.M., and *E. tereticornis* Sm.), the specific epithet could not be transferred to *Eucalyptus* because the combination is pre-occupied by *E. salicifolia* Cav.

E. amygdalina Labill. *must* be restored for the "Black Peppermint" of Tasmania.

2. *E. ANDREANA* Naudin, "River Peppermint" ("River White Gum").

(Synonyms: *E. numerosa* Maiden.
E. Lindleyana Blakely, *non* De Candolle).

There has been much confusion over the specific name of this plant and *E. radiata* Sieb. was applied to it by many writers before Maiden[6] proved that the name should be restricted to the Common Peppermint of New South Wales and Victoria. Maiden had pointed out earlier[7] that the River White Gum was distinct from

E. radiata Sieb. and separated it as a variety (var. *numerosa*) of *E. radiata*[8] and later as a distinct species (*E. numerosa*),[9] but with sundry earlier vacillations. W. F. Blakely resurrected[10] the old name *E. Lindleyana* D.C. for this plant, but Cheel[11] has lately insisted that *E. Lindleyana* D.C. *must* fall because of uncertainty (Maiden considered it synonymous with true *E. radiata* Sieb.). Cheel's claim that the name *E. Lindleyana* D.C. has priority over *E. radiata* Sieb. is not correct, as both names were first published in De Candolle's *Prodromus* and *E. radiata* has actually priority of position (p. 218 against p. 219, both in volume III). Possibly Cheel was confusing the date of publication of *E. Lindleyana* D.C. with that of its earlier synonym *E. longifolia* Lindley (*non* Link.). Maiden pointed out[7] that *E. Andreana* Naudin was synonymous with his variety *numerosa*, but when he finally raised this plant to specific rank he ignored the older name. I have consulted the original description and figures of *E. Andreana* Naudin[12] and am satisfied that these refer to the "River White Gum." Since this is the oldest valid name, it *must* be adopted for this plant.

E. ANDREANA Naudin, var. *stenophylla* (Blakely) Cameron *comb. nov.*

Blakely created[10] a new variety (*stenophylla*) of *E. Lindleyana*, as he understood that species. The varietal name must now be combined with the correct species name.

3. *E. BRIDGESIANA* R. T. Baker, var. *AMBLYCORYS* (Blakely) Cameron *comb. nov.*

I have pointed out[13] that *E. Stuartiana* F.v.M., the generally accepted specific name of the Victorian Apple Box, must fall in favour of *E. Bridgesiana* R. T. Baker. Blakely, using the specific epithet *Stuartiana*, created the variety *amblycorys*.[14] This varietal name must be combined with the correct species name.

4. *E. CAMALDULENSIS* Dehnhardt, "River Red Gum."

Although Maiden indicated[15] the synonymy of *E. rostrata* Schlecht. with *E. camaldulensis* Dehn. (he saw an authentic type specimen of *E. camaldulensis*), it remained for Blakely[16] to suppress *E. rostrata* Schlecht. in favour of the older name. I understand that the synonymy is questioned by some botanists, so it is thought advisable to repeat[17] the pertinent facts, viz., that *E. rostrata* Schlecht. (1847) is preoccupied by *E. rostratus* Cav. (1797)—a slip of the pen by Cavanilles, using the masculine instead of the conventional feminine form, "*rostrata*." *E. rostratus* Cav. is a synonym for *E. robusta* Sm. (1793). Whatever argument may be advanced as to the identity of *E. camaldulensis* Dehn., *E. rostrata* Schlecht. *must* be abandoned as the specific name of the River Red Gum.

5. *E. DELEGATENSIS* R. T. Baker, "Alpine Ash" ("Red Mountain Ash").

This species is usually referred to *E. gigantea* Hook.f (1847), a composite species which, as originally described, included *E. obliqua* L'Herit. The name, however, is already preoccupied by *E. gigantea* Dehn. (1822)—a synonym of *E. globulus* Labill. (1799). *E. gigantea* Hook.f. must therefore fall, and *E. delegatensis* be retained as the specific name of this important tree. (N.B. Baker's use of the "a" in spelling *Delegate* is perhaps questionable.)

6. *E. LARGIFLORENS* F.v.M., "Black Box."

This species is usually referred to *E. bicolor* A. Cunn., and the original description as quoted by Hooker[18] is: "*E. bicolor* A. Cunn. mss., a species closely allied to *E. haemastoma* Sm., but the marginal nerve is not so close to the edge of the leaf (this is the 'Bastard Box' of the carpenters)." J. M. Black has quoted[19] Dr. T. A. Sprague's opinion that this description is insufficient to validate the name *E. bicolor* in accordance with the International Rules of Botanical Nomenclature, and has pointed out that the next oldest validly published name—*E. largiflorens* F.v.M.—should be retained for this species.

E. LARGIFLORENS F.v.M., var. *XANTHOPHYLLA* (Blakely) Cameron *comb. nov.*

Blakely described[20] this form as a variety of *E. bicolor* A. Cunn., but the varietal name must be combined with the correct species name.

7. *E. POPULNEA* F.v.M., "Bembil Box."

This species is usually referred to *E. populifolia* Hook.; but Hooker bestowed the name on two separate plants, viz., the Poplar Gum of tropical Australia (*E. platyphylla* F.v.M.)[21] and the Bembil Box.[22] However, Hooker's epithet *must* fall, as it is preoccupied by *E. populifolia* Desf. (1829) which is a synonym of *E. tereticornis* Sm. (1793). *E. populnea* F.v.M., being the oldest valid name for the Bembil Box, must be restored for this species.

E. POPULNEA F.v.M., var. *OBCONICA* (Blakely) Cameron *comb. nov.*

Blakely described[23] this form as a variety of *E. populifolia* Hook., but the varietal name must be combined with the correct species name.

8. *E. ST. JOHNII* R. T. Baker, "St. John's Gum."

(Synonym: *E. pseudoglobulus* Naudin ex Maiden.)

Blakely claimed[24] the above two species to be distinct and separated them thus:

{ *E. St. Johnii*—fruits sessile and unicostate.
{ *E. pseudoglobulus*—fruits pedicellate and bicostate.

As it is common to find sessile and pedicellate, uni- and bicostate, fruits on the same tree, these distinctions break down. The type of *E. pseudoglobulus* as illustrated by Maiden[25] is sessile and cannot be separated from *E. St. Johnii* as found in its type locality (Lerderberg Gorge, Bacchus Marsh) and in the Gippsland Lakes district, where it is very common. The two forms are, in my view, conspecific. The first publication of the name *E. pseudoglobulus* Naudin[26] certainly has priority over that of *E. St. Johnii* R.T.B.,[27] but, as the former remained a *nomen nudum* until formally described by Maiden much later,[28] *E. St. Johnii* must stand for this species.

9. *E. TERETICORNIS* Sm.

var. *GLAUCINA* (Blakely) Cameron *comb. nov.*
var. *MEDIA* (Blakely) Cameron *comb. nov.*
var. *PRUINIFLORA* (Blakely) Cameron *comb. nov.*

Blakely adopted[29] the name *E. umbellata* (Gaert.) Domin, instead of *E. tereticornis* Sm., for the Forest Red Gum. I have shown elsewhere[30] that *E. tereticornis* Sm. must stand. These three forms, described by Blakely as varieties of *E. umbellata* (Gaert.) Domin., should be transferred to the correct species name, as above.

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NATURAL HISTORY NOVELTIES

Comments on Australian natural history made by visitors to this country are often entertaining and sometimes a trifle staggering. The latest additions to oddities of the kind occur in *Link of Two Hearts*, a gossipy book published in England and written by George Sava, the London surgeon and author, in collaboration with his Australian-born wife.

Turn to page 45 of this book and you will have your education broadened in regard to Philip (*sic*) Island. After encountering various quaint statements regarding Mutton-birds (including the alleged fact that Australians know the birds' flocks as "mobs"), you will be faced by the startling information that all the Penguins have disappeared from the Island, every one having been eaten by foxes, which "swam the whole fifty miles from the mainland." That "news," surely, will amaze Mr. F. Lewis, the Chief Inspector of Game, who knows the fauna and geography of Phillip Island very well, though not so well, apparently, as do casual visitors!

But the Sava lore doesn't stop at Mutton-birds and Penguins. It extends to the Kookaburra (about which some freakish statements are made), and, getting fairly into its stride, discovers Swamp-Pheasants, Emus, Whip-birds, Lyrebirds, and Spotted Bower-birds on "Philip" Island, together with "a huge bird that looked like a turkey," and which, so Mrs. Sava learned, could run at 45 miles an hour.

Was there ever such an ornithological muddle! Imagine finding the jungle-loving Lyrebird, the sub-tropical Swamp-Pheasant, and, above all, the interior-dwelling Spotted Bower-bird on Phillip Island! And imagine a Plain Turkey (also a bird of inland Australia) finding its way to a Victorian island and there doing a sprint of 45 miles an hour, faster than even the fastest of Emus!

Obviously, the Sava family has gone astray both in its geography and natural history. That is to say, one or other of the authors of *Link of Two Hearts* has been the subject of a little gentle leg-pulling or has been indulging in flights of fancy.

P.S.—I have just telephoned Mr. Lewis and given him some of the "information" outlined above. He says he is deeply grateful to learn that Swamp-Pheasants, Whip-birds, Lyrebirds, and Spotted Bower-birds are to be found on Phillip Island. But he cannot comprehend why those foxes swam fifty miles instead of only one; nor can he wholly accept the statement about the "extermination" of the Fairy Penguins, which are in fact more abundant on the Island today than they ever were.—A.H.C.

At the excursion by Club members to the Fitzroy Gardens on April 6th last, the intimation was made that many of the English Elms (*Ulmus campestris*) forming the splendid avenues of these trees had a close association with Mr. Charles French, the founder of this Club. Most of the trees, at least 85 years old, were brought over by him, *per wheelbarrow*, from Scott's nursery on the other side of the Yarra, at Hawthorn, in 1863.

AUSTRALIAN AND NEW ZEALAND ORCHIDS

By the Rev. H. M. R. RUPP, Northbridge, New South Wales.

In this journal, Vol. XLIX (1932), p. 151, I called attention to the close relations between the orchid flora of Australia and that of New Zealand. The subject has recently been examined more fully by Mr. E. D. Hatch of Auckland, in collaboration with the present writer. Our investigations have resulted in a joint paper published in the *Proceedings, Linnean Society of N.S.W.* (Vol. LXX, pp. 53-61, Feb., 1946) and a shorter one by Mr. Hatch published at the close of last year by the Royal Society of N.Z. Students of the orchid family may be interested to learn something about our doings.

As might be expected from the relative areas of the two countries, and the fact that a large portion of our continent lies within the tropics, the orchid flora of Australia is far more extensive than that of New Zealand. Between 40 and 50 of the 71 orchid genera represented and known in Australia at the time of our joint paper are almost certainly of Asiatic origin; and the Asiatic element is very small indeed in New Zealand. The total number of genera represented in the Dominion is 22, viz.:

Thelymitra	*Chiloglottis*	*Lyperanthus*	*Gastrodia*
Orthoceras	*Aporostylis*	*Caladenia*	*Spiranthes*
Microtis	*Acianthus*	*Petalochilus*	*Earina*
Prasophyllum	*Townsonia*	*Adenochilus*	*Dendrobium*
Caleana	*Calochilus*	*Corybas*	*Bulbophyllum*
		Pterostylis	*Sarcochilus*

Of these genera, only three—*Aporostylis* (one species), *Petalochilus* (two species), and *Earina* (three species) are not represented in Australia. The first of these is a new genus which we have established to accommodate the anomalous *Caladenia bifolia* of Hooker (*Chiloglottis Traversii* of Mueller). *Petalochilus* Rogers is a curious genus very closely allied to *Caladenia*, but entirely devoid of labellar glands or calli. *Earina*, Lindl. appears to be of Polynesian origin, since it occurs neither in Australia nor Asia, but is found in Fiji, New Caledonia, and other Pacific islands.

Of the remaining 19 genera, at least five—*Orthoceras*, *Prasophyllum*, *Caleana*, *Acianthus*, and *Calochilus*—are considered to be of Australian origin, though not now endemic here. So that a general statement of the genera occurring in New Zealand is sufficient in itself to indicate close relation to the orchid flora of Australia.

When we come to consider species, the evidence for this relation becomes still more striking. In my earlier paper in this journal referred to above, I gave the number of orchid species common to both countries as at least 24. We have increased this to at least 31, with two others still under investigation. In the list of these species which follows I have omitted *Prasophyllum patens* R.Br., as we have reason to doubt the identity of the New Zealand plant with Brown's species, and the matter is at present *sub judice*. Synonyms are given below only where it seems necessary to indicate by what name the species has been known until recently, either in Australia or in New Zealand.

Thelymitra ixioides Sw.
longifolia Forst.
aristata Lindl.
pauciflora R.Br.
Matthewsii Cheesem. (*T. D'Altonii* Rogers.)
carnea R.Br. (*T. imberbis* Hook.f.)
venosa R.Br.

Microtis unifolia (Forst.) Reichb.f.
parviflora R.Br.
Prasophyllum Rogersii Rupp.
Caleana minor R.Br.
Chiloglottis cornuta Hook.f. (*C. Muelleri* R. D. Fitzg.)
formicifera R. D. Fitzg.
Calochilus campestris R.Br.
Robertsonii Benth.
paludosus R.Br.
Townsonia viridis (Hook.f.) Schltr. (*T. deflexa* Cheesmn.)
Acianthus fornicatus R.Br. (*A. Sinclairii* Hook.f.)
reniformis (R.Br.) Schltr. (*Cyrtostylis oblonga* Hook.f.)
Caladenia Lyallii Hook.f. (*C. alpina* Rogers.)
carnea R.Br. (*C. minor* Hook.f. and *C. exigua* Cheesm.)
Corybas aconitiflorus Salisb. (*Corysanthes Cheesemanii* Hook.f. ex Kirk.)
unguiculatus (R.Br.) Reichb.f. (*Corysanthes Matthewsii* Cheesm.)
Pterostylis nutans R.Br. (*P. Matthewsii* Cheesm.)
nana R.Br. (*P. puberula* Hook.f.)
furcata Lindl. (*P. micromega* Hook.f.)
foliata Hook.f. (*P. gracilis* Nicholls.)
mutica R.Br.
barbata Lindl.
Gastrodia sesamoides R.Br.
Spiranthes sinensis (Pers.) Ames.

Of these species, *Acianthus fornicatus* and *Calochilus campestris* were added in Hatch's Royal Society paper alluded to above. The former is represented in New Zealand by the diminutive plant which Hooker named *A. Sinclairii*. This never reaches the dimensions often attained by the Australian plant, but morphologically the flowers are completely identical, and *A. Sinclairii* should be retained only as a variety of *A. fornicatus*. In our joint paper we excluded *Calochilus campestris*, but subsequently it became clear that the late H. B. Matthews had recorded this species in the North Island.

Thelymitra carnea R.Br. Here the New Zealand form is more robust than the Australian; but apart from this we can find no reason for separating Hooker's *T. imberbis* from Brown's species.

Caladenia carnea R.Br. Hooker described a New Zealand form as *C. minor*. We find nothing to distinguish this in its essential characters from *C. carnea*, and were at first persuaded to place it in Rogers's var *pygmaea*. Subsequently we found that it lacked certain attributes of this form, and we restored Hooker's name for varietal distinction. The New Zealand form can be matched perfectly in Australia. So also can Cheeseman's *C. exigua*, which is likewise no more than a variety of the polymorphic *C. carnea*.

It is one thing to indicate the close relation between these two orchid floras: it is quite another thing to try and account for such relation. Probably no one can offer any satisfactory explanation. Theories come and go: the facts remain. The hypothesis of an ancient Palaeozelandic continent in early Cretaceous times, favoured in our joint paper, would explain a good many of the facts in connection with the orchid floras; but it would not explain them all. The carriage of orchid seeds across the Tasman by dust storms and by birds might also serve to explain some identities of species, but as an explanation of all the facts it is woefully inadequate. If a small, inconspicuous Australian orchid of very limited distribution—*Chiloglottis formicifera* could reach New Zealand in this way, why is there in the Dominion no trace of a single species of *Diuris*, a widely distributed genus very common in those parts of Australia nearest

to New Zealand? Commenting upon this, Mr. F. Fordham of Brunswick Heads, N.S.W., suggests that every species of orchid may require mycorrhizal association with "its own particular" fungal hyphae, and that the kinds required by *Dimis* are absent from New Zealand. Who can say? Patient research and observation along the roadway of Time may solve these and kindred problems: at present we can only say we do not know.

HYBRID BETWEEN LYREBIRD AND COMMON FOWL

(To the Editor)

Sir,—Reading through some early numbers of the *Australian Magazine* (New Series—Second Series, Vol. 3, 1904, page 46), I came upon the following extract from a letter from the late A. W. Milligan to the Editor: "Whilst living in Victoria I kept many of the native birds in captivity. I was never able to rear *Menura superba*, although I made many attempts to do so. I had, however, hybrids between the Lyrebird and the common fowl, and exhibited them at the Victoria Poultry Show many years ago."

The Editor, D. Seth-Smith, remarked, "Although the Lyrebirds were at one time thought to be related to the Pheasants, they are now known to be quite distinct from the gallinaceous birds, and the production of such a hybrid is most extraordinary. We hope to hear more on the subject."

A search in contemporary "bird" literature has failed to disclose any further correspondence on the subject. The record should not, however, be left as it is, so perhaps the drawing of attention to it now may result in some further information on this, as Seth-Smith wrote, "extraordinary" statement. Will some Victorian naturalist take up the search for further information? Local newspaper reports of poultry shows and programmes of such shows are likely sources.

Yours faithfully,

H. M. WHITTELL.

Bridgetown, W.A.

May 4, 1946.

[Bearing on Major Whittell's inquiry, it may be of interest to republish the following paragraph, which appeared in my Nature Notes column of the Brisbane *Daily Mail* on January 21, 1922: "A clutch of hybrids between a lyrebird and a game fowl is mentioned as having occurred near Twofold Bay long ago. Mr. W. R. Pennycook says (in the Melbourne *Argus*) that about 30 years ago he was travelling in the Twofold Bay district, N.S.W., and a friend at Eden told him that just previously he had seen a brood of such hybrids at a lonely farm on the edge of a great fern gully. In appearance they were more like lyrebirds than fowls, having tails about 6 in. long and long, strong legs and claws. The farmer told him that a fine male bird was running with the poultry every day, though he could never be induced to come into the yard at night. The chicks were very wild at first and refused grain. The writer says that hearing more later of this interesting family he went to the farm to try to get them, but found that they had just been sold to a travelling dealer." Regarding Mr. Milligan's failure to breed lyrebirds in captivity, it seems that there is only one accredited record of success in this respect. In the winter of 1936 "Joe" and "Zoe," a pair of lyrebirds kept in a large aviary by Mr. J. Coyle, of Springwood, N.S.W., built a nest and hatched out a young one in their ninth year of captivity. I discussed this achievement in *Walkabout* for September 1938.—A.H.C.]

NEW GUINEA ORCHIDS

An interesting paper ("Orchidaceae of New Guinea") by Louis O. Williams published in the February, 1946, *Botanical Leaflet* (Harvard University, Cambridge, Mass.) is of especial interest to Australian orchidologists. Among the orchids figured and described is a new species of an Australian genus, a new habitat for an Australian species, and a new species of *Pterostylis*, one of our most widely distributed genera.

Calochilus caerulea (L. O. Williams) is a species with almost leafless stem and a remarkable obovate-cuneate labellum. The latter is most striking and at once sets it apart from all those known in Australia. Stem green, from an ovoid tuber; flowers green, densely mottled and shaded with red, beard of the labellum a deep metallic blue at the base, distal portion maroon red. Habitat, British New Guinea; sporadic on poorly drained soils or savannah forests. E. J. Brass, 1937. As the author points out, *Calochilus*, a genus of about 12 species, has its centre of distribution in Australia. It belongs to a group that is essentially Australian, but is represented also in Tasmania, New Zealand and New Caledonia.

Drakaea irritabilis (Mueller), small genus of about seven species, six of which are limited to Western Australia, and one to eastern Australia. Previously known only in Australia. New habitat, Fly River, Papua. Savannah forest, occasionally on wet flats. E. J. Brass, 1937.

Other interesting descriptions include a new *Pterostylis* (*P. caulescens*), a species with very large stem leaves (no basal leaves seen), long-petiolate. Flowers solitary, terminal, flesh-pink. Habitat, alpine, bush-margin. British New Guinea, September, 1941. Also an uncommon species of *Pterostylis* (*P. Papuana* Rolfe, *Kew Bulletin*, 1899).

The orchids described in this leaflet are the results of the Archbold Expeditions. See A. L. Rand and E. J. Brass in *Bull. Am. Mus. Nat. Hist.* (1940).

EDITH COLEMAN.

A NEW PALAEONTOLOGICAL RECORD

On April 21, 1946, among the Jan-jukian fossil deposits at Flinders, Victoria, a tooth of *Carcharodon megalodon*, the largest species of our fossil sharks, was found. The specimens had apparently been exposed to the weather for some considerable time, and portion of the base is missing, leaving its present measurements as follows: Height 66 mm., width 74 mm., thickness 22 mm.

Search of the literature on Victorian fossil sharks and enquiry among leading palaeontologists in Melbourne has failed to reveal any previous recorded occurrence of the species at this locality.

A. N. CAUTER.

NATURE PHOTOGRAPHY GROUP

The Committee has sanctioned a proposal to form a group of members interested in the photography of natural history subjects, and having as its object the starting of a pictorial survey of the natural history of Victoria.

The tentative plan is to have regular monthly outings, and possibly evening meetings every two months, when methods will be discussed.

While it would be desirable for members to have an elementary knowledge of photography, anyone interested is welcome. As there is no Club meeting in June, members interested are invited to meet at the home of Miss Watson, 1 Charles Street, Jolimont (near M.C.G., 2d. section Flinders Street tram) on Monday, June 24, at 8 p.m., when plans will be formulated.

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PROCEEDINGS

Although no meeting of the Club was held in June—the cancellation, a rare event, had been necessitated through unavoidable circumstances—the *Victorian Naturalist* was published as usual, and the interest of members was further sustained by the holding of excursions. Reports on two of these outings are given below.

EXCURSION TO SHERBROOKE

June 9th being World Bird Day, an excursion was made to Sherbrooke to see and hear Lyrebirds. Thirty-four members and friends attended. The party left the bus at Kallista and walked up the fern-lined Clematis Avenue to the Firebreak in the forest, which is the best starting-point from which to find the birds.

Several birds were located and observed, and during the morning the majority of the party were fortunate enough to see a display of some length by a male bird.

No nests were seen, but a "platform" made by a bird, as a preliminary to nest-building, was found. Several freshly-made display mounds in the Firebreak gave evidence of the birds' activities.

A strong wind made conditions unsatisfactory, particularly in the afternoon.

At lunch-time Mr. A. G. Campbell spoke of the ideals behind World Bird Day, which was inaugurated by Mr. Noble Rollin of the Bird Research Station, Glanton, Northumberland, England. It was hoped that all round the world the day would be set aside for bird watching, with the aim of all observers either seeing a bird or hearing a song new to them, or recording a fresh observation about a bird they knew. It was agreed that a report of this outing be sent on to Mr. Rollin in England.—I.M.W.

"MYSTERY" EXCURSION

Twenty-four Club members and friends—an equal number of each sex—had little nature fore-knowledge of the itinerary proposed for them on June 17th, the King's birthday holiday, when they assembled at Flinders Street station to travel by train for the "mystery" excursion, the first in the history of the Club. Alighting at Loch, on the South Gippsland line, questions revealed that not one member of the party, including the leader, had visited

the town previously. Moreover, the route marked for the winter walk, from Loch north-east to Poowong, then south-west along the Grand Ridge Road to Nyora, a distance of twelve miles, had never hitherto been traversed on foot by any member present.

With bearings obtained from a road map, the party found itself in the Bass River valley, notable from a natural history standpoint by three of its faunal inhabitants, two of which, alas, are no longer resident. Firstly, it was the original home of the rare Victorian marsupial, Leadbeater's Gliding Possum (*Gymnobelideus leadbeateri*). The first animals collected here were named by Professor Sir Frederick McCoy in 1867. Secondly, in the same year McCoy made the first Australian description of the Helmeted Honeyeater (as *Ptilotis leadbeateri*) with specimens from the same district. By a remarkable coincidence, at that time in England the renowned John Gould worked out the same bird as *Ptilotis cassidix*, from specimens sent to him from an area of the river along Western Port Bay. Gould remarked it as "one of the finest species of the genus yet discovered," an observation that still holds good. The bird is now officially designated *Meliphaga cassidix*, and the south-eastern part of Victoria has the distinction of being its strictly confined habitat. No longer to be observed in the Bass River area, it happily still flourishes at Beaconsfield and in some few other areas. The third faunal subject, again one confined to south-east Victoria, and closely associated with McCoy, the Giant Gippsland Earthworm (*Megascolides australis*) now alone makes the district a worthwhile one for field naturalists.

Thus the party did not expect to see the animal or bird, but prospects of encountering the earthworm were considered promising. By good fortune, the very first questionnaire with a local resident, Mr. A. D. Davenport, found our unexpected guide an authority in search of the Annelid. Armed with shovels, the party ascended a slope of damp ground, and it was not long before "gurglings" betrayed the presence of the earthworms. Assiduous digging by Mr. Davenport brought portion of a good specimen to view, of sufficient length to tie in a knot to prevent escape, and to allow closer inspection and photographs. Careful digging is required to unearth a complete specimen. The worm can disappear quickly along its burr, which visual as well as aural evidence of the "gurglings" demonstrated. It was explained that this curious form is by no means uncommon around Loch and Poowong. It abounds in suitable moist areas, and many are ploughed up when the soil is cultivated. Mr. Davenport stated the average Giant Earthworm measures 4 ft., but 6 ft. specimens were occasionally found. Mr. L. C. Cook, another local authority, who once collected for the late Professor Sir Baldwin Spencer, recorded a *Megascolides* 9 ft. long, when extended. The eggs, not seen on this excursion, are oval, about 2 to 3 inches long, semi-transparent,

and of a delicate green colour when fresh. These are often loosely bound together with an openwork net, and placed in long grass, or under a clod of earth.

The whole morning had been absorbed in study of the earthworm, and members proceeded to lunch, and to contemplate the long walk, with only half a mile gone over! The local memorial park was an ideal lunch site. Leaving this, we crossed the first bridge on the Bass River section of the road, and soon found it the haunt of many birds. In one bush the Grey Thrush, the Grey Fantail, the Firetail, and the Brown Thornbill were observed together. Many other birds of the riversides and open spaces were seen on the five miles of the road that winds and rises through prosperous dairy farm lands to join the main Grand Ridge road at Poowong.

A short halt at Poowong permitted the party to scan briefly the Jurassic character of the impressive indentations towards Strzlecki. A shower of rain shortly after leaving Poowong failed to dampen the walking ardour of the excursionists, who enjoyed the exercise in clear air and the magnificent panoramas unfolded on both sides of the high ridge. Cloud, rain, sun, and sky effects alternated in succession, with glimpses of Western Port, the bayonet grass swamp plains in the south, and the Noojee-Beaconsfield ranges in the north, with the farther distant outlines of the Dandenongs and Healesville-Warburton heights.

After a brilliant sunset, the light of the short winter day faded into darkness as Nyora was reached. Here a fire in the station waiting-room radiated warmth, and also heated tea for the evening picnic meal in ample time before the train back to the city was boarded.

H. C. E. Stewart.

PHOTOGRAPHY GROUP

The first meeting of the Group was held on June 24. Eight members attended. Mr. H. Reeves was elected President, Mr. P. C. Morrison Vice-President, and Miss Ina Watson Secretary.

It was decided that members before being admitted to the Group must have any necessary equipment and a very real interest in photography, and, of course, be members of the F.N.C. Monthly outings will be held on the last Sunday of every month, and for a few months at least an evening meeting to discuss technique and for print criticism will be held on the first Monday at the home of one or other of the members.

The first outing (object, general) will be to the Botanic Gardens on Sunday, July 28, meeting at the kiosk at 10 a.m.; members can stay on for the afternoon, and lunch can be obtained at the kiosk if desired. An indoor meeting will be held at the home of the Secretary, 1 Charles St., Jolimont, on Monday, August 5, when the President will speak on "Flower Photography."

Members are asked to send in suggestions for excursions.

I.M.W.

NATURE NOTES ON CANBERRA

By CHAS. DALEY, B.A., F.L.S., Melbourne.

Canberra presents a fine example of the utility and value of afforestation, a vital need in Australia, awaiting serious and active recognition.

In 1831 Charles Throsby discovered the Limestone Plains, skirted by mountains, of which Mount Ainslie and Black Mountain are the most prominent. The Plains were open, treeless, destitute of scrub, but where at intervals spreading eucalypts grow on the slopes and rises bordering the mountains they have a park-like aspect, the prevailing species being the Snow Gum (*Eucalyptus coriacea*). Through the Plains the Molonglo River meanders on its course to the Murrumbidgee. As was customary in those early days, the first settlers planted poplars at the sites of their homesteads by the creeks, and also willows, the latter presumably (as is so often averred) from slips of those on Napoleon's grave at St. Helena.

At Sullivan's Creek, Acton, at the foot of the Black Range, specimens remain of both trees, probably over a hundred years old. One poplar, storm-beaten but still vigorous, is five feet in diameter; others are about four feet. The willows, too, are of substantial girth.

A very fine clump of poplars on the Molonglo River, below the bridge at present in disuse, forms a beautiful sight in its leafy autumn colouring, or in its golden coating of spring. The Plains do not produce many wild flowers. In springtime and summer amid the grassy swards are Blue-bells (*Wahlenbergia* species), the Blushing Bindweed (*Convolvulus erubescens*), *Bulbine bulbosa*, white and yellow *Helichrysums*, the Trigger-plant (*Stylidium graminifolium*), and *Goodenia hederacea*. Reeds and rushes in some parts line the river-bank under the willows.

Black Mountain, of siliceous formation favourable to vegetation, has the greatest variety of native flora, among which are several Acacias, including *A. obtusata*, *A. dealbata*, *A. verniciflua*, *A. penninervis*, and *A. venulosa*. Among the Eucalypts are *E. dives* (Blue Peppermint), *E. maculata* (Spotted Gum), *E. macrorhyncha*, and *E. haemastoma* (Brittle Gum). *E. pauciflora*, called "Scribbly Gum," owes its name to the markings on the bark made by insects' agency resembling a child's scribbling on a slate. Cherry Ballart (*Exocarpus cupressiformis*) also grows here.

On Mount Ainslie's harder surface of igneous origin *Acacia armata* (Prickly Wattle) and *Casuarina stricta* are seen among the Eucalypts.

In the vicinity of the city, *Indigofera australis* and *Hardenbergia violacea* are also sparsely found. Rock Fern (*Cheilanthes tenui-*

folia) thrives well, as also the Maiden-hair *Adiantum aethiopicum*, and in some parts *Pteridium aquilinum*, the Common Bracken.

Around the junction of the Cotter and Murrumbidgee Rivers is an interesting botanical area. Below the Cotter Dam are many vigorous specimens of the robust *Casuarina Cunninghamiana*, the River Oak. The most beautiful flowering plant in the district is *Grevillea juniperina*, along the river's course. Of profuse growth, its spidery-like flowers of scarlet hue are very striking. Also in this vicinity are *Dillwynia ericifolia* and *Bossiaea laxifolia*. Among the Tea-trees are *Leptospermum scoparium*, *L. myrtifolium*, *L. stellatum*, *L. attenuatum* and *L. triloculare*. *Kunzea pedunicularis* and *Callistemon paludosus* favour the streams. An occasional *Banksia marginata* defies the colder conditions, which are also unfavourable for the Mistletoes. The Black Pine, *Callitris calcarata*, not infrequently grows about the ranges.

The flora generally partakes more of the character of that of a wintry climate, influenced by the extremes of hot summer and cold winter, and frequently wide range in daily temperatures. This, with an altitude of about 2,000 feet and a moderate rainfall, accounts for the absence of certain typical vegetation of the warmer and more humid coastal fringe of New South Wales, such as the well-known Angophora and the Currajong, the former ranging as far as Mallacoota and the latter to the Mitchell River in Victoria.

The colder conditions also exclude *Eucalyptus bicostata*, the Blue Gum, *E. canaldulensis*, the Red Gum, the *Melaleucas*, and the Ironbarks, all liking warmer conditions. Ferns are scarce, but Gramineæ are in abundance. How suitable the soil and climatic conditions are for the hardier trees from colder countries is exemplified in the luxuriant growth of the pine forests at Mt. Stromlo and vicinity, and of European trees and shrubs in the city environment.

Introduced weeds and noxious plants are as yet not very noticeable about Canberra. On the whole, the mountains and valleys have a dry aspect as compared with the luxuriant Gippsland or Cape Otway regions, with vegetation to correspond. The introduced trees and shrubs, well chosen and admirably planted, are a most pleasing feature of the city. There are no fences except one at the railway station. The hedge is used for garden enclosures, several subjects, among which are *Pyracanthas*, being commonly grown.

With the abundant growth of trees and shrubs has come, of course, a great incursion of bird-life. The spreading gums from the foothills, wisely preserved, with spacious open plains, form an ideal country for the tuneful Magpies, so numerous at Canberra. At nesting-time male birds sometimes attack passers-by who may unconsciously come within the protected nesting-domain. The

writer on three occasions had to defend himself actively with a stick from Magpies who resented his intrusion. Applications have even been made for permission to destroy daring home-defenders. Every morning at break of day comes the delightful and soothing warbling of the Magpies, so essentially Australian. The laugh of the Kookaburra is also a frequent accompaniment of early morn.

In the autumn the Grey Bell-Magpies, with their rather harsh notes, are numerous. Galahs and the smaller species of parrots, which with other birds are attracted by fruitlets on hedge-plants, are frequent visitors. The Glossy Cockatoo appears once in a while, and on the outskirts of the city flocks of White Cockatoos will alight on an open field, taking care by efficient watch to guard against sudden attack or interference.

Among birds frequenting the home garden at Acton may be noted the Wagtail, in restless though cheerful mood, and the rarer Rufous Fantail. A Thrush may charm in a burst of melody, a loquacious Minah make its presence, and the Blue Wren, with his attendant inconspicuous escorts, may pay a quick passing call. Parrots on swift flight, and in full cry, may momentarily pause. a Peewee call shrilly from a high tree, whilst rarer but ever-welcome comers are the Scarlet Robin, the Yellow-breasted Whistler, and the busy Chats and Honeyeaters. By the river Reed-Warblers are tunefully vocal. Occasionally a White-fronted Heron will appear, a solitary Shag seek a hasty morsel, or a few wild-fowl briefly ruffle the water before dawn.

Recently for about a week the boom of a Bittern sounded nightly from the Molonglo down by the golf links. The night silence is sometimes broken by the monotonous calling of a Mopoke. In the mountain valleys near Mt. Coree Lyrebirds are to be found. Introduced birds have as yet been inconspicuous at Canberra.

Very extensive, useful research work in natural history is in operation at the Government establishment below Black Mountain with its effective equipment for experimental and laboratory observations and activities, so beneficial to the agriculturist, horticulturist and pastoralist.

A former member of the F.N.C., Mr. T. Greaves, has done good work on the life-history of the white ant. Fruit and vegetable pests receive the most searching enquiry in regard to their habits and life-histories. The close study of the blowfly and noxious insect pests also is made.

A few years ago an experiment was undertaken to breed possums in a prepared enclosure at the back of Black Mountain, but the venture was unsuccessful.

Except for the bird-life, fauna is scarce. Rabbits have been kept well under control. Foxes find cover towards the ranges.

THE RIDDLE OF THE MOCKING-BIRDS

By A. H. CHISHOLM

Part II

MASTER MIMICS (Continued)

RUFOUS SCRUB-BIRD (*Atrichornis rufescens*).—Were it not for the utterance of a resounding "Chit," or "Chip," this singular small bird of the sub-tropical jungle would be even less known than it is. That note is the "household word" of the species, and to it are added frequently clever imitations of the voices of other birds of the region. On one occasion I heard an Atrichornis mimic the voice of a Grey Fantail immediately after the Fantail uttered the call. And another observer has stated that when he attempted to "whistle up" a Scrub-bird the alert little creature responded with an imitation of his whistle!

It was suggested years ago that the female of this species was practically voiceless. An agitated mother-bird disproved this belief by uttering in my hearing an anxious squeaking note and a curious "Tick, tick, tick." I doubt, however, if the female possesses any mimetic powers.

YELLOW-THROATED SCRUB-WREN (*Sericornis lathami*).—This sprightly little bird of the eastern rain-forests is not only the most accomplished vocalist of its genus but shares with *Atrichornis* the distinction of being the most competent mimic among small birds of the jungle. You cannot be long acquainted with the "Devil-bird" without becoming conscious of its vocal powers, which in some instances extend into company performances and range over the voices of many species—a festival of song. E. Nubling and P. A. Gilbert have reported hearing four Yellow-throats in company, near Sydney, imitate no fewer than 26 species; and A. J. Marshall, writing of the same region, says he heard one Yellow-throat, on a day in spring, mimic the voices of 19 species in succession, ending with a perfect imitation of the "Bellie-bellie" of the Lyrebird. A female Yellow-throat shared, though somewhat mildly, in the remarkable performance.

The Yellow-throat's own song, which may be rendered either singly or in chorus, is strong and melodious. Few small birds are able to whistle so spiritedly, and fewer still are able to mimic with such grace and buoyancy, as this gentle Puck of the jungles.

HEATH-WREN (*Hylacola pyrrhopygia*).—Several writers, mostly residents of Sydney, have paid cordial tribute in *The Emu* to the remarkable mimetic powers of this small bird of the heathlands, and I have rendered similar homage in the *Emu* papers and in books. (See in particular "The Horns of Elfland" in *Bird Wonders of Australia*). The Heath-Wren is indeed a highly accomplished vocalist—the possessor of an assured and melodious song of its own and an artist of supreme skill at weaving the calls of other birds into a mosaic of song. There were times in Sydney when we used to wonder how it was that a bird of the undergrowth contrived to acquire such an extensive repertoire. I recall an occasion when K. A. Hindwood returned from National Park rejoicing because he had heard a Heath-Wren imitating not only honeyeaters of the heath but the Wagtail, Whip-bird, and Grey Butcher-bird as well. And a few days later, on the northern fringe of Sydney, I heard a Heath-Wren giving a brilliant fantasia that included the voices of the Mud-Lark, Rufous Whistler, Brown Flycatcher and Bronze Cuckoo. Moreover, P. A. Gilbert has recorded (*Aust. Museum Mag.*, April, 1926) having heard a male Heath-Wren imitate in a continuous song the voices of 15 species, ranging from the Yellow Robin and Brown Thornbill to the Yellow-tailed Black Cockatoo.

Other "borrowings" in the Sydney district include the Grey Thrush, Crimson Parrot, Scarlet Robin, Silvereye, Swallow, Buff-tailed Thornbill, Pallid and Fantailed Cuckoos, Black-faced Cuckoo-Shrike, Brush Wattle-bird, Spinebilled, Tawny-crowned, White-cheeked, Yellow-winged, and Yellow-faced Honeyeaters, and, most remarkable of all for a tiny bird, the "laughter" of the Kookaburra. The song of the Rufous Whistler is an especial favourite; sometimes you get the "Ee-choo" and the rippling chatter, and sometimes just the lovely ripple.* All the calls are woven into the woof of the master's own song, the blending of widely differing notes being effected with consummate artistry. The composite melody may be rendered either loudly (while the bird is perched a few feet aloft) or as a charming whisper-song -with a performer of such high vocal talent almost anything is possible. But, necessarily perhaps, in most instances the stolen notes are reproduced more softly than the originals; they are slightly etherealised, as it were, to accord with the elfin voice of the mimic.

In brief, the Heath-Wren has all the vocal vigour and sweetness of a Skylark and rather more versatility. And the talent of the species, it should be noted, extends to the female; we have proved this by seeing and hearing both birds using mimicry when disturbed at the nest.

You may hear the Heath-Wrens exercising their artistry, in the low scrub near Sydney, at almost any period, but especially in the cooler months. Dusk is a favourite time for mimetic song. As a fact, our little minstrel of the heathlands is distinctly crepuscular—on the way to becoming an Australian edition of the Nightingale!

Having in mind the remarkable mimetic ability of this bird, it is very singular that its close relative, *H. cauta*, appears to be restricted to its own spirited warble. I could gain no evidence of mimicry from specimens of *H. cauta* met with in the Victorian Mallee, and Hugh Milne, who knows both species near Bendigo, says that while he has heard imitations rendered by *H. pyrrhopygia* he has never known *H. cauta* to use mimicry.

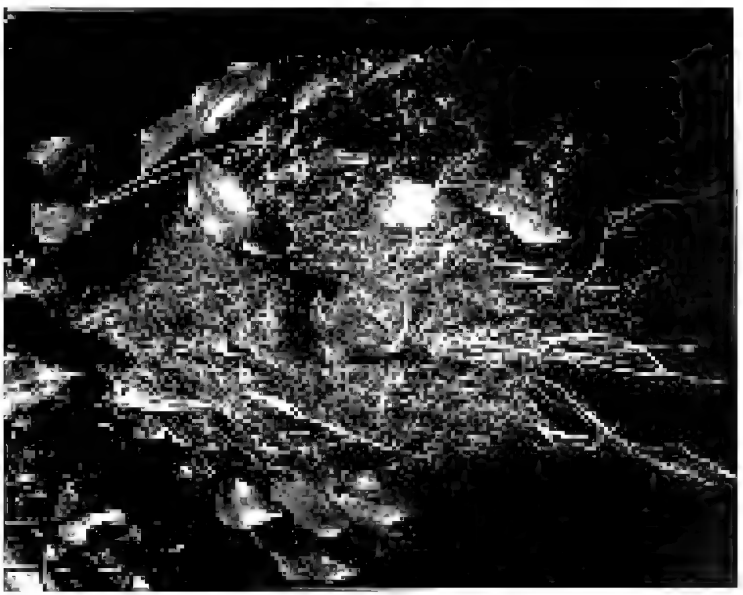
REDTHROAT (*Pyrrholaemus brunneus*).—"This species is a splendid mimic and reproduces the songs of all the surrounding birds." So says F. L. Whitlock (*Emu*, 9/201) and his claim does not lack support. For my own part, I have had only scanty experience of this shy little ground-bird of the interior, but I think it probable that if the species were better known it would become, as John Gould predicted, one of the favourite small birds of Australia.

MINOR MIMICS

BUSH-LARK (*Mirafra javanica*).—C. F. Belcher reported in 1914 (*Birds of Geelong*) that he had seen Bush-Larks soar, singing their own songs, to a height of perhaps 150 feet, and then begin clever imitations. Subsequently a bushman assured me that he had heard this Lark render "marvellous mimicry" and also "throw" its voice. Several other listeners have since given similar evidence, a notable record being one supplied in 1927 by Harry Newell, of Hindmarsh Island, S.A., who listed 11 species of birds known to be imitated by the Bush-Lark in his district. It begins to seem that this bird is much more than an "apprentice" at the art. I doubt, however, if mimicry is constant throughout the species. Incidentally, its use of mimicry while flying tallies with what has been reported of the Calandra Lark, both in Europe and America. (For notes in *The Emu* on the Bush-Lark as a mimic see in particular H. Newell, 26/202; A. C.

*There must be something especially persuasive in the resounding "Ee-choo," or "Ee-chong," as well as the rippling chatter, of the Rufous Whistler. The notes are not only favourite borrowings of various small birds but also of small boys who compete in the bird call competitions in Sydney on Bird Day.

PLATE VII



Cameron, 36/133; and M. S. R. Sharland, 44/4. Two of these writers, as well as C. F. Belcher, remark on the Lark's skill and persistence in imitating the "Twa-to-weep" of the Stubble Quail.) It would be interesting to know if the Bush-Lark uses mimicry when it sings on moonlit nights. If so, it must rank as our only nocturnal mimic.

PIPIT (*Anthus australis*).—This bird figures in my *Ibis* paper of 1932 as the possessor of a spirited song, uttered both at rest and on the wing, and as an occasional mimic of such birds as the Magpie, Raven, Plover, etc. P. A. Bourke reinforced this record ten years later by reporting in *The Emu* (42/184) that while occupying a photographic hide he saw and heard a Pipit, perched near by, give admirable imitations of the notes of eight species of the open spaces, including the Wagtail. "I have never previously heard any species," it is added, "attempt to mimic that 'sweet-pretty-creature.'" Actually, the call of the Wagtail does not seem to present any difficulty to certain mockers; it has been known to be used skilfully by the Heath-Wren in particular, and also by the Bush-Lark, Silvereye, Pied Butcher-bird, Magpie, and English Starling.

GREY-BACKED SILVEREYE (*Zosterops halmaturina*).—Because the Silvereye is one of the familiar garden birds of Australia its vocal ability is becoming somewhat widely recognized. You must listen intently, however, to detect imitations in the slender melody, uttered as the bird sits quietly in the heart of a shrub. I have long admired the "whispering" ability of the Silvereye, but would not have supposed, as a friend assures me is the case, that this can extend into imitations of such difficult notes as the calls of the Whip-bird, Wagtail, and Magpie-Lark, and even the "laughter" of the Kookaburra. That record, which came from northern N.S.W., is supported by a similar one from Queensland, Mr. W. H. Davidson of Tamborine Mountain reporting that he heard a talented Silvereye imitate the voices of the Whip-bird, Wagtail, Magpie-Lark, Sacred Kingfisher, and Kookaburra, and also the curious calls of that small bird of the fields, the Fantail-Warbler. On and on went the elfin mimic, and the admiring listener continued to give it audience until a feminine voice called, "Drat the little creature! Come and have a cup of tea."

Presumably imitative powers are possessed by other Australian species of *Zosterops*, and possibly by many in other countries as well.

MISTLETOE-BIRD (*Dicaeum hirundinaceum*).—The usual call of this beautiful little bird is a single high-pitched note, which in the breeding season swells into an imperious chatter. Mimicry is not commonly reported in the species, but it appears to be practised with some frequency, though probably only in whisper-songs. An alert friend of mine has reported having heard a male Mistletoe-bird, while sitting near its nest, imitate the voices of the Soldier-bird, Whistler, and Restless Flycatcher, the renderings being so accurate that "it was difficult to believe that the birds were not present." Moreover, Mr. J. S. P. Ramsay has shown me a diary note in which his father (the late Dr. E. P. Ramsay) recorded having heard, in March of 1866, a young male Mistletoe-bird imitate perfectly the notes of several species. Evidently, then, *Dicaeum* mimics in the autumn as well as in the breeding season. Evidently, too, the imitative powers are exercised at an early age.

OLIVE-BACKED ORIOLE (*Oriolus sagittatus*).—Is mimicry constant among birds of this species? The indications are that it is not, for several observers who know the species reasonably well have failed to detect imitations in its calls. Sound evidence regarding the Oriole's mimetic

ability, however, has been given by a number of ornithologists, notably P. A. Gilbert, who records having heard an individual bird in springtime using the notes of nine forest-frequenting species, including the migratory Koel Cuckoo. E. A. R. Lord's remark on the species is that he has heard it render 27 separate calls (other than its own), all being used in "a running whisper-song." Ellis McNamara, too, has a high opinion of the Oriole's skill as a springtime mimic; he tells me that he regards it as ranking next to the Lyrebird and Heath-Wren among the mockers of his district.

Possibly the tropical Yellow Oriole, which has a distinctly flexible voice, will also be found to be a mimic.

GREY BUTCHER-BIRD (*Cracticus torquatus*).—Vocal mimicry in this species has not been freely noted, but there are several records indicating that the bird is apt to use imitations at times in a charming whisper-song. (See Introduction.) The usual song of the Grey Butcher-bird, of course, is a rollicking, sardonic, challenging series of notes, which suffer by being checked too abruptly. What a brilliant vocalist this bird would be if he took his singing rather more seriously!

PIED BUTCHER-BIRD (*C. nigrogularis*).—My chief recollection of the voice of this handsome bird relates to its full-throated gipsy melody, uttered either as a solo or a duet and sometimes in choruses. In addition, several dwellers in country Queensland have credited the species with warm mimetic ability. One man has told me that a Pied Butcher-bird near his home not only carolled delightfully but actually imitated the barking of a dog, the bleating of a lamb, and human whistling. Another observer (H. Thorogood) says that this species is the only one he has heard imitating the voices of the Peaceful Dove and the Koel and Channelbill Cuckoos. A third listener (E. A. R. Lord) writes me that he regards the sturdy black-and-white Butcher-bird as a most accomplished mimic of the "whispering" type.

Mr. Lord adds that of thirteen species of birds known to him as vocal mimics all but one give their recitals in a subdued voice. This statement, it may be noted, differs sharply from one made by another Queenslander (N. H. E. McDonald), who when acclaiming the "whispering" mimicry of the Pied Butcher-bird (*Emu*, 39/300) rashly declared that "most mimics" become "excited and voluble."

It remains to be learned whether vocal mimicry is practised by the three tropical species that complete the Australian members of the genus *Cracticus*.

SHRIKE-TIT (*Falcunculus frontatus*).—The usual notes of this sturdy and pretty little bird of the tree-tops are a high-pitched piping and a throaty chatter. Occasionally, however, it discovers a chuckling song that may include borrowed notes. I recorded in 1932 that a newly-captured male bird, when placed in an aviary in Sydney, revealed distinct ability to use other birds' notes, and in *The Emu* for 1937 Ellis McNamara and K. A. Hindwood both give substantial evidence regarding the Shrike-Tit's mimetic talents. In each instance the species imitated included migrants. McNamara's bird, a female, appears to have been unusually accomplished; she not only imitated "about a dozen species" but actually echoed the voice of a Black-faced Flycatcher that called from a neighbouring tree. Hindwood's bird rendered imitations of six species, all very competently. (See *Emu*, vol. 36, pp. 246 and 314.)

Another striking example of mimicry by a Shrike-Tit was given by a Victorian country-dweller in the Melbourne *Argus* in July 1941; he recorded having heard a bird imitate the voices of ten species, ranging from Pardalotes to Eagles.

BROWN FLYCATCHER (*Microeca fascinans*).—In a long acquaintance with this species I have never heard any individual utter notes which I could regard with assurance as mimetic. Several observers, however, have recorded fragmentary mimicry on the part of "Jacky Winter," and one (E. A. R. Lord) states that he has now recorded "twenty separate bird-calls" for the species in Queensland, meaning, no doubt, imitations of twenty species. Ellis McNamara's experience is that "Jacky" renders imitations very well, during autumn and winter, in a fragile whisper-song.

LEMON-BREASTED FLYCATCHER (*M. flavigaster*).—A dweller in tropical Queensland (H. Thorogood) reports that the yellow-breasted edition of the Brown Flycatcher also is an able mimic. "Many times," he says, "I have listened to the under-song of this bird—so low that one has to be within a few yards to hear it—and amongst a great variety of its own calls I have identified those of the Forest Kingfisher, White-breasted Wood-Swallow, and Magpie."

ROCK-WARBLER (*Origma rubricata*).—Like many other observers with long experience of the rugged country near Sydney, I have never detected vocal mimicry from this curious and engaging sprite of the sandstone—the "Cave-bird," "Rock-Robin," and "Cataract-bird" of boys of the region. It would appear, however, that the species, either as a whole or in part, has considerable mimetic ability. P. A. Gilbert states (*Emu*, 37/29) that when he disturbed a pair with three fully-fledged young ones, on a day in mid-summer, he heard five species of birds imitated in rapid succession. Attempts to enjoy a repetition of the experience failed during several years, but eventually, and again in mid-summer, he flushed another family party and heard the parents mimic no fewer than seven species of forest-haunting birds.

EASTERN WHIP-BIRD (*Psophodes olivaceus*).—Although for most people the voice of the Whip-bird is restricted to the powerful "crack" and "follow-on" notes, closer observers have long known the species to use a chuckling chatter; and so it is not surprising that some few records have latterly been made of the bird as a mimic. An interesting note on the species by Ellis McNamara (*Emu* 36/246) includes reference to a Whip-bird's "amazingly accurate" imitation of the voice of the Satin Bower-bird. K. A. Hindwood, too, has heard the Whip-bird mimicking: in his case the rendition was "a perfect imitation of the call of the Grey Thrush." Another bird-student, Mrs. L. M. Mayo of Queensland, has also paid cordial tribute to the mimetic ability of the Whip-bird; she records (*Emu* 36/184) an "amazing performance" by a male bird that imitated the Grey Thrush and Rufous Whistler.

SPANGLED DRONGO (*Chibia bracteata*).—A slim black bird about the size of an average thrush, the Drongo is a high-spirited fellow, much given to chasing birds of prey and abusing them in a polyglot chatter. Perhaps it is through this habit that he sometimes imitates the voices of predatory birds. I have heard a Drongo imitate cleverly the cry of a Goshawk, and a resident of tropical Queensland actually has credited the bird with using the call of a Butcher-bird in order to cause a Magpie-Lark to drop food it was carrying.

WHITE-BACKED MAGPIE (*Gymnorhina hypoleuca*).—The natural notes of the Australian Magpies (three species) are a gurgling carol, which when uttered by a number of birds may become a rollicking chorus. Even in the days of Gould it was known that Magpies could be taught to whistle

and to articulate words, but only in recent years have instances been recorded of wild Magpies indulging in vocal mimicry. In one of these a single White-back was heard to utter the notes of several species of birds, in quite a loud voice, while several other Magpies perched in the same tree remained silent. The period was mid-winter and the place a spot near Melbourne. In at least one other instance a wild White-backed Magpie has been credited not only with skilful imitations of other birds but with faithful renderings of the neighing of a horse and the sounds made by a man when calling his cows home.

BLACK-BACKED MAGPIE (*G. tibicen*).—Writing me on several occasions a few years ago, about a remarkably accomplished mimetic Magpie that lived near her home at Eskdale (northern Victoria) Miss Kathleen Conway said that the bird, a perfectly wild specimen, frequently imitated the voices of the Grey Thrush, the Wagtail, the White-eared Honeyeater, a Parrot, a Hawk, and other birds. In addition, he rendered admirably the neighing of a horse and the barking of a fox. "I think this bird is wonderful," Miss Conway wrote. "I could listen to him for hours." Another note of the kind comes from Queensland: E. A. R. Lord says that on a day in autumn a Black-backed Magpie sat alone in a dry tree and ran in a quiet warble from its own notes to imitations of the Grey Butcher-bird, Grey Thrush, and Oriole, together with what appeared to be the notes of smaller birds.

Apparently mimicry is more commonly practised by Magpies than we had supposed—indeed, the impression until recent years was that they used imitations only when taught to do so in captivity. Miss Conway, however, says that after learning that one of the birds near her home was a skilled mimic she listened more carefully to others, with the result that at Tallangatta she discovered two wild Black-backs of marked mimetic ability and two other competent mimics in the Mitta district.

BROWN THORNBILL (*Acanthiza pusilla*).—More than a quarter-century ago L. G. Chandler learned to his surprise that when this small bird is agitated, by reason of being disturbed at its nest with young, it is apt to break into vocal mimicry. K. A. Hindwood supplied two additional instances in accord years later (the nest contained young in each instance), and later again J. Waterhouse recorded hearing a Brown Thornbill using mimicry, in autumn, in a tranquil whisper-song. Obviously, then, this gurgling little chatterer, or at least an occasional individual of the species, is able to use mimicry whether agitated or in repose.

RED-TAILED THORNBILL (*A. hamiltoni*).—L. G. Chandler recorded in *The Emu* in 1913 that he heard birds of this species "imitating the calls of the Fantailed and Bronze Cuckoos in a low tone." Similarly, when visiting the Victorian Mallee in 1935 I was deceived three times by Red-tailed Thornbills—certain of their calls caused me to look for Narrow-billed Bronze Cuckoos. It is curious that the same imitation has been recorded as the favorite of the Whitlock Tit in W.A. That the calls are imitations, and not examples of capricious resemblance, may be regarded as certain.

CHESTNUT-TAILED THORNBILL (*A. uropygialis*).—P. A. Bourke, of Gilgandra (New South Wales) has written me that when he disturbed a bird of this species at its nest the tiny creature hopped towards him, fluffed out its feathers, and proceeded to utter a number of imitations, interspersed with "definitely threatening twitters." Amongst the calls imitated were those of the Brown Treecreeper and the Grey-crowned

PLATE VIII

The Sprite of the Sydney Sandstone
Rock Warbler or Cave Bird

Photo by K. A. Hindwood.

Whip-bird at nest.

Photo by A. H. Chisholm.

Babbler. "Can it be," Mr. Bourke asks, "that this tiny bird thought that by puffing out its plumage and imitating the calls of larger birds it could intimidate me?"

WESTERN THORNBILL (*A. inornata*).—"I can state with certainty," says Major H. M. Whitell in *The Emu* for 1938 (38/58), "that this bird mimics other birds, as when I 'squeaked up' the parent birds one of them sat on a twig close to me and to the nest and poured forth a volume of song. Amongst the birds mimicked I recognized the calls of the Western Rosella, the Western Fantail, and the 'Squeaker.'" In this instance the bird was not agitated by the observer's presence, but appeared to be singing for its own amusement.

WHITLOCK THORNBILL (*A. whitlocki*).—The only reference to the mimetic ability of this species is a note in *The Emu* many years ago (9/199) by F. L. Whitlock, who says that in addition to imitating the voice of the Robust Thornbill it frequently was heard to repeat the call of the Narrow-billed Bronze Cuckoo.

Possibly some of the other members of the genus will become revealed as mimics, however modest, when they are better known.

WHITE-BROWED SCRUB-WREN (*Sericornis frontalis*).—Some few observers have recorded this active denizen of the undergrowth as a vocal mimic of relatively slight ability. According to Ellis McNamara, it utters only one borrowed call at a time and at about the same volume as the original, whereas "mimics such as the Jacky Winter and Brown Thornbill —to mention two others which seldom mimic—mix the calls of many different species with their own, uttering the whole in a very soft and more or less continuous song." Because of that distinctive method of imitating, the White-browed Scrub-Wren is regarded by McNamara as the most deceptive of all mimics.

LARGE-BILLED SCRUB-WREN (*S. magnirostris*).—This is the third species of *Sericornis* to be recorded as a mimic, and doubtless other members of the genus (which contains eight species of small, ground-frequenting birds) will be found to be mimetic. Of the present species, an observer in New South Wales (A. O. Elliott) has recorded that when agitated through being disturbed at the nest it frequently imitates the voices of other small birds.

WHITE-BROWED WOOD-SWALLOW (*Artamus superciliosus*).—I have heard mimicry from this migratory species only on one occasion; then a male bird sat in a tree a short distance from its nest and, discarding his usual harsh chatter, sang a pleasant little song interspersed with calls of the Pallid Cuckoo and the Brown Treecreeper. Similarly, Athol F. D'Ombrain, of West Maitland (New South Wales), has recorded having heard White-browed Wood-Swallows imitating the voices of certain other birds; one male in particular "copied the first few notes of the Pallid Cuckoo to perfection."

DUSKY WOOD-SWALLOW (*A. cyanopterus*).—E. A. R. Lord wrote me from Queensland in 1938 that he had heard these suciable little birds on various occasions using borrowed notes in rapid whisper-songs. Later (October 1939) K. A. Hindwood reported from Sydney a Dusky Wood-Swallow's imitation of the voices of the Grey Thrush and Rufous Whistler—the mimicry was rendered in soliloquising fashion.

Speckled Warbler (*Chthonicola sagittata*).—The chief utterance of the sprightly little "Speckled Jack" is a grating or churring note, but at times you may hear an individual bird rendering a slight but sweet song, which occasionally includes excerpts from the calls of other birds. A Melbourne birdman tells me he has heard a Speckled Warbler imitate, "clearly though not loudly," six species of birds one after the other.

Grey Thrush (*Colluricincla harmonica*).—Although this species is one of the familiar birds of Australia, vocal mimicry on its part has not been reported until recent years—which perhaps is an indication that the practice is not consistently followed. A Victorian observer credits a Thrush with having imitated the voice of a possum immediately after the animal squealed, and a Queensland student declares that he has heard Thrushes mimic very well, with the call of the Pied Currawong as a masterpiece. Those appear to be the only instances in which the Grey Thrush has been detected mimicking. On the other hand, however, the original notes of the species are imitated very freely by various birds—more freely in many cases than are any other sounds. It seems probable that the voice of the Grey Thrush is used consistently by every Lyrebird in Australia, and in Sherbrooke Forest, Victoria, the rich and bold notes are adapted and glorified and in general used in all Lyrebird songs to a remarkable extent.

(To be concluded.)

HAWTHORN JUNIOR F.N.C.

The meetings of the Junior Branch of the F.N.C.V. at Hawthorn have met with great success. Attendances have been consistently good throughout the year, the only slack meetings being those held during the school holidays.

Members are taking an active interest in the Club and have started their own collections. Cuttings and seeds have been distributed to the botanists and killing bottles to those interested in entomology. Many members bring along exhibits to discuss or have named.

A very pleasant excursion was held at Mr. Fisch's orchard at Doncaster on December 16, the children thoroughly enjoying the peaches. Another interesting excursion was to the quarries at Lilydale under Mr. Mitchell's leadership. Mr. Fisch kindly took about 30 children in his truck, much to their delight.

Several members have renewed subscriptions for the third time. In August the second birthday party was held.

Members of the committee have been very helpful in instructing the members the correct methods of mounting specimens and caring for plants.

Our stand at the Children's Exhibition, Melbourne Town Hall, created a good deal of interest as there were many beautiful and varied exhibits, pleasing to our sponsors the Field Naturalists' Club and Hawthorn traders.

M. E. Freame,
Hon. Sec., J.F.N.C.V.

CORRECTION

A printing mishap caused a slight "mixup" in the early portion of the article "The Riddle of the Mocking-Birds" in the last issue of this journal, page 31. The concluding lines of the second paragraph from the bottom of the page should read: "(1937), each a paper of some twenty pages in which all data available at the time, together with various theories, was presented."

NEW BEES AND WASPS—PART III

Another New *Exoneura*; also Notes on the Biology of *E. hamulata*.

By TARLTON RAYMENT, Melbourne.

Superfamily: Apoidea; Family: Ceratinidae.

EXONEURA DAWSONI, sp. nov.

TYPE: Female—Length, 7 mm. approx. Black and red.

Head transverse, four face-marks dark-red (almost obsolete on some); one at base and apex of clypeus, and one at each side; frons with a few large punctures; clypeus flattened with a few punctures of irregular size; supraclypeal area like a high ridge on the excavated face; vertex wide and rounded; compound eyes only slightly converging below; genae large, with a few scattered punctures; labrum obscurely reddish; mandibulae black, reddish in middle; antennae black, brownish beneath, scapes reddish in front.

Mesothorax almost polished, an extremely delicate tessellation, with an odd large puncture; tubercles black; scutellum large, shining, with numerous fine punctures; postscutellum with tessellate sculpture more marked; metathorax with two slight elevations posteriorly; abdominal dorsal segments red, each with a wide band slightly suffused with blackish, darker apically; ventral segments progressively blacker apically.

Legs red, trochanters and femora black basally, hair on hind legs black; tarsi reddish, hair on hind tarsi black; claws reddish; hind calcar reddish; tegulae black. *Wings* yellowish; nervures dark-sepia; cells—second cubital very broad, pterostigma large and dark-sepia; hamuli five, very weak.

ALLOTYPE: Male—Length, 5 mm. approx. Head and thorax black, abdomen reddish.

Head very wide, with long black hair; not any face-marks; frons compressed by the large compound eyes; clypeus depressed at apex, coarse punctures; supraclypeal area depressed; vertex with long black hair; compound eyes large, convex, slightly converging below; genae with long black hair; labrum nodiform, black; mandibulae black; antennae entirely black, scapes with long dusky hair.

Prothorax with long black hair laterally; tubercles black.

Mesothorax polished, with long black hair on margin; scutellum, postscutellum and metathorax with long black hair; abdominal dorsal segments 1 and 2 black, 3 and 4 reddish, 5 and 6 suffused with blackish; apex with long black hair; ventral segments suffused with blackish.

Legs black, with long dusky hair on the trochanters and femora; black hair on tibiae; tarsi red; claws red; hind calcar blackish;

tegulae blackish. *Wings* yellowish; nervures dark-amber; pterostigma large, dark-brown; hamuli five, weak.

Locality—Neerim South, Victoria, Nov. 26, 1945. Owen Dawson.

TYPE and ALLOTYPE in the collection of the author.

Allies: Near to *E. excavata*, which has the excavated, but *all black*, face and scapes, with hair on hind legs reddish; also to *E. turneri*, which has all black face, scape red on front, hair on hind legs rufo-fulvous. *E. fultoni* is nearest, having clypeus suffused with red, antennae reddish, and hair on hind legs dark-fuscous.

(Numbers of *Exoneura* females were taken on flowers of Loganberry.)

General Discussion (Biology, etc.)

My last paper on the *Exoneurae* (*Vict. Nat.*, Vol. 62, p. 230) was in the hands of the editor when Owen Dawson, R.A.A.F., brought me a small stick of Snow Daisy-bush (*Olearia lirata*) some 20 centimetres (8″) in length, with a diameter of 9 mm., containing several bees he had collected among tree-ferns, some fourteen feet tall, at Neerim South, Gippsland, Victoria, on Nov. 26, 1945. The species proved to be new, and, as this is the first record for Victoria of a "nest" in this genus, and also because of the remarkable larvae, the author considered it advisable to make this new material the subject of a third paper on *Exoneurae*.

Mr. Dawson's discovery was made at the head of a small gully on the eastern aspect of a hill, about 100 feet above the level of the nearest railway station, "Crossover." The soil is a volcanic loam carrying the typical dense mountain vegetation of the area, which enjoys a regular rather heavy precipitation.

The original *Olearia* stem was in an upright position in the ground, and between 2 and 3 metres (8 ft.) tall, with a diameter at the base of a trifle over 25 mm., and tapered at the top to 9 mm. This contained a pithy tube, 3 mm. in diameter, and the bees had experienced no difficulty in enlarging this to 4 mm. for a depth of about 17·5 cm. (ca. 7″). A few white silk threads were draped over the wall. The entrance was on the top of the stick, and a bee (sex unknown) was seen hovering over the apex; another was observed to enter the tube and this one was immediately captured —later, it was found to be a male, an old one, with tattered wings.

On splitting open the plant-tube, three more bees were taken, another male and two females (sisters), together with a number of well-developed larvae. Four of the larvae overlapped each other at one place, while the others were disposed singly along the tube, as were the bees also. The species proved to be nearest to *E. fultoni* Cklf. (see description above).

There was not a trace of any cell-divisions, although the base of the gallery had been closed with a blackish wad of skin-like substance. The youngest and smallest larvae were at the base, as though the older ones had worked their way up during development.

It would appear that the larval appendages differ in each species of *Exoneura*, for those of *E. dawsoni*, sp. nov., are bifurcate, and thus are easily distinguished from the other two already described. It seems certain, then, that the "arms and hands" are to enable the larvae to maintain their proper relative positions in a communal tube utterly devoid of all cell-divisions. The larval appendages, therefore, are splendid specific characters, far more distinctive than any possessed by the imagines. The "arms" of the larvae are divided apically into two "fingers," and there is a curved "spur" near the base. Segments 12, 11, and 10 each bear a slender lateral appendage, although on segments 9, 8, 7 and 6 there is only a short node, but on segments 5, 4, and 3 they are again long and slender. These disappear as the larvae approach the pre-pupal stage.

It is amply demonstrated that several adult males and females (sisters) frequent the galleries while the larvae are developing, and it is almost certain that some progressive feeding of larvae takes place in this genus. It would appear that a pap or secretion, regurgitated by the females, forms at least portion of the diet.

Microscopical dissection of the mesenteron, just before its junction with the proctodeum, demonstrated that it is not distended with pollen-granules, as in other genera. Certainly there were numbers of empty shells present, all colourless, but there was not any packed mass of coloured food. Among the pollen-shells was a partly-digested, long-legged Acarid mite, and also a strange hard yellow chitonous many-segmented microscopic insect[1]—genus unknown. The fully-fed larvae have only a few large creamy-coloured opaque oenocytes, many fewer than the larvae of other wild-bees, and the paucity suggests that the food supplied to the larva is different, and so fewer oenocytes are required in the physiology of the Exoneura. Glaser[2] (1912) thought that these free cells are the

1. This strange animal may be related to another one found by the author on *Anthophora engaunensis* Rayn. Unfortunately, the author's paper on *Anthophora*, describing many new species, and illustrated with 1,200 figures, fell into the hands of the Japanese, and its fate is unknown. These very remarkable insects may prove to be triungulins, in the Order STREPSIPTERA, where the genus *Pentozoecra* has somewhat similar triungulinid larvae. Should they be in the Family *Mengenillidae*, then they may be related to *Austrostylops*, and provide the explanation for the presence of the parasites in the abdomen of the adult bees.

2. See R. W. Glaser, in "A Contribution to our Knowledge of the Function of the Oenocytes of Insects," *Biol. Bull.*, pp. 213-224, 1912.

source of the oxidising enzymes, since they react to tests for oxidase.

What function, if any, the males perform in the tubes is not known, but it is remarkable that Exoneurae males are rarely caught a-wing in the field, hence one postulates that much time is spent inside the plant-tubes. The male observed to enter at the top immediately closed the entrance with the flattened apical dorsal area of his club-like abdomen.

Since one adult bee almost completely fills the small tube, it is difficult to see how it is possible for it to pass and re-pass the several larvae clinging to the vertical walls, although it is evident that the flying bees do traverse the entire gallery. The adult bees are able without difficulty to reverse themselves in the tube by simply bending into a sphere of smaller diameter, and turning "heels over head," an action performed with astonishing dexterity and celerity.

An attempt will be made during the coming summer to study the biology in the field, and an endeavour to elucidate the oenocyte problem, also the exact nature of the food supplied to the larvae. A few brown tiny pellets were observed disposed at intervals along the wall of the gallery, and these are probably the stercoral debris or excreta of the larvae.

The Biology of Exoneura hamulata Cktl.

On December 12, 1945, the author telegraphed to L.A.C. Dawson, R.A.A.F., at Neerim South, requesting that he search for the "nesting" sticks of *E. hamulata*—a species he had collected in numbers on blackberry flowers which had succeeded those of the garden loganberries.

This species of *Exoneura* is perhaps the most widely distributed one in the eastern States, for I have collected it in many localities in Queensland, New South Wales, and especially at Emerald in Victoria—numbers of the rather bare females, together with the larger black-haired males. It is anomalous that, in this genus, the males are larger and far more hairy than the females.

A day or two after my communication, Dawson arrived with a 30-centimetre length of the base of a dry frond of Soft Tree-fern, *Dicksonia antarctica*. The stem had dried while still adhering to the trunk, as is the habit of this fern, and later had fallen off, but it was held by the debris of the forest and had not reached the ground to absorb moisture. Two galleries had been excavated in the stem, but in the pith only, for the bees did not attempt to gnaw through the thin, but nevertheless much harder, fibrous divisions. Again the entrance was effected in the pith exposed at the end, and it is clear that these small bees cannot pierce the hard woody epidermis to gain admission to the interior.

E. hamulata is considerably larger than *E. dawsoni*; consequently, the galleries have a diameter of 4 mm., and are somewhat longer, but the bees keep very strictly to the soft pith. The two galleries were separated by a mere millimetre or so of the natural woody division, but it is quite sufficient to constitute an impassable barrier. There is not the slightest indication of any cell-divisions; it is a true communal chamber.

Eggs and larvae of all ages were taken from the gallery, together with five females from one, and four females from the other. Not any males were present. Six eggs were taken from the first tube, and five from the second, while the total number of larvae in both tubes numbered twenty-six. Because a few larvae fell out when the stem was split open, it is impossible to be certain of the number in each series.

Again, the larval appendages proved to be excellent specific characters, for in this species there are two pairs with three distinctive "fingers," diminishing in size towards the apex. The lateral appendages of the other segments are much shorter than those of *E. dawsoni*. Moreover, each ventral segment bears two pairs of short nodes, but the first and second lateral appendages are very distinctive, being quite different from the others described, so that no confusion can arise in their identification.

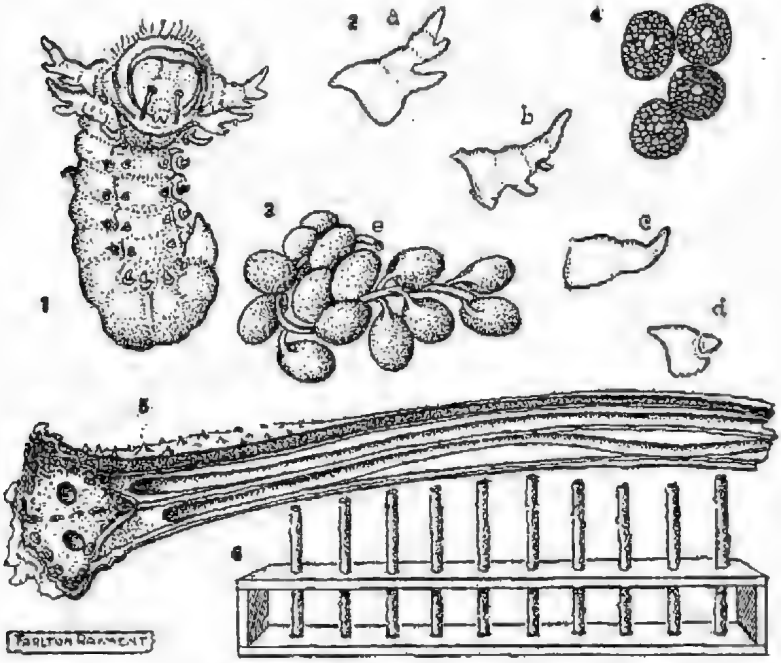
The larvae are slightly bowed on the dorsal surface, and the mandibulae are continually "champing," and this "mouthing" of the parts seems to suggest that the larvae are "asking" to be fed. This action was intensified by hunger when the adults were separated from the larvae. It seems certain, then, that progressive feeding of the larvae is the rule in *Exoneura*. Dissection of the glandular system showed that the pharyngeal glands, which lie posteriorly inside the genae of the head, are well developed, and doubtless have the same function as those of the honey-bee, i.e., secretion of a "pappy" food which is fed to the larval bees.

Exceedingly few oenocytes were observed in any of the larvae dissected, although fat-cells were very numerous and large. Tests with "Sudan III" stain demonstrated that much fatty oil is present, and this dissolved out readily in ether. Micro-chemical tests made to demonstrate the presence of glycogen showed it to be present in quantity in the fat-body of the fully grown larvae. The mesenteron in the larvae of *E. hamulata* contained numerous empty pollen-shells from some Myrtaceous (probably *Eucalyptus*) species, but there is not any tightly-packed mass of coloured food-residues or excreta. It is significant, too, that no pollen-pudding has yet been found in any of the plant-tubes examined by the author, although each contained larvae at all stages.

It will be exceedingly interesting to discover the "nest" of *E. bicolor* Sm., which is close to *E. hamulata*, and to compare the

larval appendages of these two species. It is very gratifying to find that the determinations of the taxonomists, often founded on extremely critical observation of the gross morphology of the field-bees, should be so amply justified by a study of the far more distinctive larval forms.

NOTE.—The collector should search for these bees on the flowers of the Blackberry bramble, *Rubus fruticosus*; many Eucalypts; *Flatweed, Hypochaeris radicata*; Swamp Paper-bark, *Melaleuca cricifolia*; Tea-tree, *Leptospermum* species; and the Handsome Flat-pea, *Platylobium formosum*.



1, Ventral view of larva (male) of *Exoneura hamulata* Ckll. 2 a, b, c, d, Enlarged views of first, second, third and fourth anterior lateral appendages of the larva. 3, The pharyngeal glands of adult females of *E. hamulata* are well developed; e, the main duct. 4, The globules of oil in the fat-cells of the larva are large and plentiful. 5, The two communal galleries in the frond stem of a tree-fern. 6, The dry stems of hydrangea, recommended for the study of the *Exoneurae*, should be held vertically in a frame. The pithy core should measure 3 to 4 mm. in diameter.

PLANT NAMES COMMITTEE

The name of Mr. Geo. Coghill was inadvertently omitted from the personnel of the first Plant Names Committee, published at the foot of page 237 in the April issue of this journal.

THE BAG MOTH AGAIN

Mr. Rayment's note on the Bag Moth (*V.N.*, May, 1946) leaves me still puzzled. He says the female is impregnated "while still in the bag," the lower end of which she opens for the purpose. This implies that she has emerged from the pupal case. She must, then, re-enter it if, as Mr. Rayment states, her eggs are deposited inside it: "the bulk of the female dwindling as the eggs are deposited makes the space available, since the pupal case cannot be enlarged." The shape of the adult female, as depicted in Mr. French's book, and the frailty of the empty pupal case, stress the difficulty, if not impossibility, of her re-entry once she has left it. It is, of course, possible that she merely inserts her ovipositor, but Mr. Rayment *makes her occupy the pupal case, with her eggs.* Is it not more feasible that she should withdraw gradually from the pupal case, leaving the eggs behind her?

Lictor Case Moth. Left, female; right, male. Pupal skin of male shown wedged in the opening.

Having left the pupal case, why should she return to deposit her eggs inside it, rather than in the cosy silk surrounding it? It is, indeed, possible that she never leaves the pupal case, that she is impregnated within it. How many naturalists have seen an emerged adult female Case Moth?

Mr. Rayment says that she opens the lower end of the bag—for mating; but is it ever closed? In all the bags I have examined this end was open at all times—a provision for the passage of excrement. (These caravan homes are models of perfect hygiene). It is possible that she seals it up, as she does the feeding opening, before pupating; but could she, in her imperfect state, re-open it? Moths are provided with means for softening and tearing open their cocoons, but this adult female seems too poorly equipped for anything of the kind.

Except when the bag is anchored, or when the larva is alarmed, the feeding end is always open. When alarmed, the owner pops inside and with its feet holds the mouth tightly closed—as the grey thrush knows. Mr. French says the male larva protrudes from the bag in feeding. He makes no reference to locomotion of the female. Mr. Rayment refers only to protrusion of the female; but both male and female protrude, using the thoracic feet in crawling from leaf to leaf, otherwise they would not reach the "fully-fed" stage. Mr. Rayment tied the mouth of the bag "to ascertain whether the wingless female adult would come right out when it was re-opened." But why tie it to ascertain this?

He also says that she "bites cotton easily." How did he discover this? Was she attempting to leave the bag?

Mr. Rayment makes the female leave the pupal case twice, once for mating and again after egg-depositing: "the depleted female, now considerably smaller, slides down out of the bag and soon expires." This, if a voluntary act, would certainly complete the story of her self-immolation on the altar of motherhood.

Even should she die within the bag, there would be little danger of pollution from her dry and shrivelled remains; but her body might, indeed, block the opening when her emerging larvae stream down to that one gleam of light. To me that act seems a prodigious feat. Even in her shrunken state she should still be greater in bulk than the male pupal case which, almost always, becomes tightly wedged in the opening as the moth escapes. (This is seen in my photo of the male Saunders' bag, *V.N.*, May, 1946.)

Critical examination of the debris left in the pupal case seems desirable. Soaking in hot water, or even boiling, should yield identifiable material—egg-membranes, first-shed skins, or what? These, with the aid of Mr. Rayment's clever pencil, should lighten our darkness. His note is extremely interesting because provocative, which is just the incentive we nature lovers need to pursue unbeaten paths.

End how it may, it is a beautiful story, and one which emphasises the fascination and completeness of the lives of these lowly creatures.

EDITH COLEMAN.

CLUB SUPPORT FOR MUNICIPAL PLANTING SCHEMES

Brigadiers, commodores, members of Parliament, mayors, girl guides and boy scouts were among the citizens of Mordialloc who combined in a tree-planting project on Saturday, June 8. This was an admirable way in which to celebrate Victory week-end, and the Mordialloc tree-planters should be congratulated on their foresight and sound sense: school children who carried out the planting will be able to follow with interest the development of those trees which are to be entrusted to their care.

The 250 native trees now planted in the new park (adjoining Mordialloc Creek) are but the forerunner of a much larger project. It is intended gradually to transfer small native shrubs from bush land that is being opened up for building at Parkdale. Club members A. J. Swaby, G. N. Hyam and P. F. Morris assisted in the choice of trees and in the preparation of a major plan for future plantings.

Messrs. Ivo Hammet and P. F. Morris are also advising the Heidelberg City Council in connection with its Victory Tree-planting Scheme, which envisages an avenue of native trees extending from Ivanhoe as far as Greensborough.

P.F.M.

FORTHCOMING EXCURSIONS

Advance Notice. Ararat, 20-24 September, in conjunction with Ararat F.N.C. Tentative plans for bus tour, four full days, leaving Melbourne late afternoon Friday, returning following Tuesday. The Pyrenees, Grampians, and other district points will be visited. Transport for 400 miles is £2 per passenger, plus 1/- for each extra 10 miles. Accommodation at two Ararat hotels. Total estimated inclusive cost £4/10/- to £5. Early reservation essential. Further particulars from leader, Mr. H. Stewart.

WHERE MEMBERS' INTERESTS LIE

Summary of Replies to Questionnaire sent out to F.N.C.V. Members in January, 1946.

Interests of Club Members

Plants, 62; General, 58; Birds, 47; Insects, 31; Geology 26; Mammals, 22; Sea Life, 19; Pond Life, 17; Reptiles, 17; Shells, 16.

Allocation of Time at Meeting

Lecture, including questions and vote of thanks, 60 min.
Club Business, 30 min.
Nature Notes, 20 min.
Exhibits, 15 min.
Reports on Excursions (include in *Naturalist*), nil.
Conversazione, 15 min.

Excursions

1. Generally agreed too large—suggest more leaders or have several excursions on same day.
2. Make provision for all-day excursions, also week-end and camping excursions.
3. Have a special excursion committee, apart from General Committee.

Journal

1. Less botany, more zoology and entomology. Definitely less orchids.
2. More illustrations and photographs by members.
3. Have occasional articles for beginners
4. Where specific names are used, provide for either English translation or common name in brackets.
5. Give reports of lecture in more detail.
6. Give brief statement of business handled by committee each month.
7. Have a readers' exchange section.
8. Could the volumes run from January to December?
9. Suggest keep articles confined to Victorian natural history.

Special Facilities

1. Form discussion groups.
2. Issue booklets and have reprints of other Club publications.
3. A list of suitable books of reference and price to be included in booklets.

General

1. Improve meeting place.
2. Restore library facilities and issue list of publications.
3. Arrange exposition of exhibits with exhibitors in hall 15 minutes before meeting starts. Another suggestion is to have one or two members in charge of exhibits each month.
4. List of names and addresses of members and interstate club secretaries to be made available for reference and guidance.
5. Have a panel of members from each branch of natural history whose duty it would be to (a) look after new members, (b) keep track of research, (c) correspond with country members, (d) look after exhibits, (e) give suggestions to excursion committee, (f) sponsor section at Annual Show, (g) suggest lecturers.
6. Encourage collections—especially among school children. Special section at Show with annual prize.
7. Have quarterly forum night—nature notes and queries.
8. Encourage members to wear badge with name showing at Club functions.
9. Conduct and publish research on a given area.

PERIODICALS RECEIVED BY THE CLUB

By request of the Committee, the Hon. Librarian reports that the following thirty-five periodical publications are being received:

General Australian

Australian Journal of Science.
Council for Scientific and Industrial Research, Journal.
Council for Scientific and Industrial Research, Bulletins.
Commonwealth Forestry Bureau, Reports.
Commonwealth Forestry Bureau, Bulletins.
Commonwealth Forestry Bureau, Leaflets.
Australian Orchid Review.
The Emu (Royal Australasian Ornithologists' Union).

Victorian

Royal Society of Victoria, Proceedings.
Microscopical Society of Victoria, Proceedings.
Forests Commission of Victoria, Publications.
Journal of Agriculture, Victoria.

New South Wales

Royal Society of New South Wales, Journal and Proceedings.
Linnean Society of New South Wales, Proceedings.
Australian Museum Magazine.
Australian Museum Memoirs.
Royal Zoological Society of New South Wales, Proceedings.
Agricultural Gazette of New South Wales.

Queensland

Queensland Museum Memoirs.
North Queensland Naturalist.

South Australian

Royal Society of South Australia, Transactions.
South Australian Museum, Reports.
South Australian Naturalist.
South Australian Ornithologist.

Tasmanian

Queen Victoria Museum and Art Gallery (Launceston), *Reports.*

New Zealand

Royal Society of New Zealand, Transactions and Proceedings.
Auckland Institute and Museum, Annual Reports.

British

Monthly Science News, London.
Quekett Microscopical Club, London, Journal.

American

American Museum of Natural History, Bulletins.
American Museum of Natural History, Publications.
Smithsonian Institute, Annual Reports.
Plants and Gardens (Brooklyn Botanic Gardens).
Ohio Journal of Science, Bulletins.
Lloydia.

The Victorian Naturalist

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PROCEEDINGS

The Annual Meeting of the Club was held on July 8, 1946, at the Lecture Hall of the Public Library, the President (Mr. H. C. E. Stewart) presiding and about 180 members and friends attending.

The following were elected as Ordinary Members of the Club:—Mrs. A. E. Lowe, Miss I. A. Marshall, Miss Valma Gillespie, Miss W. Taylor, Miss J. Blackburn, Dr. R. E. Allen; and as Country Members: Miss Helen Kininmonth and Messrs. R. Buckingham, L. Gilbert and Trevor E. Hunt.

The Annual Report was read by the Hon. Secretary and its adoption approved. The Balance Sheet was projected on the screen and explained by Mr. A. S. Chalk, who moved its adoption (seconded by Mr. H. P. Dickins, and carried). Mr. V. H. Miller expressed the thanks of the Club to Mr. E. E. Lord for his excellent work as Hon. Treasurer.

Mr. Stewart, before vacating the chair, expressed his thanks to the Committee and members generally for their sustained help during his term of office. The incoming President, Mr. F. S. Colliver, thereupon took charge of the meeting, and thanked members for the honor he had received.

The election of office-bearers was continued by Mr. Colliver (names of officers are given elsewhere in this issue). A vote of thanks to the retiring Committee was carried.

The President announced that a Show would be held this year at the Hawthorn Town Hall, on October 8 and 9. Mr. A. J. Swaby moved: "that Committee for the annual exhibition be formed, and that this Committee consist of Mrs. Freame, Miss Watson, Messrs. H. P. Dickins, H. C. E. Stewart, P. F. Morris, Ivo C. Hammett and the Chairman of each Group or his deputy." The motion was seconded and carried.

Mrs. Pinches reported she had collected specimens of *Cordyceps*, in which the caterpillar had reached its pupal stage.

The Presidential Address, under the title of "Roc Eggs," was given by Mr. H. C. E. Stewart (a summary appears elsewhere in this issue).

EXHIBITS.

Mrs. M. E. Freame: Young Ribbon or Oar-Fish from Portland, octopus and Elephant Slugs from Stony Point.

Mrs. Lyndon: Large hooked cones of *Pinus Coulteri* from plantation at the You Yangs. Photographs of natural history subjects.

Mr. C. French: Orchid *Corybas unguiculatus* from near Belgrave, a new locality (specimen collected by Miss C. Stanton, East Camberwell).

Mr. P. G. Collins and Master Ivan Collins: Crinoidal limestones from Chillagoe, Queensland.

Mr. T. Griffiths: Strap Fern, *Blechnum Patersonii*.

SIXTY-SIXTH ANNUAL REPORT.

The membership is as follows:—Hon. Members 18; Ordinary Members 312; Country Members 129; Associate Members 28; Service Members (free) 15; total 503, this being an increase of 39 on the total (463) last year. We record that most of our members previously in the forces are now civilians again, and that we have had the pleasure of welcoming to our meetings members who joined whilst in the Services.

We record with regret the deaths of the following members:—Mr. J. A. Kershaw (1888-1946), Mr. W. J. Stevens (1908-1945), Dr. Georgina Sweet (1911-1946), Mr. F. H. Salau (1931-1946), and Mr. C. C. Towle (1942-1946). The Club also lost some good friends in Mrs. S. C. Richardson, Messrs. F. H. Baker, C. C. Brittlebank, A. V. Braun, H. E. D. Stevens, M. Galbraith, and A. F. Bassett Hull. Mr. Kershaw's passing has left a gap in the scientific world and in our Club; he was one of our oldest members and a naturalist well known as an authority on general zoology.

During the last year we were pleased to elect the following to Hon. Membership in the Club: Mrs. C. H. Edmondson, Miss Freda Bage, Mr. Alister Clark, Mr. F. A. Cudmore and Mr. David Fleay.

Attendances at meetings have averaged 150, and the new meeting-place is now a definite necessity. The trustees of the Public Library have made available a suitable room and our thanks are accorded to them.

Excursions this year were somewhat better arranged, although lack of early information prevented the publication of the year's programme. With motor transport again available, we were able to visit Bacchus Marsh, Healesville and Anakie Gorge.

We were fortunate that supplies of paper of good quality continued to be made available, and we were not reduced to news-print. Volume 62 of the *Victorian Naturalist* was successfully completed. For the last issue in the volume we were able to return to our pre-war size and we now look forward to better and bigger volumes. Stress must be laid on the fact that printing costs have increased considerably, and that expenditure on the journal must be covered by members' subscriptions. Further, we would point out again that the nature of material published is largely the responsibility of members themselves. That the journal holds its place in scientific literature is shown by the fact that additional overseas bodies are seeking exchanges.

The Author Index is almost completed as regards typing, and it is expected that publication will take place in the coming year.

During the Club year World War II ended, and we as a Club rejoice in that fact. At the meeting held shortly after the cessation of hostilities the matter was referred to by the President, and a parallel was drawn between Club affairs during 1914-1918 and the recent war.

War conditions prevented due attention to matters affecting the protection of fauna and flora, but we have considered a number of important items and contacted the relevant authorities. Among these may be mentioned:—Grazing at Mt. Buffalo; preservation of the Aboriginal Cemetery at Healesville; additional land for the Badger Creek sanctuary; preservation of the Beaumaris flora when the proposed settlement takes place; renovations and planting of the grave of Sir Frederick McCoy; Cheltenham Park and its native flora; killing of possums for coursing purposes; proposed sanctuary at Dimboola; destruction of wattles; ferns taken from Gunyah Gunyah reserve; and the present state of Wilson's Promontory National Park and of National Parks in general.

Matters in which the Club collaborated included:—Formation of a National Council of Scientific Societies (the Club became a Foundation Member of the Council); formation of an Advisory Committee for the Sherbrooke Forest National Park; proposed Chapman Memorial at Maranoa Gardens; grazing in National Parks; Save the Forests Campaign; a check of the State Forest Acts with the Rangers' League of N.S.W., and a proposed Science Exhibition to be held next year.

In connection with grazing in National Parks, the Club called a meeting of interested societies, and from the delegates attending an investigating committee was appointed. This committee in turn met and agreed to certain proposals, which are now

being investigated before another meeting of the interested societies is called.

We have been asked from time to time to assist other Clubs and meetings by the provision of lecturers and, as far as possible, assistance was given.

The Junior Branch at Hawthorn is doing well, due largely to the continued interest of Mr. and Mrs. J. J. Freame, Mr. P. F. Morris and Mr. S. R. Mitchell. Another Junior Branch, at Toorak, has been launched. A country club has been formed at Bendigo and a week-end excursion by this Club enabled members to participate in the inaugural meeting. We congratulate our Bendigo members on their interest and initiative. The Ararat Club has been unable to meet during the war, but some of our members attended a meeting at which this club was re-organised, and we look forward to a sound future for Ararat. Similarly, we are glad to note the continued success of the Portland Naturalists' Club.

In the Club we have functioning as a section meeting a very healthy Geological Discussion Group; meetings are held every month, with an excursion following each meeting to study in the field the facts learnt at the meeting. Messrs. S. R. Mitchell, F. G. Elford and F. S. Colliver are chairmen, and Mr. A. A. Baker hon. secretary. A programme covering a general introduction to the study of geology was drawn up by Mr. F. G. Elford, who has, with one exception, given these lectures to date.

A Botanical Discussion Group also has been formed, and here Mr. A. J. Swaby is the chairman, with Mr. H. C. E. Stewart as hon. secretary. Again a series of lectures covering preliminary matters were arranged and are being given by Mr. Swaby. Mr. J. H. Willis is to start a series on more advanced matters.

A Natural History Photography Group is also in operation, with Mr. H. T. Reeves as president, Mr. P. C. Morrison as vice-president and Miss Ina Watson as secretary. This group, too, has meetings for both field work and study.

The Committee agreed that, by these Discussion Groups, the Club can do much to assist the interested member, the general meetings having become too large for individual "get-together" talks.

Yet another innovation started by the Club is a Register of Research. Mr. A. J. Swaby, as Registrar, asks that all members engaged on any natural history research whatsoever will advise him of it. By this means it is hoped that members working on

allied subjects can be brought closer together, and where combined efforts would assist arrangements can be made for such efforts by proper organisation.

A Wild Nature Show was held at Hawthorn and was an outstanding success, with a substantial sum accruing to the Club's funds. It is proposed to hold another show this year and members are urged to even greater efforts. We were asked to stage similar shows at Footscray and South Melbourne, but were unable to do so owing to lack of time. These suggestions seem to prove that the public is becoming more Nature-minded.

The Plant Names Sub-Committee are continuing their good work and it is hoped they will soon be able to arrange for a new edition of the Census. The general members of the Club were able to learn something of the work done by this Committee by symposium at a general meeting, and the lecturettes given were printed in the *Naturalist*. Comments are still invited, particularly with regard to popular names for common plants.

The sum of money donated to Mr. David Fleay last year is being used in an attempt to capture a pair of Thylacines. A recent report from Mr. Fleay states that although not yet successful he has every hope of ultimate success, and that he is making the capture of these animals a number one priority job.

The Australian Natural History Medallion for 1944 was awarded to Mr. C. P. Mountford, ethnologist, of South Australia, and the presentation took place at a meeting of the Bread and Cheese Club. Interstate bodies participated, and we can now more properly refer to the award as the Australian Natural History Medallion.

With the Historical Society, the Club arranged a special excursion commemorating the Centenary of the Melbourne Botanic Gardens, and a large gathering of interested members and friends gathered to listen to the remarks of the several speakers and to tour the gardens.

During the year a questionnaire was sent out with each copy of the *Naturalist*, and from an analysis of the replies it was hoped to arrange the Club meetings so that they would suit the greatest number of members. Returns of the completed questionnaire were disappointing, but many interesting points were raised and a special meeting of the Committee considered the replies. A preliminary analysis of the returns was drawn up and circularised before the meeting, and consideration of the results had brought about several changes in the agenda of meetings.

Mr. L. W. Cooper, after many years of hard work in typing and dispatching the wrappers for the *Naturalist*, had at last to retire, and to him, for his interest and industry, the Committee expresses warm thanks. Arrangements for the wrappers to be typed commercially were completed.

The Club has made representations to the trustees of the National Museum for a tablet to contain the names of all past directors to be placed in a public part of the Museum. This was agreed to, and we have been advised that the trustees are seeking a suitable medium for this tablet.

Owing to the general meeting-place being taken away from the old Club Rooms, the library is not used as it should be, although we have noticed a considerable difference since the formation of the Discussion Groups. The blocks have been cleaned and re-greased, and now we have order and ready accessibility to this important section of the library.

We record the sterling work of Mr. F. A. Cudmore, Librarian of the Royal Society, who compiled a census of our library for the new edition of the C.S.I.R. Catalogue; the thanks of the Club are accorded Mr. Cudmore for his generosity in doing this work for us in addition to his own Royal Society library census.

Few additions were made to the collection of newspaper cuttings, etc., during the year, and the Committee appeal for additional material in this line. Book-binding is at a standstill, and we look forward to the time when arrears can be overtaken.

During the year we were glad to welcome to the Club again our Hon. Editor, Mr. A. H. Chisholm, F.R.Z.S., who had been granted six months' leave. During his absence (on the staff of H.R.H. the Governor-General), the *Naturalist* was capably edited by Mr. J. H. Willis.

To Mr. McCrae Howitt we give our best thanks for the continued use of his room as a Committee meeting-place, and a comprehensive expression of thanks is extended to all who have given their time and energies toward the advancement of the Club and its ideals.

MAP REQUIRED.

A Club Member, Mr. Alan Coulson, M.Sc., now teaching at Daylesford, Victoria, is greatly in need of the following map to assist in some geological research: "Geological Survey of Victoria," Quarter Sheet, 16 N.E. (Mt. Franklin, Talbot, Holcombe, Glenlyon, are the areas covered). This map is out of print at the Department, and any member willing to sell a copy is asked to contact Mr. Coulson at Bridport Street, Daylesford.

FIELD NATURALISTS' CLUB OF VICTORIA

STATEMENT OF RECEIPTS AND EXPENDITURE FOR 12 MONTHS ENDED 30th APRIL, 1946

RECEIPTS

Balance at Banks on 1st May, 1945—						
E.S. & A. Bank	£75	4	0			
State Savings Bank	32	17	1			
					£108	1 1
Subscriptions						
Arrears	£29	18	3			
Current	261	19	8			
In advance	41	1	6			
				£332 19 5		
Cash Sales of—						
Victorian Naturalist	£6	10	11			
Publications	44	1	9			
Badges	4	7	6			
				55 0 2		
Advertisement in *Naturalist*				6 0 0		
Interest received—						
"Best" Fund, £50 @ 3½%	£1	12	6			
Savings Bank Current Account		11	1			
Commonwealth Loans	29	11	1			
				31 14 8		
					425 14 3	
Life Membership Subscription					20 0 0	
Hawthorn Wild Nature Show proceeds					104 17 3	
Donations on account of—						
Frederick Chapman Memorial	£8	15	6			
Healesville Sanctuary	4	0	0			
Sir Frederick McCoy Memorial	4	0	0			
					16 15 6	
					£675 8 1	

EXPENDITURE

Victorian Naturalist—						
Printing	£249	0	0			
Illustrating	60	10	0			
Despatching	9	11	5			
Index	6	10	0			
					£325 11 5	
Reprints					6 14 6	
Postage					11 8 0	
General Printing and Stationery					27 18 2	
Library					2 10 0	
Rent and Caretaking					24 6 0	
General Expenses					11 14 2	
Affiliation Fees					1 1 0	
					£411 3 3	
Donation Healesville Sanctuary					4 0 0	
Purchase of Commonwealth Bonds					200 0 0	
Purchase of Badges					40 12 9	
Balance at Banks on 30th April, 1946—						
State Savings Bank	£62	4	5			
Less E.S. A. Bank Overdraft	42	12	4			
					19 12 1	
					£675 8 1	

FIELD NATURALISTS' CLUB OF VICTORIA

BALANCE SHEET ON 30th APRIL, 1946

Liabilities				Assets					
Late Dudley Best Fund	£50	0	0	Arrears of Subscriptions—					
Subscriptions paid in advance	41	1	6	Estimated to realize			£40	0	0
Special donations in hand	12	15	6	Bank Current Accounts			19	12	1
	£103	17	0	Investments—					
Balance, being surplus of Assets over Liabilities	1,904	15	1	Commonwealth Bonds:					
				Late Dudley Best Fund	£50	0 0			
				General	950	0 0			
							1,000	0	0
				Library, Furniture and Epidiascope—					
				At insurance value			800	0	0
				Water Colour Paintings by late Miss Amy Fuller (insured for £200)			100	0	0
				Stock on hand of Books at valuation—					
				Fern Book	£10	0 0			
				Fungus Book	1	0 0			
				Platypus Book	3	0 0			
				Badges	35	0 0			
							49	0	0
	£2,008	12	1				£2,008	12	1

Audited and found correct on 1st June, 1946.

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

E. E. LORD, Hon. Treasurer.

ROC EGGS—A PLEA FOR OUR VANISHING FAUNA.

(Summary of the Presidential Address, 1946, to F.N.C.)

By H. E. C. STEWART.

Mark Twain once said his idea of misery was to break an egg in his pocket. Had his pocket been large enough to hold a Roc's egg, his misery would be understandable. Not only for its size, but also its history and antiquity, the egg of the Giant Roc is remarkable. An average specimen measures 13 inches by 9¼ inches, representing a cubic content of two gallons, and the equivalent in bulk of about 150 hens' eggs.

The Melbourne National Museum possesses a genuine Roc egg, strictly guarded, and shown only on rare occasions. This particular specimen was obtained by Professor Sir Frederick McCoy, founder of the Museum, and first President of this Club. Sir Frederick had a flair for getting what he wanted for the scientific edification of Melbourne, and the Roc's egg shows his pertinacity in this regard.

Many accounts of fabulous bird monsters are found in ancient literature, and the giant *Aepyornis* that dwelt in its last stronghold on the island of Madagascar, until a few centuries ago, no doubt gave rise to classical allusions to birds that flew at prodigious speeds with elephants in their talons, or with human travellers borne on their wings. The exploits of Sinbad the Sailor in *The Arabian Nights*, and of Marco Polo, with others, refer to enormous birds.

In the absence of exact evidence, science discounted these myths, but ornithologists received a shock when in 1849 Strickland brought under notice the comparatively recent existence of a Madagascar genus of *Struthionidae*, a giant Moa which stood ten feet high, and produced some eggs as visual proof. As white navigators began to traverse the seas, so civilized trade sprang up in the places visited. No different from other peoples, the Madagascans soon fell for lucre's filthy lure, and eventually their great bird perished completely, leaving a few precious eggs for barter.

Thus the Roc's extinction signalizes the beginning of fauna disappearance by man's intervention. Mark Twain's misery may be applied metaphorically to this address, which submits a plea for our rare and vanishing fauna. Can we behold a little of the misery and profit by the moral suggested by the Roc egg which our Museum authorities go to such pains to preserve?

The first elimination from our Australian fauna was the Sea-elephant, our largest species of mammal. This 20-foot amphibian formerly abounded in the Bass Strait Islands and Tasmania. The long snout gives the animal the vernacular name. Its size

and marine habitat fits in with the blackfellow's conception of the bunyip. The valuable furred skin and yield of up to half-a-ton of oil attracted the sealing ships that pirated the marine fauna of Australia during the late 18th and early 19th centuries. The sealers often sheltered in Sealer's Cove, Wilson's Promontory, in the early days. By the end of 1803 the Sea-elephant was extirpated from the Australian region. To-day the nearest Sea-elephants, of two species, survive at Macquarie Island, 900 miles south-east of Hobart. Even in this lonely part protection has been found necessary.

The Australian Fur Seal, too, would have disappeared long ago from Bass Strait but for the watchful State Fisheries and Game Department. The fight to preserve the Seals from extinction at Phillip Island still goes on.

A complete write-off from the Australian scene — and No. 1 "Roc" priority — was the Tasmanian aboriginal. March of 1869 dated the demise of the last pure-blooded male of the race. "King Billy," or William Lanné, was only 34 years old when he passed out, and his death aroused more attention than the 80 years' pathetic struggle the native Tasmanians put up in their contact with white civilization. Someone has alleged that a dead specimen evokes more scientific interest than a living one at liberty. In William Lanné's case the allegation seems true. As his remains awaited interment, scientists remembered that no steps had been taken to secure a perfect specimen of the skeleton of a male Tasmanian black. The Royal Society moved to obtain Lanné's body, but the Hobart authorities decided that the last of their black men was to be given a decent Christian burial. Soon after the funeral took place the aboriginal's grave was found disturbed. The full story was gradually unfolded. A medical ethnologist had made private access to the dead native the night before the funeral. He removed the head, substituted a white pauper's head, drew the black skin over this, and placed it in Lanné's casket. The second body-snatcher who later exhumed the body found to his consternation he had been forestalled. Prominent Hobart citizens were involved in the gruesome proceedings, but by the time the full story came out the aboriginal's skull was on the way to England.

Of the indigenous birds, lost since the white man's arrival, many forms have faded out from time to time. Bird people are diligent in bringing their obituaries to notice, so it is not proposed to dilate unduly on these here. Among the important disappearances, we know of the Tasmanian, King Island, and Kangaroo Island forms of the Emu.

The Paradise Parrot of Queensland, posted as long missing, if not actually a "Roc," is a typical instance. This exquisite

bird was originally plentiful and was exported in some numbers for overseas aviaries. Its unusual habit of constructing the nest-burrow in termite mounds ought to have brought home the futility of successfully breeding the bird in cages. Now, "The beautiful has vanished and returns not"—an apt quotation made by A. H. Chisholm in a chapter, "The Paradise Parrot Tragedy," in *Mateship with Birds*.

Great numbers of the Torres Strait Pigeon (*Myristicivora spilorrhoa*), the Squatter Pigeon and the Flock Pigeon have been extinguished. But perhaps the greatest rarity is the Black-banded Pigeon (*Leucotreron alligator*), the species so named because of its occurrence on the Alligator River, North Australia. No skin of this species exists in Australia, and its nest and eggs remain undescribed. Another rarity, the Noisy Scrub-bird (*Atrichornis clamosus*), a denizen of the south-west of Western Australia, is also extremely rare, if not extinct.

In a contemplation of Australian settlement records, from the natural history standpoint, nothing blots the national escutcheon more than our treatment of the native mammals. The story of the unique marsupials, from 1629 when Pelsart first saw them, cannot be surveyed without a sense of national shame.

About 140 species of marsupials, exclusive of the monotremes, are listed by Ellis Troughton in his *Furred Animals of Australia*. How many of these marsupials have we observed in a natural environment? Possibly ten species at the uttermost. And how many of the 140-odd are known even by hearsay to the average Australian? There are, of course, the marsupial characteristics with which we can become conversant by book and museum and zoological garden; but the important distinctive *living* qualities are beyond our ken, because the animals do not now exist in numbers or localities to permit proper observation in the field.

Our smallest marsupial is also the rarest, the Western Marsupial-Mouse (*Planigale subtilissimi*), represented by the only specimen found, the type in the Stockholm Museum. The tiny animal has a head and body length of 45 mm. It was found in 1913 by a Swedish expedition along the Fitzroy River, in the West Kimberleys of W.A. Some of the smaller fugitive marsupials turn up at rare intervals. If this diminutive creature is re-discovered, nature-lovers will be jubilant.

All the Australian museums admit that their collections of marsupials are very incomplete. It is now too late to fill the large gaps of missing types, or to replace individual specimens secured in the past that have faded in colour or are otherwise no longer of use for study. The Australian Museum, Sydney, has appealed unsuccessfully for fresh examples of the Potoroo

(*Potorus tridactylus*), one of the Rat-Kangaroos. About the size of a small rabbit, the Potoroo originally abounded in eastern and southern Australia, but it is now probably a "dead finish," certainly in southern Australia.

The Squeaker, or Brush-tailed Rat-Kangaroo (*Bettongia penicillata*) was once the commonest and widest distributed of this group. Proved extinct in the more settled parts, it is very rare generally, but small colonies may survive in remote parts of W.A. Wood Jones failed to locate a single skin for study in South Australian collections. Yet forty years earlier dealers in Adelaide sold live Brush-tails by the dozen, at ninepence apiece, to coursing sportsmen.

The Bandicoots have been particularly vulnerable to the onslaughts of man and his introduced destroyer, the fox. The Pig-footed Bandicoot (*Chaeropus ecaudatus*) was plentiful with a wide occurrence, but to-day is rarely seen, and is threatened with obliteration. Major Mitchell secured the first specimen in 1836, on the Murray Plains, and worked it out curiously without a tail, which explains the specific name.

In Victoria the rarest marsupial is Leadbeater's Possum (*Gymnobelideus leadbeateri*), described by Professor Sir Frederick McCoy in 1867, with specimens from the Bass River country. The fourth of the five known specimens secured (all are in the Melbourne Museum), was obtained in 1909 at Mount Wills in the North-east, a new locality, which revived hopes that the animal might still be alive. Chances of survival, however, have been weakened by the great bush fires of 1939.

Of the marsupials associated with John Gould and Mitchell, the Little or Eastern Jerboa (*Antechinomys laniger*) has become "very rare, if not extinct," the Museum label (or epitaph), figuring many of the interesting forms. Its habits and economy are little known, Gould pictured it as living in a tree. This was subsequently disproved. The quaint animal is insectivorous.

These are a few illustrations of the many native animals that have been badly let down into obscurity. Time does not permit detailed mention of the large Kangaroos, the Wallaroos, the Hare and Nail-tail Wallabies, the Pademelons, the Bilbies, the Possums, the Gliders, the Native Cats, and the Wombats; all these have paid a toll to man's inhumanity, indifference, thoughtlessness, or economic necessity.

Turn to the older world and review the sad accounts of the decimation of many fine species of wild life. With birds in Great Britain the story is poignant. A striking illustration is the last nesting of the Bittern (*Botaurus stellaris*) in 1911. The White-tailed or British Sea-eagle (*Haliaëtus albicilla*) provides another instance of recent suppression. This Eagle was last

bred 10 years before, when a solitary widowed bird remained the sole representative of a species once numerous in North Britain. The Golden Eagle has also been gradually reduced, and its possible disappearance is predicted. Our Australian Wedge-tailed Eagle may also become a "Roc." The report for last year of the Chief Inspector of Rabbits in W.A. states that 6,201 Wedge-tailed Eagles were killed and bonuses paid for their destruction. Tasmania knows something of the Wedge-tail's insatiable appetite for rabbits. Recently the Government there brought in a measure prohibiting its destruction.

In America an even more harrowing picture is presented by the fauna massacre that has occurred. So it is, too, in other countries and islands.

Now let us look on the brighter side. Protection by legislation has had good effect in combating the complete disappearance of certain species. Particularly is this so in Victoria. The Chief Inspector of Fisheries and Game (Mr. F. Lewis) informs us that the seals at Phillip Island are in a progressively healthy condition and that kangaroos are proved to be on the increase. We have reason to confirm this last observation, if only by the many requests to shoot them as nuisances — when the skins are in the best marketable condition.

We may not have our smallest Australian marsupial alive now, but our largest, the Great Grey Kangaroo (*Macropus major*), flourishes in many parts of the outback. The Kangaroo generally has a capacity to adapt itself to changed food conditions, and readily feeds on the introduced grasses the man on the land provides. The Kangaroo Island Kangaroo (*Macropus fuliginosus*), historically linked with Matthew Flinders, has multiplied to such an extent that there is an open season for this species. Not long ago two riflemen shot 600 kangaroos in a restricted area, a regrettable happening, as the surplus kangaroos could surely have been transferred to suitable places on the mainland.

Equally responsive to protective measures, the commoner kinds of Possums have thrived. Wombats can be readily traced in almost any suitable locality. And the Echidna resists the prejudices some people still exert against a harmless and interesting monotreme.

The Desert or Plain Rat-kangaroo (*Caloprymnus campestris*) is one of the smallest and most beautiful of this tribe. Three examples were obtained in 1843 for the British Museum by Sir George Grey and named by John Gould. For many years these were the only specimens extant, and Professor Wood Jones deplored the fact that no scientific institution in Australia possessed a skin. No trace was seen of the animal until 1931,

when it was re-discovered by H. H. Finlayson, who not only obtained specimens but also many photographs and observations on their habits.

With birds, unexpected re-discoveries have been made, and comparatively rare kinds dramatically turn up. Some heartening signs of an increasing concern for the preservation of species are evident, and instances of practical action in this regard have occurred.

The concern aroused over the Koala's preservation shows a commendable public interest in this quaint animal's welfare. Achievements with the Platypus at the Healesville Sanctuary and the Melbourne Zoo have had repercussions on the public mind, all to the good. Broadcasts of the Sherbrooke Lyrebirds, too, have worked wonders in promotion of popular interest. If anyone wilfully killed a Lyrebird to-day, an enlightened public would be moved to furious protest.

If we are to avoid the stigma of many more "Roc Eggs" to be handed down to future Australians, we as field naturalists must do our part in the promotion of understanding and appreciation in the field, and direct our knowledge into channels of adequate preservation. One way in which we can do good work is to wean the over-indulgence in cats and dogs to an increased interest in the native animals. Attention to forest lands is urgently required, the cleaning up National Parks and their extension on suitable sites, preferably islands and remote places, and the careful excision of the breeding and feeding grounds of fauna from lands taken up for settlement. The elimination of competitive introduced pests, as rabbits, foxes, cats, dogs, and effective steps to cope with alien pot-hunters, poison maniacs, and fire-bugs, are also very desirable.

If we can save the remnant of a unique living heritage, we will earn the gratitude of an enlightened posterity. Let us do our part in sweeping away some of the smell and stain of "Roc Eggs" cast at us.

THE EDIBILITY OF BIRDS

In *Nature* (Vol. 156, p. 736, Dec. 22 last) Dr. Hugh B. Cott of Cambridge University opens an intriguing discussion, viz. the relation between palatability of bird flesh and colour of plumage, or *edibility* as regards *visibility*. He states that when arranged in order of preference (by meat-eaters like man, cats, and certain hornets), the species heading the list are those with the most effective concealing coloration. Wryneck and Crested Lark take first and second place, while the conspicuous chats, kingfishers, orioles, and shrikes are at the bobttom of the meat-eaters' preferential list! How would our Australian avi-fauna fit into such a scheme? Dr. Cott would welcome any further information from explorers, sportsmen, or others who have tasted various birds.

STUDIES IN AUSTRALIAN SPIDERS.

By A. P. and R. A. Dunn, Melbourne.

This paper deals with three spiders, two of which are new. Probably the most interesting is that well-known species, *Celaenia excavata* L. Koch, the male of which is recorded for what is believed to be the first time. That this should be so is not surprising in view of the fact that the male is minute in comparison with the female. Such disparity in size between the sexes does not seem to be unusual with the *Epeiridae*, as similar conditions have been recorded in the widely separated genera *Argiope* Audouin, *Arachnura* Vinson, *Nephila* Leach, and *Gasteracantha* Sundevall.

Belonging to the same sub-family as *Celaenia* is *Dolophones elfordi*, sp. nov. Sixteen species of this genus have been recorded in Australia previously. These spiders are noted for their broad and flattened abdomen, and have a somewhat superficial resemblance to the *Gasteracantheae*. The abdomen is not, however, armed with spines, and the labium is longer and more pointed than that of other Epeirids.

With the description of *Rebilus swarbrecki*, sp. nov., the range of the genus is extended into Victoria. Four species have previously been recorded in Australia, namely: *R. lugubris* L. Koch, from Queensland and New South Wales; *R. diversa* L. Koch, from Bowen, Nth. Queensland; *R. praesignis* L. Koch, from Peak Downs, Queensland; and *R. castaneus* Simon, from Western Australia. The remarkable feature of these spiders is the shape of the median spinnerets, and in this respect *Rebilus* is closely allied to the Western Australian genus *Corimaethes* Simon.

The type-specimens, and the allotype of *Celaenia excavata* L. Koch, are in the collection of one of the authors (R. A. D.). Acknowledgements are made to Dr. V. V. Hickman, of Tasmania, and to Messrs. F. G. Elford, L. S. G. Butler, and Eyre Swarbreck, of Melbourne, for their help and encouragement.

Order ARANEAE.
Sub-order DIPNEUMONOMORPHAE.
Branch TRIONYCHAE.
Family EPEIRIDAE.
Sub-family EPEIRINAE.
Genus *Celaenia* Thorell, 1868.

CELAENIA EXCAVATA L. Koch

Male	m.m.
Total Length	2.67
Length of Cephalothorax	1.45
Width of Cephalothorax	1.24

Length of Abdomen	1.51
Width of Abdomen	2.03
Height of Abdomen	1.64

	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.	Total.
Leg i	1.72	0.71	0.98	0.50	0.36	4.27 mm
ii	1.72	0.71	0.98	0.50	0.36	4.27 mm.
iii	0.93	0.31	0.46	0.36	0.33	2.39 mm.
iv	1.04	0.31	0.61	0.49	0.30	2.75 mm.
Palp	0.31	0.18	0.14	—	0.36	0.99 mm

Carapace dark brown, with a few white squamose hairs scattered over the surface; marginal band yellowish. Chelicerae, maxillae, labium, sternum, and coxae, dark brown. Legs: dark brown; end half of tibiae yellowish; metatarsi yellowish, slightly darker at base, brownish at apex. Palpi lighter brown. Abdomen creamy-yellow, darker on anterior and posterior slopes; a square pattern of black spinules near the base; a mixture of smaller black spinules and white squamose hairs scattered sparsely over the surface. Spinnerets dark brown.

Carapace rounded, surface granular, broadest and highest between legs ii and iii, from where it slopes forward and narrows into a conical protuberance around which the median eyes are grouped. Clypeus concave, equal to approximately 8/9ths of the diameter of A.M.E.

Eyes arranged in two recurved rows as in Figure 1. Ratio of eyes A.M.E : A.L.E : P.M.E. : P.L.E. = 27 : 18 : 20 17. The A.M.E are separated from each other by 40/27, from A.L.E by 14/27, and from P.M.E. by 14/27 of their diameter. The P.M.E. are separated from each other by 23/10, and from P.M.E. by 13/10 of their diameter. The lateral eyes, placed on a common tubercle, are separated by 11/9 of the diameter of A.L.E. The median ocular quadrangle is broader than long in the ratio 41 : 29, and broader in front than in rear in the ratio 41 : 39.

Chelicerae conical, granular, and with few hairs. Fang short. Mouth parts and sternum also granular. Maxillae oblong, parallel, base narrowed. Labium almost semi-circular, broader, at base, than long in the ratio 6 : 5. Sternum oval, ending in a point between the fourth coxae, longer than broad in the ratio 3 : 2.

Legs 1 = 2, 4, 3; sparsely clothed with bristle-like setae, dorsal surface of femorae, patellae, tibiae, and metatarsi, with white squamose hairs, tarsi with black bristles dorsally. Tarsi with serrated bristles and three claws. Superior claws on legs i and ii unequal, the prolateral much the larger, both unarmed. Superior claws on legs iii and iv equal. Palpal organ as in Figure 2.

Spines—Except for femorae i, ii, and iii, and one bristle-spine on patella iii dorsally near apex, the legs are without spines. Femorae i, ii, and iii, have two longitudinal ventral lines of tooth-like spines which vary in size and are less numerous on femora iii. Femora iv is unarmed.

Abdomen broad, tapering to front and rear, truncate in front, elevated. Spinnerets rosette-shaped, median pair hidden, terminal joints of superior and inferior pairs dome-shaped.

Locality: Carnegie, Victoria. A single male specimen collected on 4th February, 1946, from near a female which had been kept under observation for several months. The active movements of the male attracted attention, but unfortunately any mating that may have occurred was not witnessed. The female had a total length of 13.7 mm.

Genus *Dolophones* Walckenaer, 1837.

DOLOPHONES ELFORDI, sp. nov

Female	mm.
Total Length	7.63
Length of Cephalothorax	3.72
Width of Cephalothorax	4.55
Length of Abdomen	6.27
Width of Abdomen	11.59

	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.	Total.
Leg i	3.47	1.81	2.77	2.52	1.01	11.58 mm.
ii	3.47	1.81	2.77	2.64	1.01	11.70 mm.
iii	2.99	1.44	1.69	1.63	1.06	8.81 mm.
iv	4.25	1.99	2.44	3.54	1.20	13.42 mm.
Palp	1.27	0.69	0.74	—	1.25	3.95 mm.

Carapace yellowish-brown, sparsely covered with light brown and a few dark brown hairs, eyes enclosed by patches of dark brown. Chelicerae yellowish. Maxillae and labium yellowish at base, cream at apex. Sternum and coxae yellowish-red, provided with a few fine whitish hairs. Legs yellowish; femorae ii, iii, and iv, yellowish-red, fading to yellowish at apex; metatarsus iv with a black apical ventral patch; tarsi yellowish-red at apex, with a black median ventral patch. Palpi yellowish with darker patches. Abdomen above fawn with greenish-grey markings; ventral surface dark grey, from epigastric furrow to base of abdomen white. The colouring of the dorsal surface turns underneath and forms a margin around the ventral surface. Spinnerets brown.

Carapace broadest at rear, gradually narrowing in front. Cephalic part low, with a median longitudinal groove extending to the base of the ocular tubercle; cephalic striations moderately distinct. Thoracic part with three longitudinal grooves and two small round depressions. Clypeus equal to approximately 5/4 of the diameter of A.M.E.

Eyes arranged in two rows as in Figure 3. Anterior row procurved from in front, recurved from above. Posterior row procurved. Ratio of eyes A.M.E. : A.L.E. : P.M.E. : P.L.E. = 12 : 8 : 16 : 8. The A.M.E. are separated from each other by 13/12, from A.L.E. by 40/12, and from P.M.E. by 17/12 of their diameter. The P.M.E. are separated from each other by 42/16, and from P.L.E. by 33/16 of their diameter. The lateral eyes, placed on a common tubercle, are separated by 1/8 of the diameter of A.L.E. The median eyes are grouped on a low tubercle, the median ocular quadrangle being broader than long in the ratio 67 : 40, and broader in rear than in front in the ratio 67 : 37.

Chelicerae strong, stout, with lateral condyles. Promargin of furrow with three unequal teeth, of which the one furthest from the base of the fang is much the largest, and the one nearest the base is the smallest, the median tooth being placed in advance of the other two. Retromargin with three teeth, of which the one furthest from base of fang is much the largest.

Maxillae somewhat oval in shape, provided with apical scopulae. Labium longer than broad in the ratio 7 : 6, apex pointed.

Sternum subround, longer than broad in the ratio 71 : 67, ending posteriorly in a double point between the well-separated fourth coxae. A medium longitudinal ridge, increasing in height anteriorly, runs from

the middle to the anterior margin. In front of each coxa is a low tubercle.

Legs 4, 2, 1, 3; provided with stiff, almost spinelike bristles. Patellae, tibiae, and metatarsi, flattened dorsally. Tarsi with serrated bristles and three claws. Superior claws robust, equal, and similar, each provided with about nine teeth, of which the median teeth are a little longer than the basal and the apical. Palpi short, provided with stiff bristles. Patellae and tibae flattened dorsally. The single tarsal claw has about six long teeth.

Spines on legs and palpi arranged as follows: First leg—Femur: dorsal 2 near apex, prolateral 1-1, elsewhere 0. Patella : prolateral 1-1-1, retrolateral 1-1-1, elsewhere 0. Tibia : dorsal 0, prolateral 1-1-1-1-1, retrolateral 1-1-1-1, ventral 2-2-2-2-2. Metatarsus : dorsal, 0, prolateral 1-1-1-1-1-2, retrolateral 2-1-1-2-1, ventral 4-2-2-2-2. Tarsus : 0. Second leg—Femur and patella as in leg 1. Tibia : dorsal 0, prolateral 1-1-1-1, retrolateral 1-1-1-1, ventral 2-2-2-2. Metatarsus and tarsus as in leg 1. Third leg—Femur : dorsal 2 near apex, prolateral 1 near apex, elsewhere 0. Patella : prolateral 1-1-1, retrolateral 1 near apex, elsewhere 0. Tibia : dorsal 0, prolateral 1-1-1, retrolateral 1, ventral 2-1-1-2. Metatarsus : dorsal 0, prolateral 1-1-1-2, retrolateral 1-1, ventral 2-2-2-2. Tarsus : 0. Fourth leg—Femur : dorsal 1-1, elsewhere 0. Patella : prolateral 1 near apex, retrolateral 1 near apex, elsewhere 0. Tibia : dorsal 0, prolateral 1-1-1-1, retrolateral 1-1-1-1, ventral 2-1-1-2. Metatarsus : dorsal 0, prolateral 1-1-1-1-1-2, retrolateral 1-1-1-1, ventral 2-1-1-1-2 Tarsus : 0. Palp—Femur : 0. Patella : 0. Tibia : dorsal 0, prolateral 1-2, retrolateral 1-1, ventral 1 at apex Tarsus : dorsal 1-2, prolateral 2-2-2, retrolateral 1-1, ventral 0.

Abdomen somewhat triangular in shape, with the apex of the triangle to the rear. Dorsal surface slightly convex, pleated and folded to the rear, ornamented with a number of ocellated patches, four of which form a median trapezium narrowest in front; eight others form a transverse row along the base, and, from the outermost of these latter, two lateral rows run along each side and merge into the folding towards the rear of the abdomen. Ventral surface slightly concave, corrugated. Epigynum has the form shown in Figure 4. Spinnerets rosette-shaped, terminal joint of inferior pair dome-shaped, posterior spinnerets with longer and tapering terminal joint.

Locality: Wooragee, via Beechworth, Victoria. A single female "found on eucalypts" by a pupil (Frances McIntosh) of State School 653, and forwarded to Mr. F. G. Elford, B.Sc., of the Teachers' College, Melbourne; February, 1946.

Branch DIONYCHAE.
Family GNAPHOSIDAE.
Sub-family HEMICLOEINAE.
Genus *Rebilus* Simon, 1880.
REBILUS SWARBRECKI, sp. nov.

Female	mm.
Total Length	20.6
Length of Cephalothorax	8.5
Width of Cephalothorax	8.0
Length of Abdomen	12.1
Width of Abdomen	7.5

	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.	Total.
Leg i ..	9.1	5.0	7.1	5.4	1.9	28.5 mm.
ii .	11.0	5.6	10.2	7.3	1.9	36.0 mm.
iii	8.8	3.3	6.0	4.8	1.8	24.7 mm.
iv .	9.1	3.1	5.9	4.9	1.8	24.8 mm.
Palp ..	2.4	1.3	1.2	—	2.0	6.9 mm.

Carapace and legs brown, clothed with grey hairs interspersed with a few small black bristles. Marginal band and ocular area almost black. Chelicerae black. Maxillae and labium brown, the former cream towards apex. Sternum and coxae yellow-brown. Abdomen greyish, fairly densely covered with grey hairs. Lung-covers cream. Epigynum dark brown.

Carapace very flat, posterior margin concave. Dorsal grooves distinct. Thoracic groove longitudinal. Cephalic part also with a short longitudinal groove. Clypeus narrow, being equal to approximately 2/5 of the diameter of A.M.E. A few bristles are present before the A.M.E. and near the A.L.E.

Eyes arranged in two rows as in Figure 5. Anterior row slightly procurved. Posterior row recurved, broader than anterior row in the ratio 265 : 203. Ratio of eyes A.M.E. : A.L.E. : P.M.E. : P.L.E. = 21 : 28 : 13 : 23. The A.M.E. are separated from each other by 21/21, from A.L.E. by 43/21, and from P.M.E. by 165/210 of their diameter. The P.M.E. are separated from each other by 61/13, and from P.L.E. by 71/13 of their diameter. The lateral eyes, placed on a common protuberance, are separated by 30/28 of the diameter of A.L.E. The median ocular quadrangle is broader than long in the ratio 87 : 45, and broader in rear than in front in the ratio 87 : 63.

Chelicerae projecting forward, furnished in front with black bristles. Lateral condyles present. Promargin of furrow with scopula and three subequal teeth. Retromargin with two teeth.

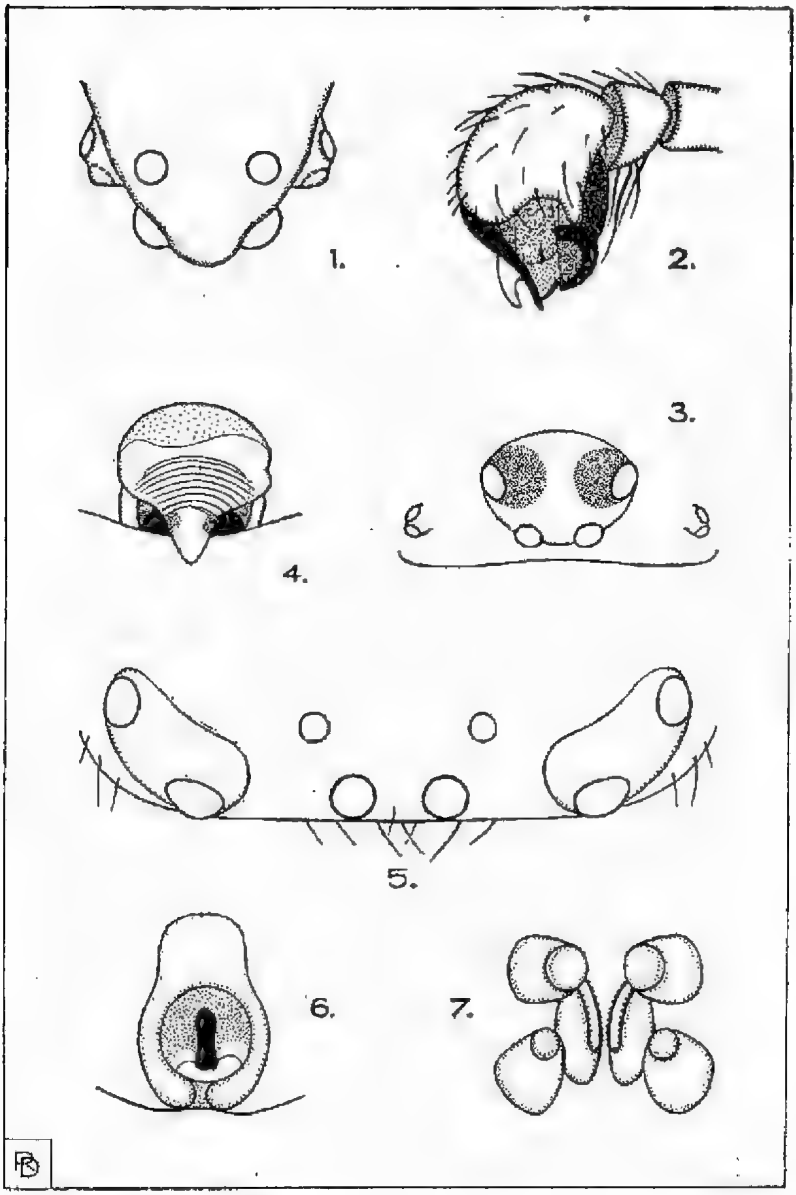
Maxillae constricted in middle, slightly converging over labium, with apical scopulae. Labium longer than broad in the ratio 13 : 11, excavated at base, anterior margin truncate and reaching to about half the length of the maxillae, posterior margin convex.

Sternum somewhat oval in shape, longer than broad in the ratio 3 : 2, ending in an obtuse point between the fourth coxae, in front slightly attenuated and truncate.

Legs 2, 1, 4, 3, laterigrade, sparsely clothed with bristle-like setae. Femorae swollen at base, tapering to apex. Trichobothria present on tibiae, metatarsi, and tarsi. All tarsi, and metatarsi i and ii, with ventral scopulae. Tarsi with claw-tufts and two claws, the claws without teeth. The single palpal claw is also without teeth.

Spines on legs and palpi arranged as follows: First leg — Femur : 0. Patella : 0. Tibia : ventral 2-1-1-2-2 (on left leg 1-1-1-2-2 only), elsewhere 0. Metatarsus : ventral 2-1, elsewhere 0. Tarsus : 0. Second leg — Femur : 0. Patella : 0. Tibia : ventral 2-1-2-2, elsewhere 0. Metatarsus : ventral 2-1, elsewhere 0. Tarsus : 0. Third and fourth legs without spines. Palpi with a few long bristles on tibiae and tarsi, but without spines.

Abdomen very flat, tapering to rear, where it is rounded. Epigynum has the form shown in Figure 6. Inferior spinnerets are separated by approximately 5/3 of their diameter. Median spinnerets, as in Figure 7, with longitudinal truncature provided with two rows of spinules.



Celaenia excavata L. Koch (Male):

1. Dorsal view of eyes. (The A.L.E. are not visible from above, but their positions are indicated by broken lines). 2. Prolateral view of right palpus.

Dolophones elfordi sp. nov. (Female):

3. Dorso-anterior view of eyes. 4. Epigynum.

Rebilus swarbrecki sp. nov. (Female):

5. Dorsal view of eyes. 6. Epigynum. 7. Spinnerets.

Locality: Mount Buffalo, Victoria. A single female collected by Mr. Eyre Swarbreck; January, 1946.

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FORESTS AND WATER SUPPLY

The intimate relation of forests to water supply is forcefully shown in an illustrated leaflet just issued by the "Save the Forests" Campaign. The writer of the leaflet, Mr. L. R. East, Chairman of the State Rivers and Water Supply Commission, gives some surprising figures regarding the value of primary production made possible by water conservation work over the past fifty years. The expenditure in the construction of reservoirs and channels for the irrigation districts for this period has been approximately £15,000,000. This large sum, however, is almost equalled in one year's production from irrigation areas. In the year 1943-44, the value of primary products in the natural state from irrigation districts reached a total of £11,351,000, while these products in the manufactured state increased substantially in value.

Mr. East is scathing in his criticism of those who, through thoughtlessness or selfishness, jeopardise the lives of their neighbours and the natural resources of the State.

WHEN DO SNIPE LEAVE VICTORIA?

In a discussion on this question recently it was agreed that most of the birds have left for Asia by the end of February, but one man, a country-dweller, said that he once saw two jack-snipe on April 3. That was in a stubble paddock, which had in places become water-logged after heavy rain. He was fortunate enough to bag both birds, which were in excellent condition, strong flyers, and about the largest of the species he had seen.

Speaking of the movements of snipe in Mornington Peninsula, the old-time game-shooter, H. W. Wheelwright, said that the birds left there in February or the beginning of March, while A. J. Campbell mentions March 12 as his latest record for the exodus. It is worth noting that the eggs in his collection were got towards the end of April on the slopes of Fujiyama, and it is unlikely that the birds, worn out by the long flight from Southern Australia to Japan, would begin laying immediately after their return.

AWARD OF GOLD MEDAL FOR HORTICULTURE.

Congratulations of the Club are extended to Mr. Noel Lothian, a member now resident in New Zealand. At the recent Dominion examination for National Diploma of Horticulture, Mr. Lothian gained highest marks and earned the coveted Cockayne Gold Medal. His first important contribution on the *Wahlenbergia* species ("blue-bells") of Australasia is very shortly to be published by the Linnean Society of N.S.W., and represents years of monographical research into this difficult genus, both here and on the Continent.

THE RIDDLE OF THE MOCKING-BIRDS.

By A. H. CHISHOLM.

Part III

CASUAL AND POSSIBLE MIMICS

REGENT BOWER-BIRD (*Sericulus chrysocephalus*).—Little is known of the normal notes of this beautiful bird, and it does not appear ever to have been recorded as a mimic in any part of its haunts—the coastal jungle from immediately north of Sydney to a point in Central Queensland. A Tasmanian naturalist, however, has stated that a Regent-bird kept in an aviary in Hobart very soon caught and reproduced calls of various birds in the vicinity: a fact that seems to indicate latent mimetic ability. In any event it would be surprising if this species, member of a very talented group, wholly lacked the imitative faculty of its relatives.

FAWN-BREASTED BOWER-BIRD (*Chlamydera cerviniventris*).—Of the seven or eight species of Bower-bird found in Australia this is the only one restricted to the northern tip of the continent (Cape York) and the only one that extends to New Guinea. Rather smaller than the Spotted Bower-bird, it is distinctive in that it lacks the lilac mantle of the other "spotted" species, and because of its habit of placing its bower near the seashore and decorating it with green berries. As for the bird's vocal powers, N. W. Cayley, in *What Bird is That?*, says it is "an excellent mimic," but there is no warrant for this statement in the writings of men who have studied the species. "It utters a number of extraordinary notes in slow succession," says Bertie Jardine. "A bird that had a fully-fledged young one with her gave voice to a great variety of notes," says W. D. Macgillivray. And H. G. Barnard records that whereas he found *C. orientalis* to be an expert mimic, the Fawn-breast was "not heard to imitate any sound."

Obviously, more study of the Fawn-breasted Bower-bird is needed. That it possesses mimetic ability can scarcely be doubted, but possibly this is used only rarely, as is apparently the case with the Regent Bower-bird. Moreover, the Fawn-breast appears to be akin to the Regent in having rudimentary tastes in bower-building. What factors, one wonders, govern such variations in artistic culture and vocal ability among the Bower-birds?

It will be interesting to learn, when field knowledge in New Guinea has developed, whether the Bower-birds of that region also are vocal mimics.

EASTERN BRISTLE-BIRD (*Dasyornis brachypterus*).—Very little has been noted regarding this secretive species in recent years, it having fallen away grievously—if indeed it was ever abundant—before the advance of settlement. In other years Bristle-birds inhabited heathy areas that are now suburbs of Sydney, and A. J. North has recorded his admiration of the song, which he thought included imitations of the introduced Skylark. It is possible, however, that North was misled by chance resemblance.

No evidence of mimicry on the part of the more or less familiar Rufous Bristle-bird (of southern Victoria) has been gained; nor is the ability known to obtain with the very rare Western Bristle-bird, although this species has, according to John Gilbert, notes that are "loud, clear, and extremely varied."

YELLOW-TAILED THORNBILL (*Acanthiza chrysorrhoa*).—Although this small bird is familiar throughout a wide area, and although it possesses

a bright song, only one claim for its inclusion among vocal mimics has been lodged, that was made in *The Emu* (41/90) by E. A. R. Lord, who wrote that on a spring day he heard a Yellow-tailed Thornbill imitate the voices of three species.

GREY FANTAIL (*Rhipidura flabellifera*).—When wandering about a dry hillside near Maryborough (Victoria) on a bright day in October of 1945, I was astonished to hear the characteristic, unmistakable trill of the Scarlet Robin. The slight chirrup of the Red-capped Robin might reasonably have been expected there, but a parched old goldfield, sprinkled with ironbarks, was no place for a Scarlet-breast, especially in nesting-time.

As I approached the tree whence the call came, a Grey Fantail flew out. But I could not find the Robin. That, I told myself, was strange. A few moments later the call sounded from another tree. Hurrying across, I flushed the Fantail again, but again failed to find the Robin. This time I waxed distinctly annoyed with myself. It began to seem that I was "slipping." The locating of that Robin became a personal obligation.

Accordingly, when next the trill sounded I approached at the double—only to find once again nothing other than the frisking Fantail. Now, belatedly, I became suspicious. Since it was highly improbable that any practising observer would repeatedly fail, in favourable circumstances, to find such a showy bird as the Scarlet Robin, an idea developed that the Fantail was playing vocal tricks: and this in spite of the fact that, in a long acquaintance in various States, I had never gained any evidence of mimetic ability on Grey Fan's part. Sure enough, as I watched the pair of flycatchers one of them ceased its customary chatter, opened the beak a trifle wider, and emitted a perfect imitation of the hard trill of the Scarlet Robin. Eureka!—the situation was saved!

Subsequently I found the Fantails' pretty little nest, which contained two eggs, and time and again as I watched the birds I saw one of them (I presume only the one bird was concerned) utter the Robin's trill at irregular intervals. It was curious to reflect then on the freakish development that had caused a member of a species that is not normally mimetic to acquire that one distinct call from another bird; and it could only be supposed that constant hearing of a Robin at an earlier period, in another area, had somehow played upon the auditory senses of the Fantail.

I had assumed at the time that the experience was unique, but have since noted that in *The Emu* for 1939 (38/418) E. A. R. Lord reports having heard a Grey Fantail in Queensland imitate the voices of the Blue Wren and the Speckled Warbler, both of which have a general resemblance to its own animated chatter.

Incidentally, I have heard the churring trill of the Scarlet Robin uttered on occasion by Heath-Wrens near Sydney, and in Victoria it used to be a specialty of a certain enterprising English Starling.

WHITE-PLUMED HONEYEATER (*Meliphaga penicillata*).—The only claim for mimetic ability on behalf of any of the large number of species comprising the Honeyeaters proper is one made by E. A. R. Lord, who has stated in *The Emu* (41/90) that he once heard imitations of the calls of the Crested Hawk and the Golden Whistler made by a number of White-plumes that were feeding and frolicking together. Possibly this was a matter of fortuitous resemblance rather than mimicry. Aside from the consideration that the White-plume, a familiar bird, has not been known to use mimicry in any other part of its wide range, a casual mimic would scarcely be expected to use imitations in company.

YELLOW-TAILED BLACK COCKATOO (*Calyptorhynchus funereus*).—M. S. R. Sharland has given in *The Emu* (38/17) a note in which a resident of the Blue Mountains records "an unmistakable imitation" of the Kookaburra by a wild Yellow-tailed Black Cockatoo. I regard this record as very doubtful and would be interested to learn if it can be supported.

TAWNY FROGMOUTH (*Podargus strigoides*).—A most unpromising "candidate" for inclusion among vocal mimics, this nocturnal bird has nevertheless been put forward by R. W. Legge, who says in *The Emu* (34/240) that as darkness fell on a day in July he heard the loud call of a Kookaburra come from a tree near his home in Tasmania, and on investigating he flushed a Frogmouth. He had no doubt that the "Mopoke" was responsible for what he terms "wonderful mimicry." In the nature of the case, however, it would seem that this claim should be accepted only on a tentative basis.

It is interesting to note, by the way, that when the late Dr. W. D. Macgillivray was in North Queensland he found that the Papuan Frogmouth utters "a weird and ghostly laugh—a rapid 'Hoo-hoo-hoo.'" Does the Tawny Frogmouth ever utter such a sound, as a natural note?

PIED CURRAWONG (*Strepera graculina*).—K. A. Hindwood wrote me in the winter of 1940 that Noel Roberts had reported having heard near Sydney some Pied Currawongs giving calls which closely resembled the "chip-chip" notes of the Red-tipped Pardalote. "On paying a visit to the spot," says Hindwood, "I heard from the bulky black birds the usual wailing notes and the 'currawong' call, with an occasional 'chip-chip' just like the voice of the Pardalote in tone and volume. It may have been chance resemblance; if so the similarity was remarkable. Anyway, I think the Pied Currawong might go on the mimetic list as a 'possible' until confirmation is forthcoming."

INTRODUCED BIRD-MIMICS

Mild examples of vocal mimicry on the part of the British Song-Thrush and Blackbird have been recorded in Victoria, but the only assured mimic among our twelve species of introduced birds is the ubiquitous Starling. Mimicry may not be constant in the species (that is scarcely to be expected of a flock-bird) but many individuals in various States have been known to exercise imitations very skilfully while sitting alone in a tree or on a housetop. Imitations of the Blue Wren and the Pallid Cuckoo are frequent—and, by the way, it is always an astonishing experience to hear the chatter of the Wren coming from a rooftop. A particular Starling which I knew in Melbourne went much better: he imitated freely, day after day, the notes of ten species of Australian birds, including the Wagtail, Magpie, Magpie-Lark, and Shrike-Tit. Obviously, that Starling did not always live in a busy suburb.

In England years ago Starlings used to be trained to talk (sometimes the cruel and useless practice of splitting their tongues was adopted) and so it is not surprising to learn that in America recently a Starling taken young learned to use quite a number of words and phrases.

Incidentally, with the spreading of introduced birds in Australia the "stealing" of notes has become something in the nature of an international two-way traffic. That is to say, while individual Starlings, supported by some few Song-Thrushes, have been helping themselves to the voices of native birds, various Australian species have done the same thing by the immigrants. There are, for example, several records of mimicry of the Starling by native birds; mimicry of the Blackbird by the Silvereye has been recorded by Professor J. B. Cleland in South Australia; mimicry of the

PLATE IX

Photo by N. Caller

Brown Flycatcher on her tiny nest
(This bird and the Grey Fantail are the only Victorian Flycatchers known to use vocal mimicry.)

Photo by A. H. Chisholm.

Grey Fantail at nest.

Greenfinch, Goldfinch and Sparrow by the Bush-Lark has been recorded by C. F. Belcher and others, and in Sherbrooke Forest I have heard several times mimicry of the Blackbird by the Lyrebird.

All this, of course, was to be expected, for native mockers borrow freely from each other. Set a thief to catch a thief!

CONCLUSIONS

(1) Vocal mimicry has been, and still is, a factor of importance in the building-up of bird-song.

(2) Birds that practise vocal mimicry do so mainly for pleasure—because they are sound-lovers and are capable of profiting by their receptivity.

(3) Pleasure is derived from the intrinsic value of the "stolen" notes and from the stimulus of emulation, not to say rivalry. It is thought also that a sense of companionship may be a contributory factor, but, since some birds imitate mammals, frogs, etc., and even artificial sounds, it is clear that this point has severe limitations.

(4) Territorial zest has probably been a factor in stimulating vocal mimicry (or the mimetic ability) in some birds and the mimetic notes may now be portions of territorial proclamations in certain instances. For example, imitations by a Lyrebird, being constant and distinctive, and being blended with the mocker's natural notes, are recognized by other Lyrebirds as normal songs of their species.

(5) When mimicry is used in whisper-songs, as it is by most minor or occasional mockers, it carries no territorial significance. In most instances of the kind it is purely a tranquil reaction, on the part of impressionable creatures, to compelling sounds; but, curiously, in other instances it is an agitated utterance of birds disturbed at nests.

(6) Imitations do not deceive the birds that are imitated, but may at times deceive other species, as when small birds become agitated on hearing the supposed call of a bird of prey.

(7) Some birds may be able to associate impressions sufficiently to turn mimicry to practical advantage, as in the case of a Drongo that secured another bird's food by shouting like a Butcher-bird, and as with the Bower-birds that are said to drive other birds away from food by screaming like Hawks.

(8) In some instances at least "stolen" notes are passed on from one mimic to another—one Lyrebird, for example, may build up a vocabulary from other Lyrebirds in his area, with perhaps only slight assistance from the original owners of the calls.

(9) In all instances mimetic power is greater in male than in female birds, and in some instances (but by no means all) it is more potent in the breeding season.

(10) Mimetic ability is admittedly a birthright, but judgment is reserved on the question whether, in some instances, actual mimetic notes also are inherited. There is, no doubt, significance in the fact that certain young birds have been known to practise mimicry, and apparently with enjoyment, independently of their parents; and this suggests that experiments in the subject with young birds might give profitable results.

(11) It is believed that certain bird-notes which suggest mimicry are in fact "natural" calls: the resemblance (as of notes in various species which suggest the cries of cats) is probably merely capricious—what an American writer has termed "adventitous similarity."

(12) Some birds are able to imitate certain sounds immediately they hear them, but probably frequent hearing is necessary for *retention* of a call or sound. No support is accorded an American suggestion that immediate mimicry is a "conscious" imitation; the prompt response is thought to be merely an automatic reaction, on the part of "vocal kleptomaniacs," to an appealing or challenging sound, as is also the case, perhaps, with birds that burst into song immediately they hear the roll of thunder or the sound of a gun.

(13) Mimicry probably is constant throughout each species of master mimics (males at least) but probably is not constant throughout species of minor mimics. Moreover, the quality of mimicry in any one species may vary considerably.

(14) It is not agreed that, as suggested by various writers, the frequent use of vocal mimicry must necessarily impair the function of natural selection.

(15) The only scientific value attaching to vocal mimicry by captive birds is that it indicates species in which the ability to retain and reproduce other voices or sounds is latent.

(16) Having twelve species of skilled mimics and more than thirty other species so far known to mimic occasionally, Australia appears to possess a greater number of mocking-birds of each class (major, minor, and casual) than any other country.

(17) If, as may be supposed, the genial Australian climate is a factor in stimulating vocal mimicry, it is equally potent with certain species in the temperate region of the south and others in the tropical zone.

(18) Mimetic species manifest between them many differences in size, form, colour, habitat, "temperament," and general behaviour. Even normal vocal ability varies greatly, some mockers having melodious "natural" notes and others mediocre or harsh calls. It is observed, however, that all of the master mimics are

birds which spend much of their time on the ground, and, further, that most of them belong to restricted and very distinctive genera—small and singular groups that are not found outside Australia.

(19) The suggestion arises that ground-dwelling birds, because of their acute hearing, have developed greater receptivity than birds which maintain guard with vision, and that the receptive quality has to some extent repressed "natural" vocalism. In many instances, however, the natural ability rivals the receptivity, as manifest in improvisations and improvements on the borrowed notes. A difficulty here—in relation to the use of mimicry by ground-birds of small and distinctive groups—is that certain similar groups, although equipped with good singing voices, do not appear to mimic at all.

(20) With so much conflicting evidence on hand, one's general impression at the present stage is that vocal mimicry among Australian birds has been developed and maintained on a basis created by several factors, namely: Climate, "temperament," habitat (in relation to ground-birds), territorial zest, and perhaps food, with a certain element of chance added.

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In addition to the foregoing references (which are here listed at the suggestion of Mr. K. A. Hindwood, who kindly read proofs of the present paper) numbers of brief but informative notes on various Australian vocal mimics are distributed throughout the pages of *The Emu*, the *South Australian Ornithologist*, the *Australian Zoologist*, the *Australian Museum Magazine*, and the *Victorian Naturalist*. Additional remarks on Lyrebirds, Bower-birds, Scrub-birds, Heath-Wrens, etc., occur in my earlier books, *Birds and Green Places* (London, 1929) and *Nature Fantasy in Australia* (London, 1932). Passing references to mimicry contained in some fifteen other books, mainly English, are quoted in my *Ibis* paper of 1937. The

references above to Littlejohns relate only to Lyrebirds, and those to Broadbent and North relate only to Bower-birds. It is curious that although North had field experience near Sydney of the Heath-Wren and Yellow-throated Scrub-Wren he failed to remark their strong mimetic ability, a fact which emphasises again that you have to listen well to detect vocal imitations. The same point applies regarding unfamiliar birds of Australia. Many of these, no doubt, will be recorded as mimics when they are better known.

(Concluded)

TASMANIAN "NATURALIST"

The F.N.C. of Victoria extends congratulations to the Tasmanian Field Naturalists' Club upon the launching of a journal, the *Tasmanian Naturalist*. Dated May, 1946, the first issue, of 16 pages, is devoted almost entirely to a series of discussions on the natural history of the Safety Cove area—a good example of ecological concentration. Photographic illustrations and a map are added. The *Victorian Naturalist* hopes that its young kinsman will enjoy a long and prosperous career.

"AUSTRALIAN WILD LIFE"

The first number of Vol. 2 of *Australian Wild Life*, journal of the Wild Life Preservation Society of Australia, is to hand. Containing 96 pages, with illustrations, it records a considerable amount of work accomplished in the safeguarding of fauna and flora, and includes a lengthy statement by the editor (Mr. David Stead) in relation to the National Parks of N.S.W. The price of this informative booklet is 1/3 to non-members of the W.L.P.S.

WHERE MEMBERS' INTERESTS LIE.

(To the Editor)

Sir,—I am interested in the "Replies to Questionnaire," published on page 71 of the *Victorian Naturalist* for July, and can hardly escape "censure" (as a frequent orchid contributor) under item 1 of the *Journal* section. But, as one of a loyal band of interstate members, what shocks me most in that journal list is No. 9, viz., "Suggest keep articles confined to Victorian natural history." In Heaven's name, who are the folk that want to impose politico-geographical limits to a magazine for nature-lovers? I am not thinking of myself, though possibly I am the most grievous offender in this regard, but I do trust the Committee will never countenance a rule to exclude from the pages of the *Naturalist* anything that concerns the doings of Nature beyond the Victorian political boundary-line. That would surely be to resurrect the spirits of the *Eatanswill Gasette* and the *Eatanswill Independent!*

Yours, etc.,
H. M. R. RUPP.

24 Kameruka Rd.,
Northbridge, N.S.W.

[The Editor and Assistant Editor share Mr. Rupp's view that political boundaries do not affect the interest and value of an article on Australian natural history.]

ORCHIDS OF THE DRIPSTONE-WELLINGTON-GULGONG DISTRICT (CENTRAL-WESTERN SLOPES, N.S.W.)

By G. W. ALTHOFER, Dripstone, N.S.W.

Although the past year had been a particularly dry one, as a consequence of good 1945 winter rains, terrestrial orchids were plentiful in selected portions of the district during spring, gradually tailing off as the heat of summer and lessening rainfall became effective. Very little summer and early autumn rain was no doubt responsible for a meagre flowering of autumn species this year. Some notable "finds" have been made by my brother and myself and the known range of some species considerably extended. Although our main collectings have been around Dripstone, other portions of the area under review were not neglected. The physical features of this district include portion of the Macquarie River and its tributaries the Bell and Cudgegong Rivers. The Dickerton, Cundumbal and Yamble Ranges cut through the area, with peaks to a little over 2,000 feet. Much of the area is auriferous, with belts of limestone, ironstone, diorite, slate and rock of volcanic origin, and it lies mostly between 1,000 and 1,500 feet above sea level.

Quite the most remarkable find in the area last season was that of *Chiloglottis formicifera*. An inhabitant of the eastern fall of the Divide, from Hunter Valley to Illawarra, as well as of the North Island of New Zealand, this quaint little orchid has now appeared on Barren Jack Mount, Dripstone, at an elevation of 1,400 feet—base of a wet cliff face with south-easterly aspect. Possibly it may occur in the country intervening, but a search of many likely places has been fruitless to date. Why the 130-mile westward leap from the coastal country of higher rainfall? Is the occurrence of this and other typically coastal species in this area indicative of a much higher rainfall at some far distant date? Our rainfall now varies from 22 to 25 inches per annum in a country of steep mountains and narrow valleys, of high summer and low winter temperatures—as low as 18° F.

Diuris brevissima, recorded by Fitzgerald from Woodford (Blue Mountains, N.S.W.)) has made a welcome reappearance here, 120 miles farther west. The writer collected it also at Blackheath (central Tablelands, N.S.W.), in October, 1945, and it will probably be collected in the intervening country when conditions are favourable. From personal observations, I consider that many orchids have a resting period, varied only by the seasonable conditions in the area. I know of some species of *Diuris* which have lain dormant as long as seven years and then flowered. Will they flower every year given suitable conditions or is a resting period necessary for their continued existence? *Diuris* spp. were especially abundant in the Dripstone-Gulgong region during spring 1945, but the later flowering *D. punctata* (and another summer-flowering species not yet identified) did not show up at all. In the Dripstone area, hybridisation appears to obtain and renders identification doubly difficult.

Another surprise was the location of three of Mrs. P. Messmer's newly described Mount Victoria (Blue Mountains) orchids in this district. They are *Diuris polymorpha*, bearing handsome sulphur-yellow flowers lightly blotched with reddish-brown, *D. lineata* and *D. flavopurpurea*. Again, we find a north-westerly jump of 100 miles with no known intermediate stations. The writer also recorded *D. flavopurpurea* from Dubbo, 130 miles from Mount Victoria. In his opinion the most beautiful among all *Diuris* species collected were specimens of a large-flowered form of *D. aurea*, which may warrant varietal rank if other future flowers accord with last season's examples.

Outstanding for new district records was the fascinating "Spider" group of the genus *Caladenia*. *C. Fitzgeraldi*, *C. clavigera* and *C. filamentosa* are

flowers of exceptional beauty. *C. clavigera* had not been recorded in New South Wales for over 60 years. Cunningham's type locality was "Vale of Clwydd," now suburb of Lithgow city (Blue Mountains, N.S.W.). A specimen, supposedly collected in Mudgee district by Rev. R. Collie, is in the National Herbarium, Sydney, also one collected near Yass in 1881.

The story of the reappearance of *Pterostylis Boormani*, previously known only from specimens collected by Boorman at Peak Hill (Central-West, N.S.W.), 1906, has already been told in a previous issue (Vol. 62, No. 9) of *Vict. Naturalist*. We collected it at both Gulgong and Dripstone during October 1945. In the former area it was fairly plentiful, but rare about Dripstone. The rare green-flowered form of *Pterostylis rufa* was also recorded from both areas. Several specimens of the uncommon *Pt. Woollsii* were observed in the Dripstone district; this unique species has exceptionally long lateral sepals and can hardly be mistaken for any other.

Another remarkable record was that of the diminutive *Prasophyllum nigricans* which we found 150 miles farther west than previous New South Wales records, in May of this year. Apart from above records, a fine *Diuris* collected near Gulgong by my brother Peter is so distant as to warrant specific rank. Further specimens will be needed for confirmation.

The final identification of all species cited in the following list was undertaken by the Rev. H. M. R. Rupp, whose cordial co-operation has been a great asset:

SPECIES COLLECTED DURING SPRING 1945-AUTUMN 1946

1. *Thelymitra aristata* Lindl. Dripstone—rare.
2. *Thelymitra nuda* R.Br. Dripstone—uncommon.
3. *Diuris palachila* Rogers. Dripstone and Gulgong—common both areas.
4. *Diuris platichila* Fitzg. Dripstone—common.
5. *Diuris brevissima* Fitzg. Nicholls. Dripstone—rare.
6. *Diuris flavopurpurea* Messm. Dripstone—common.
7. *Diuris polymorpha* Messm. Dripstone—not common.
8. *Diuris lineata* Messm. Dripstone—common.
9. *Diuris aurea* Sm. Dripstone—common.
10. *Diuris sulphurea* R.Br. Dripstone—uncommon.
11. *Microtis unifolia* Reichb.f. Dripstone—uncommon.
12. *Prasophyllum gracile* Rogers. Gulgong—uncommon.
13. *Prasophyllum odoratum* Rogers. Dripstone—uncommon.
14. *Prasophyllum nigricans* R.Br. Dripstone—common.
15. *Prasophyllum* ? (Past maturity, perhaps *P. longisepalum*). Dripstone—uncommon.
16. *Chiloglottis formicifera* Fitzg. Dripstone—common.
17. *Acianthus fornicatus* R.Br. Dripstone—common.
18. *Acianthus reniformis* R.Br. Dripstone—common.
19. *Calochilus campestris* R.Br. Dripstone—uncommon.
20. *Calochilus Robertsonii* Benth. Dripstone—common.
21. *Eriochilus cucullatus* Labill. Dripstone—common.
22. *Caladenia dilatata* R.Br. Dripstone—uncommon.
23. *Caladenia Fitzgeraldi* Rupp. Dripstone—rare.
24. *Caladenia clavigera* Cunn. Dripstone—rare.
25. *Caladenia filamentosa* R.Br. Dripstone—rare.
26. *Caladenia angustata* Lindl. Gulgong—common.
27. *Caladenia carnea* R.Br. Dripstone and Gulgong—common.
28. *Caladenia cærulea* R.Br. Dripstone—common.
29. *Glossodia major* R.Br. Dripstone and Gulgong—common.
30. *Pterostylis curta* R.Br. Mt. Arthur near Wellington—common.
31. *Pterostylis revoluta* R.Br. Dripstone—common.
32. *Pterostylis rufa* R.Br. Dripstone and Gulgong—uncommon.

33. *Pterostylis nutica* R.Br. Dripstone—common.
34. *Pterostylis Boormani* Rupp. Dripstone and Gulgong—uncommon.
35. *Pterostylis Woollsii* Fitzg. Dripstone—uncommon.
36. *Pterostylis parviflora* R.Br. Dripstone—uncommon.
37. *Dipodium Hamiltonianum* F.M.Bail. Dripstone—uncommon.
38. *Diuris* sp. nov. Gulgong—uncommon.
39. *Pterostylis* sp. (?) Dripstone.

In addition the following previous records are known for the area:
Corybas diemenicus (Lindl.) Rupp and Nicholls. Curra Creek near Wellington, 1945.
Diuris punctata Sm. Dripstone, 1938 and previous years.
Caladenia Patersonii R.Br. Dripstone, 1936.
Thelymitra ixioides Sw. Gulgong, 1916.
Diuris tricolor Fitzg. Guntawang (no date).
Pterostylis clavigera Fitzg. Guntawang (no date).

NATIONAL PARKS.

The Committee would be pleased to receive suggestions from members regarding more effective control, extension, rehabilitation, and finance of Victorian National Parks. Such suggestions would be discussed by our National Monuments sub-committee (convened by G. N. Hyam) and, if desirable, placed before the newly-constituted committee chosen from various Natural History and interested societies in Victoria to further ways and means for the improvement of sanctuaries and scenic reserves throughout the State.

TIGER SNAKE'S CALLS.

In a discussion on this subject in a contemporary, Mr. H. Pooley, Barnawartha (Vic.), writes as follows:

"The call described by your correspondent, J.E.T., as resembling the escape of a very small jet of steam is doubtless what is known—for want of a better word—as the hiss of a snake. At times when the snake is merely suspicious of danger the sound might be better described as a gentle puffing. Naturalists inform us that though most kinds of snakes have only one lung, usually with a rudiment of the other, there are often auxiliary air-sacs on the windpipe, and the posterior part of the lung is rather a reservoir for air than an actual breathing organ. I have heard a 'big fellow' when excited expel air so forcibly that, in the words of an old bushman, 'he fairly whistled.'"

CROAJINGALONG.

This paragraph, bearing upon a Victorian aboriginal place-name, is taken from notes on the subject that occurred in the Melbourne *Argus*:

Both Mr. Hugh Montgomery and Mr. Charles Daley, who have had considerable experience of aboriginal dialects, agree that the name Croajingalong has been perverted. Mr. Montgomery makes it "Croatin-Coolong," Mr. Daley "Kroatunggolong," but they agree that the name referred to a powerful and fierce tribe of aborigines inhabiting East Gippsland, from the Snowy River, back towards Cape Howe.

Mr. Daley points out that the termination "olung" is common in the language of five Gippsland tribes, as referring to a bay tribe. Thus the name Briagolong is a perversion of the "Braiakolung"—meaning "men of the west" (as Kroatungolong is "men of the east")—the name of a tribe occupying the country about the Latrobe, Mitchell, and the Lakes.

TREE, FUNGUS, AND SOIL RELATIONSHIPS

Trees and Toadstools, a slim volume by reason of publishers' wartime restrictions, issued by Faber, London, has recently been added to the Club library. The author, Dr. M. C. Rayner, is already well known as collaborator with her husband, Professor W. Neilson-Jones, in other notable books.

Written lucidly to interest the general reader, the little book gives an outline of a subject regarded by up-to-date botanists, mycologists, soil experts and foresters alike as of crucial importance. Research in recent years has revealed surprising unseen forces at work in the natural world, as, for example, in the inter-relation of widely different groups of plants with one another, with toadstool-producing fungi, and with the mechanism of life as a whole. Because of these complicated, imperfectly understood forces, Dr. Rayner ventures forth her book, about "the jig-saw puzzle formed by the different kinds of life that surround us in nature; about the interplay and interdependence of their various vital activities and the pattern formed when these are fitted together, and about the position we ourselves occupy in the completed picture."

Toadstools dominate the text, and some fine plates illustrate the author's points. The Fly Agaric (*Amanita muscaria*), in situ with earth and plants, is given prominence. A photograph that challenges attention shows cord-like rhizomorphs of the Honey Fungus (*Armillaria mellea*) on the trunk of a pine, stripped of the bark to reveal the hidden cause of death. The deadly Honey Fungus is widely distributed and its ravages are only too well known, but it has never hitherto been completely studied. It now seems that *A. mellea*, which can grow in soil and on living or dead plant tissue, has a peculiar association with certain plants having underground tubers as *Gastrodia* (of the Orchidaceae), a species of which *G. sesamoides* (the Potato Orchid or "Cinnamon Bells") is common to Victoria. Another picture depicts Honey Fungus rhizomorphs infecting tubers of *Gastrodia elata* (an Asiatic species) and the common potato. In the one case a balanced relationship has been established with the orchid tuber, stimulated by the fungus to flower and fruit, thus completing the life cycle. In the other the relation is parasitic, and the potato is destroyed by the fungus. This suggests similar fungoid influence in the closely allied Australian *Dipodium*. The functions of the extensive tuberous system of the Hyacinth Orchid (*D. punctatum*) has interested members of the Club. *Gastrodia* and *Dipodium* have points in common—absence of green leaves with chlorophyll to produce food substances, underground tubers, and large inflorescences in comparison with the size of the plant. Investigations on fungus lines may give a clue to the functioning of the tubers of the Hyacinth Orchid.

Incidental reference is made to *Penicillium notatum*, a mould fungus and the source of the wonder-drug penicillin. The author suggests this and near allies, with good reasons, as soil fungi. She further states: "Substances with similar properties to penicillin—antibiotic substances as they are called—are now known to be produced by other members of the soil population; for example, by other species of mould fungi, by some of the woodland fungi that form mycorrhizal associations with trees, by certain bacteria, and by other common soil organisms named *Actinomyces*."

The book opens up an enthralling vista for further research. It concludes with a lofty statement on the fertile soil. "To think of the soil as itself an organism—a social organism like a human society, the manifold activities of which are carried on by its numerous living inhabitants. Disturbance of any one of these may affect others and thus lead to loss of equilibrium and the appearance of symptoms of disorder."

H. C. E. Stewart.

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PROCEEDINGS.

The monthly meeting of the Club was held on August 12, 1946, at the Lecture Hall of the Public Library, the President (Mr. F. S. Colliver) presiding and about 200 members and friends attending.

The following were elected as Ordinary Members of the Club: Mrs. L. Brown, Mrs. A. J. Swaby, Misses Nancy Bowman, Winifred Gates, Elma Gossip, L. P. Sexton, N. G. Burke, D. R. Evans, Edith L. Barkla, N. Westcott, Dr. D. E. Thomas, Messrs. P. Westcott, W. J. Parr, A. C. Patterson, F. J. Bromilow; as Country Members: Major H. M. Whittell, Messrs. H. Brew and R. A. Green; and as Associate Members: Peter Green and Master J. R. Thomas.

SHOW COMMITTEE REPORTS:—(*a*) Members were asked to contact friends in the country who might be approached with a view of collecting flowers for the Show; (*b*) Members were asked to collect on the Saturday and Sunday preceding the Show; (*c*) Members who are free on October 7 and 8 for unpacking and identifying the plants, and also members who can help in the cleaning up after the Show, please contact Mr. A. J. Swaby. The Botanical Group in particular needs both skilled and unskilled assistance; (*d*) Ewart's *Flora* is required for the duration of the show; (*e*) Next Show Committee Meeting will be held at the Royal Society's Hall on August 26 at 6.30 p.m., prior to the meeting of the Botanical Discussion Group.

NATURE NOTES.

Miss Ina Watson reported that greenhood orchids were particularly common this year between Eltham and Warrandyte.

Mr. Chas French stated that Mr. Gilbert Rogers, guide at the Grampians, had remarked on the wonderful season in the Grampians for orchids and wild flowers in general.

Miss Wigan reported that Scarlet and Flame Robins were very common in the Toorak area this year.

GENERAL BUSINESS.

The President drew attention to the fact that Mr. Noel Lothian had obtained the Cockayne Gold Medal in New Zealand, and it was agreed that a letter of congratulation be forwarded.

Mr. H. C. E. Stewart reported that in October we commemorate the 50th anniversary of Baron von Mueller's death, and some suitable function would take place at St. Kilda.

SUBJECT FOR THE EVENING.

This took the form of a series of motion pictures in natural color, and a commentary by Mr. E. L. Brown. Central Australia was the subject and many interesting places were shown, notably some of the Gaps in the McDonnell Ranges, Palm Valley, Hermansburg Mission, Alice Springs, etc. The excellent pictures gave members a good insight into this Australian wonderland, and the remarks of the lecturer added to the interest.

The President congratulated Mr. Brown and a vote of thanks was carried by acclamation.

EXHIBITS.

Mrs. D. W. Lyndon:—*Zygophyllum glaucescens*, collected at Keilor; also a photograph of a blackwood tree growing in fork of dry eucalypt 30 feet above the ground, at Stradbrooke, Gippsland, Victoria.

Mr. R. D. Lee:—Photographs of *Acacia pravissima*, *A. Howittii*, *A. subporosa*, *Grevillea linearis*, *G. buxifolia*, *Melaleuca* sp. from Maranoa Gardens; also *Corysanthes fimbriata* (orchid) and a giant earthworm.

Mr. J. S. Seaton:—A form of *Grevillea lavandulacea*, garden-grown at Caulfield.

Mr. L. C. Viney:—Stone axe from Mt. Hagen, New Guinea.

Mr. A. A. Baker:—Specimens of corals, minerals and dendrites from Cave Hill and Black's Quarry, Lilydale; also the pteropod "Tentaculites" from railway cutting near Coldstream (collected during excursion held on July 21).

Mr. A. N. Carter:—Fungus, *Trametes cinnabarina*, from Wonga Park.

Messrs. A. P. and R. A. Dunn:—Spiders: *Celaenia excavata*, male (allotype) and female, *Dolophones elfordi*, female (type); and *Rebilus swarbrecki*, female (type).

Mr. T. Griffiths:—Collection of mosses and lichens from Kinglake.

Mr. J. Ros Garnet:—Collection of Acacias from Mt. Royal, Royal Park, including *A. doratoxylon*, *A. Dallachyana*, *A. Sophorae*, *A. floribunda*, *A. stenophylla*, *A pravissima*, *A. armata*, *A. salicina*, *A. acinacea*, together with various other botanical specimens.

OUTING TO BORONIA

Through the kindness of Mr. A. C. Chandler, Liverpool Road, Kilsyth, sixty members were able on August 17 to see over his Boronia Farm and to learn something of the commercial harvesting of this fragrant flower. *Boronia megastigma* is a native of Western Australia, and one of the 88 varieties possessed by Australia. Members were delighted with one large patch of the new red-brown variety cultivated by Mr. Chandler. The number of blooms at Mr. Gilbert Chandler's was fewer than before, but a paddock of King Alfreds evoked much admiration.—I.M.W.

EGGS OF THE GIPPSLAND GIANT EARTHWORM.

By H. C. E. STEWART, Melbourne.

The brief reference to the eggs of the Giant Earthworm (*Megascolides australis*) contained in the report of the Club excursion to Loch, *vide Vic. Nat.* for July, needs amplifying. The eggs were not found on this visit, as mentioned, and the note was condensed from data in back numbers of the *Vic. Nat.* from McCoy, Baldwin Spencer, and other sources.

The statement that the eggs are "often loosely bound together with an openwork net" is incorrect. Mr. A. T. Davenport, of Loch, who was contacted on the excursion, has since kindly sent some interesting comments on the eggs. He writes—"I cannot claim to be an authority, but I have never seen any eggs bound together by an open net-work." His impression is that "only one egg may be 'laid' by a worm in one year; also there is never more than one egg in any one spot, and always a foot or so under the surface. Nor have I come across them in long grass or under a clod."

Ploughing of the soil might, of course, account for eggs found on the surface, or to become entangled in grass, or under clods of earth. Mr. Davenport thinks the worms "never naturally come out on the surface, hence the reason for their limited location — they never migrate." It is well known that the worms soon shrivel up when taken up out of the ground, which supports his observation that they never naturally emerge.

The stated colour of the eggs as "a delicate green when fresh" is also questioned. McCoy (*Prodromus*, 1878) states that "the egg capsules are greenish and translucent when fresh, but soon become dark and hard in spirit." Baldwin Spencer terms the eggs "cocoons," which "vary from light yellow to dark brown in colour according to their age, and contain only one embryo each, which I have at present only been able to obtain in a somewhat highly developed state." Mr. Davenport has seen the eggs "in all stages of freshness, always of a colour similar to the worm itself."

He goes on to ask, "Where does the egg develop and how is it 'laid'?" He believes it develops round the worm at the girdle. "The little elongated points of the egg indicate the possibility of the correctness of the girdle theory."

The anatomy and general structure of the worm have been described and figured with considerable minutiae by McCoy and Baldwin Spencer. Yet, strangely, little seems to be written about the creatures' habits and life economy. Our knowledge of the eggs is also very incomplete. Naturalists might well undertake some field research in this direction and record their findings. With this in view it is proposed to arrange a bus trip

to Loch at a favourable opportunity. Photography of the earthworms and eggs in situ has already been promised by the Club Nature Photography Group. Mr. Davenport kindly volunteers his assistance.

REFERENCES:

Prodromus of the Zoology of Victoria, Decade 1, pp 24-25—Frederick McCoy.

Transactions of the Royal Society of Victoria, Vol. 1, Pt. 1, August 1888—W. Baldwin Spencer.

Vict. Naturalist—Vol. XLVI, No. 3, July, 1929, p. 72.

Vict. Naturalist—Vol. XLVII, No. 6, October, 1930, p. 93.

Vict. Naturalist—Vol. XLVIII, No. 3, July, 1931, pp. 42-43.

Wild Life—June, 1941, p. 254.

Wild Life—August, 1941, p. 334.

HOW TREE-RUNNERS BUILD

Interesting details regarding the domestic affairs of Black-capped Tree-runners (*sittella pileata*), called also the Nuthatch and Sittella, are given in the following notes by the late Charles McLennan, who used to write under the name of "Mallee Bird":

"Three of these birds are building their nest in a dead pine tree near my tent. It is most interesting to watch them. The bird with the blackest head (the female) seems to act as clerk of works. The other two birds, not so black about the head or so bright in the rest of the plumage, are assistants. The two males generally arrive at the nesting place together with building material, and by the time they have worked it in, the female comes on the scene with further material. When the others have done she goes over the whole work, rubbing her beak first up and down, then across over the outside of the nest, and binding all the material together with the cobwebs which have been brought. The outside of the nest is composed of lichens and moss, gathered from the pine trees, and bound together with cobweb. The birds only work about an hour at a time; then after spending about half an hour hunting for food, start work again, and so on. They have now been building the nest for 12 days (two wet days are included in that period), and the home is almost completed. They are still putting the finishing touches on the inside with the down of thistle seeds. The site chosen for the nest is between a forked pine tree, and the birds have done their work so completely that you can hardly distinguish the nest from the other parts of the pine tree."

Association of three Tree-runners at one nest has been noted with some frequency. Are we to suppose, in view of the foregoing notes regarding the sexes, that the species is polyandrous?—A.H.C.

BACK TO DIMBOOLA

(Saturday, 9th-Sunday, 10th November)

In connection with this celebration, the newly-created Flora and Fauna Reserve at Dimboola will be opened officially and an excursion held therein under the leadership of Mr. E. Muir (local F.N.C. member). Accommodation can be only by private arrangement and intending participants are requested to communicate with the Hon. Secretary, Mr. J. Ros. Garnet.

EFFECTS OF BITE OF RED-BACKED SPIDER.

By F. O'Donnell, Newbridge, Vic.

As I have never seen a detailed account of the effects of a bite from *Lactrodectus hasselltii*, and as such a bite was recently suffered by a neighbour, I thought that it might be of interest to others to know just how potent the poison can be. A very interesting article published in the *Victorian Naturalist* last April brought the most common of our spiders vividly before readers, and the following should add interest to what was written then.

The young lady who suffered the bite was of an age and a temperament that enabled her to give a reliable account of how it affected her. The bite occurred in a country lavatory in an area where *Latrodectus* is very common.

The first indication she had of the presence of the spider was a crawling sensation on the side of her leg, and on brushing the place with her hand she noticed the spider fall to the floor. She kept it, and was able to identify it with certainty from its markings. She suspected that she had been bitten, but felt nothing at the time. At the spot where the spider had crawled a white lump appeared, but it was some minutes before pain was felt. When it did come it quickly increased until it became intense, spreading down the leg to the knee and up to and across the stomach.

The pain had a burning quality, and a feeling of stiffness was experienced. The victim of the bite had now become a patient, and her comment at this stage was that she did not know how a child, if bitten, could bear the pain that she had to endure.

Within twenty minutes she was at the local hospital, and her one wish there was to get to bed, as she felt too ill either to stand or sit. The doctor ordered an injection of morphia to relieve the pain. That was the only treatment administered. She remained at the hospital for two days, and during that time suffered a great deal of pain.

She could not sleep and her nervous system seemed to be greatly upset—her hands shook violently and she lacked control of her facial muscles to such an extent that she appeared to be continually on the point of breaking down. After two days in hospital she returned home, but because of her nervous condition could not content herself to lie in bed for any time. She felt bad enough to be in bed, but no sooner had she settled down than she wished to be out of it. When in bed she was unbearably hot, but when she got out she soon began to shiver, as if from the cold, although the room had been warmed to a pleasant temperature. She perspired most profusely and her attire had to be changed about every fifteen minutes. The skin was irritated by

the perspiration to such an extent that in many places, such as folds in the skin, it peeled off as though it had been scalded.

The only relief obtained was from soda baths. When in the baths the patient felt quite normal, but the distressing condition returned five minutes after she had left them.

The bite occurred on Sunday afternoon, and it was not until Thursday that relief was felt. That indicates how potent the poison injected really was.

The red-back spider is very common everywhere about here; I have found it in lavatories, in piles of old tins, and on one occasion in a corner made by the framework under the seat of a form in a church.

Since the above occurrence, I found some small boys trying to catch a rabbit that had taken refuge in a concrete culvert under a road. When I lent a hand I found that a family of *Latrodectus*, in all stages of growth, from little ones to full-grown ones, had taken up their abode only one foot from the opening where the boys had been seeking the rabbit. I have not heard of a child from this district being bitten, and, after seeing what an adult has to endure from such a bite, I hope that such a thing does not occur.

BELL-BIRD PARK, RINGWOOD.

Members will be pleased to know that the Ringwood Borough Council, in its long-range plan for a garden city, has reserved an area for preservation of the local flora. It is situated directly south of the Ringwood railway station, on Dandenong Creek.

In June some of the Botany Group inspected the park. They found it in remarkably good preservation and identified 52 species of native plants, apart from several interesting mosses, lichens and fungi. There were practically no introduced plants. With careful planning and good local co-operation, the park could be made truly representative of the silurian flora which we have found so attractive.

This cultutal step of Ringwood is commended as an example to municipalities everywhere. The co-operation of members is invited, more particularly eastern residents. Publicity is not recommended at present. It is suggested that efforts be directed toward securing a large body of residents who will take a pride in the local plants. From these, a movement could be established for protection and stocking.—A. J. SWABY.

SEEKING WESTERN ORCHIDS

Mr. W. H. Nicholls, accompanied by his wife, has left Melbourne for Western Australia, where during several weeks he will investigate the distinctive orchid flora of portions of that great area. Mr. Nicholls has not previously visited the West and it is highly desirable that he should gain firsthand knowledge of the region for the purposes of his forthcoming work on the orchids of Australia. He expects to be away until November.

FOODS OF THE TAWNY FROGMOUTH.

By EDITH COLEMAN, Blackburn, Vic.

Although much has been written on the feeding habits of Tawny Frogmouth (*Podargus strigoides*) there are still a few open questions. Most of my own observations have been made in a garden, some two acres in extent, and at a nearby creek-side, where Frogmouths nest freely.

It is a bird which forms an attachment to one locality, even to one tree. Mr. A. Hardie (Maffra) stated in October, 1934, that one old Frogmouth had been on his property for at least 23 years. Here — at Blackburn — Frogmouths have nested year after year either in our own trees or in others close by.

At dusk, parent birds and their young, usually two, have flown confidently about the garden. On one occasion there were three adults and two young. One adult appeared to be an intruder, and later disappeared.

The Frogmouth has such poor perching feet, the toes are so short and the feet so small for its size, that they encompass but a small part of the large branches on which it rests. Many young ones are found on the ground in stormy weather, and several of these waifs have found a home in this garden. Until recently, a very tall messmate (*E. obliqua*) grew on our land. It was a landmark which could be seen from a distance of many miles. From this tree several young Frogmouths were blown. To replace them was impossible. Doubtless the parents would have fed them at dusk had

Showing the poorly developed feet for a bird of such great size. No wonder so many young ones are blown from their perches during a storm.

they survived until the end of the day, but we decided to succour them, and while doing so learned much of Frogmouth ways.

An adult bird with cut wing, picked up on the road, was brought to me. Although he spent five years "waiting for his wings," he was never able to fly properly. He died (20/6/42) on a bitterly cold night. Two other dead birds were found on the lawn that morning.

A second Frogmouth was brought to me which, although fully fledged, and apparently uninjured, did not fly. As it knew at once what to do with pieces of beef, I assumed that it too had been a captive.

With none of the wild birds that haunted the garden was there any sustained flight. Although they flew from tree to tree some 15 to 20 yards apart, only once or twice did they appear to hawk for insects, but they often gave the impression of "pursuing" them. They did not veer or tack, but flew straight to their objective. From horizontal branches, clothes-props or posts, they flew to the ground, appeared to snatch up something and returned to tree or post. From the sometimes great distance of their watching-posts to the ground one assumed that they possess marvellous eyesight in the dusk.

Often young ones clung to the bole of a tree and were fed in this position. At no time did their movements suggest that they were following up swift creatures such as mice. One assumed that the prey was motionless or moving slowly, which would rule out mice, for which, in captivity, the Frogmouth shows a liking.

I often saw them pounce, with open wings. It was not until Dec. 30, 1943, that I learned definitely that they were capturing hosts of small golden-brown beetles (*Heteronyx insignis*), a species which feeds on grass roots, emerging at dusk just when the Frogmouths leave the perches on which they have been practically motionless for some 15 hours.

The great gape of the Frogmouth's bill certainly suggests use as a sack for bagging insects on the wing, and to some extent I think it is so used; as, for instance, when it flies at dusk from tree-trunk to tree-trunk in our paddock, for fully 30 yards without alighting, and immediately feeds a waiting youngster. Sometimes they would fly from one end of the tennis court to the other several times without alighting, and then feed a baby which was waiting high up on the top of the wire netting.

I think, however, that in addition to trapping beetles, etc., on the ground, the bill may be used as a capacious trap for engulfing creatures that move towards it as it rests motionless on a branch. Its shape should facilitate capture of small, unwary

mammals such as young possums, phalangers, etc., that are approaching it. The hooked tip of the upper mandible fits over a sinus in the lower one, making a deadly vice in which its prey may "all hope abandon."

One might apply the gamekeeper's test, as recorded by Richard Jefferies in discussing the Barn-owl: "Just look at his beak! Tell me that there bill weren't made to tear a bird's breast to bits; why, an owl have got a hooked bill like an eagle. It stands to reason, as he must be in mischief." So the poor owls were shot and nailed to the barn by ignorant keepers, despite the fact that wiser farmers kept them to destroy mice, which multiplied incredibly in those days when corn was threshed with a flail on the floor of the barn.

Our Frogmouth, too, loves mice, but I have not been able to discover whether he has the owl's facility in catching them. Certainly his open-winged pounce on beetles resembles the owl's manner of falling on its prey with open wings, when beating the meadows for mice.

Nearly 100 years ago, John Gould, who did not believe in the hawking theory, suggested that the Frogmouth crept along branches in search of such insects "as are in a state of repose." I would suggest that the creeping is done by the insects, and occasionally small mammals, while the Frogmouth is in a state of repose, or "freezing," so that they walk right into his parlour, as it were. Gould based his view on the stomach content of one Frogmouth. This included phasmids and cicadae, which, he believed, never move at night. Actually, both of these insects are active at dusk, just when the Frogmouth shakes off his daytime lethargy. The "freezing" should facilitate capture of crepuscular creatures such as phasmids, cicadas, crickets and mountain-grasshoppers.

This Bittern-like freezing is not always necessary as a protective measure, but may sometimes be a lying-in-wait attitude. The Frogmouth has no near vision. To focus on near objects he arches his neck, like an elderly person who bends his head to look over his spectacles. He would probably see the approach of prey and move to meet it, instead of waiting until it was beneath him.

The Frogmouth is stated to be nocturnal. Those which I have kept were active only in the dusk of evening and very early morning, except on moonlight nights. Whenever I visited their enclosure during the dark hours of the night they were motionless.

From my observation of captive Phasmids, over some five or six years, they too appear to be crepuscular never moving in the dark hours of the night. Seeing the spider-like movements of these great insects, one realises what an easy prey they would be for a hungry Frogmouth.

Except on moonlit nights I have found domesticated possums to be crepuscular, rather than nocturnal. According to Ronald Munro (*Wild Life*, 1940) parent Frogmouths fed their baby in the early part of the night, with long spells between as midnight approached. In another issue of the same journal he described the female as hunting in the light of a full moon; the male brought food before midnight and before dawn. One parent flew with a moth which it hit against a tree to kill it.

There are several records of treecreepers as victims of the Frogmouth. This bird is a late forager, and will itself, at a sound, freeze on the hole of a tree, a habit that should make it an easy prey. T. P. Moore, April, 1938, watched a treecreeper fly on to what appeared to be a bit of dead wood: "The top of that bit of dead wood switched round and opened in a flash, taking in the flapping little woodpecker."

Roy Wheeler (*Emu*, 1943) saw a Frogmouth battering feathers off its prey, a treecreeper again. I would suggest that the beating was not to rid the bird of its feathers, which the Frogmouth is quite happy to swallow, nor to crush the bones, but to "kill" it, on instinctive action, even when quite unnecessary, as when a dead mouse is fed to it. However, I have never fed a living mouse or bird to my Frogmouths, so I write with no authority on this point. Captive birds gulp down meat instantly, but mice and nestlings, although already dead, are sometimes "killed" with a kookaburra-like flip, as if cracking a short whip.

One of David Fleay's Frogmouths beat a half-grown rat to pulp before swallowing it." He tells me that he had been attracted to Frogmouths on tree-limbs at night through the beating sounds they make in thrashing frogs against a bough.

There was rarely any attempt to batter the mice I fed to my pets. They were gulped instantly, although a jerk was sometimes given afterwards as if to alter the position of the mouse within the bill — I assumed to facilitate swallowing. Often the bird remained for more than a minute, with the tail of a mouse protruding from its bill, before giving the jerk.

Mealworms fed alive were instantly rejected, although when crushed they were relished. If the Frogmouth has the bird-of-prey habit of ejecting pellets of bones, fur, etc., I have never noted it, in the garden or beyond, or under the perches of tame ones, even after mice had been swallowed whole. This suggests that the digestive juices are able to deal with such things.

Some birds are said to eat tree-bark to aid in ejecting pellets. According to Pycraft, the great crested grebe, instead of loading its gizzard with stones for digestive purposes, uses its own feathers.

Although neither carnivorous nor a bird of prey in the accepted sense, the Frogmouth has adopted a partly fresh diet. He is often seen watching for frogs; and as for nestlings, he is condemned out of the shrieking bills of other birds who bitterly resent his proximity. How they hate him! I have seen them flutter, screaming, round the vacant post on which he sunned himself the day before. One feels that there must be some justification for such bitter hatred.

The Frogmouth is indeed an ardent sun-worshipper. See him as he lies, perfectly flat, wings at fullest stretch, on branch or ground, in a patch of warm sunshine. Yet not often may he indulge the passion. He is no sooner discovered than he is harried by many birds, who rush to a concerted attack.

Published analyses of the stomach-content of Frogmouths have shown only a small percentage of birds and mice in his diet. The researches of Dr. Serventy and others (*Emu*, Oct., 1936) show most of his victims to be nocturnal (crepuscular?) and un-winged. After sifting much material, Dr. Serventy pronounced the Frogmouth chiefly a ground feeder. He records the stomach content of a Frogmouth, analysed by Mr. J. Sutton, consisting of 13 specimens—crickets, spiders, centipedes, 1 mantis and 1 moth-larva, all nocturnal, except one, and only three of them winged.

William Heathcote (*Wild Life*, 1943) records the capture of large moths (emperor and wattle-goat) dragon-flies and three large green leaf-insects (Phasmids). The Phasmids were killed by hitting them on a branch, while held in the beak. Often he was able, like David Fleay, to locate the birds by this sound. He had seen them at a street light. They would keep out of the circle of light and catch insects as they flew into the shade. As Frogmouths in his garden often flew to the street light just across the road, I assumed that they were capturing moths, beetles, etc.

In Dr. Serventy's analyses, moths formed only a negligible part of the diet, but in this garden they often gave the impression of pursuing moths, and even of taking them from tree trunks. Those on the wing were quite literally pursued. There was never any sustained hawking, but a direct flight from the tree to prey and back to tree.

PERSONAL NOTES

Members will be glad to know that Mr R. H. Croll, a former President of the Victorian Field Naturalists' Club, who has been ill for several months, is considerably improved in health. A new book of his editorship—correspondence between the artists Roberts and Streeton—was recently issued.

Another new book by the Editor of this journal, Mr. A. H. Chisholm, is the life-story of the poet C. J. Dennis. It is entitled *The Making of a Sentimental Bloke*.

A NEW SPECIES OF *SCIRPUS* (CYPERACEAE)

By S. T. BLAKE, Queensland Herbarium, Brisbane.

The genus *Scirpus* is represented in Australia by a large number of species, many of which are very difficult to discriminate and some of which are poorly understood. The new species described in this paper is represented in a number of Australian herbaria, as is indicated in the enumeration of specimens by the following abbreviations proposed for international use by Lanjouw in Chronica Botanica v. 142-150 (1939):

Tate Herbarium, University of Adelaide	AD
Queensland Herbarium, Brisbane	BRI
National Herbarium of Victoria	MEL
National Herbarium of N.S. Wales	NSW
State Herbarium, Perth	PERTH

SCIRPUS DISSACHANTHUS sp. nov. (sect. *Actaeogeton* Reichb.)

Herba annua usque ad 30 cm. alta. Culmi caespitosi, graciles, compresse trigoni, usque ad 20 cm. longi, enodes vel uninodes. Folia plerumque ad vaginas ore oblique sectas mucronatas redacta, raro breviter laminifera. Inflorescentiae dimorphae: altera terminalis sed quasilateralis bractea longa suberecta compressoteretī culmum quasi continuante et ejus ¼-⅔ aequilonga sustenta, alter ad culmi basin sita et vagina obtecta. Spiculae terminales 1-3 sessiles, flavescentes, oblongae, obtusae, haud angulatae, plerumque 7-10 mm. longae et 2-2.5 mm. latae, multiflorae. Glumae arcte appressae, ovatae, acutae, cuspidulatae, tenuissimae, marginibus latis hyalinae glabrae, concavae, plerumque circa 2.5 longae. Stamina 2. Stylus profunde bifidus. Nux fusca, suborbicularis, breviter apiculata, inaeque biconvexa, transversim conspicue crebreque undulato-rugosa, plerumque 1.25-1.3 mm. longa et 1.1-1.25 lata. Setae hypogynae 6, pallide brunneae, retrorsim minutissime scabrae vel laeves, inaequales, longiores nucem fere adaequantes. Inflorescentia basicaulina ad florem solitarium femineum redacta; glumae 0, stamina 0; stylus longissimus trifidus; nux nigra, ovoideo-ellipsoidea rostrata, subtrigona subtricostataque, transversim leviter undulato-rugosa, 2.3-2.5 mm. longa (rostro inclusō), circiter 1.5 mm. lata. Setae hypogynae 2, nucem adaequantes, pallide brunneae.

Annual, up to 30 cm. high. Culms tufted, straight or curved, compressed-trigonous, closely striate-ribbed otherwise smooth, glabrous, up to 20 cm. long, about 0.5-0.8 mm. thick, nodeless or sometimes with a node a short distance above the base. Leaves usually reduced to sheaths, 1 or 2 closed, striate, fairly tight with a slightly inflated oblique apex which is mucronate or else bears a short erect setaceous blade channelled on upper surface and rarely exceeding 4 mm. long (or very exceptionally so long as 6 cm.), the margins and anterior part hyaline and minutely dotted with red-brown. Inflorescences of two kinds, the one pseudolateral at the apex of the culm and bracteate, the other basal. Involucral bract solitary, appearing as though a continuation of the culm, compressed-terete, erect or incurved, some-

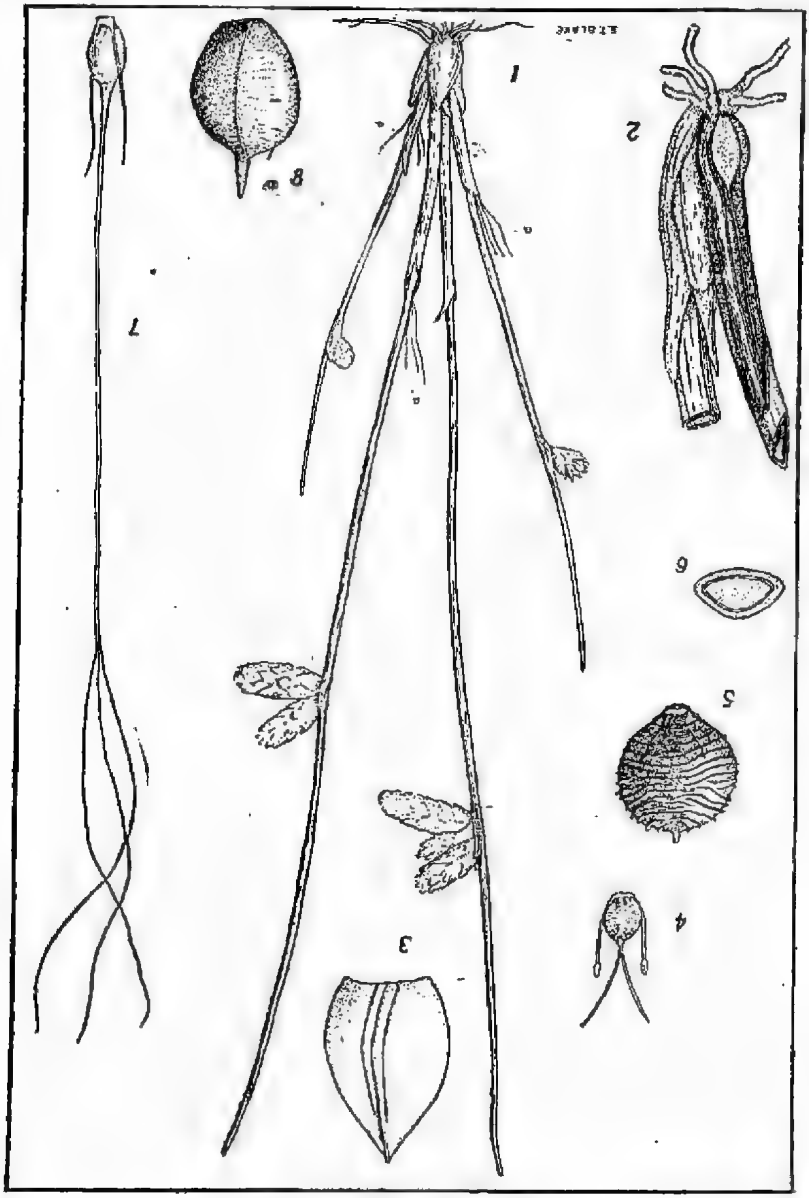
times excurved near tip, mostly ⅓-⅔ as long as the culm and up to 9.5 cm. long. Terminal spikelets all sessile, 1-3, yellowish or greenish yellow, oblong, cylindrical and not angular, obtuse, 7-10 mm. long or lengthening to 12 mm. after the fall of the lower glumes, 2-2.5 mm. wide, many-flowered. Glumes closely appressed, ovate, acute, cuspidulate, very thinly membranous with broad hyaline sides, glabrous, concave, finely 3-nerved below and rather broadly but shallowly keeled in upper part with the keel excurrent as a very short erect or excurved point of 0.1-0.15 mm., in all 2-3 (mostly about 2.5) mm. long. Stamens 2; anthers 0.25-0.35 mm. long. Style 2-fid, the entire part very short, in all about 3.7 mm. long. Nut dark brown, suborbicular to somewhat obovate, shortly apiculate, unequally biconvex, closely and prominently undulate-ridged, for the most part 1.25-1.35 mm. long, including the mucro of 0.1-0.15 mm. long, 1.1-1.25 mm. wide. Hypogynous bristles 6, pale brown, most minutely retrorsely scabrous or smooth, irregular in length, from ¼ to nearly as long as the nut. Basal inflorescence consisting of a solitary female flower in the axils of the basal leaf-sheaths; glumes absent; stamens absent; style very long, in all about 9 mm. long; branches 3, about 5.5 mm. long; nut black, slightly shining, ovoid, ellipsoid, obtuse and rostrate, turgidly subtrigonous and indistinctly 3-ribbed, indistinctly transversely undulate-ridged, 2.3-2.5 mm. long (including the beak of about 0.5 mm.) and about 1.35-1.75 mm. wide; hypogynous bristles 2, as long as the nut, pale brown, slender, flat.

WESTERN AUSTRALIA.—North-West Division: Fortescue R., Nickol Bar district, in 1878, *J. Forrest* (MEL). Kimberley Division: Near junction of Lennard and Barker Rivers, *W. V. Fitzgerald* 542 (PERTH).

NORTHERN TERRITORY.—North Australia: Without further indication of locality, *F. Mueller* (MEL). Central Australia: Deering Creek, *R. Tate* (AD).

QUEENSLAND.—Mitchell District: Geera, E. of Barcaldine, at edge of lagoon on sand, 900 ft., Dec. 6th, 1935, *S. T. Blake* 10362 (BRI). Leichhardt District: *Gainsford*, in 1869, *E. M. Bowman* (MEL). Warrego District: Dynevor Downs, E. of Thargomindah, at shady edge of swamp, ca. 500 ft., May 22nd, 1939, *S. T. Blake* 14080 (TYPE in BRI, MEL, NSW). Maranoa District: About 30 miles W. of St. George, in gilgai in brigalow (*Acacia harpophylla*) scrub, ca. 600 ft., March 15th, 1936, *S. T. Blake* 10817 (BRI, MEL); Noondoo, near Dirranbandi, in wet places near tank, ca. 600 ft., May 16th, 1939, *S. T. Blake* 14022 (BRI, MEL).

SOUTH AUSTRALIA.—Murray River, in 1890, *Miss Wehl* (MEL, BRI). (Probably also in New South Wales and Victoria)



For explanation, see page 120.

An interesting species, noteworthy for the fact that, besides the terminal inflorescence (pseudolateral by reason of the erect bract simulating a continuation of the stem), the plants also produce flowers *at the base of the stems* surrounded by the leaf-sheaths. These flowers are solitary, without stamens and without subtending glumes, but with long styles, the branches of which are exserted from the enclosing sheath. *S. uninodis* (Delile) Boiss* and *S. laevis* S. T. Blake are two other Australian species with similar flowers in the axils of the leaf-sheaths. Three comparable species from Madagascar have been discussed by Chermezon in Arch. Bot., Caen, Bull. 1929, iii. 193-197 (1931), but in these the basal flowers are digynous in the same manner as those in the terminal inflorescences, not trigynous and thus sometimes differing from them as in our species; also one of them, *S. Perrieri* Cherm., has well-developed glumes.

Thirty mature nuts were examined from the terminal inflorescences of the type-collection; of these one was trigonous, another was definitely black in colour and a third was definitely obovate in outline. The average length was 1.25 mm. and the average breadth 1.15 mm. Only three mature and two submature nuts from the basal spikelets were examined, though flowers are frequent. The nuts are at length set free by the disintegration of the sheath.

The specimens collected by Mueller and by Bowman were referred by Bentham, Fl. Austral. vii. 332 (1878) to the American *S. debilis* Pursh (*S. Smithii* A. Gray; not *S. debilis* Lam.). Fitzgerald, in Journ. & Proc. Roy. Soc. W. Austr. iii. 123 (1917) has referred his specimens to *S. erectus* Poir., with which he regarded *S. debilis* Pursh as synonymous, and Forrest's specimens to *S. supinus L.* It is closely allied to *S. uninodis* (Delile) Boiss., of which Australian specimens were referred by Bentham, op. cit., p. 331, to the closely similar *S. supinus* L. These species may be distinguished as follows:

*This name is used here for convenience, as it is the one used by A. A. Beetle for this widely-spread tropical and subtropical species in his recent account of the section *Actaeogeton* in Am. J. Bot. xxix, 653-656 (1942). But during the study of *S. distachanthus* it became evident that the nomenclatural position is very complex, and until this is solved the correct name must remain doubtful.

Spikelets ovoid, always sessile; glumes finely many-striate; nut definitely obovate in outline, always black; stems never with a node above the base; no flowers in the basal leaf-sheaths; leaf-blades usually well developed:

Nut strongly transversely ridged, trigonous (Europe) .. *S. supinus.*
Nut weakly ridged to nearly smooth, usually biconvex and thin (North America) .. .. *S. Smithii*

Spikelets not or scarcely ovoid, some occasionally on developed rays; glumes 3-1-nerved with broad thin sides; nut suborbicular rather than

obovate, brown or black; stems frequently with a node well above the base; usually with flowers in the basal leaf-sheaths; leaf-blades usually rudimentary:

Spikelets angular, gradually narrowed upwards, some usually pedunculate and then with a secondary bract present; glumes strongly keeled often with a prominent mucro, stained or streaked with red-brown, the margins minutely ciliolate; nut black; stem usually 1-noded ..... *S. uninodis*

Spikelets oblong cylindrical, very obtuse, not at all angular nor tapering, always sessile; bract always solitary; glumes indistinctly keeled and then only in the upper part; mucro not exceeding 0.15 mm., slender, sides white-hyaline or stained with yellow, margins glabrous; nut in terminal spikelets brown; stem usually nodeless ..... *S. disrachanthus*

S. dissachanthus can be distinguished from all others by the characteristic shape of the spikelets, the brown nut, and the glabrous glumes; the minute hairs at the margins of the glumes in the other species are not too readily seen, but they appear to be constantly present. The specific epithet is derived from the two Greek words *dissache*: in two places, and *anthos*: flower, in allusion to the two kinds of inflorescences.

EXPLANATION OF PLATE.

Scirpus dissachanthus S. T. Blake (drawn from type).

Fig. 1, plant, natural size; style-branches of basicauline flowers at *a*, *a,a*; 2, base of portion of plant, with part of leaf-sheath cut away to show semi-mature basicauline inflorescence in position, × 5; 3-6, details of spikelet from terminal inflorescence:—3, glume; 4, flower; 5, nut; 6, transverse section of nut; 7-8, details of basicauline inflorescence:—7, flower; 8, nut. Figs. 3-8, × 10

RECORD OF RESEARCH.

Co-operation of members is requested in the following researches:—

Mr. T. S. Hart—Victorian Mistletoes (see *Vic. Nat.*, July 1938, page 44). 1—Does *Loranthus linophyllus* occur near Melbourne? It is suspected that *L. Preissii* has been recorded as *L. linophyllus*. 2—How far west does *Phrygilanthus celastroides* extend? He has it from Gippsland Lakes. 3—*Persoonia*: Which species are found in Victoria? What is their range? Is *P. lanceolata* in Victoria? *P. lucida* has been confirmed at Bendoc and *P. confertiflora* as far west as Haunted Hills. 4—*Lepidosperma*: Occurrence near Melbourne. Any plants should be noted, with a view to obtaining flowers and fruit in early and middle or late summer. Specimens in flower and fruit of any of the above should be posted to Mr. T. S. Hart, at Dorset Road, Croydon, with full notes on locality and abundance.

Mr. F. S. Colliver asks for accurate observation of seashells which have been bored. He particularly wants specimens of the agents which do the boring.

[N.B.—Members investigating any natural feature are requested to communicate with Mr. A. J. Swaby, 17 Avondale Street, Hampton, S.7.]

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PROCEEDINGS

The monthly meeting of the Club was held on September 9, 1946, at the Lecture Hall of the Public Library, the President (Mr. F. S. Colliver) presiding and about 200 members and friends attending.

Discussion arose regarding the Australian Natural History Medallion. From the committee Mr. P. Crosbie Morrison had been asked to allow himself to be nominated. Mr. Morrison, however, had written stating that he would rather not accept nomination and suggesting that Mr. G. Lyell, of Gisborne, would be a worthy nominee from the Club. Mr. V. H. Miller thereupon nominated Mr. Lyell; Mr. Railton seconded, and the motion was carried. Mr. H. Stewart, however, said that as Mr. Morrison's nomination was made from the committee, the Club should not accept his refusal. He moved to this effect. The motion was seconded by Mr. Swarbreck and carried. The President said that both nominations would be referred to the committee for consideration.

Mr. A. D. Hardy and Mr. A. J. Swaby spoke on progress being made with the arrangements for the Nature Show and asked for the names of helpers to collect and to assist in setting up.

Mr. J. Ros Garnet spoke on the suggestion that Dunlop Perdriau be asked to keep a section of their proposed Garden City at Beaumaris in its virgin state for all time. Mr. Miller, commenting, said that before reserves were formed, vandals should be dealt with.

The following were elected as Ordinary Members of the Club: Miss Edna Morrison, Messrs. John Bale, C. T. Barbour, D. W. Lyndon, and W. C. Watts; and as Country Member, Mr. Ray Hunt.

The President, as delegate, reported having attended the Science Congress at Adelaide, and stated that several Club members were there. The Congress was an outstanding success; some 1400 members were present and many admirable papers were placed before the various groups. Social functions were held, and many meetings were arranged with breaks that enabled contacts to be made and friendships to be renewed. A good series of excursions was held, both for pure and applied science, and members from other States were able to see at first-hand some of the beauties of South Australia. Whilst in Adelaide, Mr. and Mrs. Colliver and Mr. R. Kershaw attended the annual meeting of the South Australian Naturalists' Club, and by invitation Mr. Colliver addressed the meeting and conveyed greetings from our Club.

NATURE NOTES

Mr. H. Stewart reported a Mudlark's nest in a tree at the corner of Nicholson Street and Victoria Street, near the Royal Society's Hall.

Mr. A. H. E. Mattingley gave a short note on Macquarie Island, and lamented the fact that the Japanese should be allowed to take up whaling again. Millions of sea-birds, particularly penguins, abounded there and on previous occasions the Japanese had made use of them for oil. The albatrosses on Laysan Island were in millions, and before the war the Japanese took their eggs by truck-loads and destroyed the birds for their feathers. On Macquarie Island a parrot and a rail had been exterminated by cats. Mr. Mattingley considered that it was necessary for us to protect the birds during the breeding season, and prevent the Japanese from carrying out wholesale slaughter of them. (Slides were shown to illustrate these remarks.)

Mr. Railton stated that he had noticed that when plants growing in a pot were watered copiously a vigorous weed growth occurred, and instead of smothering the plants they flourished, and he wondered what was their association. (Pot plants illustrating this were exhibited.)

EXHIBITS

Mr. and Mrs. E. Muir: Eighteen botanical specimens from Dimboola Reserve.

Mrs. C. French: Twelve varieties of native flowers, garden-grown at Canterbury.

Mr. T. S. Hart: Sword Sedges (four species) and a tabulated summary of Melbourne species.

Mr. A. A. Baker: Fossil woods, oak from English swamps, and undetermined material from Bacchus Marsh, Altona, Mornington, Wonthaggi, Omeo, and various places in N.S.W.; also for comparison specimens of living species, including *Casuarina stricta*, *Banksia integrifolia* and *Leptospermum laevigatum*.

Mr. C. J. Gabriel: Marine shells, including *Brechites radix* Desh., Amboina; *B. vaginiferum* Lam., Red Sea; *B. dichotomus* Chenu., N. Aust.; *B. pulchrum* Desh., Singapore; *Dacosta australis* Sby., N.S.W.; *Humphreysia strangei* A. Ad., Vic. and Tas.; *Gastrochaena tasmanica* T. Wds., Vic.

Mr. T. Griffiths: Mosses and lichens in fruit.

Mr. J. Ros Garnet: Collection of Bryophytes from Rosebud.

Mr. E. E. Lord: Species of *Pterostylis*, found by Mr. E. Muir at Dimboola, painted by Mr. Stan Kelly, Ararat, and at present being investigated by the Rev. Rupp. A fine example of gall-forming scale (female) on a Eucalypt (specimen forwarded by Mr. Davey of Toolern Vale), vigorous growth of *Passiflora molissima* in pots, in association with weeds as distinct from weaker growth in clean pots. (This has been noticed for many years by Mr. James Railton.)

Mr. F. S. Colliver: Specimens pertaining to the Cambrian Glacial Epoch in South Australia, including Sturtian Tillite, Tapley Hill Shale, True Varve from Hallets Cove, Fluvio-Glacial Grits, etc.

VOICES OF THE FROGMOUTH AND HIS NIGHTJAR RELATIONS

By EDITH COLEMAN, Blackburn, Vic.

The most familiar note of the Frogmouth is a deep "Oom-oom," uttered many times, a rhythmic, pulsing sound. Mr. A. H. Mattingley, who heard it mostly on moonlit nights, estimated the number of "ooms" at 14 to 150 without cessation. (*Emu*, 1910.)

Showing the bird's outline broken up by streaks and shadows.

Our captives commenced at dusk, in response, we often thought, to the calls of wild ones. The sound penetrated the house although their enclosure was some distance away. The "Oom-oom" that came down the chimney from a wild one perched on top was eerie. Even my tame possums, who always came out at dusk, retreated into their cubby-holes when the Frogmouth commenced to call. They possibly have some cause to fear him. With his poorly developed feet he could grasp but a tiny one, but his wings, as we have seen, are powerful enough to knock a full-grown ring-tail possum tumbling off the rose-arch.

The call of the baby Frogmouths, as we interpreted it, was an oft-repeated "A-woo, A-woo," with the accent on "woo." Florence Irby's pet Frogmouth made a low growling sound (*Emu*, 1927). Bushmen, too, had heard this call. Her pet's cry of alarm when annoyed was a deep, low "Too-toot," a croaking, frog-like sound. D. F. Thomson (*Emu*, 1923) records the squeaking, wailing cry of a young one when picked up, the only note it uttered. One of my captives gave a coughing, barking sound when given water from a tea-spoon; presumably this was a note of protest.

Muriel Cheney (*Emu*, 1914), who heard Frogmouth and Boobook Owl calling simultaneously and thought no one should confuse them. She described the Boobook's call as leisurely, uttered a note at a time; the Frogmouth's as a quick one, uttered seven to ten times in succession. The Boobook made a slight pause between the syllables, "Boo—book." The Frogmouth made no appreciable pause. David Fleay, in a letter to the writer (Nov., 1943), described the Frogmouth's note as a very rapid series of "oo-oo's," like the engine of a motor cycle in the distance, and its danger call as a quick, double-syllabled cry of "oo-oo," differing from the usual one. This cry, he thinks, has some resemblance to that of the Boobook Owl. He, too, thinks they would not be confused by any one who had heard both.

The Frogmouth has another call to which I have seen no reference, a call which is apparently given only under great stress of fear or annoyance, or perhaps as a *cri de coeur*. It is an eerie, hair-raising scream, which, in many years, I have heard only five times. If this is the "screaming woman" call, it would be that of a drunken harridan, such as Tony Sarg might portray. To some extent it is a blend of the Black Cockatoo's screech and the harsh note of the Crow, but far, far worse than either. The cry is uttered with wide open bill, glaring expression, and fluffed-out feathers.

Twice the cry was uttered when I caught a bird, once when he was looking down at a neighbour's pet Magpie, and once when my little dog startled it. I did not discover the cause of the fifth scream, but found the Frogmouth clinging to the wire netting of the aviary. Was there a wild bird outside? Was this his "cry of the heart"?

I recently came upon the description of a Ceylon bird-call which fits it perfectly. The Singhalese, who call it Devil-bird, regard this bird with horror, as a harbinger of evil. P. H. Gosse (1860) believed it to be the Brown Owl. The cry, according to Mr. Mitford, of the Ceylon Civil Service, is indescribable, the most appalling that can be imagined, and scarcely to be heard without shuddering. He could only compare it to a boy in torture, whose screams are being stopped by strangling, a description which fits the Great Horned Owl of North America—the "half-suppressed scream of a person suffocating or throttled."

Of the Ceylon owl Mr. Mitford says: "It has another cry, like that of a hen just caught," and this, I think, describes perfectly the scream of my Frogmouth—that harsh scream of a captured hen, which always sends me indoors.

It is possible, I think, that the Ceylon bird, which was never seen actually producing the scream, was a Nightjar, to which the Frogmouth is related, and whose notes certainly resemble some of the Frogmouth's calls.

Viscount Grey of Falloden described the churring of the Nightjar as a most soothing sound, continued for long periods without a break — quite unlike a bird-voice to one hearing it for the first time — a "continuous sound such as the hum of a threshing machine," which recalls David Fleay's comparison of the Frogmouth's call to a motor-cycle engine, and which I (Dec. 18th, 1943) likened to the rhythmic sound of a stationary steam engine. Once, however, the Falloden Nightjar gave a piercing shriek, such as Viscount Grey had never heard from any bird, a shriek that seemed to be uttered "at" him. It suggested not so much fear as loathing. This seems to imply that the horrible shriek of our Frogmouth is a family call.

Even the normal voice of the British Nightjar is compared with so many and such varied sounds that it must have an extensive repertoire. One writer describes it as like "a thin lath fixed at one end and in a state of vibration at the other," loud enough to be heard half a mile away, while another of its calls is likened to "swinging a thong in the air." Some of Shakespeare's allusions to the Screech-Owl should probably have been attributed to our Frogmouth's relative, the Nightjar.

Lenox (*Macbeth*), describing a night of horror, full of lamentations and strange screams of death, refers to the "obscure" bird which clamoured the livelong night. As the less "obscure" Owl was sometimes "seen" to utter its shriek, it was regarded as the prime bird of evil. "The owl shrieked at thy birth, an evil sign," says Henry VI to Gloster. "It was the owl that shrieked, the fatal bellman which gives the stern'st good-night," says Lady Macbeth.

It is possible, I think, that many of those fearful night shrieks should have been attributed, not to birds, but to crepuscular and nocturnal animals, such, for instance, as the badger, whose prolonged *cri de coeur* is a most ghastly scream, "as of someone being slowly murdered" (Michael Blackmore). As the shy nocturnal badger is rarely seen, some such mystery was inevitable.

Our Echidna is said to scream shrilly. Natives of northern Australia say that it utters a wailing cry when on the prowl at night. Although I have had exceptional opportunities of watching Echidnas, day and night, I have not heard either cry. It is possibly a mating call, uttered at night, in which case few people would actually "see" it uttered. It might, indeed, be confused with the "screaming woman" bird.

Not to unleash the whole pack of horrible night screams, I think we may assume that many of them, coming from unseen nocturnal creatures, were attributed to night birds, and because of the mystery and obscurity that shrouded them they were regarded as portents of evil; a mystery that has found its way to Australia.

A NEW SPECIES OF *THELYMITRA* R.Br. (ORCHIDACEAE)

With notes on its nearest congener, *T. chasmogama*.

By W. H. NICHOLLS, Melbourne

THELYMITRA IRREGULARIS, sp. nov.

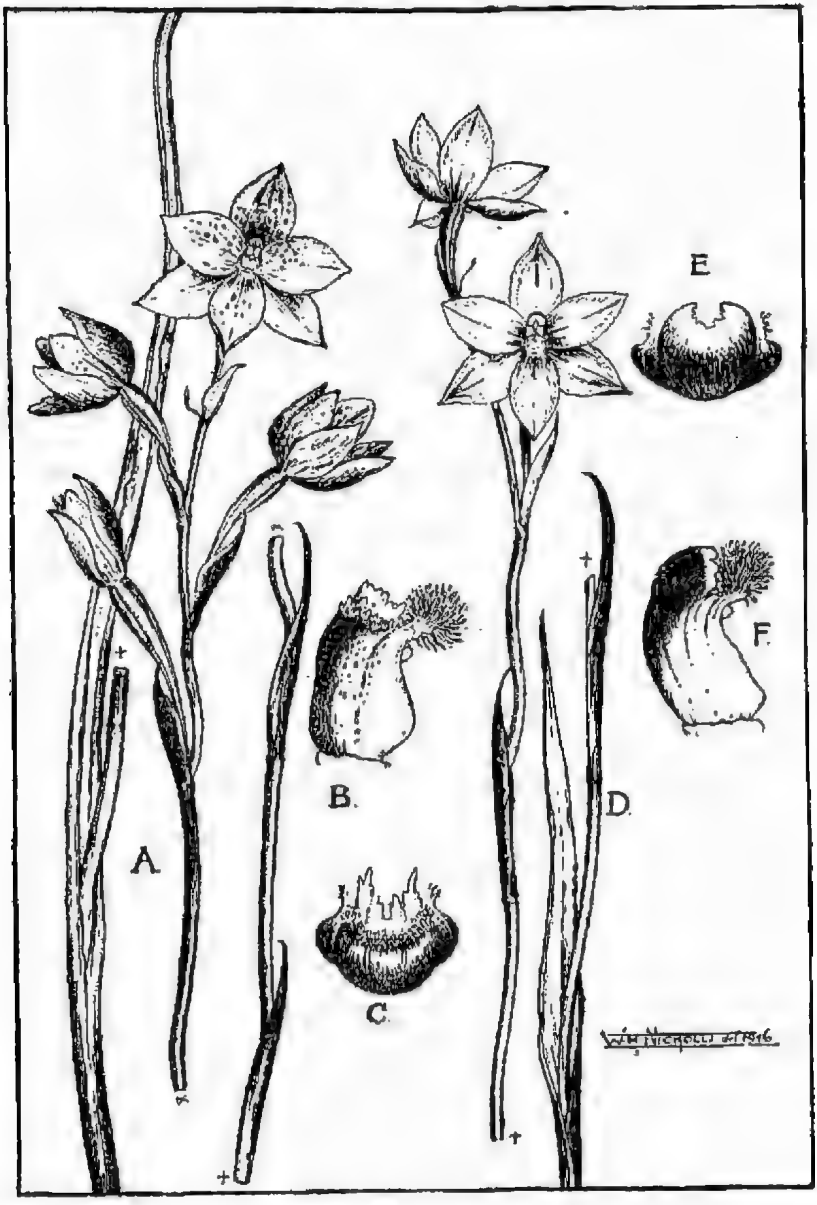
Planta gracilis, glabra, 25-40 cm. alta. Folium anguste-lineare, subtenue, subrigidum, canaliculatum, acutum, circiter 10-22 cm. longum, basi vaginans. Caulis carneus, subflexuosus vel fere strictus; bracteae 2, subulatae, vaginantes. Flores 2-4, carnei illis Th. chasmogama, Rogers similes. Pedicelli graciles; ovaria subgracilia, teretia, bracteae parvae, acutae. Segmenta perianthii elliptica, maculata. Columna circiter 6-7 mm. longa, sub-cucullata, maculata; lobi laterales penicillati, lutei; lobus intermedius erectus, abruptus; marginibus irregularis, dentatus, ad basin fimbriatus. Anthera obtusa, sub lobis penicillatis, apice conspicuo, pollinarium facile deportum.

A slender glabrous plant from 25-40 cm. high. Leaf narrow-linear, about 10-22 cm. long, rather thin; channelled, acute. Stem pink, with a tendency to angulation or nearly straight. Stem-bracts 2, subulate, sheathing. Flowers 2-4, on slender pedicels, each subtended by a small sheathing bract. Ovary rather slender, terete. Perianth-segments bright rose-pink, similar to those of *T. chasmogama* Rogers[1], expanding freely, elliptical and finely speckled with dots. Column about 6-7 mm. long, the lateral wings produced upwards into 2 golden-yellow penicillated processes as in *T. chasmogama;* the hood short and abrupt, but *not produced forwards into a definite tube*, as in *T. chasmogama;* the apex bright yellow, and prominently, also irregularly dentate; an erect collar-like fringe of small calli immediately below. Apex of anther obtuse, showing distinctly below the tufted lobes. Anther-case dehiscing freely. Stigma small with pink upper border. Flowering September, October, November.

Distribution: Victoria — Croydon (F. G. A. Barnard, Oct., 1929); Wonthaggi (E. H. Hohnann, Nov., 1934, *type*, a perfect four-flowered specimen). New South Wales — Asquith, near Hornsby (Rev. H. M. R. Rupp, Sept., 1945).

The new *Thelymitra irregularis* is clearly related to *T. chasmogama*, but readily determined by the very distinct structure of its column mid-lobe, and the finely dotted perianth (dots are present in some degree on the column also). The specific name is in reference to the broken and very irregular toothed median lobe of the column. The pollinary mechanism of both species is adapted for cross-pollination.

T. irregularis is distinguished from *T. rubra*, FitzG.,[2] as also from *T. carnea* R.Br.[3], by the presence of penicillate lobes, etc. From *T. luteociliata* FitzG.[4] it is separated by the readily-expanding perianth; the flowers of *luteociliata* rarely open, and,



KEY TO ILLUSTRATIONS:

Figs. *A.*, *Thelymitra irregularis*, sp. nov.; B., Column from side; C., Column from above (hair-tufts removed).

D., *Thelymitra chasmogama*, Rogers; E., Column from above (hair-tufts removed); F., Column from side. (Figures A and D about natural size).

like those of *Th. rubra* and *Th. carnea*, are pollinated in early bud stage.

There has been much confusion between *T. luteociliata*, *T. chasmogama* and *T. irregularis* for some years. *T. chasmogama* and *T. luteociliata* are somewhat difficult to separate in the bud stage; both are rare orchids. What some of us have been calling *luteociliata* is now recognized to be *chasmogama* (thanks to the late Dr. R. S. Rogers); in Victoria we had lumped them.

In *The Victorian Naturalist* (Vol. lvi. (1939) p. 63), the writer incorrectly interpreted *T. chasmogama*, mis-applying that name to the species now described as new. The finding of true *chasmogama* among orchid exhibits at the Wild Flower Show, held in 1945 at Hawthorn, provided a solution to the tangle. This material (approximately 8 specimens) was collected near Ararat (Vic.), and forwarded to Miss L. Banfield.

The late Mr. Barnard's specimens (2) of *T. irregularis* were imperfect (the leaf and lower portion of the stem were missing). The Wonthaggi specimen, collected by Mr. Homann, has been chosen as the *type* (No. 233, *Thelymitra* species in my herbarium). Unquestionably, *T. irregularis* is a very beautiful sun-orchid, with its delicate tints and markings.

The accompanying illustration depicts both the new orchid and typical *T. chasmogama*[5], of which a brief description only[5] is appended:

T. chasmogama Rogers (flowers pollinated during expansion of the perianth). A plant closely resembling *T. luteociliata* Fitz.G. but with a different hood, which is produced into a yellow *tube with smooth entire margins*. It likewise differs completely in the structure of its pollinarium, which is easily removed, and therefore adapted for cross-pollination, whereas *T. luteociliata* is strictly cleistogamous. Unlike the latter, it opens freely. Found at Golden Grove, in South Australia; also in Victoria (Ararat) and New South Wales (Woodford, Blue Mts., Killara, Kurri Kurri)

REFERENCES:

1. *Roy. Soc. S. Austr. li* (1926) 4.
2. *Austr. Orch. ii, i.* (1884).
3. *Prodr.* (1810), 314.
4. *Gard. Chron.*, XVII (1882), 495
5. Adapted from *Fl. S. Austr.* (J.M.B.) *iv* (1929), 680 (R. S. Rogers).

RECORD OF RESEARCH

Mr. A. J. Swaby, 17 Avondale Street, Hampton, S.7, requests careful observation of "Trigger Plants" and capture of insects springing the trigger. A stiff card with a hole near one end and a small glass jar will serve for a trap. A container for the insect can be placed against the hole and the jar can be slid along to let it pass through. Notes will also be welcome.

Will members engaged in any investigation please send particulars and requests for co-operation.

ON THE TRAIL OF THE MARSUPIAL WOLF.

(Tracking and trapping in the wild and picturesque west of Tasmania).

By DAVID FLEAY, Director, Sir Colin Mackenzie Sanctuary, Healesville, Vic.

Our aim in setting out for Tasmania early in November, 1945, lay in a long cherished wish to secure a pair of the remarkable pouched "Tigers," as Tasmanians call the marsupial wolf, and bring the animals back alive and unharmed for the purpose of intense observation and study; perhaps even to avert by breeding experiments the process of extinction now unhappily nearing its final phase.

Unfortunately, when considered seriously at all, native animals are too often looked at purely from the tourist point of view. Their preservation and study, as essentially Australian creatures of great antiquity and scientific interest, are largely forgotten or left to the mercy of people in other countries. Records of their life histories are few and fragmentary, and, in the case of the distinctive marsupial wolf, or Thylacine, largely unrecorded. Shamefully treated as a zoo inhabitant in the past, this rare animal of fastidious habits is unique in being the largest carnivorous marsupial. The matter of its study must be dealt with now if it is ever to be done at all.

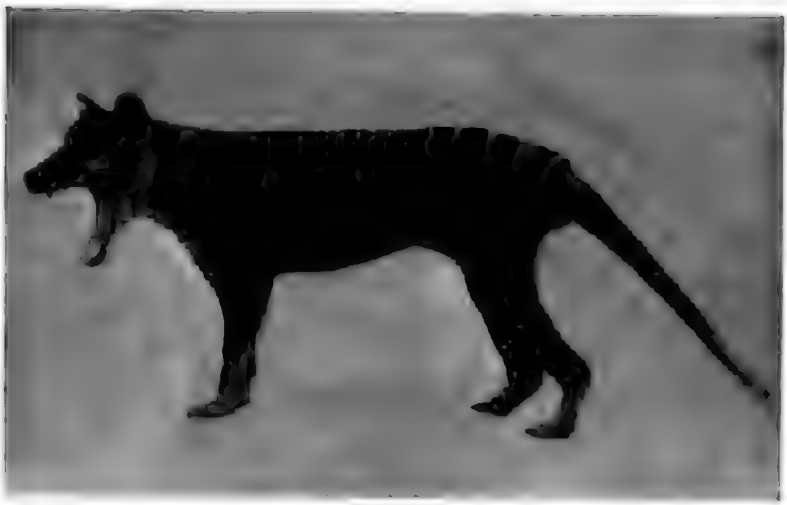
Up to half a century ago, in some parts of Tasmania, the Thylacine (lit. "*pouched dog with a wolf head*") was fairly plentiful. Jack Pearce, of Derwent Bridge, informed me that in the winter of 1898 he snared 15 unintentionally! Because of its menace to flocks, sheep farmers naturally made war against this marsupial wolf, their efforts being aided by a scalp bonus of £1 paid by the government. So, on the eastern side of the island the animal was exterminated. It is said that an epidemic disease also contributed to the depletion of the species.

However, in recent times the value and unique nature of this distinctively Tasmanian mammal has come to be realised, and in the past ten years the Tasmanian Animals and Birds Protection Board has despatched several expeditions to wilder parts of the island in an effort to gain an estimate of the animal's distribution. The last and most productive of these was an investigation in 1938 of the broken and forbidding mountainous areas in the South West, bounded roughly by the West Coast Road, the Frenchman, Prince of Wales, and King William Ranges.

Led by such competent bushmen and observers as Inspector Arthur Fleming and Mr. M. S. R. Sharland, this party found

many footprints of their quarry in a comparatively short time over a good deal of the country traversed. It was obvious, to use Mr. Sharland's words, that "the animal was fairly common and well distributed, and it was probably as numerous here as in any other part of the West Coast."

A careful study of Mr. Sharland's report had convinced me that an expedition to secure living specimens of the "Tiger" would be well advised to work in this same part of Tasmania, particularly along the Jane River, where tracks had been most common. Accordingly, in November 1945, with the willing



Last Marsupial Wolf in captivity, Hobart Zoo, 1933; showing enormous gape. (This animal died in 1934.)

Photo: D. Fleay.

assistance of the Fauna Board and members concerned in the 1938 expedition, we were guided by Inspector Fleming to our jumping-off place at the Jane River Dump below Mt. Arrowsmith, some 37 miles from Queenstown on the West Coast Road. That was the beginning of nearly four months in varying localities on the trail of the "Tiger."

We lived in a heavy rainfall belt, usually with eight days wet out of ten and not uncommonly summer snow and frost; we struggled with Horizontal Scrub and clinging Bauera, or walked through dark and silent rain forests of dripping myrtle sassafras, leatherwood and pine. Floundering journeys with heavy packs and equipment across boggy button-grass plains and strenuous climbing over high ranges were every-day events, not

to mention the endless torment from mosquitoes, blow-flies, biting flies, even rheumatism. Our personnel varied, Major and Mrs. Gavan Crowl and Mr. Roy Alderson (an experienced Tasmanian bushman) being out in November, with Mrs. Fleay, Messrs. Jack Daly and Alan Batchelor working through January, February and March.

Only one track suitable for a pack-horse runs to the Jane River goldfield, some 20 miles south of the West Coast Road, and this we travelled on the first trip with a narrow-gauge, horse-drawn cart loaded with wire traps, snares, food and bed-rolls.

Conditions were suitable for finding Thylacine footprints and other traces, for, contrary to the state of affairs existing in 1938, not a soul, either prospector or "piner," as the soft-wood timber-cutter is known, had lived anywhere in this region for several years In fact, there was not a soul between us and the South Pole! Wherever muddy sections of track appeared on swampy crossings between hard quartzite hills, and wherever we crossed button-grass flats, careful inspection was made of all animal footprints. In fact, after years of aerial spotting in the mainland bush for rare birds and for traces of possum-gliders, my eyes had descended to earth with a vengeance. We were destined to concentrate on mother earth for the duration of our Tasmanian stay. What we wanted were Thylacine tracks, regular ones if possible, so that we could settle down to a long period of systematic trapping, using every conceivable artifice and lure in order to secure our quarry.

Not easily confused with the prints of other animals, and quite undoglike, though leaving an impression superficially resembling that of a wombat front foot, the "Tiger" forepaw track is typically *round* — some three inches in diameter, with five claws well indented and well spaced and two main pads (one large and one small), which leave no strong impression, but form a crescent at the base of the digits round the palm.

Moving as it does at night, the tawny-grey Thylacine, with its transverse brown stripes on the lower back and tail base, was rarely seen even in the days when it was plentiful. Its peculiarly rigid hind quarters and tail, its long body, and comparatively short legs, combine to produce a curious but very characteristic bounding gait. One of the outstanding features of this ancient counterpart of the modern dog and wolf is its amazing mouth gape. When yawning, its upper and lower jaws form an almost straight line!

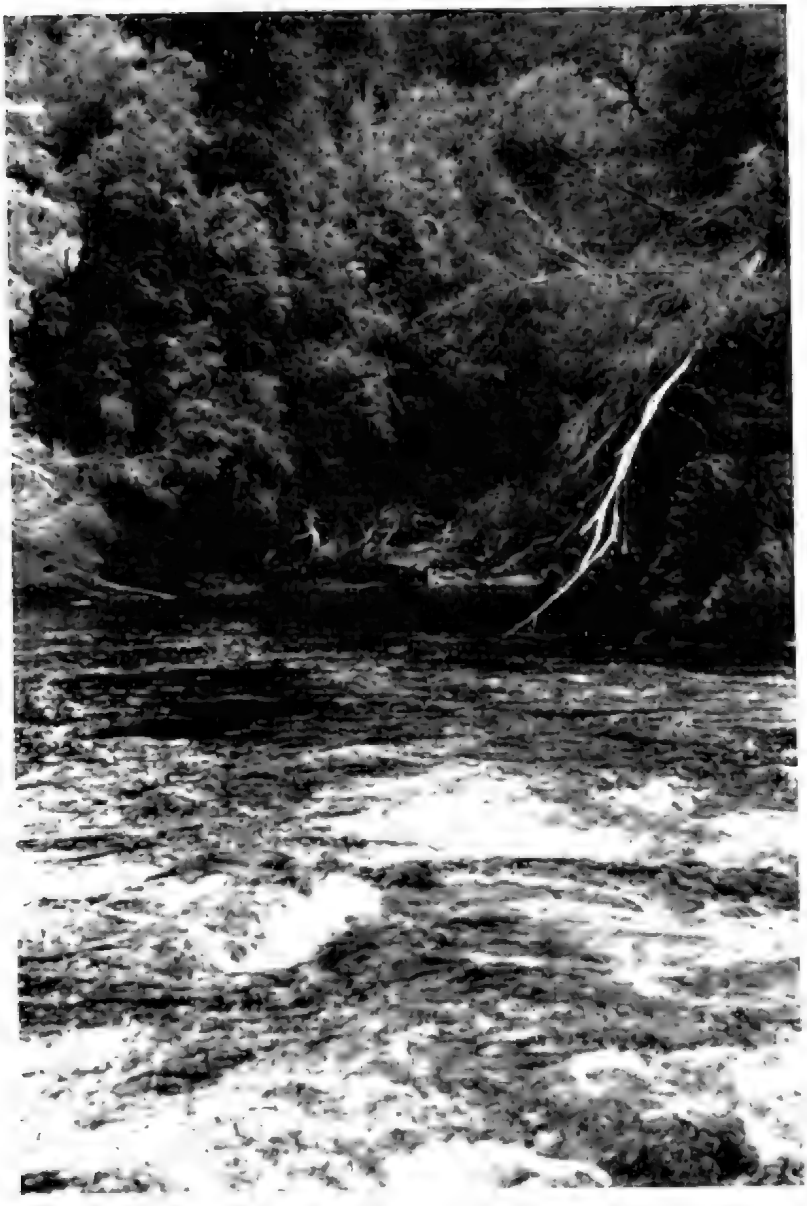
From our November base in a slab hut, on the now scrub-grown Jane River goldfield, we set out day after day in different directions. Along the Erebus River, a tributary of the Jane.

where, in the typically clear tea-coloured water, unafraid platypuses swam in the shelter of dark and gloomy myrtle forests, we set up several of our large steel-framed chain wire traps. The doors of these stout structures automatically locked when released by a pull on the hook within. Naturally, it paid to remember this when going out alone to bait them. Camouflage in the shape of earth and leaves was employed in covering the floors. Fresh, attractive bait was highly important, particularly as the Thylacine is a fastidious eater. Bacon was always a good stand-by — firstly, because we found its taste and salt content appealed to all the carnivorous marsupials we met, and even to possums; secondly, it had a comparative immunity from attack by Tasmania's over-diligent blow-flies; and thirdly, there were the persistent stories told by old-timers of the Thylacine's habit of licking out frying pans and thieving bacon hanging about in camps. Men such as Roy Alderson had caught "Tigers" in box traps on bacon bait in the days when they brought in living specimens slung on poles to the late James Harrison, of Wynyard — the man who acted in Tasmania as an agent for zoos all over the world.

Live decoys used in association with the traps on the Erebus included several fowls and ducks, surely the first poultry ever to reach that remote area. By rare good fortune, fresh eggs appeared daily, not all sharing the sad fate of the one carried for nearly a day by Major Crowl, who dropped it disastrously over the edge of his frying pan at the shack! Unfortunately, as our investigations progressed there were ominous indications that a vast change had been wrought in this part of Tasmania.

In 1938, before the pack-horse track had been constructed, no professional hunters had worked this region; but now, at the end of 1945, there were snare poles along every track and animal pad of consequence that we travelled. A large number of these were what are known as "neckers," as distinct from "treadle" or foot snares. In other words, wallabies and "kangaroos" (large grey Bennett wallabies) or devils and, in fact, any unfortunates coming along in the winter open season ran their necks into suspended wire nooses and, releasing the sassafras, gum or tea-tree poles, were quickly hung up and choked. Game was scarce in all the Jane River country. Bennett wallabies which fed out in the open areas were rarely seen, though the dumpy little rufous wallaby or pademelon was more evident, and "badgers" (wombats) left plentiful footprints out on flats and ridges, where they fed each night on the tough button-grass clumps. Several snarers told me that this stocky Tasmanian species is particularly susceptible to extreme cold. On frosty mornings "badgers" are often found in a torpid state stretched

PLATE X

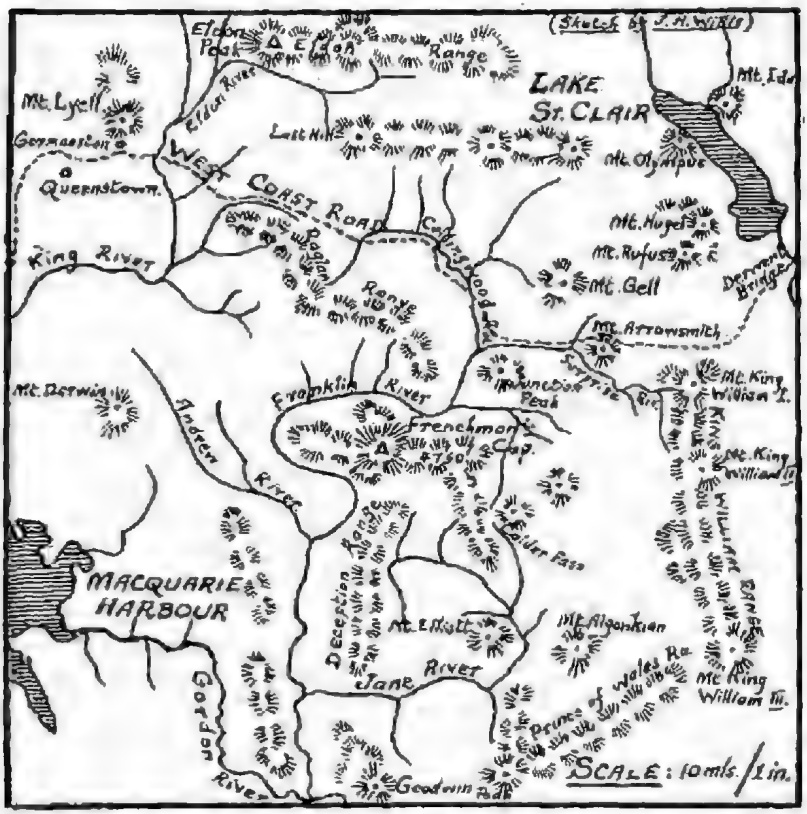


Franklin River, favourite haunt of the Platypus

Photo: D. Fleay.

across a tussock and incapable of movement until warmed by the sun.

Spiny ant-eaters ("porcupines" of the bushman) were really numerous, being more hairy and less spiny than mainland specimens, doubtless by reason of their association with a colder climate. Some were creamy-white in colour, and one, by the state of its developed pouch, was a nursing mother with a baby parked in the vicinity. I had never seen anything like the numbers of ant-eaters and platypuses encountered in Tasmania, and, obviously, among other things the island state is our richest store-house of these two egg-laying mammals. We captured several large and very black tiger snakes and for want of accommodation housed them in an old camp-oven. They settled down very well, being more amiable and sluggish in disposition than their mainland cousins.



Region explored for Thylacine. (N.B.: The present West Coast road skirts Mt. Arrowsmith to the south, *not* to the north as indicated.)

Associated with the large number of snares, now of course in a state of disuse, there was a complete absence of marsupial wolf tracks. How many of the animals had blundered into nooses and by means of their size and strength managed to uproot the poles and perhaps die later in a tangle, or how many had succeeded in cutting snare wire or hemp with their teeth and escaping, is something forever unknown. However, apart from this, with the thinning out of their food supply it is obvious that they would tend to move to more populous game areas.

Late in the 1930's, it is said, one snarer came out from Lightning Plain, near the Frenchman, with three Thylacine pelts among his collection of furs. It is understandable that, from the professional hunter's point of view, carnivorous creatures tearing up wallabies in the snares and spoiling their skins would merit only one type of treatment, and it is undoubtedly true that skin-hunters who are not averse to using baits before seasons open have played a very large part in bringing the Thylacine so quickly to the brink of extinction. Though we caught smaller members of the marsupial wolf family, devils with their bristling-whiskered quaint faces, shocking teeth, and loud whining snarls, and pretty spotted dasyures, or native cats, that came to the hut at night and danced about in the moonlight, and though we found the tracks of tiger cats, domestic cats gone wild, and odd brush possums associated with the ubiquitous pademelon and badger prints, the first visit to the Jane River area was devoid of anything that could be construed as definite evidence of a "Tiger's" presence.

The most interesting catch was a "lady" devil with the maximum number of four rat-sized "joeys" projecting awkwardly from her pouch. Most of the devils in this region were almost completely black in colour, with the merest traces of the usual large white chest, shoulders and rump patches characteristic of the species, and found in devils farther north and east. One big fellow, whose footprints had been found superimposed on our own of previous days, was trapped one morning, and when we turned him loose he ran straight for the river bank, plunged into the icy depths of the Erebus, and swam strongly across, to scamper away among the ferns of the opposite bank.

The wild country here was a rugged, impressive, tumbled region, revealing its primitive beauty only when clouds and mist rolled up to disclose the long 20-mile stretch of the Prince of Wales Range to the east and south-east, the King Williams to the north-east, the great bulk of the east peak on the Frenchman Range to our west, and saw-toothed Mt. Gell faintly, far to the north. All of these ranges, some touching 5,000 feet, were devoid of tree-growth on their upper reaches, having bare rocky jagged-

looking tops, those of diabase compositions showing great rock slides completely bare of plant-life. Here and there in the lower country crimson waratah in full bloom, native "gorse" and banera flowers made splashes of colour; but it was a silent, sombre region, disturbed very occasionally by the wailing cries of the slow-flying black cockatoos, or the flight calls of green rosellas. I was interested in watching these Tasmanian Rosellas indulging in two habits shared by the mainland Crimson species —that of feeding on the substance of leaf galls on peppermint gums and of bathing in the early mornings by fluttering in the high wet foliage of eucalypts.

(To be continued.)

GRAZING ON MT. BUFFALO

At the Melbourne sittings of the Forests Grazing Commission sworn evidence was given before Judge Stretton on behalf of the Club by the immediate past president, Mr. H. C. E. Stewart. Mr. Stewart put forward the Club's views on a grazing lease resumed in 1938 at Mt. Buffalo National Park. He pointed to the gradual depreciation of the alpine native flora over a period of 26 years in which he had been visiting the Plateau.

From his observations, Mr. Stewart said the denudation through fires and grazing had been accelerated since 1939. Some typical high-altitude species that were diminished and threatened with extinction were instanced. Botanical authorities were quoted in regard to two of the dominant species concerning their water holding and erosion resistance qualities. One, the Alpine Ash (*Eucalyptus gigantea*) was sadly reduced by fire and the seedling growth menaced by cattle.

In reply to a question, Mr. Stewart said one complaint registered by the Club suggested the pollution of the Chalet water supply. A new and substantial fence had since been erected around the reservoir. Cattle, however, still browsed during the summer on the extensive grass areas of the water catchment. In his opinion stock also contributed to erosion of the tracks and watercourses.

Copies of reports, including an article printed in *The Victorian Naturalist* for June, 1942, were tabled. The specific case of a small fire in an open area at the 17-mile post during 1944/45 was also presented.

An important book on American forest problems issued in 1945, Richard R. D. Boerker's *Behold Our Green Mansions*, was referred to in the evidence. The Club library copy was handed in for perusal at the Commission's request.

Miss Hilda R. Samsing, a former lessee of the Mt. Buffalo Chalet and a frequent visitor there since, submitted evidence on the previous day as an independent witness. In *The Argus* of July 26, 1946, she was reported to have stated that before the first world war period, when the mountain was free from grazing, it was also free from forest fires, but in later years, after grazing had been introduced, large sections of the forest had been destroyed by fire, and nearly all the beautiful flora had gone from the plateau.

"The National Park of Mt. Buffalo belongs to the people of Victoria, not to the cow men, or to the Lands Department, or any other department," Miss Samsing said. "It is one of the outstanding beauty spots of the world, but it has been shockingly abused."

THE VICTORIAN GRAMPIANS

(A Botanical Retrospect)

By J. W. AUDAS, Melbourne.

Sweeping for fifty miles between Mt. Zero and Mt. Sturgeon, the Grampian Ranges form a wide crescent with convexity toward Melbourne—140 miles east of their central, highest and nearest point, Mt. William (3830 ft.). These rugged sandstone mountains are exceptionally high in comparison with other West Victorian uplands, from which they stand aloof, and their towering escarpments make a noble southern terminus to the Great Divide which began at Cape York.

Probably, when a Miocene sea washed over the vast Murray-Mallee country in South Australia and western Victorian, there was a large "Grampians" promontory—or perhaps even an island. Under the protection afforded by long geological isolation, free from invading competing plants, the original vegetation doubtless followed its own peculiar lines of development and brought forth certain distinctive species. So, we find there today the highest endemism of the State: at least eighteen vascular plants are absolutely confined to the Grampians, while several others occur nowhere else in Victoria, though present also in South or Western Australia. Following are the known endemic species:

Bauera sessiliflora,
Showy Bauera.
Caleana Sullivanii,
Spectral Duck Orchid.
Calytrix Sullivanii,
Grampians Fringe-myrtle.
Dillwynia oreodoxa,
Mountain Parrot-pea.
Eucalyptus alpina,
Grampians Gum.
Grevillea confertifolia,
Dense-leaf Grevillea.
Grevillea Williamsonii,
Serra Grevillea.
Hibbertia humifusa,
Mountain Guinea-flower.
Pleurandropsis phebalioides,
Downy Star-bush.
Pultenæa Luehmannii,
Thready Bush-pea.
Pultenæa Maidenii,
Wedge-leaf Bush-pea.
Pultenæa mollis,
Soft Bush-pea.
Pultenæa patellifolia,
Mt. Byron Bush-pea.
Pultenæa subalpina,
Rosy Bush-pea.
Stylidium soboliferum,
Bristly Trigger-plant.
Thryptomene calycina,
Bushy Heath-myrtle.
Trymalium D'Altonii,
Narrow-leaf Trymalium.
Trymalium ramosissimum,
Broad-leaf Trymalium.

The presence of Coast Banksia, high up on Mt. Rosea, is likely evidence of former maritime conditions, as also are the abundant heathland shrubs now distributed throughout these ranges. Here also is the last vestige of truly alpine vegetation west of Melbourne —Silver Daisy (*Celmisia*) grew on the summit of Mt. William until comparatively recent years, also the subalpine Mountain Pepper (*Drimys*).

Approximately 750 different flowering plants and ferns (*one third* of the State's entire flora!) are to be found among the ranges, and their vegetative forms vary with the local topography and climate—whether plants of the dry hillslopes or moist sheltered valleys, the streams, shallow swamps, sandy selvidges, damp rock ledges or exposed subalpine heights. The variety, prodigality, colourful beauty and scientific interest of Grampians flowers have an irresistible appeal and have proved a constant source of delight to the author for more than thirty years.

In the decade 1912-22, I paid many visits to the Grampians and contributed a series of six papers to this journal, descriptive of the plant life (see appended references). These formed the basis for my book *One of Nature's Wonderlands* (1925), and in 1928 I wrote a further paper for the *Victorian Naturalist*, describing the flora of the little-known Black Range—westernmost of the system, but differing from the typical Grampian hills in its forest species. Now, I wish to conclude my writings with a bird's-eye view of the Grampians vegetation as a whole. I hope this sketch may serve to awaken the interest and enthusiasm of younger Club members, many of whom are as yet strangers to the region.

Major Sir Thomas Mitchell first saw and named these ranges, climbing Mt. William on July 15, 1836, and passing a most uncomfortable night with his men on the wintry summit; they were chilled by driving sleet and the icicles which hung thickly on low unprotective bushes around them. Five days later, Mitchell ascended and named Mt. Zero at the northern extremity of the ranges. Among the numerous plants that he collected between Mts. William and Zero, the following 22 species were carefully preserved and subsequently described by Dr. Lindley in England—the first recording of Grampians flora:

Acacia acinacea,
Gold-dust Acacia.

Acacia armata (*A. furcifera* Lindl.)
Hedge Acacia.

Acacia aspera,
Rough Acacia.

Correa acmula,
(*Didimeria acmula* Lindl.),
Hairy Correa.

Correa rubra (*C. cordifolia* Lindl.),
Red Correa.

Cryptandra tomentosa,
Prickly Cryptandra.

Daviesia brevifolia,
Leafless Bitter-pea.

Dillwynia hispida,
Rough Parrot-pea.

Grevillea Aquifolium,
Holly Grevillea.

Leucopogon glacialis,
Twisted Beard-heath.

Leucopogon rufus,
Ruddy Beard-heath.

Leucopogon thymifolius,
Thyme Beard-heath.

Lhotskya alpestris,
Snow-Myrtle.

Marianthus procumbens,
(*Campylanthera ericoides* Lindl.),
White Marianth.

Phebalium bilobum,
Truncate Phebalium.

Psoralea tenax,
Tough Scurf-pea.

Epacris impressa, var. *lawrenliana*, Common Heath.
Eucalyptus alpina, Grampians Gum.
Grevillea alpina, Mountain Grevillea.
Pultenaea mollis, Soft Bush-pea.
Tetratheca ciliata, Pink-eye.
Thryptomene calycina, Bushy Heath-myrtle.

In the 1850's came Dr. (later Baron) von Mueller, Wilhelmi, and Dallachy to the Grampians, greatly augmenting the pioneer records of the Major. D. Sullivan (resident at Moyston) was an assiduous collector of Grampians flora in the 'seventies, sending all his finds (including many mosses) to the Baron; two endemic species (*Caleana Sullivanii* and *Calytrix Sullivanii*) honour his memory. Charles French, sen., Carl Walter and H. B. Williamson were later collectors, the last-named botanist discovering on Mt. Abrupt a new and remarkable species of *Grevillea* (*G. Williamsonii* F.v.M., now alas presumed extinct). St. Eloy D'Alton made the northern portions his chief hunting ground and added much to the elucidation of the flora; his sons initiated the writer into many botanic and other secrets, accompanying him on numerous excursions through these mountains, near which they had been fortunate to spend their lives. Messrs. H. Smith and A. J. Swaby are familiar with the lesser known Black Range flora.

The last twenty years have witnessed an ever-increasing flow of tourist traffic, and good roads and tracks now lead to remote beauty spots formerly difficult of approach. Many botanists have made short visits here since the Grampians were opened up as a tourist resort, but such recent collectings have been mostly scrappy and superficial, without establishing any further new records.

Forestal growth embraces at least fifteen eucalypt species, the shrubby *E. alpina* alone being restricted to the area. Messmate and Grey Gum yield merchantable timbers and attain the dimensions of tall rain-forest trees under an annual precipitation of nearly 40 inches. They were formerly milled, as are the valuable giant Red Gums of Victoria Valley and elsewhere. Oyster Bay Pines (*Callitris tasmanica*) are attractive as bushy small pyramidal trees on rocky hillsides, especially at the south of the Mt. William and Serra ranges. Certain she-oaks, tea-trees, paper-barks, bottle-brushes, wattles (notably the Blackwood), hallorts ("cherries"), banksias and hakeas also attain the stature of trees.

Scrub vegetation comprises a great wealth of the legume, myrtle, protead, and heath families, several handsome twiners, numerous orchids and lilies and ferns, while the humbler Victorian plants of meadow, swamp and runnel are there in good measure. Let us take some of the families seriatim, and mention their more colourful and/or fascinating representatives:

Flowerless Types

Mosses are a feature of dripping rock ledges and sheltered canyons, often forming a green carpet as foothold for small epacrids and the dainty Purple Bladderwort. Fungi are numerous in season, the luminous Ghost Fungus (*Pleurotus lampas*) being noteworthy. Lichens abound among and upon the rocks, surely the most lovely being Coral Lichen (*Cladonia retipora*), which occurs in rounded creamy-white cushions, sometimes a foot wide, on "Wonderland" and other high parts. Two dozen different ferns, including three tree-fern species (*Cyathea australis, Dicksonia antarctica* and *Todea barbara*) may be sought along shaded creeks and in ravines. The hardy and well-known Bracken, Maiden-hair, Necklace-fern, Soft Water-fern and Shield-fern are conspicuous, and there are three Coral and Fan ferns and three polypodies.

Grasses and Sedges

All the best known Victorian kinds are to be found. The useful Wallaby-grasses (*Danthonia*) and the plumy Spear-grasses (*Stipa*) each number five species. Wire-grass (*Tetrarrhena juncea*) obtrudes its harsh tangled stems in clumps of scrub, especially near swamps. The family *Restionaceæ* includes ten plants of the Grampians and occurs in great profusion on swampy sandy ground; flowering "tassels" of *Restio tetraphyllus* are a particularly fine sight. Large tussocks of Red-fruit Saw-sedge (*Gahnia tetragonocarpa*) and Button Bog-rush (*Gymnoschoenus sphaerocephalus*) are the giants among *Cyperaceæ*, which numbers at least 44 species here. There are nine species of *Juncus*.

Lilies

On green turf and moist places generally, liliaceous plants flourish —starlike in yellow, white or blue, e.g., Bulbine, Early Nancy and Blue-star (squill) types. Nodding Blue-lily (*Stypandra glauca*) and metallic, papery-flowered Tinsel-lily (*Calectasia cyanea*) are lovers of sandy places and have glorious azure blooms, whereas the Flax-lilies (*Dianella*) and Turquoise Berry (*Drymophila*) flaunt bright blue berries in season. Tinsel-lily looks more like a heath and is not to be found anywhere else in Victoria, though occurring also in South and Western Australia. More remarkable still is the distribution of Pincushion Lily (*Borya nitida*) which is restricted to far south-west Australia, except for the one occurrence at Hall's Gap in the Grampians. Over 30 members of *Liliaceæ* are at home here, the largest and most spectacular being Southern Grass-tree (*Xanthorrhoea australis*) which is frequent about Mt. Zero, the Victoria Valley, etc., its immense kangaroo-tail-like flowering spikes pointing skyward for up to twelve feet.

(To be continued.)

IN THE NIGHTCAP NATIONAL FOREST

By F. S. WRIGHT, Melbourne.

During a visit last year to Byron Bay on the north coast of New South Wales, some 40 miles south of the Queensland border, we heard of Minyon Falls in the Nightcap National Forest. The Falls are described in a booklet issued by the Forestry Commission, N.S.W., and this reserve sounded most attractive.

More recently, in May, 1946, the writer and a friend (henceforth referred to as "Doc.") were again at Byron Bay. We decided to visit the falls, and, in answer to enquiries, found that the best way to get there from Byron Bay was via Mullumbimby and Coorngarra to Repentance Creek settlement, thence up the eastern end of the Nightcap Range—a distance of about 26 miles.

The whole drive from Mullumbimby is very beautiful, through steeply undulating dairy and banana country, with some pineapple plantations here and there. Many distant views are obtained of Lennox Head, Broken Head, Byron Bay and Chinkunga, the extinct volcano overlooking Mullumbimby. Beyond, to the north, rise the MacPherson Ranges, the boundary between New South Wales and Queensland.

The last three miles or so are spectacular. On the right the mountains fall away very steeply to a beautiful valley dotted with dairy and banana farms. This is the valley or gorge of Repentance Creek, the waters of which come over Minyon Falls. Large trees, mostly eucalypts, including Scribbly Gums, are everywhere. The descent into the Minyon Gorge appeared most precipitous and, where we first made a stop to look over, we considered any descent quite impossible (although later we actually went down near that spot).

At the head of the gorge are the falls, in one clear vertical drop of about 500 feet. Our first view of them was from about a mile away, and at this distance the amount of water seems to form little more than a thread of white as it descends.

The valley below is, apparently, an impenetrable mass of large jungle trees and other growths, amongst which numbers of giant bangalow palms predominate at the bottom. The walls of the gorge on the opposite, south-western, side are very steep, although mostly covered with vegetation, but at its head the rocky precipices are so sheer that only a few patches of moss and fern show up on the otherwise completely bare rock.

The gorge proper is, perhaps, a mile and a half long and half a mile wide, with an average depth of about 800 feet, extending downwards from the falls in a south-easterly direction.

We were on the north-east brink, and, after taking in this general aspect, continued along the good metalled road, which passes by the head of the fall at a distance of only 100 yards or so. We parked our car here at a picnic ground, and walked to the creek, which is full of boulders and rocky ledges, amongst which the water cascades to the brink of the escarpment. The fall is quite sudden: at one instant the water is travelling normally in its rocky bed, and the next it is hurtling into space in its great free fall to the valley far beneath.

At no position on the top could we see any sign of the creek below the falls; it was completely masked by dense jungle vegetation. We boiled the billy and decided to seek out someone who could tell us whether there was a safe descent. First, we went a mile or so, still on a good metalled road more or less parallel with the Repentance Creek, in heavy forest country above the falls. An idea of the water going over was gained from a road crossing the creek—a cemented ford, about three or four inches deep and about three car lengths wide.

We then turned back, passed the falls and stopped for a moment again

where we had our first best views of the gorge. Here Doc. took a few photos. Continuing back down the road to Repentance Creek settlement, we asked a man whether we could get into the gorge below the falls. He offered to take us there and we gladly accepted; so he got into the car and directed us back up the road toward the picnic ground.

We left the car at a point where the first good view of the gorge is obtained—a convenient parking spot. A quarter mile walk up the road brought us almost to the point where we had taken photos, and where we had considered any descent to be impossible.

There was no track at all, but our guide (Mr. Roy Williams, a local banana grower) said this was the usual way down. So we started working, zig-zag fashion, along the slope and were soon below the precipitous rocky walls that had seemed practically vertical. I began to wonder how we would ever get up again. The slope was such that we had to hold on to bushes, little trees, and tussocks of grass to prevent sliding. Often it was best to sit down and slither for a few feet over short steeper slopes.

Enormous and beautiful trees towered above us, some 150 to 200 feet. Although, on the road above, it was a brilliantly clear sunny day, we were soon in complete shade which increased as we slid and scrambled down.

After going down perhaps 300 or 400 feet, the inclination decreased somewhat, although still very steep, with boulders strewn everywhere. Jungle vines had to be dodged or crawled beneath. Epiphytic creepers were plentiful around many trees, and seemed to bite into the bark of their hosts. Here and there, "lawyer canes" caught on to our clothing and had to be torn free or disengaged, as we scrambled about. Then we entered the zone of bangalow palms, although this did not seem to include any lesser quantity of great trees. Most of these were quite unknown to me, but Williams pointed out "Blackbutt" and "Box" (reddish smooth bark) which predominate among the eucalypts present.

Bangalow palms persist right to the bottom and shelter masses of a plant looking not unlike New Zealand Flax, although the leaves have no appreciable fibre strength. These plants shut out all possibility of a view and at times we could not even see each other at a few feet apart. Remains of the summer crop of fungi were noticed on many rotten logs; some were about the size of a melon. I had taken some labels with me in the hope of getting a few botanical specimens, but I made no attempt to do so; my hands were fully occupied helping myself along.

Finally, after nearly an hour, we made the brink of the creek or river, whose bed is full of boulders and practically clear of vegetation for a width of perhaps ten to twelve yards. On either side tower great trees which practically meet overhead, but the bangalow palms seem to predominate by the water. Hundreds of stag and elk-horn ferns adorn trees along the river and, to a lesser extent, those farther up the slopes. One palm trunk was covered with about eight or a dozen of these great ferns for a height from 15 feet up to about 30 feet. Some of them were as much as five or six feet across. Literally thousands of young bangalow palms, mostly only a few inches high, grow in the soil and finer debris along the creek bank. Smaller ferns and mosses abound everywhere.

Having reached the bottom, Doc. and I were in need of a spell. Mr. Williams was as fresh as a cricket and suggested scrambling at once up the creek bed to the base of the falls, but we were reckoning on the energy needed for our return, particularly as we had only started the descent at about 3 p.m. and the sun was to set at about 5.15. So, while we rested, Williams went up the creek some distance. Doc. had his little camera and exposure-meter. It was so dark (although above, chinks of the bright, sunny sky could be seen) that an 8-second exposure on F.8 aperture was necessary—about normal for an "inside snap."

About 4.15 we started the climb out, and it *was* a climb. I had asked Williams about orchids. He said there were many near the falls, where the spray kept everything moist over a large area, but of course we missed seeing these. However, he soon pointed out colonies of orchids growing on eucalypts, mostly blackbutt, in clusters of from two or three to as many as 30 or so. They were mostly high up -70 or 100 feet perhaps. They seem to be rooted in the somewhat rough bark on the dark lower parts of the blackbutts. At this time of year they were not in flower, and Williams could only say that the flowers were of various colours. I doubt if he really knew, because all we saw appeared to be one variety. Each plant was about ten or twelve inches wide.

Williams led us out by a slightly different route which was, I think, rather better going. However, I puffed and sweated, and was so engaged in pulling and climbing that I had no time to worry much about Doc. Frequent rests were essential for us, although our hardy Williams seemed able to leap from rock to rock without either concern or distress.

As we ascended, the slope grew steeper and steeper, and soon it was almost a matter of going on hands and knees, clutching at everything available. Near the top, we skirted along the base of a small precipice and then scrambled up a diagonally sloping fissure in the rocks. Actually, with care, the trip was not dangerous, for it would have been practically impossible to fall any distance because of the thick brush.

We walked back to the car, and were soon down to the Repentance Creek bridges, where we parted from Mr. Williams most affably. He would not accept anything for his guidance and said he would take us again if we ever came back. The whole descent and ascent took only two and a half hours, but we should have needed a whole day to allow of more spells and a better exploration of this most wonderful gorge.

I saw neither bird, mammal, nor reptile in the gorge, but signs of wallaby were seen about half way down, and the entrances of small burrows were noted in the toe of the steepest part. These may have sheltered some sort of small marsupial. We heard a bird like the whip-bird, but very loud—perhaps this was caused by the confining effect of the jungle. Doc. said that, when we were at the top of the falls, he had noticed a flock of birds in the bangalow palm tops, but these would not have been visible from beneath.

List of Principal Hardwoods and Brushwoods in the Nightcap National Forest.

(Adopted from booklet issued by the Forestry Commission, N.S.W.)

Hardwoods:

Blackbutt (*Eucalyptus pilularis*).
Bloodwood (*E. gummifera*).
Tallowwood (*E. microcorys*).
White Mahogany (*E. triantha*).
Red Mahogany (*E. resinifera*).
Blue Gum (*E. saligna*)
Forest Red Gum (*E. tereticornis*).
Scribbly Gum (*E. haemastoma*).
Brushbox (*Tristania conferta*).
Turpentine (*Syncarpia procera*).
Brown Salwood (*Acacia implexa*).
Forest She-oak (*Casuarina torulosa*).
Brush Cypress Pine (*Callitris Macleayana*).

Brushwoods:

Yellow Carrabeen (*Sloanea Woollsii*).
Cherry Birch (*Schizomeria ovata*).
Scented Satinwood (*Ceratopetalum apetalum*).
Brush Mahogany (*Geissois Benthamii*).
Corkwood (*Ackama Muelleri*).
Silver Quandong (*Elaeocarpus grandis*).
Black Bean (*Castanospermum australe*).
Sassafras (*Daphnandra micrantha*).
Orleans Plum (*Chrysophyllum pruniferum*).
Rose Walnut (*Endiandra discolor*).
White Walnut (*Cryptocarya obovata*).
Bolly Wood (*Litsea reticulata*).
Parsnip Wood (*Pratinia australasicum*)—most southerly locality on record.
Tulip Oak (*Tarrietia argyrodendron*).
Eugenia, Myrtles, etc.

THYLACINE AND THYLACOLEO.

A probable ancestor of the present-day carnivorous *Thylacine*, the "tiger" of Tasmania, was *Thylacoleo*, a fossil form known vernacularly as the marsupial lion of Queensland. This fossil form was about the size of the present African species, and evidently a bone eater, as it had only one back tooth on either side of each jaw—formidable crushing teeth. Many fossil bones show marks of teeth apparently made by the marsupial lion. When the Royal Australasian Ornithologists' Union held its annual session in Launceston in November, 1913, an illustrated lecture on the wild life of Queensland was given by me in the art gallery. Amongst other illustrations, I screened a picture of a suggested reconstruction of *Thylacoleo* running on its hind legs. From the structure of its fossil remains this primeval creature was suggested by a paleontologist to be able to adopt this method of locomotion. The pose, as given to me, was mentioned in my lecture. At the conclusion of my remarks an elderly man stated that he was a breeder of sheep. During the winter months the thylacines were apt to harry his flocks. When this occurred, and to drive off the marauders, he took a pack of dogs to pick up their scent, and to help to chase them. When the tigers were driven into the snow, some of them, in an endeavour to mislead the hunters, ran off on their hind legs, thus leaving only two pugs instead of four.—A. H. E. MATTINGLEY.

BENDIGO F.N.C.V.

At the annual meeting of the Bendigo branch of the Club, held on September 11th, steady progress for the year was reported. The branch has 29 full members and 18 associate members, whilst 7 new members were proposed for the new year entered upon. The club followed the action of the parent club in Melbourne in electing the Hon. Secretary as President for 1946/47. Mr John C. Ipsen is well-known for his interest in botany and ornithology and the parent body congratulates him on his accession to the presidential chair.

The retiring President, Mr Marc Cohn, who has given sound service in the formation of the branch, delivered the presidential address, entitled "Bird Photography," with epidiascope illustrations.

At a recent Bendigo Rotary Club gathering, another active F.N.C. member, Mr. Hugh Milne, addressed Rotarians on the importance of fauna and flora preservation in the district.

A CENTURY AGO TODAY

Mount Faraday, on the Great Dividing Range, stands at the sources of the Nogoa and Warrego Rivers in the extreme south-west of Leichhardt district, Queensland. The first white man to ascend and describe it was Sir Thomas Mitchell, in his retreat from the search for a good overland route from Sydney to the head of Carpentaria Gulf. He found the Faraday region a wildflower paradise and wrote as follows in his diary:

"*10th October, 1846.*—We commenced our retreat with cattle and horses in fine condition, and with water in every crevice of the rocks. That in the flat reedy swamp near the pyramids had a sulphurous taste, and nausea and weak stomach were complained of by some of the men. . . . I went to the summit of Mt. Faraday, and . . . ascertained the height, by barometer, to be 2523 feet above the sea. The plants growing there were *Commelina undulata*, *Thysanotus elatior*, *Plectranthus parviflorus*, the yellow *Vigna lanceolata*, a villous form of *Ajuga australis* and a little *Pilotheca* with narrow, close-appressed leaves [*P. ciliata* Hook. ms.]. . . . Many beautiful shrubs were now beginning to bloom. The *Bursaria incana* was now covered with its panicles of white flowers; the *Ozothamnus diosmæfolius* [= *Helichrysum diosmifolium*], a shrub four feet high, was loaded with small bulbs of snow white flowers; a downy variety of *Lotus australis*, with pink flowers, was common on the open ground; the *Acacia podalyriæfolia* was now forming its fruit; in the open forest we found a beautiful little *Gompholobium* [*G. foliolosum* Benth. ms.]. . . . Mr. Stephenson and I had been so busy collecting these on our way back that we only reached the camp at sunset."

MUELLERI MEMORIA FLORET

This day (October 10) marks the fiftieth anniversary of the death of Baron Sir Ferdinald von Mueller, founder of the Melbourne Herbarium, nestor among Australian men of science, an ardent Victorian field naturalist, and beloved friend of all who were privileged to know him.

Any reference here to the varied accomplishments of this great man, during his 44 years as Government Botanist of Victoria, would be superfluous. Today his spirit permeates almost every book and folder of the vast State collection that he called together.

Our Club will honour the anniversary by a pilgrimage to Mueller's grave, and it is hoped that many will visit St. Kilda Cemetery for this purpose on Saturday afternoon, October 12. Next year is the centenary of Baron von Mueller's arrival in Australia. Would it not be fitting for Australians to recognize the occasion by a commemorative postage stamp, with attractive floral motif?

J.H.W.

ERRATA

Referring to the article "Observations on Australian Spiders" (*Vict. Nat.*, April, 1946), Mr. R. A. Dunn points out that he is responsible for only portions of pp. 224-229, otherwise his sole contribution was in reading and suggesting alterations to the text of the original paper.

In Mrs. Edith Coleman's article, "Foods of the Tawny Frogmouth" (*Vict. Nat.*, September, 1946), the following typographical corrections are necessary:—P. 114, fifth line in third paragraph: for "on instinctive action," read "an instinctive action." P. 115, second line in first paragraph: for "fresh diet," read "flesh diet." P. 115, eighth line in fourth paragraph: for "his garden," read "this garden."

It is regretted that the illustration accompanying Mr. S. T. Blake's article, "A New Species of Scirpus" (*V.N.*, Sept., 1946) was accidentally inverted in the press.—Ed.

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PROCEEDINGS

The monthly meeting of the Club was held on October 14, 1946, at the Lecture Hall of the Public Library, the President (Mr. F. S. Colliver) presiding and about 180 members and friends attending.

The President announced the recent passing of Mrs. Geo. Coghill, wife of one of our oldest members, and daughter of our second President, Rev. J. J. Halley. Representatives of the Club had attended the funeral service and a wreath was sent.

The Dunlop Rubber Company wrote stating that its plans for a village at Beaumaris were still in the very early stage, but they did intend to have parklands and playgrounds in the area, and when the time was opportune would seek advice from experts such as the Club suggested.

The President thanked all who had assisted at the Nature Show and stated that results were well worth while. The show was equal to any we have ever staged (this in spite of transport difficulties), and several new methods of lay-out were a feature of the display. The three Discussion Groups revealed their value to the Club, and the results to date showed that approximately £130 was received and about £35 paid out.

The President announced that Mr. Les Woolcock, a young member, had recently joined the C.S.I.R. and would be transferred to Canberra at the end of the month. On the Club's behalf he expressed good wishes.

The following were elected: As Ordinary Member, Mr. R. H. Adams; as Country Members, Mrs. Mary Norman-Bale, Miss Julia Norman-Bale, Messrs. Hurst Gray and Ray Verity.

Questions asked by members included the following: Does the Indian Mynah in Australia migrate? (Answer: No.) Are there any Lyrebirds at Healesville Sanctuary or the Wild Life Sanctuary? (Answer: There is a pair at Healesville.)

THE WEDGETAILED EAGLE

Under the heading "Does the Wedgetailed Eagle Deserve Protection?", Mr. F. G. Elford took into consideration various reports that have appeared in the Press and gave the results of his attempts to follow up such reports. It was suggested that the Wedgetailed Eagle was a good control on rabbits, and that the C.S.I.R. should be asked to investigate this point. Further, it was suggested that what mainly operated against the eagle was the

general public's wrong ideas concerning the bird, which impressions were fostered by the newspaper photographs and reports.

Mr. V. H. Miller, who had read of a Wedgetailed Eagle carrying off a full-grown wallaby, asked Mr. Elford if this were possible. Mr. Elford replied that he had checked up several such statements and had found that the animals called wallabies ranged from the Great Grey Kangaroo to the short-nosed Rat-Kangaroo; it was certainly impossible for the bird to carry off the first-named animal, but it would be comparatively easy for the second to be taken.

Mr. A. D. Hardy, commenting, stated that the Forest League was in favour of protecting the eagle. On one occasion there appeared in a newspaper published in the Upper Murray district an announcement that the Graziers' Association had resolved to ask for the protection of the Wedgetail.

EXHIBITS

Mrs. M. Pinches: Earth-star fungus.

Miss Helen Knipe: Collection of pressed Australian wild flowers.

Mr. and Mrs. E. Muir: Thorny plagianth (*Plagianthus microphyllus*), a flowering and fruiting specimen from the Dimboola district.

Mr. A. N. Carter: Specimens of *Enomphalus northi* from Cave Hill quarry, Lilydale, showing the cavity partly filled with calcite crystals.

Mr. J. D. Seaton: Collection of cultivated native flowers.

Mr. C. French: Orchids—*Caleana minor* (Small Duck Orchid) from the Grampians; *Pterostylis curta* (Blunt Orchid), specimens with two and three flowers on the one stem (specimens collected at Warrandyte by Miss Stanton of East Camberwell); *Pterostylis grandiflora* (Blunt Greenhood), collected at Belgrave; *Dendrobium striolatum* (Streaked Rock Orchid) from East Gippsland.

Mrs. Lyndon: Mistletoe (*Loranthus exocarpi*) infesting three different types of vegetation in the You Yangs area, namely, the snowy mint bush, sheoak and sweet bursaria; photograph of nest and eggs of the Silver Gull, taken in the Altona marshes.

AUSTRALIAN TREES IN THE AZORES

The seven small islands comprising the Azores archipelago lie in the wind-swept Atlantic, 1200 miles south-westerly from Land's End and 800 miles west of Gibraltar. Writing in the *Gardeners' Chronicle*, May 4, 1946, Mr. Stanley Pittman draws attention to the value of Australian trees and shrubs for protective plantations in agricultural and horticultural practice; he instances Blackwood, Sweet Pittosporum, Banksia and Eucalyptus species, all of which have found a congenial home there.

It is claimed that the increased wooded surface of the islands, taking place mainly toward the close of last century, has been responsible for a slow but definite effect on the climate—periods of summer drought have been shortened, but the wet seasons dangerously prolonged. Eucalypts are stated to absorb and return to the atmosphere (as vapour) about ten times their own weight of water [daily?], and the Portuguese Forestry Commission exercises control of all planting. This opens up the old, highly contentious question, "*Do* forests affect rainfall?"—P.F.M.

FROGMOUTHS IN THE GARDEN

By EDITH COLEMAN, Blackburn, Vic.

After reading Dr. Serventy's interesting paper on the feeding habits of the Frogmouth (*Emu*, Oct., 1936) I decided to watch the birds closely and to make fuller notes on those that frequented this garden—which is not a garden in the accepted sense of the word, but really a piece of the Australian bush in which we have gradually carved our home and garden. It offers especially good observation ground, being almost equal to natural conditions.

Here are no moist, bird-haunted lawns, but plenty of native grass growing under the trees, chiefly eucalypts (messmate and stringybark), a few acacias, and pittosporums under which the Frogmouths love to forage. Until recently three very tall sugar-gums (*E. cladocalyx*) dominated the garden, but they swayed so alarmingly in a high wind, and have such brittle wood, that it was decided to have them cut down to within two feet of the ground. The extra space afforded, as well as the flat-topped stumps, gave the Frogmouths playgrounds in which they seemed to delight.

I had watched these birds for years, never without recalling Kipling's "The long and the short of it is that we don't match our backgrounds." I had watched the mother Frogmouth crouch along a bough as though she were a part of it, or "nothing in particular." I had many times seen her "freeze" into her broken-branch attitude, stretching her body vertically so that its wavy markings harmonized marvellously with ridges and furrows of the branch behind her. To an unpractised eye she was lost to view.

Her greatest protection is the blend of greys and browns in her colouring, streaked, blotched and splashed in such a way that not only is her outline broken up, but she appears to be merely a jumble of shadows and streaks of sunlight filtering through the boughs.

Other parent birds, when alarmed, crouch in their nests, beak held where it is least likely to betray a bird, unrecognizable as anything more than a piece of grass or a short stick. But the Frogmouth has never learned to hide in a nest. She broods with flattened feathers that seem to diminish her great size, often with neck extended vertically to its fullest extent—to the human mind a rather cruel pose. With the heads of two babies peeping through her feathers, like guns through the port-holes of a ship, she may hold this turret-like pose for hours, never seeming to unbend, even to fondle a nestling.

The following notes, jotted down as they occurred, are evidence of the Frogmouth's attachment to one particular locality. She is truly a "bird of the hearth." Where there are gaps in the notes, I was either away from home or otherwise prevented from watching the birds.

Early in November, 1943, I had been watching four Frogmouths for a week or two. There were two adults and two young, perched in the trees during the daytime, flying about the garden at dusk. They had probably nested in the garden, but I had missed that phase. As they appeared to leave their daytime perches at almost exactly the time when our street lights were switched on (artificial summertime), I began to time them, and to make other notes as I stood watching them.

Each evening at dusk I saw them drop at about 9 p.m., taxi along the ground, dive beaks into the grass, taxi along a little further and dive again. Wings were spread as they used their bills.

Nov. 21st: As I wished to find out what they obtained from the grass, I lay on a cane lounge under the eaves of the summer house, covered with a dark rug, hat pulled over my eyes, opera glasses in hand. The birds had never seemed to worry about my great interest in them, either in the daytime or evening, but in this way I should have a closer view, as they were in the habit of foraging near the summer house. With the glasses I was able to watch every movement of the birds on their high perches, as they waited for the evening "call." They flew to the ground at my feet, and one alighted on the foot of the lounge. They would, three at once, alight on a water pipe just above a small pool, but took no interest in the pool. A new call, a "squeak" close to me. A young one, I thought.

Nov. 22nd: No sign of Frogmouths all day or at night. Probably in trees beyond the garden proper.

Nov. 26th: Birds back in tree at 7 a.m. (Had not looked on the evening of 25th.) Greenies shrill at them. Spinebills, too, I think. Preening a lot. Feathers drawn through the bill for long period. Saw one shake a tuft of feathers off its bill with some effort. Sun-lover's. Pretty to see great wings stretched to full extent, often arched to meet over back. Eagle-like they look then. Bob and peer down at me like a cockatoo on his perch. Sleep with bill on breast. All are perching properly, not crouching as one so often sees these birds crouch. Seem to like the old, open gums. Don't go into densely foliaged shelter. Turn at times during the day, but towards dusk face the west until time to leave their perches. "Side-step" quite long distances along a bough for change of position, like soldiers closing in after dressing from right or left. Parents together all day. Young apart on next bough.

Nov. 26th, p.m.: Scattered some mealworms and watched from the lounge. Saw birds drop near. Picked up something several times, which I was to learn later were beetles. The mealworms move quickly and, doubtless, soon disappeared into tussocks. Three together on a garden seat. Not yet dark. Seat natural colour of wood, so fairly light and easily seen by birds. Flew to a

light wood lattice table, the other one to flat top of sugar-gum stump, it light colour probably making it an easy landing stage. Prefer open spaces. Apparently need "some" light.

Dec. 4th, p.m.: Young about the trees. Saw parents fly low, then fly up to feed young on boles of trees. Young would attempt to follow parents, then cling to first tree they reached.

Dec. 12th, p.m.: Dropped at ten minutes to 9.

Dec. 13th, p.m.: Dropped at eight to 9. Lights on at that time. Appeared to go to bed again at 10.25 p.m. Watched them get ready to drop; stretched wings. One left first, creeping up trunk of tree like a mouse or big beetle, before dropping. Must use bill or tail as a climbing organ, I think. Watched them in paddock, from tree to tree, clinging to boles, alighting on low branches, probably to get correct focus on ground prey. Did not forage among branches. One young one nearly walked over by member of family coming down path. Is hearing poor? Seemed early to disappear for the night. If, as it seems, they are only feeding for about an hour and a half, they must start foraging very early in the morning to secure enough food. What a long day without food or water! Saw one sidle along branch at 9.20 p.m. (artificial time), then all disappeared.

Dec. 14th: I rose at a quarter to 5 (summer time, really quarter to 4, bird time). Frogmouths not in paddock or garden, I think. Ten minutes later they were moving about among the trees near summer house. They appeared about to settle for the day. Would be too dark, one thought, to forage among trees, and possibly getting too light for them in the more open paddock. Probably had their "one crowded hour" before I rose. Beautiful to see them, three together, scrounging together, leaning all one way. The male bird now appears to perch apart from the others.

Dec. 14th, p.m.: Lights on at five to 9 but birds did not drop. Vivid sunset. Glow still in western sky, which birds faced. Each gave a little jump, as if testing feet, then dropped at five past 9. Babies had been alone all day. Male, at first above them, was joined by mother. She had feet and part of legs clasped round bough, toes, of course, not meeting, so that her breast rested on the bough (seen from below). Much preening and wing-stretching usually takes place before the birds drop. Give little startled turns of the head, as if listening. Although they always drop to the ground first, I think a little hunting is done among the trees. Came in at 9.30.

Dec. 15th, a.m.: Birds in pairs today at 7 a.m., but at other times mother and babies were together. Photographed. Male not included in photo, though not far away.

Dec. 15th, p.m.: Dropped at 9.10. Still fairly light in open spaces. Flew from low branches to ground many times. Ran along ground, wings open. Many beetles emerging. Flew close

to my head several times. Don't they "see" me? Almost bump into me. In windy weather they perch "along" a bough, but on calm days across it as other birds perch. Due, perhaps, to small feet. Crouch rather than perch. Saw young one walking up trunk as if using bill as a third foot.

Dec. 16th, a.m.: Beautiful to see how three of the birds have settled so that a big horizontal bough makes a wall against south wind and gives overhead shelter. Saw them thus at 7 a.m. Did they foreknow the weather? Rain did not come till 7.30 a.m. Male under a leafy branch.

Dec. 17th, p.m.: Down at 9 o'clock, to sugar-gum stump. Surprisingly light. Three on log at once, then jump the short distance to ground, then back to log or low branches, as if watching for movement on ground before pouncing. Went to paddock soon after. One dropped six feet from me as I stood against the fence. Squeak. Was it something on the fence, or on ground? Prefer to drop in open spaces; fly between the boles; clear and fairly bright, so perhaps do not really love darkness as we have supposed. Can still see sky through branches which are not thickly foliaged, so could work quite late. On moonlit nights it should be easy to forage among these gums. I came in at 9.30. They were still active.

Dec. 18th: Fine day. Not "under" branch. Three together, perched just like other birds.

Dec. 18th, p.m.: Down at 9 p.m. Almost touched me, perched on low fence within six inches of my face. Made noise as of stationary steam engine, a rhythmic, somewhat hissing sound. Three at once on stump. Took broken branch attitude when little white dog romped underneath them.

Dec. 19th: Three together again. Male distant. Wheelbarrow, moved below, caused all four to "freeze." Held pose for a long time. Froze again in afternoon when visitors taken to see them. Beautiful to see four in Bittern-like attitude. (Have seen three Kookaburras freeze in exactly the same attitude.)

Dec. 19th, p.m.: Down at 9.10. Street lights on, but not dark until much later. Seem to run along ground like a landing plane's "run-up" before stopping. Just like animals at play in the grass. Not afraid of me. Do they see me? Settle so near me, on table, seat or lounge. Can see nothing, yet they certainly get something when they pounce.

Dec. 20th, p.m.: Down at five past 9. Again that pretty little chick-like run along the ground when they drop, or like a broody hen when she leaves her eggs.

Dec. 21st, a.m.: Very warm. Too hot to sit close. All separate, and all perching, not squatting. Peer and bob at me like barking owls. Wings spread in sun; much preening and "powder-puffing." No pellets cast up.

Dec. 27th: Photographed again. Saw two "side-step" quite a long way. One young one flew across a space of some four feet to join two of the others.

Dec. 28th: Two perched among slender branches at the ends of the old gums; just as conspicuous as any other birds. No attempt to camouflage. Do they feel too safe here to bother?

Dec. 28th, p.m.: At 9 p.m., when street lights switched on, saw them wake up and turn to west. Had been crouching with tails to west. Scattered some mealworms. They seemed to run after them like chicks. A sort of crawl and dive. (I learned later that they were after beetles, not the mealworms.) On the grass close to me as I lay on lounge, hat over eyes. Not yet dark. They were heard in very early morning on roof of sleep-out, and were seen flying past its windows before daylight.

Dec. 29th: All day three together. Male alone not far away. My daughter watched from the lounge and I from a verandah that gave another view. I saw them drop to the stump and play(?), jumping from it to the clear ground beneath. Then, hidden from me by trees, but visible to my daughter, they dived for beetles which were crawling up grass-stems to "take off" for flight. She could hear the beetles. One Frogmouth twisted round and dived for beetles that were behind it, so he must have "heard" them. My daughter, too, heard the rhythmic engine sound. With the torch she examined a diving-point and saw hosts of beetles. So that question was settled for me. She had experimented with an artificial mouse, drawing it to her by a long thread of black cotton, but the Frogmouths were quite indifferent to it. Beetles were the attraction.

Dec. 30th: Very hot and windy. From their early positions one might think they fore-knew the day's weather. All in sheltered positions with a crotch nearby. The male crouched in broken branch attitude far out on a limb but sheltered by leafy twigs. All seemed to feel the heat; bills agape. Three moved right into a crotch formed by a thick branch and the main trunk. The two actually in the crotch crouched comfortably. Third one faced wind and seemed unhappy. Later it moved to where the branch rose vertically, and so broke force of wind. He put his bill against vertical branch as if holding by it. He was almost upright, clinging rather than perching.

Dec. 30th, p.m.: Down just as lights switched on. With torch saw hosts of beetles emerging. Birds both pounce on them and catch them in the air quite close to the ground. No sustained hawking.

Dec. 31st: Hot north wind. Birds in a new tree which gave better shelter. Visitors again. Possibly my handclapping and handkerchief-waving, to induce them to perform, annoyed birds. Or probably the changed position of seats, table, etc., on which they

had been alighting, perturbed them. Did not see them leave in the evening. Not in the garden. They probably regarded visitors as disturbers of their peace. Have disappeared.

Jan. 17th, 1944: Two Frogmouths back. Separate trees, but quite close. Dropped at 9.10 p.m. Still fairly light.

Jan. 18th: Both in same tree, side by side. Young ones probably.

Jan. 19th: Both in same tree. Dropped at twelve past 9 p.m.

Jan. 20th: Close together in same tree. Dropped at 9.10 p.m.

Jan. 21st: Broken branch attitude. Chose splendid position where limb broken off.

Jan. 22nd: Great rain in night. No effect on them. Not under cover on morning of 23rd, though still raining. Heat distresses them. Rain does not. Here every day until 27th, but I did not always see them as they chose different trees, and I was too busy to search for them. Their perches were betrayed by "whitewash" beneath. No sign of them after Jan. 27th until April.

April 18th: Two in favourite tree as before. Dropped at sixteen past 6 p.m. (normal time). Did not notice street light until 6.30 p.m. Fine sunset. Glow still in the western sky.

April 19th: Same tree. Dropped at 6.5 p.m. Old birds, I think.

Jan. 3rd, 1945: Two Frogmouths back; old ones, I think. Both together until other birds annoyed them. Then on separate boughs not far apart. One dropped at five past 8, the other at ten past 8. Had seen many beetles emerging.

Summing up, I think there is little doubt that the Frogmouth is chiefly a ground feeder. From stomach analyses, as shown by Dr. Serventy and others, its diet consists of phasmids, grasshoppers, weevils, scorpions, spiders, beetles, centipedes, crickets, frogs and, rarely, moths, mice and birds. Add an occasional small bandicoot, a nocturnal ground forager, and it is seen that most of the prey is un-winged and taken on the ground. Unsustained hawking flights, I think, add winged creatures. I should expect to find evidence of more moths, taken from tree trunks, or in short flights. Tree foraging probably gives small mammals and birds. He probably never "pursues" his prey among branches, but pounces on them when they are still, or moving slowly.

Dr. Serventy suggests that the great width of bill which educed the hawking theory may be regarded as an over-specialization; but its great size should be more advantageous in capturing moving ground prey, than a bill such as that of the magpie. In cricket parlance, its great width has widened the bat, or added another stump to the wicket. From the structure of tail and toes, Gould believed the Frogmouth to be a climber.

It is interesting to note that, on two occasions, I saw one climbing, with the assistance, I thought, of its bill. I had not

noted the use of the tail, but thought it was possibly used as a climbing organ.

Watching Budgerigars climb a vertical wall I noticed that the tail was pressed flat, as if held by suction, but when they climbed small-meshed wire netting I could see that the feathers under the tail were half-erected, making what might be called a "shingled" surface, and giving a surer hold.

With reference to night screams, I am aware that some authorities accept the word "owl" as used in the Scriptures, as a general term covering night birds, so many of which were regarded with horror. Shakespeare's screech-owl, night-raven, night-crow may all be referable to the one bird, perhaps the Night-jar, which literally jars the night.

"ICELAND MOSS" APPEARS IN AUSTRALIA

In February this year some University men explored our far eastern highlands to become acquainted with the rarer alpine flora and fauna. A very interesting botanical "find" was made by Mr. J. H. Willis, botanist of the party—a genuine specimen of *Cetraria islandica* Ach., the "Iceland Moss." This alpine lichen, somewhat resembling crisp parsley, was found growing among clumps of white *Thamnolia vermicularis* Shaer. on bare porphyry rock at the summit of The Cobboras (five miles from the N.S.W. border, at about 6000 feet).

All available records to date show this to be a purely boreal species, and its undoubted occurrence in south-east Australia now provides yet another link in the slender chain of typically Northern Hemisphere plants which affect only our highest mountain peaks: *Thamnolia vermicularis*, *Botrychium lunaria*, *Carex canescens*, *C. curta*, *Geum urbanum* and *Alchemilla vulgaris* are other links in this chain.—P.N.S.B.

SLAUGHTER OF SEA-BIRDS

(To the Editor)

Sir,—My note on Macquarie Island as reported in Nature Notes of the *Victorian Naturalist*, vol. 63, is somewhat at variance with my statements. I said that thousands (not millions) of albatross on Laysan Island had been destroyed by the Japanese—practically the whole rookery was slaughtered. It was mentioned by me that there were millions of penguins in the area exposed to a similar fate if Macquarie Island was not protected during the breeding season from the Japanese and others in pursuit of oil. At no time did I suggest that the Japanese had already destroyed penguins on Macquarie Island, although they may have done so in default of a caretaker stationed thereon.

Yours, etc.,

ARTHUR H. E. MATTINGLEY.

Melbourne.

ON THE TRAIL OF THE MARSUPIAL WOLF

By DAVID FLEAY, Director, Sir Colin Mackenzie Sanctuary, Healesville.

Part II

Difficulties connected with transport and the use of a truck drove us for an interval of several weeks to the great game Sanctuary of Lake St. Clair. Here, on the advice of Mr. A. D. Fergusson, one of Tasmania's best-known characters and an expert bushman and capable ranger, we made intensive searches of the Lake Hugel area — lumping the sections of heavy traps 3¼ miles up a 1,000-feet rise to set them among the mountain tarns, stunted gums, low pencil cedars and other snow-line growth. The daily tour around our traps involved a ten-mile walk!

Here last winter "Fergie" had found tracks in the snow, revealing the story of a relentless pursuit by a "Tiger" of a Bennett wallaby right into the bitterly cold waters of the lake. This last refuge, so typical of hard-pressed members of the kangaroo clan, is evidently no protection from the Thylacine, which readily follows its prey into lakes and across rivers. On the Hugel plateau extremely cold weather usually prevailed, with snow and piercing winds. One solitary and doubtful footprint between button grass clumps was the sole piece of evidence attending our search of the Lake St. Clair region for "Tigers." There is every attraction for such predatory animals here, and undoubtedly there are one or two about, for, thanks to the protection given this great 365,000-acres reserve, game is particularly plentiful, especially in such places as the Cuvier Valley. *There is no comparable game sanctuary in any other State*, and Tasmania is to be applauded for her foresight.

It is regrettable that the services of so knowledgeable a ranger as Mr. Fergusson have recently been lost. Such men who work for the love of wild animals in the bush are few and far between. Unfortunately for Thylacines living in this region, the reserve is surrounded by "hostile" country not conducive to the safe-keeping of these nomadic animals.

As previously mentioned, it is undoubtedly true that snares have caught Thylacines in recent years, just as they have devils, and in remote areas the term "protected animal" is meaningless, particularly when such carnivorous creatures are in the habit of spoiling the skins of wallabies held in snares. Hunters generally never spare the devil, and it, too, may become a rare creature; but there is every hope that they will stay their hands in the case of the "Tiger," especially now that they realise both its rarity and scientific value.

So far as the West Coast Road is concerned, the decrease in numbers of the Thylacine on both sides of it in little more than a decade may be traced fairly easily. This main route to Queenstown was put through about 1932. In those days tigers were seen and caught on the road itself, and even now there are several "Tiger Hills" and at least one "Tiger Creek" (or "Crick" of the locals).

At the Collingwood River Crossing the Davie family knew of a female Thylacine with several "cubs," which approached the house at night. Unfortunately, but inevitably, with this new country opened up snarers worked along and off the road each winter and the "Tiger" began to go.

Then, in 1935, came Bob Warne's discovery of gold on Ridge Creek, near the Jane River. Prospectors journeyed there along a foot track originally made by the piners of the Jane. They found plentiful tracks of the "Tigers" along this river and its tributaries, and were intrigued to find that these animals followed the human tracks for considerable distances. The piners and prospectors set only odd snares to keep themselves supplied with sufficient fresh meat. However, as Mr. Jack Daly (one of the original diggers of the field) told me, the first systematic winter snaring of the tracks between the West Coast Road and the Jane field and Frenchman's Range began in 1941-42, and has continued since.

This was a natural consequence of the construction in 1939 of the new pack track, when fifty men were employed in cutting this new route through the ranges. Most of these men had dogs, and amused themselves by hunting. Two brothers, operating a line of snares several seasons back, had 2,000 in use at one time and they obtained that number at least of "kangaroo" and wallaby skins in the one winter's work! So, adding our recent observations, it is obvious that there is little hope for the "Tiger" once snaring begins on a wholesale scale, and its disappearance is now proceeding at an alarming pace.

One day at Derwent Bridge Mr. Ron. Brown, driver of a freight lorry operating between Hobart and Queenstown, told me that twice within a week, two months previously, he had seen a "Tiger" on the road at night, in the vicinity of the Collingwood Range. That was the warmest news we had so far received regarding our quarry and I travelled down the road through the mountains on Ron. Brown's lorry to the scene of his meeting with the animal. It had turned off into a quarry the first time, and on the second occasion had quietly faded into the scrub another hundred yards beyond. Early January found our camp at the foot of the long Collingwood Range close by the Collingwood River, and within half a mile of the scene of Mr.

Brown's "Tiger" locality. The bare conglomerate mass of Mt. Hardy, showing white outcrops of quartzite, stood to the east of us, with the impressive mass of Mt. Gell more north by east.

Here, within a stone's throw of the road, was more game than we had seen in the remotest parts of the Jane River. Tracking was difficult because the ground was either stony or covered with soft, springy moss. Picking out gullies and natural passes between the hills where game pads showed signs of the greatest traffic, we set the large wire traps and others of varying types, also special composite brass-wire and hemp snares fashioned

Special treadle-spring snare for Thylacine, near Erebus River.

by Mr. Alderson on a converted egg-beater. These snares were set in all accessible places of strategic importance over a large area. Decoys, such as well-fed possums and wallabies, were comfortably and securely housed in boxes or stockades behind the traps, so that only a limited approach was possible through the trap itself. There were also live sheep, regularly fed and well protected in stockades, with catching devices set outside their enclosures.

The general opinion is that when the "Tiger" catches its prey it opens its victim's thorax and eats the heart and liver, but little else. So, each evening, sheeps' hearts and livers, lumps of bacon and other delicacies were semi-cooked to render them more odorous and then dragged on a string for several miles, creating

Plate XI

Track to Lake River

Typical West Coast rain forest with eucalypts [illegible] celery-top pine and sassafras

Photo: [illegible]

a scent trail, which it was hoped that a tiger would encounter at some point and follow down to one or other of the scattered traps.

That these were effective with carnivorous marsupials was proved beyond doubt, for, approaching the scent line in early morning when heavy mist was beginning to roll up from the Collingwood Range, we would often see fresh devil or dasyure footprints, going in the direction of the trap. If a mature specimen, the visitor would reconnoitre the contraption for the first night or so; but sooner or later we would find the door down in the morning, with a black devil or graceful spotted dasyure glaring at us with baleful eyes. We caught 19 devils in the wire traps — some fully grown, others half-grown specimens of the previous winter's breeding season. Some large males twisted the chain wire with their powerful jaws in a phenomenal fashion. One cut his way right through the wire and escaped, leaving a fringe of black hair around the opening. This feat was really not remarkable compared with the story of a man who once tethered a devil by means of a strong dog chain and collar, only to find one morning that his captive had departed wearing the collar and leaving the chewed off chain behind! "Fergie," of Lake St. Clair, tells of one old, old devil that rushed in on a winter's night and attempted to drag his cat away from the hearth for its supper!

Entering the cage traps on hands and knees to remove captured devils was a test of nerves. Slow, deliberate movements were the order of the day, rapidity of action would mean disaster. The only mishap for the trip was a nice quick bite on the elbow. I don't want any more!

Other animals, too, were snared and caught. There were Bennett wallabies, more pademelons, spiny ant-eaters, eastern swamp rats and lizards, native cats, both black and yellow and grey types. Once a black brush possum came along a bacon trail and caught himself when he tried out this new fare.

One morning, on breasting a rise, I could see a trap door down on the opposite side of the gully, a big greyish animal padding up and down inside. My heart missed several beats! Could this by a Thylacine at last? A breathless climb, and then the anti-climax: it was a large domestic cat — probably born in the bush — a fighting, snarling, spitting fury. That was the first of eight of these wretched scourges of the bush that we caught, and they were the only captives to be summarily dealt with. Tasmania's West Coast has little enough bird-life without cats to take toll of such things as the ground parrot (which was both seen and heard), the blue-winged grass parrot, the friendly dusky robin, the pink robin, flame robin and confiding grey

thrush. One cat was shot in the act of stalking a young and too-friendly blue-winged grass parrot near our third camp.

A month of tough work on the Collingwood saw us flooded out three times, invaded by countless small whip snakes and one large black tiger snake, which, with nine others of its kind, is now a resident of the Healesville Sanctuary. Mrs. Fleay was on friendly terms with the whip snakes, but she could not summon up any enthusiasm whatsoever for the tigers. One lived temporarily in the tool box of the truck until we found an opportunity of sending him across Bass Strait. Nocturnal trips with headlights on, up and down the road in the still small hours, were unproductive, and fraught with a good deal of danger when one's eyes left the road even for an instant.

At the base of the Raglan Range, Mr. Mick Tiffin, road patrolman of Cardigan River, showed me a tree butt which he was sawing up some 2½ years previously when a young Thylacine had run out from under it. From his description there was no doubt about the animal. However, a long hike over the lofty Raglan Range, now blasted by fire, yielded no better results than similar quests up the Alma River, across the slopes of Mt. Hardy and down the gorges of the Collingwood River. Over a month's stay on this river had revealed nothing positive in the way of traces of the Thylacine unless odd skeletons of large wallabies, untouched except for broken ribs, were former victims, so camp was struck and moved to a piner's deserted cabin at the foot of Mt. Arrowsmith and near a gully where myriad glow-worms studded the mossy banks at night.

In a further attempt to work out all accessible areas, and to reach south among the Gordon River tributaries, the next survey and trapping attempt was made down the old Frenchman track. We entered from the Stonehaven creek, crossed the Franklin and Loddon Rivers, skirted the base of the majestic and awe-inspiring Frenchman's Range to approach the Jane River via Calder's Pass and Thirkell's Creek. Alan Batchelor, of Derwent Bridge, proved a stout mate on this, the wettest and most difficult of our many wet journeys. Four miles in from the road a single blurred foot impression on a gravelly patch of the 2,000-ft. Franklin Hill indicated that a "Tiger," possibly one of which more is written later, had evidently crossed the track at right angles, possibly in pursuit of a wallaby. Tracks of wombats and wallabies and the fur-frilled droppings of devils were particularly numerous in the Loddon Hills. The first day out was fine and warm, and, after a long plod over a seemingly everlasting soggy plain of button grass, we reached the middle Dump Hut, just below Calder's Pass, at dusk.

That night as we sat before the fire there came from an

adjacent high hillside a most peculiar cry. It suggested the brief, sharp creak of a door and was quite unlike any cry of a mammal or bird I have ever heard. Then came a recollection of what Tasmanian old-timers say of the "Tiger's" voice. They declare independently that the animal had a habit of yelping shrilly near camps at night and that its voice had some of the characteristics of both cat and dog. Five years ago, on a moonlit night, the Davie brothers had actually seen a "Tiger" performing in this manner on Gum Ridge, between the Jane River goldfield and the Prince of Wales Range. Therefore, here at last it seemed we were listening to the voice of an animal that in our estimation was almost a phantom. The remarkable voice came only three times during the night. We set the traps and next day conducted thorough searches of the heavy myrtle forest along Thirkell's Creek, after a solid struggle through the approaches to Calder's Pass where Bauera scrub has obliterated big sections of the original trail.

However, the only foot-prints we found were those of devils, wallabies, wombats and small swamp rats. About 1 a.m. the following day a lump of bacon was taken from beneath a heavy stone outside the hut and there was a rattle of tins. Whether a "Tiger" was responsible or not we never found out, for immediately afterwards rain began to fall and for two days and nights we scarcely had a break from rain and hail. There were devastating lightning and deafening, stupendous thunder. At one stage blue flame flickered round the walls of our hut and across the soaked floor. Then came snow. With food exhausted, we set off back to the base camp. This part of our 40-mile journey was a wading, stumbling, bitterly cold crossing of the button-grass flats and a risky fording of flooded rivers.

(To be continued.)

FOXES AS SNAKE-KILLERS

A bushman sends this note: "I have never actually seen a fox killing a snake, but round about the dens where there are young cubs it is quite usual to find many large dead snakes which have been partly eaten. The snakes seemed to have all been bitten in half, so it looked as if the fox had seized them in the first instance by the middle of the back."

The same writer says: "During the summer months, especially October and November, I have watched vixen foxes stalking trout in the shallows of a certain creek. They would sometimes spend half an hour, crouched low and motionless like a cat after a bird, waiting for a favourable opportunity to spring on a fish, which they seldom missed. The trout were carried to the cubs at a place quite a mile away from the creek, and, instead of taking the fish into the burrow, or den, the young were always called out into the open to eat it. It was a common occurrence to find remains of trout in places where I knew foxes were breeding."

THE VICTORIAN GRAMPIANS

(A Botanical Retrospect)

By J. W. AUDAS

Part II

Orchids

Sandy tracts with heathland vegetation are frequent throughout the ranges and on such formations terrestrial orchids flourish; no fewer than 70 species of these fascinating flowers are on record from the Grampians area—fourteen of *Caladenia*, eight of *Pterostylis* (the "greenhoods"), seven of *Thelymitra* ("sun-orchids") and six of *Prasophyllum*, to mention but the largest genera. Spectral Duck-orchid and Spiral Sun-orchid are two of the rarest. The Common Spider-orchid here shows an amazing range in colour and may be found with unusually attenuated petals. Although the flowering time may vary by a week or two in different districts, it is yet remarkably constant for each area, and in the Grampians there is a succession of orchid blooms throughout the year—small Leek (or Midge) Orchids during autumn, certain Greenhoods in winter, a wealth of spring kinds ("spiders," "beard-" and "horned" orchids, etc.), with Potato and Hyacinth Orchids in summer.

Proteads

The family *Proteaceae* has two dozen shrubby representatives in the Grampians, including a rich development of showy *Grevilleas* (ten species); particularly bright and large-flowered forms of *G. alpestris* and *G. lavandulacea* are there. *Hakea* claims six species, the Beaked Hakea having large S-shaped fruits, laughably reminiscent of "turkey-gobbler" heads. Victorian Smoke-bush (*Conospermum Mitchellii*) differs from its greyish, loose-flowered West Australian congeners in having dense terminal heads of creamy flowers. Hairy and Prickly Geebung (*Persoonia rigida* and *P. juniperina*) evince a preference for rocky mountain sides.

Wattles and Peas

There are at least 22 *Acacia* species in these mountains, shrubby *A. Mitchellii* and *A. rupicola* being comparatively uncommon; the latter, together with *A. spinescens, A. calamifolia, A. aspera, A. montana*, and *A. verniciflua*, occurs only at the northern extremities where they merge into typical Mallee desert vegetation. *A. myrtifolia* is very widespread and, with *A. acinacea* (Gold-dust Acacia), is a delight in the springtime; both exhale a sweet perfume.

Still more numerous are the lovely Bush-peas (genus *Pultenaea*); it is questionable whether any like area in Australia can claim such a long list as the Victorian Grampians—25 species, of which five are endemic here. *P. subalpina* of the mountain peaks bears thickly clustered pinkish-mauve blossoms and is unique in a genus of

PLATE XII

[illegible].—Coral Lichen (*[illegible]*) from the Wonderland area. Photo: W. H. [illegible].

Below.—The endemic Grampians Gum (*Eucalyptus alpina*), abundant on mountain summits.

Photo: H. [illegible] Rose.

otherwise yellow or red-striped flowers. Mt. Rosea takes its name from this rare and beautiful Rosy Bush-pea. *P. mollis*, a tall sticky shrub from near Mt. Sturgeon, is exceedingly rare, perhaps even now extinct through repeated bush fires.

Of other legumes, there are Bitter-peas (four species of *Daviesia*, leafless red-flowered *D. brevifolia* being the most unusual), Parrot-peas (five species of *Dillwynia*), Shaggy-peas, Bosseas or Sunbushes—all with ericoid foliage and most attractive blooms in red, orange or yellow tones that have earned for them the rather absurd collective name of "eggs-and-bacon." *Gompholobium Huegelii*, Pale Wedge-pea with variant bronzy red and gold flowers, both Common and Long-leaf Hovea, one species each of the humble sprawling *Eutaxia* and *Phyllota*, and the graceful lilac-sprayed *Indigofera australis* are worthy of mention, but these do not by any means exhaust the catalogue of handsome leguminous flowers to be seen in the Grampians.

Boronias

Half of the twelve Victorian *Boronia* species affect the Grampians, none more lovely than *B. pinnata* of Mts. William, Rosea, Difficult and one or two other lofty points; its large rosy flowers are very conspicuous and the whole plant, as with the heathy *B. pilosa*, gives out a delicious aroma. Blue *Boronia caerulescens* is to be met on the Black Range. Downy star-bush, Sandfly Zieria, Prickly-, Truncate- and Umbellate Phebalium, Small-leaf and Fairy Waxflower, and three delightful *Correa* species (Hairy, Mountain, and several forms of the red-belled type) are among the score of rutaceous plants occurring here. *Tetratheca ciliata* and *T. ericifolia*, of the small related, but purely Australian, family *Tremandraceæ*, provide charming, widespread clusters of bloom close to the ground—white, mauve, or rich magenta.

The Myrtle Family

Beside the fifteen eucalypts, there are twenty other species in the family *Myrtaceæ*, including some glorious ericoid shrubs that add much to the distinctive floral aspect of the region. Manuka, Tantoon, Silky and Woolly Tea-Tree (*Leptospermum* species) grow freely almost everywhere, while a large-flowered form of the last adorns the heights. Honey-myrtles (*Melaleuca*) embrace eight species, three with purplish flower-heads—*M. gibbosa* is very dainty and has the smallest leaves, *M. neglecta* is an unusual migrant from the Mallee. The Scarlet Bottle-brush (*Callistemon rugulosus*) relieves dense thickets with vivid splashes of colour in season.

Rather similar in their ericoid foliage, slender branching and profusion of virgin white blossom are Snow-myrtle (*Lhotskya alpestris*) and Grampians Fringe-myrtle (*Calytrix Sullivani*); the

more common Fringe-myrtle (*C. tetragona*) has white or pink flowers with spidery calyx segments and is another link with Mallee scrubs to the north. The endemic Bushy Heath-myrtle (*Thryptomene calycina*) is the special glory of the ranges, and is now widely and successfully cultivated in nurseries and gardens, being freely sold as a cut flower. A close relative is Fringed Heath-myrtle (*Micromyrtus ciliatus*), both species delighting the eye with copious dainty white or rosy flowers, or with the reddened calyces which remain long after petal fall. All of these heathy myrtles have strong affinities with the sand-heath flora of West Australia.

Heaths

The 22 epacrids afford a galaxy of colour for a large part of the year. Common Heath (*Epacris impressa*) is abundant in all shades from white and faint pink to deep red. Pink Swamp Heath (*Sprengelia incarnata*) attractively brightens many wet low-lying areas of scrubland and Flame Heath (*Astroloma conostephioides*, with satiny scarlet bells) the drier ground. Pine-Heath (*A. pinifolium*) favours rocky ground and bears rich yellow flowers, as does Golden Heath (*Styphelia adscendens*). Each of the last three produces succulent stone fruits, much relished by emus. On Mt. Difficult occur all of the four *Brachyloma* species indigenous to Victoria, while one or several of the seven *Leucopogon* species (Beard-heaths) are sure to command admiration anywhere in the Grampians; *L. glacialis* and *L. thymifolius* were long regarded as endemics, but have recently made their appearance in several other parts of Victoria.

Daisies

Largest family by far is the *Compositæ*, with nearly 90 local representatives, from subalpine to semi-desert kinds. Though richly developed on dry inland plains (chiefly ephemerals), daisy plants are essentially mountain lovers and the higher one ascends in any part of the world, the more do they predominate over other groups of plants—a species of *Saussurea* attains the high altitude limit among flowers, 19,000 feet in the Himalayas. We have mentioned the stately Silver Daisy (*Celmisia longifolia*) whose large flowers, lovelier than shasta heads, once graced the summit of Mt. William; recent botanical visits there have failed to locate it and extermination is feared. Daisy-bushes (*Olearia*) and Everlastings (*Helichrysum*) have each ten species in the Grampians, while the true Australian Daisy genus (*Brachycome*) claims twelve —they are a particular feature of Mt. Difficult. In the "Wildflower Garden" (east of Hall's Gap), white Woolly Everlasting (*Helichrysum Blandowskianum*) grows in profusion, and on the Long Red Hill (near Stony Creek diggings) is a wonderful variety

of everlasting types. Plumed Humea (*H. elegans*) calls for special notice; this tall biennial, with large tobacco-like, very aromatic leaves, produces great nodding panicles of countless tiny glistening flower-heads—rosy carmine, flesh-pink or white, and a most compelling sight.

Some Other Attractive Plants

Of climbers and twiners there are many species, two handsome ones being *Clematis* with delicate starry blooms succeeded by silvery feathered fruitlets. Three parasitic Dodder-laurels (*Cassytha*) are here, two modest Apple-berries (*Billardiera scandens* and *B. cymosa*), the dainty blue Love-creeper (*Bredemeyera volubilis*) with small cœrulean flowers like miniature peas, Purple and Scarlet Coral-peas, Twining Glycine, Twining Fringe-lily, Blushing Bindweed and Wiry Bauera. Small-leaf Bramble (*Rubus parvifolius*) seeks the support of rocks and neighbouring vegetation in its growth toward sunlight, Matted Bush-pea sprawls along the ground, but the most delightful and elfish of all our lianes is Orange Bell-climber (*Marianthus bignoniaceus*), so abundant at Wonderland and other spots near Hall's Gap.

Nine of the golden Guinea-flowers (*Hibbertia*) find the Grampians to their liking, the rarest being Mountain Guinea-flower (*H. humifusa*) from Mt. Zero. This northernmost peak also yields a remarkably fine unnamed *Westringia* and the exceedingly rare Skeleton Club-moss (*Psilotum nudum*). Hereabouts, several plant types have intruded from the dry Mallee scrubs to the north, whereas a number of Grampian types have extended their range into the outskirts of the Mallee, this interchange probably arising from the gradual declination of the lofty sandstone ranges toward the northern plains; seed dispersal by weather, bird visitations, and stream flow from the Grampians watershed has been easy. In the so-called "desert" area those migrants from Grampian hills to the south have been somewhat modified in leaf structure, growth habits, and floral colours to conform with the more arid conditions of their new environment. The change from Grampians flora to that of swampy plains adjoining the Wannon River to the south is more pronounced.

In closing this sketch, it need scarcely be said that a vast array of glorious wildflowers has been left unnoticed. To extol the beauties of the Mint-bushes (*Prostanthera*), Euphrasias, Veronicas, Rice-flowers (*Pimelea*), Hop-bushes (*Dodonæa*), Goodenias and Trigger-plants, including that charming little endemic Trigger (*Stylidium soboliferum*) whose dense bewhiskered rosettes perch on dripping rock faces among moss, like "hen-and-chicken" plants (of *Sempervivum*), it would require not a paper, but a volume of considerable size.

Floristically, the Grampians *are* a first-class tourist attraction,

and we must guard their treasures for posterity. The Wildflower Protection Act has materially helped to check thoughtless spoliation, but legislation is impotent without the enthusiastic support of all nature lovers, who must spread their gospel among the unenlightened.

PREVIOUS CONTRIBUTIONS TO THE "VICTORIAN NATURALIST"

"One of Nature's Wonderlands—The Victorian Grampians," XXIX (1913), 146.
"The Grampians Revisited," XXXI (1914), 24.
"Nature in the Serra Range, Grampians," XXXV (1919), 171.
"Through the Murra Murra Country (Western Grampians)," XXXVII (1920), 59.
"Through the Balangum Ranges and at Rose's Gap (Grampians)," XXXVIII (1921), 11.
"A Circuit of the Grampians" (with map), XXXIX (1922), 87.
"The Flora of the Black Range," XLIV (1928), 341.

(Concluded.)

MUELLER MEDAL AWARD

At the meeting of the Australian and New Zealand Association for the Advancement of Science held recently in Adelaide—the first since before the war—Mr. Cyril T. White, Government Botanist of Queensland, was made the recipient of the Mueller Memorial Medal. This bronze medallion, which figures a waratah head on one surface and a profile of Baron von Mueller on the other, is struck whenever the Association meets (but not more frequently than once in two years) and awarded to some distinguished author of "researches in natural science" within a period of five years preceding the meeting.

A special inter-State committee administers the medal fund for the A.N.Z.A.A.S., and the first award was made in 1904 to the late Dr. A. W. Howitt, of geological and ethnological fame. The committee's present choice of a recipient—almost exactly 50 years after von Mueller's death—is particularly gratifying to our Club.

As a Past President, Secretary and Treasurer, and most active office-bearer in the Queensland Naturalists' Club for many years, Mr. White has always taken a sympathetic interest in the affairs of the F.N.C.V. Moreover, he is a grandson of the great Frederick Manson Bailey—contemporary and loyal friend of the Baron. Bailey was appointed Colonial Botanist of Queensland in 1881, and, at his death in June 1915, was succeeded by Mr. White—first as assisting, then as acting, and finally as full-time Government Botanist in 1917. So, this honoured position has been held with conspicuous ability by members of one family for 65 years, and there is surely no other upon whom Mueller himself would rather have bestowed the medal.

J.H.W.

ROYAL COMMISSION ON FOREST GRAZING

The report of His Honour Judge Stretton has just been published (1s. 3d. from Govt. Printer, Melbourne) and will surely be welcomed by all naturalists. The Commissioner likens the appalling state of our mountain forests to the ruin that has long since overtaken much of Africa, the Levant, and China. He condemns present grazing methods as a common cause of fire and erosion, and recommends the establishment of a Land Utilization Authority to protect *all forest land*.

NOTES ON AUSTRALIAN HARVESTMEN

By R. A. DUNN, Melbourne.

It is to be regretted that man is inclined to grade all animal life according to commercial value, and so tends to overlook those forms that have no direct influence on his well-being. Into this category comes the majority of Arachnida—the spiders and their allies—and there are few branches of zoology that have been neglected more than that of arachnology. Even now there is only a slowly-awakening realization of their interest and importance, but there are signs of an increasing desire for knowledge, particularly of the spiders, which cause arachnologists to hope that in the near future there will be created an interest in arachnids comparable to that shown in insects.

Although spiders have claimed a certain amount of interest, small enough though it is, other arachnids have received even less, and in Australia the "honour" in this respect belongs probably to that group which contains the Harvestmen—the Order *Opiliones*. That this group will become much better known is certain, mainly because one of New Zealand's leading arachnologists, Mr. R. R. Forster, who has done much to elucidate the Harvestmen of New Zealand and the Pacific islands, has fortunately turned to the study of our Australian forms. Obviously there is a vast field waiting to be studied, as a species which is fairly common in the writer's garden is not only undescribed, but will become, so Mr. Forster says, the type of a new genus.

In view of their novelty to the average naturalist, chiefly because of the fact that popular books on Australian arachnida contain no mention of Harvestmen, a few notes may be appropriate.

Also known as "Harvest-spiders," Harvestmen are almost invariably mistaken for spiders, but actually are much closer related to the Mites (Order *Acari*). The distinguishing feature of spiders is that the abdomen is separated from the cephalothorax by a narrow waist or pedicle, whereas most other arachnids have the abdomen and cephalothorax joined across their whole breadth. In Harvestmen the abdomen is distinctly segmented, but the Mites have lost almost all traces of segmentation.

One of the most obvious features of Harvestmen is their long and slender legs, which gives them a somewhat superficial resemblance to the "Daddy Long-legs" spider (*Pholcus litoralis*). Like those of spiders, the legs are seven-jointed. The tarsi, however, are divided into a varying number of segments. Among spiders, the *Pholcidae* have false segmentation lines on the tarsi, and some of the males of the genus *Mennaus* (family *Dinopidae*) have their tarsi divided into two parts, but in the vast majority the tarsi are entire.

Another peculiar feature is the position of the eyes These are

two in number, and are usually placed back to back on the sides of a tubercle of varying shape.

Harvestmen are essentially nocturnal, and may be found by day under logs, stones, or fallen leaves—generally in damp situations, as they cannot live without water. Their food consists of caterpillars, centipedes, spiders, and other small animals, and they are not averse to cannibalism. Unlike the spider, they will also eat the bodies of creatures found dead, but only if these be fresh.

Notwithstanding their ungainly appearance, they possess a turn of speed that is surprising when first encountered. The legs are readily cast off when seized and the discarded member has the ability to move for some time. The writer has examined the leg from a freshly-killed specimen, and after more than an hour the leg still "kicked" strongly enough to fall off the microscope slide. Probably this helps the creatures to escape from their enemies, but it seems that their main protection is the ability to emit an odour from glands which lie in the forepart of the cephalothorax.

Being of various shades of grey and brown, sometimes with a touch of yellow or other colour, they blend into their surroundings and often cannot be seen until they move. The sexes are very similar in appearance, and their sexual organs are usually concealed in the front end of the abdomen.

No cocoon is made—they have no spinning organs—but the eggs, 20 or more in number, are laid in holes in the ground, or under logs or stones. When the young hatch out they are exactly the same as their parents, except in colour and size. Up to nine moults may take place before maturity is reached, and usually the first moult gives them the normal markings of the adult.

Although some 40 species have already been recorded from Australia, it seems probable that many times this number are still undescribed. As Mr. Forster so mildly puts it, the Australian Harvestmen are "not very well known," and anyone who desires to help in increasing the knowledge of these interesting creatures is asked to forward specimens, no matter how common, to Mr. R. R. Forster, at 33 Buller Street, Wellington, N.Z., or through the writer, who will be glad to pass them on.

CONCERNING THE "YAHOO"

"What is a yahoo?" D.G., an old bushman of Walcha (N.S.W.), asks the question. He remembers that when a youngster he heard talk of its being a blacktellows' name for an evil spirit of the night. He has never seen the word in print, except in *Gulliver's Travels*, and wondered how or where Swift got it. Between 50 and 60 years ago he heard this call on a creek 20 miles east of Tamworth, and, the moon being full, he was able to trace it to a bird about the size of a kookaburra which he "mooned" in a low tree, but he was never able to fix its identity.

✓ Seen by J.H.Willis 16–19th June 1948.

EUCALYPTS OF THE AUSTRALIAN CAPITAL TERRITORY

By C. E. CARTER, M.F., Canberra.

✓+ *E. albens* F.v.M. [= *E. hemiphloia*, var *albens* (F.v.M.)] 1. *Mugga Mugga* (2670'),
✓ *E. Blakelyi*—Below 2,500 ft., City area.
E. brevirostris—Laurel Block.
E. camphora—Blundell's, Coree Flats.
✓ *E. cinerea*—N.E. Boundary of A.C.T. *Mugga Mugga* (2670').
E. Cordieri—2,000-3,000 ft., common towards Tharwa and Naas, less plentiful farther N. Stromlo.
✓ *E. Dalrympleana*—usually above 3,500 ft.
✓ *E. dives*—Widely spaced all elevations up to 4,000 ft.
✓ *E. fastigata*—2,800-4,000 ft. on Mtns.
✓ *E. delegatensis*—3,800-5,000 ft.
E. Huberiana—Below first 5 crossings, Coree.
✓ *E. maculosa*—Plains to 3,500 ft.— two distinct forms.
✓ *E. macrorrhyncha*—Common to 2,700 ft. Black Mountain.
var *minor*—Below Cotter Dam.
✓ *E. melliodora*—Common plains up to 2,400 ft.
var. *brachycarpa*—Foot of Ainslie, smaller fruits.
E. niphophila—On mountain tops above 5,000 ft.
✓ *E. pauciflora*—Widely in A.C.T. towards S. Bimberi.
E. Perriniana—At 4,000 ft. on Coronel Trig., above Cotter House.
E. polyanthemos—On plains and low foothills.
✓ *E. Robertsonii*—2,500-4,000 ft. (see radiata).
✓ *E. Rossii*—Common to N. and E. of A.C.T. (see micrantha).
✓ *E. rubida*—Damp places to 2,500 ft.
E. stellulata—Damp sites plains to 5,000 ft.
✓ *E. Bridgesiana*—Common plains to 3,000 ft.
✓ *E. viminalis*—From plains to 4,000 ft.
E. vitrea—Blue Rge., Laurel Block, Brindabella Rd.
E. Westonl—Near Gungahlin Block.

[Commenting upon "Nature Notes on Canberra" by C. Daley (*Vic. Nat.* July, 1946, p. 52), Mr. Carter has been good enough to supply the above complete, informative catalogue. His long and wide experience of eucalypts, first as Principal of the Victorian School of Forestry, Creswick, and latterly of the Commonwealth Forestry School at Canberra, needs no emphasis, but members interested in our gum-trees may not all know that he is the author of a very excellent recent work, *Distribution of the More Important Timber Trees of the Genus Eucalyptus*.—ED.]

TIGER SNAKES AND DOGS

How deadly the venom of the Tasmanian tiger snake may be is indicated in this note from a resident of the island State: "Some years ago two boys, one of them a son of Mr. John Headlam, of Woodbury Station, in the Midlands, were rabbiting with a pack of six dogs which held up at a fallen log. When the boys turned the log over all the dogs rushed a tiger snake coiled under it, and quickly tore it to pieces. Five of the six dogs died, the first of them within a few minutes of being bitten, and the only one of them to get home—Mr. Headlam's favourite sheepdog—died on the chain the following night. I have heard other cases of dogs dying quickly when bitten, possibly because the heart action of a dog means more rapid circulation of the blood."

DIGGERS' REST—ST. ALBANS EXCURSION

All who took part in this excursion (September 14) enjoyed the very leisurely walk along the railway reserve under unexpectedly pleasant weather conditions—even the wind was gentle, which is remarkable for the Keilor Plains in September. Had there been the usual brisk wind blowing, the party might have had more reason to note the absence of trees from this part of the plains. Even the few Casuarinas seen in a previous walk by the writer were no longer there. Among what now remains are a few stunted Eucalypts, Blackwoods and Boobiallas—the latter near to St. Albans.

To the ornithologically-untrained eye bird-life seemed scanty—those birds which were not heard were not seen or, at any rate, not commented upon. Magpies, ravens and skylarks were noted, but not much else.

Miss Peggy Sweatman made a vast collection of caterpillars which were particularly abundant on the grasses, and in all stages of development—even to the pre-pupating stage where they were seen making their way underground. No snakes were seen, although it is safe to say "tigers" are still as plentiful in that region as they were in the days when Tom Eades used to take a dozen or more in an afternoon's hunting. The only reptiles encountered were two blue-tongue lizards.

The existing flora of the area we traversed can, to some extent, be taken as a cross-section of what once covered most of the near-Melbourne portion of the basalt plains, except that the present components of the communities have increased or decreased or, in some cases, even disappeared as a result of complete change to cultivated forage and cereal plants in the adjacent paddocks, and of invasion by weeds.

Several specimens of a plant not specifically recorded for the Plains in our 1928 census—*Thysanotus Patersonii*, the Twining Fringe-Lily, were observed, and several others plants were seen which it may be of interest to record. The Adder's Tongue (*Ophioglossum coriaceum*) was noticeably abundant. Of the eight *Filicales* recorded for the Plains, the only others observed were Rock-lip Fern and the Common Bracken, the latter in only one small patch near Sydenham.

Of *Orchidaceae*, which contribute about twenty species to one part or another of the Plains, only three were noted. Several sizeable colonies of *Pterostylis truncata* still exist, but, it being an autumn-flowering plant, no blooms were seen. Although the area was examined very carefully, not more than a dozen specimens of the scented Sun-orchid (*Thelymitra aristata*) and two specimens of the Golden Moth Orchid (*Diuris pedunculata*) were seen. Both these species, as well as *Diuris alba*, were common enough not much more than a decade ago and now one has to search closely to find any of them. Their present scarcity may, of course, be due entirely to seasonal conditions and not to ruthless collectors, but one fears the worst with regard to *D. alba*.

The probability of the previous seasons being unfavourable was emphasized by the relative paucity of the characteristic composites. A very few plants of Clustered Everlasting (*Helichrysum semipapposum*) were seen, but the Common Everlasting (*H. apiculatum*) gave quite long stretches of the reserve that curious greyness that is noticeable from railway carriage windows. Even the Bulbine Lily (*B. bulbosa*) with its showy golden-yellow flowers, previously seen in thousands on the moist flats, was evident only in twos or threes. Members of the Goosefoot family are an important constituent of our basalt plains flora and several were collected during this excursion, viz., *Chenopodium microphyllum*, *Rhagodia nutans*, and *Atriplex semibaccatum*.

J. Ros Garnet.

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PROCEEDINGS

The monthly meeting of the Club was held at Nicholas Hall, Wesley Church, Melbourne, on November 11, 1946, the President (Mr. F. S. Colliver) presiding and about 450 members and friends attending.

This being a special film evening, the President welcomed to the meeting representatives of the University and members of allied societies.

It was announced that for the time being the proposed excursion to the Anakie Gorge must be cancelled owing to the illness of the leader, Mr. S. R. Mitchell.

A message from Mr. R. G. Painter, now at Hepburn, near Daylesford, announced the proposed formation of a Field Naturalists' Club in the district, after an excursion to the golf links which revealed a large variety of orchids.

The Hon. Secretary (Mr. J. Ros Garnet) reported on the opening of a new National Park at Dimboola during the Back to Dimboola Celebrations, when a number of Club members attended for a week-end excursion (October 17-18, 1946). This park is the smallest in the State, but consisting as it does of original Mallee scrub it should be a worth-while addition to the list of National Parks. The council has promised to fence the area.

The following were elected: As Ordinary Members, Dr. M. M. Chattaway, Mrs. M. Johnston, Mrs. M. Trott, Mrs. V. A. Wallace, Mrs. E. M. Fyson, Misses P. Barrett, N. Clancy, J. Routley, Messrs. J. H. Schultz, W. J. Schultz, J. D. Ashburner, F. L. Beauchamp, T. C. Bryan; as Country Members, Miss L. E. Meaumont, Mr. and Mrs. R. A. Smart, Rev. E. N. McKie, Messrs. O. H. Lightbody, Ruben S. Gullick, J. L. B. Mills, G. C. Collis, A. J. Russell; and as Associate Members, Miss J. Muntz and Mr. Sydney B. Blencove.

NATURE NOTES AND REMARKS

Mr. C. J. Gabriel exhibited a fine specimen of the tube-shell, *Siliquaria australis*, Q. & G., dredged from Bass Strait. He stated that this shell is found in company with various kinds of sponges and this particular specimen, the finest he had collected during fifty years, was to be passed over to the National Museum collection.

Mr. Garnet spoke of the nest of either a Rail or a Sandpiper built in salt near Dimboola.

Mr. Colliver exhibited specimens of salt from Altona and Geelong, and outlined the process whereby salt-water is reduced to this material at the Altona salt pans

SUBJECT FOR THE EVENING

Two short films, "The Flax Industry" and "Behind the Food Front," from the Agricultural Department, were introduced by Mr. G. N. Hyam, who stated that they were wartime preparations, used to show what Australia was doing. "The Flax Industry," in particular, showed in operation several Australian-invented machines that reduced handling of raw material to an absolute minimum.

Due to transport troubles the film advertised ("The Sands of Central Asia") could not be shown, but the Soviet Legation made available in its place "The Vigour of Life." Wonderful photography and some outstanding combinations of animal and plant life made the film something to be remembered. Death, of course, had a part in this film, but it was never blatant, being seen rather as the natural ending to a busy life and part of the plan of nature. As against this side of the film, many groupings showed young mammals and birds of various kinds as indications of the opening life-cycle.

At the end of the film, which lasted one hour, the thanks of the Club were accorded the Soviet Legation.

EXHIBITS

Mr. R. Cuddihy: Volcanic Bombs from Wiridgil Hills, Camperdown.

Mr. J. R. Garnet: Botanical specimens from the Wimmera (Dimboola, Mallee and Little Desert) and Diapur (Lawtoit Ranges), salt water from Lochiel salt lakes near Dimboola showing a trace of coloration due to a pink algae.

Mr. J. S. Seaton: *Verticordia plumosa* (Western Australia), garden-grown at Caulfield.

Mr. C. J. Gabriel: Marine shells. *Siliquaria australis*, dredged from Bass Strait.

Mr. F. S. Colliver: Specimens of salt from the salt pans of Altona and Geelong

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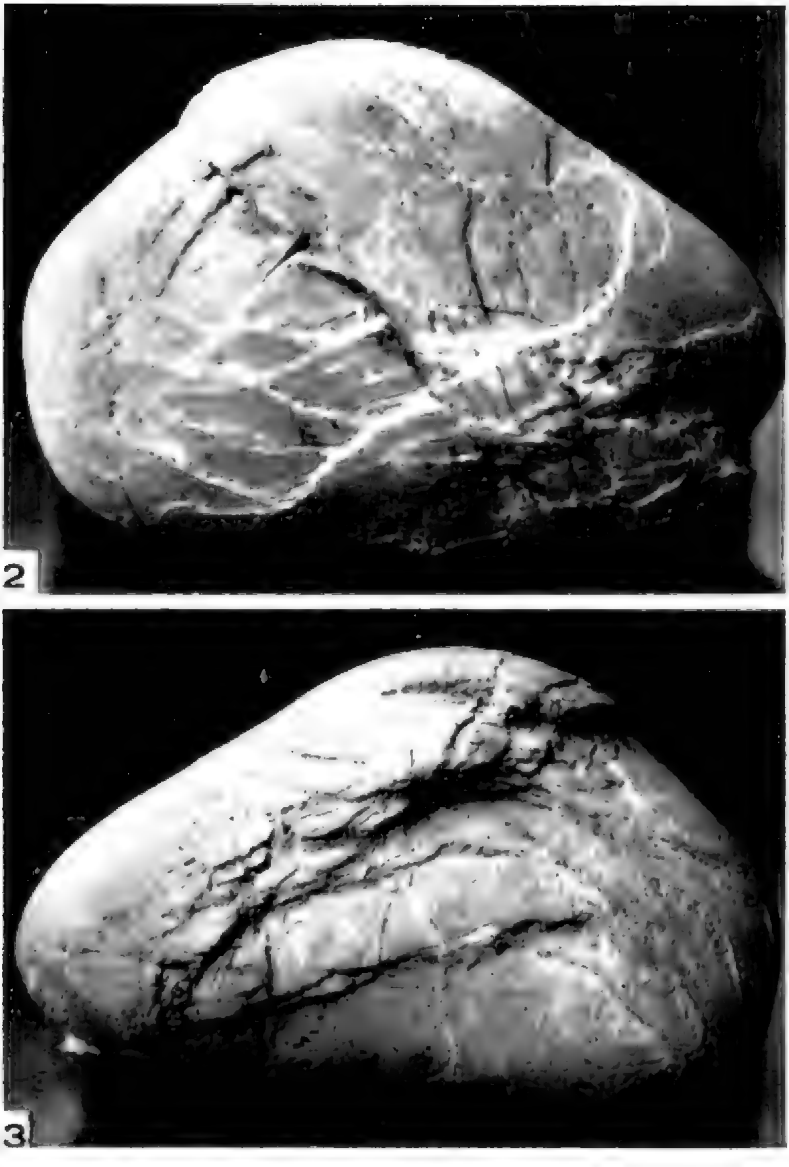
THE RIDDLE OF VOCAL MIMICRY

Mr. A. H. Chisholm's study of this subject, which appeared in several issues of the *Victorian Naturalist*, has been revised and amplified and published as a booklet under the auspices of the F.N.C. Containing 24 pages of letterpress and eight illustrations, the booklet, which is entitled *Nature's Linguists*, is now on sale at 2/- a copy. As the edition is limited, intending purchasers should make early application to the Club Librarian. Proceeds go to the Club's publications fund

PLATE XII



Figs. 2 and 3.—Illustrations of shearing and crushing noted in quartz pebbles.

UNUSUAL PEBBLES FROM AN ANCIENT RIVER

By EDMUND D. GILL, B.A., B.D., Melbourne.

A large mature river flowed in early Tertiary times from the Woori Yallock basin northward round the Coldstream end of the Dandenong Range and southward through Lilydale and Mooroolbark to enter the sea probably in the direction of Frankston. This ancestor of the River Yarra flowed down beside a range of hills running roughly north and south (through where Croydon now is) called by Keble (1918) the Wurunjerri Range. It is therefore suggested that this Oligocene(?) river be called the Wurunjerri River.

Clays, sands, quartzites, conglomerates and gravels left by the Wurunjerri River are still preserved, and have been mapped in an earlier paper (Gill, 1942), and later field studies have brought to light still further evidences of this river. Leaves of *Nothofagus* and a piece of silicified wood (*Beilschmiedia*) about a foot in diameter have been collected in the vicinity of Lilydale. Holes have been noticed in the quartzite at Cave Hill which might well be cavities left by sticks.

Cave Hill Pebbles.—One of the most interesting features of the Wurunjerri River deposits at Cave Hill, Lilydale (where they underlie Older Basalt), is the presence of sheared and crushed pebbles. These are readily found in the soft sands overlying the Lower Devonian limestone which is being quarried for lime. Fig. 1 shows the wall of the quarry with the limestone in the lower part of the section, basalt on the upper right-hand part of the section, and sands with quartzite in the upper left-hand part of the section. Figs. 2 and 3 illustrate the nature of the shearing and crushing found in the quartz pebbles.

Origin of the Pebbles.—As the Wurunjerri River originated in ranges consisting of dacite and granodiorite, it may be asked where the very numerous milky quartz and quartzite pebbles originated. It is probable that the milky quartz pebbles of larger size came from dykes, while the fine material could, of course, originate from the volcanic and intrusive rocks named. The quartzite pebbles no doubt originated in the quartzitic beds of the bedrock which occur in the Woori Yallock basin and appear to be a repetition of the Brushy Creek quartzites.

Cause of Shearing.—It is obvious that the pebbles could not have been sheared in the sands in their present condition, because the sands would give way before the hard quartz pebble would break. On the other hand, the pebbles do not seem to have been transported to their present location in a sheared condition because the edges are so sharp, as the plate shows. If they had been transported, the edges would have been abraded in transit. The

most likely explanation is that they were sheared and crushed while held in quartzite. It might be inferred at first that the sands accompanying the quartzite are just unconsolidated sands, but closer inspection shows that much (if not all) of the sand is a result of de-silicification. All stages between the solid quartzite and the loose sand can be identified, and the de-silicification is seen in places to be developing along joint planes and areas more readily open to infiltration of percolating liquids. Moreover, the partly de-silicified rock is firm but easily broken, having a sponge-like consistency, i.e., there are fine cavities all through it, whence, apparently, the silica has been leached away. One imagines,

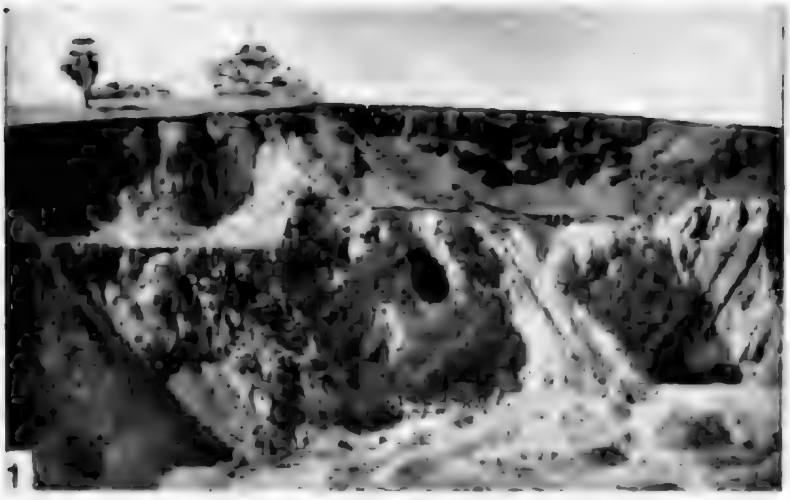


Fig. 1. Wall of quarry on site of the old Wurunjerri River, Cave Hill, Lilydale.

therefore, that the pebbles were sheared and crushed while forming part of a quartzitic conglomerate, and that since then the matrix has been de-silicified sufficiently to release some of the very hard pebbles it contains.

Origin of Shearing Forces.— Another problem is why the pebbles at Cave Hill should be sheared and not those in the other sub-basaltic deposits mapped by the author (Gill, 1942, p. 248). The explanation suggested for this is that the sands and quartzites at Cave Hill overlie a limestone deposit. Quarrying operations have shown that there are numerous caves in the limestone, and, particularly when these are near the surface of the limestone, a certain amount of collapse has ensued. Fig. 1 shows a cave in the limestone, but in this case it has been infilled with basalt. Collapse

due to slumping over limestone caverns could provide all the local forces necessary to provide the small-scale faulting and crushing seen in the pebbles under discussion.

Disposition of Sands and Quartzites.—It will be noted from Fig. 1 that the sands and quartzites rise to a height equal to that of the basalt, and some have questioned whether the basalt did actually cover the sands. A study of the stratigraphical contours reveals that the base of the basalt shown in the photograph is the thalweg of the pre-basaltic river; also that the flow was of the order of at least 200 feet thick at this point. The base of the basalt is about 435 feet above sea level (aneroid measurement), while the top of the basalt on the hill nearby is about 650 feet. An enormous amount of erosion has taken place since early Tertiary times when the deposits came to rest there, so much so that the Wurunjerti River materials are now preserved only on occasional hilltops in the Lilydale area, and the basalt flow is reduced to a few small residuals. Apparently a marginal stream developed between the basalt and the toscanite-dacite complex of the Dandenongs to the east. The stream was able to erode the latter more easily than the former and so the Olinda Creek runs on a toscanite bedrock in this vicinity, leaving the Tertiary quartzite-basalt association as a monadnock.

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NORTH QUEENSLAND FERNS

The North Queensland Naturalists' Club, Cairns, is to be complimented on the appearance last month of its third special publication—a complete check list of the pteridophytes (ferns and club-mosses) to be found in northern Queensland. Mrs. D. A. Smith, lately of Brisbane Herbarium, was the pteridologist mainly responsible for the determinations and general set-up. Nearly two-thirds (220 species) of all the ferns in the Commonwealth are included; this renders the brochure of considerable scientific value, enhanced by the facts that an up-to-date classification is used and the text is remarkably free from annoying typographical errors (*Selaginella pumilis* instead of *S. pumilio* is one of these rare slips). Authors, localities, collectors' names, etc., are given for each species. One could wish some definite limit had been assigned to the area called "North Queensland."

It is noted that *Cheilanthes Sieberi* has been retained as a species distinct from *C. tenuifolia*—an opinion discredited by Mr. N. A. Wakefield (*Vict. Nat.*, LVI, p. 110, 1939)—and that *Diplazium australe* has been kept in the genus *Athyrium*, despite Wakefield's explanation to the contrary (*Vict. Nat.*, LVIII, p. 140, 1942). But these little bones of contention in no way detract from the excellence of the compilation.

J.H.W.

ON THE TRAIL OF THE MARSUPIAL WOLF

By DAVID FLEAY, Director, Sir Colin Mackenzie Sanctuary, Healesville.

Part III

The weather having defeated our attempted penetration of the old trail, we decided to search the country up the Jane River in the vicinity of a piner's old cabin towards Lightning Plain. Jack Daly, ex-prospector and ex-packer, whose tales of gold-seeking in wild western Tasmania had beguiled us on many occasions, accompanied Alan Batchelor and myself. We set out in the first week of February just as the ground was becoming firm after the rains that had weather-bound us at Calder's Pass. Our route lay along the pack-horse track we had not travelled since November.

Then, out of the blue, and only three miles along the track, lay revealed what we had for so long diligently sought — an unmistakable and fresh series of tracks made by a Thylacine no more than 24 hours previously! Rain is too frequent for impressions to last long in this country, but these footprints were perfect, running for a hundred yards down the track and then turning off into the button-grass whence they had come. We had no doubts at all about the animal responsible, carrying as I had done a plaster cast of a Thylacine fore-foot kindly loaned by Dr. Pearson, Director of the Hobart Museum.

Marking the locality for later reference pending the results of this new journey, we pushed and wheeled several bicycles (in this instance), to which were attached bedrolls and trapping gear. However, since heavy and continuous scouring by water had reduced large sections of track to little more than boulder-strewn creek beds, we were forced after seven miles to abandon the system, and there the bicycles stayed. An uncommon black native cat was our catch that first night, which was also notable for a brilliant display of the *aurora australis*. I carried the "cat" on foot for 40 miles after that, and now, at Healesville, she has claims to being quite a tourist.* On down to the Erebus, along the river, and across open button-grass once again to the lower end of Thirkell's Creek, thence (on the second day) to the piner's cabin on a knoll high above the deep and dark Jane River. We had passed wire "necker" snares by the hundred. Game was again as scarce as we had found it nearer the field in November; and though we searched most carefully, there was not the slightest sign to indicate the presence of Thylacines.

In spite of the favourable conditions prevailing in the complete absence of the piners, prospectors and hunters, snaring in

*This dasyure now has four joeys in her pouch. Their colours will be interesting.

recent seasons had done its work only too well. Years ago Mr. Daly had regularly found "Tiger" footprints at each end of a great log spanning the river, but now special investigation yielded no signs. Likewise, no tracks could be found either up or down stream or out on the plains. In fact, the log cabin itself, once the scene of a nocturnal visit by a curious "Tiger" when Messrs. Fleming, Sharland and party stayed a night there, showed unmistakable evidence of having been a snarer's base.

Faded white lettering on the door, relic of the hospitable pining days, could still be deciphered — "Enter here all ye who are heavy laden and tired and we will feed you — The Jane River Hostel." It did not need Jack Daly to tell us that many a weary packer had accepted the invitation.

Several days later we crawled back dispiritedly to the West Coast Road. Nevertheless, we had a card up our sleeves, namely, the tracks now sadly rain-worn on the three-mile near Poverty Plain. If a Thylacine had been there so recently surely sooner or later it would return, particularly as this was a natural gateway between the Loddon and Surprise Valleys. No time was wasted in bringing the truck load of traps from the Collingwood and taking them by means of pack horses to the new prospect. They were set at intervals along a mile section. Two palisades were erected for sheep decoys, a third for a young Bennett wallaby and a fourth for a brush possum. I had caught the little Bennett wallaby by the tail at night in the bush and had thought myself very clever until it was discovered that she was totally blind, though otherwise healthy and well.

Having dispersed these varying types of traps, we now settled down to the tedious but necessary job of laying scent trails each evening for miles and placing fresh baits, such as sheep's hearts and livers, on hooks to attract the fastidious Thylacine. Owing to the precocious blow-flies, no bait was of any further use even as early as an hour or so after sunrise. The decoy animals also had to be fed, kept clean, and fly free, and it was usually a difficult job to find sufficient green food for them. No wonder that rabbits had never managed to establish themselves in this part of Tasmania. It was a somewhat deserted locality here, with few devils and no native cats. This was an advantageous state of affairs, as the traps remained undisturbed and ready for the purpose in hand.

Day and weeks went by. One morning an absolutely jet-black devil was sitting in a wire trap; another tore a great hole in the chain netting of the lightest one and escaped after first cleaning up every scrap of liver, heart and bacon. A tiger cat, small but fierce cousin of the Thylacine and devil, reconnoitred the cage traps one night. Footprints in the mud betrayed the

way in which he had circled the whole system after following the scent trail for half a mile. Next night he tried some bacon and became a prisoner. Taking him out of the trap was a nerve-racking job, for, with hair standing on end and jaws gaping widely, he flew at me time and again, uttering the most piercing "circular-saw" screeches. A whole month elapsed with little further excitement than the capture of two more wild domestic cats.

In what spare time there was we prospected the King William I Range, where game was fairly plentiful and where among eleven native cats handled we found one male specimen which was as big as a medium tiger cat. The dasyures here we found to be living on land yabbies, which they evidently caught at the top of their turreted burrows at night. Bettongs, or rat-kangaroos, were also met on the plateau country above Arrowsmith, and it was a unique experience to walk through the stony forest country here putting up these alert bounding marsupials instead of the ubiquitous rabbit that has replaced them on the mainland.

Then, following an evening of drenching rain, and only ten days before the end of the trip, the Poverty Plain Thylacine or another of its kind came by the traps at last. Picking out the blind Bennett wallaby in its stockade and endeavouring to reach it, the "Tiger" evidently approached crouching low, and, unfortunately for us, instead of being held by a paw in the special trap, all he left for us was a tuft of hair from his shoulder or chest as he got away. It was a most bitter disappointment, after the long weeks of work in that wet, cold, silent region. However, the marauder could not have been unduly alarmed, for footprints and a characteristic dropping betrayed his presence in the vicinity only two nights later. This time he had come within close range of a pen from which a sheep had not long been removed. So, at an interesting stage, I had reluctantly to leave it all.

Thanks to the continued co-operation of the Tasmanian Animals and Birds' Protection Board, we have been permitted to continue the quest, and at the moment three cage traps are still being kept in operation by local bushmen. It is hoped that with snow-time the Thylacine's keener appetite may overcome its caution and we may be successful after all. In any case, in the interests of securing a pair of these remarkable creatures, even at this late stage when odd roaming individuals are the best that one can hope for, I intend, with the help of the Tasmanian authorities, to continue the search, proceeding on the next trip to country where snares have never been known. There is also, of course, the strong likelihood that snarers will accidentally secure odd specimens.

It is my belief that there is only one means of giving the Thylacine a chance of survival, comparatively short-lived like devils and dasyures as it probably is, and of slowing the process of extinction; that is, to *prohibit snaring in any form* in the whole south-western area from the West Coast Road down to Port Davey and South West Cape. In 1939 Sharland forecasted possible disaster once hunters worked the area traversed by the expedition he accompanied. How quickly that prophecy is coming true! Even if only in force for ten years, results of total protection in the South West could be assessed. Not only is the Thylacine of great importance, but Tasmania, as compared with the settled states of the mainland, is an invaluable store-house of many other forms of marsupial life unaffected by the destructive fox. Particularly is it the home of flourishing carnivorous species either long gone or disappearing rapidly from the mainland, largely because we have no such naturally dense and terrifically mountainous, unsettled country to harbour them, as is found in Western Tasmania.

Postscript.—In a letter written late in August Mr. Jack Daly, of Mt. Arrowsmith, informed me that Bob Warne, now back at the scene of his famous strike, reports the recent tracks of a Thylacine between River Peak on the Jane River and the Field itself. A resident of Queenstown has also reported to Mr. Daly that he actually saw a "Tiger" at Lake Margaret, due north of Gormanston, less than twelve months ago. Mr. Daly's final item is a report of the catch made by snarers between the West Coast Road and the Jane River in the winter season recently ended. He estimates this at approximately 700 skins, which, like furs from other areas, brought a record price—up to 26/- per pound.

(Concluded.)

ROYAL VISIT TO BIG TIMBER AREA

Their Royal Highnesses the Governor-General and the Duchess of Gloucester have seen much of the open-air life of Australia during the past two years. Their latest experience in point was gained on November 8, when, accompanied by Prince William, they visited the Cumberland Valley, beyond Marysville, in order to see timber-men at work among the great Mountain Ash trees. Although the day was showery throughout, the Duke and Duchess and other members of the party were much impressed by the wild scenery of the ranges within about 70 miles of the city, and even more so by the trees in the "Sample Acre," where every example of *Eucalyptus regnans* exceeds 250 feet in height and one extends to 301 feet. Later the visitors saw an Ash 260 feet in height being felled—a majestic sight, with as a corollary a tumultuous thud as the gigantic tree struck the ground. The prevailing dampness repressed bird-life to some extent, but Lyrebirds and Golden Whistlers provided incidental music while the party were lunching with the timbermen under the shelter of an awning.—A.H.C.

NOTES ON THE PURPLE DIURIS

By the REV. H. M. R. RUPP, Northbridge, N.S.W.

By many who are well acquainted with the genus, this is considered the most beautiful of the many species now known in Australia. But I doubt if it is generally realized how many striking variations are to be found in the flowers; and therefore I propose to discuss here those which have come under my personal observation.

The habitat of *Diuris punctata* is extensive. Its western limit appears to be the south-east corner of South Australia, whence it ranges eastward through Victoria and northward through New South Wales and Queensland, at least as far as Ingham, about 100 miles north of Townsville. It has not been found in Western Australia or Tasmania.

So far as I have been able to observe and to ascertain, the flowers do not exhibit a great deal of variation in southern areas. Many years ago I remember collecting specimens near Geelong, and farther west along the Wannon River. Quite recently I have been shown a flowering plant which came from Gippsland; and it appeared to agree precisely with those of the western parts of Victoria. This may really be regarded as the typical form of the species, although it is *not*, botanically speaking; *the type form*; of that I shall have more to say presently. This "typical" form is a plant up to 2 feet in height (30-60 cm.), with the grass-like leaves characteristic of most species, and producing from two to five flowers—often large for the genus—the prevailing colour of which is variously described as purple, lilac, or heliotrope. The two longitudinal ridges of the labellum are occasionally dotted, or are darker than their surroundings, and between them there is often a suffusion of yellowish-green.

Sir J. E. Smith, who described and named *D. punctata* in his *Exotic Botany*, Part I (1804), p. 13, merely stated that it was a native of New Holland, so we do not know where the type locality was. The epithet which he bestowed upon it, "punctata" (dotted), has been widely regarded as a misnomer, the only known dots being those occasionally seen on the labellum ridges, and they are inconspicuous. The coloured plate accompanying Smith's description shows large handsome purple flowers *heavily spotted all over*. Was this a figment of the author's imagination? It has at all events been considered by many a gross misrepresentation of the real flower, although it is worth noticing that Bentham, who castigates Smith for his plate of *Dendrobium speciosum*, accepts the *Diuris* plate without comment, and follows Smith's description.

Now recently I have received the clearest possible proof that Smith's critics (of whom I have been one) are quite in the wrong;

that his plate of *Diuris punctata* is "true to life"; and that the name he bestowed upon the species is entirely appropriate to the form which came into his hands. In October, 1945, Mr. A. W. Dockrill of Kogarah, N.S.W., sent me a large *Diuris* flower collected by him near Campbelltown, on the western outskirts of Sydney. It was undoubtedly a flower of *D. punctata*; but it was a form which I had never seen before, except in Sir J. E. Smith's plate! With that it agreed perfectly, except that the purple was a little paler. All parts of the flower were rather densely spotted in a deeper tone; the spots were clear-cut, and none united into blotches. Twelve months later Mr. Dockrill sent several complete plants from the same area. Here, then, is the type form of *D. punctata*. I think we may go a little further and say that it is quite likely that Campbelltown was the type locality, for settlement had begun there a few years prior to the publication of Smith's work.

The type form, however, appears to be rare. I should like to hear from anyone who has come across it.

Among the 1946 specimens from Campbelltown sent by Mr. Dockrill was one with pure white flowers (lateral sepals excepted). This was not Robert Brown's *D. alba*, which is distinguished from allied forms by (1) *violet* suffusions on the white floral segments, (2) the consistently fan-shaped mid-lobe of the labellum, and (3) *three* raised lines on the disc of the labellum. I have seen white-flowered *D. punctata* elsewhere; it is not uncommon in several localities between the Hawkesbury River and Newcastle. I have never seen a genuine *D. alba* from New South Wales or Queensland, although I am not questioning its occurrence there. Brown's type, indeed, seems to have been located in North Queensland. But I think that frequently it has been confused with a white-flowering form of *D. punctata*.

Bentham's var. *minor*, with which I have identified specimens from Barraba in New South Wales and Stanthorpe in Queensland, seems to me to require further investigation; it may prove to be specifically distinct. Very small flowers received from Proserpine in North Queensland are merely diminutives of the typical form, and do not agree well with those from Barraba and Stanthorpe. I have not seen Bentham's var. *longissima* from Mudgee, New South Wales; but I have found that the length of the lateral sepals, even in one area, varies considerably.

The shape of the floral segments is also very inconstant, and difficult to define. In Harris's *Wild Flowers of Australia* (1943 ed.), pl. XLI, facing p. 42, Forster has figured a form from Bega in southern New South Wales, of which I possess the artist's original specimen, and a duplicate of his life-size painting. The dorsal sepal, petals, and labellum of this form are very peculiar. The sepal is acuminate; the petals are very narrowly lanceolate and reflexed; the lateral lobes of the labellum are exceptionally small;

the mid-lobe is shaped like a spear-head. These differences are almost of specific value.

In the Paterson district of New South Wales *D. punctata* is (or was) very abundant along the railway line towards Maitland. This is a tall and robust form sometimes bearing as many as ten flowers, which are of good size and less flaccid than usual. The lateral sepals are just barely more than twice as long as the petals. On the North Coast about Kempsey, both plants and flowers are smaller. Farther north, however, large-flowering specimens reappear, and over the Queensland border, at Burleigh Heads, is a form, sent to me by Dr. C. P. Ledward, exceeding in dimensions any others I have seen. This is a truly lovely orchid, only surpassed within the species by a form sent by Miss Jean Gemmell from Stanthorpe, in praise of which I am moved to use the epithet "superb." Assuredly if it had been sufficiently misguided to choose a tree for its home instead of Mother Earth, commercial growers would have raided it. It is nearly as large as the Burleigh form, but the flowers are a rich reddish-purple—by far the darkest I have seen.

Perhaps the most remarkable variety known to me is one that hails from the New England tableland in northern New South Wales. This was forwarded by the Rev. E. Norman McKie, of Guyra, and collected by Mr. T. P. Skinner on his property in that district. The whole flower, except for the green lateral sepals, is sulphur yellow. At first I felt sure it must be a new species—a yellow Diuris with elongate lateral sepals was unheard of! But examination proved that in everything but colour it had all the essential characters of *D. punctata*; and so it was duly named var. *sulfurea*. A curious point is that it possesses the perfume of the old-fashioned "Flag Iris." I remembered how distinct this was in the case of Geelong and Wannon River flowers years before. Generally speaking, in New South Wales I had found the flowers to be scentless.

It would be interesting to know whether any Victorian readers who are familiar with this species have observed any variations in line (or out of line) with those I have described above.

CYCADS IN THE FLINDERS RANGE

A botanical discovery of some moment has recently been made by scientists in South Australia—the occurrence of living cycads in the wild Gammon region at the northern extremity of the Flinders Range. This adds not only a genus but a family and order to the South Australian macroflora, and it is astonishing that such a large plant should have escaped detection for more than a century of plant hunting.

Until complete material has been collected and examined, the identity of this fan-palm must remain uncertain, but there is the possibility of its being specifically distinct from *Macrozamia Macdonnellii*, geographically the closest cycad—in Finke River Gorge, 600 miles away to the north-west of the Flinders outpost.—J.H.W.

SOME UNPUBLISHED COMMENTS ON A MITCHELL JOURNAL

By J. H. WILLIS, National Herbarium, Melbourne.

Among many books on Australian exploration at the library of the National Herbarium, Melbourne, is an interesting copy of Sir T. L. Mitchell's *Journal of an Expedition into the Interior of Tropical Australia* (published 1848) which was once the personal property of Baron von Mueller. In some way, probably by loan from his baronial patron, the celebrated Ernest Giles was enabled to peruse this particular volume, and along the margins of its pages he pencilled sundry comments on the text. The general tenor of the remarks gives an estimate of one great explorer by another who styled himself (1889) "the last of the Australian explorers."

On the whole, Giles' commentary is decidedly acrimonious, and it is evident that he was irritated, even goaded to hostility, by reading certain statements and conclusions made by Mitchell. Especially was Giles disgusted with the frequent references to water scarcity in southern Queensland and the hardship occasioned thereby; he sneeringly implies a comparison with his own harder experience of the *really* waterless tracts in Central Australia.

Contentious passages of the journal narrative were underlined in pencil. These and their accompanying marginal notes are reproduced hereunder in chronological order:

June 21, 1846.—The first insertion concerns an entry when Mitchell's party was in the vicinity of Mt. Owen, viz.; "the want of water was the great impediment to this journey," to which Giles responds:

"In a country where permanent water exists at every turn!"

June 22.—The statement, "Water was only to be found, in so dry a season, in the neighbourhood of mountains," evokes the sarcastic retort:

"There never was an explorer who didn't travel in the driest season ever known; vide all their journals."

June 25.—"Felix Maguire had on two occasions dreamt of water, risen, and walked directly to where he found it! However that might have been, this man had a happy knack in finding water." Note (E.G.):

"They could have had nothing else to dream about, as they could scarcely go a yard without coming to water. They were following the courses of river after river, and the area of complaining of want of water is monstrous; they should have been exploring in Central Western Australia to know what want of water really was. They couldn't help finding it in a country that was all rivers.—E.G."

June 26.—"Water of any quality, in abundance too, was to us rather uncommon good fortune, and quite cheering even when surrounded by soft mud."

Note (E.G.):

"What infernal humbug, when they had followed the Bogan, Macquarie, Barwon, Narran, Balonne, Cogoon, Maranoa, and were now on the Warrego."

July 5.—"The course of rivers afforded the readiest means of determining where the division was between northern and southern waters."

Note (E.G.):

"I should rather think it did."

August 5.—"We found the party in the midst of scrub and succeeded in guiding it, even by moonlight, to the pond at which we had watered our horses."

Note (E.G.):

"How clever!"

Again, "The kangaroo, on being so incessantly followed, becomes at length so defenceless that one native can despatch it with a tomahawk."

Note (E.G.):

"This is much easier said than done."

August 13.—"We crossed some patches of dry swamp where the clods had been very extensively turned up by the natives, but for what purpose Yuranigh could not form any conjecture."

Note (E.G.):

"Yuranigh must have been a bright specimen of an Australian aboriginal not to know that the wild blacks live at times almost entirely on roots and vegetables and that these clods were turned over to obtain the little yams or yam-like bulbs which are found near most Australian watercourses."

August 14.—"The drizzling rain continued. . . . An unpleasant smell prevailed everywhere this day, resembling that from a kitchen sewer or sink. Whether it arose from the earth, or from decayed vegetable matter upon it, I could not form any opinion. . . . It was equally new and unaccountable to Yuranigh."

Note (E.G.):

"The tree called Brigalow is probably the acacia which in many parts of Queensland (or tropical Australia) covers large areas and is known as Gidia. Whenever rains occur the stench from a Gidia scrub is horrible—resembling that of sewers."

August 21.—"I was most thankful for the glorious abundance of water, the want of which had hitherto confined my route and retarded the exploration of the country."

Note (E.G.):

"What on earth did this man expect? He had found 5 or 6 new and splendidly watered rivers that had taken him nearly 600 miles through previously unknown country, and here he says 'the want of water had retarded exploration of the country'!"

August 29.—"Thus it was that, during a season of unusual drought, we has found abundance in this river."

Note (E.G.):

"Oh!"

September 13.—"The aborigines kill emus for their fathers [feathers?] *only*; these birds being reserved, or held sacred, for the sole use of the old men and women!"

Note (E.G.):

"That's absurd, because even where emus are most abundant they are always very difficult to catch, and it is very seldom that even the most luxurious of natives can get more food than they can eat. Even if one or two in a tribe are so fortunate as to kill more game in a day than they can eat, there are always plenty more in the tribe that have not been quite so lucky and to whom the surplus is given."

September 17.—"Unless we found water today, 'tomorrow' had found us unable either to proceed or return! However, we went forward and found a pond in the river bed, not distant more than two miles."

Note (E.G.):

"Oh!"

October 26.—"Yuranigh told me that this was the nest of a pair of these fish, and that they carried the stones there and made it. That the fish

had some way of carrying or moving stones to such spots seemed evident, but for what purpose I could not discover."

Note (E.G.):

"If they did so, it was to protect their own."

October 28.—"The natives use a bough of *Acacia varians* to poison the fish in waterholes. They are too honest and fair in their fights to think of poisoning their weapons."

Note (E.G.):

"Simply because they can't do it. Australian trees do not" [yield blood poisons?]

November 21.—"The sky resembled that in a Poussin's picture of the Deluge, and to one who had contended a whole year with scarcity of water . . . ."

Note (E.G.):

"Bosh!"

EXCURSION TO BOTANIC GARDENS

Saturday afternoon, November 2, was both pleasantly warm and sunny for the three dozen excursionists who assembled to observe proteads. The leader read a short paper on the remarkable austral family *Proteaceæ*—its distribution, floral and vegetative peculiarities, and economics. A book illustrating the value of the N.S.W. Waratah (*Telopea speciosissima*) in applied art and a superior tobacco pipe made from Hooked Needlewood (*Hakea vittata*) were passed round for examination. In addition to the inspection of several fine proteaceous trees and shrubs, the party's attention was drawn to certain other Australian trees which have proved worthy subjects in landscape design, notably the Brisbane Box (*Tristania conferta*).

P.F.M.

FISH OUT OF WATER

The powers invested in fresh-water molluscs to resist droughts are well shown by the following incident: On April 13, 1946, the writer, accompanied by Mr. George Buick, of Adelaide, attended the F.N.C.V. excursion to Broadmeadows. From ponds in an old granite quarry on Gellibrand Hill many specimens of *Isidorella kainsii* (Tryon, 1866), were collected. The animals retreated into their shells and remained in a perfectly dry state for over 6½ months, until October 29, 1946, when they were again placed in water, and, practically without exception, they emerged from their shells and commenced crawling about. It is by such a process that pond snails are frequently found in ponds that only contain water for short infrequent periods.—ALAN N. CARTER.

WHIP-BIRDS IN A GULLY GARDEN

"We were very thrilled on Thursday (October 31st) to see a hen Whip-bird feeding her young on the garden path. It looked a pet with its little top-knot and no tail. Such a neat little bird and so perky. We have Whip-birds in our gully always. I have sauntered along the garden with a cock bird making the long crack of the whip on one side of the path, and have *watched* the hen bird responding with the little twirly bit on the other side of the path. One afternoon I heard what I thought was a new bird-call, and went to investigate. Saw a hen Whip-bird making a song of all the twirly bits. Some people think the cock bird does both crack and twirly bit. This is not my observation here."

(From a country member in the Dandenong Ranges, communicated by H.C.E.S.)

LEEK-ORCHIDS OF ALBANY, W.A.

Surely the genus *Prasophyllum* must attain the acme of its development and beauty in this favoured south-western district. Mr. W. H. Nicholls writes enthusiastically from King River (eight miles from Albany):

"Flowering spikes of *Prasophyllum regium* stand five to six feet high and are about three-quarters of an inch in diameter at the base (veritable giants of the genus). Mrs. Pelloe's description says 'flowers white,' but I have seen little white showing in them. *P. elatum* is also a noble species and very plentiful on the mountain slopes—we saw hundreds of them on Mt. Clarence. *P. cyphochilum*, too, is abundant; it has yellowish flowers and only the labellum white. *P. macrostachyum* is deliciously scented and grows in myriads over certain granitic hills, while *P. Mueller*i is equally abundant on sandy stretches.

"Other species occurring in great profusion are *P. attenuatum*, *P. hians* (very lovely), *P. lanceolatum*, trim little *P. ovale*, *P. plumaeforme*, *P. triangulare*, and *P. cucullatum* (often on swamp lands). *P. fimbria* exhibits two common forms—one tall, robust and green, with mauve and white flowers, the other purplish-black and quite slender. This is the most lovely *Prasophyllum* I know and specimens at Little Grove and Nanarup were exceptional; the fringed inner plate of the large labellum assumes a brilliant mauve colour and contrasts delightfully with the crisped frosty-white edgings. *P. ellipticum* has not been collected here so far—it is one of the three remaining Western leek-orchids which I have yet to find"

SUBMERGED BATHING BY HONEYEATER

The following notes are taken from observations extending over a number of years of the submerged bathing habit of the White-plumed Honeyeater (*Meliphaga penicillata*). The first observation was made some years ago at a swamp near Raywood, Victoria. While I was engaged in watching movements of water birds, a White-plumed Honeyeater perching upon a dry overhanging branch suddenly flew down to the water, dived almost completely under, emerged, and flew back to the branch again and began preening its feathers.

Some years later, in summer-time, I was watching birds drinking at one of the few dams to be holding water at this time of the year, in the Whipstick Scrub, Bendigo. The time of day was sunset. Flying about and perching on a half-submerged tree-stump in the dam was a flock of about a dozen White-plumed Honeyeaters. The birds would perch on the stump, flutter down and under the water, and back to the stump again to preen their feathers. They appeared a very happy party, and this performance was kept up for almost half an hour.

Again, during the last month, I have observed them at home, usually in pairs, submerging in a lily pond in the garden. One individual bird submerged three times in as many minutes. Sometimes individual birds will fly off the edge of the pond, only a few inches above the surface of the water, sometimes from trees and shrubs a dozen yards away and much higher above water level. Almost always entry to the water is made head downwards, the head being shaken quickly from side to side, with only the tail not being submerged, although occasionally I have noted a complete submergence. I have not noted any other honey-eating bird submerge when bathing, and the habit of the species under notice is remarkable in the fact that submergence is made in deep water—when the bird is flying.

W. Perry (Eaglehawk, Victoria).

HABITS OF A SPHEGID WASP.

By TARLTON RAYMENT, Melbourne.

Como, on the George's River, is 30 or so miles south of Sydney, and in sandy ground there, Alex Holmes, of Woollahra, observed a large black wasp dragging a paralysed green Orthopteron to its shaft. He captured both the victor and the victim, and the author was able to determine the wasp as *Sphex canescens* Sm.

In another paper the author has described the attack on the tomato grub by a black and red wasp, *Ammophila suspiciosa*, which first stings the prey on the several nerve ganglia, and then drags it to the "nest" cell to receive an egg. The grub does not die for several days, and it seems that the Orthopteron of Como survives for the several days while it is being consumed.

The author regards this diversity of habit among the Sphegid wasps as evidence of the plastic nature of wasp intelligence, for most naturalists who have studied wasps in the field are impressed by the changes in the technique of attack when called upon to deal with prey of another character. The *Ammophila* stings her grub perhaps ten times, *Sphex* gives her Orthopteron a single stab with her lance. The difference is tremendous, and it is such departures from typical behaviour that make the wasps an interesting group for the observer in the field.

A remarkable feature of the Como observation was the presence of many small pale-green insects clambering over the body of the paralysed victim, and since these, too, were in the formalin solution, the author was amazed on discovering that they were actually the young of the captive Orthopteron. Without being dogmatic, he puts forward two suggestions to account for the presence of the newly-hatched young in these extraordinary circumstances. *First*: the victim was amongst its progeny when struck by the wasp. Of course, there are certain objections to this speculation. *Second*: The shock brought on by stinging precipitated the premature release of many young from the body of the mother. The objections to this are less serious than those to the first speculation. However, I record the observation, since it presents a phenomenon for which no satisfactory explanation is readily available.

VICTORIAN NATURALIST PRAISED

From Colorado, U.S.A., Professor-Emeritus T. D. A. Cockerell acknowledges receipt of several numbers of the Club's journal containing accounts of the Reed Bees, *Exoneurae*, by Tarlton Rayment, and he writes: "On the eve of our departure for Honduras I have just received your most excellent and interesting articles, and I enjoyed also the other good articles which they contained."

Professor Cockerell has recently gone to lecture for six months at the Escuela Agricola which has been formed to educate selected men from different States for a course in advanced methods of modern agriculture and horticulture. Professor Cockerell visited the F.N.C.V. on his last visit to Australia. He is now eighty years of age.—L.Y.

The old case of a case-moth from which young hatched last year is hanging high on my oak tree. Recently I saw fluffy pieces of "silk" adhering to it and was puzzled until I saw a goldfinch perking at the case and teasing out the silk-like thread of which the case is made and flying away with it, evidently for nest building.—L.Y.

PLANT NAMES SUB-COMMITTEE

Third List of Recommended New and Changed Vernaculars.

Your sub-committee regrets the delay of two years since its second and last list was published in November, 1944 (*Vict. Nat.*, LXI, p. 127). This does not signify a long period of inactivity, but simply that certain sections of the flora, which would normally have been dealt with first, were being critically revised and it was deemed expedient to postpone publication of the committee's recommendations thereupon.

In the meantime, work has gone ahead until, now, 42% of the State's vascular flora has received attention—up to and including the family *Droseraceæ*. So that revision of the remainder may be hastened, it is proposed to hold future meetings *twice* a month, instead of once as formerly; more frequent publication of results in the *Naturalist* is also hoped for. During 1945 the sub-committee welcomed to its personnel Mr. R. V. Smith of the National Herbarium staff.

In this Third List, hereunder submitted, all remaining additions and alterations (to date) in the large, difficult Grass Family will be found. As before, the asterisk serves to indicate a naturalized alien species:

GRAMINEÆ (Grasses)

Tribe PANICEÆ

For **Paspalum dilatatum* [reconsidered], change "Dallis Grass" to "Paspalum."

Tribe PHALARIDEÆ

Add **Ehrharta villosa*, "Pyp Grass."
For *Tetrarrhena juncea*, change "Wire Grass" to "Tangle Grass."
" **Phalaris paradoxa*, change "Bristle-spiked . . . ." to "Variable Canary Grass."
" **Anthoxanthum odoratum*, change "Scented . . . ." to "Sweet Vernal Grass."

Tribe FESTUCEÆ

Add *Echinopogon Cheelii*, "Long-flower Hedge-hog Grass."
For *Distichlis distichophylla* (not *D. spicata*), change "Salt Grass" to "Australian Salt Grass."
" **Festuca gigantea*, change "Tall . . . ." to "Giant Fescue."
" *Festuca asperula* (not *F. duriuscula*), change "Hard . . . ." to "Graceful Fescue."
Add *Festuca Mucileri*, "Alpine Fescue."
" **Vulpia megalura*, "Fox-tail Fescue."
" **Vulpia ciliata*, "Fringed Fescue."
For **Bromus catharticus* (syn. *B. unioloides*), change "Prairie Grass" to "Rescue Brome."
" **Bromus inermis*, change "Hungarian Brome Grass" to "Awnless Brome."
In **Bromus macrostachys* (not *B. scoparius*), **B. madritensis*, **B. mollis*, **B. racemosus*, **B. rigens* (syn. *B. villosus*), and **B. sterilis*, delete the suffix "Grass," simplifying to "Mediterranean Brome," "Compact Brome," "Soft Brome," etc.
For **Briza maxima*, change "Shell Grass" to "Quaking Grass."
" **Briza minor*, change "Shivery Grass" to "Little Quaking Grass."
" *Eragrostis parviflora* (syn. *E. pilosa*), change "Soft . . . ." to "Weeping-Love-grass."
" *Eragrostis lacunaria* (not *E. falcata*), change "Sickle . . . ." to "Purple Love-grass."

For *Eragrostis australasica* (syn. *Glyceria ramigera*), change "Bamboo Grass" to "Cane Grass."
Add **Eragrostis pectinacea*, "Carolina Love-grass."
For *Poa lepida*, *P. Drummondiana*, and **P. trivialis*, change "Scaly . . . ," "Knotted . . . ," and "Rough-stalked Meadow Grass" to "Scaly Poa," "Knotted Poa," and "Rough-stalked Poa" respectively.
" *Poa Fordeana* (syn. *Glyceria Fordeana*), change "Swamp Sweet Grass" to "Swamp Poa."
" *Puccinellia stricta* (syn. *Glyceria stricta*), change "Marsh Grass" to "Salt-marsh Grass."
" *Glyceria maxima* (syn. *G. aquatica*), change "Reed Sweet Grass" to "Reed Manna Grass."

Tribe AGROSTIDEÆ

For **Polypogon monspeliensis*, change "Beard Grass" to "Annual Beard-grass."
Add **Polypogon lutosus*, "Perennial Beard-grass."
" *Agrostis australiensis*, "Australian Bent."
" *Agrostis hiemalis*, "Winter Bent."
" *Agrostis aequata*, "Rare Bent."
" *Agrostis Adamsonii*, "Adamson's Bent."
" *Agrostis Muelleriana*, "Mueller Bent."
" *Agrostis rudis*, "Silver Bent."
" **Agrostis semiverticillata*, "Water Bent."
For *Agrostis parviflora* (syn. *A. Muelleri*), change "Mueller's Bent Grass" to "Hair Bent."
" *Agrostis avenacea* (syn. *Calamagrostis filiformis*), change "Blown Grass" to "Common Blown-grass."
Add *Agrostis aemula*, "Plains Blown-grass."
" *Agrostis Billardieri*, "Coastal Blown-grass."
For **Agrostis gigantea* (syn. *A. alba*), change "White Bent" to "Red-top Bent."
" **Agrostis tenuis* (syn. *A. vulgaris*), change "Fine Bent Grass" to "Brown-top Bent."
" **Agrostis Spico-venti* (syn. *Apera Spica-venti*), change "Silky Apera" to "Silky Bent."
Add *Deyeuxia monticola*, "Mountain Bent-grass."
" *Deyeuxia brachyathera*, "Tailed Bent-grass."
" *Deyeuxia Benthamiana*, "Alpine Bent-grass."
For *Deyeuxia frigida*, change "Alpine . . . ." to "Tall Bent-grass."
" *Deyeuxia contracta* (not *Calamagrostis rudis*), change "Coarse . . . ." to "Lax Bent-grass."
" *Aristida arenaria*, *A. Behriana*, and *A. ramosa*, change "Sand . . . ," "Brush . . . ," and "Cane Spear-grass" to "Sand Wire-grass," "Brush Wire-grass, and "Cane Wire-grass" respectively.
" *Stipa teretifolia*, change "Coast . . . ." to "Prickly Spear-grass."
" *Stipa elatior* (syn. *S. aphanoneura*), change "Delicate . . . ." to "Maritime Spear-grass."
Add *Stipa densiflora*, "Dense-headed Spear-grass."
" *Stipa verticillata*, "Bamboo Grass."
" **Stipa leucotricha*, "Texas Needle-grass."
For *Sporobolus virginicus*, change "Coast Rat-tail Grass" to "Salt Couch."

Tribe CHLORIDEÆ

Add *Chloris ventricosa*, "Plump Windmill Grass."

Tribe AVENEÆ

Add **Avena sativa*, "Common Oat."
" **Avena sterilis*, "Animated Oat."
" **Avena strigosa*, "Bristle-pointed Oat."
For **Holcus mollis*, change "Creeping Velvet Grass" to "Creeping Fog."
" **Schismus barbatus* (syn. *S. calycinus*), change "Kelch Grass" to "Arabian Grass."
Add *Amphibromus Archeri*, "Pointed Swamp Wallaby-grass."
" *Amphibromus gracilis*, "Graceful Swamp Wallaby-grass."
For *Danthonia pallida*, change "White-topped . . . ." to "Red-anther Wallaby-grass."
" *Danthonia nudiflora* (not *D. pauciflora*), change "Few-flowered . . . ." to "Alpine Wallaby-grass."
Add *Danthonia nuda*, "Snow Wallaby-grass."
" *Danthonia robusta*, "Robust Wallaby-grass."
" *Danthonia Duttoniana*, "Dutton Wallaby-grass."
" *Danthonia Richardsonii*, "Richardson's Wallaby-grass."
" **Pentaschistis airoides*, "False Hair Grass."

Tribe HORDEÆ

Add **Lolium rigidum*, "Rigid Rye-grass."
" **Lolium subulatum*, "Dalmatian Rye-grass" [this was the original so-called "Wimmera Rye-grass"].
" **Triticum æstivum* (syn. *T. sativum*, *T. vulgare*), "Common Wheat."
" **Psilurus aristatus*, "Bristle-tail Grass."
" **Agropyron junceum*, "Sea Wheat-grass."
For *Agropyron velutinum*, change "Velvet . . . ." to "Mountain Wheat-grass."
" **Hordeum marinum* (syn. *H. maritimum*), change "Sea Barley" to "Sea Barley-grass."
" **Hordeum nodosum*, change "Knotted . . . ." to "Meadow Barley-grass."

J. H. Willis, Secretary, P.N. Sub-committee.

POSTING OF CHRISTMAS GIFTS AND GREETINGS

The Post Office is most anxious that gifts and greetings be delivered to recipients before Christmas Day and the co-operation of citizens is sought by early postings. The Deputy Director, Posts and Telegraphs (Mr. C. G. Brown) would like you to:—

Post during the week-end the 14th and 15th December;
Make sure that each address is very clear and complete;
Pack all gifts securely and show the name and address of the sender, preceded by the word "from";
See that correct postage is prepaid, especially on Christmas cards. 1½d. postage is correct for a Christmas card if the envelope is not sealed, but if the envelope is sealed, even with the ends partly cut open, the charge is 2½d. Only five words of greeting may be written on a card posted at the 1½d. rate.

SNAKES

Mr. Ray Hunt (State School, Texas, Queensland) desires to communicate with any fellow-members interested in snakes.

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PROCEEDINGS

The monthly meeting of the Club was held at the Lecture Hall, Melbourne Public Library, on December 9, 1946, the President (Mr. F. S. Colliver) presiding and about 150 members and friends attending.

It was announced that both the Botany and Geological Discussion Groups would continue next year, and interested members were advised to contact the respective secretaries for further information.

Mr. G. N. Hyam, representing the National Monuments Sub-Committee, said that the time had now arrived for this sub-committee to be reorganized. He asked members generally to submit lists of areas, natural or historical places or objects for the consideration of the sub-committee with a view to having them proclaimed National Monuments.

A letter was received from the Bird Observers' Club regarding proper protection of Macquarie Island now that whaling has started again. The President stated the committee would keep in touch with this matter.

The following were elected as Ordinary Members: Mrs. C. King, Miss N. Lewis, Mr. S. R. Dunn and Mr. A. R. Henderson; as Country Members: Messrs. A. F. M. Haque, V. Subramanyam, A. E. Lindner, Alan Jordan, W. H. Gray; and as Associate Members: Mr. V. Weston and Master Ros King.

NATURE NOTES AND QUESTIONS

Mr. V. H. Miller reported that two white Cockatoos were seen flying high above his home at St. Kilda.

Mr. E. E. Lord reported a large Ghost Fungus near Ringwood.

Question asked: Why are certain birds called Cuckoo-Shrikes—is it that they are parasitic? Answer: Mr. A. S. Chalk said the bird often used old nests belonging to other birds, instead of building one for itself, but the term "Cuckoo" was used merely because of superficial resemblance. Mrs. V. H. Miller stated that Dr Leach used to say the birds were so named because they had the flight of a Cuckoo and the bill of a Shrike.

SUBJECT FOR THE EVENING

This was an illustrated lecture on "Sea-Shells and Snails," given by Mr. F. S. Colliver. The lecture was strengthened by a series of specimens displayed by Mr. C. J. Gabriel and by the part he also took in the discussions. (A summary of the lecture will be printed in a later issue of the *Vic. Nat.*)

Mr. A. A. Brunton stated he was on one occasion bitten by an octopus, and he had vivid recollections of the arm swelling.

Mr. A. J. Swaby asked if univalve mollusca had tentacles on the other parts of the body beside the head. Both Mr. Gabriel and Mr. Colliver suggested that fringes of the mantle suggesting tentacles would only have limited reflex actions by comparison with the proper areas of sensory organs.

Mr. A. H. Mattingley asked what was the heaviest recorded weight of a bivalve. Mr. Gabriel, speaking from memory, stated that examples of the Giant Clam weighing 551 and 520 lbs. were recorded.

In reply to a question, "What is the most handsome shell in Victorian waters?" Mr. Gabriel suggested the Painted Lady (*Phasianella australis*) for the univalves, and Mr. Colliver suggested *Trigonia margaritacea* for the bivalves.

EXHIBITS

Mr. C. J. Gabriel: Marine shells—*Dolabella gigas*, Rang, Mauritius; *Dolabrifera olivacea*, Pease, Hawaii; *Umbraculum sinicum*, Gmel., Mauritius; *U. aurantium*, Pease, N.S.W.; *Philine angasi*, Crosse, Vic; *Tethys tigrina*, Rang, Vic.; *T. concava*, Shy., Vic.; *Aplustrum velum*, Gmel.; *Abera soluta*, Chem., S.A.; *Alys naucum*, Linn., N. Caledonia.

Mr. A. P. Dunn: Land shells—*Paryphanta atramentaria* Shuttleworth, from Gembrook; *Helix pisana* and *Cochlicella acuta* (Muller) from Carnegie (introduced species)

Mrs. J. J. Freame: Freshwater mussel and pearl from this shell.

Mr. F. S. Colliver: A series of univalves sectioned to show interior cavities.

Mr. A. H. Mattingley: Aboriginal ornamental breastplate of mother-of-pearl and gin's hair necklet.

Mr. R. C. Kershaw: Coloured sands from Noosa Head, Queensland.

MR. W. H. NICHOLLS RETURNS

Mr. and Mrs. W. H. Nicholls have returned to Melbourne after several weeks of orchid-hunting in Western Australia. They report having had a fruitful experience. More than 40 species of orchids new to Mr. Nicholls—including some new to science—were discovered, and these will be figured in the forthcoming work on the orchids of Australia. Meanwhile, it is hoped that articles bearing on the expedition will be made available for presentation in this journal.

PLATE XIII

Stomach content (largest items) of Frogmouth. One moth larva seen at top of photograph.

Photo.: Edith Coleman.

FURTHER NOTES ON FOODS OF FROGMOUTHS

By EDITH COLEMAN, Blackburn, Vic.

A dead Frogmouth, picked up on the Healesville road at about 5.30 p.m. on October 2, provided unexpected confirmation of this bird's habit of pouncing, with open wings, on its prey. It also bore eloquent testimony to a wide taste in foods.

Neck and one leg were broken, but the body was not crushed, nor was the skin broken. Apparently it had been struck by a car in its early morning foraging, but, lying well to the side, in a slight ridge of road sweepings, it had escaped further traffic, which was exceptionally light on this Saturday.

Underneath the Frogmouth was a toad, rather larger than a fully-grown mouse, to the back of which adhered feathers from the Frogmouth's bare breast, firmly attached by dried mucus. The toad's skin was quite dry and the body greatly distended. It was obviously distressed and made no attempt to escape. Presumably it had lain there all day, embedded in the breast feathers, quite unable to move. It was put into a tin with some wet moss. Half an hour later it had recovered. The now moist skin had shed the feathers, which lay in the moss. The toad was released in the garden, none the worse for its great adventure.

One assumed that the Frogmouth was struck as it pounced, falling on its prey in the characteristic manner described in the September and October issues of the *Vic. Nat.* Headlights often show frogs and toads crossing this road at night, sometimes in large numbers. It is, doubtless, a happy hunting ground for many a Frogmouth.

Inflation of the toad's body would seem to be a protective measure, making it almost as difficult for the bill to grip as a rubber ball. The Frogmouth's habit of falling on its prey has, surely, developed through long experience of such elusive shapes! It suggests that the battering of toads is not done to crush the limbs but to deflate the body, and so to bring it within compass of the mandibles. Battering of less inflated frogs may be necessary to crush the wide bones of the head.

Examination of the bird's stomach content was interesting, even exciting, as huge centipedes, huntsman and other spiders, longicorn and other beetles were withdrawn. So tightly was the comparatively small stomach crammed that one seemed to be cutting into a solid body. There was only one moth larva. If there were moths, they were too fragmented to identify.

The large items were dropped into formalin solution for an hour. They were then laid on blotting paper to dry over night. They were really too dry, and so appear shrivelled in the photograph shown herewith. The centipedes appeared to have been well crushed before swallowing.

The residue, strained from the formalin solution and laid on blotting paper to dry, yielded two tablespoonfuls (by graded glass measure) of heads, legs, elytra, antennae and other unidentifiable desiccations. One looked in vain for the toad's "waiting-room"!

Several hemi-spherical beetles with hard chitinous elytra explained part of the resistance met by the razor blade. These should have taxed the bird's digestive juices.

The great number of huntsman spiders was surprising, until one remembered the Frogmouth's habit of hunting on tree-trunks, which are also favourite hunting-grounds of the huntsman. One may see them at dusk and later. In the daytime a prised-up sheet of bark will often reveal a family of dozens of half-grown huntsman spiders.

Several jumping-spiders are shown. These, so often brought into the house on leaves of silver-beet, explained why the Frogmouths made frequent dives into the vegetable garden. The absence of moths, too, was surprising when one remembered the bird's habit of flying to street lights. Possibly the soft bodies are soon macerated and digested, and the delicate wings may be too fragmented to identify.

VOICE OF THE FROGMOUTH

It will be agreed that Mrs. Coleman's various articles on the behaviour of Frogmouths have been very interesting and instructive, and have indeed shed light on many aspects of the life of these curious birds.

Bearing on the voice of the species, when at Wattle Park (Melbourne) on August 25 last, I was attracted by a curious zooming or buzzing sound, rather suggestive of a hive of bees, and, investigating, found that it came from a Podargus that was sitting lizard-like 20 feet up in a tree. Was this a courting note? Anyway, it was the first call of the kind I had heard from the species, and in fact the first time I had heard a Frogmouth calling in daylight.—A.H.C.

MUELLER MEDAL AWARD

Mention should have been made in last November number (p. 164) that Mr. E. C. Andrews, B.A., F.G.S., the noted Sydney geologist, also received a medal from the recent A.N.Z.A.A.S. meeting at Adelaide. Since no award had been made during the past seven years (Professor T. Harvey Johnston was the last recipient, 1939), the committee had recommended that *two* medals be given in 1946. This oversight is regretted, and the Club's congratulations extended to Mr. Andrews.

Dr. A. B. Walkom, Hon. General Secretary of the Association, has kindly drawn attention to a necessary correction in the conditions mentioned as governing the award, which is now made for "important contributions to anthropological, botanical, geological or zoological science, ..." and is *without any time limit*. (The original regulations, *vide Minutes of Council Meeting*, January 8, 1902, specified a period of five years preceding the award.)

J.H.W.

A VARIABLE DIURIS

By REV. H. M. R. RUPP, Northbridge, N.S.W.

In reading Mr. G. W. Althofer's remarks on the orchids of the central-western slopes of New South Wales (*Vict. Nat.*, August, 1946), I was reminded of the exceptionally fine display last year, in many widely-separated areas, of *Diuris aurea* Sm., which is pre-eminently the "Golden Diuris" of this State.

Up to the present it has not been recorded much farther south than the Shoalhaven River; but it extends northward into southern Queensland. It is very common between Port Hacking and the Hunter Valley. I did not know that it extended so far west as Dripstone, and Mr. Althofer's specimens came as a surprise, especially as his flowers were larger than any I had seen elsewhere. The measurements of one now in my herbarium are as follows: Lateral sepals, 3·5 cm.; petals (with the claws), 3 cm.; dorsal sepal and labellum, each a trifle over 2 cm.

In the accompanying plate I have endeavoured to illustrate the remarkable variability of this species, from actual specimens in my possession. As variations in the column are so trifling as to be negligible, it is not depicted in any of the figures, which are confined to the perianth and labellum.

No. 1 is the Dripstone flower. Except for its larger dimensions, this will be seen to resemble closely No. 12, which is a Hunter Valley form. It will be observed by glancing through the series that there is great diversity in the markings (brown on a yellow background) at the base of the dorsal sepal. In 1 and 12, however, these are similar, and both agree with those of No. 6, which otherwise is a very different flower.

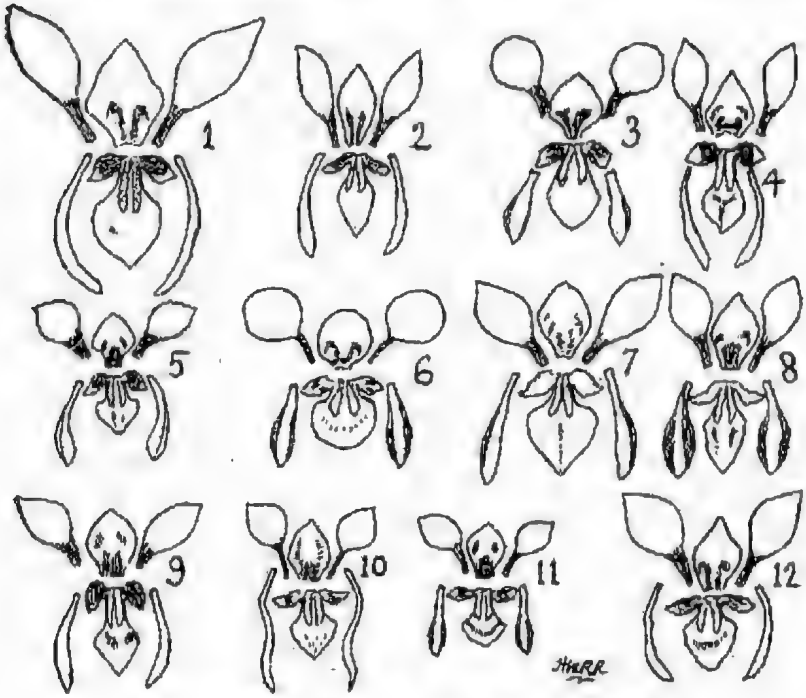
No. 2 is a flower from Somersby, near Gosford. It may be taken to represent the commonest Hawkesbury Sandstone form. All segments are relatively narrow. The lateral lobes of the labellum are just about half as long as the mid-lobe.

Nos. 3 and 7 are two different forms from Pymble, growing on shale. In No. 3, notice the orbicular petals on short, broad claws; the very broad lateral lobes and almost rhomboid mid-lobe of the labellum; and the short, slightly petaloid lateral sepals. These features are all different in No. 7, which also has crenulate upper edges to the lateral lobes of the labellum, and a quite distinct pattern for the dorsal sepal markings.

Nos. 4 and 6 are two forms differing still more widely. They were growing quite close to each other, near the Bunnerong power house on Botany Bay, in sand. Were it not for intermediates, one would be disposed to regard them as distinct species. Compare the orbicular petals of No. 6 with those of No. 3—the former on long, slender claws, the latter on short, broad ones. In No. 6 the

dorsal sepal and mid-lobe of the labellum are almost as orbicular as the petals.

No. 5 is a flower from the granite country about Stanthorpe in southern Queensland. It is smaller than the average New South Wales flower, and the petals are cuneate like those of the lilac-coloured *D. cuneata* Fitzg. Relatively to the mid-lobe, the lateral lobes of the labellum are very large. The dorsal sepal resembles



Variations in the flowers of *Diuris aurea*. (See text.)

that of *D. sulphurea* R.Br. This is even more noticeable in No. 11, another Stanthorpe form, suggestive of a natural hybrid between these two species: the dark band across the front of the labellum is very characteristic of *D. sulphurea*.

No. 8 is another Dripstone flower, all parts except the petals differing from those of the giant No. 1. The petaloid sepals, conspicuously coloured, are almost as broad as the mid-lobe of the labellum, contrasting strongly with the green linear sepals of No. 1.

No. 9 is another Bunnerong flower, with most unusual lateral lobes to the labellum. The petals, as in No. 8, are cuneate rather than clawed.

No. 10, another form from Stanthorpe, puzzled me very much. The dorsal sepal and petals were buff-coloured with a faint suffusion of reddish-purple; the labellum was bright yellow. The long, linear lateral sepals, when considered in the light of this colour-scheme, suggest a natural hybrid *D. punctata* Sm. x *D. aurea*. Near the Stanthorpe golf links there is a remarkably fine form of *D. punctata* with reddish-purple flowers. I am indebted for all these Stanthorpe specimens to Misses Jean and Dorothy Gemmell, of "Braemar," Glen Aplin.

Variations such as are indicated here are very interesting, and not a little perplexing; since some of the most distinctive forms are found growing close together, and cannot be accounted for by different climatic or soil conditions. Those who are interested may be recommended to study a paper by W. H. Camp and C. L. Gilly entitled "The Structure and Origin of Species, with a discussion of intraspecific variability and related nomenclatural problems," published in the American periodical *Brittonia* for March, 1943. With all due respect to the learned authors, I would add that for the ordinary amateur like myself, in studying this brochure a dictionary of technical botanical terms is an indispensable accessory.

ORCHID COLLECTION FOR NATIONAL HERBARIUM

Mr. W. H. Nicholls, authority on Australian orchids, has presented his entire collection of more than 5000 specimens (including many types and rarities) to the Victorian State Herbarium. This splendid gesture augments the national collection of Australian orchids by almost as many specimens as those already housed at South Yarra, and Mr. Nicholls is to be warmly commended for his generous action.

FOR MOSQUITOES

Bearing on the subject of the use of kerosene on ponds to kill mosquitoes, an experienced man recommends not more than half a teaspoonful per square yard. Some years ago, in the Bendigo district, the mosquito pest became simply intolerable, and after much suffering he tried oil on a tank near the house. The tank was about 6 ft. in diameter, and he used a teaspoonful of kerosene with astounding results. In the morning there were myriads of dead mosquitoes; the water was black with them. The tank was flushed with a sprinkler and given another spoonful at night. The second morning there were still myriads; the third trial showed only a few, and mosquitoes at once ceased to be a nuisance about the house. It is suggested that if kerosene were used in anything like excess the mosquitoes would not alight on the water.

GLIMPSES OF A SUB-TROPIC RAIN FOREST

By LEONEL GILBERT, Nabiac, N.S.W.

Although much of Australia is within the tropics, actual areas of "rain," "jungle" or "tropical" forest are not particularly extensive, being mainly along the Queensland coast (especially in the north). These are fairly large in the north, but decrease as one proceeds farther south, until in northern New South Wales only more or less isolated patches of such forests are found (in damp and sheltered places). The rain forest localities become still smaller and rarer south of Sydney, and finally disappear in eastern Victoria.

In Northern Australia the country is mainly covered with savannah woodland and the only vegetation approaching the jungle type is found along the freshwater rivers and creeks. Such river forests are very dense, but do not extend beyond the rivers, and lack the stature and damp atmosphere of the real east coast rain forest with its Malayan forms of vegetation.

Jungles are a relic of the times when Australia had a much moister, more humid climate than now, and consequently they are found only in those places which still offer shelter, humidity, a humus soil, and rainfall of some 50 inches or more.

About three miles from the town of Nabiac, N.S.W., is Mount Talawahl (1400 ft.)—a mountain of considerable bulk, covered mainly with rather heavy open forest. Around the mountain are river gullies, and on the southern side there is one which is quite noteworthy. This gully is deep in places and a small stream occupies the narrow rocky bed.

From a distance one sees a few tall palms (*Livistona australis*) standing apart from the forest, and these are signposts to something "tropical" beyond.

Following up the rocky creek-bed, one encounters great Lantana thickets with *Rubus rosaefolius* and *R. Hillii* to render progress more difficult. Looking forward, above the Lantana, to the mountain ahead, the vegetative covering of the mountain seems to be divided into three. There appears a dark, compact mass of tangled vegetation bounded on each side by the lighter normal open forest. This dark mass marks the path of the creek down the sheltered mountain valley, and is the site of the rain forest we are going to consider.

Along the creek-bed at the foot of the mountain, plants of the open forest may be seen on either side, beyond the Lantana. These are mainly Gums (*Eucalyptus* spp.), Turpentine (*Syncarpia procera*), Native Cherry (*Exocarpus cupressiformis*), Green Wattle (*Acacia decurrens*), with "Tea-trees" (*Melaleuca* spp.) in the damper areas. Among the ferns at this stage are the tougher types—*Pteridium aquilinum*, *Cheilanthes tenuifolia*, *C. distans*, and *Doodia aspera*, while among the orchids are *Eriochilus cucullatus* and a species of epiphyte growing in stumps. Shrubs include *Persoonia* spp., *Cassia laevigata*, *Melaleuca thymifolia* (et al.), *Leptospermum* sp., and other coastal types.

Higher up the creek-bed softer types of ferns are to be seen—Maiden Hair of three kinds (*Adiantum aethiopicum*, *A. hispidulum*, *A. formosum*, with *A. diaphanum* in a few places), *Pteris tremula* and others to be mentioned later.

Where the creek finally flows into the open, after its passage through the dark forest, the vegetation on either side of the creek-bed forms a natural doorway leading to the forest proper, and the change in vegetation, scenery and atmosphere is abrupt. The Lantana loses dominance because of the lack of light in the lower places, owing to the thick canopy overhead, and thus progress up the rocky creek-bed is comparatively easy once the forest is entered.

It is now that one realizes the presence of a tropical element—the whole place is damp and musty, and strangely quiet—the rocks are all thickly moss-clad so that one's footsteps are muffled, rotting trees are lying across rocks or leaning crazily among huge "monkey ropes" or lianes. The atmosphere is damp and gloomy.

Surface soil is well-nigh lacking. However, leaf-mould is thick between the rocks, and underneath them may be seen a rich dark brown soil into which the huge trees firmly root themselves beneath the rocks.

Here one finds great trees towering overhead on all sides—Brush Box (*Tristania conferta*), Flame Trees (*Sterculia* sp.), Firewheel Trees (*Stenocarpus sinuatus*), *Pittosporum revolutum*, Figs (*Ficus* spp.), *Hibiscus* sp., Featherwood (*Polyosma Cunninghamiana*), Native Plums (*Siderophyllum australe*) Stinging Trees (*Laportea gigas*, *L. photiniphylla*), and many other types, all seeking the essential sunlight, and by their very seeking, making the task more difficult for themselves so that further growth is necessary, and thus the struggle goes on to produce enormous trees.

Various climbing plants add to the confusion by trying to solve the light problem. In some areas at the edge of the forest is the White Passion Vine (*Passiflora alba*), reported to be poisonous to stock, while within the forest is the Supplejack (*Flagellaria indica*) so common in the river forests of the Northern Territory. One of the prettiest climbers is the liliaceous *Rhipogonum Elseyanum*, with strong thorny stems and sprays of white flowers. *Lantana camara* is comparatively rare in the forest because of its inability to climb to great heights.

Ferns, too, seek the light by climbing—the fleshy fronded *Cyclophorus confluens*, *Arthropteris tenella*, and *Polypodium pustulatum*. These ferns beautify the trunks of trees to a great degree.

The Stinging Tree or Gympie is very plentiful, unfortunately, and is usually given an extremely wide berth by all who know it (either by repute or by experience). By misfortune I slipped and bumped against a leaf of *Laportea gigas* and a most painful sting resulted immediately, with small swellings all over the affected part. The sensation was just as if dozens of powerful ants were stinging simultaneously. The pain lasted for five hours and the part itched for three days after. *Laportea photiniphylla* does not have as many stinging hairs on the leaves, but is bad enough. It is said that the natives of northern Queensland used the trees as a cure for rheumatism. I should imagine that the shock one receives from the tree would serve to cure anything! The sap of a blue-flowered lily is said to be an antidote, but this is denied by some authorities.

Climbers and epiphytes, with their ingenious ways of reaching sunlight, command the most attention. Huge lianes may be 3 to 6 inches through, and sometimes they lie coiled at the feet of trees like enormous hawsers. The epiphytes may be divided into ferns and orchids. The former include three main species—the Staghorn (*Platycerium grande*), Elkhorn (*P. bifurcatum*) and the Bird's Nest Fern (*Asplenium nidus*). There seems to be some confusion regarding the two colloquial terms "Stag-" and "Elk-horn." *P. grande* sometimes receives the name Elkhorn, or it may be referred to as a Staghorn. Fortunately, all three are on the protected list.

It is interesting to note that the only colony of Mistletoe observed in the forest was of a specimen of *Viscum* growing on *P. grande*. Platyceriums may have another fern—*Davallia pyxidata*—growing on them, and the combinations make a very striking sight. Likewise *Asplenium nidus* may have the very beautiful *A. falcatum* growing on it, with fronds three or more feet long, spraying over the side of the Bird's Nest Fern. All three types grow to a great size, and sometimes it is said that Platyceriums grow to such a size that they cause the downfall of the branch or even of the tree upon which they are growing. *P. bifurcatum* often grows right around a tree trunk.

The second group of epiphytes comprises the orchids. Like ferns, they may grow at very great heights above the ground. The beautiful "Rock Lily" (*Dendrobium speciosum*), the Bronze or Spider Orchid (*D. tetragonum*), a Pencil Orchid (*D. Beckleri*), and the tiny *Sarcanthus tridentatus*, as well as about three or four other species, are quite common. The delicate vanilla odour of *D. tetragonum* is very pleasing, while *D. Beckleri* has an odour something like cinnamon. The collecting of orchids for pressing is quite a task, as in addition to the heights of the specimens, they have a very definite flowering period, and a day or so on either side will result in the finding of a withered flower stalk, necessitating a further year's patience. For this reason, not all the orchids seen have yet been collected or classified. Some trees seem to be literally bursting with orchidaceous colonies, especially in the case of *D. speciosum*, which grows to an enormous size and like the Platyceriums appears to cause the downfall of the branch which has supported it from the time when it was a seedling.

The species of Ficus which strangle other trees are quite plentiful, and excellent examples of the process of strangulation may be seen.

Saprophytes are also at home in the forest, the leaf mould providing an ideal habitat. Orange, white, brown, yellow, and black toadstools are seen, and some mushrooms—or at least fungi which proved to be edible—were found. Orange "liver fungus" and a red and grey "bracket fungus" are also common. One specimen of a bright orange crinoline phalloid was seen, and, as usual, the characteristic fly-attracting odour was evident. Earth-star fungi (*Geaster* spp.) are fairly common also, though erratic in their distribution.

Because of the lack of light on the ground beneath the densely clustered trees and vines, shrubs and herbs are comparatively rare, and ferns such as the four species of *Adiantum* listed above, as well as *Asplenium attenuatum*, *A. flabellifolium*, *Pellaea paradoxa*, *P. falcata* var. *nana*, *Doodia caudata*, *Dryopteris lenera*, *D. decompasita*, *D. parasitica*, and occasional Athyriums, dominate the ground, with the masses of mosses, lichens and fungi. Some lichens clothe the branches of trees also (*Usnea* spp.). The Musci are very well represented, including the large *Dawsonia* moss. On the rocks, too, specimens of *Peperomia reflexa* are very common.

Here and there are specimens of *Gymnostachys anceps* and the pretty *Plectanthus parviflorus*, with occasional *Solanum* spp.

Rock lichens are found carpeting some rocks in a moss-like fashion, while others, as already stated, hang from trees, causing them to have a ghostly appearance. Both foliose and fruticose lichens are well represented.

After rain has fallen, and the creek is running down its rocky staircase, the whole picture is most pleasing, and would be one of restfulness were it not for the myriads of over-active mosquitoes that inhabit the gloomy depths of the forest in summer. There is something striking on every hand, whether it be the creek itself, the lowly mosses and fungi, the quaint staghorns and birds' nests, the beautiful orchids or the fine trees that hold them to the sunlight. Such places never fail to provide one with something new and fascinating, whether we be seeking the aesthetic or the scientific. Let us hope wise counsels will prevail in keeping many of them inviolate.

LATE NESTING

A member asks whether it is unusual for the English Song-Thrush, a common bird in Melbourne, to nest late in December. The answer is that the Thrush is apt to produce a second brood, or perhaps a third brood, as late as January. Incidentally, this has been a good nesting season for native birds in southern Victoria, and some—including such early breeders as the Yellow Robin—are still nesting.—A.H.C.

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Compiled by F. S. COLLIVER, Melbourne.

This compilation has been made for the benefit of workers on the *Mollusca*, and gives a complete list of published material, chronologically arranged. The system followed is that of a similar bibliography (Bernard C. Cotton) published as a Supplement to the *South Australian Field Naturalist*, Vol. 24, No. 1.

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EXCURSION TO DIMBOOLA

By J. Roz GARNET, Melbourne.

The purpose of the excursion from November 8 to 10 was to afford Club members an opportunity of being present at the official opening of the new National Park at Dimboola and, during the visit, to see something of the Wimmera. This part of Victoria presents a very different picture from that of the Club's usual excursions, which, of recent years, have favoured the well-known districts nearer Melbourne.

Geologically the Wimmera is a part of the Murray Basin Plains—an area of internal drainage where streams such as the Wimmera River follow a northward course finally to disappear into chains of shallow lakes.

Scattered through the Wimmera and Mallee are other evidences of the internal drainage system—isolated salt lakes and mud pans, both depending for their water intake on rain, either direct or through seepage, and under the guidance of Mr and Mrs. Muir the party had an opportunity of seeing one of these shallow salt lakes.

At Lochiel, about seven miles west of Dimboola, lies one of the peculiar pink salt lakes, covering an area of about 20 acres. Almost surrounding the lake were Kangaroo Island Melaleucas, which provided a sharp contrast to the soft colours of pink, blue and white to be seen in the water, the pink due to the pigmented micro-organisms which flourish in the saturated brine, the blue from the reflection of the almost cloudless sky and the white from encrustations of salt which are depositing throughout the water and on the margins of the lake. Salt from this lake was, and perhaps still is, harvested for commerce and, while we were walking around the path of one of the concentrating pans, we noted a nest of salt crystals—a bird's nest with three eggs which we have been told were those of the White-headed Stilt. The writer collected a sample of the saturated brine for further examination (a report of which will be published at a later date)

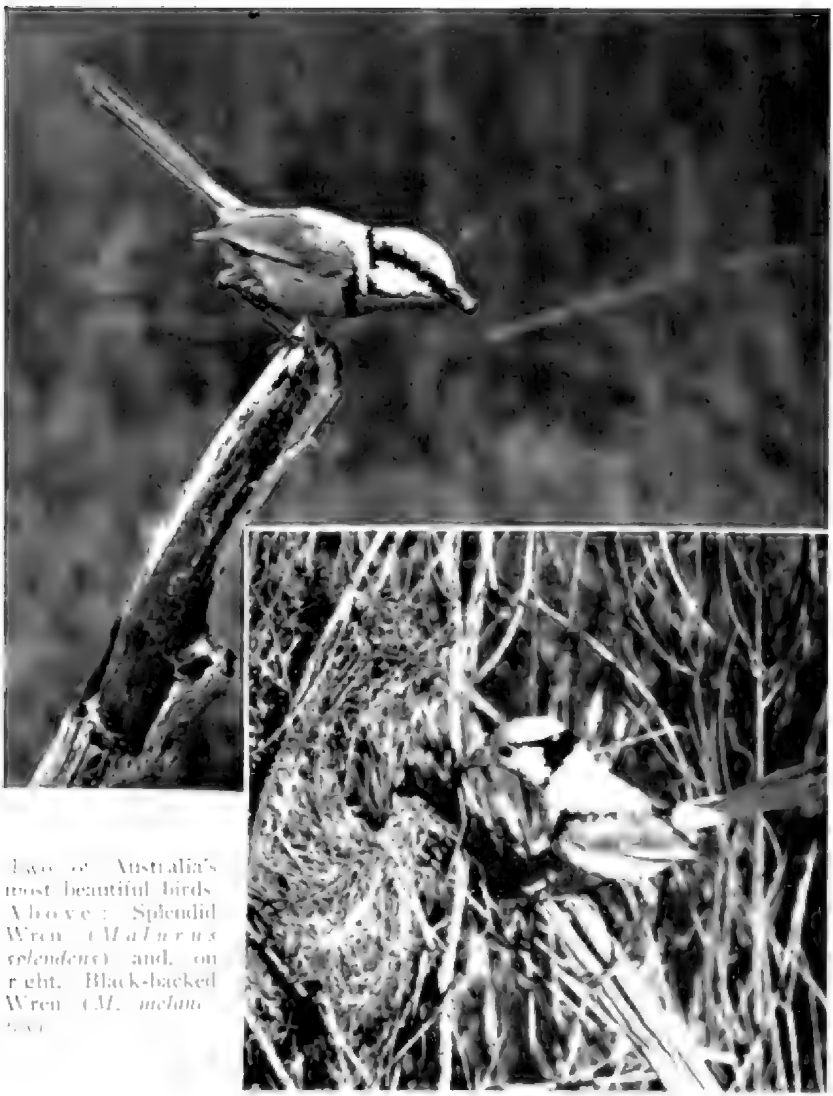
Of more immediate interest to us was the marginal flora of salt bushes, glassworts and plagianths. Curiously enough, in the lake basin and not far distant from the salt water was a spring from which flowed quite palatable though somewhat "hard" water. Near this spring several grasses and pigmy rushes flourished, together with the little mossy *Angianthus strictus*.

Leaving the lake, we travelled on to Nhill (a contraction of "North Hill," we were informed by Mr. Muir), where we lunched. From here we visited Dimpur and the Lawloit Range—a red ironstone outcrop which all but bridges the "Little Desert" and the "Big Desert." Here we spent the afternoon hunting insects and plants, each according to taste. At the time of our visit the special charm of the flora lay in the wealth of flowers of *Baeckea Behrii*, *Melaleuca Wilsonii* and *Eucalyptus dumosa* (all in full bloom) and *Eucalyptus gracilis*, just commencing to bloom. A single plant of *Santalum Murrayanum*, with its ripe, bitter quandongs still on the tree, was a pleasing sight among the myrtaceous shrubs.

All these species are peculiar to the north-west of the State, and with the smaller herbs and undershrubs such as *Loudonia Behrii*, *Brachemeyera calymega*, *Calytrix*, *Micromyrtus* and *Hibbertia* in bloom, there was plenty to be seen and admired. It was only a sudden thunderstorm with a following and even less expected hailstorm which persuaded us that it was time to leave the Lawloit Range.

That night we were the guests of Mr. and Mrs. Muir at an open-air concert in the Dimboola Recreation Ground—an unexpected treat which was enjoyed all the more because of the absence of mosquitoes. We were up "betimes" on Sunday morning. It wasn't that the concert lasted as long as a Greek play, but that, after the concert, we had our collections of plants and beetles to sort and classify. However, this task was completed at about

PLATE XIV



Two of Australia's most beautiful birds. Above: Splendid Wren (*Malurus splendens*) and, on right, Black-backed Wren (*M. melanocercus*).

Most of Australia's lovely little Fairy Wrens have now been photographed. Here are two of the most recent additions to the gallery: the Splendid Wren, by S. R. White (W.A.), and the Black-backed Wren, by Norman Chaffer (N.S.W.).

half past two and we were able to sleep in until almost 9 o'clock that morning.

Our next excursion was to the riverside fringe of the Little Desert, but we were too early for the fiery display of the Crimson Bottle-brush (*Callistemon rugulosus*) which occurs in dense colonies in this area. But that part of the desert was not lacking in colour nor in interest, with *Calytrix*, *Pimelea*, *Bredemeyera*, *Hibbertia*, *Goodenia*, *Dillwynia*, *Wahlenbergia*, *Helipterum* and *Helichrysum* species in bloom, together with a little *Calandrinia* and the curious *Podotheca angustifolia*. *Banksia ornata* was the dominant species on the sand and *Eucalyptus largiflorens* and *E. camaldulensis* on and near the banks of the river and its anabranches.

After attending the opening of the National Park, we inspected the grounds and building of the Dimboola High School. The school adjoins the National Park and, as the headmaster pointed out, some care has been taken to preserve as much as possible of the native flora within the grounds. This policy has undoubtedly added much to the already attractive setting in which the school is placed.

Although there was more sorting and identification that night, we *did* manage to get to our beds soon after midnight so that we might be up early enough to catch the bus to Horsham, and so by train to Melbourne in the early afternoon—tired, rather sleepy perhaps, but filled with appreciation of the kindness and hospitality of Dimboola and especially of Mr. and Mrs. Eric Muir. As perfect hosts, they even purchased a motor car to coincide with our visit, and this explains how we four "got around" so much.

THE STORY OF A MARSH CRAKE

The following notes have been received, through Mr. K. A. Hindwood, from Miss Daisy McCulloch, of Sydney, who in turn got them from her sister at Clermont, Central Queensland. They tell a striking story about a species of bird of which little is known:

A strange little bird came in at the kitchen window one night recently. As far as we can judge it is a Marsh Crake, though the colouring and markings are more like a Lewin Rail, but that is too big. It is the prettiest, daintiest little thing, very quiet, and ate moths from our fingers a few minutes after it was caught. As there is no water about, we are keeping the bird until rain comes—we think it came from the Pink Lily Swamp, now almost dry. We have it in an old safe, where it seems quite happy, and has a wonderful appetite. Grasshoppers are not to be found, so it has to eat meat, and we catch flies on the gauze, and also give it "crawlers" which breed in damp laying-mash. It calls to us as we pass: one note is a loud "knock" like the call of the little scrub-bird which comes sometimes. It has a dish of water with clover in it, and it often dips its food in this. We let it free in the gauzed room every day; it has a bath, which it greatly enjoys, and afterwards races round the room.

Later.—The little Crake is at my feet, talking sadly—it wants another feed. If it gets too hungry it flies on the kitchen table and tries to catch flies. We let it out in the garden sometimes, but it is nervous, and its tail goes up with a twitch, like that of a waterhen; it never does that inside. It is very conversational and always answers when we speak to it. No matter how softly I come downstairs in the morning, it always greets me with a loud "Chit" before I reach the gauze door.

Later.—Our little Crake seems quite content to live in the gauzed room and the kitchen, and runs about the floor like a little mouse. As soon as it sees Mary wave her arm to catch a fly, it comes running to take it from

her fingers, and peers between them, to see where the fly is. It really is a brainy little creature. It didn't care for meat at first, but now eats quite a good meal of it, tugging it vigorously out of our fingers. It talks in all sorts of tones whenever we speak to it.

Later again.—The fairy Crake grows more intelligent every day. It follows me round when it's hungry, calling "Chit chit." It knows the meat is kept in the frigidaire and tries to fly into it and help itself if I am too slow. When I take a piece of meat to the kitchen table to cut it small, the bird flies up and pulls the meat away, tugging hard. When satisfied it retires behind the stove, stands on one leg, and sleeps. We leave it free, but it has no wish to go away.

HARVESTERS INDOORS

Queer creatures come indoors to shelter from the rain. Queerest, perhaps, are the long-legged harvesters or "harvest-men," which obviously are not spiders because their round bodies (absurdly small in proportion to the length of limb) appear to be all in one piece, but which as obviously are not "mites," at least in the popular sense, for in leg-span they equal or exceed even the very large house spiders named after Cardinal Wolsey.

These Cardinal spiders can move fast enough, but the speed and reaching power of the harvesters is amazing. Transferring from one surface to another or from the horizontal to the perpendicular with the utmost ease, there is for them only one unscaleable height in the house, and thus the slippery road to escape from the enamelled abyss of the bath.

Called to "rescue" a spider from the bath, an observer found, on one occasion, a Cardinal spider, large and threatening, facing a poor harvester trembling in every limb, its small round body vibrating, in terror (or possibly in anger). Something interrupted the operations, and when the rescuer returned a little later there was only one to be rescued. The survivor was—the harvest-man; of the spider there remained only a few scattered legs. It was difficult to believe that the harvester, whose body seemed to have grown no bigger, had really killed and eaten a spider so large and powerful. Yet what else could have happened?

(From a recent issue of the weekly edition of *The Times*, London. Forwarded by F. J. Lidowici.)

BIRD STEALS HUMAN HAIR

While spending a holiday at the Grampians early in October I had my first experience of the White-eared Honeyeater as a "hair remover." I was making a day trip to Mt. William for botanical specimens and had proceeded about half way up the track when the Honeyeater, after flying around, settled on my head and endeavoured to pull out hair for its nest. The persistence and complete lack of fear must be seen to be believed. As I had still some miles to go, I marked the place on the track and went on, hoping to renew the bird's acquaintance on the return journey. It was late afternoon when I returned to the spot and I was disappointed at the White-ear's non-appearance. However, a little further down the track it flew out of some trees—and straight on to the top of my head. After some further pulling of hair the bird appeared to become discouraged, and presently departed.—J. S. Seaton (Caulfield).

The Victorian Naturalist

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PROCEEDINGS

The monthly meeting of the Club was held on January 13, 1947, at the Lecture Hall of the Public Library. In the absence of the President (on vacation), Miss Ina Watson, Vice-President, presided at the gathering of about 200 members and friends.

The Vice-President announced that owing to illness Mr. A. H Mattingley, who was to have been the speaker for the evening, was unable to be present. In his stead Mr. G. N. Hyam had agreed, at short notice, to address members.

The Honorary Secretary drew attention to a recent addition to the Club's library from the office of the Chief Inspector of Fisheries and Game—a small book entitled *The Fresh-water Fish of Victoria and Their Food*. It was stated that members may obtain personal copies from the office of the Chief Inspector at 2/- each.

The following were elected to the Club: As Ordinary Member, Mr. N. E. M. Walters, of Caulfield; and as Country Member, Miss Ethel Tonge, of Eltham Heights.

NATIONAL MONUMENTS

On the completion of the formal business Mr. G. N. Hyam addressed the Club on "Conservation of National Monuments." As convener of the recently reconstituted sub-committee on National Monuments the speaker was able to draw freely from the considerable amount of data on the subject that he has accumulated, and the series of illustrations that were shown towards the end of the lecture gave emphasis to the extent that the conservation of national monuments, in such forms as primitive areas, reserves, sanctuaries, intermediate areas, geological features, panoramas, trees and buildings, is proceeding in other lands. In the course of his talk Mr. Hyam reminded members that what had already been done in this direction in Victoria was achieved largely through the influence and activities of members of this Club, but much yet remained to be done, and the need for conserving not only for our own generation but for posterity many of our extraordinary or unique natural monuments was becoming the more pressing as industrialization and settlement extended. He appealed to all members to assist the sub-committee in its work by submitting suggestions and recommendations relative to the establishment, maintenance and control of any subject which was believed to be

worthy of being conserved as a national monument. It could be safely left to the sub-committee to sift the wheat from the tares.

In the course of the discussion which followed, one member cited Mt. Eccles, in the Western District, with its crater lake, as being well worth reserving.

Mr. A. A. Brunton protested that Victorians did not seem to set much value on what national monuments they already possessed. A case in point was the Kinglake National Park, the entire assured finances for the maintenance of which were derived from the parking fees collected at week-ends. This enterprise provided the Committee of Management with funds sufficient to employ and pay the ranger on an average of one day a week!

Mr. Hyam believed the best approach to the problem of interesting the general public in these matters was to enlist the aid of the Education Department and through the editor of the monthly school paper keep the subject alive through the medium of a regular monthly article dealing with one or other phase of the subject.

Dr. Margaret Chattaway spoke of some of the achievements of of the people and governments in Britain in the direction of conserving outstanding national monuments. In passing, she mentioned that many of the reserves that had been taken over for defence purposes during the war were, under public pressure, being rapidly restored to the people.

Mr. F. G. Elford suggested that the Club should seek an annual report from the Sherbrooke Forest Advisory Committee.

The discussion was closed following Mr. G. Coghill's reference to the complete lack of funds for many of our national parks. The National Park at Sperm Whale Head (to whose Committee of Management he belonged) had no source of income at all, and in such circumstances little could be expected in the way of its development or even in maintaining it as a primitive area.

EXPRESSION OF SYMPATHY

The Vice-President announced with regret the recent death of Mr. John Ingram, a member of the Club for over twenty years and a former Treasurer. By invitation, Mr. A. S. Chalk made brief reference to Mr. Ingram's passing, which occurred on December 31st last. A wreath had been sent on behalf of the Club, which had been represented at the funeral by Messrs. Colliver, Chalk and Hyam.

NATURE NOTES

Mr. Tarr reported the finding on the western shores of Port Phillip Bay (near Werribee) of two nests, each containing eggs, of the Pied Oyster-catcher.

A further note concerned the location at Marlo, in East Gippsland, of a nest containing young of the Rufous Bristle-bird. The nest consisted of a rough structure amongst undergrowth. This observation was of particular interest to ornithologists, as it records a considerable extension of the range of the breeding places of this bird.

Miss Watson mentioned that, during her recent holidays at the Glenelg River, where the stream is still affected by tides, she had the happy experience of watching a platypus diving and swimming in the river.

Mr. Tarr commented on the nesting of seagulls near Goodwin Sands. There were 40 nests containing young birds and the observers were interested to see a White-breasted Sea-Eagle pounce on one of the young birds and fly off with it in its talons.

Mr. Stewart, in reporting on the alpine flora of Mt. Buffalo, mentioned that this summer had provided a notable display, among which the orchids were prominent. A greenhood, withered beyond easy recognition, was taken to be *Pterostylis alpina* Rog., in an atypical form, while a particularly tawny manifestation of *Prasophyllum brevilabre* Hook.f. was another interesting "find."

EXHIBITS

Mrs. M. E. Freame: *Philline angasi*, white sea-slug and egg-mass; body divided into two halves containing fragile shell and three gizzard plates, used for crushing small shell fish, swallowed by the animal when burrowing through the sand. Specimen from Altona.

Mr. A. N. Carter: Large specimen of the Giant Punk, from the head-waters of Tomahawk Creek, Beenak, Victoria.

Mr. C. French: Rare Longicorn Beetle (*Tragocerus spencei*) collected at the Seaford excursion by Mrs. Pinches; also a collection of Banksia and Acacia Borers.

Mr. R. Savage: Flowering specimens of garden-grown native shrubs, including *Melaleuca pulchella*, *M. Huegelii*, *Baeckea plicata*, *Bursaria spinosa*, *Prostanthera spinescens*, *Grevillea buxifolia* and *G. Hookeriana*.

Mrs. Fenton Woodburn: Types of soil from Central and Northern Australia.

Mr. H. C. E. Stewart: A collection of native flowers from Mt. Buffalo.

F.N.C. EXCURSION TO SEAFORD

About 25 members and friends took part in this excursion. We first visited the sand-pits and examined the Banksias, Wattles and Casuarinas. Quite a nice lot of the beautiful Jewel Beetles were collected, some being fine specimens. The larvae of Banksia borers (*Uracanthus triangularis*), the triangular-marked longicorn, and also the larvae of the Acacia feathery-antennae longicorn were observed feeding in the boughs. Other insects were observed, the principal "find" being the rare and fine longicorn *Tragocerus*. This was found by Mrs. Pinches on a young Banksia close to the railway station. After hunting the trees in the sand-pits we proceeded amongst the trees along the shore, and the extensive damage caused by borers was observed. Most of the fine old Banksias, Wattles and Casuarinas are being wiped out.—C. French and R. Lee.

HUNTING WASPS AS GRASSHOPPER CHECKS

By EDITH COLEMAN, Blackburn, Vic.

In the *Vic. Nat.*, April 1944, I referred to the felling of trees on our forest land at Healesville, a necessary precaution after fires had swept through some acres of it. Although we regretted the loss of the trees, there were, to a nature-lover, some compensations. One was the chance it gave to study certain insects which "nested" in the trunks beyond reach.

In some of the fallen eucalypts (peppermint and grey-box) and black wattles, tufts of grass-stems protruded from holes at intervals of 9 to 15 inches, commencing at about 12 feet from the ground. They were not always one above the other, but showed here and there round the stems. The trees were of all sizes from small (but tall) saplings to fully-grown trees.

We were able to point out tufts on still standing trees, and these the woodcutter felled more carefully, splitting some of them open for me to examine. Each tuft of grass filled the opening that led to cradles of a hunting wasp—man's valiant ally in the war against grasshoppers.

The cradles were in tunnels up to 15 inches in length. They were most beautifully packed with wads of tightly curled grass-stems and were divided into sections. Two or more sections were crammed with the remains of grasshopper nymphs, and in the same sections two plump pupae showed how well the wasp's larvae had dined on the soft parts of the nymphs.

I photographed the contents of one section and sent a print, with descriptions of the cradle, to Mr. T. Rayment. He replied (28/7/43): "I feel sure that this is the work of a wasp and it seems possible that it is one of the genus *Chlorion* (Family *Sphecinae*). These wasps have diverse habits; some nest in the ground, others occupy holes in trees. However, yours is the first example I have seen of curled grass-wads. The *Chlorion* wasps certainly use grasshoppers for larval food, but there is little information on their habits. You could help there."

Although Mr. Rayment had not seen the wasp, his "guess" proved correct. When, later, I was able to see the small wasp, I marvelled at her skill in capturing such hosts of active nymphs larger than herself, and in curling long strands of grass-stems. That there were no adult winged grasshoppers stored must be due, I think, to the fact that the period of the wasp's egg-laying corresponds with the nymphal stage of the grasshoppers. Some of the stems were brought to Blackburn and cut into sections to fit a glass fish-tank (28 in. x 10 in. x 10 in.) and a kerosene case with closely fitting hinged lid. These were placed in a wired-in verandah

Several wasps escaped from the fish tank before I noticed that the lid did not fit closely. Two were caught on the verandah wire. As there were two empty pupal cases in one of the logs, it was proof assumptive that the wasps were the grass-curlers.

However, as I had not actually seen them emerge, I waited for further proof. Then I found one (dead) with its head firmly wedged in a small slit made by one of the two box hinges. It had flown to one of the two tiny chinks of light. I then sealed up the lids of both tank and box with nucraft, and was rewarded with two perfect wasps, apparently male and female.

These were sent to Mr. Rayment, but in the rush of Christmas postage could not have reached him. (I learned later that he was in Queensland.) As no more wasps have emerged it seems possible that the pupae were badly shaken when the trees were felled. I showed the wasps to Mr. A. N. Burns, who confirmed Mr. Rayment's determination of the genus *Chlorion* and suggested a species near *imbrosus*.

Some of the logs have since been split, and in one of them was a dead wasp wedged in a grass-wad. A few pupae still "look" unharmed and may yet complete their metamorphoses.

The wasp, a glossy black pin-waist with transparent, bronzy-brown wings, is under an inch in length. Great compound eyes half cover the sides of the head. When short hairs on the forehead catch the light they appear golden, on a silver base. The under-surface is covered with short buff hairs. The curled antennae, sweeping incessantly this way and that, suggest that they are "picking-up" the whereabouts of prey.

A glance at the larder should make us all her friends for life.

Whether the wasps did any of the tunnelling I do not know. As there were long "wads" of tightly packed sawdust at the farthest ends of the tunnels I assume that she had "squatted" in tunnels of burrowing larvae of wattle-goat and other wood moths.

The photograph of the burrow and its cradles was taken on November 22, 1943. The pupae shown were $\frac{7}{8}$ inch in length. The arrow indicates the opening. The tuft in the opening had been disturbed.

The curling of grass-stems up to 10 inches long seems a remarkable feat.

One section of the tunnel contained packing of soft fine grass cut very short, or perhaps teased into a soft bed, and in this the egg appears to have been deposited, not on the body of a victim, as with certain other hunting wasps. Next to this is a wad of slightly coarser grass closely curled and closely packed. Beyond, near the opening, is the final packing, and this shows how its close spirals and straight ends are placed.

For this, a stem of 8 to 10 inches is carried into the opening, *always in an upward direction*, and several spirals are made in

the upper end of it. The straight end is left protruding from the hole. Another stem is carried in, the tip curled, and the spiral laid over that of the first stem; then another and another, until 12 to 25 stems have been carried in, their spiral tips lying tightly packed one above the other, their straight ends protruding from the hole.

Further inwards, there are no straight ends to the wads. For these the whole length of more pliant grasses, 8 to 12 inches long, have been curled into spirals.

Why did the wasp not use tightly curled grasses right to the opening? It may be suggested that the tufts of grass-ends serve as direction flags, to mark her doorways. But she has finished with the tunnels when those tufts are added, and will not again visit the cradles. It certainly suggests that she anticipates rain, and that the stems will drain the water downward, away from the holes, so that no rain will enter the tunnels, as it would if the tufts were horizontal or pointing upward.

I think the explanation of the drainage lies in the position of the burrows in which she "squatted." She could place the stems in no other way because the woodmoth's larval burrows lead downwards towards the root of the tree. A tight wad of sawdust lay behind the burrowing larva. Therefore the wasp's grasses could be carried in no other direction. It does not detract from the wonder of the whole proceedings—the perfection and safety of the tunnel, the store of nymphs, the tightly curled grasses.

The tufts were probably a matter of "chance" in the first instance, and proving of survival value were "adopted" until they became a fixed habit of the species.

It is a beautiful story which makes one wish that our entomologists would devote more space in their books to the fascinating ways of such little lives. One does not suggest the deletion of necessary taxonomy; but it is disappointing to find too frequently in the works of great entomologists: "Nothing is known of its habits." Why do they not set to work to unravel these fascinating but puzzling stories, so that they may feed the hungry nature-lover with more substantial food? We go to their books asking for bread, and are given pages of tedious classification with scarcely an item of human appeal. Such books are invaluable to the specialist but of little use to the ordinary nature-lover.

Is it a matter for wonder that boys and men sheer off entomology at a time when entomology is of such vital interest to Australia? If a boy's interest be captured he will soon seek more technical knowledge. We want our entomologists sometimes to unbend, not too much Fabre and Maeterlinck, but with quiet stories that will impress by their very simplicity.

PLATE XV

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HONEYEATERS IN THE MALLEE

By WILL. BURGESS, Mitcham, Vic.

The 1941 season was good, but an early-breeding one for a number of the true Mallee forms, especially the ground-loving species found in the locality of Manya, north-west Victoria, where my wife and I spent a holiday from Sept. 20 to Oct. 11, 1946.

We went from Panitya to Manya and stayed with Mr. and Mrs. Harold Hitchcock, who had also been our hosts when we visited the locality with Mr. and Mrs. F. E. Howe during the season of 1941. (For a description and the number of species observed on that visit see "Ornithologists in the Mallee," *Emu*, vol. XLII, pp. 65-73, and for a description and map of the locality see "On the Occurrence of *Psophodes nigrogularis* in Victoria," by F. E. Howe and J. A. Ross, *Emu*, vol. 32, pp. 266-269.)

Mr. A. H. Chisholm, in his "Observations and Reflections on Birds of the Victorian Mallee" (*Emu*, vol. 46, pp. 168-186) deals extensively and interestingly with species of this and some near localities.

Although I spent many days—fourteen, in fact—in the area where the Mallee Whipbird was first recorded by F. E. Howe and J. A. Ross, no sight or sound of the birds was gained, and I am sorry to say we were not able to visit the Little Desert (some 13 miles south of Pinnaroo) where we saw the birds and Mr. Howe found them nesting on our previous trip.

It was spending so much time in this locality, watching and listening for Whipbirds, that led me to the discovery of a species new to me and also for the district, and later to record it nesting, for the first time, I believe, in Victoria. This was the rare Pied Honeyeater (*Certhionyx variegatus*). The habitat of this species, as quoted by the *Checklist* of the R.A.O.U., 1926, is the interior of Australia, New South Wales, Western Australia and north-west Australia.

It was on September 29, while near the Manya Bore, that I wandered through the scrub northwards and saw a pair of birds of which I had not had any previous knowledge. They attracted my attention by their extraordinary flight and unique call-note.

Both male and female were seen to mount into the air together and literally loop the loop. Frequently during following days the birds were seen to repeat this performance, and also an act that I could only describe as a "back slide." To see the male with the light shining through the outspread tail, singing as he rose and descended—an action not unlike those of the Songlarks—was a never-to-be-forgotten sight.

Usually at the conclusion of these flights the male would perch on the topmost branches of a tree and, with the head thrown well

back, would utter a rather monotonous, melancholy piping note.

They were extremely shy and would not allow very close inspection before they would be up and away, flying some considerable distance. Many of their actions in the air were similar to those of the Black Honeyeater (*Myzomela nigra*).

On October 10 a nest of this species was found. It was then in course of construction—merely half a dozen twigs had been placed in position. The site chosen was 3 feet from the ground in a large, bushy, round-shaped wattle of a species that abounds in the area. The nest itself was placed on a horizontal twiggy branch on the northern side of the bush, about 8 inches from the edge of the foliage. It could only be detected with difficulty from underneath and from the opposite side of the shrub.

Both male and female (they shared the task of incubation) could only reach and leave the nest by entering from the southern side of the bush.

The nest was completed and two eggs laid by October 5. I was amazed at the celerity of the whole proceedings. When last visited the nest still contained two eggs, from which the male was flushed.

The nest itself was an open saucer, 1½ in. deep, irregularly formed on the outside of long thin twigs of broom-bush and tea-tree, with small twigs and some spiders' webbing forming the main structure. The inside was scantily lined with seeding yellow daisy flowers.

Only a few days previous to our visit Black Honeyeaters had arrived in great numbers, and during the first few days of our stay were busily choosing nesting locations, which were mainly in the scrub bordering the roadways. Very few pairs stayed or nested in the larger scrub areas. On an average there was a pair of birds in every five hundred feet of roadway.

On the morning of September 20 I watched a pair of these birds choosing their nesting-site, which was a horizontal fork of a dead, half-burnt fallen limb of a Mallee gum. No cover whatsoever was near the nesting-site. Its height from the ground would be about 6 inches.

About 10 feet away from the nest the branches of a dead Mallee acted as a look-out perch for the male. He, while the female was absent, would keep up a monotonous call. When the female answered the call and arrived back, both birds would fly to the nesting-site, where they would twist in turn for a few moments; then off they would fly, the female hotly pursued by the male. Within 15 or 20 minutes the male would return and the whole proceeding would be repeated.

Passing in the late afternoon of the next day, much cobweb was to be seen forming a foundation around the fork of the branch. By the next afternoon the nest was taking shape and by September

25 it was completed. One egg was laid on the morning of the 27th, and two eggs were seen in the nest on the 29th. The male was then flushed off the eggs.

The nest itself was a small, open, shallow structure, loosely constructed of small dead twigs and grasses, and matted with cobwebs and lined with seeding flower-tops of a small plant.

Both male and female shared the task of incubation and were extremely tame when on the nest, allowing one to approach within inches before flushing.

Their actions in the air when flying from place to place are at all times rapid. Frequently the male ascends to a considerable height, with spasmodic rises and falls, uttering his plaintive note the while.

A female of this species was found lying on the ground with the bill clogged and the breast feathers covered in nectar. When she was lifted nectar ran from the bird's bill and for some time afterwards her actions were those of an extremely intoxicated person. She was not able to perch or keep her balance and the eyes were very much glazed. After some time, however, she recovered and went on her way.

It was the day I found this bird that I also noted the Regent Honeyeater. Four individuals were observed, but I do not think they stayed in the locality for long. No sign of them could be found in the latter half of our stay. Mr. Howe informs me that during his many visits to the district he had never heard of Regent Honeyeaters or observed them in the district.

One of the most common of the blossom-birds were the White-fronted Honeyeaters (*Gliciphila albifrons*). Pairs were all through the district and we saw many of their nests, just commenced building, with eggs, or with young nearly ready to fly.

The nests were cup-shaped, about 2½ inches in depth, and composed of greyish-coloured bark and grass, matted together with spiders' webs and cocoons, and were lined sometimes with wool, sometimes feathers, and sometimes down from flower-seeds. Two eggs are the usual clutch quoted by authors, but my observations showed that generally three eggs were laid. The White-fronted Honeyeaters were extremely tame, and many a time I wished for the company of one of our photographic-minded members, or a camera of my own.

Two miles this side of Bolton's Crabhole the White-plumed Honeyeaters (*Meliphaga penicillata*) were met with again (two birds seen on the 1941 visit), half a dozen individuals being observed. This species seemed to be well out of its usual habitat. It was, in fact, in close proximity to its near relation, the Yellow-plumed Honeyeater (*M. ornata*). The last-named bird was common and breeding was in full swing. Brown-headed Honeyeaters (*Melithreptes brevirostris*) were numerous and one nest placed

about 5 feet high in a stunted Mallee gum contained three young.

Tawny-crowned Honeyeaters (*Gliciphila melanops*), found common and breeding on our previous trip, were not seen. This seemed remarkable in view of the fact that Honeyeaters generally were so plentiful in variety and numbers of birds.

White-eared Honeyeaters (*Meliphaga leucotis*) and Purple-gaped Honeyeaters (*M. cratitia*) were in good numbers and both had well-developed young on the wing. Nesting seemed to have been completed some weeks earlier.

Some few other common Honeyeaters were noted and two Striped Honeyeaters were watched whilst they drank from the leaking Manya Bore tank, a place I can recommend to anyone for bird-watching on a hot day.

THE LATE JOHN INGRAM

It is inevitable that the personnel of the Club must undergo changes with the passage of time. Nevertheless, it is always a sad duty to record the death of tried and trusted members who have rendered faithful service, even though they may have long since reached the allotted span. Our most recent loss was Mr. John Ingram, who passed away at the close of the old year, December 31, aged 78 years.

Although his twin brother, the late W. H. Ingram, had been a member for several years, it was not until October 1926 that Mr. John Ingram joined the ranks of the Field Naturalists' Club. Possessed of a dry wit, his amiability on field excursions was somewhat overshadowed by his retiring disposition. That the Club was not dilatory in assessing his sterling qualities was exemplified by his election as Honorary Treasurer in 1929. This exacting position he filled for the succeeding 13 years, with one short leave of absence, until failing health compelled his resignation as an office-bearer in 1942. To those in close contact with the Ingram brothers it was obvious that Mr. John's sojourn with us was nearing its end, yet, surprisingly, he survived his brother William by nearly two years. (*Vic. Nat.*, vol. 62, p. 31.)

A married sister predeceased Mr. John some few days earlier; and to the surviving Miss Ingram we tender our warmest sympathy in her loss.

B.E.M.

NATURAL HISTORY MEDALLION

Just as this edition of the *Vic. Nat.* goes to press advice has been received that the Australian Natural History Medallion for the current year has been awarded to Mr. Heber A. Longman, retired Director of the Queensland Museum. Mr. Longman's chief interests have been palaeontology and herpetology, but, in addition to much admirable work on fossil remains and on reptiles, he has been interested in botany, ornithology, etc., and during many years has rendered sound service to the Queensland Field Naturalists' Club, Royal Society, and other bodies.

SEEN BESIDE THE GLENELG RIVER

By INA WATSON, Melbourne.

Fishing is one occupation which gives the nature-lover opportunity to indulge in his hobby. With the boat tied up to a reed-bed, we were enjoying the changing glories of the sunset and its reflection, when suddenly there was a tiny splash and a ripple marred the crimson surface of the river. A platypus—a large specimen—had emerged from its burrow farther along the bank, and proceeded to perform its toilet about half a dozen yards from our boat. Even a "bite" on one of the lines was neglected while we watched. Later the animal swam and disported lazily alongside the boat, just before darkness closed down. We thought we caught a glimpse of a second form near the burrow, but it didn't come farther out into the stream at all. At this point, approximately 40 miles upstream, the Glenelg is about 70 yards wide. It is brackish and subject to tidal movement of several feet.

The gang-gang cockatoos are in force along the river, and their crazy calling while flying, with their lolloping erratic flight, might well be the "signature tune" of the Glenelg.

On the four days we were at the river, the weather was hot and settled, and each evening we saw swifts hawking in numbers. However, the storm they are said to presage did not arrive.

On a warm still morning we were fishing beside a rocky, precipitous cliff, in the base of which swallows had built on the ledges. There seemed to be about 20 in the group flying in and out to the ledge. As far as could be seen from the boat, there was only the one nest still containing young, and though we watched carefully, it was not possible to tell how many birds were helping to feed the babies.

Here, also, we saw the azure kingfisher plunge from a twig about 4 feet above the water, in the manner of a gannet, and emerge with a small fish shining in its beak, with which it flew off downstream.

During a hot afternoon, we watched a sand-wasp. (A study of McKeown's *Australian Insects* suggests that it was a *Sphex* ?sp.) It had burrowed its tunnel in a tiny ledge of sand between the grass, and drew our attention by the erratic flights of its large black and orange-red body. In a few moments we saw it walking in a straight line over grass-stems, leaves and obstacles, carrying a paralysed caterpillar in its jaws—the caterpillar was equal in length to the wasp. We saw the caterpillar move slightly when deposited before the tunnel, while the wasp made a quick trip inside, returning to drag in the prey, and presumably to deposit its egg. Then began a fascinating performance lasting well over half an hour.

First it scavenged round and carried back tiny pebbles and gum-nuts, which it forced into the tunnel. Between these trips, the wasp balanced itself on its four hind legs, and, using its forelegs in the manner of a dog digging, sent the sand flying over the mouth of the tunnel—sometimes from a distance of three or four inches. This went on from all angles until the hole was filled. Then began the camouflaging. Small sticks, dead leaves and grass-stems were tugged into position, and more sand was thrown, until it was impossible to tell the surface had been disturbed.

The sequel is interesting. Leaving early next morning, we went for a final visit to the scene. We found the whole of the camouflage removed, and although the symmetry of the tunnel was not disturbed, presumably the pebbles and gum-nuts had also been removed completely—there was no sign of them in the immediate vicinity of the hole. Not only that, but in the small area of sand, possibly 6 in. x 4 in., were two other holes in line about an inch apart, and previously unsuspected. Unable to suggest what agency had been at work, we decided to dig up the area to see if the caterpillars had been taken. It was difficult in the dry sand soil bound with grass roots, but in the burrow we had seen filled, at least, the caterpillar was intact, still limp and alive, and attached to the middle of it was the tiny elongate white egg of the wasp. Unfortunately it became detached from the caterpillar on the journey home, and so the possibility of watching further events was lost.

Captured from the landing was one of the large freshwater crayfish. Of the usual dark colour, it was approximately 18 inches long, and armed with claws at least 4 inches in length. It was studded, particularly over the tail section, with sharp spikes: altogether a formidable armoury. Clustered over it, not confined to any one area, but spread from claws to tail, were groups of small, soft, dark, round parasites.

These are all common things, seen and described by many, but still holding magic when actually observed for oneself. Incidentally, the Glenelg River is a glorious stream, and it is hoped that the movement now afoot to have it declared a reserve and sanctuary will be successful; it is worthy of all support.

BLUE WREN AND BRONZE CUCKOO

On the occasion of the Club's excursion to Bayswater on December 21 last, we came upon the nest of a Blue Wren containing four eggs. Suspecting that one of the clutch might be the egg of the Narrow-billed Bronze Cuckoo, we removed the eggs from the nest and at once recognized the egg of the Cuckoo. Usually this Cuckoo's egg is more elongated than that of the Wren, but in this instance it was about the same size and shape as the remainder of the clutch. The colour, of course, always resembles that of the Wren's eggs, though it differs considerably from those of certain other fosterers.—A.S.C.

AN UNDESCRIBED VICTORIAN PHALLOID FUNGUS

By JAMES H. WILLIS, National Herbarium, Melbourne.

Class BASIDIOMYCETES Sub-class GASTEROMYCETES
Order PHALLALES
Family **PHALLACEÆ**

MUTINUS CARTILAGINEUS sp. nov.

Planta inexpandita ovoidea vel subgloboidea, 12-35 mm. in diam. Peridium tertio-spissatum, album; medio crasso gelatinoso, aliis tenuiter membranaceis. Receptaculum **album** *usque 7 cm. altum, 5-8 mm. in diam., fusiforme, fistulosum, sæpe distortum vel complanatum, extrinsecus sæpe striatum, textu* **duro cartilagineo**. *Gleba olivacea receptaculi* **majorem partem** *tegit. Sporæ ellipticæ, glabræ, 3·5-4 × 1·8-2 mic.*

Hab. Humus arenosis fruticetorum ericacearum prope Cheltenham, Victoria (TYPE); etiam in Horto Camperdown, Vic.

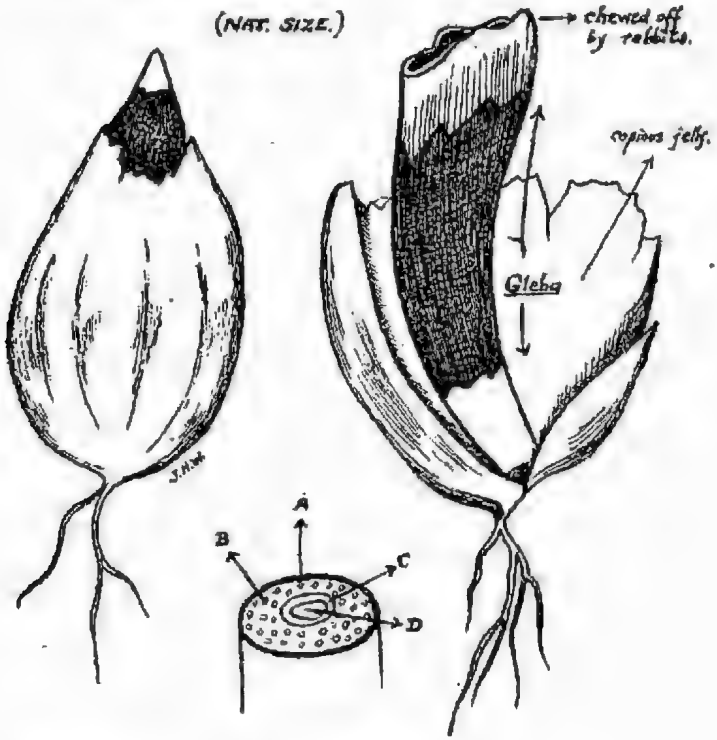
Unexpanded plant ovoid, obovoid, or irregularly subgloboid, 12-35 mm. diameter, attached to the substratum by several basal rhizomorphs. Peridium of three layers, the outer white, membranous and exteriorly finely pubescent, the central thick and gelatinous, inner thin and membranous, rupturing irregularly at the apex into two or more irregular lobes. Receptacle to 7 cm. tall, 5-8 mm. diameter, often distorted and flattened when 10-12 x 4-5 mm. diameter, fusiform, sometimes bent, tapering gradually to the base where permanently attached to the peridium and imperforate; apex bluntly acuminate, or as frequently subturbinate and distorted, pervious, white, irregularly roughened and often provided with 2-3 longitudinal striae, sometimes appearing triquetrous; hollow, composed of a layer of cellular pseudoparenchyma, cells two or three, pervious on the exterior, stuffed with woven hyphae, about 1-3 mm. thick, appearing rigid and cartilaginous. Gleba olivaceous, mucilaginous, at first aromatic with a "fruity" quality, becoming somewhat foetid, carried upon the greater part of the receptacle, save for the sterile base and apex, attached to a thin (1 mm.) membranous tissue which is permanently attached through the pervious cells. Spores olivaceous, elliptical, smooth, 3·5-4 x 1·8-2 *mic.*

DISTRIBUTION: Victoria, Australia — in humus-rich soil under shrubs.

Heathland at Morly's Road, West Cheltenham, J. H. Willis, May, 1946 (HOLO-TYPE and PARA-TYPES in Nat. Herb., Melbourne); also in adjoining tea-tree scrubland at Black Rock, Dr. E. J. McLennan, May, 1938.

Camperdown Public Park, D. Fuller, May, 1946.

Characters of the new species are the white colour of the receptacle, its *tough firm structure* (hence the specific epithet), often ridged exterior, and peculiar manner in which the gleba is carried over the greater part of the receptacle upon a firmly attached woven membrane. Plants are irregular in size and shape, the apex often being distorted and enlarged. Sections show that there is no true pileus, however, so that the species is a *Mutinus*, related to *M. curtus* (Berk.) Fischer in its small size. Rabbits are apparently fond of this phalloid, nibbling off the receptacle (often to ground level) when it emerges.



Left: Receptacle emerging from peridial "egg."

Right: Peridium opened out to show narrow base of a mature flattened receptacle, apex of which has been eaten by rabbits.

Below: Transverse section of receptacle—

A. Olive-brown sporogenous layer (½-¼ mm.).

B. White chambered pseudoparenchymatous layer (1-3 mm.) of loose rounded cells, 30-60 *mic.*

C. Cartilaginous layer surrounding stuffed or hollow medulla (D.).

Mutinus cartilagineus sp. nov.
Group of plants *in situ*, on damp, sandy heathland at West Cheltenham, Vic.
(Note unexpanded "eggs" and presence of rabbit faeces.)

Dr. Ethel I. McLennan, Associate Professor of Botany at Melbourne University, first recognized the distinctiveness of the fungus, collecting specimens at Black Rock in May, 1938, and forwarding them (together with mounted sections) to Dr. G. H. Cunningham, Director of the Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, New Zealand. Unfortunately, the package was opened up in his absence and the covering information discarded, so that the sender remained unknown to Dr. Cunningham, who could make no report. In May, 1946, Miss E. Colline Chugg re-discovered this interesting plant (in quantity) at West Cheltenham—at the south-west corner of Victoria Golf Links, and not far from the original collecting ground. She willingly escorted the author there, and from the abundant material available, this diagnosis has been prepared with Dr. Cunningham's kindly assistance. Simultaneously, the plant appeared also at Camperdown in western Victoria—growing among the roots of cultivated shrubs in the public park. An interesting feature is that the new phalloid was accompanied at both localities by the "Lattice Fungus" (*Clathrus gracilis*).

BOTANY DISCUSSION GROUP

A review of the experiment made during 1946 in the formation of the Club Botany Discussion Group justifies the hope that the forthcoming year will see the Group consolidated and extended in activity. At the nine monthly meetings held the average attendance of members was 29. All the Group field excursions were successful and consistently well attended. The Group co-operated with the systematic botany section of the Australian Nature Show in October. Improved classification and higher general standard of the set-up on the previous show was manifest as a result.

The Group mainly functioned under the capable tutelage of Mr A. J. Swaby, to whom the thanks of members of the Group, and the Club generally, are due for his splendid service. The bulk of the lecturettes was given by him, whilst he provided all the charts and many of the exhibits. Able assistance in the talks by Mr. J. H. Willis and Mr. J. Ros Garnet was also appreciated.

For 1947, a complete programme has been outlined, to include a beginners' course in Elementary Botany. Special reference is to be made of the Club census of Victorian flora. New Club members are cordially invited to take the opportunity to link up at the first meeting for the year on Monday, 24th February next, at 8 p.m., in the Royal Society's Hall. The meetings thereafter will continue on the fourth Monday in each month. Group excursions are fixed for the third Saturday monthly, which in a few instances will coincide with Club general excursions of botanical character.

A register of research has been instituted, and newer members are encouraged to assist actively by undertaking plant ecology investigation. Special field work and study will be covered by other excursions to nearer areas, such as the Sherbrooke Forest, Studley Park and Seaholme, still possessing plant survey value.

The Group committee comprises Messrs. A. J. Swaby, J. H. Willis, R. D. Lee, and Miss A. B. Adams, with Mr. H. C. E. Stewart as Hon. Secretary. Intending 1947 members can contact any of these for further information.

The Rev. George Cox, who died on December 16, 1946, was widely known as a field naturalist, and had a good natural history collection at his Mornington home. He founded a children's naturalist club at Mornington, and in other days frequently lectured at the Melbourne Museum.

THE ESTABLISHMENT OF THE NEW NATIONAL PARK AT DIMBOOLA

By J. Ros GARNET, Melbourne.

At 3 p m on Sunday, November 10, Victoria's latest National Park was officially opened by the President of the Dimboola Shire Council (Cr. Howland). There was a large attendance of residents and visitors, including (whom the President generously welcomed) "four very distinguished visitors from Melbourne"

Dr. M. Chattaway, Messrs. F. Hallgarten, W. Watts, and the writer, with Mr. and Mrs. Eric Muir, of Dimboola, and Mr. Keith Hately, of Kiata, represented the F.N.C.V. on this occasion and listened with interest to Councillor Howland's address. Although he, in common with so many of the early Mallee settlers, had regarded Mallee scrub as little more than a nuisance, to be eradicated by the quickest means possible, he was now converted to the belief that it was very desirable to leave the small remaining areas untouched so that future generations could see for themselves the type of country the pioneers had to deal with and perhaps see something of the flora and fauna which were once dominant in the district. He congratulated the people of Dimboola on their possession of such a reserve and expressed the hope that in the near future, when materials became available, the fence with which it was intended to surround the park would deter the thoughtless from using it as anything else but a national park.

In referring to the interest in natural history that was made so evident by this particular occasion, the President said he would very much like to see a branch of the F.N.C.V. established at Dimboola, and it is not at all unlikely that such a branch *will* be established with the present country members as a nucleus for the group of thirty or forty people who share a common interest in natural history.

By invitation, several of the F.N.C.V. members addressed the gathering. One of the party, Dr. Margaret Chattaway, who recently arrived in Australia from England, drew some happy comparisons with what she had seen since her arrival and what she had been led to believe she might expect to see. Perhaps what impressed her most was the colourfulness of the scenery—the green of the Mallee gums, their coppery tips, the red of the sandstone areas, the white of the Little Desert and, best of all, the blue of the brilliant sky: to have all this at one's doorstep and a national park as well, was a matter for congratulation to the people of Dimboola.

As F.N.C. Secretary, the writer expressed the Club's appreciation, not only for being afforded an opportunity to be in Dimboola, but for being officially represented at such an event as the founding

of a new national park. Although our smallest national park, its very nature made it a valuable acquisition both to the people of the Shire of Dimboola and to the Victorian public. Being small, its proper maintenance would be simplified and it would have little attraction as a grazing area—a feature which has spelt the ruination of our big national parks.

Here then was our best means to preserve what is fast vanishing from all parts of the State, e.g., the once magnificent stands of Mountain Ash in the eastern half of the State—another "noxious weed," often 300 feet high, which because of its commercial value *had to be* eliminated as quickly as possible. Without the extension of a system of regional reserves, the time would soon arrive when the flora and fauna of our country would be replaced by exotic types, while our own would be sought only in the parks, zoos and museums of other lands. Preservation *in their own land* is not merely a matter of sentiment but of vital ecological importance, and Dimboola's small reserve is an area where careful ecological study might amply justify its existence.

Continuing this line of thought, Mr. F. Hallgarten stressed the urgency for the need of proper entomological surveys of our primitive areas. Without the knowledge afforded by such enquiries we were helpless in the face of such invasions as north-west Victoria was now experiencing—the grasshopper plague. And "hoppers" were not our only economic enemy. We knew something of their life history, but of so many of our other plagues, little or nothing, and reserves such as this one, where the original communities were least affected by settlement, provided the entomologist with his necessary field laboratory.

Mr. Eric Muir spoke in turn as a resident and a field naturalist who, with Mrs. Muir, was glad to be associated with the establishment of a national park which could serve such an important purpose in the community. He called attention to some of the special features to be found within the bounds of the reserve and took the opportunity to compliment the pupils of the nearby High School on the practical interest they were taking in its welfare.

Mr. Daws, the headmaster of the High School, who also spoke, made it clear that the young people of Dimboola who passed through his hands and who would be among the future custodians of our native flora and fauna would surely profit by the better understanding they will gain from active interests in this reserve.

At the conclusion of the brief ceremony, held in brilliant sunshine, with the Mallee gums forming a background to the gathering, the party dispersed to tour the area and see for themselves some of the treasures which for many, even after long residence in the district, were surprisingly unfamiliar. Mr. and Mrs. Muir have undertaken the preparation of a complete Plant Census for the park.

ADDITIONS TO THE MOSSES OF VICTORIA

By G. O. K. SAINSBURY, F.L.S., Wairoa, Hawkes Bay, New Zealand.

I have in recent years received from Mr. Frank Robbins, Castlemaine, Victoria, three interesting mosses which were collected there by him, and which had previously ranked as New Zealand endemics. One of them is clearly distinguishable as a variety, and I have described it accordingly, but the others are essentially identical with the New Zealand plants. If any proof were needed of the close relationship between the bryological floras of the two countries it would be furnished by these interesting discoveries. The collector's number is given in each case at the commencement of the reference.

SAINSBURIA NOVAE-ZEALANDIAE Dix., in *The Bryologist*, Vol. 44, p. 40 (1943).

No. 50b. 3rd Oct., 1942. Shady vertical clay banks, Castlemaine. In fruit.

This monotypic genus and a few others, whilst having the gametophyte of *Fissidens*, differ in the peristome teeth not being divided above. In *Sainsburia* they are rimose above, entire below and at the tips, and striolate at apex. The Castlemaine plant agrees well with the type, the only noteworthy difference being that the operculum, to judge by a single operculate stem present in the gathering, is sub-erect instead of being curved as in the New Zealand plant. The latter has been collected by myself in several localities in the Wairoa County, North Island.

TRIQUETRELLA CURVIFOLIA Dix. and Sainsb., in *Journal of Botany*, Aug., 1933, p. 217.

No. 30. April, 1943. Barker's Creek, Castlemaine. Barren.

A very distinct species in the leaves closely spirally twisted round the stem when dry, with cells crowned by several low papillae. The Victorian plant matches the type closely, except that the leaf arrangement, though quite distinct, is perhaps not so well marked, and the stems are often more robust, with somewhat larger leaves. The New Zealand plant has only been found in, and near, Havelock North, Hawkes Bay, North Island, by its discoverer, Mrs. E. A. Hodgson. Fruit has not been found.

TORTULA FLAVINERVIS Dix., in Bull. No. 3, *N.Z. Inst.*, p. 144 (1923), var. nov. *PARVIRETIS* Sainsb.

A forma typica differt cellulis superioribus magis obscuris, minoribus, 8-12 u. (ibi 12-18 u.). Costa in aristam longissimam circa dimidiam partem folii aequantem, excurrens.

No. 12b. 1943; common in open fields, Castlemaine. Barren.

In naming this variety I have been influenced by the smallness of the cells, which is, in the circumstances, a more important character than the strikingly long arista, because the nerve in the New Zealand plant shows great variation in the degree of its excurrence, and I have collected a specimen in which the arista is quite one-third the length of the leaf. This variation in the length of the arista has been established by gatherings subsequent to the publication of the species, the plant having been there referred to as having the nerve *very shortly mucronate*. The cells, however, in the type plants are constantly larger than in the Victorian, and in the latter they are also more obscure. Fruit has been found in New Zealand, though very rarely.

VALUABLE BENEFACTION

The late C. C. Towle, of Eastwood, N.S.W., a former member of the F.N.C.V., whose death was referred to at the Club's monthly meeting in May last, had, over a period of 25 years, amassed an immense collection of aboriginal stone artifacts. Comprising about 14,000 specimens of knapped and trimmed implements of all kinds, including axeheads, grinding, percussion, ritual, and cylindro-conical stones, obtained from many parts of N.S.W., the collection is regarded as the finest ever made privately in that State. Under the terms of Mr. Towle's will, the whole of this splendid collection has been bequeathed to the Australian Museum, Sydney.

Mr. Towle contributed several articles on ethnology to the *Victorian Naturalist*. He was a naturalist of wide interests, botany, geology and astronomy finding a place in his active interests.

DEFINING "NORTH QUEENSLAND"

(To the Editor)

Sir,—"J.H.W." offers some criticism that the use of the geographical designation of North Queensland has not been defined in the Checklist of N.Q. Ferns (and of Orchids). However, in *A Census of Plants of N.Q.* (first published in the *N.Q. Naturalist*, No. 9, June, 1933) this is given as "including Pastoral District of Cook, Burke and North Kennedy, and that portion of Mitchell north of 22nd parallel of South Latitude." This corresponds to District No. 3 (Northern) gazetted by Order in Council on March 27, 1930, in connection with the Animals and Birds Act, 1921 to 1924. Like all the mainland State borders, the southern and western boundaries at least are purely arbitrary, but the coastal boundaries are established by nature. Actually the definition should read, "That part of Queensland north of and including Pastoral District of Cook," etc., as defined above.

Yours faithfully,

J. WYER,
Hon. Secretary,
North Queensland Naturalists' Club

Cairns, January 16.

THE MUELLER MEMORIAL

The Australian plants at the memorial to Baron Sir Ferdinand von Mueller in the St. Kilda Cemetery, set out during 1938 and since, have on the main thrived and blossomed. Of the necessary replacements made, two eucalypts—*E. Baxteri*, which inadvertently sprang up after some Grampians seedlings were planted, and *E. siphophila* (a "Snow Gum")—have so flourished that regretfully their early removal is imperative in order to avoid overcrowding and possible interference with the memorial foundations.

The Baron died on October 10, 1896. It was fitting to commemorate the fiftieth anniversary on Saturday afternoon, October 12 last, by foregathering at the memorial in its native sylvan setting. One of the original shrubs planted, *Calytrix tetragona*, was resplendent in flower for the occasion.

The commemoration was unique in that Messrs Charles French and George Coghill, pioneer members of the Club, and Mr. Best, a visitor, who had attended the funeral fifty years before, came again to honour the great man's memory, together with a large gathering of Club members, and accompanied by many from the Historical Society of Victoria. Others in the assemblage, too, had been witness to the unveiling of the monument by Lord Hopetoun, as first Governor-General of the Commonwealth.

The President of the F.N.C.V. (Mr. F. S. Colliver) presided, welcomed those present, and introduced the various speakers. The principal brief addresses were delivered by Mr. A. D Hardy, for the older generation contemporary with the Baron, and Mr J. H Willis, B.Sc., as representative of the younger generation. Other speakers included Messrs. A. T. Latham (for the Historical Society of Victoria), Charles Daley, and H. C. E. Stewart. A message was read from Mrs. Henrietta Sinclair, of Brisbane, the Baron's niece, who also sent a handsome wreath, which was placed on the memorial by Mr. Daley for her and the surviving Mueller relatives. Native flora from his garden was brought by Mr Charles French. Among the other floral tributes, the Club's botany "pole," four feet high, composed entirely of wildflowers, was conspicuous.

Proceedings terminated with the planting of two native shrubs, one by the President, Mr. Colliver, and the other by Mr. P. F. Morris, as representative of the Director of the Melbourne Botanic Gardens and National Herbarium, who was unable to attend.

The centenary of the famous botanist's arrival in Australia falls in December next, and the Club committee intends suitably marking the anniversary. One proposal is to ask the Commonwealth Government to issue a special Mueller stamp. Where required, the replacement at the memorial area of more suitable Australian plants will be undertaken.

H. C. E. Stewart.

SILVEREYE AS MIMIC

While working in my garden recently I was attracted by the whisper-song of a bird. The sound came from a leafy willow-myrtle. I began to search for the vocalist, which seemed to be practising ventriloquism, for the voice appeared to come from different directions as I carried on the search. I expected to find a Blackbird, from the tone and class of mimicry used—such as "Pretty Joey," the calls of the Mudlark, Black-faced Cuckoo-Shrike, etc. Imagine my surprise, however, when I at last discovered the singer to be the Grey-backed Silvereye. With its voice kept to a pitch lower than the ordinary, it carried on this whisper-song, which was made up mainly of mimicry interspersed with short breaks of its own song. I have many times heard and watched the Silvereyes in their soliloquies, but never before have I known this type of mimicry to be practised by them.—A. S. Chalk.

PLATE XVII

The Mueller Memorial at St. Kilda.
The left-hand tree is *Eucalyptus Baxteri*, the smaller one on the right *Eucalyptus viminalis*.

Photo.: R. D. Lee.

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PROCEEDINGS

The monthly meeting of the Club was held on February 10, 1947, at the Lecture Hall of the Public Library. The President, Mr. F. S. Colliver, presided and about 200 members and friends attended.

Mr. Ivo C. Hammet gave notice of motion aiming at increasing subscriptions to the Club to 25/- for Ordinary Members and 12/6 for Country Members, and to increase the price for the *Victorian Naturalist* to 1/6; the subscription for Associate (without journal) to remain at 5/-. The President and Hon. Secretary spoke on the matter.

The following were duly elected as Ordinary Members: Mrs. L. Julian, Mrs. Winifred Hazel, and Mr. H. E. Myring; as Country Member, Mr. Geoff. Stephens.

HOLIDAY OBSERVATIONS

Members were invited to tell briefly of their holiday experiences, and the following notes were given:

Miss Margaret Sarovich reported having visited Sorrento and the spot where white people had first landed from Van Diemen's Land.

Mr. E. Prohasky had visited the Kinglake-Mt. Slide district, with its very fine fern gullies, and he suggested that this area deserved to be far better known. He offered to lead an excursion to the area at some future date.

Mr. C. J. Gabriel had travelled about three yards to his wife's glass-house, where he had made an onslaught on some alien land mollusca. There were now several species of these creatures in gardens, and, although interesting, were very destructive to our garden flora. The first of them were brought into this country on a pot plant, in 1843, by two Frenchmen.

Miss R. Chisholm had visited Tasmania and was interested in the pebble deposits along the Tamar, about 14 miles north of Launceston. She mentioned also plants, insects, and birds.

Mr. A. H. Chisholm (Hon. Editor) reported having found two rare birds, the Black Honeyeater and the Inland Warbler, nesting in the Maryborough district, these being the farthest south records in eastern Australia for both species. He also showed nests of

the Mistletoe-bird and the Painted Honeyeater (remarkable contrasts in bird artistry) and discussed the question as to what part these eaters of mistletoe berries played in the distribution of the parasitic plants. He invited botanical opinion on why mistletoes had spread considerably of recent years and whether they did any serious damage to forest trees.

Mr. Garnet Johnston reported that at Kalorama the mistletoe had infected gums and wattles, especially wattles.

Mr. V. H. Miller stated that at Mallacoota a number of trees infested with mistletoe did not appear to be greatly affected by it. He asked if the spread of the mistletoe was ascribed to the increased number of Mistletoe-birds, and, if foresters decided to destroy numbers of the birds, how was it proposed to do this?

Mr. Colliver stated that at Werribee Gorge he had noticed that wattle-trees infested with mistletoe were dying, but close examination had showed the trees to be infested with borer as well.

Mr. Miller suggested that other means of dispersal of the mistletoe were available. Trees were infected at Toorak, but he had yet to hear of the Mistletoe-bird there.

Mr. A. A. Baker said he had visited the Mitchell Gorge, a very rough region west of Bairnsdale. Geologically it was very interesting, showing alluvial flats and high cliffs. Fossiliferous beds were common in the tertiary beds. Some specimens of plants of Devonian age, including a nice stem of *Lepidodendron australe*, were collected, and the neighbouring Deadcock Gorge also visited.

Mr. F. S. Colliver reported having visited Sydney and Broken Hill. At Beacon Hill, near Sydney, he had collected a fossil fish of Triassic age. Considerable time was spent at the Australian Museum, and it was of interest to note the damage done in the district by a freak storm. So much glass was broken in the roof of the museum that a galvanized iron roof was erected over the whole building, and it is estimated that four years' work and the sum of £50,000 will be necessary to effect repairs. At Broken Hill considerable time was spent below at the 1150-ft. level at the North Mine with the geologist engaged in his routine mapping, and on the field with the surface survey on the leasehold. The trip was marred by the fact that Broken Hill had at the time the longest hot spell for about twenty years, and a dust storm to boot.

Mr. J. H. Willis said that there was a reserve of some five acres on Deadcock Creek, but it should be enlarged to at least 500, this Gorge being useless for any other purpose although a wonderful area for a national park. He had just visited Genoa Gorge and had seen Rock Lily and Streaked Rock Orchids in quantity. Regarding mistletoe, he suggested that heavy infection only took place when the trees were in ill-health. A very uncommon club moss, originally collected at Genoa Park by Baron von Mueller, was seen, and in the short time available, under the guidance of

Mr. Norman Wakefield, he had seen for the first time in the living state nearly 100 different plants. The Bogong High Plains also were visited, and there, at 6000 feet, many snow plants were seen, including the Alpine Marsh-marigold. A search revealed specimens of rare Bladder Fern, which had not been collected since Mr. Tadgell first recorded it 24 years ago.

EXHIBITS

Mrs. J. J. Freame: Marine shell fish with internal shell (*Aplysia* sp.).

Mr. J. A. Blackburn: A series of Pleistocene fossils from Portarlington (described in *P.R.S. Vic.*, Vol. 49; New Series).

Mr. R. A. Dunn: A common Victorian scorpion (*Urodacus manicatus*) from Mt. William.

Mr. R. D. Lee: Eight mounted specimens of sea-weeds.

Mr. C. J. Gabriel: Introduced land shells from glass-house at Abbotsford.

Mr. A. N. Carter: Rare shells from Apollo Bay, including: *Dosinia caerulea*, Rve.; *D. crocea*, Desh.; *Bassina pachyphylla*, Jonas; *Psammobia kenyonana*, Pritchard and Gatliff; *Paryphanta compacta*, Cox and Hedley.

Mr. J. S. Seaton: *Beaufortia sparsa*, a Western Australian species garden-grown at Caulfield.

Mr. A. A. Baker: Geological specimens, including *Lepidodendron* from Dead Cock Creek; Devonian plant remains from Iguana Creek; conglomerate, grey and red micaceous sandstone from Mitchell River Gorge; spherulitic rhyolites with geodes of quartz crystals from Mitchell River Gorge; Limestone replacing wood, Dead Cock Creek; cassiterite, Iguana Creek district; agates, chalcedony and banded jaspers from the gravels at Tom's Creek; and marine fossils from limestone, Bairnsdale.

Mr. J. Ros Garnet: The life history of a leaf miner (*Lagra grandis*), showing larva, pupa and perfect form of the beetle, also harvestman from West Brunswick.

Mr. A. H. Chisholm: Nests and photographs of various birds.

Miss R. Chisholm: Pebbles from beds, Tamar River, Tasmania.

SIMPLE FISHING

Mr. C. T. White (Government Botanist of Queensland) reports that when doing botanical work in the Solomon Islands last year he was much interested in the kite fishing practised by the natives. A man sits in a canoe flying a kite from which is suspended a fishing line. It has no bait or hook, but some very sticky cobweb acts as a combined hook and lure. It flits over the water and fish, mostly mackerel, snap at it and get their jaws entangled. They are then pulled into the boat and clubbed.

DEATH OF REV. J. R. B. LOVE

There will be wide regret among naturalists at the death of the Rev. James Robert Beattie Love, M.C., D.C.M., M.A., which occurred on February 19. Mr. Love was distinguished as a Presbyterian minister and missionary and as an officer of the A.I.F. in World War I. In addition, he was a competent anthropologist and had done much valuable research work among aborigines, particularly in Western Australia. His book of 1936, *Stone Age Bushmen of Today*, is a volume of very considerable interest. Mr. Love also took a healthy interest in birds, and his name is commemorated on the Desert Bush-Chat, *Ashbyia Lovensis*. He leaves a widow, three sons and one daughter.

SEEDLING HABIT OF *PITTOSPORUM BICOLOR*

By JEAN GALBRAITH, Tyers, Victoria.

The regular appearance of either one or two cotyledons in all flowering plants has been regarded as universal and it is a basic distinction in all plant classification. Therefore a plant which regularly has three cotyledons seems a remarkable discovery to a botanist.

There appears to be such a unique species, for among many dozens of plants of *Pittosporum bicolor* which I have grown from seed, every one has three cotyledons. The first seedlings were from seed gathered at Blackwarry about 1924. Some of the seeds took fifteen and some eighteen months to germinate and then for the first time I noticed the three cotyledons.

About six years later I noticed the same peculiarity when seed from another part of the Strzlecki Ranges germinated.

Two years ago (January, 1945) I collected more seed of *Pittosporum bicolor* at Fern Tree in Tasmania, and last winter (June, 1946) the familiar "tricotyledons" appeared. Other seed collected in Tasmania (from Bruny Island, I believe, but I have not been able to verify this) and some sent by a friend from Fern Tree also grew. Among all these seedlings not one had two cotyledons. It seems as if three cotyledons must be an established character of the species, to be taken much more seriously than the freakish appearance of an occasional extra cotyledon which may be seen in almost any species.

It would be interesting to hear of any other observer's experience in connection with the germination of this *Pittosporum*.

I suggest no conclusions—I have drawn none, but merely record an interesting fact, with the suggestion that it should be studied by someone living (as I do not) in a district where *Pittosporum bicolor* is found.

If development in nature is, as it appears to be, toward infinite variety, this seems to be a new line of variation.

A further interesting fact about the growth of this tree is that in South Gippsland it seems to germinate only in the trunk of a tree-fern.

A bushman living at Blackwarry pointed this out. "I've looked at every one I've seen for years," he said, "and every one grew out of a tree-fern."

I have looked for one that started life in the ground, or even in a cranny in a tree, but have found none on the southern slopes of the Strzleckis—I have never seen *P. bicolor* on the north side of these ranges—but in Tasmania it appeared to grow in the ground as readily as *P. undulatum* does here.

Incidentally, all my Victorian seed germinated in tree-fern fibre, and that from Tasmania in leaf mould, but this proves nothing as I did not try any of the Victorian seed in soil.

PLATE XVIII

Glenelg River, Vic., in an area which it is hoped to have reserved as a National Park. (Club members will make an official inspection at Easter.)

Photo.: A. H. Chisholm.

REMARKS ON VICTORIAN BLUEBELLS (*WAHLENBERGIA*)*

By NOEL LOTHIAN, Christchurch, N.Z., formerly of Melbourne.

The genus *Wahlenbergia* has wide distribution, and with few exceptions all species are limited to the continents and islands in the Southern Hemisphere. The total species number approximately 120, and of this number over 90 are recorded from South Africa, 20 from South America and only 10-12 species for the whole of the Australian and New Zealand region (4-5 for Australia and 7 or 8 from New Zealand). It is obvious that our knowledge of the species in this region, especially Australia, is very incomplete, and much study will be necessary before this can be remedied.

Members of the genus have a widespread distribution in Australia, and have been recorded from coastal, savannah, forests, "deserts," montane, and alpine regions.

Up to 1827, all species of *Wahlenbergia* had been described under *Campanula*, but in that year Schrader proposed a new generic epithet "Wahlenbergia" in honour of George Wahlenberg, then Professor of Botany at the University of Uppsala. Specific mention was made of *Campanula gracilis* Forster, and while Schrader suggested that this plant be transferred to the new genus, he did not make the new binomial. This was left to Alph. de Candolle in his monumental work *Monographie des Campanules*, published in 1830. Therefore the true name for Forster's plant is *W. gracilis* (Forst.) A.DC. Unfortunately A.DC.'s description included elements other than the true "gracilis" which helped to give a misunderstanding of this and closely related species.

The species dealt with in this short paper are limited to those the writer has so far recognized in Victoria, viz., *W. quadrifida* (R.Br.) A.DC., *W. vincaeflora* (Vent.) Dene., *W. Billardieri* nom. nov., *W. bicolor* nom. nov., and the following recently described* new species: *W. consimilis*, *W. gloriosa*, *W. gymnoclada*, *W. Tadgellii* and *W. gracilenta*. These additions to the genus will be found justifiable, when careful field work is carried out, and checked with the descriptions.

Confusion has been in no way limited to the "gracilis" complex —or "marginata" complex as it should be called—and we find the same trouble occurring in the "vincaeflora" and "multicaulis" groups. I now claim to have established these on a sure foundation, allowing for further constructive work to be completed.

*See N. Lothian in *Proc. Linn. Soc. N.S.W.*, Vol. lxxi, pts. 3 and 4, Jan. 15, 1947, pp. 201-235.

The confusion which surrounds these and many other species is not surprising when we consider the varying climatic and ecological conditions found in the Australian continent. The lack of type material for comparison, wide dispersal of this material and the uncertainty of the actual existence of certain types have also accentuated such a problem. It is probable that much confusion could have been avoided by careful comparison of fresh material with the types. Bentham unfortunately stated, "they run so variously into one another that they would require to be differently defined in every separate collection." This statement most certainly hindered a better understanding, not only of the species involved, but the conditions which cause variations to appear. It also makes plain the absolute necessity for field work.

In 1913, N. E. Brown* published a revision of the species occurring in the Australian and New Zealand region. This was the first real attempt to give under one head all the then known species occurring within this region. However, Brown did not go deeply enough into the problem, and many later botanists have been led to wrong conclusions from his writings.

Together with *W. marginata* (Thunb.) A.DC.—a species not found in Australia, but common elsewhere—the greatest confusion surrounds *W. gracilis* variously of Forster, Schrader and A. De Candolle. This latter species is recorded in all Australian Floras—those of her States included—yet NO specimen matching the type collected by Forster in New Caledonia has ever appeared in Australia!

The plants which are usually referred to *W. gracilis* are *W. quadrifida* (R.Br.) A.DC. and *W. gracilenta*, both with a wide range in practically every part of the continent. All evidence at present points to the fact that mainland species are not closely connected to the "*W. marginata* complex" at all, though this group is widespread in Asia, Pacific islands, East Indies, New Caledonia, New Guinea and New Zealand, and may possibly extend to Norfolk and Lord Howe Islands.

The precise correlation of anatomical features has been neglected in the past, hence appreciation of the specific identity of many of our plants has been missed. This, together with the lack of careful field work, has, for the main part, been one of the principal causes of such gross misunderstanding. While vegetative characters differ under varied ecological conditions, the floral parts have remained almost constant, and this is amply borne out by what little experimental work has been accomplished.

Hybridism between species has been over-estimated in the past and has been frequently advanced as one of the principal reasons for great variation within the genus. Evidence at present indicates that rarely, if ever, do species of this genus naturally hybridise.

*See *Gardeners' Chronicle*, Vol. LIV, p. 316.

Mention may be made of the great variation in the number of petals and sepals, frequently found on the same plant. *W. gracilenta, W. quadrifida, W. Tadgellii*, etc., all show this variation, the first-named especially so. But the most astounding cases, so far recorded, are to be found in *W. bicolor*; instances of 7-9 petals are not rare, and there is more than one instance where the number of petals has exceeded 16, and even 18-petalled flowers are recorded.

Apart from these "double flowered" specimens, normal polypetaly appears to have little systematic value, and is probably of common occurrence in Australian species.*

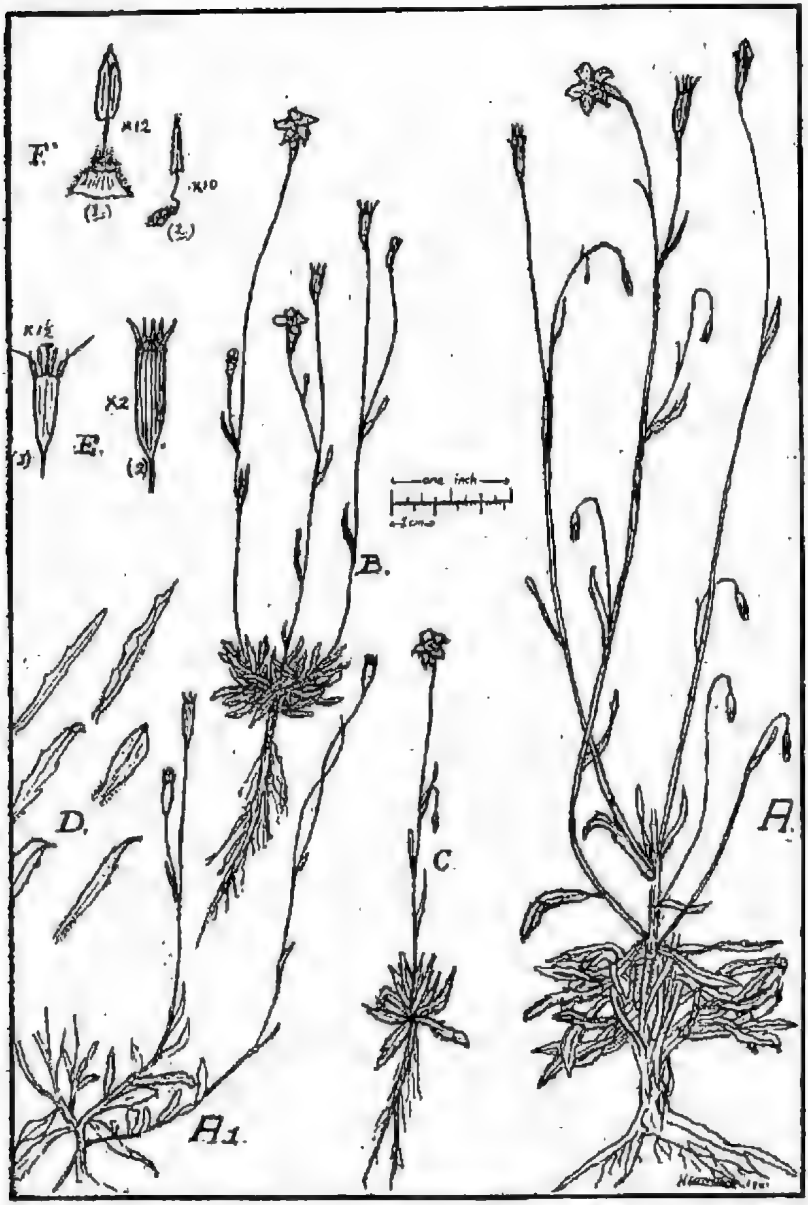
Space prevents further elaboration, but it is emphasized that accurate field work, in conjunction with the descriptions given below, will do much to clear away the misunderstanding which at present exists. It must also be stressed that the species herein described by no means exhaust the total number of Victorian entities, not to mention those in other States of the Commonwealth. Preliminary work has commenced, but further long periods of time will be necessary before a complete survey of Australasian *Wahlenbergia* species is possible.

Work of this nature could not proceed without the very kind co-operation of numerous botanists, both Australian and overseas. Acknowledgements have been duly made in *Proceedings of the Linnean Society (N.S.W.)*, but I would again like to express my deep appreciation to two Victorians: Mr. A. J. Tadgell, who throughout this revision has forwarded me fresh material and copious field notes, and Mr. J. H. Willis, who has helped me continually with technical advice, without which this paper could not have been presented.

KEY TO THE VICTORIAN SPECIES

Flowers over 12 mm. in diameter		A
" under 12 mm. in diameter		AA
A Plant tufted, with numerous close-set glabrous stems, leaves narrow linear		*W. bicolor*
Plant not tufted, stems one to few, leaves ovate to lanceolate		B
B Leaves lanceolate, hirsute, margins crispate		C
" lanceolate, almost glabrous, margins serrate-denticulate		D
C Calyx and capsule hirsute		*W. rosiflora*
" " " glabrous		*W. consimilis*
D Leaves usually opposite, rarely alternate		E
" usually rosulate, rarely alternate or opposite on stems		F

*For variations in structure and other notes concerning the genus see A. J. Tadgell in *Vict. Nat.*, 55 (1938), p. 148.



Wahlenbergia quadrifida (R.Br.) A.DC.

A, Typical plant, natural size. A1, Sketch from *Type* (R. Brown). B and C, Seedling and one-year-old plants. D, Leaves—various adult types to be found on the one plant. E1, Diagrammatic cross-section of the flower. E2, Mature seed capsule. F1, Stamen—front view. E2, Stamen—side view.

E Corolla more than 2·5 cm. in diameter, royal purple; calyx half length of the corolla tube (alpine species) ... *W. gloriosa*
Corolla less than 2·5 cm. in diameter, blue, mauve or white; calyx equal to length of the corolla tube ... *W. Billardieri*
F Corolla up to 3 cm. in diameter, deep blue, with large tube; leaves linear ... *W. gymnoclada*
Corolla up to 16 mm. in diameter, blue to purple, with small tube; leaves lanceolate—spathulate ... *W. Tadgellii*
AA Perennial, almost glabrous, branching from root-crown; corolla 6-12 mm. in diam.; capsule elongate obconic ... *W. quadrifida*
Annual, almost completely hirsute, branching along a central axis; corolla up to 5 mm. in diam.; capsule subglobose ... *W. gracilenta*

1. *W. BICOLOR* N. Lothian, nom. nov. (in *Proc. Linn. Soc. N.S.W.*). (*Camp. gracilis* var. *stricta* R.Br., non *W. stricta* Sweet; *W. gracilis* var. *stricta* A.DC.)

Much branched perennial plant. Glabrous except at the base, 6-18 inches high. Leaves very numerous, almost glabrous, linear lanceolate, up to 1½ inches long, up to ⅛ inch wide, margins entire or denticulate. Flowers numerous, azure blue; yellow, old gold or white externally. Calyx 5-, rarely 6-10, lobed, glabrous, narrowly deltoid, ¼ inch long, quarter as long again as the corolla tube. Corolla 5-lobed (6-18 petalled specimens not unknown), up to ¾ inch in diameter; tube one-third the length. Staminal filaments broadly triangular, with 2 incurved ciliated shoulders. Capsule slender elongate, glabrous, up to $\frac{7}{16}$ inch long.

It favours savannah and open, dry grassland formations, and has been extensively collected in Victoria from Keilor Plains, Eltham, Torquay, Bacchus Marsh, Sandringham, Grampians, etc.; also recorded from New South Wales and South Australia. Confused with *W. multicaulis* Benth.; it differs from that Western Australian species principally in the size of flowers and length of corolla tube. The species is one of the best examples of polypetaly so far recorded; specimens showing 7-9 petals are common, and above that number not rare. Abortion of stamens usually follows with such increases. Like all of our large-flowered species it makes an excellent rockery and border plant.

2. *W. VINCÆFLORA* (Vent) Dene. (*C. vincæflora* Vent.; *W. gracilis* var. *litteralis* A.DC. *pro parte.*)

Mention is made of this species as it has been continuously confused with the following, in so far as Victorian records are concerned. All the specimens I have examined come from New South Wales, where it is common in savannah areas (especially Ingleburn, etc.), and the species may be limited entirely to that State.

3. *W. CONSIMILIS* N. Lothian (in *Proc. Linn. Soc. N.S.W.*). (*W. vincæflora* N. E. Brown, non Dene.)

Strongly growing hirsute perennial, up to 2 feet in height. Stems densely hairy at the base, glabrous above. Leaves lanceolate, up to 2 inches long and ¼ inch wide, hirsute on both surfaces, coriaceous, margins crispate and thickened. Flowers large, dark blue in colour. Calyx 5-lobed, attenuate or narrowly deltoid, glabrous; equal to or slightly longer than the corolla tube. Corolla 5-petalled (frequently 4-6), up to 1½ inches in diameter. Staminal filaments large, with two prominent wings, edged with hairs.

Capsule barrel-shaped, or subglobose, glabrous, up to $\frac{1}{16}$ inch long, and $\frac{1}{4}$ inch in diameter.

Common in the drier parts of Victoria (Warby Ranges, Keilor Plains, etc.) and also found in New South Wales and South Australia. Previously included with *W. vinciflora* (Vent) Dene., it differs from that species by its glabrous calyx, and barrel-shaped or subglobose, glabrous capsule. There appears to be a montane form of this species growing in subalpine areas of this State (Dandenongs, etc.); the parts are much smaller, the foliage being almost glabrous, and flowers rarely above $\frac{1}{2}$ inch in diameter. Evidence is at present inconclusive and precludes action to rank this plant as other than a form. The typical plant is really beautiful, flowering for many months of the year, and well worthy of cultivation.

4. *W. GLORIOSA* N. Lothian (in *Proc. Linn. Soc. N.S.W.*).

Almost glabrous perennial, 6-18 inches high; stems slender, weak, hirsute below, glabrous above. Leaves mostly opposite, ovate to elliptic-lanceolate, $\frac{1}{2}$ to $1\frac{1}{2}$ inches long, up to $\frac{1}{2}$ inch wide; glabrous on upper surface; hirsute below; subcartilaginous; margins thickened, crispate, rarely dentate. Peduncles long and slender, glabrous. Calyx glabrous, $\frac{1}{10}$-$\frac{1}{8}$ inch long, linear-deltoid, acute. Corolla rich blue to royal purple, large, up to $1\frac{1}{4}$ inches in diameter; tube shorter than the lobes. Staminal filaments ligulate, with two small shoulders, pilose on their edges. Capsule broad obconic, $\frac{1}{8}$-$\frac{1}{6}$ inch long, glabrous.

Widely spread among rocks along the alpine chains of east, north-east, and south-central Victoria at Mts. Hotham, Buffalo, Feathertop, Torbreck, etc., rarely below 5,000 feet; also collected in the Australian Alps (N.S.W.). Previously included with *W. vinciflora*, it is totally distinct from that species. It is a handsome garden subject, and those who have grown this plant all extol its beauty.

5. *W. BILLARDIERI* N. Lothian, nom. nov. (in *Proc. Linn. Soc. N.S.W.*). (*Camp. littoralis* Labill.; *C. gracilis* var. *littoralis* R.Br., non *W. littoralis* Schlecht. et Brehm.)

Perennial, 9-15 inches high, stems hirsute, simple, rarely branching. Leaves mostly opposite, ovate to lanceolate, hirsute, $\frac{1}{2}$-1 inch long, up to $\frac{1}{4}$ inch wide; margins undulate, dentate. Flowers blue, mauve or white. Calyx 4-6 lobed, narrowly deltoid, glabrous, $\frac{1}{4}$-$\frac{3}{8}$ inch long, almost equal to the length of the corolla tube. Corolla 5- (rarely 4-6) petalled, $\frac{1}{2}$-$\frac{3}{4}$ inch in diameter; tube goblet-shaped. Staminal filaments roughly deltoid, with small shoulders, covered with glandular hairs. Capsule obconic, $\frac{1}{4}$-$\frac{3}{8}$ inch long, up to $\frac{1}{16}$ inch in diameter, glabrous.

Precise distribution unknown, but probably limited to coastal and light forest areas (Torquay, Heathmont, etc.). Also found in Tasmania. Misidentification has been responsible for much of the confusion respecting this species. Previously identified as the plant Gaudichaud collected at Port Jackson, which is referable to *W. vinciflora* (Vent) Dene., it is now considered identical with the plants Robert Brown collected at Arthur's Seat, in 1802. Labillardiere's plate in his *Novae Hollandiae Plantarum Specimen* differs in some respects, due no doubt to "artistic license."

6. *W. GYMNOCLADA* N. Lothian (in *Proc. Linn. Soc. N.S.W.*). (*W. gracilis* var. *vinciflora* Hkf.; *W. gracilis* var. *littoralis* A.DC. *pro parte*; *W. gracilis* var. *vinciflora* N. E. Brown.)

Slender, almost glabrous perennial plant, 9-15 inches high; stems usually simple, sparsely hairy at the base, glabrous above. Leaves confined to the basal part of the plant, frequently as a loose rosette, or more rarely scattered along the stem, glabrous, linear, rarely lanceolate, up to 2 inches long, $\frac{1}{4}$ inch wide, margins entire or denticulate. Flowers borne singly on long stems, blue to purple, rarely white. Calyx lobes glabrous, narrowly

deltoid, $\frac{1}{3}$-$\frac{1}{10}$ inch long, equal to or slightly exceeding the length of the corolla tube. Corolla $\frac{1}{2}$-$1\frac{1}{4}$ inches in diameter; tube short, two-thirds the length of the lobes. Staminal filaments broadly ligulate, shoulders not prominent, hairs just apparent. Capsule obconic, $\frac{1}{5}$ inch wide, up to $\frac{3}{16}$ inch long, glabrous.

At present known only from Victoria and Tasmania. I am indebted to Mr. Cliff Beauglehole, of Gorae West (Portland), who supplied me with such excellent material of this species. In Victoria it has also been collected from Clarinda (E. Oakleigh), Frankston, Bemm River, etc.

7. *W. TADGELLII* N. Lothian (in *Proc. Linn. Soc. N.S.W.*).

Robust perennial, 12-24 inches high; stems rigid, erect, rarely branching except from the base; covered below with longish hairs, glabrous above. Leaves alternate or opposite, spathulate-lanceolate or lanceolate, 1-2½ inches long and up to $\frac{3}{16}$ inch wide; upper surface glabrous, under hirsute; margins entire or denticulate. Flowers up to $\frac{3}{4}$ inch in diameter, deep blue with white throat. Calyx 5-6 lobed, glabrous, narrowly deltoid, $\frac{1}{8}$ to $\frac{1}{4}$ inch long, two to three times the length of the corolla tube. Staminal filaments broadly ligulate, with two erect ciliate shoulders. Capsule broadly obconic, $\frac{1}{2}$-$\frac{5}{8}$ inch long, up to $\frac{1}{4}$ inch in diameter, glabrous.

Sporadic, but widespread in its Victorian distribution; on heathlands at Torquay, Grampians, Stawell, Elsternwick, etc. Also collected in South Australia and New South Wales. The species may be easily identified by its strong growing habit, which immediately separates it from *W. quadrifida*. I have bestowed on it the name of A. J. Tadgell, in appreciation of the very great kindnesses which I have received from him.

8. *W. QUADRIFIDA* (R.Br.) A.DC. (*Camp. gracilis* var. *vincæflora* R.Br.; *C. quadrifida* R.Br.; *W. gracilis* var. *vincæflora* A.DC.)

Almost completely glabrous perennial, 6-15 inches high, with one or more stems arising directly from a somewhat thick and fleshy rootstock. Leaves mostly basal and glabrous, except for scattered hairs on the lower parts and around the axils, lanceolate, up to 1¼ inches long and $\frac{1}{8}$ inch wide; margins denticulate. Corolla blue, spreading, up to $\frac{1}{2}$ inch in diameter. Calyx glabrous, $\frac{1}{16}$-$\frac{1}{8}$ inch long, twice the length of the corolla tube. Capsule elongate-obconic, glabrous, up to $\frac{1}{4}$ inch long and $\frac{1}{10}$ inch in diameter.

Complete natural distribution unknown; the majority of localities are those in which the plant has appeared recently on disturbed soil, rather than being indigenous, viz., King's Domain (Melbourne), Kyneton and Mont Albert Railway Stations, private gardens, etc.; also in New South Wales. It is extremely variable in habit, which may account for the absence of recorded localities.

9. *W. GRACILENTA* N. Lothian (in *Proc. Linn. Soc. N.S.W.*). (*W. quadrifida* J. M. Black, non DC.; *W. gracilis* var. *minutiflora* Bailey; *W. gracilis* var. *littoralis* Hk.f.)

Annual or ephemeral, 1-15 inches high; stems hirsute, simple, with frequent branching along the central axis, or rarely branching from the base. Leaves almost rosulate and adpressed in depauperate, but alternate along the stem in normal specimens; ovate-lanceolate, clothed with long whitish hairs on both surfaces, up to $\frac{1}{4}$ inch long and $\frac{1}{8}$ inch wide. Peduncles and pedicels glabrous. Flowers small and numerous, clear blue. Calyx 3-6 lobed, broadly subulate, $\frac{1}{16}$-$\frac{1}{8}$ inch long, glabrous. Corolla 3-6 lobed (varying on the same plant), up to $\frac{1}{16}$ inch in diameter; tube slightly longer than the calyx lobes. Staminal filaments narrowly ligulate, non-ciliate. Capsule subglobose, glabrous, up to $\frac{1}{16}$ inch long and $\frac{1}{8}$ inch in diam.

Common along coastal heathlands and scrubs as well as on dry inland stations. It has in the past been confused with *W. quadrifida*, no doubt by reason of the frequent 4-partite flowers. No other species described herein displays more patently the effect of climatic conditions on growth.

EFFECT OF PAINT FUMES ON SPIDERS

By W. PERRY, Eaglehawk, Victoria.

While painting our house recently I was able to observe some curious effects of paint fumes on spiders. The spiders affected were of two species, mainly the Window Spider (*Amaurobius robustus*) and the grey and black Jumping Spider (*Ocrisiona melancholica*).

Regarding the former, our house had the usual large number of funnel-shaped webs as are found around window-mouldings, barge boards, etc. These were first swept clear before the paint was applied. Always within two or three minutes after the paint was applied the owners of these destroyed snares walked out from their hiding-places, sometimes on the paint, sometimes on to parts not yet painted. Their movements were slow and, generally within a matter of seconds, they would bunch their legs in close against their bodies, and fall to the ground.

I observed no spider to make a drag-line by which it might lower itself. The way in which they succumbed to the fumes was similar to that when a specimen is killed with chloroform. The majority of spiders affected were females, only one male being observed.

The grey and black Jumping Spiders acted in much the same way, but were not so numerous.

CULTIVATION OF THE HYACINTH ORCHID

In January, 1946, my father and I transplanted a Hyacinth Orchid (*Dipodium punctatum*) from the western slopes of Arthur's Seat to our home in Melbourne. In its natural habitat this orchid was growing close to eucalypts, as has been noted so often. The roots of the plant were very little exposed during transit, and the orchid was planted in sandy soil in an old laundry tub, which had first been well washed to remove any traces of soap. In the same clod of earth were bracken, sword sedge and a number of miscellaneous small plants. During September and October, several Nodding Greenhoods and Spider Orchids, which had obviously been transplanted with the *Dipodium*, appeared above the surface of the soil and flowered.

Early this month (January, 1947) we found that *Dipodium* had sent up two flower stalks, where last year there was only one. The buds of both flower stalks are now showing colour and look perfectly healthy, although I have seen larger specimens in the bush.

Our tub is not situated in a very shady position, but it is not exposed to strong sunlight during the whole day. It has received very little water apart from natural rain, although we have sprinkled it lightly at times to compensate for undue evaporation.

I note that in Mr. J. Murray Cox's recent ambitious work, *A Cultural Table of Orchidaceous Plants*, this plant is listed as a species suitable for growing in gardens, but I should certainly like to hear from anyone else who has succeeded in cultivating it.

WINIFRED WRIGHT.

SEA SHELLS AND SNAILS

(Summary of lecture given to F.N.C.V., December, 1946)

By F. S. COLLIVER

From very early times shells have been an object of admiration, and as such have been collected by most of us. Sea shells obtained during holidays at the beaches may have kept alive memories of better days for a time—before being discarded on the arrival of fresh treasures from other holidays. Or, in a few cases, they may have been the basis of a habit continued throughout life, and as such been kept until replaced by better specimens.

Some of us have collected and discarded time and time again. Some, like myself, find it hard to throw away specimens once treasured until that bug-bear of all collectors, space, makes it a necessity to do something drastic, and then maybe a better and more useful collection results.

The number of specimens in our larger museums, speaking of shells alone, indicates the wealth of material available to the collector and student. Certainly most people have the chance of making at least "locality collections," which can be a decided help to the museum worker or group specialist. I would suggest that here is a study available to all at very little cost, and one that can occupy all the interested people there are, and keep them at the study of conchology as long as they live.

The Mollusca are really named from being "soft-bodied animals." Slugs and snails, oysters and cuttle-fishes are familiar examples of a restricted group (sub-kingdom or phylum) of the animal kingdom.

Being a plastic form of animal, they differ very much among themselves as regards external form, some of the more aberrant types being hard to recognize as members of this group at all. Nevertheless, apart from the protective shell which is a leading feature of the group, there is a remarkable uniformity characteristic of their internal organization which is particularly marked in the young forms. Externally most possess a head, a ventral creeping organ called the foot, and a dorsal covering called the mantle, which bears and secretes the shell if present. Usually this mantle does not extend far beyond the shell, although in some cases, for example the cowries, it extends right over the shell to meet at the top.

In the more specialized forms of the Mollusca there is a tendency to reduction of the shell. This may reach a stage where there is no shell at all. Where the reduction of the shell occurs there is a corresponding liability for it to become more and more enveloped permanently in the mantle.

The muscular foot is generally an organ of locomotion. Univalves—slugs and snails—creep along by it; a great many of the

bivalves use it to burrow with; the cuttle-fish have it modified to form the "arms," and other types of Molluscs have it transformed into "fins" for swimming. In some forms, e.g., the oyster, it has degenerated so much that it is no longer used; in other forms, e.g., *Trigonia*, by its means the animal is able to jump a considerable distance; and in other forms, e.g., *Sphaerium*, a bivalve, the animal can actually crawl on the inside of the surface film of the water.

The composition of the shell is mainly carbonate of calcium, as much as 95 per cent. being in the form of the mineral calcite or aragonite, with an admixture of a chitinous substance, "conchyolin," and a little phosphate of lime and carbonate of magnesia.

This material originates in a "shell gland" or "pit" in the embryo, and the successive layers of which it is built up are formed as the animal grows by addition to the margin; these layers are deposited in order from the outermost to the inner by a series of special cells.

The first series or outermost layer is known as the "periostracum" and contains most of the chiton-like material, the function of which is protection of the shell material itself from acid in the water, or from weathering influences in water or land forms as the case might be. This layer is the work of the cells right at the edge of the mantle.

The second series or principal layer is known as the "ostracum." It is secreted by cells in from the mantle margin. This material may be coloured, and is sometimes made up of prisms of the mineral calcite (as in "Pinna") or it may have a porcellaneous structure. Cells more remote still deposit the innermost layer of the ostracum, thus thickening and strengthening the shell. This layer is of the mineral aragonite, and is often known as the "nacreous layer," being generally formed of overlapping plates giving rise to the well known mother-of-pearl appearance.

The remaining surface of the mantle is also able to secrete shelly matter, and if needs be repairs an injury, strengthens the shell further, or fills in unwanted spaces.

The successive additions along the growing edge of the shell generally leave ridges or marks parallel with it, and these are termed "lines of growth." Deposition of shelly matter does not go on continuously; there are definite rest periods, which are often indicated by a stronger ridge or mark on the shell. The different details of sculpture on the surface of the shell—striae, ribs, spines, etc.—are all products of corresponding irregularities on the mantle margin, and when first formed were situated on the growing edge.

The power of removing, by solvent action, unwanted portions of the shell is possessed by certain Mollusca, especially gastropods.

This removal of material can take place either from the inside or outside of the shell. By this means additional space or living room necessary for an animal grown larger can be excavated from the inside of a shell or made by the removal of partitions.

The lime used for building up the shell is obtained from the food, and where lime is abundant strong heavy shells are generally the rule. Certain areas, however, do not have much lime. That is so in the Channel Islands, and there the larger land shells even resort to the shells of dead individuals to obtain supplies of the necessary material.

Internally, common traits of the Mollusca are the reduction of the body cavity to a space around the heart and the concentration of the principal nerve centres into a ring surrounding the oesophagus.

With the exception of the bivalves, all sections of the Mollusca have a distinctive feeding organ called the radula. Besides this there is one or a pair of horny mandibles or jaws. This mandible is single and placed on the upper side of the mouth in the limpets, some of the sea-slugs, the land and freshwater snails and tusk shells. Two kinds of freshwater snails, *Limnaea* and *Planorbis*, have three mandibles, and the majority of the other gastropods have two lateral plates. Possibly the best-known examples of these mandibles or jaws are the so-called "beaks" of the cuttle-fish and octopus, which strongly resemble a parrot's beak, with the difference, however, that the upper fits into the lower one.

The radula itself consists of a series of recurved teeth formed of a dense chitine, attached to a membrane of the same substance. The teeth are attached in transverse rows, and in the case of the limpets may contain as much as 27 per cent. of hydrous silica or opal. In the rest of the gastropoda the chitine is hardened superficially by deposits containing calcium, iron and phosphoric acid, which together may amount to upwards of 6 per cent. The chitons differ from the other sections by having ferric iron oxide as the most important of the mineral constituents in the radula.

In each transverse row the numbers of teeth may vary from one, as in certain sea-slugs, to 300 or more, as in the top-shells. The number of rows also varies from a few to very many, so that in some types, as the limpets, the radula may be twice as long as the animal.

In all, the teeth in the front tend to become worn through constant use, and to replace them fresh teeth are constantly being formed at the other end, which is kept in a special little pouch under the gullet. The worn-out teeth usually fall out and are lost, but in one tribe they are recovered and retained in a special sac.

The total number of teeth varies according to the type of Mollusc. *Chaetoderma* has one single tooth present, the whelk has about

250, the limpet 2,000, the periwinkle 3,500, the common garden snail (*Helix aspersa*) 15,000, the large grey slug (*Limax maximus*) 26,000; and from here we go through ascending numbers to the genus *Umbraculum*, which is computed to own 750,000.

The shapes of these teeth are so constant that they assist the determination of not only families and genera, but, with few exceptions, that of species also.

The Molluscs have a heart which is well-developed and entirely arterial, and a well-developed nervous system. The gills which aerate the blood have been used as a basis for the classification of the group, and in number they vary from one in the majority of the gastropods to 80 pairs in some of the chitons.

Most forms have eyes, and these are particularly perfect in the higher cuttle-fish. Snails have their eyes elevated on horns at times, and although headless and usually having no eyes, certain forms of the bivalves possess them in the larval stages, and they persist in the adult *Mytilidae* and *Pteria*.

Possibly one of the most interesting of all eye structures is found in the chitons. If the surface of the valves of a chiton be examined with a microscope they will be seen to be studded with minute black specks with convex, perfectly round, shiny tops. It is now known that these black specks are really eyes in the shell, each complete with retina, pigment and lens, and connected by nerves passing right through the shell to the mantle of the animal underneath. Some species of chitons possess many thousands of eyes, arranged in symmetrical patterns. A New Zealand species, *Eudoxochiton nobilis*, has approximately 8,000 of these eyes.

That Mollusca can hear is inferred, owing to the presence of "otocysts," or small cavities filled with fluid in which grains of shelly material float; they seem to be capable of tasting and they certainly can smell.

Certain observations suggest that these animals have a degree of intelligence, or instinct. It is well known that each limpet returns after each grazing excursion to the spot to which it has fitted its shell, and all gardeners know how slugs and snails punctually return to their hiding places after their nightly forays. Even higher intelligence is credited to a Roman snail, *Helix pomatia*, which is cited by Charles Darwin as having made one journey from an ill-stocked garden over the wall to a well-stocked garden, then returned and piloted a weakly companion to the better land.

The classification of the Mollusca presents certain difficulties as to limitation of sections in the group. For the purposes of this discussion I propose to use five main classes, as follows:

1. Amphineura or Chitons.

2. Gastropoda or Snails, including the Pteropoda, Heteropoda and Nudibranchs.
3. Scaphopoda or Tusk Shells.
4. Pelecypoda or Bivalves.
5. Cephalopoda.

Amphineura or Chitons have a body more or less elongate, without a distinct head, but with a definite foot forming the ventral surface.

The animal is symmetrical and generally has a shell consisting of eight plates or valves that either fit over one another, like tiles on a roof, or appear as a row of shelly humps along the animal's back. Placed also in this class are some lesser known molluscs, one genus of which, *Chaetoderma*, lives on the smaller animals contained in the ooze through which it burrows.

Gastropoda or Snails. The shells of this group are essentially a longer or shorter hollow cone. In the limpets it is a simple hollow cone, but in the greater number it is an elongate cone coiled round and round, each coil forming a whorl, the last being the body whorl. The coil may be flat, but most are dextral or coiled to the right hand; some are normally synstral or left-handed, and occasionally reversed individuals are met with. Some of the shells start off as synstral forms and change to dextral as they develop. The axis or columella is sometimes hollow or umbilicated, the hollow itself being the umbilicus. The cavity here is at times filled with callus. The apex or extreme top of the shell is generally different in marking and other features, and this nucleus or protoconch is the portion formed in the egg and is known as the embryonic shell.

The spiral channel formed by the junction of the whorls is termed a suture. A spiral line traced along the whorls midway between the sutures would mark the periphery. The mouth or aperture has sometimes quite a circular margin, when it is said to be entire; more often it is interrupted.

There are frequently notches in the lip to give passage to the siphons of the animal, these notches being the posterior and anterior canals as the case may be. In some forms (*Pleurotoma, Bellerophon, Pleurotomaria,* etc.) there is a slit that gives passage to the siphon; in others, as Haliotis, this slit is reduced to a series of perforations.

The outer lip or labrum is thin and sharp in most juvenile shells and in some adult forms; more frequently in the adult stages it is either thickened, curved outwards (reflected) or curved inwards (inflected), expanded or fringed with spines. When these occur at intervals during the growth of the shell they form, on the whorl, conspicuous markings termed varices.

External spines, etc., that come in the way of the growth of the shell as whorls are added, are often dissolved in some way and removed by the animal.

An unused space in the upper whorls is either infilled or cut off by a wall or septum. A similar partition is found when the apex of the shell becomes worn through, broken by accident, or attacked by boring molluscs, or is broken off as a regular phase of the animal's existence, as in *Rumina decollata*.

Many of the gastropods close the mouth of their shells by a trap-door, or operculum. When the animal is extended this operculum lies on the animal's back, and in many cases forms a sort of pillion, on which the shell rests. The operculum consists of a horny layer sometimes strengthened by shelly matter, which has a structure different from that of the shell. The inner side of the operculum is marked by the scar of the muscle to which it is attached and the outside face exhibits lines of growth. This growth is by additions made to the original point of beginning, and the spiral is dextral in synstral shells and synstral in dextral shells.

Nearly all gastropoda have an operculum in the young stage within the egg; some discard it, but the greater number retain it. Some genera have a perfect fitting operculum; in others it only partially closes the aperture; in others again (e.g., *Strombus*) it is reduced to or converted to a sort of a claw and used to assist the animal's locomotion.

Besides the operculum, many of the gastropods use other means for blocking entrance to the shell. *Clausilia*, a genus of land shells, has a spoon-shaped elastic plate attached to the columella within the shell, and this "clausium" closes automatically behind the occupant as it retires. Another genus, *Thyrophorella*, which inhabits the island of St. Thomas in the Gulf of Guinea, has portion of the peristome hinged and projecting beyond the upper half of the aperture, and this portion is bent down by the retiring animal.

In many gastropods, especially land shells, a series of projecting teeth occur some way back in from the mouth of the shell, and at times these are so long and numerous that it is a matter of wonder how the rightful owner itself gets in and out of the shell.

Scaphopoda or Tusk Shells. The animal is symmetrical, with a rudimentary head and a long cylindrical foot used for burrowing in the mud in which the animal lives. The shell is tubular and open at both ends, with generally a notch in the smaller end on the convex side.

Pelecypoda or Bivalves. The head is rudimentary and there is no radula. The foot in many cases is well developed and serves as a burrowing organ; more rarely it is used for creeping. The organs of the body are enclosed between the two (right and left)

lobes of the mantle, which are in turn covered by the two shelly valves or plates, hence the term bivalves. In a few cases the mantle is extended and reflected over the valves, and in one genus (*Ephippodonta*) actually envelops them. The mantle lobes are attached along the back and extend out to the margins of the valves, and towards the back of the muscular foot is situated the gland for spinning the horny threads, or byssus, by which many species anchor themselves, and the animal generally has the power of rejecting the byssus at any time and spinning a new one.

The animal has a mouth but no jaw. The mouth is flanked on either side by a pair of twin triangular lobes called the labial palps; it is apparently the function of these to collect and possibly taste the food before it passes into the mouth. Each valve is a hollow irregular shallow cone, the apex of which is termed the beak or umbo; this is the point at which growth began, being in point of fact the young shell. This generally differs in shape and markings from the later growth. The umbo is usually curved more or less to one side and generally points toward the head or anterior end. The two valves are generally of equal size and shape and are termed "equivalve," as in cockle shells. Sometimes one valve is smaller than the other, as in oysters, and the valves are then termed "inequivalve."

Bivalves are all more or less "inequilateral"; that is to say, the two halves made by a line drawn from the umbo to the ventral margin will be found to be of different sizes.

When the shell is shut it is said to be "close" if the valves fit accurately, and to "gape" if there are openings left. Near the "umbones" the two valves are united by a chitonous ligament, or sort of "C" spring, which tends to open the valves. The act of closing is effected by two powerful adductor muscles that pass from one valve to the other and are situated at either end of the axis of the body.

To prevent the valves from shifting when closed, a series of projections, or "teeth," are developed near the ligament. These are sometimes numerous and all alike (e.g., as in *Nucula, Arca,* etc.), being then termed "toxodont"; but more usually they are divided into "cardinal" teeth in the centre and "lateral" teeth running with the shell margin, and in this case they are termed "teleodont." The shell margin bearing the ligament and teeth is the "hinge line" and this area is sometimes extended inwards to form a "hinge plate."

Shelly tubes of *Teredo, Brechites, Aspergillum,* etc., scarcely seem to belong to the bivalves, but a careful examination will show the two valves built into the tube in the case of *Brechites* and *Aspergillum,* and the two valves free within the tube in the case of *Teredo.*

In the bivalves, the muscle attachment points are marked by well-defined "muscular scars," and other minor muscles leave scars as well. Running from one "adductor scar" to the other is a shallow groove, the palial line, which marks the attachment of the mantle edge.

Molluscs with long retractile siphons have a "palial sinus" also, this being a well-defined recurvature in the "palial line."

Cephalopoda. These are the most highly organized of the Mollusca, as well as the largest, for certain of the cuttle-fishes are well over 50 feet long, and fragments of one washed up on the north-west coast of Australia some years ago seem to indicate a specimen nearly twice as long. In this class the mouth lies in the centre of the arms and is furnished with a beak. Many of the forms have an ink sac from which a cloud of sepia is extruded in times of danger—the animal makes good its escape by these means. Many of the group have shells, the two better known types being the chambered nautilus and the paper nautilus. The latter, however, is not a true shell but actually an egg-case manufactured by the female animal as a cradle for the eggs.

In the Cephalopods we meet with cartilage for the first time in the group.

The shell resembles that of the gastropods in being a simple conical tube, but it has the difference of an internal structure. As the animal grows it moves forward in the shell, partitions off the space behind, but always remains attached to the apex of the shell by a tube, part shell and part chiton, which is called the "siphuncle." The chambers of the shell during life are filled with air containing more nitrogen than is in normal atmospheric air, thus giving great buoyancy to the shell and permitting the animal to swim rapidly.

The earliest forms of these shells were straight, but through geological time all sorts of means of coiling were tried. The shelly types, once living in their hundreds of different forms, are now restricted to a few species of the closely coiled genus *Nautilus* and one living Dibranchiate form, *Spirula*, in which the uncoiled flat spiral shell is partly internal.

The octopus, cuttle-fish and squid are members of this class and are numerous both in genera and species.

Distribution: The greater number of molluscs live in the sea; and of these the greater number live in the laminarian zones, which is to about 15 fathoms. Certain forms frequent the rocks, others sandy or muddy sea-floors; others spend their whole time on the surface waters of the open sea.

There is a fauna that extends to abyssal depths. The *Challenger* Expedition recorded a chiton from 2,300 fathoms, a gastropod (*Stylifer*) at 2,650, a nudibranch at 2,425, a pelecypod at 2,900, a scaphopod at 2,600, and a cuttle-fish from between 2-3,000

The brackish waters of estuaries and lagoons have their own fauna, and ponds, lakes and rivers show a considerable number of species. On the land, every spot capable of supporting life has its quota of Mollusca, and some spend their whole life below the surface of the ground.

A slug was taken on the Himalayas at 16,400 ft., a land shell (*Vitrina*) extends to 72 degrees in Greenland; a freshwater form (*Limnaea hookeri*) has been taken at 18,000 ft. above sea-level; and a British species is said to extend as far as 73° 30′ North in the Taimyr Peninsula.

Truly, study of the Mollusca can keep anyone interested and busy, and I suggest this science to some of the younger members of this club.

"SAVE THE FORESTS"

In its January news circular, the "Save the Forests" Campaign puts forward the claim of forests in relation to the observance of Australia's national day.

At the anniversary of the foundation of Australia it is natural for those of us who love and appreciate our country to endeavour to form a mind's-eye picture of its appearance in those days.

In such a picture as we might conjure, we would be correct in clothing the area from the eastern seaboard to the western slopes of the Great Dividing Range in a rich and all-enveloping mantle of forest. Historical reports bear this out, and on this point J. W. Audas, in his book *Native Trees of Australia*, says: "Australia as we found it was one of the best endowed lands as regards the amount, variety and usefulness of its native timbers. At the present time it ranks far down the schedule of timber wealth."

The first Australian homes were, therefore, literally carved out of the forest and for 150 years the process went on, each year gathering momentum until only the threat of national suicide called a halt. Control of our forests was eventually established, but much damage had been done.

For a century and a half, the people of Australia have taken copiously of Australia's bounty—her natural resources, her sunshine, blue skies and kindly climate. It should, therefore, be with a spirit of thankfulness for such blessings that we regard Australia Day.

To a great extent, "Australia" and "our forests" are synonymous. To love the one is to love the other. But if the Australian forests are to survive, we must show our love not only in words but in deed. Words are not enough.

Fortunately, our Governments have realized this, and bodies have been created for forest preservation, not only to control indiscriminate felling, but to prevent and combat forest fires, which are the forerunners of the twin evils—wind and water erosion, and the subsequent siltation of our reservoirs, which might be regarded as storehouses of the nation's lifeblood, water.

But legislation can only be effective if it has the co-operation of the citizens, and surely there is no better way of expressing our patriotism and gratitude than by co-operating in any movement, Government or private, which makes forest preservation its aim.

Each one of us has received so much from this great land of ours that the time has come when we should give something back in return.

Human gratitude may prompt this but economic necessity certainly demands it.

BIRDS STEAL HUMAN HAIR

Apparently the Grampians White-eared Honeyeaters make more of a habit of collecting human hair than those in other parts of Victoria. We had a similar experience to that described by Mr. Seaton in the January *Naturalist*, when climbing near Boroniа Peak, Mt. William Range, Grampians, on September 6, 1944.

At least two White-ears, after brief examination of my companion and myself, proceeded in businesslike manner to pull out our hair. One was very persistent, and continued to visit and work on my head while I was stalking Tawny-crowned Honeyeaters—rather distracting, but excellent camouflage, I suppose, for a bird-observer.

Two points about these occurrences: (1) Both the Grampians and the Sydney uplands, where these raids habitually take place, are sandstone areas. (2) Shortage of animal hair is probably not the explanation in the Grampians.

J. L. Provan.

[Although there are isolated records of White-eared Honeyeaters taking human hair in other localities, it is true, as Mr. Provan says, that the chief centres of the practice appear to be the sandstone areas of the Sydney and Grampians regions. The explanation, surely, is that both districts are deficient in the animal hair which this bird appears to regard as essential for the lining of its nest. The deep-seated nature of the bird's attachment to hair is especially manifest in certain parts of northern Sydney. There the White-ears, normally aloof birds, are so persistent in their attentions to human visitors (in springtime) that a specimen often alights on the head of a naturalist who is trying to photograph it on another fellow's head.—Editor.]

EXCURSION TO KOROROIT CREEK

Other nature fixtures over the holiday week-end probably accounted for the reduced attendance (nine members) at the excursion arranged for Kororoit Creek, Seaholme, on January 25th last. The locality can always be relied upon to produce some good example of marine bird-life. This visit members were unexpectedly introduced to the Sea Curlew. Five of these stately birds were first sighted in the beach shallows, their long curved beaks sharply defined against the smooth water as they fed. Nearer the mouth of the creek another ten birds were seen in the distance, but these were very shy. On closer approach they flew off, uttering their double alarm notes. Afterwards, the first company were still to be seen in the vicinity of the feeding-area. With numbers of Pacific and Silver Gulls, they rested, facing the gentle breeze, on a sandy spit a little distance out. Under these favourable conditions, most of the members present were able to see the birds for the first time.

First discovered last spring not far from the mangrove area by Botany Group members, a solitary plant of the Showy Cassinia (*Cassinia spectabilis*) was on this occasion found to be in flower.

H. C. E. Stewart.

NARDOO IN THE METROPOLITAN AREA

Members of the Botany Group were interested to see this clover-like, mud-loving fern (*Marsilia Drummondii*) during an excursion to the Yarra lagoons at Burke Road Bridge, Kew (Feb. 8). Baron von Mueller had found it on the Yarra in the early 'fifties, though it has been seldom, if ever, collected since. Little River and Bacchus Marsh are probably the next nearest occurrences to Melbourne.

FINANCES OF THE F.N.C.V.

I feel it is my duty, as Honorary Secretary of this society, to state reasons which have influenced the committee in endorsing the action of Mr. Ivo Hammet, who, at the February general meeting, gave notice of motion regarding an increase in subscriptions. The proposal is for an increase as from May 1st, 1947, of 25% in the annual subscription of Ordinary and Country Members and of 50% in the price of the *Naturalist*.

It may be remembered that at the general meeting in July, 1946, Mr. A. S. Chalk, speaking as one of the Hon. Auditors, drew attention to the insecure state of the Club's finances. He made special reference to the high cost of production and distribution of the *Naturalist* and recommended that steps should be taken to rectify the position.

The present committee *has* considered this matter and with much reluctance has come to the conclusion that the least detrimental step would be to increase the charge for the *Naturalist*, so that it should be self-supporting.

Study of the statement of receipts and expenditure (*Vic. Nat.*, August, 1946) shows that the Club is run very economically, the working costs (excluding the charge of £325/11/5 associated with the journal) being £85/11/10 for that year.

It will also be seen that the Club's revenue from subscriptions amounted to £332/19/5, which included £41/1/6 for advance subscriptions, without which the revenue would have been £297/17/11, leaving £27/13/6 to be acquired from other sources to finance the publication of the journal.

We now have an ordinary membership of rather more than 400 and a country membership of about 150, but this increased membership does not help to ease the position. This is because costs associated with the journal have risen sharply from £27 per issue in the 1945/46 period to more than £36 per issue in the present year—roughly 33⅓%.

At the present rate of subscription, and even with our present larger membership, the revenue will not meet the expenditure—we can expect a deficit which will have to be met from other sources.

Members should not (and doubtless do not) expect the Club's activities to be financed from any profits which may arise from such functions as Nature Exhibitions—profits which result only from the labours of relatively few members, who, of course, do such work as a labour of love.

The Club, if it is to function as it should, must be backed by a substantial fund of fluid assets. Such a fund is needed if the Club is to sponsor such publications as the Census and the several Natural History booklets which have appeared in the past. Moreover, the fund is needed if the Club is ever to put into effect its long-cherished hope of establishing its own club-rooms. This hope will remain little more than a hope if the Club cannot do better than accumulate in its long life of more than 60 years a sum of £1000—£16 per year.

This, of course, is relevant to the motion only inasmuch as it indicates that the F.N.C.V. should at least take steps to preserve the continuity of one of its most important functions—the *Victorian Naturalist*.

J. Ros Gamlet.

ASTRONOMER ROYAL VISITS MELBOURNE

The University lecture room was packed beyond capacity on the evening of February 26, when Sir Harold Spencer Jones delivered a public address on the possibilities of extra-terrestrial life. Sir Harold is the tenth Astronomer Royal (dating from 1675), and it is hoped that his brilliant discourse will be published in some Australian journal for the benefit of all naturalists.

CENTRAL AUSTRALIAN ABORIGINES AND ROCKET BOMB TESTS

In common with Anthropological Societies in the various States, and other movements interested in the preservation of the primitive culture of Australian aborigines, the F.N.C.V. has been, and still is, gravely concerned with the implications of the proposed "guided missile" range to be situated in the Centre. A statement by the Minister for Defence (Mr. Dedman) in Parliament on November 22 last revealed, *inter alia*, that the firing point of the range will be in the vicinity of Mt. Eba (South Australia), between the Transcontinental and North-South railways. The direction of the centre line of the range is such that, if prolonged, it would pass roughly midway between Broome and Port Hedland in W.A. The initial step is to build a short range of about 300 miles, designed to be capable of extension at a later date, and to reserve the necessary area. This means that the range, at first, will not affect the Central Australian aboriginal reserve.

The Minister referred to the aborigines, and gave assurance that everything possible would be done to safeguard the natives from contact, or encroachment, on any area of special significance to them. He said instructions had been given that the Australian Rocket Bomb Committee is to consult with the Director of Native Affairs and other bodies concerned in aboriginal welfare, and to report on the measures necessary to ensure their safety.

However, the possibility was mentioned of the range being extended to a limited number of observation posts along the line of fire, and with past experience in retrospect, many anthropological minds continue to feel disturbed over the infiltration of white man's ways that will inevitably follow in the wake of rocket range development. From the Canberra reports, no exhaustive search by the Commonwealth authorities seems to have been made for alternative routes for the tests. Further, the Reserve was originally created in consultation with informed anthropological opinion as the best means of preserving the remnant of unspoilt Australian natives in their primitive condition. To take the range through the area, *violates* such reservation. This aspect does not appear to be fully realized by our Parliamentary representatives.

To protest against the route proposed, a public meeting is fixed for Monday, 31st March next, in the Melbourne Town Hall, at 8 p.m. Dr. Duguid, of Adelaide, is one of the sponsors of this meeting, and with kindred societies, F.N.C.V. has been officially invited to co-operate. Members are asked to attend in force, to urge that the natives' territorial rights be respected and their claims brought more prominently against the policy of setting up the range.

—H.C.E.S.

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PROCEEDINGS

The monthly meeting of the Club was held on March 10, 1947, at the Lecture Hall, Melbourne Public Library. The President, Mr. F. S. Colliver, and about 200 members and friends attended.

The following were elected as Ordinary Members of the Club: Misses W. Waddell, I. D. Dike, L. Fraser and Lucy E. Rixon, Mrs. A. Binns, Messrs. T. H. Sarovich, F. J. May, E. Prohasky, Peter Price and Chas. Metcalfe; as Country Members: Messrs. C. Southee, T. H. Banfield, F. W. Sadlier and G. H. Fetherston; and as Associate Member: Master Ian Webster.

A Special General Meeting preceded the Ordinary Meeting to consider the notice of motion given at last general meeting by Mr. Ivo C. Hammet, viz., a proposal for increasing subscriptions. This was formally moved by Mr. Hammet, seconded by Mr Chalk and discussed at some length; an amendment was carried, referring the matter back to Committee for further consideration.

NATURE NOTES

Mr. T. S. Hart gave a note on the Hyacinth Orchid, stating that the new season's growth is normally from lateral buds near the base of the old stem. Two, or even three, such buds may occur providing for increasing number of stems. Flower spikes should always be cut sharply as, if pulled, next season's bud may come away.

Mr. A. A. Brunton asked if any member had noted echidnas in the district about 20 miles north of Shepparton.

BOTANY OF THE BOGONGS

In the course of a half-hour lecturette, Mr. J. H. Willis gave a physiographic outline of the Bogong High Plains—largest single area of alpine moorland on the Australian continent, and the most elevated land in our State. The vegetation was shown to be a reflection of the rigorous climate and, to a lesser degree, of the geology; basalt areas differ slightly from the schistose and granitic parts. Of 275 vascular plants now known to occur within the 180-odd square miles of the Bogong Alps (i.e. between Mts. Bogong, Nelson, Cope, Feathertop and Fainter, and above the lower alpine limit of 4,500 feet), 97—or almost 2/5ths—are found *only* in alpine terrain. Introduced weeds number less than a score, with Sheep Sorrel as the most conspicuous and abundant species.

The botanical unveiling of Bogong district was traced, from Baron von Mueller's first ascent of these great mountains in December, 1854, to the present day. With Mueller, two other figures are pre-eminent in the elucidation of the flora; viz., Messrs. J. Stirling (1879-'83) and A. J. Tadgell (1922-'26). To Mr. Tadgell, in particular, we are indebted for a very comprehensive tabulation of Bogong plants, based upon his own extensive researches and all previous recordings (see *Vic. Nat.*, August, 1924).

Experimental work now being undertaken by a University research team (of which Mr. Willis is consulting botanist), under the auspices of the Soil Conservation Board and S.E.C., was explained briefly, and the lecturer drew attention to several uncommon and beautiful plants that he had been able to examine while in the Bogong region last January, e.g., massed white star-flowers of *Coltha introloba* against melting snowdrifts, *Pultenea capitellata* in moss beds along Wild-horse Creek, "peach-jam-scented" cushions of *Scleranthus diander* on Mt. Feathertop, and the very rare fern *Cystopteris fragilis* on a Mt. Bogong cascade. Several examples of "Red Starfish Fungus" (*Aseroë rubra*) were found and evoked especial interest, while "Reindeer Moss" (*Cladonia rangiferina*) was located on Basalt Hill—apparently for the first time in Australia.

EXHIBITS

Mr. E. Muir (Dimboola): Nardoo (*Marsilia Drummondii*) from Tarrangingie, N.-W. Vic.

Mr. A. A. Baker: Photographs of the Mitchell Gorge.

Mr. A. N. Carter: Land shells from Cuba, West Indies (*Pleurodonta sageinon* P. & R.; *Polymita iolimbata* Gut; *P. riosecu*; *Liguus blandanus* Pils; *L. fasciatus varidis* Clench).

Mr. T. S. Hart "Centipede Plant" (or "Flat-stem Lignum"), *Homalocladium platycladium*, from New Caledonia, showing unusual development of leaves on the typically bare flattened stems.

Mr. J. S. Seaton: *Beaufortia sparsa* from Western Australia.

Mr. F. S. Colliver: Fossil remains of soft-bodied crabs (*Callianassa*) and their supposed burrows.

EXCURSION TO MOOROOLBARK

Not many species of plants were seen in flower on Feb. 22, the most abundant being the "Wiry Buttons" (*Leptorrhynchus tenuifolius*) which continues well through the summer. Chief interest was in the eucalypts. Examples were seen of Candlebark (*E. rubida*) and Yellow Box (*E. melliodora*) of much larger size than the general run of trees remaining, but these were evidently individuals unsuitable for splitting. The change of foliage in young Candlebark was seen. She-oaks with attractive small growth also came in for some attention.

Those who returned by direct road to the station could scarcely have missed the introduced Oxtongue (*Picris echioides*) and the parsnips run wild. Few fruits remained on the *Exocarpus*. A bush-like *Coprosma Billardieri* was seen, also without fruit. (By a slip, *C. hirtella* was given as the name, but it is not there.)—T.S.H.

THE CHARMING FLITTERMOUSE

By EDITH COLEMAN, Blackburn, Vic.

At Sorrento in November 1946 my daughter and I watched 13 bats emerge from between the verandah roof of shingles and its covering roof of corrugated iron. At 20 to 8 p.m. (Nov. 11) and 10 to 8 p.m. (Nov. 12) they scrambled through a very small opening, dropped a foot or two to clear the verandah roof, then rose, to sail off on their evening "air-raids". I have always loved these little elfin creatures and was delighted to see so many of them. Incidentally, why do we not use the pretty names "Flittermouse" and "Pipistrelle"?

Writing from Sorrento in January 1947 my daughter told me that they were still there and could be seen hanging upside down, having come nearer to the opening during the hot days. They were heard calling and scrambling as they changed position. She described their tiny squeaks as resembling the blue-wren's twitter, but higher in pitch and uttered more quickly, quite different from their shrill, high-pitched evening calls which so few people are able to catch.

Just before dusk they were clearly heard calling from the rafters. With a lighted candle my daughter watched one little fellow yelling "blue-murder" in bat language:

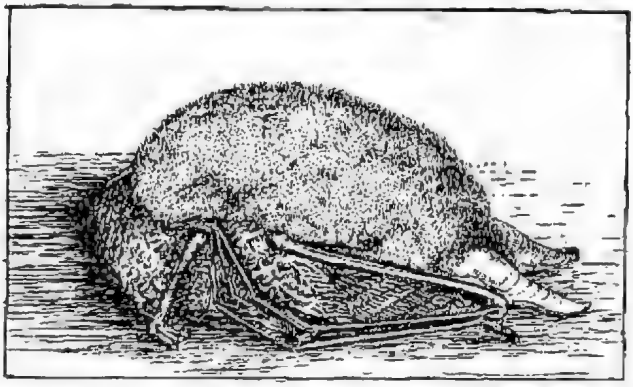
> His little face was lovely to watch; the pink lips moved and his mouth made an 'O' as he screamed, looking at me all the time. Then I put my hands over him. He didn't seem to mind, and crawled over them and up my arm. It felt so nice! After sketching him, I let the little dark angel go. In the daytime the ears are crumpled, but when the bats wake up they open like wings. They have a tiny horse-shoe over the nose. The membrane between the hind legs is 'smocked' and looks like a skirt. On hot days there is much scuffling and blue-wren twitter. At any time of the day, whenever I look, I can see a dusky arm or an ear between the rafters.

On February 8 a tiny baby bat was found on a rustic table just beneath their opening. It must have fallen from the mother, or perhaps had been scraped off as she clambered through the narrow exit for her one crowded hour.

One bat flew into a bedroom and crouched on the floor. Several times it rose as high as the bed, but fell back, perforce. This raises again a question I asked a year or two ago. It is a common belief that bats *cannot* fly unless they first drop from a height.

In Algernon Blackwood's beautiful fantasy, "Jimbo", we read: "You see, we're like the bats and cannot rise from the earth. We can only fly by dropping from a height." Paley, writing in 1802, held the same view, doubtless borrowed from the naturalists of his day. Discussing the bat's hooked thumb as a contrivance compensating for the decrepitude of its legs and feet, he says: "Without this hook the bat is the most helpless of animals. She can neither run nor raise herself from the ground. These inabilities

are made up to her by the contrivance on her wing. She remains suspended by this claw and takes flight from it." Bewick, writing in 1820, says of the bat: "It raises itself from the ground with difficulty." The Sorrento bat was able to rise as high as the bed. It may possibly have risen higher had it met no obstacle.



While the artist worked Flittermouse grew sleepy. His head fell, like that of a tired child; but he did not fold his ears, so she knew that he was still alert.

I well remember an instance of a bat's rising from the earth. I had found it clinging to a sack in the shed. It did not move as I carried it outside. Sack and bat were laid on the ground and were lightly covered with another sack, so that the children might see it after school. When I began very carefully to uncover the bat, an old man in the garden told me I needn't be so careful: "It *can't* fly from the ground." The words were scarcely out of his mouth when my bat *did* "rise from the earth", and sailed away before the children could get a close look at it.

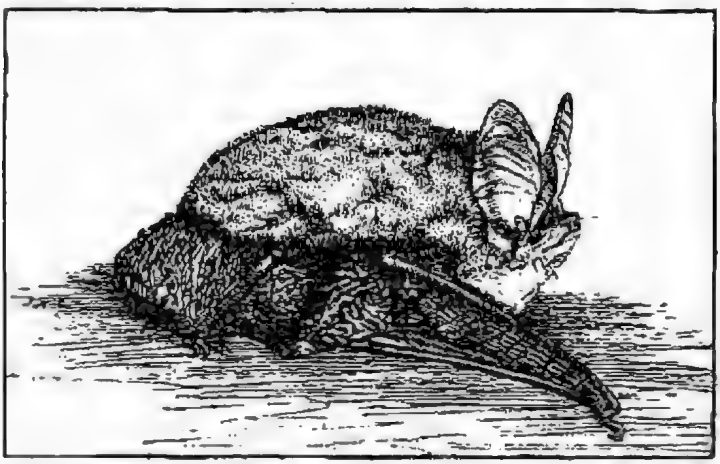
The legs are not muscular enough for the bat to use them very efficiently as a spring in leaping from the ground. Seeing it suspended upside down with closely folded wings one wonders whether a drop may be necessary to unfold fully the flying membrane, as in the case of a parachute. The wings are almost horizontal, not raised above the body, the weight of which would carry it down until air pressure against the membrane counteracts the force of gravity.

It is said that bats are not so numerous as formerly. The reason may not be far to seek. In the roof of another week-end cottage at Sorrento were many bats. The owner told us that he "got rid" of them by hitting them down as they emerged at dusk. This suggests that a wider knowledge of bats and their usefulness is much needed.

According to Professor Wood-Jones, bats are the most wonder-

ful of mammals, but of our Australian species next to nothing is known. Little can be recorded of the life histories of even our commonest species. Here is not only a fascinating field for naturalists but an opportunity to dispel much harmful ignorance and superstition regarding them. In America their usefulness is fully recognized and bat-roosts are provided—saving two birds, as it were, with one stone, for the droppings are one of the finest manures. In Biblical times the bat was classed among "fowls that creep, going upon all fours", an "abomination" not to be eaten. (*Levit.* XI: 19-20.) In Hebrew the word fowl is literally "winged" and is as applicable to a bat as to any bird. Doubtless this Scriptural indictment has clung to the poor little Flittermouse all down the centuries. For this it has suffered cruelly. It has suffered, too, for the sins of its fruit-eating and blood-sucking cousins. The Harpies of the ancients were probably attributable to a hatred of bats.

Shakespeare and Middleton use the poor bat for their witches' cauldron. Bewick, whose pencil was so ready to depict beauty in bird or beast, describes the appearance of the Pipistrelle as "the least disgusting of bats." He records the slaughter in 1808 of 280



Walking or scrambling attitude of Flittermouse. Sometimes he lifted his head to show his gnome-like face.

of these elfin creatures in an ancient mansion belonging to Sir Hugh Owen. Many of the females had two young attached to them. How many injurious moths and other insect-pests multiplied as a result of that slaughter of the innocents!

Could we not do something to save the little Flittermouse? A changed attitude might so easily be developed in our schools. Old superstitions should be relentlessly attacked, and the bat

should be accorded the respect its position in zoology demands.

The older naturalists classed it with birds, a sinister bird, a bird of ill-omen. Linnaeus placed it in the Order Primates, with man! It was later given an Order of its own, *Chiroptera* (hand-winged), a high Order placed next to the Primates in zoological precedence. Few people have fully appreciated the temerity of Linnaeus in classing the little winged "mouse" with man. A glance at the illustration of the bony structure on which its delicate flying membrane is stretched shows some reason for the high status accorded him.

Like those of man, the bats' fore-limbs have humerus, radius, elbow and a five-fingered hand. Its hind-limbs, again like those of man, have femur, tibia and a five-toed foot. Moreover, the female has two teats, not on her lower abdomen, as is usual in most mammals, but on her breast. When suspended by her hooked thumbs she enfolds her little ones in her soft wings as in a shawl, tenderly as any human mother. Its closeness to man would seem to be further emphasized by the modern employment of the bat for experimental work on malaria. The reactions achieved are said to be closely akin to the form of malaria developed in man.

In old *materia medica* we find frequent reference to the bat as a remedy for various human ills. John of Gaddesden, Court Physician under Edward III and a great authority in his day, treated the spleen with a remedy compounded of 7 fat bats' heads. These medical uses led to more suffering and slaughter. Why were bats carved on the folding miserere seats in some churches?

W. H. Hudson described the bat's wing as the most sensitive thing in nature, the antennae of insects only excepted:

> A bed and field of nerves, so closely placed as to give the membrane the appearance of the finest, softest shot silk. The brains of the creature, as it were, are as if spread out in its wings, and so exquisite is the sensitiveness of these parts that, in comparison, our finger-tips are no more quick of feeling than the thick tough hide of some lumbering pachyderm.

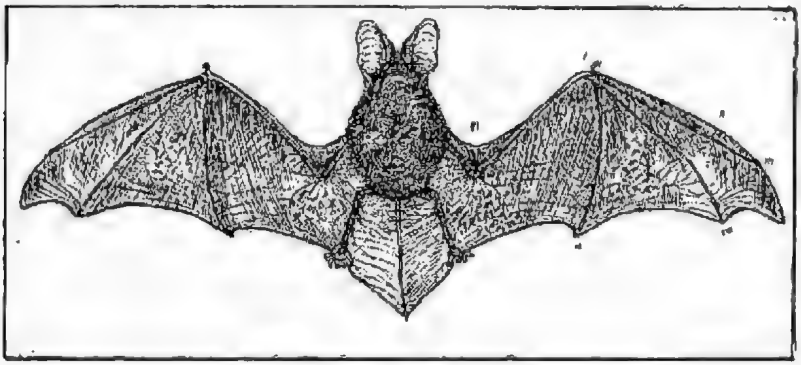
Surely the study of such soft furry creatures should appeal to women, with their innate love of silks and furs. One would like to stress the need for gentleness in handling these little allies, so valiant in their quest of food, so timid in the hand. To quote W. H. Hudson again: "I have never held one in my hand without being struck by the shrinking shivering motion, the tremors that passed over it, like wave following wave; and it has seemed to me that the touch of a soft finger-tip on the wing was to the bat like the blow of a cheese or bread-grater on his naked body to a man."

It was a great satisfaction to read Ellis Troughton's plea on behalf of the "little bats" (*Furred Animals of Australia*):

> To kill, far worse to injure, such marvellously modified little mammals because of unreasoning fear of evil or damage is a positive crime against

nature. In Australia the various 'little bats' are of the greatest possible service to man . . Of 50 or more species of bats only 4 flying-foxes are serious pests, while over 40 species of 'little bats' are allies of man, taking the night watches in the battle of insectivorous birds against insect enemies of mankind.

These words should surely appeal to the average schoolboy's love of fair play. If space could be found for them in the School Paper, say once a year, they should bear good fruit.



A Flittermouse in flight:
Geoffroy's Long-eared Bat (*Nyctophilus geoffroyi*).

KEY TO ILLUSTRATION

Beneath the furry body are hind-limbs and tail, all attached to that part of the flying-membrane which forms a pouch when curved under the body. On each side is a great winged hand which supports most of the flying membrane, and which gave the name to the Order (*Chiroptera*, meaning hand-wing).

I: the small hooked thumb at the wrist.
II, III, IV and V: very long fingers.
VI: the bend in the elbow.

From body to elbow is the *humerus*, and from elbow to wrist the *radius*; long bone of the leg is the *tibia*, while short bone of the leg is the *femur*—all of which follow exactly the bones of our own limbs.

LOAN OF *NATURALIST* BLOCKS

All blocks used in illustrating the *Victorian Naturalist* are the property of the Club (unless responsibility for the cost of their preparation has been guaranteed to the Committee by respective authors of articles before publication).

The Committee is concerned at the many gaps among the stock on hand at our Club's library, and urges any member having blocks on loan, or knowing of their whereabouts, to take immediate steps for the return of these to the Hon. Librarian.

Committee has ruled that anyone desiring to obtain blocks on loan, for printing purposes, shall first produce the written consent of the artist or photographer (if living) and then pay the Club a hire fee—10/- for half-tone and line drawings, and £2/2/- for colour blocks,—excepting loans to the artists or photographers themselves, to kindred societies and to non-profit projects, which shall be at the discretion of the Committee.

NEW BEES AND WASPS—Part IV

A New Cerceris Wasp, and some Small Chrysomelid Beetles

By TARLTON RAYMENT, Melbourne

Superfamily: SPHECOIDES; Family: PHILANTHIDÆ.

CERCERIS ZIEGLERI, sp. nov.

TYPE: Female—Length, 11 mm. approx. Black and yellow; entirely coarsely punctured.

Head large, transverse; black; sub-quadrate; lateral face-marks large, lemon-yellow, semi-circular; frons rising to a sharply defined carina; clypeus lemon-yellow, a large mark laterally, a few stiff silvery hairs; supraclypeal area with a short yellow line; vertex broadly-rounded, black, coarsely rugoso-punctate, a small spot of yellow laterally; compound eyes large, claret-brown; genae large, with a median yellow mark, coarsely punctured; labrum blackish-brown; mandibulae simple, yellow, black apically; antennae clear ferruginous beneath, scape black.

Prothorax large and black; coarsely rugoso-punctate; tubercles black; pleura black, coarsely rugoso-punctate. *Mesothorax* and scutellum longitudinally-coarsely rugoso-punctate, shining, black; postscutellum black, finely punctured; metathorax black, an area like an equilateral triangle enclosing fine radiating rugae, outside of the area coarsely rugoso-punctate; abdominal dorsal segments black, coarsely punctured, a few stiff silvery hairs; No. 1 with a large yellow mark laterally shading to red; 3-4 with hind margins broadly yellow; 6 with a broad oval bare plate; ventral segments black, a few stiff silvery hairs on margin; a mark of yellowish colour on sternites 1 and 5.

Legs reddish-yellow; coxae, trochanters and femora basally black; tarsi reddish-yellow; anterior pair with coarse "earth-rakes"; claws reddish; hind calcar finely serrated, reddish; tegulae polished, reddish shaded yellow. *Wings* dusky, especially in the large radial cell; nervures blackish-brown, strong; cells—the second cubital small, the intercubitus nervures uniting at the apex, the recurrent meeting at the middle of the base, pterostigma large and dark-brown, hamuli about fourteen but not strongly developed.

ALLOTYPE: Male—Length, 8 mm. approx. Superficially like the female.

Face entirely yellow, with a few stiff silvery hairs; frons excessively constricted, with the yellow carina of the female; clypeus with beautiful dense lateral fringes of golden hair on the anterior margin; mandibulae golden-yellow, black apically; antennae brighter ferruginous beneath, black scapes with a yellow dot.

Prothorax with two large yellow marks laterally; tubercles yellow. *Mesothorax*, scutellum and postscutellum similar to

female, but area of the metathorax not so defined. The propodeum black, and coarsely punctured (developed to a distinct cylindrical segment in both sexes). The apical plate coarsely punctured in the male. Ventral segments shining, coarsely punctured, with golden hind margins.

Locality—Emerald, Victoria (alt. 1,100 feet), Jan. and Feb., 1938, T. Rayment.

TYPE in the collection of the author.

Allies: *C. froggatti* R. Turn., which is larger, 18 mm., and of similar colouring.

The species is dedicated to John Ziegler, in appreciation of his hospitality and assistance during the study of these remarkable wasps. It had been intended by the author to append this paper to his *Notes on the Biology of Exoneura* (see *Vict. Nat.*, Vol. 62, p. 178—first par.), but, as material for two further papers on undescribed *Exoneura* species came along, he deemed it advisable first to have these published as a series.

Locality Notes

The Emerald district (Dandenong ranges) is 37 miles east of Melbourne, at an elevation of 1,100 feet, which is the highest point on the Gembrook narrow-gauge railway. The soil of the hills is a deep, rich-red loam of volcanic origin; in it are cultivated peas, beans, potatoes, strawberries and raspberries for the metropolitan market. The rainfall is heavy, and the temperatures mild, although snow is not unknown during winter months.

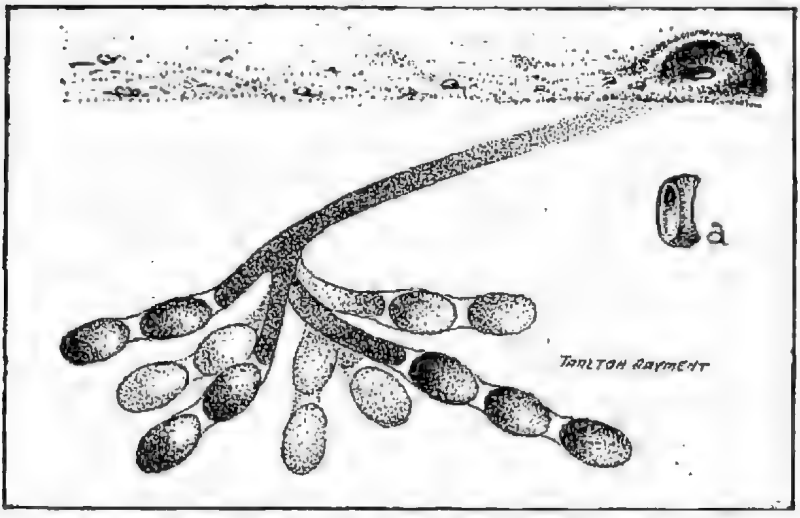
Apart from the main highway, the roads through the hills are often formed merely of the native soil, which consolidates under heavy traffic so thoroughly that plant-life cannot succeed, and, although in winter the hard crust softens into greasy red mud, yet it drains rapidly and the hard surface soon reappears in spring. The original forest of eucalypts was very dense, but has now been almost superseded by introduced plants, and the hilly landscape is no longer Australian in aspect.

Architecture of the "Nesting" Shafts of Cerceris ziegleri

During January, 1938, my attention was drawn by John Ziegler, who has a house in the hills, to a number of small semi-circular "hoods" erected over the entrances to shafts in a bare roadway. Actual count revealed 57 shafts in an area of six feet square, so that the colony is an extensive one. The "hoods" all faced N.N.E., and are about half an inch in height, on a semi-circular base averaging three-quarters of an inch in diameter. Every opening revealed a round shaft going down at a low angle, and having a diameter of three-sixteenths of an inch. In no case was the deepest cell below nine inches.

Careful excavation showed the shaft sloping down at an angle of 35 degrees, for about six inches, when it branched radially. The radiating galleries at the base contained a pair of cells in five,

but, in one case, the sixth contained three cells, each being half an inch in length at the long axis. The pairs were all separated by concave earthen plugs slightly less than one quarter of an inch in thickness. This "twin" arrangement of cells is so unusual among the *Hymenoptera* that the author searched the available literature for a similar construction, but the only record is the "nest" of an unknown species figured by Phil and Nellie Rau. Although these observers give only the figure of the twin-structure, without any other details, yet they describe the habits of many Cerceris wasps, and the remarkable twin-cells may have been the work of a species in this genus.

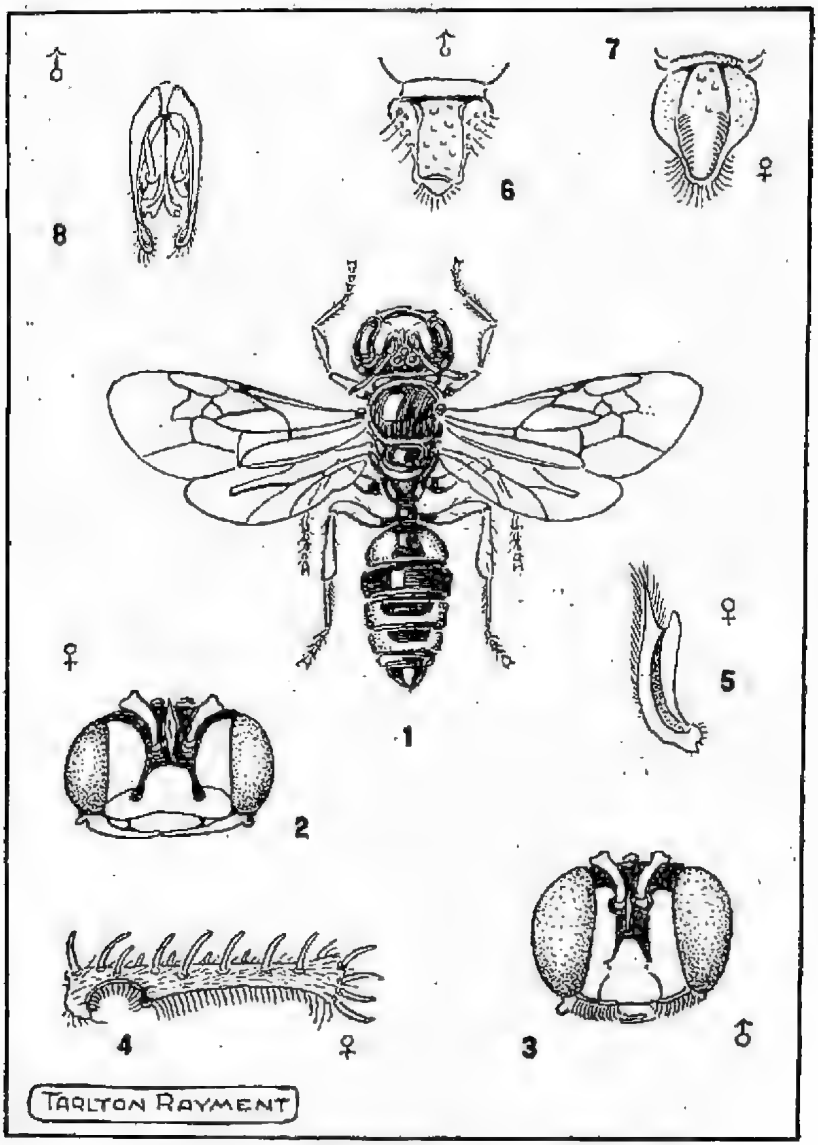


"Nesting" galleries of *Cerceris ziegleri*, with shaft and "hood" over entrance. Fig. a—a bi-concave cell plug.

Larval Food

The cocoons were of silken thread, in which were incorporated traces of the red soil, and the dry elytra of many tiny beetles. Although only fragmentary remains are available for study, it is quite certain that the larvæ were fed on Chrysomelid beetles, identified by F. E. Wilson as *Edusa perplexa*, which is often seen swarming on plants of the Bidgee-widgee (*Acæna anserinifolia*); there were, in addition, elytra of two other species in the same genus. The beetles are less than one-eighth inch in length, and some exhibit the purplish-green iridescence of this family. Although it is difficult to be precise, yet it would appear that from 40 to 60 beetles are given to each larva.

The author was unable to ascertain whether or not the prey was merely paralysed by the foraging mother, or killed outright,



Cerceris siegleri (new species). Key on page 260.

before being placed in the cell; it would certainly seem that the beetles are killed outright, because such a number would surely take a day or two to collect, and the food is consumed as it is brought home. However, it is well known that fresh meat is favoured by other wasps for the feeding of the young. Moreover, there is no evidence that the full quota of beetles is placed in the cell before the egg is deposited, and the cell closed with an earthen plug.

Behaviour of the Individual

On extremely hot days, the wasps were observed bringing up the spoil from below, and, because of the tough nature of the ground, the pellets cohere easily. Since they are not cast away at a distance, after the manner of *Sphex* and *Bembex*, a hood is soon built up. Whether or not this protection is intended to act as a bad weather cowl cannot be ascertained, but it is clear that, since the heavy rains come from the south and the south-west, the north-east orientation most assuredly prevents the copious moisture from driving into a sloping shaft.

There is a strong flight of departing and homing females, and copulation of the sexes takes place close to the site of the colony soon after the females emerge from their natal cells. The author has some slight evidence that the deepest cells contain females, the others males. No eggs were discovered so early, for they are not deposited until towards the end of January.

When winter comes, only slight patches of the greyish subsoil mark the site of the "weather-hoods" of the industrious summer colony. Many specimens were collected on the wing, with a net, and others were taken from the interior of the shafts. The series was examined later by microscope, and the insects were determined as a species new to science.

KEY TO FIGURES

1. Adult male *Cerceris ziegleri*, sp. nov.
2. Head of female tipped back to show mandibles
3. Front of head-capsule of male.
4. Earth-rake on the front basitarsis.
5. Strigil or antennal-cleaner on the anterior leg.
6. Apical segment of male abdomen.
7. Apical segment of female abdomen.
8. Genitalia of the male.

A TAME LIZARD

In a Bayswater nursery we watched a small lizard wait quietly while the owner foraged among some flowerpots, a few yards away, for slugs. These he tossed to the lizard. Some were expertly caught in its open mouth. Others it picked up from the ground.—E.C.

MOUNT BECKWITH GRANITES AND SOME FELSPAR CRYSTALS

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

Mount Beckwith, or Beckworth, one of the "Little Mountains" of Mr. E. M. Webb's article (*Vic. Nat.*, September, 1943) lies a few miles west of Clunes. The shorter spelling appears on Major Mitchell's map in the *Three Expeditions* (Boone, publisher, 1838), but there is no explanation at this point of the narrative. The other spelling has long been in official use, at least as early as 1863.

As mentioned by Mr. Webb, the mount is granitic, not one of the numerous volcanic hills of this district. Apart from several minor variations, there are, in particular, a moderately coarse-grained rock with large felspars and a fine-textured very hard granite, strongly resistant to weathering. The coarser rock usually weathers rather easily, yet on bare exposed surfaces where the rock shells off under the wide change of temperature, the felspars are found to be fairly fresh and catch the light on their smoother surfaces, the dulling by chemical change being less than usual.

The hump which forms the actual summit of the mount consists of the coarser rock, traversed by bands of the resistant type—an arrangement which allows prominence as a whole with rather smooth outlines. The granitic rocks being deep-seated in origin are only exposed at all by long-continued denudation, and the details of their outlines are due to continued, more or less varying, wear under atmospheric agencies.

Mt. Bolton to the south is in the same granitic mass, but shows a more irregular profile. The harder rock is there, and no doubt contributes to the peaks.

A knoll of this close-textured rock occurs at the Learmonth Cemetery, actually on the Main Divide though much lower than Beckwith and Bolton. The Main Divide here is a water-parting formed by the coalescence of the lower slopes of a number of volcanic hills, separating the waters going to the Loddon from those going *via* Burrumbeet to the Hopkins.

Farther south, the granitic series is mostly concealed under the much newer volcanic rocks, but an explosive centre near the north-west part of Lake Burrumbeet has thrown out much granitic material, some in blocks of several tons. This is not sorted by weathering and remains reasonably fresh in the tuff cliffs and on the beach. (See *Vic. Nat.*, XVII, p. 160, 1901).

The Felspar Crystals

At places in these rocks there occur good specimens of felspar with the usual characters of orthoclase, a potash-alumina-silicate.

In the knoll of fine granite at Learmonth, crystal nests are frequent, quartz and felspar crystals projecting into the gas cavities. The crystals are usually not large, but the rock is very hard and good specimens are not easily obtained.

Not far away, near Addington School, a small watercourse has cut through the volcanic layers, just exposing granitic material. Here was found a fine example of an orthoclase crystal, practically a text-book figure. "Fine example" does not imply crystal clear nor necessarily large, but one which shows unusually well the typical features of the orthoclase Crystal, the word "crystal" being technically used for the more or less symmetrical shapes which most minerals and many other substances assume under suitable conditions.

These shapes are an expression of the symmetry of the minute structure of the mineral and this symmetrical structure is found even when the crystal outlines do not appear. Exact tests are made by optical and other methods outside the scope of this note, which refers to characters visible in the field and in hand samples without special preparation.

In many minerals this minute structure produces a property of repeated splitting in certain definite directions always related to the crystal shapes.

This is known as cleavage and is present even when crystal outlines are not seen, so that it is a most useful feature for identification of minerals. It differs in different minerals. The orthoclase cleavage is in two directions at right angles to one another, hence the name orthoclase.

This cleavage is a different character from the cleavage of slaty rocks, though a cleavable mineral may contribute to a type of fissility in some rocks.

The Addington crystal is enclosed by four sets of faces, each set including similar faces which must occur together to keep the characteristic symmetry of the mineral. In this particular case also the faces parallel to the cleavage are smoother and brighter than the others.

Each such set constitutes a crystallographic "form", a technical term differing from shape. The actual outline of a crystal is usually made by more than one "form".

At Burrumbeet the large felspars are welded into the granite and outlines are not clear, but the cleavage is excellently displayed. Orthoclase in granite is usually in "twin crystals" made up of two parts definitely situated with regard to one another. In the most frequent type one of the two cleavage directions usually present in orthoclase agrees in the two parts of the twin crystals, but the position of the second part turns the other cleavage away, though still keeping its proper orthoclase position in its own part. A haphazard blow will often break the rock along the cleavage of one half of the twin crystal and continue across the cleavage of the other, giving a seemingly irregular fracture, which on closer examination often shows a succession of minute steps following the cleavage of this part.

North-west of Mt. Beckwith there occurs a series of dykes (wall-like masses of igneous rocks) often showing larger individuals of quartz and felspar in a finer ground. A block of one of these near Stony Creek had weathered in such a way that the felspars separated readily, firm and showing good outlines, though dulled by chemical change in weathering—again, good typical shapes, though differing from the Addington crystal. These in the dyke were twin crystals, often in flat shapes from one pair of faces, being relatively large. Others were of nearly square outline with small faces making oblique ends in accordance with the orthoclase symmetry.

These dykes are shown on Norman Taylor's map of Clunes and Talbot on which there is a hill called locally "Granite Hill", not really granite but a much rarer rock provisionally called syenite, pending more modern examination. This hill is quite distinct from the granitic hill near where Mitchell crossed the Main Divide.

SUBMERGED BATHING BY HONEYEATER

I was interested to read in the December (1946) *Naturalist* W. Perry's notes referring to the submerged bathing habit of the white-plumed honeyeater. Although I have not observed this habit in the white-plumed species, I have seen both yellow-faced honeyeaters (*Meliphaga chrysops*) and spinebills (*Acanthorhynchus tenuirostris*) doing the same thing in both Sydney and Cairns (North Queensland) districts. In both instances the procedure was similar to that described by Mr. Perry—the birds flying down and through the water, either partially or wholly submerged, and then up to a nearby branch to preen their feathers. One bird will often repeat the performance three or four times before flying off. As in the case of the white-plumed honeyeater, the submergence is always made in deep water near the centre of the pool or creek, although there is shallow water around the edges where other small birds bathe.—J. D. WATERHOUSE, Lindfield, N.S.W.

ON THE GERMINATION OF PEAS AND OTHER SEEDS AT LOW TEMPERATURE

By J. Ros GARNET, Melbourne.

In January 1946 I exhibited at the F.N.C. some ordinary garden peas which, after removal from the green pods and subsequent storage in a refrigerator for a short time, had germinated. The purpose of the exhibit was to illustrate not so much an unusual as a very interesting phenomenon associated with the germination of seeds.

No horticulturist or home-gardener would dream of planting his peas straight from the pod, even were he anxious to have no delay in establishing another crop of the same variety of pea. It is almost safe to say that most of his seed would rot in the ground without germinating—and this would not be the fault of the gardener, except inasmuch as he caused the peas to be planted.

The horticulturist's potential seed crop normally remains in the pod until perfectly mature, i.e. sealed-off in its tough skin. This stage is reached when atmospheric conditions favour desiccation—continued warm sunshine and a fairly dry atmosphere. At dehiscence of pod, the peas (unless collected) will drop to the ground and there remain dormant until the following autumn or winter, or until such time as continued rains cause germination. Should summer rains bring about germination the chances of continued growth are rather limited unless the peas are deliberately pushed beneath the surface of the soil to protect their developing embryos from the desiccating effect of any subsequent hot sunshine and drying winds.

Under the rather special conditions of successful pea growing, dried and mature peas are planted beneath the surface of the ground and, in the drier months, the soil is kept sufficiently moist by supplementary watering, both measures being taken to eliminate the hazard of drying-off. Whatever may be the practice of the pea-grower, the first essential for success is to stimulate the formation of that hormone-like substance which induces germination in the dormant seed, and a hint as to how this is brought about is given by the experiment demonstrated in the exhibit mentioned above.

Other details of the experiment are that the peas were some of a quantity purchased in the usual way from the greengrocer in late December. It can be assumed that they were part of a crop picked some time within a fortnight of the date of retail sale—say, about December 10th. The peas were quite fresh, green and full and, after shelling, were placed in a dry glass jar with a screw-top, but not actually air-tight, lid. The filled jar was then placed in a refrigerator at approximately 10° C. and left there (in the dark, of course). At the end of a week germination had commenced and when first noticed the plumules averaged 3 or 4 mm. in length. A dozen of these germinated plants were transferred to another and smaller jar similarly capped and allowed to remain in the refrigerator pending their exhibition, at which time the plumules were up to 3 cm. long and the primary root had developed to a length of a little over 1 cm. After exhibition, following 24 days' incubation at 10° C., the seeds were planted out in the garden where they flourished and finally produced a crop of peas.

The interesting features of the experiment are that the seeds were *not* "ripe" in the accepted sense of being fully mature, since neither pod nor testa were dried. The temperature at which germination occurred was 20° lower than the usual optimum for peas; oxygen tension was presumably much lower than is generally acceptable, since the amount of oxygen available for a pound of green peas practically filling a closed jar would be small and, even if sufficient, the respiration would surely be hindered by the gradual accumulation of the products of respiration, even making due allowance for some slight diffusion to and from the jar.

...I concluded that the seeds had been "vernalized", although that conclusion explained nothing. By a curious coincidence, a few days after the January meeting of the Club I came across a short paper by V. A. Novikov in the *Comptes Rendus de l'Académie des Sciences de l'U.R.S.S.*, 1945, xlvi. 204, on the "Stimulation of Resting Seeds of *Polygonum Bucharicum*" (one of a cosmopolitan genus of which the Victorian representatives are often called "knotweeds"). In this paper the author discussed a series of experiments undertaken to find the reason for lack of success in the cultivation from seed of this wild plant which is so useful in the Russian tanning industry.

Novikov considers that the resting condition of seeds may be either enforced or profound and in the former case germination may fail to occur even under suitable conditions of humidity and temperature. In such case the seeds are unable to swell or to absorb oxygen because of the peculiar structure of their coat. By damaging the testa these disabilities are removed and germination may readily be induced. "Profound rest", it is postulated, obtains through the presence of a definite growth-inhibiting substance or, alternatively, by the absence of a substance which can provide the stimulus to germination. "To become freed of growth-inhibiting substances and to form the growth-stimulating one the seed must pass, after ripening, under suitable conditions." He goes on to point out that it has been established that during vernalization substances of the nature of hormones are formed at temperatures slightly over 0° C.

A further remark on cotton seed is also relevant. Swollen cotton seeds kept at between 0° and 7° C. lost their capacity to germinate, whereas the immature seeds germinated well under the same conditions of cold. The actual experiments with Polygonum seeds gave as high as 37% germination when the seeds, layered between moist cotton-wool contained in covered glass vessels, were refrigerated at from 1° to 3° C. for 45 days. Other batches soaking in water and kept at the same temperature gave no germination even when subsequently incubated at 20° to 23° C.

There is some parallel in the experiments of Novikov and my observations on the green peas, inasmuch as it would seem that the immature cotton seeds, the Polygonum seeds and the immature peas were all in the state of profound rest and, therefore, to effect germination in each case the substance inhibiting germination had to be removed or, alternatively, that stimulating germination had to be formed; the particular hormone could only be destroyed or produced, as the case may be, by lowering the respiration rate while maintaining a high relative humidity.

Since mature peas germinate freely enough at room temperature in the presence of abundant water and oxygen, it is probable that they are free from the growth-inhibiting hormone and that the factors of temperature and humidity are sufficient to increase their rate of respiration to a stage where the hormone, responsible for initiating germination, is formed.

My interest in seed germination having been stimulated by the green peas, it seemed worth while following-up the observation by some experiments on a collection of mature seeds of native plants—especially those of the Leguminosæ which are difficult to germinate by the usual simple means. The same procedure as for kitchen peas was first applied to some immature Sweet Peas taken from their green pods. After 8 weeks' refrigeration most of the Sweet Peas had germinated and, like the kitchen peas, they developed vigorously when transferred to the open garden.

The same technique failed when applied to some dried peas, even after the seeds had been swollen in tap-water and kept swollen by adding a little water from time to time. My rather unnecessary persistence in the experiment merely resulted in the peas serving as a nutrient medium for a collection of micro-organisms, including a mould.

Of the seeds of eleven indigenous plants that were tested, those of *Chorizema ilicifolia*, collected in 1943, germinated within 40 days at 10° C.

There being fewer seeds of each of the species to be tested, the technique was varied to the extent of placing them on the surface of moist, washed sand contained in a shallow glass dish covered with a glass lid. As in the previous experiments, no attempt was made to observe aseptic conditions and this shortcoming resulted in the development of a mould whose hyphae had to be removed by occasional washings with tap water. The viable and healthy seeds resisted invasion by the mould and, after storage at the low temperature for more than 2 months, appeared to be still healthy, but the *Chorizema* seeds were the only ones that actually germinated and continued to develop at 10° C.

After 40 days' refrigeration, samples of the seeds of each species under test were (on 29/1/46) transferred to pots containing moist sand and kept at outdoor temperature. Of these seeds which were planted just beneath the surface of the sand, the *Chorizema* continued to grow while, after a fortnight, the seed of a white-flowered form of *Grevillea alpestris* from Whroo (collected in January 1942, i.e., 4 years previously) pushed its Cotyledons above the surface. On 20/4/46 it was planted out in the garden and at the time of writing—9 months later—appears well established.

Refrigeration of the main collection of seeds was continued, but as no further germinations had occurred after 63 days the dish was removed from the refrigerator on 2/4/46 and kept at room temperature. After 6 days at room temperature, one seed only germinated—that of *Grevillea oleoides*, collected in December 1943 (i.e., over 3 years previously); twelve days later, it was sufficiently developed to plant out. This plant has subsequently been added to the garden collection and is thriving satisfactorily. None of the other seeds germinated either at room temperature or out-of-doors.

As in the case of dried kitchen peas, refrigeration failed to promote germination except in the three cases quoted above and, of these, one only belonged to the legume family. Of particular interest was the demonstration of viability of the 3- and 4-year-old seeds of the Grevilleas—seeds which are usually credited with a short life, remaining viable for not much more than a year.

Following is a summary of results with the seeds of the eleven native plants:

Chorizema ilicifolia (2 years 2 months old): 4 out of 5 (80%) seeds germinated after 40 days at 10° C. and the seedlings continued to develop under these conditions. After 63 days at 10° C. no further germinations had occurred.

Grevillea alpestris (4 years old): One seed, after 40 days at 10° C. followed by 14 days at out-of-doors temperature, germinated and development continued under these conditions. No other seeds germinated.

Grevillea oleoides (2 years 1 month old): One seed, after 63 days at 10° C. followed by 6 days at room temperature, germinated and development continued under these conditions and subsequently out-of-doors. No other seeds germinated under these conditions, nor after further storage at room temperature.

The remaining eight kinds of seeds which gave negative results after 63 days' refrigeration at 10° C., together with their respective ages, were: *Hardenbergia violacea* (1 year 3 months), *Kennedya rubicunda* (3 months), *Hakea laurina* (7 years 5 months), *Correa reflexa* (1 year 3 months), *C. reflexa* var. *rubra* (3 months), *Boronia filifolia* (1 year 3 months), *Prostanthera melissifolia* (4 years 1 month), and *Astroloma humifusum* (3 months).

Judge Stretton's full report on forest grazing in relation to sylviculture, soil erosion, and forest fires, may now be obtained from the Government Printer at 1/3 a copy.

THERE IS MUCH SCOPE FOR STUDY

Bearing on the plea by Mrs. Coleman for more intensive field work (*Vic. Nat.* for February), it is interesting to recall remarks in point made 57 years ago (May, 1890) by the then president of the F.N.C., Mr. C. A. Topp. Here is a portion of Mr. Topp's presidential address to the Club:

In regard to papers, it would be satisfactory to have more dealing with the life-history or habits of animals and plants from the personal observation of the writers. There is still an almost unlimited field for observers, for, though year after year it is more difficult to discover new species, as catalogues become more complete, there are countless points in connection with the habits and distribution of the most familiar animals and plants which have not yet been sufficiently observed and recorded, many of which merely require patience and ordinary intelligence to elucidate.

I may refer to the methods of fertilisation of our native flowers; to the times of flowering and seed ripening in each species in various localities; the particular insects or birds on which fertilisation depends, and the provision for self-fertilisation, if any; the form of dichogamy, whether protandry or protogyny; the forms of the cotyledonary and primary leaves (a most interesting and suggestive subject); the gall-producing insects, which so frequently deform our native plants; the struggle for existence between our native flora and introduced weeds; the causes which produce the spread of the latter, and the districts they have invaded; the duration of hatching and of the larval and pupal stages of insect life of various species; the length of life of the fully developed insect, and its instincts or psychical manifestation in house-building, care of its young, etc.; the causes of the appearance, at intervals of several years, of swarms of particular species; the forms and materials of the nests of birds; the particular trees, shrubs, or other places where they are built; the period of incubation of eggs; the insects and fruits which form the food, especially in districts remote from settlement; the connection of the colours of birds with their surroundings.

Mr. Dendy informs me that a wide field still remains open for Victorian naturalists in the study of our cryptozoic fauna. The habits, the life-history, the food, the enemies, and the mutual relations of the different members of the little community which dwells in harmony, or otherwise, beneath every stone or fallen log are almost unknown to us. The solution of these problems is a peculiarly fitting task for the field naturalist. The cryptozoic fauna may be lowly, but it is not insignificant; every little community of these hidden animals is a microcosm in which we may study, in a restricted and convenient area, almost all the biological problems which present themselves for solution in communities of a higher and more extensive character.

If each one of us patiently endeavours to make accurate observations on some one of these or similar subjects, and gives a record of the result, he will not only be gaining an additional interest and pleasure in nature for himself and a resource for idle and otherwise tedious hours, but the aggregate result of many similar observations will furnish invaluable material for the speculations and generalisations of the fortunate student who is privileged after a complete training in one of our modern biological laboratories to devote his life to the elucidation of the workings of nature.

CALADENIA CLAVIGERA

At Bayswater (October 1946), the orchid *Caladenia clavigera* was more numerous than I have previously seen it. An interesting feature was that, among so many flowers, only one specimen was seen which had non-clavate sepals; yet in specimens sent to the late Dr. Rogers from another part of Bayswater *all* the sepals were non-clavate.—E.C.

EXCURSION TO MARANOA GARDENS

A Club excursion to Maranoa Gardens on February 16 had a dual purpose—to arouse interest in the gardens and to draw attention to a certain amount of deterioration which has been noted in recent years.

The President, Mr. F. S. Colliver, welcomed excursionists, about 100 in number. He stressed the unique nature of the garden and the need for care lest further losses occur, although no one doubted the skill, interest, and very hard work of the gardener, Mr. Bury, whose heart was in his task. The joint honorary curators, Messrs. Charles French and Ray Vick, had also a clear understanding of the problems of maintenance. Mr. Colliver suggested that the public might welcome another visit in the spring and asked for the opinion of those present. The response was definitely in favour and an outing was promised.

Mr. Swaby drew attention to the difficulties of fencing, poor water supply, the great lack of labels, and somewhat forlorn appearance. He mentioned evidence of vandalism—a major problem. He endorsed the President's acknowledgment of the work done by those most immediately concerned, but said that their efforts were nullified unless every member of Beckett Park Committee made of the garden a major interest. It was also imperative that the link between Committee and the City Council should be effective.

Visitors were then divided into small parties, each with a leader who had made a study of the gardens. The advantage of small groups, with opportunity for questions and general discussion, was amply demonstrated, and many appreciative comments were heard. The thanks of the members responsible are tendered to those leaders for their valuable help.

Inspections of this type should do much to deepen civic interest and co-operation. Members are asked to make a study of Maranoa Gardens, with a view to providing more leaders for a larger gathering in October. The full influence of this Club *must* be brought to bear upon the public, for better appreciation and protection in Camberwell and upon practical co-operation between the Club and the Committee.

Representatives of the Club were invited to attend a subsequent meeting of the Beckett Park Committee which controls Maranoa Gardens. Messrs. F. E. Lord and A. J. Swaby attended. They found the Committee fully in accord with the views of our members, and it is expected that a firm basis of mutual help will now be cemented.—A.J.S.

SWARMS OF MIDGES

The swarms of midges at Croydon described by Miss J. W. Raff (*Vic. Nat.*, LX, p. 67, Sept. 1943) have been noticed on several occasions since then at the place chiefly described. The close agreement in dates, however, is partly accidental. They may be seen from about the first week in April to early in May. The reappearance on the same patch of Acacias, sometimes on the same bush, may be only the easiest available to the breeding ground, or to their habits of flight. They swarm on different kinds of plants at different localities noticed.

Mr. Ros Garnet's note (*Vic. Nat.*, Oct. 1943) gives August and a Casuarina, "among its kind"—analogous behaviour, but not necessarily exactly the same fly. The position "close to Point Nepean Road" suggests easy accessibility from flight whether individually or collectively. The soil is no doubt different from that of Croydon and might allow difference in season. The food supply also might well differ.—T.S.H.

BOTANY GROUP NOTES

The Group excursion to East Kew on February 8 was notable for the discovery of a small patch of Nardoo, *Marsilia Drummondii*, not far from Burke Road bridge, on the Kew side downstream (see *Vic. Nat.* for March, p. 246). Widely spread over Australia, this fern has an interesting association with the ill-fated Burke and Wills expedition of the 'sixties. The explorers staved off death for a time by a kind of flour ground from the sporocarps of the Nardoo, shown to them by the aborigines. The clover-like fronds possess an astringent flavour, and form a low grade fodder in times of drought.

Of aquatic plants, the main objective of the visit, white Swamp Lily (*Ottelia ovalifolia*) was found flowering profusely in a shallow pond and evoked admiration. Mud around the water's edge was covered with dense mats of the Waterwort, *Elatine gratioloides*. Four species of *Polygonum* were seen in flower. Among non-aquatic botany, the wooded area along the river's margin contained specimens, some almost tree size, of Common Hemp-bush (*Plagianthus pulchellus*), a handsome member of the *Malvaceæ* and just past its flowering stage.

The locality has a diverse nature interest. Many birds attracted notice. On the top rail of the main road fence a Little Falcon rested, and several White-faced Herons flew overhead in an attractively patterned silhouette. A pair of White-winged Trillers gambolled in the higher branches of a Red Gum, while on a limb lower down a Black-faced Cuckoo-Shrike fed its fledgling. Silvereyes were common, and some nests of Magpie-Larks were noted. A youthful member of the Group found the riverside vegetation a profitable gathering-place for insects.—H. C. E. Stewart, Hon. Sec. of Group.

RAPID GROWTH OF NARDOO

Owing to a leakage, it was necessary to remove my nardoo from its tub, which is 26 inches in diameter and only 23 inches deep. The roots had become consolidated into a most remarkable felted fabric 8 inches thick—a mat of densely interwoven roots and rhizomes. One portion was placed in a large tank 36 inches deep, filled with water right to the brim. In two weeks leaves had risen to cover the surface. Owing, doubtless, to extra light and space, these leaves are very large, their four leaflets, when unfolded, barely fitting into a square of 2½-inch sides.

The rest of the "mat" was replaced in the repaired tub, the surface of which is now so thickly covered with leaves that blackbirds, wattle-birds and others, quite unafraid, bathe right in the middle of the tub. (They bruise the leaves sadly, and sparrows eat them.) Nardoo has certainly learned to make haste "while the going is good".

No leaves known to me dry so quickly and completely as those of nardoo, when removed from the water. Señor Luis Victor Vega (Mexico), who is experimenting on the restoration of life to dried plants, would find nardoo a tough problem. (According to Señor Vega, unless plant cells become disintegrated they are capable of being restored to life by a chemical process which he is demonstrating.)—Edith Colsman.

CURIOUS NESTING SITE OF PARDALOTE

While in a nurseryman's workshop at Bayswater (24/11/46) we saw a Spotted Pardalote fly through the open door and enter a long roll of hessian resting high up on the rafters. This was the third season it had nested in the hessian, which probably represented a burrow or tunnel.

Although these rolls of hessian are used to spread over skeleton sheds, as plant shelters, this one has been left undisturbed for the birds' use.—E.C.