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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, April 20, 1936. The President, Mr. G. N. Hyam, presided, and about 100 members and friends attended.

The President referred to the deaths of Miss Doris Schulz, Mr. J. Howie, Country Members of the Club, and of Mr. W. Lawford, a Life Member.

SUBJECT FOR EVENING

The President, in introducing the lecturer for the evening, Mr. M. Blackburn, spoke of the good work done by the McCoy Society. Mr. Blackburn dealt with the work and experiences of the Society's expedition on Lady Julia Percy Island. A very interesting series of lantern slides was shown.

At the end of the lecture Mr. F. Singleton and Mr. L. Stach, who were both members of the expedition, spoke briefly.

After answering several questions, the lecturer was thanked by the President, and also the thanks of the Club were expressed to the McCoy Society for its work.

WILD NATURE SHOW

The President stated that the Club had decided to hold a two-day Wild Nature Show this year.

CORRESPONDENCE

From Rev. N. Michael, of Boonah, South Queensland, asking for correspondence from members interested in the exchange of botanical specimens, especially Eucalypts and Acacias.

REPORTS OF EXCURSIONS

Excursions were reported on as follows: Heathcote, excursion cancelled; Beechworth, Mr. W. Ingram; Yarra River, Mr. W. Hanks.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as (a) Associate Member: Master A. Colliver; (b) Ordinary Members: Miss A. Cornish, Miss Joyce Outtrim, Miss D. Sachse, Miss M. Sachse.

GENERAL BUSINESS

The President extended a very hearty welcome to Miss Garling, a visitor from the Sydney Naturalists' Club; and also to a Country Member of our Club, Mr. Hackett.

It was announced that the next meeting would be held in the New Herbarium Hall, and the subject be "National Monuments." This would inaugurate a campaign for the preservation of Natural and Historic Monuments, and the checking of vandalism.

The Committee invited members to submit to the Secretary as soon as possible suggestions for excursions for the forthcoming list.

NATURE NOTES

Mrs. Miller read a cutting from the Press, stating that elm tree leaves were being collected for export to Germany, and asked for information regarding their use.

The meeting closed, and members adjourned for the Conversazione.

EXHIBITS

Mrs. V. H. Miller.—Pendant of Citrine Crystal; one of the semi-precious varieties of Quartz, from Spring Creek, Beechworth.

Mr. W. H. Nicholls.—Small Copperhead Snake, from Solomon's Ford, Maribyrnong River, Braybrook.

Mr. A. R. Varley.—Collection of Shells and Coral from Great Barrier Reef.

Mr. N. Lothian.—Flowers and fruits of *Macadamia ternifolia*, a native of Queensland.

Mr. G. N. Hyam.—Aboriginal stone chippings, from Studley Park.

Mr. A. J. Swaby.—Luminous Crab, from Port Phillip Bay.

Mr. F. S. Colliver.—A series of minerals from Beechworth, including Citrine, Rock Crystal, Jasper, Agate, Black Iron Sand, etc.; also a series of Granite from the district.

EXCURSION UPON RIVER YARRA

Twenty-eight members and friends attended the river excursion, which started from the location of the falls that formerly existed near Queen's Bridge. The leader described the Yarra as nearly as possible as it was before being altered to its present state. Some description of the geology was attempted, and a short walk taken through Studley Park. The weather was wet, but the boat was covered in.

W. HANKS.

The Rev. Norman Michael, The Rectory, Boonah, South Queensland, has been collecting botanical specimens, particularly Eucalypts and Acacias, for 30 years. Now that, after many wanderings, he has settled down, he is anxious to form an herbarium and museum of his own. He would value a Victorian series of his favourite plants, dried specimens for the herbarium, and would like to hear from any member of our Club willing to exchange specimens.

Plate 1

Male Lyre-bird displaying

Photo by R. T. Littlejohn

SOME NOTES ON THE LYRE-BIRD—PRINCIPALLY THE MALE

By R. T. LITTLEJOHNS

During ten winters devoted to the Lyre-birds of Sherbrooke Forest I, unfortunately, perhaps, have sought photographic records with such fervour that many opportunities for observation have been neglected. Nevertheless, in that period I have gathered at least a few facts which may not be recorded in the general and rather extensive literature regarding this remarkable bird. Incidentally, it has been found necessary to modify several hastily-conceived ideas formed during the earlier years of association with the species.

Influenced, probably, by something which I had read, I at first considered the male Lyre-bird to be a creature of warlike temperament. The penetrating "quilp quilp" call I regarded as a definite challenge to other males of the species, and when, on various occasions, I saw one male chasing another through the forest, I became convinced that it was proof of a widespread rivalry for mates. Later experience has changed my ideas entirely. I am now firmly of the opinion that the relationship between male Lyre-birds is almost invariably friendly, and even playful. The chasing which, in other times, I regarded as evidence of a quarrel, I am now convinced is play. Furthermore, there is little doubt left in my mind that the birds mate for life; so that, except in rare instances, rivalry for mates does not occur. The only definite evidence I have for believing that the Lyre-birds mate for life is the fact that the male occupant of one definite "territory" at Sherbrooke has been associated, during two sucessive seasons, with a female which carries a ring on her leg.

The question of territory deserves mention. There is no other Australian bird known to me in which adherence to a definite area is so strongly evident as in the case of the male Lyre-bird. Day after day and week after week, especially in the singing season, one may know exactly where to find any particular individual. The territory of each male may be two or three acres in extent, and it is seldom that the bird will be found outside it. From time to time, however, he may leave his own area and visit that of his neighbour. In most cases, when this occurs, a playful chase develops, and it may be that other territories are visited also, the occupants of which join in the chase. I have seen as many as five male birds gathered together in such circumstances. They may dance on mounds or elsewhere. Sometimes two or three display at once. I have not, however at any time, seen two birds dancing together on one mound, but frequently one dancer is replaced by another as soon as the first has completed his "turn." These corroborees seldom last very long and within half an hour each male may be found once more in his own territory.

Apart from the regularity of the habits of the males, as regards territory, there is a further characteristic which has been most helpful in connection with attempts to film the Lyre-bird and to record and broadcast the song. Although the bird may sing in any portion of his territory or on any of his many mounds, there is always one favourite singing area from which he gives his most fervent and sustained songs. This favourite singing area may

Photo, R. T. Littlejohns.

Male Lyre-bird preparing mound

contain two or three closely-grouped mounds and perhaps one or more logs, stumps or elevated horizontal branches. As the singing positions in this favourite area are almost always grouped within a radius of thirty or forty feet, it will be realized that the broadcasting of the song, whilst it involves considerable preliminary investigation, is yet a matter of less difficulty than would be imagined.

During the moulting season, in September and October, and thereafter until the following April, the adherence to the territory, while still in evidence, is not so marked and oft-times the bird may not be found in its accustomed place. At dusk, also, the males leave their terirtories to roost, often in company, in tall trees. The

females, outside the nesting season, are not so easily followed as the males because of the lack of song, but it would appear that they do not adhere to the territories of their mates or, in fact, to any territory.

There are several outstanding characteristics of male Lyre-birds in the manner of making and using their mounds and these have become known to the writer because they have affected materially the attempts which have been made to film the display. In the first place it has become evident that, whilst mounds may be formed, occasionally, where there is no screen of undergrowth close to the ground, it is almost invariably the practice to choose a position surrounded by growing ferns, sword grass or other lowly growth. This fact has been of considerable importance with regard to photography at Sherbrooke, as bracken, which is the most usual screen for the mounds, grows only in fairly well-lit areas. Last year this characteristic was responsible, almost entirely, for the success of a film taken under excellent lighting conditions.

Apparently because of an increase in the Lyre-bird population of the Forest, one male bird during the winter of 1934 took possession of a territory along the forest edge adjoining a cleared fire-break. The narrow strip of forest occupied by this bird provided a suitable feeding-ground of soft mould, but, with the exception of one small patch of sword grass, there was no place where mounds could be formed with the usual screen of low growth. This bird, therefore, made several mounds amongst the bracken growing in the fire-break itself where the light available was probably twenty times more efficient than that in any part of the forest proper.

In June, 1935, a record was made of the number of times the occupant of this territory displayed on a particular mound in his most popular singing area. The mound chosen was an old and well-formed one which had been in use also during the previous singing season. During eight days, which, however, were not all good singing days, the bird displayed on this mound ten times or on an average of a little more than once a day. A month later he commenced to form a new mound twelve feet from the old one, from which he had been disturbed on many occasions. From the time he commenced the new mound his activities increased greatly, and during a further eight days he danced on the new mound twenty-one times. He returned time after time with evident anxiety to make the display place to his liking in as short a time as possible. Much of the time was spent in scratching up the earth, removing the grass and extending the area by treading down and removing bracken at the edges. So intent was he on this task that many feet of film were exposed whilst the writer sat, camera in hand, just outside the ring of bracken and within ten feet of the bird. Time after time the motor of the camera was wound and the camera operated without any effort to muffle the sound.

It must not be assumed, however, that the Lyre-bird, even at Sherbrooke, is not an extremely wary and suspicious creature normally. Proof of wariness is provided by an experience during the endeavour to obtain film in 1935. For many days the small cinema camera, with line attached to operate the motor, remained fastened to the ground and camouflaged with debris fifteen feet from what had been a very popular mound. And although the surroundings had not been interfered with in any other way the bird would not dance on that mound. Time after time he passed over it, raked the earth once or twice, but walked off to display elsewhere. Eventually it became apparent that the small shining lens, less than an inch in diameter, fifteen feet away and recessed far into a padded box, was responsible for his refusal to use his most usual display place. The apparatus was then modified so that the lens remained covered until the camera was actually set in motion by means of the line. In this way it was possible to have the camera completely hidden during the critical period when the bird walked on to his mound and to uncover the lens later when he was engrossed in his performance, and when, probably, his vision was obscured by the widespread filmy feathers of the tail.

This characteristic of the Lyre-bird should be remembered by those who seek to witness the display and an effort to approach the singer should not be made until the display has reached a stage where the performer is oblivious to all else. These conclusions, of course, are based on the conduct of the Sherbrooke birds, but I have no doubt that the same characteristics, perhaps in modified form, will be found in birds of other areas.

During preparations for several broadcasts and recordings, many observations have been necessary as to the factors which influence the singing. From a maze of apparently contradictory results it has been possible to cull a few definite conclusions. Firstly, it has become apparent that the season of greatest activity is from the middle of June to the middle of July, and that most individuals have shed their tails and have become silent by the end of September.

The weather, also, has been found to have had considerable influence on the efficiency of the singing. On windy days, even in the height of the season, the Forest will be practically silent except for the roar of the wind in the tall trees. Such singing as does occur on windy days, furthermore, is delivered principally from elevated perches and not from mounds. Obviously, I think, the birds fear that, under cover of the roar of the wind, enemies may steal upon them unawares should they display on screened mounds. On calm June or July days, especially if there be a light fog, singing is almost continuous, and opportunities for witnessing the display are numerous.

During those portions of the year when singing is not so constant as in June and July most performances have occurred, according

Photo. by R. T. Littlejohns

Male Lyre-bird displaying on mound in Bracken outside the forest proper.

to my notes, about two hours after daylight and again about half-past three o'clock in the afternoon.

Of the song itself so much has been written that there is probably little that is new to be added. There has always been a difference of opinion as to the number of imitated sounds included in the repertoire of a singer of average ability. Probably the number of imitations varies with the locality. Acting on the principle that only those sounds which may be included without doubt as imitations should be recognized, I have estimated that the number of imitated sounds used by the Sherbrooke birds is about twenty.

Photo, R. T. Littlejohns.

Male Lyre-bird displaying (rear view)

From the high-pitched musical whistle of the pilot bird to the sound of rustling feathers and from the harsh laughing of kookaburras to the faint twittering of thornbills there is no sound, apparently, which is beyond the power of the bird to reproduce. For many months I imagined that the sound of rustling feathers such as accompanies the commencement of a flight of parrots, was produced by a shaking of the plumage of the mimic. I did not dream that such an elusive sound could be produced in the throat and I was astounded when first I witnessed the production of the sound.

Then there is the uncanny ability of the mimic to produce a clear representation of the chatter of a whole flock of parrots or the simultaneous laughing of a chorus of kookaburras. The full kookaburra chorus, rendered so seldom that I have heard it less than a dozen times, is an achievement which must place the Lyre-bird amongst the world's most efficient natural artists.

ENTOMOLOGICAL NOTES FROM THE PINK LAKES DISTRICT, NORTH-WESTERN VICTORIA, WITH A NOTE ON A NEW VICTORIAN RECORD

By F. Erasmus Wilson

Our Editor recently handed me a Tiger Beetle collected at Lake Crosby, when that locality was visited by a party of Dutch scientists early in April. I understand that about a dozen specimens were collected by Dr. J. Reuter, who was probably more active in his movements than the Editor, as capturing Tiger Beetles is no mean achievement.

This specimen is particularly interesting as it proved to be *Cicindela jungi* Blackb., a species so far quite rare in collections, and previously recorded only from two localities in South Australia. The type examples were taken by a Mr. Jung, on York Peninsula, South Australia, and sent by him to Canon Blackburn, who described them in the *Proceedings of the Royal Society of South Australia*. No more seem to have been reported until Mr. A. H. Elston collected a few specimens on the Coorong some few years ago, the previous example in my collection having been one of that capture.

The beetle now first recorded from Victoria is of about the build of the widely-distributed *C. ypsilon* Dej., a beach-frequenting form. Its head and prothorax are brilliantly metallic and rugosely sculptured, and the elytra are cream coloured as in my example from the Coorong, or slightly darker as in the Victorian specimen. The elytra are ornamented with an irregular marking commencing at the base and continuing along the suture for about two-thirds of its length. The mandibles are yellowish, tipped with black, and the legs are either brilliant coppery or bright metallic green, according to Blackburn, who evidently had a series before him when writing his description. In the Victorian specimen the metallic parts are coppery.

The Editor and I visited this lake district in October, 1922, and although we saw many examples of the Tiger Beetle *Megacephala australis* Chaud, no examples of a *Cicindela* were observed. Possibly they do not emerge so early in the summer, the lakes at that time still containing quite a lot of water. The *Megacephala* we

found sometimes under planks or logs of wood firmly embedded in crystallized salt, when they would be seen resting in the channels which they excavate. Once disturbed, however, they were exceedingly active, and catching them was not always an easy matter, even with the assistance of a net. One evening quite a number came to a light which we were using some two miles from the lake for the purpose of attracting night-flying insects. They would thud down in the sheet and then start rushing madly about.

It is a curious fact that so many of our Tiger Beetles are associated with salt. Most of the large brackish lakes and salt pans of the interior have their Tiger Beetle fauna, Western Australia particularly having a wonderful variety of beautiful forms. Our other Victorian Tiger Beetle, *Cicindela ypsilon*, as before mentioned, is a sea beach dweller, found so far only along the Ninety Mile Beach in this State.

Distipsidera, an arboreal genus, seems to shun salty situations, being a denizen of the forests in Northern Australia, and the interesting little Western Australian genus *Nickerlea*, one of the rarest of Tiger Beetles, is, I believe, found on the sand plains.

Some years ago I remember visiting a small lake in the centre of the Little Desert, south of Kiata, and although this lakelet is a very isolated one, yet here also I found *Megacephala australis*. It it just possible that other *Cicindellidæ* may turn up in our north-west salt lake system, although, I think, improbable. A new Zealand coleopterist some years ago showed me a small *Cicindela* that he had taken on grass lands some twenty miles across the Murray River from Mildura, and this species may yet turn up in the north-west corner of this State. Till then we shall have to be satisfied with claiming a Tiger Beetle fauna of only three species, out of some fifty to sixty species known to occur in Australia.

On the shores of the lake where the new Tiger Beetles were taken there grew in 1922 a small patch of sandalwood trees which I expect are not there now. From the trunk of one of these I cut out a dead, though almost perfect example of the very rare and distinctively sculptured *Melobasis abnormis* Carr., a jewel beetle, of which, I believe, only about three specimens have so far been taken. Also, in a crevice in a tree trunk I found about seven examples of the large scarab beetle, *Gigadema longipenne* Germ., a genus that was also represented by the still larger species, *G. holstocki* var. *intermedium* Gestro.

The surrounding sand-hills were the habitat of the fine scarabid genus, *Isolboceras* and *cheylum* Blkb., *Sloanei* Blkb. and *convicolle* Macl., were species that were captured. We used to dig these out of the sand, being led to their burrows by the vermiculate damp sand lumps, which were piled up in the early morning. When the sun came out and evaporated the moisture, nothing remained to indicate their lurking places.

The Needle Bushes (*Hakea* sp.) growing around the lakes not only provided us with water from their root systems, but also yielded several specimens of the Longicorn beetle, *Syllitus parryi* Pasc., and the porcupine grass tussocks were lurking grounds of the fine large Amycterid weevil, *Pfalidura flavosetosa* Ferg., as well as that of the beautiful Striated Grass-Wren, *Amytornis striatus*.

Two nice little Scarabid beetles that we took on mallee eucalypts were *Liparetrus phoenicopterus* Germ., a dumpy little chap with deep red elytra and hirsute thorax, and *L. abnormalis* Macl., a rare species that I have not since taken.

One evening we noticed a long procession of small black *Iridomyrmex* ants and interspersed all along the line of travel were examples of the Trogid Beetle, *Liparochrus geminatus* Westw. Beetles of the genus *Liparochrus* are not looked upon as myrmecophilus, so that what they were doing there is problematical. They seemed to be just walking along in the procession, neither worrying the ants or being worried by them. Fully twenty of them were picked up in the space of a few yards.

We also found near the lakes two species of the handsome Tenebrionid, genus *Chalcopterus*, viz., *clypeatus* Blackb., which also occurs in Western Australia, and *affinis* Bless., which we sometimes get in the vicinity of Melbourne. The same family also yielded *Helaeus scapiformis* Black., one of the quaint forms sometimes referred to as Tortoise Beetles.

Three or four examples of *Aphodius callabonnensis* Blackb., a small scarab that was described from Lake Callabonna, in South Australia, were collected. This insect was redescribed later under another name by a local coleopterist, but I am sure of my determination as I was able to compare my specimens with the type material in the South Australian Museum.

Ant-lion pits were seen in almost every sheltered situation, and although we saw no adults at the time, they must be very plentiful there in mid-summer. Quite a number of nice coleoptera were collected in this district, and we might have got more but for the fact that much of our time was taken up in finding ornithological subjects for the Editor's camera.

BEECHWORTH EASTER EXCURSION

Ten members and friends attended the Easter excursion at Beechworth, and were favoured with perfect weather. A view from the top of Mt. Stanley on the Saturday, embracing the Hume Reservoir, Mt. Kosciusko, Featherton, Bogong, Buffalo, etc., right around to the Divide, on the south, showed all to be snow-covered. We even had a glimpse of the High Plains, in a similar condition. The trees of the district again called for admiration, and some fruits of the Arbutus give evidence of the genial climate. Mrs. V. H. Miller noted about 60 different species of birds. The members greatly enjoyed an all-day excursion to the Woolshed valley.

W. H. INGRAM.

THE FUTURE OF THE LYRE-BIRD IN VICTORIA

BY F. LEWIS (*Chief Inspector of Fisheries and Game*)

What will be the position of *Menura* in this State in years to come? This question is exercising the minds of many people, as is evidenced, for instance, by the strongly-expressed opposition, in some quarters, to the transfer of several of our Lyre-birds to Tasmania during the last two winters. The people concerned were, I think, genuinely opposed to the experiment because they feared the depletion of our very limited stocks; but, being unduly apprehensive, they overlooked the outstanding advantage of having a reserve stock of Lyre-birds in another State should anything eventuate seriously to reduce their numbers on the mainland.

The Lyre-bird is found, in Victoria, only in the mountain gullies and dense forest of the north-eastern and eastern parts. Although the densely-timbered fern gullies of the Otway forest should be entirely suitable, they have never been found there. It is possible that, were they introduced to such a place as Turton's Pass, they would thrive and provide another safeguard against extermination should their present habitat be seriously threatened.

What now are the factors which a superficial investigation indicates as favouring the Lyre-bird in this State? To me they appear as:—

(1) The fact that a great deal of their territory is rough, inaccessible, mountainous country, much of which is proclaimed forest country, much almost worthless except perhaps as a water catchment.

(2) The more favourable public opinion formed in recent years as the result of the magnificent work of such men as T. Tregellas and R. T. Littlejohns; by the broadcasting of the song; and by the articles of nature writers in our great newspapers.

(3) The more adequate protection given by the law in recent years.

As regards (1) it must not be taken for granted that in these isolated mountain areas the birds are necessarily safe for all time. I have known densely-timbered gullies, once the home of Lyre-birds, Coachwhip Birds and other species that thrive in these localities, to be burnt and cleared for cultivation. It seems a shame that this should be done, because, in most cases, the result hardly justifies the labour and expense involved. Typical examples of this are to be seen close to the Prince's Highway, between Lakes Entrance and Lake Tyers; also at South Traralgon and Jeeralang, and many places in South Gippsland.

Many of the present resorts of the Lyre-bird are privately owned, and one cannot object legally to what a landowner does with his own property. But here, certainly, is a field for education.

Again, while many of the fern gullies beloved by *Menura*, in the

forest areas, are safe from fire in a normal season because of their dampness, a prolonged dry spell will greatly increase the fire risk, and fire seems to me the most serious menace which our native fauna has to face in these days.

Re (2). It is my belief that the more favourable opinion formed in recent years is confined almost entirely to the people living in and around Melbourne, and is mainly due to the fact that Sherbrooke Forest is so close to and easily accessible from the metropolis. People in country districts, even where the birds are still plentiful, show little or no interest in them. This attitude, I think, can only be remedied by the education of the young through the schools. Let us educate our teachers and the result will soon be seen among the children.

Of course, there are exceptions to this state of affairs, one of which I came across last winter at a little country school in South Gippsland, where the teacher and children, and even some of the parents, were greatly interested in a young Lyre-bird in a nearby gully. Practically all the forest and gullies in the vicinity have been burnt and cleared in recent years, thus reducing the area available not only to the Lyre-bird, but also to the Koala. Now only this one small piece of forest gully remains, and in it a pair of Lyre-birds nest every year, much to the interest of some of the local people. Although this district at one time must have possessed thousands of Koalas and Lyre-birds, none of the children at the school had ever seen a Koala nor the dancing display of the male *Menura*. When I showed them pictures of both, they were keenly interested.

The egg collector, of course, is a ruthless destroyer of the Lyre-bird. These eggs are keenly sought after; only one is laid in a season by each female bird, and if that is taken, there is no natural increase from the pair of birds concerned, for that year. Examination of the records of some of those from whose collections eggs were seized lately by the Fisheries and Game Department, indicated clearly how ruthless collectors can be in the pursuit of their hobby. One man recorded how he and other collectors visited the Healesville district and took eleven Lyre-bird eggs. Since these raids on collectors were made, I can readily understand where the eggs from Lyre-bird nests in the Dandenongs, which I have examined in recent years, disappeared. Now that most of the egg collectors are known, steps will be taken to check their nefarious practices in the future, much to the advantage, I trust, of the Lyre-bird.

Summarized, the position appears to me to be that the future of the Lyre-bird in Victoria is assured, contingent, however, upon two things: first, the improvement of public opinion by education, not only in Melbourne and in large cities, but more particularly in the country districts; and, secondly, by stopping the clearing of Lyre-bird gullies and the destruction resulting from bush fires and the activities of egg collectors.

LYRE-BIRDS OF THREE STATES

By ALEC H. CHISHOLM, F.R.Z.S.

When I first went to Queensland to live, some twenty years ago, my experience of Lyre-birds was limited to the hearing of one or two in Gippsland forests. In following years I frequently heard the birds in the mountain jungles south-east of Brisbane, but to see one was a rare event and the finding of a nest was rarer still. How quickly those birds could disappear in the jungle, warned perhaps by the cracking of a stick beneath a foot or the thumping of a wallaby's tail!

I remember in particular an occasion when members of the Queensland Field Naturalists' Club were camped on the Green Mountains that comprise the Macpherson Range. Every morning we heard the Lyre-birds shouting around us, but not once were we able to see the melodists. It was odd that the birds were so shy in that primeval region, where they had rarely been disturbed by man. Possibly that shyness will wear off in time, for the area is a National Park and visitors (who do not carry guns) are becoming more and more numerous. The birds in question probably were of the smaller species of *Menura*, the one which Gould called *M. alberti*, Prince Albert's Lyre-bird. In this species the tail differs considerably from that of the southern Lyre-bird, and so G. M. Mathews split the genus and gave *Menura alberti* the uncouth name of *Harriwhitea*. Not content with that, he "split" again, calling the "Albert" in north-eastern New South Wales *Harriwhitea alberti alberti* and the one in south-eastern Queensland *H. alberti rufa*. It was this fine distinction that caused Mr. Henry Tryon, then Queensland's veteran Government Entomologist, to produce a good jest as we stood on Mount Bithongabel, fairly on the border of the two States.

"You hear that bird, sir?" he said, waving an arm towards a Lyre-bird that was singing a hundred yards or so to the south. "Well, that is *Harriwhitea alberti alberti*. And you hear that bird?"—pointing to where a bird was singing on the other side of the track—"that is *Harriwhitea alberti rufa!* Now you know!"

Names aside, I am not at all sure that all the Lyre-birds of those jungles of south-eastern Queensland belong to the Albert species. There is no doubt, of course, that Albert Lyre-birds are confined to the jungles of north-eastern New South Wales and south-eastern Queensland (south of Brisbane), but no one seems to have determined just where their range ends and that of the southern Lyre-birds begin, and it seems to me just possible that the two species meet in some places.

At any rate, if the large-tailed Lyre-bird of the south does not occur in Queensland jungles it certainly is found in at least one portion of the northern State—in the granite country near Stanthorpe. This fact became revealed in 1920. At that time I was

Plate II

Photo. by A. H. Chisholm

Lyre-bird's Nest on a low rock in a gully near Gordon, Sydney

conducting a column of nature notes in a Brisbane newspaper, and a boy wrote me regarding Lyre-birds which he said were in open country, among great granite boulders, near Stanthorpe, about 100 miles inland. Support for this surprising statement came from Dr. Spencer Roberts, then a resident of the locality. The result was that after touring (in a journalistic capacity) with the then Prince of Wales, I left the Royal train at Stanthorpe and spent several days among the birds of the area.

For one who had searched in vain for Lyre-birds' nests in the jungles, it was an astonishing experience to inspect, in Dr. Roberts' company, half a dozen nests in one day; they were scattered freely about the ledges of the huge ramparts of granite, and the voices of the birds were often heard echoing among the rocks of that wild and rugged region. Subsequently a specimen of a male bird was taken, and it was found to be, not the Albert Lyre-bird, but a representative of the southern species. Certain modifications in the plumage colours caused this dweller in the Granite Belt to be given a name of its own—*Menura edwardi*, Prince Edward's Lyre-bird. It is now recognized as a sub-species. Possibly the securing of further specimens would clear the point, but it is not of sufficient importance to justify the killing of the birds.

By this time I had realized that Lyre-birds are fairly adaptable—that while for the most part they inhabit heavily vegetated areas, they can be quite at home among rocky outcrops where timber is sparse. Accordingly, it was not surprising to meet the birds in some abundance in the Hawkesbury sandstone region of Sydney. Almost every extensive sandstone gully near Sydney has its Lyre-birds, and for anyone who "knows his way about" it is not especially difficult to discover one or more nests during a winter day's ramble. Not once in a season during ten years did we fail to discover nests of Lyre-birds in Sydney's glorious National Park, and not once in six successive years did we fail to find the nest of a particular pair that belonged to an isolated gully on the outskirts of the populous suburb of Gordon. In the jungle country at the southern end of the National Park the nests may be placed on tree-ferns, on large stumps, or at the base of trees. In the main, however, they are built into crevices of the great walls of sandstone. Once, on the fringe of a suburb of northern Sydney, a pair nested on a flat rock on a hillside, fairly in the open, where the home was festooned with boronia and other flowering plants.

Certainly the Lyre-birds near Sydney are much easier to see, and their nests are infinitely easier to find, than is the case in the northern jungles. In Queensland one could never safely promise to take visitors Lyre-birding; in Sydney this has become something of a custom. Sir Philip Game, when Governor of New South Wales, inspected from year to year at least half a dozen Lyre-birds' nests—rather more than the average Australian has

seen or is likely to see. Moreover, he often made the acquaintance of mother-birds at the nests, and between whiles he listened to the melody of the male birds. But to see *Menura* in display was another matter. Even in the National Park the Sydney male birds are coy, and it was only on rare occasions that we were able to steal upon one in full display.

It will be appreciated, therefore, that after many arduous attempts to stalk male Lyre-birds in Queensland and New South Wales, I was thoroughly astonished by the tolerance of the Lyre-birds of Sherbrooke Forest, Victoria. My first visit there was in July of 1933, in company with Mr. R. T. Littlejohns and officers of the Australian Broadcasting Commission. Immediately on arrival we heard Lyre-birds calling, and within a few minutes we caught a glimpse of a fine male displaying and singing in an open space—not on a mound. Soon afterwards another male bird advanced to a mound directly in front of the broadcasting group of about ten people, and there, disregarding his audience, gave a wonderful performance. Subsequently he sang twice nearby while perching aloft, once on a limb six feet high and again from a height of five feet on a fallen branch leaning against a tree. By this time I was immune to astonishment and would not have been taken aback if a Lyre-bird had come and fed from our hands. But—to think of all those times in the jungles when, for a mere glimpse of a Lyre-bird, we crawled on our stomachs over hundreds of sticks and stones! Certainly the Lyre-birds of Sherbrooke, apparently through constant contact with humanity, have ways of their own. They are the tamest wild Lyre-birds in the world.

The question is sometimes asked: Do the singing qualities of Lyre-birds vary in the various States? My own view is that for sheer melody there is nothing to choose between them. One of Gould's correspondents long ago declared the Albert Lyre-bird to be the chief vocalist, claiming that not only was its song louder and fuller than those of southern Lyre-birds, but its imitations were more varied and accomplished. It is true that the Albert Lyre-bird produces a wonderful medley of mockery—it can imitate anything from the wail of the Cat-bird to the chattering of a flock of Parrots—but it cannot excel the superb vocal powers of its southern relative. There is, however, matter for choice between Lyre-birds generally and the tight little group of Sherbroke Forest. In Queensland, in New South Wales, and in most parts of Victoria the Lyre-birds are faithful mockers, whereas the Sherbrooke birds are given to improvisations.

[Those who desire to read further upon this subject are referred to the following chapters in Mr. Chisholm's books: "Granite Gardens and Lyre-birds" and "Australia's Mocking Birds" (*Birds and Green Places*), "The Magic of Menura" and "Jungle Re-unions" (*Nature Fantasy in Australia*), and "Lyre-bird Revels" and "The Solitary Lady" (*Bird Wonders of Australia*).—Editor.]

The Victorian Naturalist

Vol. LIII.—No. 2 June 4, 1936 No. 630

THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary monthly meeting of the Club was held in the New Herbarium Hall, South Yarra, on Monday, May 11, 1936. The President, Mr. G. N. Hyam, presided, and about 90 members and friends were present.

CORRESPONDENCE

Letters were received from the Historical Society of Victoria, Advisory Council on Fauna and Flora, and the Royal Automobile Club, stating that they were behind the Club in its efforts to secure better protection for National Monuments.

REPORT OF EXCURSION

Mr. T. S. Hart reported on his excursion to Black Rock.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as ordinary members: Miss Ida Knox, Miss Mary Knox; and as associate members: Miss Elizabeth Lucas, Miss Audrey Piper, Miss Jean Stakle.

NOMINATIONS OF OFFICE-BEARERS, 1936-37

The following nominations were received:—

President: Mr. S. R. Mitchell.

Vice-Presidents: Mr. Geo. Coghill, Mr. A. H. Chisholm.

Treasurer: Mr. J. Ingram.

Librarian: Dr. C. S. Sutton.

Assistant Librarian: Mr. W. H. Ingram.

Editor: Mr. Chas. Barrett.

Secretary: Mr. F. S. Colliver.

Assistant Secretary: Mr. L. W. Cooper.

Committee: Miss Florence Smith, Messrs. E. E. Pescott, H. Jenkins, Chas. Daley, V. H. Miller, H. C. E. Stewart, W. Hanks, J. W. Audas, A. S. Kenyon, R. H. Croll.

Auditors: Mr. A. S. Chalk and Mr A. G. Hooke were duly elected.

NATURE NOTES

Mr. V. H. Miller reported that as an Honorary Inspector under the Fisheries and Game Act, he had stopped a man catching Silver Gulls with a hook and line.

GENERAL BUSINESS

It was announced that Prof. F. E. Lloyd, M.A., D.SC., would give a public lecture on "The Carnivorous Plants of the World" at the University, on Wednesday, June 10.

SUBJECT FOR EVENING

The "Subject" was an explanation of, and discussion on, National Monuments.

The President briefly explained what was meant by the term National Monuments, and gave a number of suggestions as to objects well worthy of being classed as such, in this State. He then moved: "This Club shall take immediate steps to call a conference of all interested bodies with a view to obtaining legislation for the proclamation, reservation and protection of National Monuments of natural origin or the handiwork of man; of a scientific, historic or scenic interest, for all time."

The motion was seconded by Mr. R. H. Croll, and carried.

Mr. S. R. Mitchell then gave a lecture, illustrated by means of the epidiascope, on National Monuments in Japan, United States of America, and New Zealand.

Mr. J. Railton, President of the Tree Planters' Association, and Mr. Owens, the Secretary, spoke in support of the proposed movement designed to preserve National Monuments.

EXHIBITS

Mr. C. Daley.—Fossil wood found at Black Rock in 1866 by Mr. G. Kego.

Mr. Robin Croll.—An orchid (*Pterostylis virtata*), flowering for the sixth year in the same spot.

Mr. Noel Lothian.—Specimens of *Eucalyptus leucoxylon*, showing white and pink variations in the flowers: found at Torquay, March, 1936.

Mr. A. R. Varley.—Polyzoa (*Retepora* sp.) from Westernport Bay. Several specimens of the Basket Fungus.

GIANT CLEMATIS PLANTS

Giant specimens of *Clematis glycinoides* are growing on Eucalypts close to the King's Highway (Cann River Road) and to Flat Rock Creek, in the Parish of Kowat, County of Croajingalong. At the request of Mr. A. M. G. Thorn, of Kowat, the plants were measured by Mr. W. Hunter, Lands Department Surveyor, of Bairnsdale. Mrs. Thorn, in forwarding particulars, states that the plants, which have been under observation for some years, are definitely *C. glycinoides*. The tallest is 85 feet in height, another 75 feet and others considerably more than 50 feet.

Plate III

From a painting by M. I. Howie.

"Velvet-foot" Fungus *Collybia velutipes*

A PAINTER OF FUNGI

By CHARLES BARRETT

Triumphing over ill-health, Michael Howie, when he died, had accomplished work that deserves more than the praise of a few botanists, concerned chiefly with scientific values. As a painter of Australian fungi, the young self-taught artist excelled. His talent was developed and used despite a handicap that deprived him of active bush outings. He could not go rambling in their haunts, but toadstools and their kin were brought to him, and he preserved the shapes and colours of these short-lived plants. His paintings form a gallery unique.

When some of his paintings were sent to me, I thought at once of the *Naturalist*, and later it was arranged that Mr. J. H. Willis and his brother-in-law, the artist, should contribute to the Club's journal. The number devoted to Gilled Fungi of Victoria was the result. A notable issue, which has done much to popularize fungi and introduced many of us properly to familiar plants, known vaguely as "toadstools." When the *Victorian Ferns* book was in preparation, Mr. Howie was asked to do the paintings for colour plates; a commission executed at a nominal fee. He would have given them, as he gave the use of his fungus pictures, had we been willing. He loved colour drawing, and worked for the joy of the working.

A brave spirit had Michael Howie; and one likes to remember him with that quiet smile of his; or the eyes revealing keen interest in talk about his favourite subjects. From a few years, after choice of a special field, he gained his merit—establishing a claim to front rank as a painter of fungi. He made no claim himself, being content to work, and rest, and work again. An hour at the table tired him. His achievement becomes more remarkable when his handicap is remembered. Two hundred paintings, many of them little masterpieces; all admirable.

Born on March 26, 1900, at Creswick, Mr. M. I. Howie was never strong, suffering from a curious muscular atrophy which prevented him from walking when 16 years of age. Being extremely fond of outdoor life and rambling in the bush among the wild things he loved, the lad felt keenly this enforced inactivity; he became entirely dependent upon others to wheel him about in an invalid chair. Despite such a handicap, his natural cheerfulness and optimism caused him to look about for avenues of service, and during the war years—three brothers were at the Front—he determined to make use of a natural gift for colouring. So he began painting patriotic designs on badges, ribbons, knitting-bags, etc.; hundreds of these were executed and sold readily for Red Cross funds.

Without ever a lesson in drawing or painting, he became an

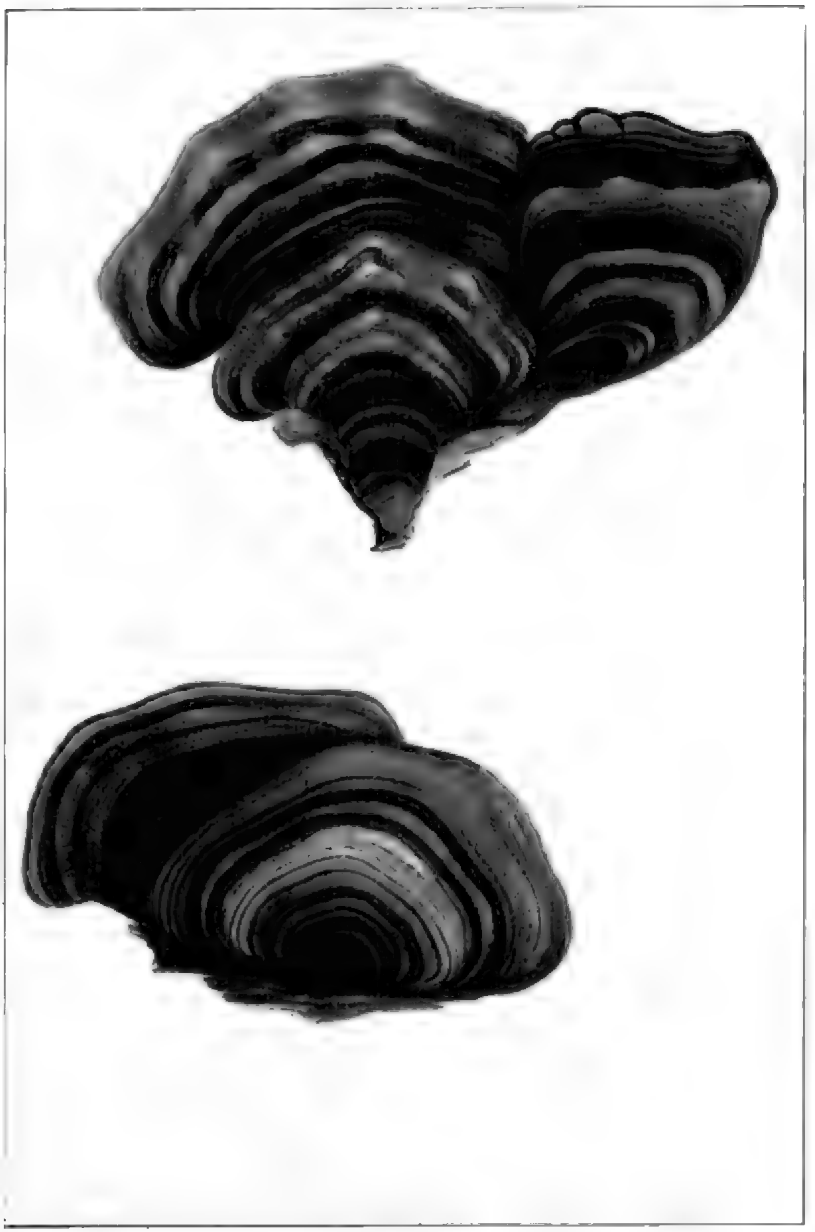
artist and evolved a technique that turned his interests to commercial possibilities. By 1926 he had orders from several large stationery firms in the cities for oil-painted calendars and suède work, the designs being principally of wildflower and bird subjects. In 1931, at the suggestion of Mr. J. H. Willis (then a close friend),

From a painting by M. I. Howie.

Rozites australiensis

he commenced painting a series of fungal studies from fresh specimens gathered by his future brother-in-law, and, with a little experience, proved that he had a special gift in this direction. A serious illness in 1934 left him more incapacitated than ever, and for months it was believed he would never be able to paint again; however, by resting his weakened arms on a table and moving the brush with wrist only, he was able to do a little painting each day, achieving remarkable results. His best work was completed after this illness, and from then until his death, on January 21, 1936, he

Plate IV



From a painting by M. L. Howe

"Rainbow Fungus" *Polystictus versicolor*

delineated no fewer than 200 different fungi—a collection of accurate nature paintings which are among the finest of their kind in Australia.

The Botany School, Melbourne University, on seeing some of these plates, commissioned the artist to supply the School's reference library with as many copies as he was prepared to make. At the time of his death he had sent to the University seven dozen paintings of fungi, many species being figured on some of the plates. He also painted numerous pictures of Toadstools and wildflowers for *The Weekly Times*; they were reproduced in colour.

With his exceptional talent and triumph over a disability that would have deterred the ambition of most artists, Michael Howie was withal a modest, retiring man of charming personality who had many distinguished friends and no enemies of his own making. He had varied literary interests, for his was a keen mind well balanced through intensive reading. He wrote verse and short plays of some merit, and in 1933 won second prize at the South Street Literary Competition for an essay on *John Galsworthy, the Man and His Books*. He was an enthusiastic debater, and was intimately connected with many phases of church activity until compelled to retire by increasing physical weakness.

The work which Michael Howie accomplished in his brief lifetime was inspired primarily by the love of service. His work will endure. A few of his paintings are here reproduced. Even without colour, their delicacy and charm are apparent.

NOTES ON THE ILLUSTRATIONS

By J. H. WILLIS

Polystictus versicolor.—Called "Rainbow Fungus" from the beautiful coloured zones usually present on its surface, this thin, leathery bracket fungus is common in almost every corner of the earth, wherever timber is subject to rot. Usually it attacks dead wood on which the fan- or rosette-shaped fruiting bodies may be seen at any time of the year. Fencing posts, telegraph poles and woodstacks are frequent hosts, and occasionally the fungus turns parasite and attacks living fruit trees or garden shrubs. The upper, zoned surface is finely velveted, the lower white and consisting of myriads of tiny pores from which the spores are dropped.

Rozites australiensis.—A stout and often very large toadstool (up to a foot broad) with white caps as smooth as kid; it is at first round and loaf-like, expanding as it grows and exhaling a strong, rather pleasant smell. The gills are pale brown and the bulbous stem clad in several ragged envelopes representing the point of attachment of the thick veil. Occurring usually in colonies on forest soil and rather uncommon.

Collybia velutipes.—The "Velvet-foot," so-called from its brown or blackish velvety stems, grows in dense clusters against logs and stumps usually of some wattle species. The caps are at first glutinous and may vary in colour from pale yellow to rich

From a painting by M. I. Howie.

"Inky-cap" Fungus, *Coprinus fuscescens*

orange-brown or chestnut. This toadstool, though said to be edible, has a decidedly inferior and rather unpleasant flavour. Common on mossy trunks in mountain gullies.

Coprinus fuscescens.—A typical representative of the "Inky-caps" whose delicate fruiting bodies are destined to rapidly shrivel up or dissolve in an unwholesome mass of slime. This grey-brown species has rather large cylindrical caps (2-4 inches high) which grow in large clumps at the bases of rotting stumps. Not uncommon in deep-soiled mountain gullies. Most Coprini are edible, but seldom gathered in sufficient quantity to be cooked.

THE "COMMON" SUN ORCHID, *THELYMITRA LONGIFOLIA* R. and G. Forster

By W. H. NICHOLLS

In *A Census of the Plants of Victoria* (1929) *Thelymitra longifolia* is credited with a wide distribution in the State, and most other publications concerned with the flora of Australia give it prominence as "a common species." But it is strange that a plant (supposedly) so widespread should not be represented by at least a few specimens at our Wild Nature Shows, or at Club meetings held during its flowering season. Since the Club's inception, no record of an undoubted example of *Th. longifolia* has appeared in *The Victorian Naturalist*.

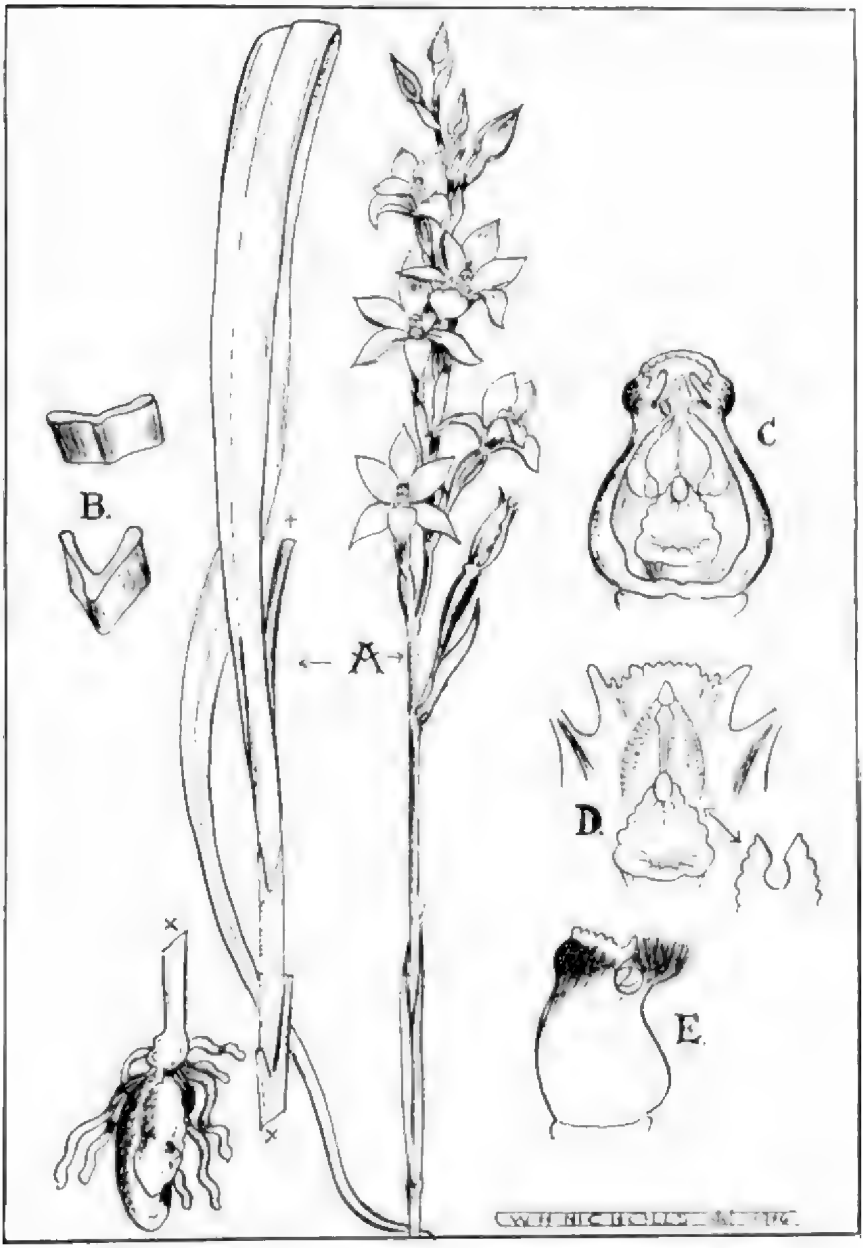
For many years—since—1926—I have sought this long-leaved species; but in vain. Many representative herbaria have been diligently examined for specimens, and collectors of Orchidaceous plants in other States have been frequently asked for this Sun-Orchid. None has been received.

In collections of Australian plants other forms have been incorrectly diagnosed and labelled "*Th. longifolia* Forst." Careful examination has shown these mostly to be *Th. pauciflora* R.Br., and *Th. aristata* Ldl., while some few were proved to be *Th. grandiflora* Fitz.: even *Th. media* R.Br. has been represented as *Th. longifolia*. *Th. pauciflora* is sometimes recorded as a synonym of the Forsters' species, but it has, though given to marked variation, the definite qualifications of a valid species.

Th. longifolia was first found in October, 1769, at Tolaga Bay, by Banks and Solander, during Cook's first voyage. Solander, in his manuscript, *Primitiæ Floræ Novæ Zelandiæ*, described it under the name of *Serapias regularis;* but as the work was never published the name has no standing in botanical literature. It was also collected by the two Forsters on Cook's second voyage, but in what locality is not stated, although it must have been Queen Charlotte Sound or Dusky Bay. After their return it was published in the Forsters' *Characteris Generum Plantarum*, under the name it now bears. It is now known to range from the Three Kings Islands and the North Cape southwards to Stewart Island and the Auckland Islands, and ascends the mountains to a height of 4,000 feet. It occurs in all soils and conditions of habitats with the exception of dense forests. Its range of habitats is remarkable.[1]

Th. longifolia is recorded from New Caledonia also. I have personally examined a flower of one of R. H. Compton's specimens (No. 1946) collected at Touine (30/10/1914). For this specimen-bloom, and also for photographs of Compton's material and the Forsters' type specimen, etc., I am indebted to Mr. J. Ramsbottom, Keeper of Botany at the British Museum, London. The most

1. *Illustrations of the New Zealand Flora*, Cheeseman, ii, 1914, pl. 192.



Common Sun Orchid, *Thelymitra longifolia*

interesting figure represented in the photographs is, of course, the type specimen of *Th. longifolia*. The specimen is about 32 cm. in length, the leaf is very long, ribbon-like, and the flowers number (apparently) seven. The figures[2] accompanying the original description of *Th. longifolia* are apparently drawn from herbarium material. Very little detail is shown, and for purposes of diagnoses they are practically valueless. Cheeseman's figures,[1] however, give a very clear idea of the characteristics of *Th. longifolia*. A careful examination of the column of Compton's specimen-flower (No. 1946 specimen) was undertaken: the column has a long tube-like mid-lobe—unlike that in *Th. longifolia* but similar to the mid-lobe of Lindley's *Th. aristata*! But the examination of additional material must be undertaken before such a statement can be considered as of diagnostic importance.

Miss M. Sutherland, Assistant Botanist, Dominion Museum, Wellington, New Zealand, has courteously forwarded fresh, also preserved specimens of *Th. longifolia*, collected in several localities in the Dominion, but chiefly "on the hills east of Wellington Harbour, growing on dry ridges of poor clay-shale soil or rotten greywacke rock. The area is partly under Nothofagus Forest (*N. fusca*), *cliffortioides* and *truncata*, and partly open Manuka ridges, succeeding burnt bush, the orchids growing mostly on the open ridges."

Mr. H. B. Matthews, of Remuera (N.Z.), so well-known in botanic circles, writes: "*Th. longifolia* Forst. is a very variable plant, the leaf, sometimes over 18 inches long, and nearly one inch wide, tapering to a point; other specimens have the leaves varying much in length and width, from a few inches to a foot or more, but are usually flat and not grooved much after leaving the stem. The leaves vary in colour also. The size and colour of the flowers is likewise variable, but the column, with its short dense tuft of cilia, maintains its characteristic features in all the different forms."[3]

Dr. R. S. Rogers, of Adelaide (S.A.), writes of this species as follows: "I have seen Forster's illustrations and they are so bad as to be practically useless for purposes of identification. His description is hardly more helpful. Consequently, for many years almost every *Thelymitra* with hair tufts was placed under this species, with the result that a very much wider distribution was assigned to it than was warranted. We have to remember that the original type came from New Zealand and it is not impossible that it does not even *extend* to Australia. The plant bearing that name in New Zealand does not appear to me to be represented with certainty by anything I have seen in Australia. The leaf is *very* different and there are distinctions in the column which should make us hesitate in accepting *our* species as identical with that in the Dominion."

2. Char. Gen. Plant., 88, tab. 49.

3. Mr. Matthews forwarded excellent photographs of *Th. longifolia*.

Thus, it appears that this species is not Australian and should be deleted from our records.

Description of *Th. longifolia* Forst.—A variable plant, both in height and robustness, but typically about 30 cm. in height. Leaf long and ribbon-like, deeply channelled towards the base, but rather flat and acuminate beyond. Flowers about 7 or 10 usually, pale blue or whitish, about 2-2·5 cm. in diameter. Column short, rather stout, not definitely hooded, margins of mid-lobe, corrugated; the forward margins produced into two subulate or tooth-like apices; lateral lobes erect, with short, dense white hair tufts. Stigma comparatively small, situated in the lower part of the column. Flowering during November and December.

KEY TO PLATE

Th. longifolia Forst.—A: Typical specimen. B: Sections of leaf, lower figure from base, upper figure from above. C Column from front (hair tufts removed). D: Showing formation of mid-lobe, etc. E Column from side.

A "MODEL" OF *DIPROTODON*

Middle-aged members of the Club will remember the huge wooden figures of *Diprotodon* and a Giant Extinct Kangaroo, which excited their childish wonder at the Zoological Gardens. The Zoo we knew as children is very different from that of to-day.

Few relics of our Golden Age remain; but none of those gone is much regretted. We should like them back only to smile at, those mighty wooden figures which stood among gum trees in a paddock enclosure. They were dismantled more than twenty years ago. Glancing through a collection of photographs, mostly taken by the late Mr. Dudley Le Souëf, I came upon this portrait of the wooden *Diprotodon*, with Wattie Parsons standing beside it. A famous elephant keeper was Wattie; his son is employed at the Zoo.

Crude life-size "models" were those old wooden structures, with shape, but not form; mere flattened things, painted on one side in "natural colours." They might have been cut out of a signboard or the wall of a cottage. And yet, in our eyes they were wonderful thirty or forty years ago.

A pity that they were not preserved as historic relics of an age when children were easily pleased and had the lost sense of wonder. Almost they belong to the era of Dundrearys and top hats, and peg-top trousers. Our fathers have told us that, as small boys, they marvelled at those wooden figures, Titan Kangaroo and *Diprotodon*. The latter was the more intriguing of the two; and one youngster remembers how he shivered at the thought of meeting such a monster in the bush. *Diprotodon*, he had been told, roamed over the site of Melbourne about a million years ago. Imagination peopled West Melbourne Swamp with wallowing beasts larger than a Rhinoceros and Wombat-like in form. The Kangaroo was less impressive, perhaps, because only an enlargement of a familiar animal—the Giant Red Kangaroo.

C.B.

Plate V

Life-size Wooden Figure of *Diprotodon*.

RAVENSWOOD IN THE AUTUMN

By A. J. TANGELL

"What do you expect to find in weather with the temperature at freezing point at early morning?" I am asked "And a rather dry season in the country," I add. Well, I had told our Editor, who was for helping a botanist from abroad, that the chances were very remote of finding carnivorous plants in May and June when the search should be in the springtime of Victoria. Still, I had found some of them in odd years, and not in inaccessible places, so I hoped that this might be one of the favourable seasons.

Why not try your North-West correspondents? I had urged. So the North-West I decided to try to investigate myself. If I went alone, no companion would be disappointed if I failed. I decided, therefore, to jump off at a country railway station and see what a six- or eight-mile walk would give me. I soon, however, noted the dry grass and conditions when uninfluenced by coastal showers of the south. One just as often overlooks in collecting, as he fails to re-find. But there is the thrill of the find. In autumn, one must not forget to be near the railhead at sunset even if that entails a two hours' wait for the return train.

I like Ravenswood because of its boundless paddocks, its rolling downs, and *Parmelia* (lichen)-covered granite outcrops, which hide the more distant domed hills In autumn one misses the lush green grass and the expectancy of many floral treasures. Compensations are in bird life, mothering ewes, clear atmosphere lending enchantment when the hills are reached, and Mitchell's route is being traced towards the Grampians. One is compelled to pause often to drink in the intoxicating views extending many miles to horizons of high mountain ranges or peaks that must have served well in the Geodetic Survey of the early colonists, and showing that the surroundings of Bendigo are by no means flat while allowing the northern rivers to flow towards their mother Murray. One reflects on the quantity of fine timber that has been taken from these pastoral flats which were denuded largely for mining purposes by great-grandfather when delving in or to make cradles for the rich wash dirt.

Many fine umbrageous Red Gums (*Eucalyptus rostrata*) line the creeks, and on these I see a few blossoms and countless buds, while dwarf Long-leaved Box (*E. eloeophora*) trees occupy the stony hillsides. Sometimes the Gums are so covered with pendant branches of Mistletoe, abundant in stout bright berries, with richly-coloured foliage and stems as if sap had been robbed together with colouring matter, and rendering it almost impossible sometimes to discover if the foliage was *Loranthus* or *Eucalyptus*. Small chattering parrots that might be Budgerigars, are in the trees. Black-and-White Flycatchers flit about in pairs and find food in the

sunshine. Flame Robins and mates are busy. Noisy Yellow-crested Cockatoo scouts warn the flock as they fly ungainly over my head, while Ravens and Magpies are restless or gather in groups searching the ground.

While following up a creek I notice a patch of brownish-yellow foliage and find it to be the Bulrush, or Bullrush, Cat's Tail, or Reedmace, upon which so much effort has been spent in the endeavour to create new species, with want of signal success. In our own State we find that the male and female flowers, which are the main features, are separated by a considerable space on the floral stalk where it will be found the males are at the top, the large plush-like cylinder, the females being underneath. There would seem to be little in the endeavour to make capital of the fact that, distance separating the sex organs, the spike of the female being interrupted or its length sometimes of a line, at others lengthening to one foot, should characterize different species as some have thought. Thus our Australian *Typha* has been given different names like *T. Muelleri, T. Basedowii, T. Brownii,* all included under *T. angustifolia;* and it is noted that the reduced length of the female spike is seen in the tropical forms while the longer are noted in temperate climes.

In Great Britain there is one species known as *T. latifolia* because of proximity and interruption. The flowers of the male are rather unkempt looking, nearly bare stalks, sticking out of the pretty plush cushion, but perhaps that is modesty on the part of the male, not seeking to detract from his consort. Really the sex flowers are like those of sedges or the *Carex*, the males superimposing the female, whose pistil organs are clothed in soft hairs that cover the ovaries and scales, while it is hardly to be guessed that the velvety cases contain one seeded nut. Our scientific and vernacular names are not always well chosen, but here they both are apt; *Typha* standing for a marsh and *bul* or *bull* referring to the size of the plant and its cylinder-like female organs. When kept too long dry, it is found that the cylinders burst and pour out a kapok-like material in a never-ending stream like mist, smoke or rain, giving rise to another Greek name very much akin to Typha. Our *Typha* has been of use to the Aboriginal, providing food from one part and fish spears from another, while earlier settlers used the "kapok" for stuffing pillows.

But we have outstayed our examination of the Marsh Reed, and we have just reached the hills after two hours from starting out. Autumn orchids should be in flower, but only *Pterostylis parviflora* is seen. *Lepidosperma laterale* and *Pelargonium Rodneyanum* are blooming. The twining *Thysanotus Patersoni* is not yet in flower and is examined for a sister without the robust tubers and earlier flowering period. The hill summit or ridge does not provide at this season too many specimens of smaller herbs or plant

life, but a beautiful Blue Gum foliage attracts one, suggesting *E. globulus* in its bloom. The saplings are not in flower or bud but are unique in their rich colouring, variety of forms of foliage and, as I count some eight different forms of leaves, think of the difficulty of trying to identify by shape of foliage. However, with lanuginated dark grey bark on the lower trunk and sinning whiter-brown of the upper branches and the cordate juvenile foliage, I do not hesitate to class it as one of the many species evolved from what was formerly varietal *E. cloeophloia* or *goniocalyx*, now constituted species. Acacias are confined to two species. The handsome many-parallel nerved *A. implexa*, with long, narrow 12-inch phyllodes narrowing into long petioles, glandular at join to the richly-coloured stalk and combining in its juvenile foliage both bipinnate and lance-falcate leaflets. Another striking feature is a handsome shrub six feet square, one mass of flowers. Well has *A. colletioides* been dubbed "Wait a while," for it took me quite a minute or two to detach small pieces from the parent, during which operation I was well pricked for my trouble. It is distinguished by its many pedunculed clusters of flowers, its articulated, pungent, subulate phyllodes. It keeps well in water if placed in a vase while boiling hot. I have it looking as if just picked after a week at home.

I am tempted to turn down a bush road leading Heathcote way, especially as hereabout I know I shall find in season *Cheiranthera linearis*, so reserve that for a November outing. It only grows sparingly and is wisely protected rigorously but it is a beauty to behold. An hour to go reminds me that I have three miles before sunset when I must be in hail of my railhead or I shall stumble along in the darkness in "no road this way." With back turned to hills I descend and notice two trappers setting their evening traps, for rabbits are plentiful, although the wire netting should keep them out, as the barb wire should myself. I still have time to inspect the soaks emanating from under the granite tors, but find little except a *Hydrocotyle* equally at home in the turbid moisture, as it is in climbing a crevice in the rock. With it is *Callitriche Muelleri* in flower and fruit; also the ever welcome flowering *Wahlenbergia* with both brown and white vestiture underneath its flowers of blue. *Cassinia arcuata* flowers are falling and *Acrotriche serrulata* shows no blooms, though its sister, *Astroloma humifusum*, lends brilliant coloring by its scarlet tubes that fall when touched. Still I hunt unsuccessfully for *Lentibulariaceae* and *Drosera* that I have not seen traces of all day. *Casuarina stricta's* flowers of both sexes are nearly out, but will not gratify me. As I wait for the train I watch Jupiter rising in the east, and Orion set in the west, while enlarged by dip and refraction Scorpio and Aquila seem twice their normal size viewed in the frosty air

"LET US AWAY TO THE HILLS"

By BLANCHE E. MILLER

"Life is short—commercial competition and the race for advance are keen . . . so let us away to the hills," remarked Dr. T. P. Lucas, philosophically, in a paper which he read before the Club in its first year. Whether or not the members needed any such suggestion it may be difficult to determine, but in the lists of excursions we have irrefutable evidence of the lure of the hills.

Quite early in the history of the Field Naturalists' Club an outing was arranged to the You Yangs, which lie some 30 miles south-west of Melbourne. Rising abruptly from the surrounding plains, they form a conspicuous landmark. It was necessary for the excursionists to catch a train at 6.30 a.m. Alighting at Little River, there was still a considerable mileage to be covered on foot before reaching the range. Under such circumstances, the day's outing must have been rather strenuous, but as some rarities, both botanical and entomological, were collected, a similar excursion was arranged for Cup Day, in the following year.

"For once in your life rise early," Dr. Lucas had further advised his hearers. Singularly enough, one member who wished to attend the second trip to the You Yangs had, perforce, to rise at 4 a.m. and walk into town from Kew!

Everyone who has traversed the Werribee and Keilor Plains is aware of the peculiar way in which the day's normal temperature becomes intensified. Autumn's bracing air miraculously changes to a piercing gale, and summer's most gentle zephyr is like a blast from a furnace. True to form, the Werribee Plains proved uncongenial on the occasion of the Club's second visit, in 1882. Torrential rains succeeded a hurricane wind shortly after noon, and precluded the possibility of any further collecting. It must be remembered that, in bygone days, the Field Naturalists' excursions were primarily collecting trips, not merely social jaunts, so it is little wonder that, in the face of such adverse conditions, the enthusiasm evidenced the previous year waned considerably. Nor did the You Yangs again appear on the official syllabus for over a quarter of a century!

In due time, other leaders found much of interest in visits to the locality, and various reports have appeared in *The Victorian Naturalist*, mostly referring to the geology, the botany, and the insect life.

So many years had elapsed since a Club picnic had been held that even many of the older members thought the idea was an innovation when it was again mooted by Mr. V. H. Miller, in 1931. "Let us go to the hills," I suggested, and after deliberation the choice fell on the You Yangs, for many reasons. Essentially a social outing, those who wished to rest and chat could, from the picnic

ground, survey a scene that is the fulfilment of all that Matthew Flinders prophesied when he viewed it 130 years before. The energetic ones who essayed to follow the tourist track, and climb to the very top of Station Peak, or as it is now called, Flinders Peak, would be amply rewarded with a panorama that embraces seascapes and landscapes, pastoral areas and growing cities. Possibly others would prefer to make use of the day, and every branch of natural history was catered for, within the confines of the Park.

Especially does the You Yangs merit a greater share of attention from the bird-lover than has formerly been the case, for it marks the most southern limit of many species of birds not usually found nearer to Melbourne. The surrounding country being occupied tends to make the birds concentrate on the ranges. It is true such well-known forms as Magpies, and Ravens, and Magpie-larks prefer the open spaces. Harriers patrol the low-lying areas, and Plover dearly love the moist places. Even in mid-winter some Straw-necked Ibis may be seen on the plains, except in very dry years, and any tiny little sheet of water will attract the lonesome White-faced Heron. The Emus which Flinders saw have long since been absentees, and the Bustard that provided a variation from the constant damper and mutton of the early pastoralists, has not been recorded from the plains for many a long day, although still a few find sanctuary elsewhere.

Any season of the year is a good time to visit the You Yangs, but the rarer forms of bird-life are spring and summer visitors. Then it is that the Black-eared and the Square-tailed Cuckoos arrive with their better-known brethren, the Pallid, the Fantailed, and the Bronze. The colourful Rainbow Birds, as well as some Honeyeaters that are not permanent residents, are striking examples of that oft-reiterated assertion that, generally speaking, birds nest in the coldest part of their range. Dollar Birds are other distinguished visitors, as well as the Cuckoo-Shrikes—shrike-like birds with the flight of a Cuckoo. The flowering of the gums synchronizes with the arrival of the Lorikeets—rowdy, irresponsible rascals; and with the Swift Parrot, who indulges in similar nectars, but "carries his liquor like a gentleman"!

In the Park, the lower grassy slopes provide for many ground-loving birds, Whitefaces, and the decorative Diamond Firetails, relentlessly trapped in many localities, although on the fully protected list. Many species of lizards bask on the fallen leaves, and can momentarily cause apprehension in an area known to be frequented by snakes. Perhaps of all the Robins, none is more sought after than the Red-capped from the north, which nests in the wattle plantations. It would, indeed, be a poor day if one did not list at least fifty species of birds, and still have ample time for special observations of favourite or uncommon types. Then, towards close of day, when the shadows lengthen, there are secluded pools that are worth visiting.

Perhaps few people other than field naturalists realize how important it is to a bird to have ample bathing facilities. No better method of learning the truth of this statement can be recommended than to draw a car fairly close to water, and await events. Movement is the most disturbing thing to any wild creature. If you can keep perfectly still, all is well, and a car allows some little movement, which is not noticeable to a bird. There is a favourite spot to which we always make, at the conclusion of a visit to the You Yangs, where many birds assemble for their evening ablutions. Christopher Robin's joyous memories of his bath are surely echoed by the White-plumed Honeyeater—the "Greenie" of our suburban gardens—who hugely enjoys a game of "sea-sides," a recreation shared equally by his smaller cousins, the dapper little ones with the white collars, and those that affect a brown velvet beret.

Towards sunset, numbers of Bronze-wing Pigeons arrive to drink, standing on the higher bank to reassure themselves that they are not in any danger, before walking in a stately way to the edge of the water. Always, there is a scout on guard, for once a pigeon starts to drink, it seldom raises its head until finished. They are the last of the day's birds, and take their departure at the setting of the sun.

"Life is short . . . so let us away to the hills."

PUBLICATIONS RECEIVED BY FIELD NATURALISTS' CLUB OF VICTORIA

Agricultural Gazette of New South Wales; Australian Museum; *Australian Naturalist*; Australian Science Abstracts; *Australian Zoologist*; *Austral Avian Record*; Auckland Institute and Museum, California University Pubs.; Canterbury Museum; Commonwealth of Australia; Dominion Museum, Wellington; *Emu*; Entomologists' Monthly Magazine; Field Columbian Museum of Natural History; Kew Botanic Gardens *Bulletin*; Linnean Society of New South Wales; *Lorquin*; Melbourne Public Library and Museum; Microscopical Society of Victoria; New South Wales Department of Mines; New South Wales Fisheries; *North Queensland Naturalist*; *Philippine Journal of Science*; Pomona College, Claremont, *Jour. of Ent. and Zoology*; *Queensland Naturalist*; *Queensland Museum Memoirs*; Royal Society of New South Wales; Royal Society of Queensland; Royal Society of South Australia; Royal Society of Tasmania; Royal Society of Victoria; Royal Society of Western Australia; Royal Zoological and Acclimn. Society of Victoria, Smithsonian Institute; South Australian Museum; *South Australian Naturalist*; *South Australian Ornithologist*, Sydney University Reprints, *Tasmanian Naturalist*; United States National Museum; Victorian Mines Department; Western Australian Museum; *Western Australian Naturalist*.

The Victorian Naturalist

Vol. LIII.—No. 3 July 8, 1936 No. 631

THE FIELD NATURALISTS' CLUB OF VICTORIA

The Annual Meeting of the Club was held in the Royal Society's Hall, on Monday, June 8, 1936. The President, Mr. G. N. Hyam, presided and about eighty members and friends attended.

The President stated that copies of Vol. 50, No. 12, and Vol. 51, No. 1, of the *Victorian Naturalist* were urgently wanted by the Club; and asked that members who had spare copies would donate them.

National Monuments.—The President announced that arrangements for a conference of all interested Societies were in hand.

The Editor stated that the Shell Book would be available shortly and that preliminary sales were very satisfactory.

WELCOME TO VISITOR

Mr. Charles L. Barrett introduced to the meeting a distinguished visitor, Dr. F. E. Lloyd, Emeritus Professor of Botany, McGill University, Montreal, Canada. He stated that the Professor was the foremost authority on Carnivorous Plants, and had discovered several new species in Australia already.

The President extended a welcome to Professor Lloyd, who suitably replied.

CORRESPONDENCE

From Mr. J. H. Willis, thanking the Club for sympathy expressed in his recent bereavement.

From Miss Frances Esperson, Lardner, regarding the Pink Salt Lakes.

REPORTS ON EXCURSIONS

Excursions were reported on as follows:—Belgrave, Mr. G. N. Hyam read a comprehensive report on behalf of the leaders, Messrs. Chalk, Hooke and Stewart. Mr. Ivo Hammett and Mr. A. S. Chalk reported on the Botanical Gardens Excursion. Mr. Hammett stated that Mr. St. John was unable, through an accident, to act as leader.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as Ordinary Members of the Club:—Miss Eileen Mason, Messrs. F. Fergus, H. Reeves, and W. D. Andrew; and as Country Member, Mr. J. Philphot.

ANNUAL REPORT

The Annual Report was read by the Hon. Secretary. On the motion of Mr. J. W. Audas, seconded by Mr. A. P. Underwood, it was received, and on the motion of Mr. A. S. Kenyon, seconded by Mr. A. S. Chalk, adopted. Mr. A. J. Swaby congratulated the Committee on a very fine report.

BALANCE SHEET

The Balance Sheet was read and explained by Mr. A. G. Hooke, who moved its adoption; this was seconded by Mr. S. R. Mitchell. Mr. G. N. Hyam thanked the auditors and the treasurer for their efforts and put the motion, which was duly carried.

ELECTION OF OFFICERS: 1936-37

The President, announcing that only one nomination had been received for the office, declared Mr. S. R. Mitchell the new President, and vacated the chair in his favour. Mr. Hyam congratulated Mr. Mitchell, who suitably replied.

The following officers, being unopposed, were duly declared elected:—

Mr. Geo. Coghill, Mr. A. H. Chisholm, C.F.A.O.U., Vice-Presidents.
Mr. J. Ingram, Treasurer.
Dr. C. S. Sutton, Librarian.
Mr. W. H. Ingram, Assistant Librarian.
Mr. Charles L. Barrett, C.M.Z.S., Editor.
Mr. F. S. Colliver, Secretary.
Mr. L. W. Cooper, Assistant Secretary.

On a ballot being taken the following were elected as members of the Committee:—Messrs. V. H. Miller, A. S. Kenyon, M.I.E. (AUST.), C. Daley, B.A., F.L.S., E. E. Pescott, F.L.S., and H. C. E. Stewart.

To test the feelings of the members as regards the proposed transfer of the Club Rooms to the new Herbarium a ballot was taken. The result was strongly in favour of remaining at the Royal Society's Hall.

PRESIDENTIAL ADDRESS

The new President, Mr. S. R. Mitchell, then called on Mr. Hyam to deliver the Presidential Address, which was entitled "Fields for Naturalists." Mr. Hyam made valuable suggestions to members who might wish to take up natural history, but who believed themselves to be handicapped through lack of scientific training.

NATURE NOTES

Notes were contributed as follows:—

Ants as fossil collectors, Mr. F. S. Colliver. Mushroom growing through a pumpkin, Mr. J. W. Audas. Shed skins of Brown Snakes, Mr. A. H. Chisholm. *Callitris* sp. growing at Yan Yean, and Crimson Rosella's new food, Mr. V. H. Miller. Structure of *Eugenia* seeds, Mr. A. J. Swaby. Birds and Pepper-tree berries, Mr. L. W. Cooper. (This was further spoken to by Messrs. Chisholm, Chalk, Kenyon, Underwood and Hammett.) Wedge-tailed Eagle perched low down, Miss R. S. Chisholm.

EXHIBITS

Mr. H. Stewart.—Commoner species of Fungi from Sherbrooke, including *Armillaria mellea* ("Honey" Fungus), *Hypoloma fasciculare*, *Cortinarius Archeri*, *Cortinarius cinnamomeus* (brown gills, dull green cap), *Hydnum repandum*, *Trametes lilacino-gilva*, *Mycena* sp. ("Pixie's Parasol"), *Stereum lobatum*, *Polystictus versicolor* ("Rainbow" Fungus), *Collybia velutipes* ("Velvet-foot"), *Clavaria pyxidata*, *Clavaria cinerea*, *Fistulina hepatica* ("Beef-steak" Fungus), *Pleurotus kimpas* (luminous), and *Pleurotus sub-applicatus*.

Mrs. J. J. Freame.—Conglomerate of fossil Sea-Urchins (*Lovenia forbesi*) from Beaumaris.

Mr. L. Wilson.—A fasciated form of *Casuarina stricta*.

Mr. Noel Lothian.—Photographs of *Acacia armata* growing out of lava cliffs at Anakie Hills.

GENERAL BUSINESS

Mr. W. H. Ingram remarked that, as a proposal for the transference of the Aquarium was being considered, the Club should take steps to bring before the authorities the desirability of having the Aquarium at the sea-side, preferably St. Kilda. It was decided that the matter be referred to the Committee for consideration.

The meeting was adjourned for the conversazione.

FIFTY-SIXTH ANNUAL REPORT, JUNE, 1936

To the Members of the Field Naturalists' Club of Victoria

Ladies and Gentlemen,

Your Committee has pleasure in submitting the fifty-sixth Annual Report.

The membership is as follows:—Life Members, 10; Ordinary Members, 240; Country Members, 77; Associate Members, 29; total, 356. This represents a decrease of 5 on the figures of the last report (1935).

We record with sorrow the death of five members of the Club.—Miss Doris Schulz (1931-36), Mr. C. F. Swinburn (1929-35),

Mr. F. Pitcher, a Foundation Member (1880-35), Mr. William Lawford, a Life Member (1928-36), and Mr. J. Howie (1935-36).

The Club also paid its loyal and sorrowful tribute on the passing of our late King and Emperor, George the Fifth.

Attendances at the meetings have been well sustained, the seating accommodation having been fully taxed on most occasions. The second room is used for the display of exhibits, which have been varied and interesting. The Committee would like to see even more exhibits, which greatly add to the interest of the meetings. The contribution of "Nature Notes" by members is also very welcome.

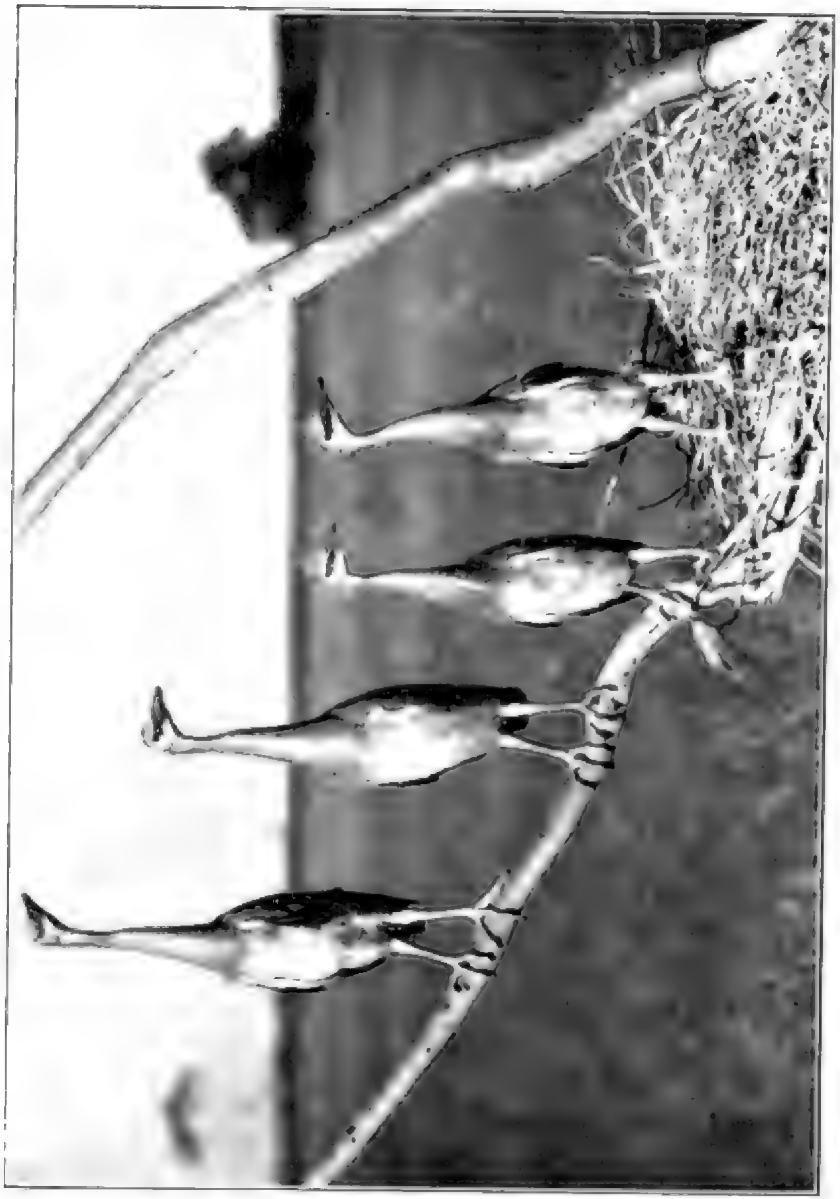
One meeting (May, 1936), was held in the new Herbarium Hall, the remainder were held at the Club Rooms, Royal Society's Hall. A comprehensive series of lectures has been given during the year, and the following contributed:—Presidential Address ("Science Marches On"), by Mr. A. S. Kenyon, M.I.E. (AUST.); "The Master Mimic," by Messrs. F. Lewis, R. T. Littlejohns, and A. H. Chisholm, C.F.A.O.U.; "British Wild Flowers," by Mr. E. E. Pescott, F.L.S.; "A North Queensland Night," by Messrs. A. N Burns and F. S. Colliver; "The Pollination of Flowers," by Mrs E. Coleman; "Animal Life in the Antarctic," by Dr. R. E. Priestley, M.C., M.A., D.SC. (Vice-Chancellor of the University of Melbourne); "The Western Grampians," by Rev. C. L. Lang; "The Centenary of Charles Darwin," by Messrs. G. N. Hyam, F. Chapman, F.L.S., A. D. Hardy and F. S. Colliver; "Common objects of the Sea-shore," by Messrs. E. E. Pescott, Chas. Barrett, C. J. Gabriel, A. J. Swaby, and others; "Nature in the New Hebrides," by Mrs. J. L. Fenton Woodburn; "Our Work and Experiences on Lady Julia Percy Island," by Mr. M. Blackburn, Jun. (Hon. Treasurer of the McCoy Society); and "National Monuments," by Messrs. G. N. Hyam and S. R. Mitchell. At the July meeting Mrs. V. H. Miller gave an interesting précis of the Club's Annual Meetings in past years.

The epidiascope was of great value in allowing lecturers to illustrate their papers by slides, photographs and other material projected on the screen.

During the year the order of Business at Meetings was changed, the "Subject for the Evening" now being number two on the agenda; this change seems to be popular. Twenty-four excursions were held in the year, three were cancelled through various causes. They were generally well attended, and gave a great deal of pleasure and interest to the members who were present.

Volume 52 of the *Naturalist* has been completed. The Committee hopes to return to the high standard set by Volume 50, as regards size and illustrations; but this depends on an increase of membership to balance the extra cost. Many papers of popular and scientific interest appeared in the volume and it is hoped that

Plate VI



A Brood of White-fronted Herons

suitable papers and notes will be forthcoming from members and others during the coming year.

The *Victorian Naturalist* is the leading publication of its kind in Australia, and it is the constant aim of the Editor to make it even more comprehensive and valuable. The demand for it from overseas is very gratifying.

The Club has continued its activity in preserving the wild life of Australia. Through our members' reports of vandalism and breaches of protection Acts have been made to the Committee from time to time; these have been referred to the proper authorities for action. Matters that have been inquired into include:—Protection of Rock Shelters, Park Preservation at Beaumaris, Proposed National Parks, Railway Posters showing the Picking of Wild Flowers in a Protected Area, Alienation of portion of Beaconsfield Reserve, Reservation of Roadside near Kowat, Cutting of Trees on Hume Highway, Duck Shooting on West Melbourne Swamp, The You Yangs as a National Park, The Boulevard through Studley Park, and Vandalism at Macedon and Flinders.

During the year the Club made efforts to have the Kestrel and Kites placed on the fully protected list. While not wholly successful, we have the satisfaction of knowing that now the Nankeen Kestrel and the Black-shouldered Kite are fully protected. The question of better protection of the birds of prey is still before the Committee. It is hoped that the whole of the Metropolitan area will be declared a sanctuary for bird life.

We report with satisfaction that the Rock Shelters at Langi Jirhan and Victoria Valley are now enclosed. The Cyclone Fencing Company, the Forests Commission, the Anthropological Society and the Field Naturalists' Club have jointly borne the cost of this important national work.

The Club still has three sub-committees in operation, they are (a) Geological, (b) Park-Lands, and (c) Nature Reserves. In conjunction they formed the "National Monuments" movement started at the May meeting of the Club at the Herbarium Hall. We believe this movement will have far-reaching effects. Numerous societies have promised their closest co-operation. The Committee asks that members will advise it of any objects or places considered worthy of proclamation as "National Monuments," should the necessary legislation be obtained.

Co-operation with kindred societies has been maintained, although we regret to state that the League of Nature Lovers has, through the ill-health of the Rev. George Cox, been forced to disband. We are represented on the Council of the League of Youth, and will co-operate in their efforts to interest the youth of Victoria in nature and civics.

The South Australian Naturalists' Club, The North Queensland Naturalists' Club, the Queensland Naturalists' Club, the Rangers'

League of New South Wales, the Ararat Field Naturalists' Club and the Victorian Aboriginal Group have been assisted by the Club at their annual shows.

The Victorian Advisory Council for Flora and Fauna, with our Mr. C. Daley as Secretary, is still active and their Annual Report shows much good work done; your Committee again voted £4/4/- towards their expenses.

The Wild Nature Show was again held this year and was opened by Dr. R. E. Priestley, M.C., M.A., D.Sc., Vice-Chancellor of the University of Melbourne.

The St. Kilda Town Hall was engaged for three days, and a very comprehensive show was staged. The attendances were not quite up to expectations, but a gratifying feature was that more than 26 secondary schools sent classes of scholars to see the exhibits, and most of them had questionnaires to answer. This shows that particular efforts made to help such classes should be well worth while in future shows. We must also endeavour to provide exhibits of fresh interest, and avoid undue repetition, and thus maintain and increase attendances.

The Memorial Plaque to Baron von Mueller has been erected in a good position in the entrance hall of the Herbarium.

The Librarian reports that numerous books and pamphlets have been bound during the year, a number of volumes and parts, including the *Chronica Botanica*, have been purchased; and overseas exchanges have been requested from and granted to China, Canada, and the Union of Socialist Soviet Republics. The list of exchanges has been reviewed: during the year various sets and parts of foreign publications have been presented to the University, Royal Society or Public Library, on the understanding that they be made available to members as required. Another Nature Book, *The Shells of Port Phillip*, by Mr. C. J. Gabriel, on the lines of the "Fern Book," is ready for publication, and will be available to members shortly. Advance sales for this book are very satisfactory.

During the year we have welcomed visitors from overseas and interstate naturalists' clubs, and we have also been pleased to see some of our own Country Members from time to time.

On several occasions the Club has arranged for exchanges or correspondence between people interested in like subjects; and we record with pleasure that overseas naturalists have been interested and that pleasure and profit to both sides is evident through the Club's efforts.

Several minor alterations to the Rules have been effected by special general meetings, the most important of these being arranged to allow the *Naturalist* to be classed as a "Scientific Publication" for postal purposes. This will save the Club a substantial amount. The Club has to thank Mr. L. W. Cooper, Hon. Assistant Secretary, for his efforts in securing this concession.

Grateful acknowledgments also are made to the following benefactors:—Cash donation, Mr J. E. Dixon, the Shell Company for the very fine display of Wild Flowers staged at the last Wild Nature Show; gifts of books, Miss Raff, *The Argus* Office, Messrs. R. O'Neil, C. French, V. H. Miller, W. H Nicholls, and Mr. Bromby.

Thanks are also due to the Melbourne daily press for generous assistance in bringing the Club's activities before the general public, and also for the prominence they give to natural history generally.

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

During the year 11 Ordinary Committee Meetings were held and the attendances of officers was as follows:—Messrs. G. N. Hyam, W. H. Ingram, V. H. Miller, L. W. Cooper, F. S. Colliver, 11; Dr. C. S. Sutton, Mr. J. Ingram, 10; Messrs. S. R. Mitchell, Chas. Daley, H Jenkins, 9; Messrs A. S Kenyon, J. W. Audas, C. L. Barrett, 6; Mr. Geo. Coghill, 5; Mr. A. H. Chisholm, 4

G. N. HYAM, President.
F. S. COLLIVER, Hon. Secretary

EXCURSION TO SHERBROOKE FOREST

Twenty-eight members and visitors journeyed to Sherbrooke on May 16, when fine weather ensured an enjoyable excursion. On arrival the party broke up into sections and penetrated the bush to the left of the main track and soon several groups of Lyre-birds' mounds were found, some with recent scratchings. Shortly afterwards the birds themselves were observed, one male displaying on a mound and treating his hearers to a fine repertoire of mimicry. The day's outing resulted in 27 additional species being added to the list compiled for Sherbrooke Forest. The total now is 130 distinct species. An interesting find was a patch of *Amanita*, of a species not determined, but resembling *Amanita strobiliformis*, a highly-developed gilled form, with perfectly shaped annulus and volva. The additions to the list already published are as follow:—

Amanita sp. (shining brown and acutely warted, like small form of *A. strobiliformis*). *Calocera cornea?* (simple clubs). *Cantharellus infundibuliformis? Clavaria ochraceo-salmonicolor. Coryne sarcoides* (red, gelatinous Discomycete). *Crepidotus sub-haustellaris. Dacryomitra* sp.? (yellow, gelatinous, pileate). *Dasyscypha lachnoderma* (small, woolly Discomycete). *Dasyscypha pteridophylla* (minute, yellow cups on dead fern stems). *Dasyscypha* sp.? (1 m.m., white, with glistening papillae). *Helotium citrinum. Hyponyces chrysospermus* (golden, parasitic on Boleti). *Lepiota paramulata. Mycena sanguinolenta. Mycena subnigra. Mycena leucerrima. Otidea* sp.? (superficial, white, and contorted). *Pleurotus sub-applicatus* (hoary, grey, with gelatinous layer and crinkled margin). *Polyporus rhipidium. Poria minutipora. Poria cincta. Psilocybe sub-aeruginosa* (blue stem) *Russula pectinata. Russula cyanoxantha? Sebacina incrustans? Typhula juncea* (long clubs on leaves). *Xylaria hypoxylon* (conidial form).

W., H., and S.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR 12 MONTHS ENDED 30th APRIL, 1936

RECEIPTS

Balance at Banks, 1st May, 1935—							
State Savings Bank					£472	7	2
Less E. S. & A. Bank Overdraft					12	10	0
							£459 17 2
Subscriptions—Arrears	£29	6	3				
Current	205	18	3				
In Advance	10	11	6				
				£245	16	0	
Wild Nature Exhibition Receipts				161	16	1	
Cash Sales of—							
Victorian Naturalist	£5	14	0				
Plant Census	0	8	6				
Fern Book, etc.	2	16	6				
Badges	1	7	6				
				10	6	6	
Advertisement in *Victorian Naturalist*				2	17	0	
Donation				1	0	0	
Baron von Mueller Fund—amount collected towards erection of Memorial Plaque				16	11	3	
Interest Received—							
Best Fund	£1	7	9				
Savings Bank Current Account	7	13	0				
Commonwealth Loan	14	0	0				
				23	0	9	
							461 7 7
							£921 4 9

EXPENDITURE

Victorian Naturalist—							
Printing	£162	17	6				
Illustrating	77	3	7				
Despatching	20	1	9				
				£260	2	10	
Wild Nature Exhibition Expenses				106	10	8	
Reprints				4	3	6	
Library				8	17	8	
Postage and Freight				7	3	2	
General Printing and Stationery				6	0	8	
Donations—							
Victorian Council of Fauna and Flora (2 years)	£8	8	0				
Langi Ghiran Cave Protection	5	0	0				
				13	8	0	
Rents—Royal Society Hall, £16, Committee Room, £4				20	0	0	
Caretaker				1	10	0	
General Expenses, Insurance, Bank Charges				7	7	9	
Baron von Mueller Plaque				17	17	0	
Badges and Die				8	4	10	
							461 6 1
Balance at Banks, 30th April, 1936—							
State Savings Bank				£469	0	2	
Less E. S. & A. Bank Overdraft				9	1	6	
							459 18 8
							£921 4 9

STATEMENT OF ASSETS AND LIABILITIES ON ASSETS.
30th APRIL, 1936

ASSETS

Arrears of Subscriptions, £90, estimated to realize, say					£50	0 0
Wild Nature Show tickets unpaid					1	1 0
Bank Current Accounts—						
State Savings Bank	£469	0	2			
Less E. S & A. Bank Overdraft	9	1	6			
	£459	18	8			
State Savings Bank, Special Trust Account	12	15	3			
					472	13 11
Investments—						
E. S. & A. Bank Fixed Deposit	£50	0	0			
Commonwealth Bonds	350	0	0			
					400	0 0
Library and Furniture, at insurance value					400	0 0
Epidiascope and stand, at valuation					70	0 0
Stock on hand of—						
Plant Census, at valuation	£17	2	0			
Club Badges, at valuation	8	3	7			
Fern Book, 1,622 at 1/1½	89	1	0			
					114	6 7
					£1,508	1 6

LIABILITIES

Late Mr. Dudley Best Fund	£50	0 0
Char-a-banc Fund	2	15 0
Special Trust Account	12	15 3
Subscriptions paid in advance	10	11 6
	£76	1 9

Examined and found correct on 8th June, 1936.

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

J. INGRAM, Hon. Treasurer.

THE WHIPSTICK SCRUB SIXTY-FIVE YEARS AGO

The Hon. Editor, *Victorian Naturalist*.

Sir,—In a recent issue of *The Naturalist* I read with interest Mr. J. W. Audas' article, "Through the Whipstick Scrub." I was well acquainted with the Whipstick some 65 years ago. Our house was on the Eaglehawk road above California Gully, and from our back gate across the gullies it was not more than a mile to the foot of Lightning Hill, where the mallee gums started. A band of happy schoolboys, most of our Saturdays were spent wandering over the hills among the bush, collecting insects, watching the birds, gathering gum, and all kinds of specimens. The engineer on the Nelson Reef Mine made me an insect box which I still have.

R. H. Nancarrow, who I think belonged to your Club, had a lease at Neilborough, where he had a mine, and lived on the edge of the Whipstick. He fed all the wild birds, had half a dozen magpies which knew their names when he called them, painted the bush flowers, and knew the wild life of the scrub. He used to visit our house, and taught me much bushcraft. Another of your members, the late William Thorn, of the Lands Department, was one of our band of bush boys; and another of my boyhood friends, Charles Daley, used to join us, or as he lived on the other side of Bendigo, we used to go with him up to One Tree Hill. Mr. Audas recalled many old-time memories in his account of the Whipstick scrub.

WALTER W. FROGGATT.

FAUNAL CORRIDORS

By ROBERT HALL

Corridors may explain themselves, e.g., by six areas:—

1. An ant is discovered in mass amongst the top foliage of a tree and again in the ground below that tree, but not in view between. On the main trunk there is a long, closed tube so that the ants may travel up and down unseen in their corridor.

2. A fish may travel to the west and return to the east annually as is indicated in corridor 5 of the map.

3. A bird may regularly migrate north-south as implied in corridor 9; or it may travel 1,000 miles in an oval; or, as a Lorikeet, from forest to forest regularly as they flower in rotation.

4. Some marsupials journey along extensive valleys on their annual change of feeding ground: while others have hillside corridors in dense scrub.

5. A Nutmeg Pigeon, e.g., daily flies across country in season E.-W., independent of valley courses or land masses; it finally crosses an expanse of sea water to an island nest.

6. Man, as with the Kula custom of the several island groups of S.E. New Guinea, is the western argonaut of the Pacific, having definitely his corridor of the sea. Warring as they have done for centuries amongst themselves these Papuans regularly have one week off per year for peace; their corridor of peace.

Corridors greatly exist by reason of winds and temperatures and in the sea by floating meadows. Firstly, under no power is the lowest organism of the meadow seen; then appear bacteria, followed by diatoms, protozoa and micro-crustacean life: one acre being proved to feed as much as 100 acres of land meadow.

A corridor is the most fascinating and essential feeding-ground for life in the sea; and, I am sorry to say, it is not free of tragedies, on a large scale, for many birds. These occur every few years when the wind sets in from the east and keeping there, as it did two years ago.

Briefly:—

Corridor 1 passes round the Pole, containing the Snow Petrel, Emperor Penguin, McCormick Skua Gull.

Corridor 2 is the subantarctic ribbon where the Great Skua Gull, Spectacled Petrel, and King Penguin, follow its line.

Corridor 3 More familiar types. Has its Crested Penguin, Short-tailed Petrel, and Richardson Skua Gull.

Corridor 4 branching for two sides of Australia has its minor corridors at 4a and 4b, passing annually between certain islands and devoted to the Humpback Whale. In the crescent of 23 the Whiptail (*Macruronus*) comes up from the south and the *Arripis trutta* comes down from the north, though just touching its convex face in force.

Corridor 5 is fish and mollusca terminating as shown in the map. At 5a the worn away or subsided neck divided the molluscan world of the west from that of the east. The resulting Bass Strait is now a three trunk centre of remarkable interest, where over 100,000,000 Petrels once nested, and where the barracouta, etc., daily ate some 35,000,000 young members of the herring family as they came in from corridor 8, and later.

Corridor 6 is the long, continuous outpost of 7, from which it has drawn its supply of birds, and at 6a made a great effort to change the colour of their clothes before passing them on to the farther west; 6a and 5b, though with an entirely different ecology, seem to have some common environment of great age. Six is one half of the great trunk corridor in the south, being parallel with the northern great half with birds. Corridors 11 and 5 with fish bear to each other in disposition but not in species.

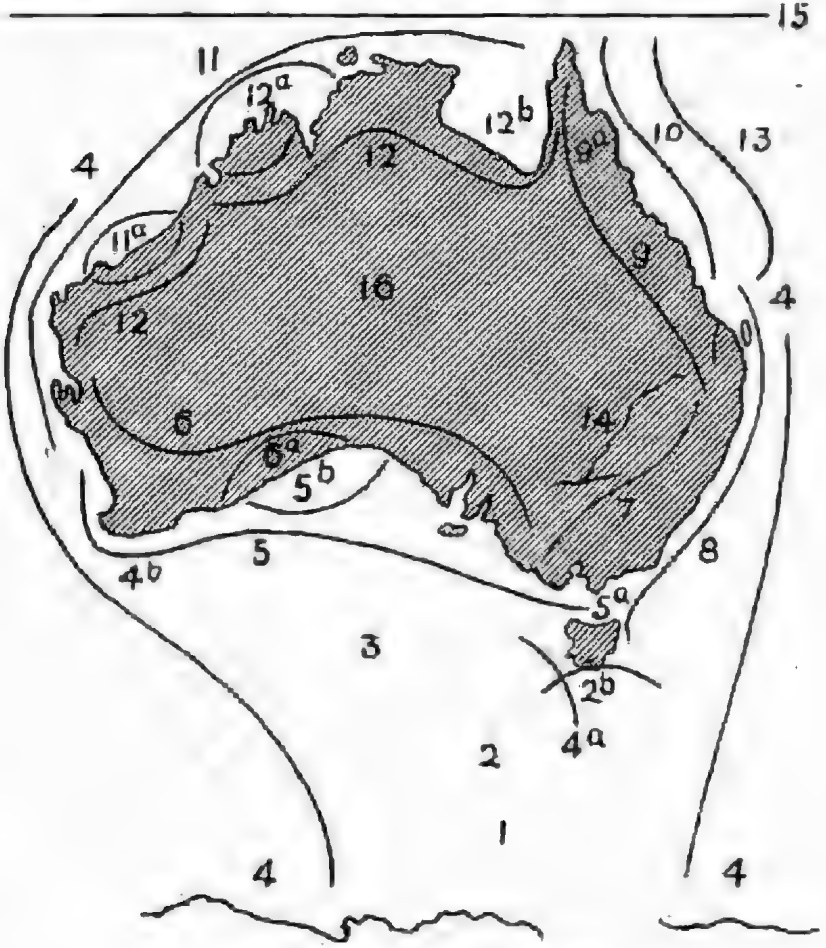
Corridors 7, 9, 10, 8; correspond in their distribution of birds and fish; 9a and 12b of 12 are ministered to by different actions of the S.E. trade wind, 9a getting its full share of moisture, while the dividing range keeps 12b dry, with the Gulf farmed for eight months off a long, dry sandstone range, and its bottom resulting from a sand detritus. This two corridor (9-10) parallelism for 1,000 miles has produced some likeness of home life amongst themselves with a difference in other corridors. Fig birds travel through the mid foliage; chaetodons through the mid coral.

Corridor 13 is an example of the oceanic type where we find the swordfish coming south outside the Great Barrier Reef and passing to the continental coast through the numberless Swain reefs.

Corridor 14 is freshwater in which *Oligorus* swims. Over the range at the head of the Darling, a second fish of this family lives in the sea for 1,000 miles within the Great Barrier Reef; and what different lives they lead. Amongst insects the native bee has no corridor west of 14. Owls by night in a drought use this corridor when the mouse plague has again appeared. The Masked Swallow uses it by day when following south the grasshopper plague coming as it does from Queensland into Victoria each few years; say from Bourke to Bendigo. The Derwent River corridor is conspicuous with galaxies. Last season one canner bought 24 tons of them as whitebait, being fry. Most of us know the Cucumber Herring of the Yarra corridor; all our rivers being seasonal corridors for breeding purposes by those species so inclined in the main trunk corridors; others being purely anadromous.

It may be seen that the north west has two great trunk corridors, 11 and 12, the first devoted to fish and the second to birds. There are several freshwater fish with their lateral corridors and a few sea birds with theirs. The land and water of 11a are different

to the land and water of 12a and there is a distinct range in colours between them. The Dampier current goes farther south than the moist air of the corridor 12 and gives the Abrolhos Islands a tropical effect in a temperate terminal corridor. Area 11a is a desert above high water mark, looking like a submerged desert



Map Illustrating Faunal Corridors

ten miles out at low water mark. The valuable large prawn has a corridor here so there must be plenty to eat. The toothless humpback whales find a rich plankton off the Lacepede Islands, their northern terminus. In the northern territory of 12 the hawks keep their chess-board corridors of the air working collectively all the year, while the duck family of the same area moves to its distant supplemental, corridor which contains fresh water.

The fish terminal of 5 in S.W. Australia has its other terminal

in 23 and Bass Strait in particular. Area 23 is a combination of 2, 3 and 8, the 3 being represented in its most eastern cross warm current, 8 by the block of a north-south anchovy stream. The fixed and visiting Penguins and Petrels visit southern Tasmania. Of the fish census in 23 it is quite possible it will be extended by 20 per cent. with a tendency to Antarctic origin by an extinct corridor. Macrocystis of corridor 2 in 23 is the prospect of an interesting water world bred of the subantarctic in the plankton range.

In the cold water current of 23, noted by its subantarctic mollusca, there has recently been a tragedy of the plankton. It sank, due to the wrong weather, and the Short-tailed Petrel, having nothing to eat, died all round the coast. It was also a great inconvenience to the barracouta, which does not want to stay more months than usual in deep water. In the present season Melbourne is short of fish because the fishermen cannot catch inshore. The fish are probably on the outskirts of the continental shelf, with the plankton halfway down at 15 fathoms. A knowledge of the bathic corridors of the perch (*Dactylopagrus*) would be welcome. The D'Entrecasteaux Channel of Tasmania is 60 miles long and it is usual for plankton to use this corridor, with the barracouta following it, during December-April, going S.W. This year the plankton colour scheme of the channel, with the waste product oil, has been much subdued and accordingly the fish of our tables. This corridor is now to let (May) while the adjacent warmer coast is tenanted with barracouta.

To explore, e.g., the southern half of corridor 8, is to see the swarming of the mullet (*Mugil dobula*) as adults going north. On the south coast of New South Wales only there is a corridor joining and being absorbed in the Bass Strait, the yellow-eyed mullet (*A. forsteri*). In the continuation of this corridor at 10 there are several tropical mullets. Some fish, as the flat-tailed mullet (*peterdi*), regularly go into the continent and come out, thus making an internal corridor or series of them of great economic value. The Australian Salmon (*Arripis*) has its corridor contained in 8 and 5; the unusual.

As birds of 7 in the countless *limicolii* pass north in April, so do the fish (herring family) hurrying out of their rivers pass north. There are many lanes leading into both 7 and 8, the corridor main roads, and Australia is scarcely mapped. A knowledge of surface-fish corridors is got by our experience of floating meadows, more or less the result of winds and temperature. Without a trinomial system how can we do justice to Australian distribution of its animals. In the great Pacific bordering us we know that the swordfish has its many roads, but how little do we yoke up the colour schemes with the economic corridors. Japan is now probably doing fine work in mapping what I would call her fish lanes and corridors.

The Indo-Pacific corridor 15 is well represented by Australian fishes on the west coast of India, while in ancient days our fish passed through the open Panama into the Atlantic.

We know that the great interior, 16, of Australia has marked its birds with rufous, but we do not know the stamping of its many floral lanes or byways. On the approach of devastating droughts different birds spread rythmically along their stress corridors into better lands. Land corridors of the more highly developed animals are cut across by river corridors and fish, with birds, e.g., are out to do a compensating duty in a full economy. Where there is a tropical forest on shore there is a tropical forest at sea; where there is the desert-looking land there is the desert-looking sea. Both populations have points of utility and beauty interest. The sea and land corridors all round this island continent are spaced to work in with the economy of each other and the abstract something that appears greater than, and built in, our economy and our structure. In Bass Strait, e.g., we have the so-called filterable viruses, the primeval units of life. The historical character of the smallest plankton in any corridor because of many invisible origins in the ocean is more than interesting, but it is too far away back from the economics that are touching and appealing to us. Even the adventure of ideas seems too far forward to meet the necessity of the present with its research into the workshops of undescribed corridors.

Throughout the net of minor corridors on land junctioning with those of the sea, not yet appreciated, there stands conspicuously the branching system of the major one of the *Limicoline* birds. Well may we wonder why they annually go to Siberia. Has it much or nothing to do with an Austro-Asiatic plan of nutrition existing many centuries ago? Does the endocrine system demand a periodic change of diet that cannot be got in any one continent any more than the passerine birds of smaller corridors can live their winter where they spend their summer? Interrelationships are changeable on defined lines.

Coastal valleys have much to unfold to us just as the 100 fathom line has hidden valleys doing intricate work. So does the great internal calcic Australia, by using its corridors, deliver to the sea its lime in return for the essential iodine that a medicinally starved Australia needs for peaceful co-operation of a people as well as for the robust health of a group of lower animals. If, e.g., 100,000 Cormorants bring in daily an iodine contribution from 1,000,000 fish, it is not wasted on a land needing it, to retail to plants growing healthily.

Following this trend of thought it might appear that the 30,000,000 birds of the Sandpiper family go to the tundras to get the essential foods that the coasts of the southern hemisphere cannot supply. Corridors, truly, might well be interesting fields of research by the bio-chemist in animal nutrition welfare.

FIELDS FOR NATURALISTS

Presidential Address by Mr. G. N. Hyam given at the Annual Meeting, June, 1936

Last year we revived a custom which for many years previously had been allowed to lapse, that of the Presidential Address. This is a feature that should, as far as possible, be continued. After a period as President, the member retiring from that office should have obtained such impressions of the Club and its work as to be able to offer suggestions for the future. Furthermore, it gives an annual opportunity of considering whether the Club is living up to the ideals of its founders of fifty-six years ago and whether it is meeting the ever changing conditions of modern life.

In seeking some inspiration for the subject of this address, I read the whole of the Annual Reports and Presidential Addresses as published in the *Naturalist*. The messages conveyed in those addresses are applicable to-day. It is worthy of record that addresses were given every year from 1884 to 1891 without a break. Then there was a lapse until 1902, when they were given until 1910. They lapsed until 1920 and continued until 1924, when they lapsed again until last year. The changing conditions of social life must necessarily affect both the Club and its members in their pursuit of natural history as the years go by. Nature itself is by no means static, however it may appear so in relation to the normal span of a single human life. It is these altered fields that I propose to review.

The original objects of the Club remain unchanged: To provide a meeting place for a body of people interested in Natural Science, to help one another to study what lies around them. The Club does provide a meeting place where the expert and tyro can come together for their mutual profit and pleasure, and also provides facilities for the interchange of ideas amongst those interested in different branches. The Rev. J. J. Halley, in his address in 1885, said that the Club "domesticated science" and in that way had justified its then short existence. Past presidents have stressed the fact that the major portion of the Club's activities and work must lie in the field, and that members should observe for themselves. The late Dr. T. S. Hall, in 1902, said that "papers given to the Club should be introductory and explanatory and should assume no previous knowledge of the subject on the part of hearers." Prof. Ewart, in 1910, said that "The Club represented a 'Back to Nature' movement in science, which could be profitably joined by many laboratory workers, who, when in the field, could hardly distinguish a crocodile from an earthworm."

To these objects present members can not raise any material objections and our present need is to adapt them to present-day conditions. The early days of the Club were necessarily a period of

Mr. G. N. Hyam.
President, Field Naturalists' Club of Victoria, 1935-36.

discovery and classification, a work which to-day is approaching completion. Systematic nomenclature and morphology always will have an important place, but in modern times it is necessarily a function of professional scientists and of institutions such as the universities, museums and national herbariums rather than the independent amateur worker. Large collections of type specimens, literature and laboratory facilities are necessary for the proper pursuit of this work. This obviously points to the fact that the day of individual collections is passing and that material, particularly of new species, should be in the hands of some suitable institution for the benefit of any workers at any time. The corollary of this is that the mere gathering of a heterogeneous collection of specimens in the field, or recording in a more or less casual way of specimens seen, is a rather useless pursuit for members.

The keynote for field naturalists should be observation. We badly lack the knowledge of life histories of almost all of the species of our rich flora and fauna. As an example of this great field for naturalists, let me instance the work recently done on the life history of the Lyre-bird by Tregallas, Littlejohns and others; the Platypus by Eadie and Burrell; on native bees by Rayment; on pollenization by Mrs. Coleman. None of these workers would, I think, lay claim to great academic distinction but their work will probably live for all time. The sole requisite for this class of work is the ability to patiently observe and accurately record.

Then there is the study of ecology—the relationship of a species to its habitat, to its physiographic, climatic and soil conditions; its relationship to other species or even relationship of fauna to flora. In botanical ecology it resolves itself into a study of vegetation rather than a mere section of the flora. It will embrace the ebb and flow of a vegetation in relation to the constantly changing forest cover, clearings, erosion or other factors of environment, including the operations of "man the destroyer." It can be studied on the basis of a square yard, a square mile, a county, state or commonwealth, and again its major requisite is patient observation and accurate recording, coupled with the aid afforded by the systematic botanists, physiographers, geologists, zoologists, in our various institutions in arriving at final conclusions.

Here is an almost untouched field so far as members of the Club are concerned, and it has the additional advantage of introducing workers in any one field to the problems of workers in other fields, and thus avoid the evils of over-specialization. Ecological work can also be approached from any aspect, botanical, zoological, physiographical or geological. It can be carried on as an intense study or merely as casual observations. I would refer interested members to Tansley's books in our library for more details and where they will find encouragement from records of really useful work by boy scouts and school boys in ecological work.

For those who have a liking for specialized work let me suggest the patient observation of the life history of a species or genus, whether it be of flora or fauna. For others who like to roam let us have preliminary surveys of district flora and fauna and let each member endeavour to obtain at least one co-operator or disciple. To all workers, I say, let your fellow-members know the results of your work by exhibits, nature notes and papers. Other studies and interests that occur to me that can be well undertaken by any of our members, whatever their previous knowledge may be, are marine biology, particularly of Port Phillip and the nearer coasts; the study of freshwater sponges and freshwater life generally; mosses and lichens, the photographic record of our flora, the changing of our land surfaces, the invasions of introduced flora, all of which have been neglected. There is also the science of Phenology, or Rural Biology; this, like ecology, requires patient observation and consists in the recording of various phases of life, particularly in relation to seasonal and meteorological conditions. The value is in the average comparison of such records over a term of years, in arriving at periodicity in natural phenomena, such as flowering periods, bird migration, influence of climate on growth, and many other factors.

These are suggestions for individual members. Let me conclude with some remarks on the work of the Club as a whole. We can, I think, take courage from the obvious fact that the Club has justified its fifty-six years existence and that we are working more or less on the lines laid down by the founders. I think that for the future the Club has even more valuable work to perform for the community. It is obvious to everyone that we are becoming more and more standardized and mechanized, not only in material matters but also in aesthetic and mental outlook. The one antidote to this that I see is more contact with nature—preferably wild and untamed nature, to counteract this lopsided development. Merely flying around the countryside on motor trips, the week-ending at guest houses, with its attendant organized games, will not provide this, but an intelligent interest in nature will, and this is what the Club provides for. Our excursions should be instructive and not merely picnics, and I appeal to our more expert members to make them so.

We have also much work ahead of us in the protection of our flora and fauna and the provision of more national parks where man can regain his lost birthright. We must fight the undue "improvement" of these and filching of them for golf courses and the like. We must see that due protection and appreciation is given of what we call "national monuments" and educate the public to appreciate them. We must endeavour to enrol all persons who think on similar lines, and thus increase our weight in the community. I would like to see the Club undertake expeditions into

various districts for the purpose of surveying the natural flora and fauna and to publish the results of such survey. In the year 1891 alone parties of Club members visited the Kent Group of Islands, the Upper Yarra, and Mt. Wellington district, and their records are still valuable. There was also a camp-out at Mornington in conjunction with the Education Department, where definite instruction in field work was given by various expert members over a period of one week. This seems to me to be worthy of repetition. When one peruses the fifty-two volumes of the *Naturalist* one cannot but be proud of the past activities of the Club, and this is tempered by the thought that possibly the next fifty-two will not be so notable. On further consideration, in view of the immense amount of work still to be done and constantly changing conditions bringing up fresh problems the encouraging view is that the Club can be still greater if it does not like so many societies do, rest on its past greatness, without much attempt to break into fresh pastures—or should I say "Fresh fields for Naturalists."

NOTES ON SOME CITY AND SUBURBAN BIRDS

By A. D. HARDY

The adaptability of several alien species which have become naturalized has led to the retreat of native species, most markedly perhaps in the case of the parrots, the Rosella and Crimson Rosella having largely yielded to the Indian Minah and the Starling, which have usurped their nesting places in old gum trees. Persons bent on park and garden improvement often show lack of perspective which may become apparent when too late to effect a remedy. The removal of old gums from natural woodland parks is a case in point. Not only the trees are removed, but also the birds which rely on them for nesting hollows.

The Town Planning Association of Victoria is alive to the situation. "The replacement of Eucalypts by deciduous trees and palms is apparently the objective of the Parks and Gardens Committee, and the citizens of the future will therefore have to attune their ears and accustom their eyes to the notes and forms of the Sparrow, Starling, Minah and Blackbird, where their fathers knew the Magpie, the Willy Wagtail, the Harmonious Thrush and the Yellow Robin." A similar warning is voiced at times by other Associations and seems to be generally recognized as well founded. Without doubt, however, much good is done in the metropolitan area by the scavenging Minah, by the Sparrow in gutter and garden, and by the insectivorous Starling and Blackbird.

To say harsh things about these lawn-improvers would savour of ingratitude on my part, so I leave it to the orchardist. I have seen some fine examples of community interest displayed by these aliens. Here is one of three species working in harmony. From a hotel window at Scarsdale I watched a vacant allotment adjoining, used as a grass paddock. A flock of birds descended at one end and immediately began an advance in irregular front formation, towards the other end, about seventy-five yards away. There were about twenty Minahs, twenty Starlings; and a dozen Sparrows. The Minahs and Starlings overturned the insect harbouring cow manure, chips, etc., the larger birds devoured grubs and the like, and the Sparrows in their gleaning accounted for much small vermin. At the end of the paddock the birds rose "en masse," whirled in a quarter circle, and flew off in a straight course to another paddock. As the size of the flock apparently

lessened the Minahs and Starlings became indistinguishable from one another, but the little dots were the Sparrows.

Next morning at almost precisely the same time they again arrived, twenty, twenty and ten, and methodically swept the field as before, but, because of the poor catch, occupying about half the time. In the evening I saw a flock in flight, but distant, and counted forty large dots and ten little dots—the sparrows; evidently the same community. Aliens and "pests," but doing work of value to the State. And the Parrots that have been largely evicted from the suburban area? Can they present a clean sheets? No! For of succulent fruits in the orchard and the seeds of the Eucalypts the Parrots take considerable toll.

During the past few weeks some Crimson Rosellas have visited my garden and have bitten most of the flowers from a tall gum tree. The damaged flowers on the ground had immature pollen and no sign of nectar, so I concluded that they had been destroyed in a spirit of mischief. This sport of Parrots is not resented, for the tree (*Eucalyptus platypus* var. *heterophylla*) bears axillary umbels of dark crimson flowers too far back on the branches to provide for table decoration, and so high on the tree as to be far out of reach. So if the rich, red crop of *Crataegus serrulata* berries and a percentage of the strawberries are for the Blackbirds, surely the *E. p. h.* flowers may be enjoyed by the Parrots! There would be less complaisance if the crimson and blue beauties were to similarly destroy the blooms of the Scarlet-flowering Gum (*E. ficifolia*), but that species they do not visit. It blooms in summer, as the Wattle-birds are well aware, the Parrots come chiefly in autumn.

It is in autumn, too, that Honeyeaters are attracted by an early flowering Protea, but I have not seen a bird anticipate the season by one day. The large, pink chalices may be open but neglected until the feast is spread. The first sign of nectar synchronizes with the appearance of the guests. A table attractively "laid" but lacking food is of no use to hungry visitors.

The Crimson Rosellas are less shy than their occasionally seen allies. They come down from the tall gum to the low branches of the *Jacaranda* and in friendly manner remain long, just beyond arm length, chattering in a language of which I regret there is no interpretation. If there is a prettier combination than Crimson Rosella and the feathery, soft green foliage of a *Jacaranda* I should like to see it. But when charmed by the picture I am troubled with recollection of my wife's aviary of pre-war days. Therein were about thirty Parrots, including *Psephotus haematonotus*, which nested under a rock in the sandy floor and reared three young.

In the autumn, sometimes Rosellas, but regularly the Crimson Rosellas, are to be seen in the deciduous trees of the Treasury Gardens. The latter are probably those which have nested in the city—in the noisily-throbbing heart of the city; once in a lift well of the Myer Emporium, and in other places.

Miss Cynthia Teague told me that in a hole in the masonry of a wall opposite the window of a fourth floor room where she was engaged in architectural work, a pair of Kookaburras found a nesting place: but in the following season these were forestalled by a pair of Crimson Rosellas. The building is off Little Collins Street and the situation an ideal one for Minahs or Starlings (city dwellers) yet strangely enough found and occupied by native, forest birds.

Sometimes when engaged in stellar observations I have had occasion to flash a torch-light to read an angle and the flash has frequently disturbed a night bird which then floated past me with swift, noiseless motion; too ghostly to be identified. It was probably the Tawny-shouldered Frogmouth, which is frequently seen and heard in this locality. I have grown to like its monotonous call, which I maintain is not "Oom Oom" (Leach) or "Hoo Hoo" (several authorities), but an approximation to "Mor-Pork" rather than to the Cockney and Australian sound "Mauw Pawk" made when requesting more swine flesh, something between the two. So that there

may be no doubt as to what I have seen perched within a few yards of me, and heard uttering its cry at intervals averaging 11 seconds (by stop watch) over a period of half an hour or more. I can best describe it as a bird of dark plumage, almost black in silhouette, with beak, body and tail in alignment, forming with the branch an angle of about 25 degrees and resembling nothing so much as a bit of loose bark. The bird that cries "Hoo Hoo" (various authorities) can be heard also but is usually at a considerable distance.

I do not know whether nectar-eating birds avoid flowers where many bees are collecting (other than the Bee-eater and Wood-Swallow) but I think that there is some recognition of spheres influence as a general rule. When birds and bees are seeking nectar or pollen from the same blooms the birds are early at work and the bees much later; the secretion is continued and there is food for all.

A fatal blunder was made by a Mopoke in a garden at Kew some years ago. It was a tame bird which during the day usually perched against an upright stump, but which had become accustomed to the daylight. Its food was butcher meat, mice and garden pests. One not too sunny day it sampled a bee and found it to be good, then another, and some more, gradually approaching the source of supply—the hive—and there, my neighbour informed me, the bird discovered that by tapping with its beak a quicker issue of bees was obtained, but the calamity lay in the success; presently the bees poured out in great numbers and stung the bird to death.

Among our wild domestics or domesticated wildlings are Blackbirds and Thrushes. These are invariably in close attendance during gardening operations, so eager are they to help. Greatly daring they come within a few yards of the feeding cat, which, because white and incapable of camouflage can be easily watched until, satisfied, he withdraws for the "siesta" which may be enjoyed close by. Then a Thrush pounces on the remnants, which may be a bone or a little milk in a saucer. The Thrushes here are very fond of milk and have grown rather careless. Once in a while the cat is not sleeping soundly; then there may be a Thrush the less.

It is *Protea mellifera* which attracts the White-plumed Honeyeater (or "Greenie" or "Ringneck" as *Meliphaga penicillata* is variously called), and when the Crimson Bottlebrush, *Callistemon lanceolatus*, is in bloom this Honeyeater is again on the scene. Both the large and the small Honeyeaters change their diet with the season. The Wattle-birds which fed their two young ones in the Scarlet-flowering Gum cleared my rose bushes of aphis for their nourishment, and the Ringnecks are as fond of those garden pests as of nectar.

One puzzling thing is the unconscious loneliness of birds in captivity. The Cockatoo and Parrot seem quite happy and contented with human company both while caged or free to roam. Indeed, two of the same sex—of either sex—may fight when newly introduced, but so, too, will possums. A few years ago my daughter, sorry for the loneliness of a gentle female Ringtail which had lost its mate, presented it to a friend who also had a lonely female. The "host" attacked the guest immediately and within a few hours had killed it before the owner was aware of what was happening. But in an aviary of Parrots containing more than twenty birds (more than ten species) the most bellicose was a cock Crimson Rosella. He was the bully, and a murderous one. An occasional dead bird on the sandy floor bore witness to observed attacks, which were made chiefly in the early summer mornings. The murdered bird in several cases had leg bones and skull broken and part of the brain missing. Cannibalism, I decided, but never caught the bird in the act. Budgerigars have bitten off the toes of Canaries, but not to eat, and Cockatoos and Parrots are fond of a chophone. The New Zealand Kea likes fresh fat from the living animal. Still, with the possibility of a rat having mauled the dead Parrot, the murder charge remains, but an open verdict stands respecting the cannibalism. The only evidence—not on oath—was that of a child who said he saw the Crimson Rosella picking at the dead bird.

A. H. S. LUCAS

In the death of Professor A. H. S. Lucas, at the ripe age of 83 years, the Club has sustained the loss of one of the most distinguished scientists ever connected with its history.

Arthur Henry Shakespeare Lucas was born at Stratford-on-Avon, England, in 1853. His father was the Rev. Samuel Lucas, F.G.S., from whom the son inherited his taste for scholarly pursuits. His early education was at New Kingswood School, Bath. Thence he proceeded to Oxford University, where he was an exhibitioner of Balliol College. The young student, working diligently, gained the degree of Master of Arts at Oxford, and that of Bachelor of Science at London. Coming to Melbourne in 1883, he was engaged as teacher for senior classes in the subjects of Science and Mathematics at Wesley College, and not long after was also lecturer in Natural Science at Trinity, Ormond, and Queen's Colleges.

Early in 1893, on appointment as Headmaster to Newington College, in Sydney, Mr. Lucas left Melbourne to take up his new duties, which he capably performed until 1898, when he accepted the position of Mathematics and Science teacher, and became Headmaster of Sydney Grammar School. He also was appointed lecturer in Physiography at the Sydney University. He retired from his long and successful educational career in 1923; but later accepted appointment as Professor of Mathematics at the Tasmanian University, where he remained two years.

The close connection of Professor Lucas with the Field Naturalists' Club was in the first period of its existence, commencing with his arrival in Victoria in 1883. In the following year he became the first editor of *The Victorian Naturalist*, which position he filled until his departure to Sydney in December, 1892. In 1884 he contributed the first of several excellent papers to the Club, entitled, "Common Objects of the Seashore," a sphere of nature study in which he was most proficient. Elected as President, 1887-9, he gave two helpful and thoughtful Presidential addresses. In the year 1891, with his fellow-scientists, Dr. A. W. Howitt, and Professor A. Dendy, he visited the little-known peak of Mt. Wellington, in Gippsland, with its hidden lake or tarn, Tali Karng, the various theories advanced for its origin being well considered. On departure to Sydney the Club members, in grateful recognition of faithful service, loyally and unselfishly rendered for nine years, made a presentation to *The Naturalist's* first editor, and elected him as an honorary member of the Club.

From time to time through the intervening years, as opportunity served, Prof. Lucas was glad to revisit the Club, and he occasionally contributed a scientific paper to *The Naturalist*, the last being on a remarkable Australian seaweed, which he called "An Ocean Rover."

Both as an educationist and a scientist Professor Lucas was in the

foremost rank. His interest and enthusiasm in Natural Science covered a wide range of subjects, and he was an indefatigable field worker and collector. In New South Wales he was Curator of Algae at the Botanical Gardens, being rightly considered the most competent authority in Australia upon that subject, his ardent desire, which he did much to achieve, being, to collect specimens of every species of seaweed on the Australian seacoast. In the subjects of Zoology and Botany the keen scientist carried out much useful research.

Having a passion for science, Professor Lucas actively supported all societies engaged in fostering its pursuit. Thus he was President of the Linnean Society, 1907-9, and on its Council up to his death. He was also on the Council of the Australian and New Zealand Association for the Advancement of Science, and on the Council of the Royal Society (N.S.W.). In the Field Naturalists' Club of Sydney he was a useful member of committee, and for a term occupied the Presidential chair. He contributed many papers and lectures on scientific subjects to societies and institutions. With his close friend, Professor Dendy, he published some years ago a popular standard work, used widely in schools of the States, *Introduction to Botany*. Then, with the late Mr. Dudley le Souëf, he issued *The Animals of Australia*, followed by *The Birds of Australia*, both adding to the knowledge of the natural history of our fauna.

Professor Lucas travelled a good deal, and was a capable linguist. He was an excellent and sympathetic teacher, modest and somewhat reserved, but kindly and helpful, never wearying in the pursuit or dissemination of knowledge, and commanding the full respect and esteem of his many co-workers and friends. For four months before his decease he had with untiring zest been engaged on research work in Victoria and Tasmania. While returning to his home at Sydney, he became ill at Albury, and died in the local hospital, his funeral to the Northern Suburbs Crematorium, Sydney, being attended by a numerous concourse of people who knew his worth and honoured his memory. He left a family of three daughters—Mesdames Cortis Jones, J. J. O'Keefe, and Miss C. Lucas.

C. Daley.

AN URGE FOR PLANTING AUSTRALIAN TREES

By Edward E. Pescott

I met a friend recently who had just paid a visit to Mount Arapiles. He was very much perturbed at the presence of a flourishing young specimen of *Pinus insignis* right in front of the mount. "If there were ever anything more out of place—anything more of an anachronism, it is this pine tree," he said—then he added, "I wished I had brought a tomahawk with me."

There are hundreds of suitable Australian trees waiting for their rightful heritage, which is as yet denied them. The time is ripe for the Field Naturalists' Club of Victoria to enter upon a vigorous campaign for the preservation and planting of our own trees. I am afraid that the race of champions of Australian trees has been followed by a race of men who advocate the cause of imported trees.

If anyone has the opportunity, let him take a walk along the Yarra from the boatsheds to the Anderson Street Bridge. The long row of graceful and beautiful trees of *Eucalyptus radiata*, the River White Gum, will surely convince them that here is a tree suitable to any situation. If the walk be continued back along the Avenue to the gate of the Botanic Gardens, leading from the King's Domain, the three magnificent parent trees of these younger ones will be seen, in all their drooping loveliness.

Let us go back over the river and coming towards the City, and halting at Batman's monument, and note the two fine vigorous specimens of the Spotted Gum, *Eucalyptus maculata*. Another fine mid specimen of this species is growing in the Geelong Botanic Gardens. Beautiful in habit and foliage, and wonderful in bark colouration is the Spotted Gum.

Let us now go to the Australian border and note that tree, common in Queensland, and very rare in cultivation, *Flindersia*, the Australian Ash. The large, bold pinnate foliage, and the strong upright habit of the tree, make it a tree of distinction for culture anywhere.

Now let us get out to Canterbury and, leaving the station on the north side, walk towards the street. Just below the electricity station on the left side is a beautiful and compact specimen of that very rare tree of Inglewood, the "Ironbark Box." The common name is unfortunate; one commemorating its species name would have been better. I refer to *Eucalyptus Blackburniana*. It is a low-growing gum, very shapely in habit, and compact growing, quite equal to any shapely tree that can be seen anywhere. I only know of two of these trees—the other is in the Richmond Park, near the Curator's residence.

Close to this tree is a fine sample of the red-flowered Ironbark, with deep coloured flowers *Eucalyptus leucoxylon rosea*. Another similar tree is in the Camberwell gardens. These trees, besides being very shapely, give the richest of red flowers I have ever seen, of this variety.

Pittosporum undulatum, the east Gippsland species, may be seen as a specimen in almost any park: but how very rarely do we see the drooping dainty species, *P. phillyraeoides*. The masses of bloom on the thin pendant branchlets in spring are delightful. In the Caulfield Park is a very fine young specimen of *P. rhombifolium*, which, apart from being a fine tree, gives abundant masses of orange-coloured berries in winter and spring.

The Victorian Naturalist

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, July 13, 1936. The President, Mr. S. R. Mitchell, presided, and about 100 members and friends were present.

The President announced that, since the last meeting, the Club had lost through death an old and valued Life Member, Mr. A. H. S. Lucas, and gave a brief account of his connection with the Club. Members then stood in silence for a minute to mark their respect.

SUBJECT FOR EVENING

An illustrated lecture, "Australian Vanishing Birds," was given by Mr. A. H. Chisholm, C.F.A.O.U. He mentioned each main group of birds and briefly dealt with the species that apparently were not holding their own under present conditions. It seemed that only two species of birds had become extinct since the white occupation of Australia. Several other species, including the Night Parrot and Ground Parrot, had become exceedingly rare.

The President, and Messrs. A. D. Hardy, V. H. Miller, A. H. Mattingley, J. A. Kershaw, A. R. Proudfoot and A. S. Kenyon spoke on the lecture. Mr. Miller stated that he had seen advertised a trip to Northern Australia, and one of the attractions offered was "Wild Turkey Shooting." This matter was referred to the Committee for investigation.

The President expressed the thanks of the Club to Mr. Chisholm for a very interesting address.

BUSINESS FROM MINUTES

National Monuments.—The President announced that a combined meeting of all interested societies would be held in the National Herbarium Hall on August 12, at 8 p.m. He invited all members to attend.

The Aquarium.—The Hon. Secretary reported that a letter had been sent to the Premier stating that should the Aquarium be shifted, the seaside, preferably St. Kilda, was, in the Club's opinion, the best place for it.

Reorganization of the Zoological Gardens.—Mr. G. N. Hyam announced that he had attended a deputation to the Chief Secretary, who stated that legislation would be introduced to improve conditions.

Wild Nature Show.—The President announced that the Show Committee would consist of Messrs. S. R. Mitchell, V. H. Miller, Chas. Barrett, L. W. Cooper, W. H. Ingram and G. N. Hyam. Mr. Hyam to act as convener.

CORRESPONDENCE

From A.N.Z.A.A.S., inviting members to participate in the January meeting at Auckland, N.Z.: and enclosing nomination forms for distribution.

From Mr. F. Lewis, Chief Inspector of Fisheries and Game, regarding the proposal to have Greater Melbourne declared a sanctuary. In his opinion very little good would come from this, as the area offered no breeding grounds; furthermore, out of season shooting was already being dealt with under the present laws. To police such an area would be impossible.

REPORTS OF EXCURSIONS

Reports of Excursions were given as follows:—University Agricultural Department, Mr. L. W. Cooper (for Miss Raff); Broadmeadows, Mr. A. C. Frostick; National Museum for Ethnology, Mr. A. S. Kenyon; National Herbarium, Mr. J. W. Audas; University Geological Department, Mr. F. S. Colliver (for Mr. F. A. Singleton).

ELECTION OF MEMBERS

On a show of hands the following were duly elected as ordinary members of the Club: Mrs. Geraldine Wilkinson, Messrs. A. E. Coulthard, John S. Russell, and A. Grassick.

GENERAL BUSINESS

The President announced that a copy of the book *A Year on the Great Barrier Reef*, had been presented to the Club by Miss Agnew, who was accorded the thanks of the Club.

Mr. A. H. Chisholm stated that large numbers of the King Orchid were being offered for sale in the markets. As this species was protected, both in Victoria and New South Wales, he would make inquiries and report further to the Committee.

Miss Chisholm referred to the loss by fire of Mr. Lancaster's shell collection, and asked whether the Club could assist him in any way; this matter was referred to the Committee for consideration.

The President stated that the Club was represented at the Melton Tree Planting, and also had been invited to send delegates to the 100th anniversary of the discovery of Mt. Arapiles by Major Mitchell.

The meeting was adjourned for the conversazione.

EXHIBITS

Miss Knox.—Kenyte from Mt. Erebus (collected by members of the Antarctic Expedition); Ammonite of Cretaceous age, from Nth. Queensland; Shells, *Spirula peroni*, from Queensland; Dendrites, from Lilydale.

Mrs. Hill.—Ivy Violet (*Viola hederacea*), garden grown.

Mr. T. S. Hart.—Stamens of several species of *Melaleuca*, specimen of Mistletoe, showing winter colouring.

Mr. Robin Croll.—*Pterostylis concinna* bulb taken (from private property) at Black Rock. It has remained in the same pot for seven years, and this season has produced nine blooms.

Mr. E. S. Hanks.—Small East Victorian Bat (*Nyctinomus* sp.), picked up dead, but still warm, at Wandong.

Mr. C. J. Gabriel.—Fan Shells and Scallop Shells from various localities.

Mr. S. R. Mitchell.—Mineral Specimens: Calcite (stalactic) from caves at Belubela, N.S.W.; Aragonite, from Lismore, N.S.W.

Mr. A. C. Frostick.—Specimens of Adamellite from Gellibrand Hill, near Broadmeadows; coloured micro-drawings of the rock under crossed nicols.

Mr. F. S. Colliver.—Leg bones of *Dinornis maximus* Owen (lent by the Geological Survey of Victoria); *Dinornis robusta* (?) Owen; *Dromaeus novae-hollandiae* from W.A.; *D. minor*, fossil from King Island (last three lent by Dr. G. B. Pritchard).

Correction.—In Annual Report, donations for Mr R. O'Neill read Mr. W. J. O'Neill.

NATIONAL MONUMENTS

The Club's campaign for the better protection and reservation of National Monuments is progressing. A meeting will be held at the National Herbarium on August 12 at 8 p.m. Delegates from about 25 societies will be present. Invitations have been accepted from all the natural history societies, Tourist Bureau, Royal Automobile Club, Honorary Justices' Association, A.N.A., and many others. It is hoped to form a strong committee for the purpose of collecting data and drafting a Bill to present to the Government at the meeting from amongst the delegates present. Club members who are interested are invited to attend.

ANNUAL SHOW

The show Committee has held a preliminary meeting and suggests that the title of the show shall be "The Field Naturalists' Club's 51st Annual Show." The Show Committee hopes to have the co-operation of all members and can find a place in the organization for everyone. This particularly applies to new members. The Committee would urge that all those who are willing to help either by services, exhibits, or both, should register their names with the Honorary Secretary. Suggestions as to improvements and interesting exhibits are also welcomed as it is the Committee's wish that new features should be added so that our displays shall not become stereotyped. Members who have friends in the country who would collect flowers or other interesting natural history specimens would greatly assist if they could arrange for supplies for the show. Admission tickets will be available at the August meeting.

FLORA OF VICTORIA
ADDITIONS AND ALTERATIONS

By PROFESSOR A. J. EWART

The following list of alterations and additions to the Flora of Victoria includes all those made since the publication of the Flora in 1930 to the present date and may be of interest to those engaged in field work.

By the courtesy of Mr. F. J. Rae, Director of the Botanic Gardens, the list has been checked from the records kept at the Herbarium. If any readers note omissions, information in regard to them will be welcome.

Hymenophyllaceae

Additions: *Hymenophyllum peltatum* (Poir.) Desv., Stalked Filmy Fern.
H. dilatatum Sw., Handsome Filmy Fern.

Polypodiaceae

Addition: *Asplenium obtusatum* Forst., Small Shore Spleenwort.

Gramineae

Alterations: *Spinifex hirsutus* Labill. to *S. inermis* Banks et Sol. (*Ixalum inerme* Forst., fil., 1786).
Elytrophorus articulatus Beauv. to *E. spiratus* Camus.
Eragrostis tenella (L.) Roem. and Schult. to *E. japonica* Trin.
E. Brownii Nees. to *E. elongata* Jacq.
Poa Billardieri Steud. to *Poa caespitosa* G. Forst. var. *Billardieri* Hook. f.

Additions: **Phleum subulatum* (Savi) Asch. and Graeb. (*P. tenue* Schrad.).
Stipa incurva Hughes, Incurved Spear Grass.
S. elatior Hughes, Stout Spear Grass.

Alterations: *Dactyloctenium aegyptium* (L.) Richt., Finger Grass, to *D. radulans* Beauv., Button Grass.
**Schismus calycinus* Coss. et Dur. to *S. barbatus* Juel.

Additions: **Pentaschistis airoides* Stapf. (Vernacular name?).
Danthonia nudiflora Morris. Alpine Wallaby Grass.
D. Richardsonii Cashmore, Tall Wallaby Grass.
D. Dutloniana Cashmore, Loose Wallaby Grass.

Alteration: *Amphibromus nervosus* (R.Br.) Hkf. to *A. Neesii* Steud.

Additions: *A. gracilis* P. F. Morris, Graceful Swamp Wallaby Grass.
A. Archeri Hkf., Pointed Swamp Wallaby Grass.
Amphibromus recurvatus Swallen, Dark Swamp Wallaby Grass.
A. Neesii Steud., Swamp Wallaby Grass.

Alteration: **Lolium hybridum* Haussk. to *L. subulatum* Vis.

Addition: **Agropyron junceum* (L.) Beauv., 1812, Sea Wheat Grass or Coast Couch; syn. (*Triticum junceum* L., 1759).

Cyperaceae

Alterations: *Cyperus squarrosus* L. to *C. aristatus* Rottb., 1773.
Cladium glomeratum R.Br. to *C. rubiginosum* (Soland) Domin., 1915.

Amaryllidaceae

Additions: **Ornithogalum umbellatum* L., Star of Bethlehem
**Gladiolus byzantinus* Mill., Turkish Corn Flag.
Family Burmanniaceae. *Sarcosiphon Rodwayi* Schltr. (*Thismia Rodwayi* F.v.M.), Fairy Lanterns.

*Introduced aliens.

Orchidaceae
Additions: *Cleisostoma tridentatum* Lindl., Tangle Orchid.
Prasophyllum pallidum Nicholls, Pallid Leek Orchid.
P. Tadgellianum Rogers to *P. alpinum* R.Br.
P. intricatum C. Stuart, var. *ciliatum* (*P. ciliatum* Ewart and Rees). Omit *P. ciliatum* from specific rank.
P. pyriforme Coleman, "Pear Leek Orchid."
Thelymitra Murdochae Nicholls, Crimson Sun Orchid.
T. nuda R.Br., included under *T. longifolia*.
T. truncata Rogers, Truncate Sun Orchid.
Microtis orbicularis Rogers, Hooded Leek Orchid.
Caladenia tesselata Fitzgerald, Paved Caladenia.
C. Patersonii, var. *magnifica*.
C. tutelata Rogers, Sentinel Caladenia.
Alterations: *C. angustata* Lindl. replaces *C. testacea* R.Br.
Spiranthes australis Lindl. to *S. sinensis* (Pers.) Ames.
Additions: *Cryptostylis erecta* R.Br., Erect Tongue Orchid.
Pterostylis gracilis Nicholls, Slender Greenhood.

Casuarinaceae
Alteration: *Casuarina lepidophloia* F.v.M. to *C. cristata* Miq.

Proteaceae
Addition: *Grevillea alpestris* Meissn., Dallachy's Grevillea.

Loranthaceae
Addition: *Notothixos subaureus* Oliv., Golden Mistletoe.

Chenopodiaceae
Additions: *Chenopodium myriocephalum* (Benth.) Aellen, Pig Weed.
C. pumilio R.Br. Common name?
Alteration: *Salicornia pachystachya* J. M. Black to *S. Blackiana* Ulbrich.

Aizoaceae
Alterations: *Mesembryanthemum aequilaterum* Haw. to *Carpobrotus aequilaterus* N.E.Br.
**Mesembryanthemum edule* L. to *Carpobrotus edulis* (L.) N.E.Br.
**M. crystallinum* L. to *Cryophytum crystallinum* N.Br.
**M. angulatum* Thunb. to *C. aitonis* N.Br.
M. australe Sol. to *Disphyma australe* Sol.

Ranunculaceae
Addition: **Ranunculus Sardous* Crantz, "Pale Buttercup."

Tremandraceae
Addition: *Tetratheca glandulosa* Lab., Glandular Pink-eye.

Malvaceae
Addition: *Plagianthus Berthae* F.v.M., White Plagianth.

Violaceae
Alteration: *Hymenanthera dentata* R.Br. to *H. angustifolia* R.Br.

Myrtaceae
Alterations: *Eucalyptus australiana* R. T. Baker to *E. amygdalina* Lab.
E. fruticetorum F.v.M. (syn. *E. polybractea* R.T.B.).

Umbelliferae
Alteration: *Azorella cuneifolia* Benth. to *Oschatzia cuneifolia* (F.v.M.) Drd.
Addition: **Oenanthe pimpinelloides* L., "Meadow Parsley."

Ericaceae
Alteration: *Gaultheria hispida* R.Br. to *G. appressa* A. W. Hill.

Labiatae
Addition: *Ajuga grandiflora* Stapf., Greater Bugle.
Alterations: *Mentha gracilis* R.Br. to *M. diemenica* Spreng.
Lycopus australis R.Br. to *L. europaeus* L.

*Introduced aliens.

Bignoniaceae
Alteration: *Tecoma australis* R.Br. to *T. pandorana* Skeels.
Rubiaceae
Alteration: *Coprosma Billardieri* Hkf. to *C. quadrifida* Rob.
Additions: **Galium tricorne* With., Corn Bedstraw.
**G. divaricatum* Lam., Spreading Bedstraw.
Campanulaceae
Additions: *Wahlenbergia vincaeflora* Deene., Austral Blue-bell.
W. Colensoi, N.E.Br., Small Blue-bell.
W. multicaulis Benth., Branching Blue-bell.
W. gracilis Schrader, Slender Blue-bell.
Alteration: *Pratia erecta* Gaud. to *P. concolor* (R.Br.) Druce.
Compositae
Additions: *Brachycome lissocarpa* Black, Creeping Daisy.
Vittadinia megacephala Black, Large-headed Daisy.
V. tenuissima Black, Slender Daisy.
V. pterochaeta Black, Wing-seed Daisy.
Leptorhynchus medius A. Cunn., Stalk Buttons.
**Onopordon Illyricum* L., Woolly Thistle.
Alterations: **Centaurea Picris* Pall. to *C. repens* L.
**Xanthium strumarium* L. to *X. pungens* Wallr., Noogarra Burr.
Additions: **Chondrilla juncea* L., Skeleton Weed.
**Xanthium californicum* Greene, Californian Burr.

*Introduced aliens.

The following amended key to the Victorian orchids has been prepared by Mr. W. H. Nicholls and Mr. R. Bond:—

Key to Genera of Victorian Orchids

A.	Stems epiphytic or rhizomic, creeping on trees or rocks	B
	Stems underground; often tuberous; less often rhizomic	C
B.	Labellum movably jointed to the base at the column; its median lobe not fleshy	DENDROBIUM
	Labellum attached firmly to the base at the column; its median lobe fleshy	SARCOCHILUS
C.	Plant leafless, at least when in flower, or the leaves reduced to small scales or bracts	D
	Plant with one or more leaves when in flower	F
D.	Flowers rather large; white, pink, purple or spotted; the labellum entire or tri-lobed	E
	Flowers small, greenish, or, if purplish, not spotted; the labellum recurved and usually tapering	PRASOPHYLLUM
	Flowers rather small, green, whitish, pinkish, or purplish; labellum hammer-shaped	SPICULAEA (DRAKAEA)
E.	Sepals and petals more or less united to a definite tube	GASTRODIA
	Sepals and petals spreading widely	DIPODIUM
F.	Stem with a single leaf	L
	Stem with two or more leaves	G
G.	Labellum tri-lobed	H
	Labellum without lateral lobes	I
H.	Petals prominent and stalked	DIURIS
	Petals minute and sessile	ORTHOCERAS
I.	Flowers small, arranged in a definite spiral	SPIRANTHES
	Flowers medium to large, not in a definite spiral	J

J.	Labellum long and thick; the other segments reflexed and inconspicuous	CRYPTOSTYLIS
	Labellum flattened; often small	K
K.	Flower forming a green or brownish hood; leaves several	PTEROSTYLIS
	Flower not forming a hood; leaves two, opposite	CHILOGLOTTIS
L.	Leaf elongated	M
	Leaf almost as broad as long	V
M.	Leaves flat or channelled	N
	Leaves leek-like, or onion-like	U
N.	Labellum not distinctly different from the other perianth segments	THELYMITRA
	Labellum distinctly different from the other perianth segments	O
O.	Flowering stems thin, not fleshy	P
	Flowering stems stout, rather fleshy	R
P.	Flowers brown, or greenish-brown	CALEANA
	Flowers not brown, at least inside	Q
Q.	Labellum with a distinct, erect appendage at the base	GLOSSODIA
	No such appendage present	CALADENIA
R.	Plant under 6 inches high	BURNETTIA
	Plant over 6 inches high	S
S.	Leaf flat; labellum hairless	T
	Leaf channelled; labellum usually with long hairs	CALOCHILUS
T.	Midrib of leaf prominent	CRYPTOSTYLIS
	Midrib of leaf absent or indistinct	LYPERANTHUS SUAVEOLENS
U.	Dorsal sepal short and broad; flowers very small; labellum curving down	MICROTIS
	Dorsal sepal narrow and tapering; flowers small to medium; labellum curving upwards	PRASOPHYLLUM
V	Flower single and very close to the leaf	CORYSANTHES
	Flower not very close to the leaf; one to several present	W
W.	Leaf flat, prominent when the plant is in flower	X
	Leaf channelled or rolled to some extent; small and indistinct when the plant is in flower	Y
X.	Flowers and stem thick; rather fleshy	LYPERANTHUS NIGRICANS
	Flowers and stem not at all fleshy	ACIANTHUS
Y.	Perianth segments fleshy; flowers rarely opening much	BURNETTIA
	Perianth segments not fleshy; flowers opening freely	Z
Z.	Column with broad wings	LEPTOCERAS
	Column with narrow wings	ERIOCHILUS

ERRATA

Page 30, Vol. LIII, No. 3, July, 1936, *Naturalist*:—

Daeryomitra sp. ? (yellow, gelatinous, pileate) for *Daeryomitra* sp. ? (*yellow*, gelatinous, pileate).

Lepiota parvannulata for *L. paranmulata*. *Russula cyanoxantha* ? for *R. cyanoxantha* ?

Owing to pressure on space the original report on the Sherbrooke Forest was condensed, which resulted in an inadvertent omission. For the sentence "The day's outing resulted in 27 additional species being added to the list compiled for Sherbrooke Forest" substitute "The day's outing resulted in 27 species of Fungi being added to the list compiled for Sherbrooke Forest."

H.S.

A NEW TOBACCO PLANT—A NATURAL HYBRID

By W. H. NICHOLLS

An Easter visit to the historic You Yangs Range, near Lara, Victoria, revealed both the introduced Tree Tobacco (*Nicotiana glauca* Graham), and the Austral Tobacco (*Nicotiana suaveolens* Lehm.) in abundance. Both species had responded remarkably to the recent beneficial rains and were in splendid condition, and the finest show of bloom so far seen by us (Mr. F. J. Bishop and the writer).

From below the steep south-western slope of Flinders' Peak we noticed the wonderful inflorescence of what appeared to be the alien form. Some of the plants seemed "too good to be true," so investigation was decided upon. We were soon among plants of a natural hybrid, the result of an undoubted union of the two previously mentioned species.

The plants ranged from about 2 feet 6 inches to over 4 feet in height, with fragrant flowers in abundance and intermediate in form.

The colour of these hybrid flowers ranged from olive-green through lighter shades to cream and steely-white, thus giving the specimens quite an ornamental bearing; and I venture to suggest a desirable acquisition to our home gardens.

The dark-green foliage was also intermediate—both in hue and in form—but lacked the "bloom" so apparent on the foliage of *N. glauca*.

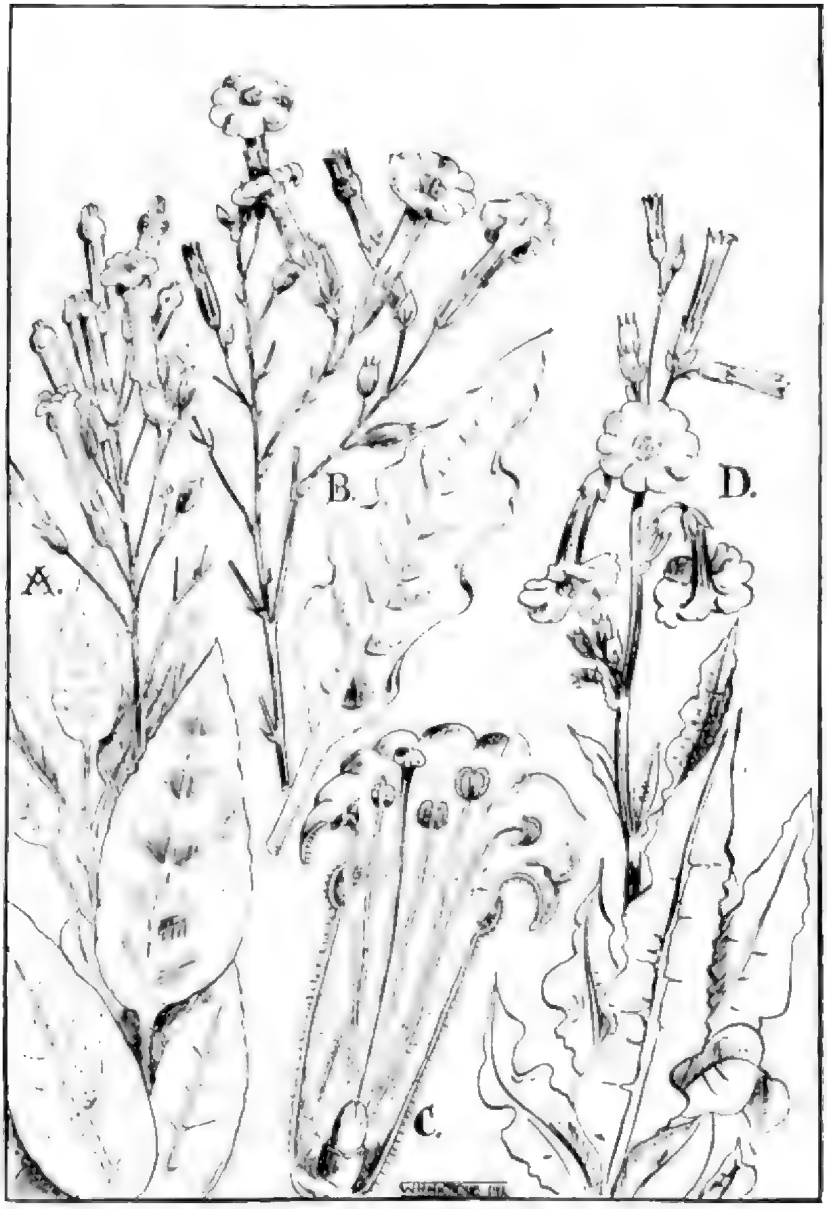
The flowers of these undoubted hybrids grow on very long slender, erect stems: the panicles of bloom were thus far above the leaves. The flowers are fragrant.

We found this new form well established on the south-western and also on the northern faces of Flinders' Peak—wherever the native and the introduced forms flourished. Owing to its outstanding characteristics and to the fact of its being well established, it is deemed worthy of classification under the name of *Nicotiana flindersiensis* (sp. nov.) in recognition of its habitat.

Planta glabra, circa 75-120 cm., alta. Folia ovato-lanceolata vel lanceolata. Marginibus undulatis. Flores numerosi, virides vel albi; corolla longa; lobi patentes, bases laborum dilatæ.

A glabrous shrub about 7-120 cm. in height. Leaves large, dark green, ovate-lanceolate, upper leaves small, lanceolate, margins undulate. Calyx with narrow lobes, the corolla 2 5-3 cm. long, green, the tube about twice as long as the calyx, the corolla dilated below the 5-lobed rim, rim spreading, sometimes reflexed, with short obtuse lobes. Capsule ovoid, enclosed by the base of the calyx. The type specimen is in the Herbarium, Botany Dept., University of Melbourne. Habitat: Flinders' Peak, You Yangs Range, Victoria.

Plate VII



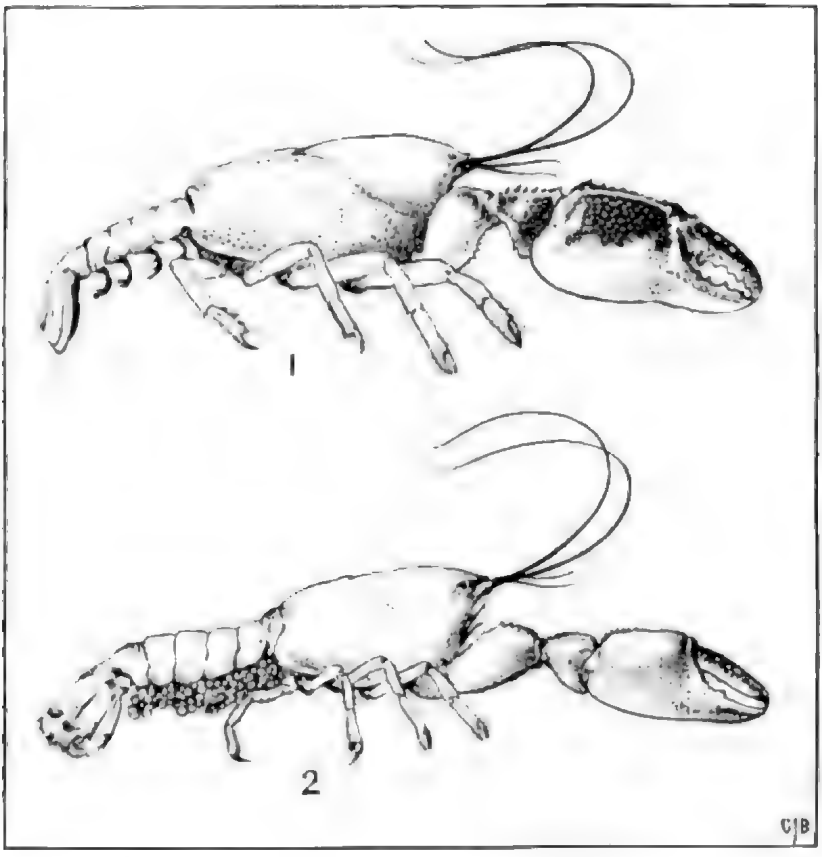
Three Species of the Tobacco Plant

A. *Nicotiana glauca* Graham, B. *N. flindersiensis*, sp. nov.
C. A dissected flower of *N. flindersiensis*, D. *N. suaveolens* Lehm.

NOTES ON THE HABITS OF LAND CRAYFISHES.

By ELLEN CLARK

Three kinds of crayfishes are found in Victoria. There are aquatic species, such as the large spiny crayfishes of the Murray, Yarra, Glenelg and Thomson Rivers; semi aquatic, those living partly on land and partly in water, such as the common yabby



Land Crayfishes.

1. *Engaeus victoriensis* Sm. and Sch., natural size.
2. *E. fossor* Er., showing method of carrying eggs, natural size.

which is found in almost every waterhole around Melbourne and in the country; and the terrestrial crayfishes, or land-crabs as they are sometimes called, which are found almost all over Victoria.

The terrestrial crayfishes are very destructive, and therefore of much economic importance. The fact that they are not entirely dependent on standing water enables them to spread over vast areas. For the past two years observations have been made on the

life history and habits of various species in the hope of finding some method of exterminating them. Observations were made in glass aquarium tanks to watch the methods of burrowing and the food requirements. Field notes were made at Ferntree Gully on a property containing several acres of orchard, grazing paddocks and heavily timbered scrub. Two creeks, which are permanent for most of the year, run through the property.

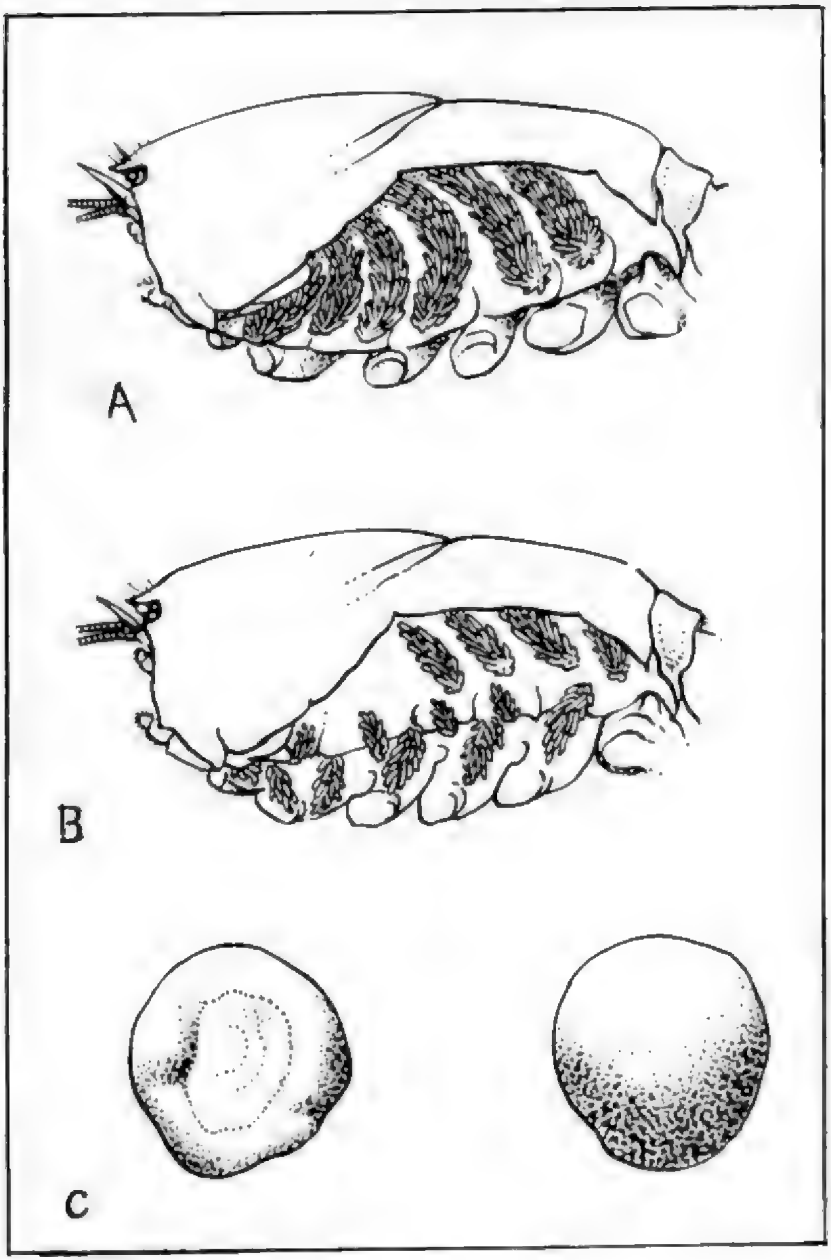
The orchard, which is on a hillside, is riddled with holes of *Engaeus victoriensis* Smith and Schuster (Fig. 1). The burrows are from six to eighteen inches deep in most places, but on the highest level some are considerably deeper. During the ploughing season many yabbies were turned up daily.

This species forms "community burrows." In an area of three or four square feet all the burrows converge, making a large cavity below, in which is the central pool. When one of these community pools is formed at the base of a fruit tree, the result of the undermining is the dying off of the tree. As the yabbies are vegetarian as well as carnivorous the roots of the trees probably form a palatable morsel. The burrows are usually indicated by cone-shaped mounds, formed by the mud excavated from the burrows. The cones vary in size from one-half to three inches in diameter and the same in height. Sometimes, however, no cone is formed, the only indications being round holes about one-half to two inches in diameter clustered within a few inches of one another.

E. victoriensis is found only on the higher and fairly dry ground, but on the flats and in the creek another species, *E. fossor* Erichson is abundant. The holes of *fossor* are usually single shafts with only one occupant, but a few holes were found to contain two or three specimens in side branches. The holes, although single, are often made so close together that as much damage is caused as in the case of the "community" burrows. Unlike *E. victoriensis*, which burrows in fairly dry soil, this species prefers very moist conditions and numerous burrows were found in all the swampy areas examined. The creek beds are full of holes, and in various places the banks have been undermined for several feet, and, on pressure, have subsided into the creek, causing much annoyance and inconvenience by blocking the creek and ruining the banks.

During the dry weather the creek bed is full of burrows and as the wet season advances the cones are built higher and higher to keep above the rising water level. Many bridges in the district have had to be reinforced due to these yabbies undermining the foundations. Channels dug to drain the swamps are constantly being filled in by the actions of the yabbies, and several times cows and horses have had nasty falls by stepping on "crab-holes."

It is interesting to watch the yabby digging the burrows. When placed in aquarium jars containing earth they soon start to burrow, usually in a corner. In digging the burrow the great chelae, or



A. Carapace removed to show gills.
B. First row of gills removed to show remaining gills.
C. Gastroliths of a crayfish (after Hale).
(Twice natural size.)

large claws, are used; these loosen the soil, which is then held between the chelae and the head and brought to the top of the hole. Specimens kept in captivity were fed on earthworms, raw-meat and tadpoles, all of which were eagerly taken and torn to pieces by the two small pairs of chelate limbs and fed into the mouth by the small foot-jaws. One female with twenty-three newly-hatched young was put in a jar to see the development of the young, but two days later the jar contained only eight very large young specimens with the female. Apparently in the absence of other food the surviving young had eaten their weaker brothers. This cannibalism is evident in all species which have been kept without food, and numerous fine examples have been lost in this way. For four days the young remained in the burrow with the mother and then started fresh burrows for themselves. These were only about one-half an inch in diameter.

The breeding season is in early spring, the eggs being carried by the female on the swimmerets of the abdomen (Fig. 2). The young hatch out during summer, usually between December and February, and for a short time remain attached to the swimmerets of the mother by the last two pairs of legs, the terminal joints of which are modified into small hooks. The young crayfishes look very much like the adults, except for the very large carapace in which is stored the food for the first moult.

Crayfishes grow by a series of moults. In the first year the young crayfish sheds its carapace several times; after that, only once or twice a year. Before moulting, gastroliths or "crabs'-eyes" as they are called, are stored up by the crayfish. These gastroliths are small nodules of calcareous matter and have a peculiar, yet characteristic form (Fig. C). During the moult they are dissolved in the stomach and are then apparently used in the formation of the new exoskeleton.

Crayfishes breathe through the gills, which are attached to the base of the legs and placed between the carapace and the outer wall of the body (Figs. A, B). They are kept moving and water is constantly circulating around the crayfish, enabling it to breathe the air dissolved in water.

A monograph of the crayfishes, aquatic and terrestrial, is now in progress at the National Museum and specimens are required from all localities for purposes of comparison and geographical distribution. To send specimens alive, pack them in a box or tin with plenty of damp grass to keep the gills moist: in this way they will remain alive for several days.

If several are put into one container, they should be separated by partitions to prevent them from fighting and consequent damage. Specimens may also be preserved in spirits of wine or methylated spirit, but live specimens are preferred by the Museum. Brief notes on their habits and habitat should accompany the specimens.

THE LITTLE DESERT*

By A. J. Swaby

A detailed and interesting account of "The Botany of the Little Desert" was contributed by Mr. St. Eloy D'Alton in *The Naturalist* of August, 1913. His mention of "the showy *Boronia clavellifolia* (now *inornata*) in profusion" aroused the curiosity of the late Mr. H. B. Williamson. Mr. Williamson tried to reach the locality from the north side without success. In 1930, when H.B.W. and myself were the guests of Mr. Harold Smith, of Horsham, two more attempts failed. Shortly afterwards, Messrs. H. and W. Smith found a way in and discovered a showy Boronia in profusion. Those who remember H.B.W. can picture the eagerness with which he opened the packet sent, and his exasperation at finding *B. pilosa*.

It was intended then to supplement D'Alton's list. Mr. Williamson prepared the specimens for mounting. His intimation that they were ready was followed immediately by news of his death. Collections from five localities were then mixed and the locality records lost. In the years since, it has been a labour of remembrance to sort and retrace, while still hoping we might one day find *Boronia inornata*.

D'Alton records 227 species—a remarkable number for a small area of so-called desert. Our observations over the eastern quarter have added 35 definitely and 10 others are not fully identified. Thus the total number of species known in the desert is 272.

We were prepared for "some really pretty vistas" and "the variety of tints in the foliage of the various trees and shrubs"; but D'Alton surely avoided over-statement. From early September to late October, the desert is an unbroken succession of beauty with many surprises.

For sheer delight, it would be hard to find anything richer than one of the low red hills covered with the Broom Honey-myrtle, *Melaleuca uncinata*. In the shimmering heat of February, one is reminded of "green pastures beside still waters." But nothing could be more inhospitable to man or beast.

D'Alton's round plain, successive fires notwitstanding, is a glorious mass of *Boronia pilosa*. The lovely waxy stars, from palest pink to crimson, are everywhere over some 15 square miles. Most of it is quite hairless: but occasional hairy plants are found, without any apparent difference in soil or aspect. The effect is enhanced by *Euphrasia collina*—not purple, but of most delicate mauve, growing up to two feet high. Here also is the Velvet Spyridium, *Spyridium subochreatum*; but not in great abundance.

In country south of the round plain, *Calectasia cyanea*, Blue Tinsel Lily, covers acres with its sheen. Is there any place where

*An area in the Nhill-Horsham district.

three such beauties could be found dominating the landscape. With the Calectasia, the Mat Heath-myrtle, *Baeckia ericaea*, is abundant. Rarely does it exceed an inch in height.

Wherever an old dune, of apparently pure silica sand, is seen, there is the Snow Myrtle, *Lhotzkya alpestris*, in great thickets. Some bushes may be masses of crimson buds, while their neighbours are in full snowy bloom. This may extend for miles, especially on the southern fringe. A curious, late-flowering form of this, with leaves almost round and very close, may be the South Australian variety, *latifolia*. It was discovered last year and fresh specimens are expected for examination in November.

In another part of the southern edge, a Calytrix, apparently a dwarfed form of *C. tetragona*, perhaps nine inches high, is dominant among other dwarfs. Not far away, the prevailing feature is the lovely golden stars of the *Phebalium stenophyllum*. A little farther west, *Boronia caerulescens*, Bluish Boronia, mingles with *Zieria veronicea*. This seems to be the only place where both are abundant.

A Calytrix resembling a miniature Lombardy Poplar in form has been the subject of much speculation. It is not plentiful anywhere, and flowers could not be obtained, although one cluster of old fruits proved the genus. We were inclined to the view that the unusual growth was due to parasites. Last year, however, flowers were obtained, very late in the season, and it transpired that the same thing or something very similar, had been recognized in New South Wales for 100 years as a distinct species. Which is right?

On a small salt lake, in the south-east, *Melaleuca halmaturorum*, Kangaroo Paper-bark, reflected in the still water, leaves an indelible memory. *Melaleuca neglecta* is frequently seen about salt marshes. *M. gibbosa* likes the river banks. *M. pubescens* is a fine tree in the red loam of the fringe and on the river. *M. acuminata* forms thickets at rare intervals. *M. Wilsoni* prefers the red rises. There is another, very dwarf, usually in clay-pans, closely related to *M. halmaturorum* and *M. neglecta*; but fruiting only on the oldest wood, on the ground. Flowers have not been obtained. Specimens in a "soak," better grown, indicate a possibility of mere variation on account of conditions.

Hibbertias are everywhere. *H. stricta* and *H. sericea* exhibit the extremes of reduction of leaf. Often the latter is very bright and fresh green, and in exceedingly dry places. Both *H. fasciculata* and *H. virgata* have the same abundance of flowers as elsewhere, often forming undershrubs for *Lhotzkya*.

Acacias favour the fringe. *A. calamifolia*, unaccountably overlooked by D'Alton, is magnificent right through the spring, especially on a red sandstone ridge that runs along the southern boundary. A recording of *A. pravissima* based on a specimen

exhibited at one of the Wild Nature Shows is somewhat doubtful. It was credited to Mr. H. Smith, and a specimen was forwarded to him for confirmation. He believes it was his; but has never found another plant.

Of Epacridaceae, 14 species are abundant. *Leucopogon virgatus* and *L. costatus* mingle in a snowy flat on the west of the round plain and another to the south. *L. ericoides* is fond of clumps of Red Stringy Bark. Very early in the spring, the countless tiny pink buds present a charming picture.

D'Alton notices the unusual colouring of *Exocarpus spartea*. It is copper-brown, and the plants are always very shapely. Good specimens scattered among the Broom Honey-myrtle always evoke admiration. *E. cupressiformis* keeps close to the river or on the fringe. One large thicket of *E. aphylla* is also very close to the river. *Leptomeria aphylla*, with heavy crops of pale-green, intensely sour drupes in spring is rather rare in the desert; but more frequent in the heavier soil among the Bulokes.

Most of these can be seen in full beauty in the last week in September.

The following plants, not recorded by D'Alton, are awaiting further study:—

A *Casuarina*, associated with *C. distyla* and *C. Muelleri*; but apparently distinct.

Confirmation of *Acacia pravissima*.

Broad-leaved form of *Lhotzkya*.

Dwarf *Melaleuca* of clay-pans.

Pterostylis, like *pedaglossa*, flowering in early October; but never obtained in maturity.

Morgania, apparently between *M. floribunda* and *M. glabra*.

Pimelea—related to the *spathulata* type; but not definitely determined.

Acacia melanoxylon or *implexa*.

Calytrix, narrow, erect form.

The following species are definitely added to D'Alton's list:—

Liliaceae—*Chamaescilla corymbosa*.

Orchidaceae—*Thelymitra antennifera*, *Glossodia major*, *Caladenia filamentosa*, *Pterostylis cycnocephala*.

Casuarinaceae—*Casuarina Muelleri*, *C. pusilla*.

Proteaceae—*Hakea flexilis*.

Santalaceae—*Exocarpus cupressiformis*, *E. aphylla*, *Leptomeria aphylla*.

Droseraceae—*Drosera pygmaea*, *D. auriculata*, *D. peltata*.

Leguminosae—*Dillwynia hispida*—here not rough, *Acacia acinacea*, *A. ligulata*, *A. calamifolia*.

Rutaceae—*Boronia pilosa*.

Sapindaceae—*Dodonaea cuneata*, *D. bursariifolia*.

Rhamnaceae—*Cryptandra tomentosa*, *Spyridium spathulatum*.

Thymelaeaceae—*Pimelea phylicoides, P. flava* (but here, pink).
Myrtaceae—*Eucalyptus oleosa, Baeckia Behrii, B. ericoea, B. crassifolia.*
Epacridaceae—*Astroloma conostephioides, Monotoca scoparia.*
Labiatae—*Ajuga grandiflora.*
Solanaceae—*Solanum simile.*
Goodeniaceae—*Goodenia robusta.*

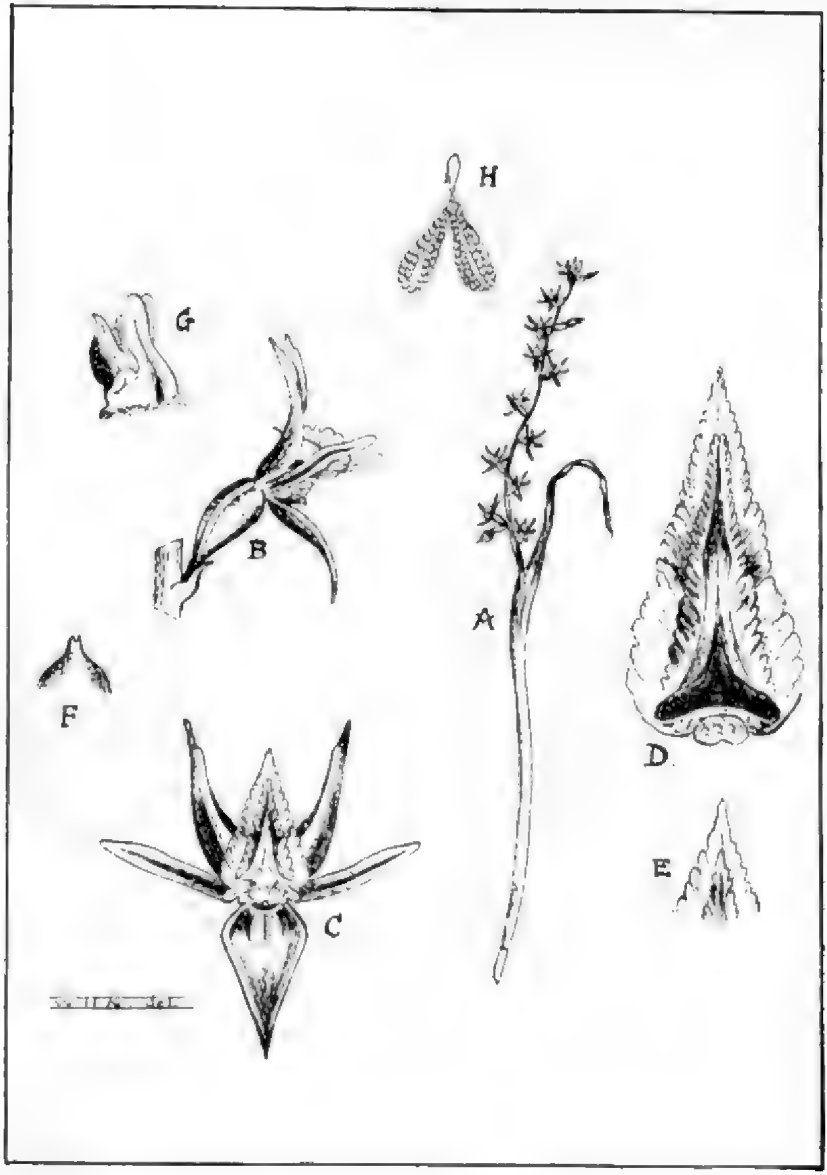
A NEW SPECIES OF THE GENUS *PRASOPHYLLUM* R.BR.

By W. H. NICHOLLS

Prasophyllum subbisectum, n.sp.

Planta terristris gracilis, humilis, circiter 12-16 cm. alta; folium teres; spica laxa; flores 7-14, virides et badii; ovaria obovata, pedicelli perbreves; sepalum dorsale erectum, ovate-lanceolatum, acutum, circiter 3 2 mm. longum; sepala-lateralia, parallela, lanceolata, concava, circiter 4 mm. longa; petala patentia, linearia, circiter 3 mm. longa; labellum circiter 4 mm longum, erectum, abrupte-recurvum, ovate-cuneatum, marginibus crenulatis, pars callosa prope bisecta, canaliculata; basi viscida, marginibus undulatis, purpureis; pars membranacea latiuscula viridis; columnæ laciniæ, laterales lineari-oblongæ; anthera purpurea; pollinia granulosa, caudicula parva.

A slender, rather diminutive plant about 12-16 cm. high; leaf terete, sometimes in a withered condition at flowering time; leaf lamina shorter than the spike, fistula a short distance below the flowers; flowers 7-14 (in my specimens) in a loose spike, green with brown markings, sometimes more brown than green; ovary oblong-ovate on a short, more or less horizontal pedicel, a small acute bract immediately below; dorsal sepal about 2 2 mm. long, erect, ovate-lanceolate, with a short point; lateral sepals lanceolate, about 4 mm. long, free, erect, spreading, concave on the inner side; tips more or less bidentate; petals linear, widely spread, about 3 mm. long, a prominent longitudinal stripe down the centre; labellum about 4 mm. long, ovate-cuneate, on a short claw, very wide at base, recurved at a right angle about the middle; membranous part narrow, greenish, margins crenulate; callous part hardly raised, reaching to within a short distance of tip, deeply and widely divided at base by a green channel, viscid only at the base, channel appreciably narrowing upward to a fine point; margins of callous part undulate, purplish; lateral appendages of column broadly linear, with a short broad depressed basal lobe; rostellum emarginate, anther purplish, pollen masses granular, caudile short. Flowering in October, November. Habitat: Portland, South-West Victoria.



KEY TO ILLUSTRATION

Prasophyllum subbisectum n.sp.

A. A typical specimen. B. Flower from side. C. Flower from front. D. Labellum. E. Variation at tip. F. Rostellum. G. Column from side. H. Pollinia.

This new and interesting addition to the genus was discovered at Pomonal by Miss L. Banfield, of Ararat, during October and November, 1932. The material was carefully examined and put aside for further and mature consideration, because other species somewhat similar were at that time under examination.*

Pr. subbissectum bears a closer resemblance to *Pr. fuscum* R.Br. than to other described forms, but is well separated by its more slender and lowly habit, an entirely different labellum, possessing a callous plate hardly raised above the membranous part, and *almost completely divided into two separate portions*, a character suggesting the specific name.

*Three species of the genus *Prasophyllum* R.Br. in *Proc. Roy. Soc. of Victoria*, xlvi, 1933.

SONGBIRDS AND PALMS

By A. J. TADGELL.

Opposite by bedroom window, in a suburban garden, grow three palms. The one in fruit, about 11 feet high, is *Chamaerops excelsa*, the Hemp Palm of China, one of the hardiest and most desirable, though its specific name is misleading. In its native country the hairy covering is used to bind plaster and its leaves provide lasting cordage. It is so easily grown that I usually have at least a dozen young plants as I cannot throw the seed to waste. Two others grow nearby, Thread Palms of California, known as *Washingtonia filifera* or *Brahea filamentosa*, of 18 and 25 feet high, but which will not flower. This hardy palm will grow to 50 feet, but its spines make its decaying branches unpleasant when being removed, especially if one is using a saw and ladder while holding on at a height. Each branch is very heavy.

This year I have been favoured more than usual in the abundance of fruit the Hemp Palm has borne and this has given me constant attendance of Song Thrushes and Blackbirds from morning to night. I find the Blackbird—especially the male—aggressive to other birds, although unfriendly at my approach. While the pretty mottled Thrushes are ready to give way to the Blackbird, they are not so easily alarmed at human approach, and their large bright eyes seem to ask, "Is it peace, Jehu?"

Yesterday, noticing the larger Thrush on my fence, I was anxious that he should have a fair share of the fruit, so I went towards the palm and placed my hand near the berries to indicate he was welcome. Unfortunately, his mate was little more than a hand's length away among the fruit and off she flew to her consort.

The practice of the birds generally is to swallow the fruit whole; at other times I find the purple grape-like skin lying uneaten, as it is apparently the sweet pulp they seek, but which is so hard, I find, to detach from the stone. Hence sometimes I find fruity seed either voided or otherwise cast aside. No effort is made by the birds to crush the stone; indeed, I find a flat pair of tweezers insufficient to crack it, although a pair of pincers will easily break it into fragments. When the whole seed, which is larger than a field pea and renate-shaped, is placed in a glowing wood fire, no gas is given out, and its shape remains the same. It also glows and finally turns black without disintegrating.

The fruit has a nice blue "bloom" and the raceme reminds one of an immature bunch of black Hamburgh grapes. It is ½ in. by ¾ in. size and is sweet to the taste. They are beautifully set on a straw-coloured raceme and held by a large spathe.

Impelled by curiosity at the attention the birds gave my Hemp Palm, I noticed for the first time the beauty of the racemes. There were six of these flower-clusters evenly distributed under the leaves near the top of the palm. I was struck by the purple grape-like fruit, and as it had attracted me, I did not wonder it should also attract my bird friends. There was quantity and weight of fruit borne by the palm at this interesting stage. I resolved to discover the weight.

Removing a raceme or branch and regarding it as an average one, I removed the berries and found the branch, without seeds, weighed 30 ounces. There were 2,120 berries, and as 290 weighed 8 ounces, I considered the six branches with fruit weighed in all 33 pounds. Surely a great weight to be supported. Thus Nature abundantly supplied life to perpetuate the plant's kind, and furnished a large provision of food for her bird family.

Visitors to the Hawkesbury River and Newport, near Sydney, will remember their pleasure at finding palms growing everywhere in the bush. I was reminded of my visit to Cabbage Tree, near Cape Conran, and Marlo in Victoria beyond the Gippsland Lakes, where our only palms native to Victoria—the *Livistonia* or *Corypha*—grow in an area of some three square miles. What a delight I experienced when looking at giant palms some 70 feet in height and watching the feathery tops waving on the skyline amongst the Eucalyptus foliage of the surrounding forest. These latter palms are reputed to have been brought from an adjoining State by aboriginals just as they are said to have brought the pines, *Callitris calcarata*, which are found at Mt. Bogong in the Kiewa River valley.

Bird life would be restored again to our bushlands and sanctuaries if hardy palms such as the Hemp Palm were freely planted, and it is just possible that Green Finches—which I also suspect of using this abundant food supply—would thrive and increase as do the Blackbirds and Thrushes.

The above article by Mr. Tadgell reminds me that there is another affinity between palms and exotic birds. The *Phœnix Canariensis* palm is a favourite roosting place for the common Brown Sparrow and the Starling. Notable examples of this are *P. Canariensis* palms outside the Metropolitan Board of Works, Spencer Street, at the Fitzroy Gardens, and a very large specimen overlooking Middle Brighton railway station. In all these cases the chirping of their "boarders" at sundown can be heard many yards away.

The interesting point is that our native birds do not usually select palms as a roost. The explanation appears to be that European birds seem to have an instinct which leads them to select roosting places that are not readily accessible to cats and other predatory nocturnal mammals, particularly as they also favour such trees as Hollies, Hawthorns, Boxthorn and others which are obviously hard or uncomfortable for cats to climb. While using such trees and palms as roosts, they do not appear to favour them as nesting places.

C.N.H.

FLORA AND FAUNA RESERVE

A considerable area embracing both sides of the Canberra Highway at Kowat, near the New South Wales border, has been proclaimed a Flora and Fauna Reserve. The area contains some typical eastern vegetation and native shrubs indigenous to the same area have been planted in suitable places by Mr. and Mrs. Thom, country members who reside in the district and will act as rangers. At their request the Club was able to obtain this reservation through the Advisory Council of Flora and Fauna. Other suitable sites might be similarly reserved if our country members advised the Club.

CORRECTION

In the memoir of the late Mr. M. I. Howie in the June issue, Mr. Howie's Christian name should read Malcolm instead of Michael.

EXCURSION TO BROADMEADOWS

Perhaps under the inducement of a glorious day, fifteen members and friends attended the excursion to Broadmeadows on Saturday, June 20. With six miles to be covered on foot, a start was made for a point on the easterly tributary of the left branch of the Moonee Ponds Creek, just above the junction. Here the streams have cut fairly steep-sided valleys through the newer basaltic lava sheet and the underlying tertiary grits and quartzites, exposing in places the older, probably Silurian, sedimentary rocks. The latter, though locally unfossiliferous, show stratigraphical and lithological characters in common with the proved Silurian rocks of Keilor, five miles to the south-west, and, by analogy, are regarded as of similar age.

A recent deposit of fresh-water limestone occurs in the bed of the tributary as thin encrustations on basalt boulders, cementing together boulders of different rocks in places, and as irregular sheets on the older sandstones and mudstones. It has been analysed and proved to be a magnesian limestone, in part dolomitic, containing disseminated quartz grit, and encloses in places fresh-water shells of the genera *Pomatopyrgus* and *Coxiella*, both of which are still found living in the creek. And it owes its origin to the chemical precipitation, from the creek water, of salts carried into it in solution by surface waters percolating through the basaltic rocks. A brief search was made for fossil shells, and none discovered, though in the creek the living representatives were particularly common.

After climbing out of the valley of the tributary, the valley of the left branch of the Moonee Ponds Creek was crossed, and again encountered nearer to the foot of Mount Gellibrand. Here a fault in the older sedimentary series was pointed out, and the downwarping of the beds on the upcast side of the fault noted. After which the creek was followed for a short distance and a halt called at an interesting patch of kaolin still nearer to Mount Gellibrand. The kaolin occurs in association with angular quartz grains and some white mica, and represents the patchy alteration of the Mount Gellibrand adamellite *in situ*, the material being unsorted by mechanical atmospheric agencies. Similar alteration has taken place along the thermal fissures in the granite of Carlsbad, in Bohemia, where the present existence of thermal springs indicates the operation of post-volcanic processes, and it is to an early stage, known as pneumatolysis, of such processes that the kaolinization of the Carlsbad granite has been ascribed.[1] Though the Broadmeadows deposit does not seem to show a great deal of evidence in support of alteration of this character, the same process has been invoked to explain the kaolinization of the granite of Bulla, about five miles to the north-west, and it seems most likely that the alteration in each case was due to an allied process.[2]

The quarry on Mount Gellibrand was not reached until late in the afternoon, and, unfortunately, too late for us to enjoy the rather fine panorama from the summit of the Mount. For, although the Mount is only about 500 feet above sea-level, the surrounding country is rather flat and affords a fine view of the more distant geographical features. The Mount is a nearly circular outcrop of a granite rock determined by Dr. F. L. Stillwell[3] in a paper from which the bulk of this report has been compiled, to be adamellite, and who states that, though granitic dykes occur in the city itself, the adamellite is the nearest outcropping granitic massif to Melbourne.

A. C. Frostick.

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1. *Grundzüge der Gesteinskunde*, Weinschenk, *Trans. Johannsen*, 1916, p. 150.
2. R. W. Armitage, *Vic. Nat.*, Vol. xxviii, July, 1911.
3. Dr. F. L. Stillwell, *Proc. Roy. Soc. Vic.*, Vol. xxiv (N.S.), Pt. 1, 1911, pp. 156-178.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, August 10, 1936. The President, Mr. S. R. Mitchell, presided, and about 100 members and friends attended.

SUBJECT FOR EVENING

The subject for the evening was an illustrated lecture on "Grasses," by Mr. P. F. Morris, of the National Herbarium. Mr. Morris stressed the part that grasses play in Australian commercial life, and also dealt with them from a scientific and general aspect. Many little-known facts and figures were mentioned. The lecture was illustrated by a fine series of lantern slides and coloured illustrations were shown, also outline sketches of the grasses of Australia (drawn by the lecturer).

BUSINESS FROM MINUTES

Reservation at Kowat.—Mr. G. N. Hyam reported that, through the Club's efforts, a nature reserve had been proclaimed at Kowat, and that two Club members, Mr. and Mrs. Thom, had been appointed Rangers.

National Monuments.—The President announced the meeting at the Herbarium Hall on August 12. He stated that delegates from more than 30 interested bodies would attend.

Shooting of Bustards or Wild Turkeys.—The Secretary stated that the Advisory Council for Flora and Fauna had moved in this matter, and that the Committee had decided to withhold any action pending advice from the Council.

Sale of King Orchids.—Mr. G. N. Hyam said that this State had no authority to deal with this matter, as the plants came from private property in New South Wales.

Mr. Lancaster's Shells.—The President reported that the Committee had decided to take no action.

Mt. Arapiles Celebrations.—Mr. A. S. Kenyon reported that 4,000 people attended the celebrations. It was proposed to fence in the park. Mr. H. Smith, of Horsham, the Club Delegate, had given some excellent advice relating to the planting of trees, etc., advice which the Trust had decided to follow.

REPORTS OF EXCURSIONS

Reports of Excursions were given as follow:—National Museum, Marsupials, Mr. F. S. Colliver for Mr. J. A. Kershaw; Zoology School, University, Mr. F. S. Colliver for Professor Agar; Lilydale, Palaeontology, Mr. F. Chapman.

ELECTION OF MEMBERS

On a show of hands the following were duly elected: Mr. A. S. Flemming, Mr. M. R. S. Sharland and Mr. P. E. O'Grady.

GIFT OF BOOKS

The President announced that three books had been presented to the Club by Mr. H. C. E. Stewart, and on the Club's behalf thanked him for his gift.

GENERAL BUSINESS

Wild Nature Show.—The Sub-Committee's work was outlined by Mr. Hyam, who asked that all members who could assist should notify the Hon. Assistant Secretary, Mr. L. W. Cooper.

NATURE NOTES

Miss Thornton-Smith mentioned an albino blackbird; and Mr. W. H. Ingram stated that one could be seen in the Botanic Gardens.

Mr. F. S. Colliver, with the aid of the epidiascope, gave a note on the Australian Dinosaur *Rhoetosaurus brownei*, further remains of which had recently been found in Queensland. The animal was possibly 50 feet long and was a swamp-dweller of Jurassic times.

The meeting then adjourned for the Conversazione.

EXHIBITS

Miss Jean Galbraith.—*Acacia decurrens* (specimens from old and young trees); natural hybrid: *A. Baileyana, A. dealbata, A. longissima, A. melanoxylon* and *A. pycnantha*.

Misses I. and M. Knox.—Pinna sp., from San Remo; Paper Nautilus, from Flinders.

Mr. C. French.—Two rare plants, *Trichinium hemisteirus* F. von M., '64, and *Goodenia modesta*; both collected in Central Australia by exhibitor, in September, 1935.

Mr. A. S. Chalk.—Limestone from Cave Hill Quarry showing, *inter alia*, coral and shells.

National Herbarium on behalf of Mr. Robbins, Orbost.—New Plant Record for Victoria: *Korthalsella articulata* Black (Syn. *Viscum articulatum* Benth.), "Jointed Mistletoe," growing on *Eugenia Smithii*.

Mr. Ivo Hammet.—*Acacia longifolia, A. juniperina, A. armata, A. praecissima, A. howitti, Grevillea pumcea, G. oleoides*, var. *dimorpha, G. alpestris, G. alpina, G. dallachiana, G. thelmanniana*, and other plants.

Mr. F. S. Colliver.—Fossils and matrix from Royal Park, Cadell's Punt, at Morgan, S.A.; Forsyth's, Grange Burn; McDonald's, Muddy Creek. Also Magnesium Limestone with freshwater shells from Broadmeadows.

Mr. A. Underwood.—Euphorbia.

Plate VIII

Photo by C. Barrett.

Arboreal Trapdoor Spider's nest, with lid closed

STRAY NOTES ON SPIDERS

By CHARLES BARRETT

Interest in spiders has become so general in the past few years that a popular book on these "neglected" forms of life was sure of a welcome. In *Spider Wonders of Australia*, Mr. Keith C. McKeown, of the Australian Museum, has provided a book that was needed. He deals with all the familiar species, and others rare or little known. He is a guide to what must be a new world to the majority of his readers.

Our Club may claim the distinction of having published in the *Naturalist* (Vol. xlix, No 12, April, 1933) the first popular account of spider life in Victoria. Mr. L. S G. Butler, author of this article, a minor monograph for the layman, has done more to popularize the spider in Victoria than any other worker in a field still almost untilled beyond the corners. He has promised for our journal another paper dealing with the nests and spinning work of spiders found around Melbourne.

Trapdoor spiders with arboreal habits have been discovered; one species in the Belgian Congo, another in Australia. The former has yet to be described, and of the latter we have no knowledge, beyond that to be gained from a study of its dwellings. In the Macpherson Ranges, southern Queensland, some years ago, Mr. Sid. W. Jackson found a few nests of a trapdoor spider on the trunk of a rough-barked tree. He collected some specimens; one is in the possesion of Mr. J. R. Ramsay, of Sydney; the others are preserved at the Australian Museum. Though the makers of these beautifully camouflaged nests were also collected, I believe, no trace of them rewarded my inquiries. For the present then, this remarkable form must remain "anonymous", but it is worth while to record the fact that Australia does possess a truly arboreal trapdoor spider.

The two photographs here reproduced doubtless are the first of a tree trapdoor spider's dwelling to be published. Even when the field is narrowed to six inches by four inches it is difficult to distinguish the nest, and locate the closed door. On a large tree trunk, concealment is complete. Only by chance is discovery likely while the trapdoor remains closed. This surely is one of the most perfect examples of camouflage in nature.

On Tambourine Mountain, Queensland, now a popular resort of Brisbane folk, and losing much of its wildness the late Dr. R. H. Pulleine, in 1912, searched for Terretellarians. He found that epiphytic ferns, huge bulks whose accumulated weight at last brings them, perhaps with the broken branch, to the ground, form a suitable nidus for some Terretellariae. But epiphytic orchids and ferns on the trunks of giant trees (*Araucaria cunninghami*) "were searched in vain for any arboreal forms of trapdoor spider." In

August this year I also went spider hunting on Tambourine Mountain, and though the burrows of two or three species were numerous enough along the banks of an old disused road and elsewhere, no arboreal trapdoor spider's dwelling was discovered.

In a Brisbane garden, five egg-bags of the Magnificent Spider (*Dicrostichus magnificus*) were found suspended from a Bougainvillea stem, and embowered in beauty: the mauve-coloured bracts of the creeper framed those shapely white cocoons, formed by the "Queen of Spinners," unseen in her own little room above the pendant nurseries. I brought them down to Melbourne: the mother *magnificus* and her unborn progeny. There were several hundred eggs in each cocoon (the actual nursery is a much smaller cocoon, pendant centrally in the outer envelope), and they hatched at the end of August. Many of the spiderlings are still alive, and presently will be liberated in my glasshouse. I hope to acclimatize the Magnificent Spider in Melbourne.

Around Brisbane the Magnificent Spider is becoming scarce. Among its enemies, the White-eye (*Zosterops*) has been observed in the act of taking *magnificus*, and perhaps is chiefly responsible for the noticeable decrease in its numbers. Mr. Longman, Director of the Queensland Museum, advances this view. He is the authority on the life-history and habits of the "Queen of Spinners."

That the Red-backed or Jockey Spider, called Katipo in New Zealand, is a common species around Melbourne is indicated by the number of specimens that are forwarded for identification. Often several, from different localities, are received in one week. Usually the specimens of *Lactrodectus hasselti* are alive and come through the post in match-boxes or tobacco tins. Occasionally the sender thoughtfully writes a warning on the inner wrapper: "Live Spider, Open with Care." But as often as not there is no indication of what the box or tin contains. A lively and aggressive specimen of the deadly Funnel-web Spider (*Atrax robustus*) was sent to me from Sydney by a medical man who, of course, did not forget to warn me—in large block letters on the lid: "Open with great care: It's *Atrax*."

In my own backyard at Elsternwick Red-back Spiders occur. One had her web-shelter between two small rough stones at the edge of a rock garden pond; another was found among broken flower pots piled in a corner.

Mr. Lee Passmore, of San Diego, California, an authority on trapdoor spiders of North America, and the famous Black Widow (*Lactrodectus mactans*) is interested in our Jockey Spider. In a letter he remarks: "I have read of several persons who have been bitten by the Black Widow, but none of the bites proved fatal. No doubt your Katipo is closely related to this species."

Plate IX

Photo by C. Barrett.

Arboreal Trapdoor Spider's nest, with hinged lid held open

NATIONAL MONUMENTS

By G. N. HYAM

During recent years most civilized countries have been investigating, preserving and generally protecting their relics of the past, whether of human or natural origin. Like we in Australia, they had found that protective legislation in relation to the fauna and flora of their respective countries had prevented, or at least deferred, the extinction of rare species, and had created an interest in living things amongst citizens who otherwise would not have recognized their value, thus realizing that similar protection could be extended to inanimate objects. On the other hand, it is evident that protective legislation, as it at present exists in Australia, is not entirely adequate.

Nearly every day we read and receive protests against destruction of avenues of trees, the quarrying of interesting rock formations, the destruction of historical buildings, or the spoliation of beauty spots which are entirely unprotected. The present wild flower and forest protective Acts, for instance, provide for the protection of certain species or areas, but they do not safeguard individual specimens or groups of specimens which may be of scientific interest or aesthetic beauty, while geological and historical monuments are in no way provided for. These Acts also fail to provide protection for, or provide for resumption of, objects that may be on private property, however valuable they may be as natural monuments of scientific, historical or aesthetic interest. In other words, there is nothing to prevent a private owner removing and destroying an unique tree, rock formation, historic building or other object, however valuable to the community it may be. At present there is no provision made for a statutory body to whom a public spirited private owner may dedicate such objects for the purpose of preserving them for all time and which possesses the means or the technique necessary for their adquate protection. It has also been forcibly brought to our notice in recent months that powers possessed by public bodies and departments are such that they can destroy objects which could be truly described as national monuments and against such destruction the public in general have no appeal. These disabilities seem to have occurred in other countries and resulted in the passing of legislation for the protection of national monuments.

The United States of America were probably the pioneers of national monuments protection among English-speaking countries.

In the United Kingdom a statutory body has been created entitled the "National Trust for the Preservation of Historic Buildings and Scenic Beauty," whose function is to select historic buildings and scenic areas which should be preserved as well as areas that are known to be the habitats of rare fauna and flora, etc.

Japan had provision for protection long before their "Westernization," and their present Act is a model of simplicity, covering such objects as individual trees, habitats of birds and even insects, extreme range limits of certain of their flora, trails and view points in scenic areas, and the like.

The Committee of this Club has frequently had instances of vandalism, conscious and unconscious, brought to its notice, generally after the damage was done, and consequently decided to make strenuous endeavours to find a means of checking this wastage of national assets. To this end, a conference of representatives of forty-three of the leading organizations in Victoria met at the National Herbarium on August 12. The enthusiasm displayed by this meeting was surprising and the conference resulted in the formation of the delegates into a Council for the Preservation of National Monuments with the following as a committee to prepare data: Messrs. J. L. Menzies (Town Planning Association), S. R. Mitchell (Anthropological Society), A. J. Swaby (League of Youth), A. H. Mattingley (R.A.O.U.), Dr. Sanderson (Victorian Historical Society), and G. N. Hyam (F.N.C.). This committee will collect data from all countries who already possess protective legislation and from these reports draw up proposals suitable for Victoria or possibly Australia for the approval of the Council, and afterwards for submission to the Government.

One policy we are determined upon is the provision of adequate funds for the protection of declared national monuments or national parks as well as for other existing protective legislation. The existing legislation for the declaration of national parks appears to be adequate, though the total area of such parks is disgracefully small in Victoria, but no permanent financial provision is made for their maintainance. Very small sums have been granted at infrequent intervals with the result that some are actually unfenced, access is difficult and rangers are too few. Some are dependent on revenue derived from grazing leases, which is most undesirable on account of the consequent destruction of the flora and ultimately the fauna.

The same starvation policy is applied to the administration of the Wild Flower Protection Acts and the Game Laws, successive governments apparently overlooking the fact that money judiciously expended in these directions is in the nature of a capital investment which in years to come will pay handsome dividends not only in cash represented by the tourist trade but also in the mental and physical health and welfare of the community. The committee seeks the co-operation of every member who can supply data as regards what has been done in other countries and also suggestions as to objects suitable for protection, and apart from this every member can assist by active propaganda in favour of the

Plate X

X-ray photograph of Platypus

movement. Protection of all kinds is obviously a duty of all naturalists, particularly field naturalists, who should prefer to see their specimens in their original position rather than in a museum.

X-RAY PHOTOGRAPHS OF AUSTRALIAN ANIMALS

Applied to the study of mammals, birds and reptiles, X-ray photography in both convenient and highly interesting. The subjects are unharmed and can be kept alive for further use. This, of course, is particularly important in the case of rare specimens.

The small bones of some animals are rather difficult to study from dissections; but may be X-rayed and the photographs enlarged if necessary, so that all the bones show plainly. This is most important in the case of the small marsupials.

The easiest subjects for X-ray study are some of the lizards, as they remain still for relatively long exposures and better details may be obtained on the film. A tortoise also is a good subject when it can be persuaded to extend its head from underneath its carapace, otherwise it is hard properly to distinguish the bones of the head and neck from the "shell," whose structure shows up well in the film. Opossum X-ray photographs are interesting, especially of a Ringtail, showing the sesamoid bones at the joints in the tail.

Birds are rather different because much shorter exposures are necessary in order to overcome movement in the subject. One method with birds is to place them in a special box and watch their movements on the X-ray screen in a darkened room. By this means all the movements may be followed at the one time. Exposures for birds are as short as one-tenth second. A film of a Magpie was taken in one-quarter second and one of a Kookaburra in half second. Both subjects were pet birds.

Most interesting of all is the Platypus. The specimen used was taken from a creek near Flowerdale, brought to Melbourne by car and returned to its haunts on the following day. The behaviour of the animal was good; it seemed to like the cold aluminium surface of the film holder, and remained still while successful exposures were made. The view from the side was taken by placing the Platypus on a slightly inclined piece of wood. When the subject walked into a suitable position the exposure was made—one second.

F. S. FERGUS.

[The plate accompanying this article is a notable contribution to the *Naturalist*, which publishes the first X-ray photograph of the Platypus to be taken. Mr. Fergus deserves our congratulations on the excellent original work he is doing in making X-ray films of native mammals and birds.—Editor.]

TORQUAY: A SYNOPSIS OF ITS FLORA

By NOEL LOTHIAN

Torquay is noted for its fossil cliffs containing numerous fossil shells, etc., but is not so well known for its flora as it should be. It is very interesting from an ecological viewpoint as it appears to be the "joining up" area of the "sands area" of our foreshore and the forest areas.

Situated thirteen miles due south of Geelong, Torquay is on the coast facing Bass Strait and therefore the sea breezes have an influence on the growth of its flora even more so than they have on the foreshore of Port Phillip Bay. During the past fifteen months I have visited this locality about once every three months, and have thus obtained a fairly good idea of its flora.

Torquay was settled during the early days of Victoria and is extensively cleared of timber. Even during the last thirty or forty years land for ages thickly covered in scrub and trees has been transformed, being now either under crops or grazing cattle. Clearing usually was carried out by firing the land. After a fire-break had been made —and this was usually about two or three miles from the coast—a fire was lit and allowed to burn, as often as not, right down to the sea-cliffs. The land was then cultivated, but, as it began to show a loss in yielding power, it was allowed to revert to bush. The soil is of a basaltic nature, overlying limestone cliffs, but towards Pt. Addis (about five miles west of Torquay) the soil is slightly more sandy in nature.

As remarked before, Torquay appears to be the "joining up" section of the sands and forest areas. There is a decisive evidence (this will be more fully explained in a later article) that the forest must have extended to the left side of Spring Creek.

Typical forest plants, such as *Burchardia umbellata*, *Anguillaria dioica*, *Microseris scapigera*, *Pterostylis nana*, etc., are all found growing in the scrub along the foreshore where at intervals are patches of wind-blown Eucalyptus. The salt breezes tend to retard growth and the height of the forest near Pt. Addis, which has not been cut or cleared, is tending to be "eaten" away by this action, except where it is protected in the valleys. In the "isolated forest" area the trees grow to a uniform height. The Eucalypts consist mainly of four species. *E. leucoxylon* is by far the commonest species, while *E. obliqua*, *E. macrorrhyncha* and *E. elæophora* are in smaller numbers.

Acacia is represented by five or six species and one variety. They are not found massed together like the Eucalypts. *Acacia pycnantha* is by far the most abundant species. There are a few plants of *A. verticillata* and also its variety *ovoidea*, and these occur in very localized places. *A. armata* is plentiful, more especially to the north of Torquay itself, while *A. verniciflua* is

typically a forest species growing rather plentifully around the isolated forests near Half Moon Bay.

Thomasia petalocalyx grows profusely in one spot only, and in this area flowers have been collected for nearly every month of the year, the main flowering season being January to March.

A curious feature of this locality is its similarity to the Grampians in certain respects. Last year *Erodia achilleoides* was found in this area, this plant before being only recorded from NW. and SW. Victoria.

There is a good showing of *Pimeleas* of which *P. serpyllifolia*, *P. humilis* and *P. octophylla* are the most plentiful. *Hibertias stricta*, *H. procumbens*, and *H. sericea* are plentiful in localized areas, the last-mentioned forming bushes from 15-18 inches in height.

One of the anomalies of the area is a small patch of *Calytrix tetragona*. This species is found in one place only—a small, sheltered valley (behind Half Moon Bay) and is only 5-10 acres in area. I have looked for this plant along the coast to Anglesea, but have failed to find it, although there is a small patch of it about two miles from Torquay along the Torquay-Geelong Road. *Melaleuca pubescens* is very common and forms a valuable sand binder. The flowering period of this species at Torquay is lengthened considerably and specimens have been recorded for May, June, September, November and January.

Casuarina stricta and *C. distyla* abound here, the former making beautifully-shaped trees. The male form would make a first-class garden shrub, but unfortunately it is not possible to tell in seedling stage which is male and which female. *Correas* are among the shrubs growing in different situations, being found in gullies, grassland and on the sea shore. *C. alba* grows right down to the high-water mark and flowers as well there as it does high up on the cliffs. *C. rubra* has a curious colour form which has a purple tint in the flowers and not the scarlet flowers which is the common form. Salicolaceous plants grow plentifully, especially at the shore of the creek and along with other plans such as *Zygophyllum*, *Apium*, *Helichrysum*, *Selliera*, etc. *Calocephalus Browni* is widely spread and useful to a certain extent as a sand binder, forming rounded bushes hemispherical in shape 2-3 feet through. This should make quite a good foliage plant for gardens and I am told that they use it in Sydney for this purpose. Another species, *C. lacteus*, is a dwarf plant. I have collected it in one small area (2-3 sq. yds.) and that in one of the main streets of Torquay, but have failed to find it elsewhere.

Epacris impressa, a small bush 6-12 inches high and the colour is a deep red. This form varies very little in the Torquay area.

A remarkable fact is the rate at which the Bidgee Widgee (*Acaena sanguisorba*) has spread over the deserted land. Some

blocks which were cultivated five to six years ago are now covered with this pest and sheep grazing on these blocks usually have the lower portions of their legs covered with burrs. Two species of *Xanthorrhoea* are found at Torquay, each in its own locality. *X. minor* produces beautiful spikes up to six feet high and *X. australis* up to eight feet. The Sea Holly (*Alyxia buxifolia*) is comparatively rare. Some very fine specimens of this plant were found in a sheltered spot just near the ochre mine. These plants were from four to five feet high and six to seven feet through.

Pultenaea daphnoides is a spectacular sight when in flower during September-October. A shrub of six to ten feet is literally covered with golden and brown terminal clustered flowers.

The following list is not nearly complete but is only to give an idea as to the flora of this area, and so far fifty-one genera have been recorded containing about one hundred and fifty species.

Provisional list of plants collected at and near Torquay:—

Filices—
Pteridium aquilinum (Kuhn)
Gramineae—
Themeda triandra (Forck)
Spinifex hirsutus (Labill) (now *S. inermis* Banks and Sol.)
Distichlis spicata (Greene)
Poa caespitosa (G. Forst.)
Sporobolus indicus (R.Br.)
Danthonia semiannularis (R.Br.)
D. setacea
Stipa pubescens (R.Br.)
Cyperaceae—
Scirpus nodosus (Rottb.)
Lepidosperma concavum (R.Br.)
Gahnia psittacorum (Labill)
Juncaceae—
Luzula campestris (D.C.)
Liliaceae—
Xanthorrhoea minor (R.Br.)
X. Australis (R.Br.)
Lomandra filiformis (Bittern), *Lomandra longifolia* (Labill)
Bartlingia sessiliflora (Dene)
Dianella Tasmanica (dwarf form) (Hk.f)
D. revoluta (R.Br.)
Anguillaria dioica (R.Br.)
Burchardia umbellata (R.Br.)
Tricoryne elatior (R.Br.)
Caesia vittata (R.Br.)
Bulbine bulbosa (Haw.)
Dichopogon strictus (J. G. Baker)
Amaryllidaceae—
Hypoxis glabella (R.Br.)
Iridaceae—
Patersonia glauca (R.Br.)
Orchidaceae—
Thelymitra antennifera (Hk.f)
Acianthus exsertus (R.Br.)
A. reniformis (Schlecht.)
Eriochilus cucullatus (Reicht.)
Caladenia dilatata (R.Br.)
C. latifolia (R.Br.)
Diuris pedunculata (R.Br.)
Pterostylis nana (R.Br.)
P. barbata (Lindl.)
P. nutans (R.Br.)
P. parviflora (R.Br.)
Linaceae—
Linum marginale (A. Cunn.)
Zygophyllaceae—
Zygophyllum Billardieri (D.C.)

Rutaceae—
Correa alba (Andr.)
C. rubra (Sm.)
C. rubra var. *virens*
Tremandraceae—
Tetratheca ciliata
Polygalaceae—
Bredemeyera volubile (H.K.)
Stackhousiaceae—
Stackhousia monogyna (Labill)
Rhamnaceae—
Cryptandra amara (Sm.)
Spyridium parvifolium (F.v.M.)
S. vexilliferum (Reiss)
Sterculiaceae—
Thomasia petalocalyx
Lasiopetalum Baueri (Steetz) (also white variety)
Dilleniaceae—
Hibbertia cericea (R.Br.)
H. stricta (R.Br.)
H. procumbens (D.C.)
Violaceae—
Viola hederacea (Labill)
Casuarinaceae—
Casuarina distyla (Vent.)
C. stricta (Ait.)
Proteaceae—
Persoonia juniperina (Labill)
Isopogon ceratophyllus (R.Br.)
Banksia marginata (Cav.)
Santalaceae—
Exocarpus cupressiformis (Labill)
Polygonaceae—
Muehlenbeckia adpressa (Neiss)
Chenopodiaceae—
Atriplex cinereum (Rair)
A. semibaccatum (R.Br.)
Salicornia australis (Sol.)
Rhagodia baccata (Lab.)
Amarantaceae—
Trichinium macrocephalum (R.Br.)
Thymelaeaceae—
Pimelea phylicoides (Meiss)
P. actophylla (R.Br.)
P. flava (R.Br.)
P. Serpyllifolia (R.Br.)
P. humilis (R.Br.)
Myrtaceae—
Eucalyptus elaeophora (F.v.M.)
E. macrorrhyncha (F.v.M.)
E. obliqua (L'Herit)
E. leucoxylon (F.v.M.) (also pink variety)
Leptospermum laevigatum (F.v.M.)
L. scoparium (R. and G. Forst).
Melaleuca pubescens (Schauer)
Calytrix tetragona (Labill)
Baeckea ramosissima (A. Cunn.)
Umbelliferae—
Hydrocotyle laxiflora (D.C.)
Apium australe (Thou.)
Epacridaceae—
Epacris impressa (Labill)
Astroloma humifusum (R.Br.)
Leucopogon virgatus (R.Br.)
L. parviflorus (Liudl.)
Primulaceae—
Samolus repens (Pers.)
Gentianaceae—
Erythraea spicata (Pers.)
Apocynaceae—
Alyxia buxifolia (R.Br.)
Convolvulaceae—
Dichondra repens (R. and G. Forst.)
Convolvulus erubescens (Sims)
Labiatae—
Ajuga australis (R.Br.)
Solanaceae—
Solanum nigrum (L.)
S. aviculare (G. Forst.)

Aizoaceae (*Ficoideae*)—
Mesembrianthemum australe (Sol.) (now *Disphyma australe* Sol.)
Tetragonia expansa (Murr.)
T. implexicoma (Hk.f)
Caryophyllaceae—
Spergularia rubra (Camb.)
Ranunculaceae—
Clematis aristata (R.Br.)
Lauraceae—
Cassytha glabella (R.Br.)
C. melantha (R.Br.)
Droseraceae—
D. Menziesii (R.Br.) var. *albiflora*.
D. auriculata (Backh.)
D. Whittakeri (Planch.)
Pittosporaceae—
Bursaria spinosa (Cav.)
Rosaceae—
Acaena Sanguisorba (Vahl.)
A. ovina (A. Cunn.)
Leguminosae—
Acacia armata (R.Br.)
A. verniciflua (A. Cunn.)
A. pycnantha (Bth.)
A. verticillata (Willd.)
A. verticillata var. *ovidea* (Bth.)
A. longifolia (Willd.)
Gompholobium minus (Sm.)
Daviesia brevifolia (Lindl.)
Pultenaea daphnoides (Wendl.)
P. scabra (R.Br.) var. *Biloba* (Bth.)
P. humilus (Bth.)
Dillwynia ericifolia (Sm.)
D. floribunda (Sm.)
D. cinerascens (R.Br.)
Platylobium obtusangulum (H.K.)
Swainsona lessertifolia (D.C.)
Kennedya prostrata (R.Br.)
Oxalidaceae—
Oxalis corniculata (L.)
Scrophulariaceae—
Gratiola peruviana (L.)
Lentibulariaceae—
Utricularia dichotoma (Labill)
Myoporaceae—
Myoporum viscosum (R.Br.)
M. insulare (R.Br.)
Rubiaceae—
Coprosma Billardieri (Hk.f) (now *C. quadrifida* Rob.)
Campanulaceae—
Wahlenbergia gracilis (D.C.)
Lobelia gibbosa (Labill)
Brunoniaceae—
Brunonia australis (Sm.)
Goodeniaceae—
Goodenia ovata (Sm.)
G. geniculata (R.Br.)
Selliera radicans (Cav.)
Scaevola microcarpa (Cav.)
Compositae—
Brachycome graminea (F.v.M.)
B. (collina) perpusilla (Black)
Vittadinia triloba (D.C.)
Olearia axillaris (F.v.M.)
Gnaphalium japonicum (Thunb.)
G. purpureum (L.)
Helichrysum apiculatum (D.C.)
H. scorpioides (Labill)
H. cinereum (F.v.M.)
Leptorrhynchus squamatus (Less.)
Ixodia achilleoides (R.Br.)
Calocephalus Brownii (F.v.M.)
C. lacteus (Less.)
Cotula coronopifolia (L.)
Senecio pinnatus (J. M. Black)
Erechtites prenanthoides (D.C.)
Microseris scapigera (Sch.-Bip.)

The Victorian Naturalist

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, September 14, 1936. The President, Mr. S. R. Mitchell, presided, and about 100 members and friends were present.

EXPLORER AND NATURALIST

An illustrated lecture on "Major Mitchell, Explorer and Naturalist," was given by Mr. C. Daley, B.A., F.L.S., and illustrated by the epidiascope.

The President tendered the thanks of the Club to Mr. Daley, and suggested that the text of the lecture should be published in the *Naturalist*. Members showed their appreciation by acclamation.

Mr. C. Long, of the Historical Society, spoke appreciatively of Mr. Daley's work.

VISITORS

A warm welcome was extended by the President to Mr. Neville Cayley, the well-known bird artist, of Sydney. Mr. Cayley, in responding, expressed his surprise at the number present at the meeting.

DONATION

The President announced that Mr. C. French had presented to the Club a copy of *A Naturalist in Cannibal Land*, by A. S. Meek, and on the Club's behalf thanked Mr. French for the gift.

BUSINESS FROM MINUTES

National Monuments.—Mr. A. H. Chisholm showed pictures of a number of interesting trees in Queensland and the National Park near Sydney, which he considered worthy of consideration as National Monuments.

Bustards or Plain Turkeys.—Mr. C. Daley reported having received a letter from a tourist firm stating it would do its best to protect these birds in Northern Australia.

CORRESPONDENCE

From Mr. Noel Lothian thanking the Club for the good wishes extended on his transfer to New Zealand, where he will spend a year.

REPORTS OF EXCURSIONS

Reports of Excursions were given as follow:—Rayswater, Mr. J. W. Audas; Cranbourne, Mr. L. W. Cooper for Mr. A. D. Hardy.

ELECTION OF MEMBER

Miss Ellen Clark, National Museum, Melbourne, was duly elected as an Ordinary Member of the Club

GENERAL BUSINESS

Mr. A. H. E. Mattingley mentioned the reported killing of whales inside the Barrier Reef by Japanese, and urged that whales should be fully protected in Australian waters. It was decided that this matter be referred to the Committee for consideration.

Mr. C. French drew attention to a newspaper cutting, a report of police taking charge of a truck-load of *Thrygiomene* at Stawell.

The meeting then adjourned for the Conversazione.

EXHIBITS

Mrs. Fenton-Woodburn.—South African Orchid (*Disa* sp.); Fluke snails and pond life, from Goulburn Valley.

Mrs. J. J. Freame.—Fungus (*Peziza* sp.), sea-spiders, New Guinea Shell Money, and rings from Octopus suckers.

Mr. D. J. Paton.—Plants from Boronia, including *Euphrasia collina*, *Acacia diffusa*, *Craspedia uniflora* (very large), *Pultenaea subumbellata*, and cultivated *Boronia anemonifolia*.

Mr. H. C. E. Stewart.—*Pterostylis nutans* (Nodding Greenhood) with variegated leaves, collected at Heathmont.

Mr. Geo. Coghill.—*Grevillea rosmarinifolia*, *Acacia myrtifolia*, *Micromyrtus ciliatus*, *Tecoma australis*, *Eriostemon myoporoides*; all garden-grown.

Mr. H. Dickens.—*Xanthorrhoea australis*, from Rosebud.

Mr. T. S. Hart (for Mrs. Birch, Tabberabbera).—*Zieria cytisoides*, not often collected in Victoria.

Mr. L. W. Cooper.—Flowers collected by Miss M. G. Campbell from the temperate region of the Himalaya.

Mr. A. R. Varley. Limestone from Cave Hill (showing Corals and Stromatopora), Native Holly and Qualup Bell from West Australia.

Mr. C. Daley.—*Thryptomene calycina* (*T. Mitchelliana*), *Micromyrtus* (*Thrytomene*) *ciliatus*, *Correa rubra*, and *Lhotzkya Alpestris* (all first collected by Mitchell in 1836); also *Prostanthera rotundifolia* (garden-grown).

Mr. S. R. Mitchell.—Torbenite, a green-coloured hydrated phosphate of copper and uranium, and autunite, a yellow-coloured hydrated phosphate of lime and uranium; both highly radioactive minerals, from Mt. Painter.

Mr. F. S. Colliver.—Fossil Ferns, Jurassic: *Sphenopteris* sp. from Wonthaggi; *Neuropteris moeana*, from Gippsland; Triassic specimens, from New Town, Hobart; *Thinfeldia lancifolia*, from Beaudesert, Queensland. Carbo-permian: *Gangamopteris spatulata*, from Bacchus Marsh. Pleistocene; *Pteridium aquilinum*, from Mt. Gambier, South Australia.

NOTES ON *UTRICULARIA*, WITH SPECIAL REFERENCE TO AUSTRALIA, WITH DESCRIPTIONS OF FOUR NEW SPECIES

By FRANCIS E. LLOYD, D.SC. (Wales), F.R.S.C., F.L.S.

Australia has in certain directions a larger and more varied assortment of *Utricularia*, the bladderworts, than any other natural geographical area.

Many of the facts might become known to anyone digging into the taxonomic literature; but many more would escape discovery. This is partly due to the inadequate descriptions, unaccompanied by illustrations or provided only with poor and inaccurate ones, but more especially by the fact that the specimens in the various Herbaria are, with few exceptions, woefully incomplete. In such cases the most interesting parts of the plant are absent because the collector has never troubled to gather them. As the majority of species grow in wet places and are very small, only the flower on its slender stalk is seen. In collecting, the stalk is grasped and pulled up out of the substrate, leaving everything but a few fibrous "roots" (but they are not roots at all), with every delicate part stripped away. By rare accident these delicate parts, when the substrate is soft and yielding, as it rarely is, are very occasionally preserved.

In order to extend my knowledge of Australian species, I have examined all the specimens in accessible Australian herbaria, with but meagre results. Naturally and expectedly, the National Herbarium, Melbourne, has yielded some returns.

The renowned botanist, Baron Ferdinand von Mueller, was an indefatigable student of the Australian flora and had many correspondents all over the continent. Extensive collections were amassed, these containing types of von Mueller's descriptions of new species.[1] What is true in general is true in particular of the genus *Utricularia*. But even these collections yielded not more than a half-dozen plants with anything beyond the flower on its flower stalk. For instance, on a sheet of some two dozen specimens of *U. albiflora* F.v.M., there was one single plant bearing a leaf and two "bladders." The plants are so small that these sought-for parts were scarcely visible to the eye. When properly examined I was able to describe them, as will be seen later on.

I write somewhat at length about this deficiency in the specimens of *Utricularia* in order to show my readers the necessity, if we are to further our knowledge of this interesting genus, of collecting adequately. Directions for this are given at the close of this article. I am very anxious to obtain suitable material in order to amplify my own knowledge so that I may pass it on in permanent

1. I am much indebted to the staff of the National Herbarium, Melbourne, for courtesies extended; and particularly to Mr. P. F. Morris.

form in which it can be generally accessible. It is my present purpose to describe the features of various species of *Utricularia* found in Australia in order to indicate how those peculiar to Australia differ from those found elsewhere and how these differ among themselves.

The genus *Polypompholyx*—peculiar to Australia—is essentially a *Utricularia* and will be considered at the same time. But to do this we need first a general account of the genus.

General Characters of Utricularia

Forms Chiefly Freely Floating

The U. vulgaris type

There are in general two groups of species, one including forms which grow as submersed forms, floating just beneath the surface and some depth in quiet waters (with two exceptions). They may float quite freely (*U. vulgaris* and *U. flexuosa*) or be more or less anchored by special "branches" (never by roots which are totally lacking), as in the case of *U. intermedia*, or probably also *U. exoleta*. The latter, found in Australia, needs more careful study. The above-mentioned two exceptions (*U. neottioides, U. rigida*) have a habit similar to that of some marine algæ, clinging by hapteria to submersed surfaces (rocks, etc.) and living swept by running water, the former in South America, the latter in Africa. In all these forms the flowers are raised above the water surface on scapes aided in some species by floats of one form or another: swollen leaf stalks or the scape itself.

The rest of the plant consists of a more or less branching stolon, as it is generally called. It is, however, not a stem, as its origin and development show, but is rather of leaf nature. This stolon bears, in the more usual type, alternating leaves in two lateral rows. The tip of the "shoot" as a whole is curled (circinate)—the whole is dorsiventral. This is very evident in such species as *U. intermedia* and *U. minor*.

The "leaves" may be either a simple once-forked member with tapering segments or may be very complex, consisting of several forking units side by side in a plane somewhat oblique to the horizontal axis. The extreme lateral members of the complex sometimes take the form of auricles: reduced fan-shaped structures, close to the axis, best developed in *U. Thomingii*. In various positions on the leaf (in the forks of two segments, on or near the base of a segment) occur those peculiar structures giving rise to the name bladderwort, viz., "bladders." In the literature several names are used, the best being "traps," since, as a matter of fact, we know they are true, very highly specialized traps. They are hollow, provided with an entrance guarded by a door or valve, attached by a hinge, its free edge impinging on a special mass of

tissue, the threshold. The trap is oblique in form as viewed laterally, the entrance or mouth being on the shorter or stalk side. This shorter side is ventral, that is, faces the growing end of the axis or stolon. The traps appear in various species in a great variety of form, as will be seen.

The floral axis always arises from the upper surface on the median line of the stolon, unrelated in position to the leaves, and itself produces secondarily near its base reduced stolons with reduced leaves, having the appearance of claws. These are the so-called "rhizoids" which appear to serve as prop supports for the scape; but are far more efficient in land forms.

In the same position also are produced, in the true floating forms, very slender long worm-like branches with small, entire scale leaves each with several stomata. These were thought by Goebel to be of service in effecting interchange of gases between air and plant and so called "air-shoots." They are very delicate and most fragile when dry so that they break off or are hidden among the leaves, and are scarcely ever seen unless looked for in living material under water. I have found them recently in *U. flexuosa* found near Sydney. The apex of an air-shoot is inrolled as in the chief shoot.[2]

In some forms there is a dimorphism of shoots—there is (a) a dorsiventral foliage shoot, bearing (b) branches or continuations with suppressed leaves, which penetrate the substratum at the bottom or sides of the pond in which they grow (*U. neglecta, U. intermedia, U. exoleta, U. minor*). Mr. George Taylor and I have recently described an Angolan plant under the name *U. paradoxa*, in which the chief stolons are all buried in the mud or sandy substrata, with leafy shoots (like minute trees) sticking up into the water above.

Among the truly floating forms are to be found the largest species—very leafy shoots over 3 feet long. On the other hand some of the species, such as *U. cymbantha, U. olivacea* (*Biovularia olivacea* of Kamienski), the former African, the latter Cuban, are minute.

In the majority of the submersed forms the flower is two-lipped, the lower being provided with a nectar-bearing spur. In a few species the spur is lacking (*U. cymbantha, U. biovularia, U. minor*) or nearly so (*U. orbiculata aff.*) The flowers are usually pale or bright yellow.

The above general description applies to a segregate of species of which *U. vulgaris* or *U. flexuosa* may be regarded as typical. Many species closely related grow as land plants—that is, in a wet but more or less firm substrate—and some of these are the largest and most showy in flower of all, e.g., *U. reniformis, montana, Hum-*

2. We use the terms "stems," "shoots," "leaf" in these descriptions in disregard of their morphological significance. They appear to be in the form of stems and leaves; while some stolons appear as "roots."

buldtii of South America. In these so-called land or epiphytic forms the stolons creep in wet moss, on a wet boggy substratum, or in the water held by the leaf-rosettes of species of the Bromeliads. Their leaves may be large and of complex internal structure (*U. reniformis*), or may, at the other extreme, be very small and ligulate or spatulate, often with stomata. However different in superficial appearance the *structure of the trap* (p. 96, figs. 9, 10), *is the same in all*, with the presently noted exceptions of *U. globulariaefolia* and *U. Lloydii*. It is to be observed that the group embraces submersed and land forms of very diverse appearance.

The U. purpurea type

This is strictly a new world type, found in North but especially in South America. The plants are always submersed and freely floating, or at best are anchored by slender shoots growing in soft bottom mud. Their "leaves" are always in whorls, each leaf bearing a trap at its apex, supported by a very slender stalk. The traps (p. 102, figs. 3, 4) are quite peculiar to the type. Both stolons and leaves are cylindrical, but betray dorsiventrality in the character of the vascular system. The apex of the stolon is circinate. The flowers are also distinctly peculiar in having the palate enlarged to form two spindle-shaped lateral pockets, found in no other group.

No land forms of similar structure are known. In fact the structure of the trap would seem to impose a complete hindrance to this manner of habit. The presence of anthocyanin renders the whole plant reddish in colour.

The U. tubulata type

U. tubulata was described by F. v. Mueller in 1875 from material collected by Armit "in mountain swamps" (v. Mueller) "near Cashmere" (Armit) 40-50 miles west of Rockingham Bay. It is a freely-floating plant with whorled leaves each (?) bearing an apical trap. The scapes are club-shaped with large air spaces and help to float the flowers above the water surface. The flowers and traps (p. 102, fig. 9) conform to a type peculiar to Australasia, namely, to that group of which *U. dichotoma* (a very well-known species of Australia) is a very good example. The plant has never been collected since Armit found it before 1875 and sent it to Baron von Mueller. In the National Herbarium at Melbourne a very good series of specimens is to be found (pl. XI), but these, with specimens at Kew and the British Museum of Natural History, South Kensington, are the only extant. Possibly von Mueller sent specimens, as was his habit, to Kamlenski.

This type embraces one known floating species,[3] with many land

3. *U. ceratophylloides* may be a second, if Schwartz's opinion is justified. He believes it is a floating representative of the "primitive Australian forms" which group themselves about *U. bilobe*. But the latter is not of that group; *dichotoma* had better been cited. I have not yet seen the species. It was found near Darwin by Mr. F. A. K. Bleeser, No. 484.

Plate XI

Utricularia Moorei, sp. n., and *U. tubulata*

species peculiar to Australasia. One might venture the guess that *U. tubulata* is a land form taken to water and the floating habit, while the *vulgaris* group may have been primitively water plants of which some have taken to land. As observed, *U. purpurea* is wholly a water-dweller.

The Predominantly Land Forms

These include types which are chiefly "terrestrial" plants, though *U. vulgaris* and *U. tubulata* types have their land-dwelling relations, as already shown above. There are other types, however, which are never found as freely-floating plants, but always as land-dwellers, whether covered or merely saturated with water. The majority of the known species are of this character, but the group, though ecologically pretty uniform, possesses a number of distant sub-groups or types. These are not readily distinguishable by their parts other than the traps, as there is a remarkable uniformity of leaf shape, while the flower structure shows no great uniformity within each group. I therefore use the structure of the traps in defining the groups, a method suggested by Goebel, which has been forced on me by the facts, and which turns out to be the most natural, though there are some parallels between grouping by traps and grouping by flowers. The trap is indeed the most characteristic feature of these plants and sets them apart from others. It will therefore be appropriate to take this occasion to describe it.

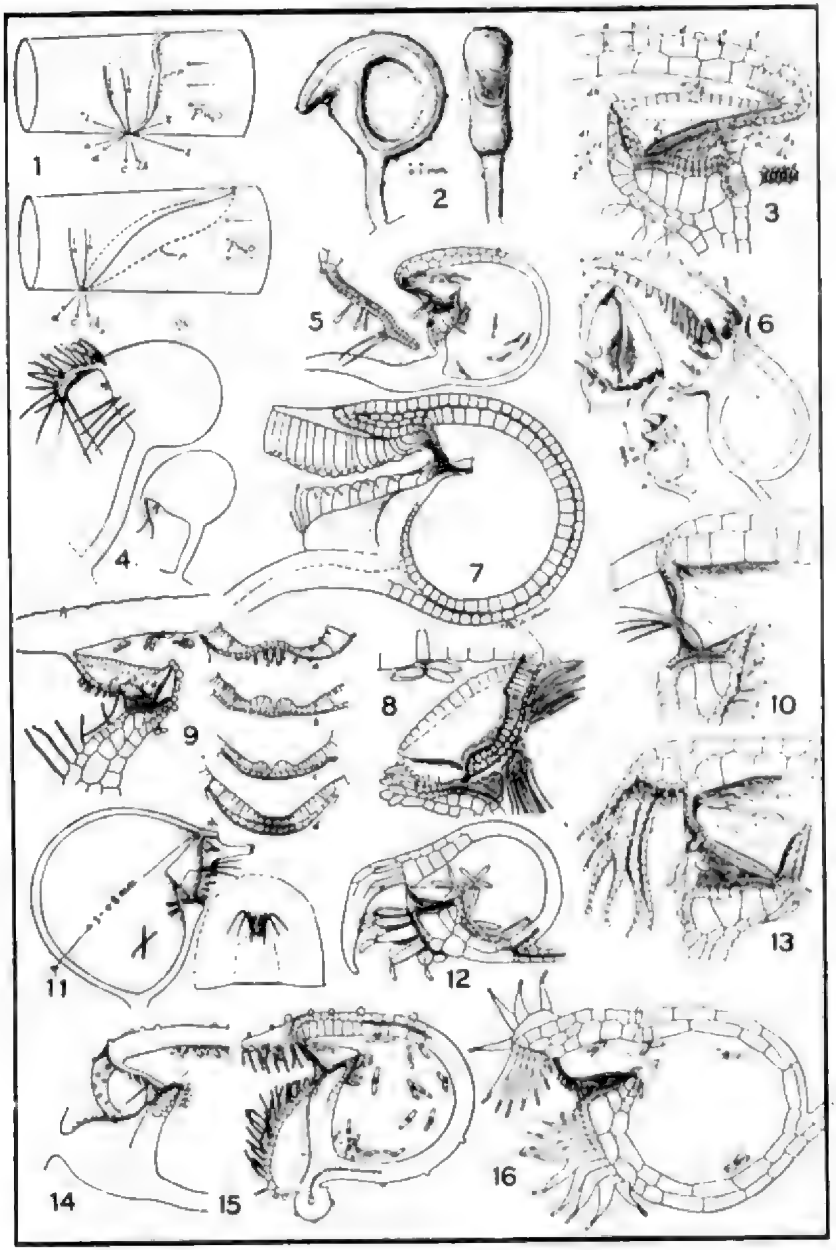
How the Trap Works

From this point of view there are two kinds of traps, or perhaps we ought to say three. This point need not be forced, however, as we shall see what is meant. The first kind is exemplified by *U. vulgaris* (p. 102, figs. 1, 2) and *U. purpurea* (p. 102, figs. 3, 4), much different except as to the principle on which the trap works. Of the second *U. cornuta*, *U. capensis* or *U. caerulea*; and of the third, confined to Australasia, *U. dichotoma* or *U. Menziesii* will serve.

The Mechanism of the Trap

The types U. vulgaris and U. purpurea

Disregarding the general form of the trap and having reference only to the entrance mechanism, this consists of a door or valve of approximately a quarter sphere in shape, or, as I often put it, of the shape of the half of the roof of a bowler hat. One edge of this is attached to the wall of the trap just inside the entrance, the middle point being forward at or near the edge of the entrance, with the sides extending inwards (p. 102, figs. 1-4). The other, conventionally the lower, free edge rests on a thickened half-circle of



Anatomical Structure of Bladders

tissue, called by Darwin the collar, and which I call the threshold of the door; or if we used the term valve, its seat. Whatever we call it, it has form and structure which permit the free edge of the door to rest snugly against it, along a pad of soft cells without cuticle called the pavement epithelium (Goebel).

The adjustment is, however, not perfect. The middle reach of the door edge makes indeed a sharp contact, resting in a shallow groove which prevents the door, if undisturbed, from swinging inwardly (p. 102, fig. 1) But along the lateral reaches the door edge lies flat on the pavement epithelium, so that a fine probe may be slipped in between the two approximated surfaces. Now this would seem unimportant, were it not for the fact that normally there is always a marked water pressure against the outside surface of the door in common with the total external surface of the trap. This arises from the fact that the walls of the trap act as *glandular tissue, excreting the water from the inside* to the outside (Merl., Czaja, Nold)—thus pumping the water out of the interior of the trap.

As this takes place, the side walls of the trap, being mechanically the less resistant, collapse, as Brocher, a Swiss entomologist, first noticed in 1911. But collapse of these walls (so that they become distinctly concave) would be impossible if the door permitted the leaking in of water, which in fact would take place along the lateral reaches of the door edge if not especially protected. That they are so protected is in fact the case, for there is a membranous structure, a second valve in fact, which is attached to the forward edge of the pavement epithelium, and seats itself along the whole of the line of contact between the door edge and threshold, effectively sealing the re-entrant chink (p. 102, fig. 1). Pressure of water against this membrane (the velum) only presses it more firmly and increases its effectiveness. I have proved this experimentally by cutting the velum with a small, very sharp knife (an ophthalmologist's "Grafe" knife).

After this operation the trap cannot reduce the volume of water within, so that the sides remain convex instead of becoming concave. And this means that the trap can no more work, since this is the way the trap sets itself for the action of catching prey. When set, the pressure of water within is much lower than without, so that, as above said, the outer water presses against the whole outer surface of the trap, and *therefore against the door*.

The door, however, is so adjusted that this pressure cannot move it unless it is thrown slightly out of its adjustment. When set, the mechanism is in a state of "unstable equilibrium," to quote Brocher, who was the first to recognize this condition. How, then, is the mechanism thrown out of equilibrium? The door is provided with a tripping mechanism consisting of projecting stiff bristles which are inserted in the door surface just above the middle point

of the thickened middle reach of the door edge and just below a thin area of the door, making it here particularly flexible. A very slight touch of the bristles, no more than that caused by a copepod bumping against them, is sufficient to disturb the door edge ever so slightly so that the door cannot now resist the water pressure. The water then presses it in very swiftly, and the inrushing column carries with it the offending animal. In pushing in the door, since its free edge is longer than the threshold measured from end to end across the trap, it becomes folded or buckled along its middle line.

As the water column slacks, the door closes again (but 3 to 4 times more slowly) and returns by its own flexibility and set of shape, into the former position and posture. Since the difference of water pressure within the trap is thus reduced, the pressure of the outer water against the door is now by no means so great; and consequently the posture of the door is somewhat changed—it now stands somewhat forward but is still watertight. As the glandular action of the walls pumps out anew the water from the interior of the trap, the door gradually assumes its set posture, when all is now ready for another actuation. Merl found that this resetting may take place in as short a time as fifteen minutes, but this is a minimum figure, thirty minutes being better. The excretion of water continues until the cohesion of the water within balances the forces acting in the opposite direction. The trap is then fully set. The process of setting takes longer in some species than others—e.g., in *U. purpurea* about two hours.

It will be seen by the figures that in this type the middle element of the door stands at an angle of about 90° with the general plane of the top of the threshold. That is, the angle of contact between door and threshold is a wide one (p. 96, fig. 1).

The second type

In the second type this angle is a small one, and the water pressure, everything equal, could more easily force entrance. This is met by a greater massiveness of the lower part of the door which produces a greater thrust of the middle reach of the door edge against the threshold: and by a broad and more massive velum. In consequence of the mechanical conditions the pressure of water produces a greater change in door posture as between the relaxed (after actuation) and set condition. By photographing living traps in both these conditions, the exact differences in posture have been determined to a nicety, even in such a minute trap as that of *U. lateriflora*, an Australian species found growing near Sydney (p. 102, figs. 10-12). This was done during my recent visit there (April, 1936).

In these traps also, when actuation occurs the door turns inside out, so to speak, by the application of slight pressure against some

sort of tripping mechanism attached to the upper wide flexible region of the door (p. 102, fig. 2). This increased localized pressure causes sufficient distortion for the water pressure to have effect in folding the door lengthwise along its middle line, permitting it to spring out of the groove formed by the threshold. In the second type this is helped also, it is probable, by a slight forward displacement of the middle reach of the door edge, giving more freedom of movement.

The third type: U. dichotoma

In the species peculiar to Australasia which conform to this type, the angle between door and threshold is still more narrow, and the change in contour of the door as between set and relaxed posture is very great (p. 102, figs 5a, b). Aside from this we have to note (a) the length of the door and its bent form so that the middle piece lies parallel to the pavement epithelium (the threshold has a like bend in harmony with that in the door); and (b) the double velum—in which the anterior part is circular, forming a frill about the door entrance; and the posterior or inner part, filling the angle between door and threshold. Precisely what the effect of the former is we are unable to say at the moment—experiment is needed. It may serve to make the trap watertight during the extremely relaxed door posture—this is, however, only speculation. The tripping mechanism consists of low trichomes lying in a group just above the bend of the door, where it is very flexible. Other trichomes occur farther above, whose function we do not understand, though it is possible that they serve to render the door more flexible in this region.

Recent study of *Polypompholyx* leads me to regard the trap of this plant as representing still another distinct mechanism, allied to be sure to the *dichotoma* type, but having a very different door action. Details of this, however, must await further study.

In this account, I am making no special mention of the problem of digestion. We may take it for granted that digestion of one kind or another does take place. The interior surface of the trap is armed with "quadrifid" or "bifid" hairs (as Darwin called them), which have to do with the absorption of the products of digestion and perhaps also with the secretion of an enzyme.

Terrestrial Types

We now return to consider the land types in view of the above. It is in these that a great variety of form of trap has come into being. To recall, we here note that the *U. purpurea* type of trap is not known to occur in land forms. There is one species, *U. olivacea* (*Biovularia* of Kamienski), allied rather to *U. vulgaris*, in which the tripping mechanism lies inserted in the middle point of the door (p. 96, fig. 11). But this is also a water plant. It is not difficult to speculate why these species are only water plants, as the door

lies much exposed and could easily be blocked by particles of earth, etc., and rendered inoperative.

In addition to the entrance mechanism there are other features which can only be particularized. These consist of projections, ranging from small sessile globose glandular hairs (e.g., *U. lateriflora*) to multicellular structures of considerable size and complexity. These in such forms as *U. vulgaris*, the first known, have been called antennae (Darwin), being two tapering and branching affairs, one on each side above and at the side of the entrance (p. 96, fig. 4). But their variety will be noted as we proceed, and more easily by following the figures. The type *U. vulgaris* has many terrestrial representatives. In the more distinctly terrestrial such as *U. reniformis* (South America), and in many others, the plumose antennae are supplanted by simple ones tightly curved over the entrance which is smaller. The door, we may believe, is thus better protected from blocking. As many land species as there may be, there are fewer of these than of those with a narrow door—threshold (briefly d-t) angle (p. 96, fig. 4). There are very few in Australia. *U. biloba* is, however, one known example (p. 102, fig. 11). *M. Lawsoni* Lloyd (see below) another. The former grows in wet, sandy bogs, the latter anchored in sand or mud in water, and fully submersed.

In the following paragraphs a general review of all the varieties of traps of the more strictly land forms will be given.

Land Forms with Wide d-t Angle

There are many species with traps practically identical in structure with those of *U. vulgaris*. There are, however, some curious departures.

U. nana. South America, while evidently allied to *U. vulgaris*, has a tripping mechanism of two bristles of particular structure (p. 96, fig. 5). In common with *U. cornuta*, it has no appendages. In spite of this position in this account, there is evidence that this species is rather of the narrow d-t type.

U. globulariaefolia. New World tropics.—This represents a small segregate in which the trap has a more or less bifid overhang and a long funnel approach to the door. This funnel is lined with long curved glandular hairs. The door is massive, this being evidently related to the thick walls (p. 96, figs. 7, 8).

U. Lloydii Merl., South America.—In this the traps are of two kinds (p. 96, figs. 14, 15), one being clothed with only sessile hairs, but having a single tripping bristle, the other having stalked trichomes and with no tripping bristle.

Land Forms with Narrow d-t Angle

U. cornuta. New World.—The trap has no appendages. Tripping mechanism, a group of sessile glands (p. 96, figs. 2, 3).

U. longiciliata, New World. Trap 0·5 mm. The middle part of wall above the entrance is prolonged as a rostrum. Below there is a second (ventral) rostrum bearing two laterally projecting prongs. The tripping mechanism is a single glandular hair.

U. peltata, South America.—The trap is much like those typified in *U. capensis* (q.v.). The entrance is at the bottom of a funnel-like opening lined with rows of glandular hairs. The tripping mechanism is a group of large sessile globular hairs.

The above exhaust the New World lot. In the Old World are the following:

U. Deightonii Lloyd and Taylor, West Africa.—Of the same door structure as *U. peltata*; in both the tripping mechanism is a group of sessile glands, placed on the upper more flexible part of the door; otherwise like *U. capensis*.

U. capensis, *U. Welwitschii*, Africa.—The tripping mechanism is a peculiarly-shaped hair which I have called the "kris trichome," because of its similarity in form to a Malay kris. I have shown that disturbing this actuates the trap (p. 96, fig. 16).

U. albida, Asia.—Door like *U. peltata*, but the circular edge of the upper part of the funnel leading to the entrance is prolonged into a long rostrum, shaped like the beak of a toucan (p. 96, fig. 6).

U. caerulea, Old World. Africa, Asia, Australasia.—Very like *U. cornuta*, but with two unbranched antennae, downwardly curved (p. 102, fig. 13).

U. Kirkii, unique; Central Africa.—By unique I mean that there is only *one* species known which has the peculiar form of door possessed by it. The tripping mechanism is two bristles set at the lower limit of the thin flexible upper part of the door, which, in its lower region, has two swellings with a middle groove between, making the door flexible along the middle line or axis (p. 96, fig. 9).

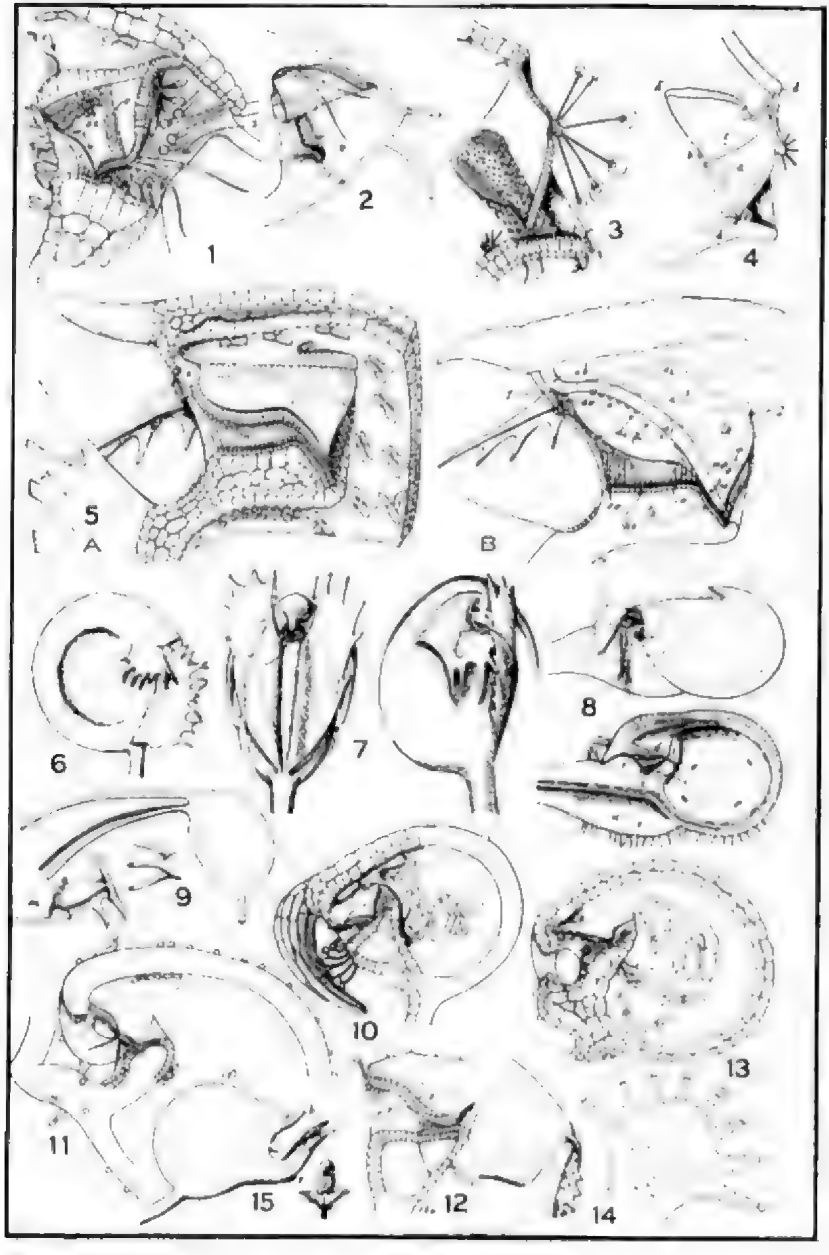
U. orbiculata, Africa and Asia.—The tripping mechanism is very curious, consisting of two trichomes which break out into beautifully shaped gelatinous horns, and a third mallet-shaped trichome. There is a supplementary velum, derived from the glandular hairs in front of the pavement epithelium (p. 96, fig. 13).

U. calliphysa, Ceylon, Borneo. Narrow dart angle. Very minute (0·5 mm.) trap with a rostrum above and two lateral combs of glandular hairs leading obliquely up to the lower edge of the entrance and with a row of tubercles above and on each side of the entrance (p. 96, fig. 12).

U. multicaulis, North India.—Unique in having a large fan-shaped rostrum bent down in front of the entrance (p. 102, fig. 14).

Types of Australian Land Forms

U. lateriflora.—Similar to *U. calliphysa* and *U. longiciliata*. I have studied living material, and have found the postures of the



Anatomical Structure of Bladders

door to be as seen in the photographic figures. The tripping mechanism is a group of transversely elongated glands on the thin upper part of the door. This is the only known species of this kind in Australia, only three being known in all (p. 102, figs. 10, 12)

U. biloba.—As above noted, has traps of the *U. vulgaris* type (wide d-t angle), in particular resembling those of *U. reniformis* (p. 102, fig. 11). Here we mention again *U. Lawsoni*, even if not strictly a land form.

U. cyanea.—Like *U. caerulea* (p. 102, fig. 13).

U. dichotoma (p. 102, figs. 6-8).—This strictly Australasian type is represented by a wide range of species, some rather large, with showy flowers (*U. Singeriana*, *U. Wallichiana*, etc.) and traps of quite peculiar construction. As noted above, the door is always transversely bent near its free edge and the threshold deep and correspondingly bent; the velum is double. As to these features there is uniformity. But the opposite is true of the external appendages. Basically there are five, a single median rostrum, and two pairs of wings, dorsal (above the entrance level) and ventral, below the entrance, running from the stalk toward the entrance. They are well seen in *U. dichotoma* and *U. Menziesii*. (In New Zealand in *U. novae-zealandiae* and *U. delicatula*, and perhaps others.) In these the wings are laciniate or deeply toothed. Their posture is such that they spread out laterally, forming wing fences which may be thought as guiding prey to the entrance. In many species they cannot have this effect, because of their shape or position or absence.

The traps of only a few species are known, and I have been able to see only three kinds in the living condition, viz.: *U. monanthos*, grown for me from seed at the Edinburgh Botanic Gardens, *U. Menziesii* and *U. dichotoma*. Material preserved in fluid of the *U. Menziesii monanthos*, *dichotoma*, *volubilis* have been supplied by Australian friends. (Some of this material was collected in Australia years ago by the late Professor Karl von Goebel, my teacher and life-long friend, and one of the greatest botanists of all time.) Since arriving here I have been able to examine the collections in the various herbaria, and have found the traps of a few species. The following different forms have been seen:

(a) The ventral wings are contracted longitudinally and are entire, forming two spreading flaps just above the stalk. The dorsal wings are reduced to slender antennae of the same shape as the rostrum, but with distinctive curvatures. *U. capilliflora* F.v.M. and *U. Dunstani* F. E. Lloyd (p. 108, fig. 5).

(b) The ventral wings may be entirely absent, only the dorsal wings and rostrum being present. The dorsal wings may then be flabelliform and laciniate (*U. Moorei* sp. n.) or reduced to slender antennae (*U. Singeriana*). *U. tubulata*, previously mentioned as a floating form, also presents this condition, the three appendages being very long and quite thick (p. 102, fig. 9).

(c) Or again, the ventral wings may also be reduced to slender spur-like appendages each ending a low ridge, a ventral wing much reduced otherwise. At the other extreme, both ventral and dorsal wings may be flabelliform and very laciniate, while the rostrum is reduced to a mere stump (*U. albiflora, U. Holtzei*) (p. 108, fig. 17).

(d) Both ventral and dorsal wings are prominent and shallowly laciniate (*U. dichotoma, U. Menziesii*) or flabellate and deeply laciniate (*U. lasiocaulis*) (p. 108, fig 16).

There are many species in Australia of whose traps we have no knowledge at all, and what other permutations can be expected in them, one cannot guess.

Polypompholyx.—Of this genus there are recognized two species, *multifida* and *tenella*, the latter scarcely more than a small replica of the former.

Approach to the entrance proper (p. 102, fig. 8) is made by passing backward or forward beneath lateral wings, and so to a sort of antechamber. Long glandular hairs pointing towards the door facilitate movement towards it. On the swollen region of the stalk there is a transverse double or treble row of stiff bristles which appear to act as directive to the movements of prey.

Another comb of bristles runs along the top of the stalk under the rostrum, in such a fashion as to divert the prey directly toward the entrance. The actual entrance is small. The lower part of the door lies curved downwards over a narrow ridge of the threshold in the set posture. After actuation the door is also curved downward in front of the threshold. There is a peculiar velum, the effective blocking of in-leakage being brought about by the supplementary action of numerous long glandular hairs. In transverse section the trap is seen to be three-sided, quite different in this from all other utricularias. When the trap is set, the walls are concave, more especially the side walls, the top wall being less responsive.

The traps are indeed very peculiar in form. The entrance mechanism, though unique in many of the structures, probably acts as the *U. dichotoma* sort of thing does, but remains to be investigated. Otherwise the plant does not distinguish itself from *Utricularia*.

The trap is anarropous, the stalk and entrance being approximated. A flat forked rostrum makes contact and presses down on the stalk, which is locally swollen and possesses a huge air cavity. There is a pair of large downwardly-curved dorsal wings (p. 102, fig. 8).

A Few Notes on Australian Species

I have already noted the peculiarities of the traps of Australian species, related to *U. dichotoma*, and not hitherto described. The

Plate XII

Utricularia Lawsoni, sp. n.

following observations are general in nature, submitted in the hope of stimulating interest in the adequate collection of material. Even dried specimens yield the information desired—not, however, as when preserved in fluid, or even when dried without pressure and transmitted in little boxes.

U. pygmaea R.Br.—Brown's description contains nothing about the vegetative parts. The material (fragments of stolons; flowers) in the National Herbarium, Melbourne, indicates the plant is similar to *U. exoleta*.[4] The specimen I have seen was collected in Lake Williams Ennasleigh River Gorge by Alquist. 826. This, or a closely-related species (and probably others also), is responsible for the destruction of the tadpoles of *Bufo marina*, a toad imported to control insects infesting sugar cane. The front end of the head or the end of the tail is sucked into the entrance. Captured in this way, the animal soon dies. This information was supplied by the Queensland Department of Agriculture, to whom I am indebted for many courtesies. It is well-known that mosquito larvae are caught, but not in sufficient quantities. The traps appear to be of identical structure with those of the *U. gibba* (p. 102, figs 1, 2).

U. dichotoma.—In the Sydney Herbarium I saw a specimen found at La Perouse, N.S.W., with very large ligulate leaves. The plant looks as if it had grown under water. Observations on this matter would be of interest, as this species usually grows in wet, sandy or boggy soil

U. albiflora.—Found along the Adelaide River by Holtze. This is a minute species with the lower corolla lip five-lobed (p. 108, fig. 17). The trap is of the *dichotoma* type. The ventral wings are low ridges ending in slender antennae, while the dorsal are also antennae-like (p. 108, fig. 17). The ontogeny of this plant (or of capilliflora and the like) would be very valuable for throwing light on the life cycle. It would be necessary to collect material very carefully so as to preserve the seed (embryo) which probably remains attached to the mature plant. Young stages would be better

U. biloba.—This species and many others have numerous "rhizoids"—stolons arising secondarily from the base of the scapes. In *U. Wallichiana* they have numerous short secondary branches covered with sessile mucilage glands. Most of the time these are the only parts pulled out of the ground when the flower stalk is pulled up, and have usually been called "rootlets" or "roots." These are not roots, and only simulate them. Their structure is often destroyed by indifferent collecting.

U. Campbelliana Oliv.—This plant has perhaps the longest and most graceful spur of its large, beautiful flower The traps are of the *caerulea* type.

4. Material sent me by Mr. J. Harold Smith, Department of Agriculture, Atherton, Queensland, shows that this view is correct The seeds are concavo-convex and winged about as usual in the group.

U. tubulata.—As above noted, this plant has traps of the type of *U. dichotoma*, but with two long unbranched antennae and a similar rostrum. It was found by Armit in the region of Cashmere, Queensland, "in mountain swamps," and was described by von Mueller in 1875, who makes no mention of traps. The turgid hollow scape acts as a float, levitating the rest of the parts which are submersed. The "leaves" are in whorls, but we do not know if each leaf bears a trap. The figures (pl. xi, figs. 2, 3) are shadow pictures of the type material in the National Herbarium, Melbourne, where all the material lies except small fragments found in Kew Herbarium and in that of the British Museum of Natural History. No other specimens exist, and it has never been collected since before 1875. The flowers appear to have the form and colour of those of the *dichotoma*. It is very desirable to find new localities for this plant, and to collect carefully a small amount of it preserved in 70% spirit (preferably) or in 50% formalin. I am particularly anxious to get material of this plant. We do not know whether it is quite freely floating or is more or less anchored or how. Observers in the Cashmere Station region (45-50 miles west of Rockingham Bay) are urged to assist in throwing light on this matter.

U. capilliflora F.v.M.—This is a very extraordinary plant and might well, in the hands of a De Candolle or Lehmann, be used as the type for a separate genus. As the figures (p. 108, figs. 1, 2, 12) show, the flowers are not closed by a palate (but the precise relative position of parts cannot be determined from dried material). The flowers are minute (2-4 mm.). The upper corolla lip consists of "two long hairlet-like segments" (F. von Mueller in the *Fragmenta*) joined together near the base by a web. The lower corolla lip is palmately deeply lobed into finger-like segments. The upper part of the spur is widely inflated, the lower part forming a double sac (in the drier material looking merely emarginate). The form of the trap (determined from one luckily-collected plant) is noted above.

Among the sheets of specimens in the Melbourne Herbarium is one which was labelled *U. capilliflora* by von Mueller, but which turns out to be quite distinct.

It is not surprising that this should have been thought to be *U. capilliflora*, since the whole aspect of the plant is the same, even to the two hair-like upwardly-pointing floral appendages. It turns out, however, that in this species these are lateral lobes of the *lower* corolla lip, which here is triangular with two other obscure lateral lobes (p. 108, fig. 3). I propose this as a new species.

Utricularia Dunstani, sp. n.

Annua, scapo uno, uniflora, 10 cm. alto, capillari... Squamae basifixae, late triangulares, trilobatae, medius lobus magnus, obtusus, laterales lobi minuti. Flos 4 mm. longus, appendiculis

capillaribus erectis, 40 mm. longis, ex labro inferiore corollae. Corolla inferiore labro triangulari, acuto, duobus lateralibus lobis brevibus, basi duobus capillaribus lobis, valde longis (40 mm.) superiore labro ovali, integro, margine involuto.

Annual, with a single hair-like scape surmounted by a single flower 4 mm. long, exclusive of the upright hair-like extreme-lateral lobes of the lower lip of the corolla; lower lip triangular, 5-lobed, the median and two distal lateral, small and blunt and two very long (4 cm.), forming the upright hair-like antennae of the above-mentioned upper corolla lip, in these characters differing from *U. capilliflora* F.v.M.

The scape is anchored by radiating obliquely-growing rhizoids. The traps have the same form as those of *capilliflora*. The fruit is the same (p. 108, figs. 1, 4, 5).

Found by N. Holtze (No. 1340) along the Howard River, Northern Australia, 1891. Flowers with "yellowish-brown colour." Type in National Herbarium, Melbourne; co-type in the British Museum of Natural History. A small, delicate plant about 10 cm., tall, or much smaller, of like habit and very similar to *U. capilliflora* F.v.M., but differing materially from that species in the shape of lower corolla lip, which is triangular with two small lobes and two very long antenna-like lobes—4 cm. long. These lobes, therefore, arise from the lower lip and not from "the upper portion of the corolla" as in *capilliflora* (F. von Mueller: *Journ. and Proc. R.S.* N.S.W., 24: 176, 1890). The stem (scape) bears a whorl of three triangular three-lobed bluntish bracteoles at the base of the pedical.

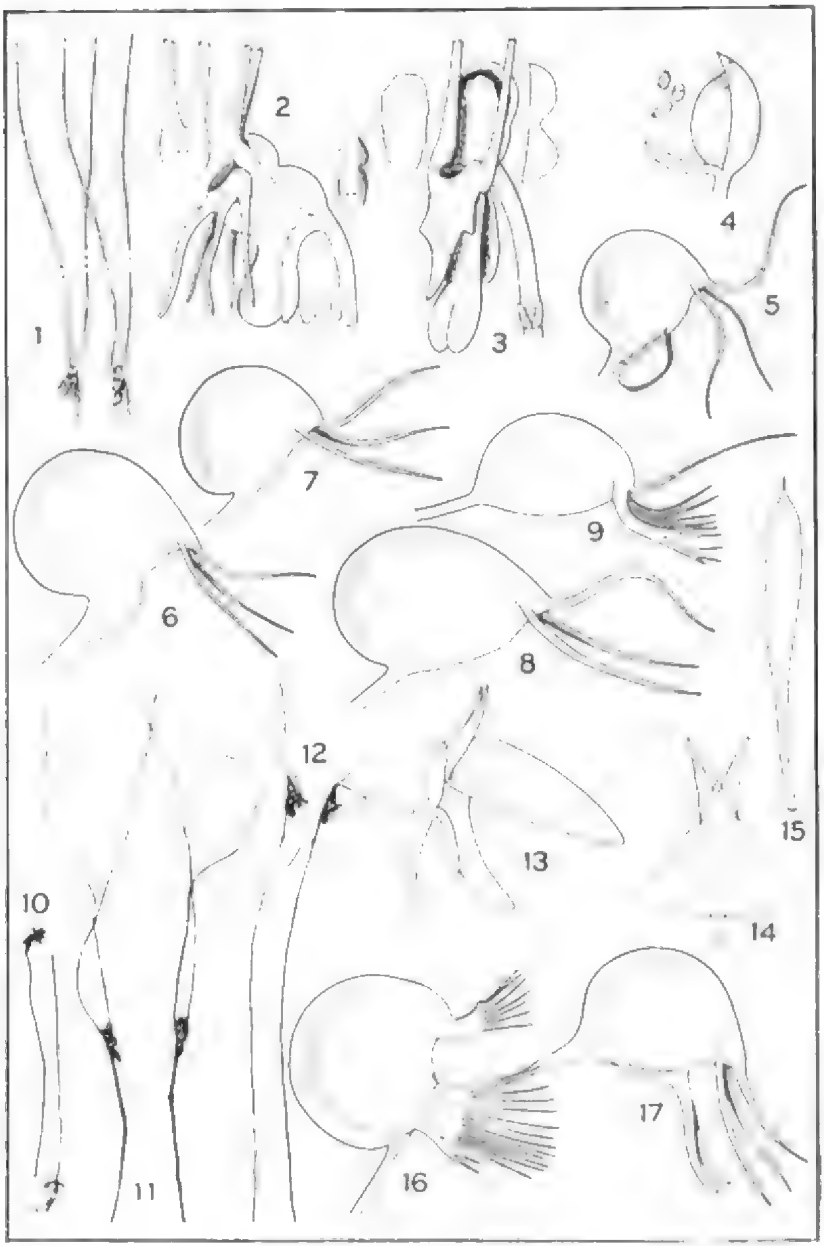
This plant is named for Mrs. William Dunstan, of Melbourne, whose sympathetic attitude has done much to foster the love and appreciation of natural history.

U. Moorei, sp. n.

A single sheet carrying two specimens of a plant collected by Mr. Charles Moore, former Curator of the Sydney Herbarium, in Eastern Australia about 1885, cannot be referred to any known Australasian species. Though regretfully lacking flowers and fruit the specimens are so good as to permit an acute diagnosis, showing as they do the habit of the plant as a whole, its leaves, and, exceptionally enough, its traps, which are exceptionally large and with unique character.

Utricularia Moorei, sp. n.

Stolones horizontaliter extensi, singulis foliis in superiore superficie late separatis. Folia elongata, spatulata, obtusa, 6 cm. longa, valde longis (3 mm.) pedunculis, duobus utriculis basi cujusque folii. Utriculi magni (4·5 mm. longi exclusis appendiculis) obliqui, rostro valde longo (3·5 mm.), angustissimo et duabus alis longis flabellatis laciniatis dorsalibus in exteriorem et superiorem partem curvatis.



Anatomical Structure of Bladders.

Stolons spreading horizontally, with leaves arising singly from the upper surface at considerable distances, elongate, spatuate, obtuse, 5 cm. long, with a pair of traps arising from the stolon laterally at each leaf base; traps exclusive of forward projecting appendages (large and conspicuous) 4·5 mm. long, oblique, with a rostrum and a pair of flabellate and laciniate dorsal wings, reaching sideways and upward, 3·5 mm. long. No other species with traps of this character is known. Flowers and fruit not known (pl. xi, fig. 1).

Found by Charles Moore, former Director of the Botanic Gardens, Sydney, in "East Australia" about 1885, though the date is not indicated. The label of the type specimen, which is in the National Herbarium, Melbourne, is in von Mueller's writing. The co-type is in the British Museum of Natural History. Shadow photograph of the co-type in the Kew Herbarium. This species is based principally on the traps, which differ from all other known traps of the distinctly Australasian group of species of which this is one. Its habit is that of *U. monanthos*, but the leaves are longer and more distant. Judging from the state of the specimens, the plants were found growing in soft mud and submersed. The trap is shown in figure 9, page 108.

U. Hamiltoni sp. n.

A single sheet contains several specimens of an unnamed species. I call this *U. Hamiltoni*, sp. n., in honour of Mr. A. G. Hamilton, veteran Australian botanist.

Utricularia Hamiltoni, sp. n.

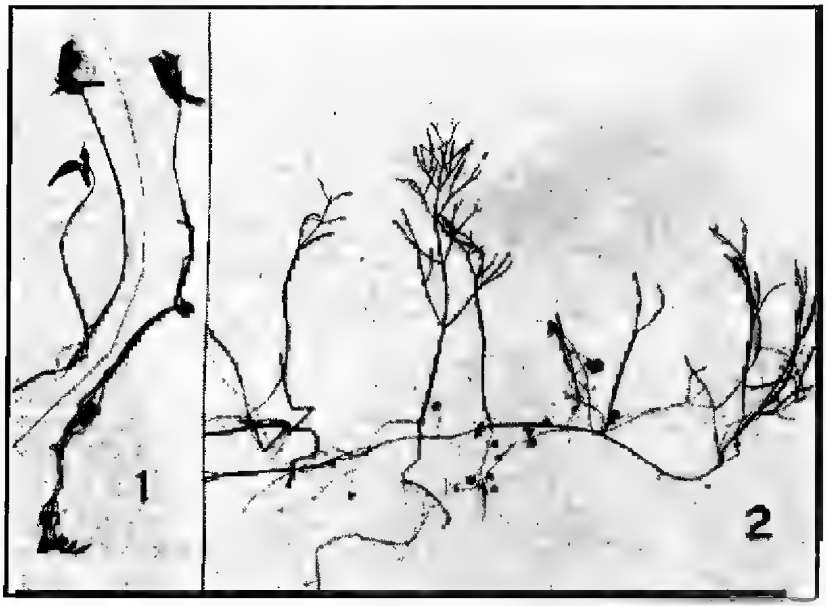
Annua parva (5 cm. vel minus). Rhizoides ex basi scapae. Folia 1 cm. longa, 1 mm. lata, subspatulata, acutissime apiculata. Utriculi (circa 3 mm. longi) rostro simplice attenuato et duobus antennis simplicibus attenuatis. Squamae triangulares, acutae, basifixae. Flores solitarii. Calyx: superiore labro integro, ovato; inferiore labro emarginato, 1 mm. longo; corolla: inferiore labro integro, late extenso, 7 mm. longo; superiore labro profunde bilobato, lobis subulatis, 1·5 mm. longis, extensis; calcari gracili, acuto, breviore quam labrum superioris corollae.

A small plant—5 cm. or less. Annual with rhizoids from base of scape. Leaves (1 cm. or less long, 1 mm. broad) slightly spatulate, long, apiculate. Bracteoles triangular, acute, fixed at the base. Flowers solitary; calyx: upper lip ovate entire; lower lip emarginate, 1 mm. long; corolla: lower lip entire, spreading, 7 mm. long; spur slender, acute, shorter than the lower corolla lip; upper lip deeply lobed, the lobes awl-shaped, 1 5 mm. long, spreading (p. 108, figs. 13-15; pl. xi, fig. 1).

Traps 2 mm. long, with a long slender rostrum and two slender antennae (representing the dorsal wings) (p. 108, fig. 8). Fruit not known.

Holtze, 1861, "near Adelaide River," flowers "light mauve."

Type in National Herbarium, Melbourne. Co-type in British Museum of Natural History.



1. *U. Hamiltoni*. Shadow picture, co-type. 2. *U. Lawsoni*. Shadow picture, to show clearly the habit of the plant.

U. Lawsoni, sp. n.

When collecting in company with my colleagues in the Department of Botany, Sydney University, I found a plant which I knew at once to be undescribed for Australia, and appeared to be identical with *U. paradoxa* Lloyd and Taylor (in press), a plant of Angola, West Africa. On examination it turned out to be quite distinct. Unfortunately, no flowers were seen, perhaps by reason of the season. A few days later one of the Botany staff, who had noticed the plant in a pond in Centennial Park, Sydney, brought in a fine lot of material. I have named it in honour and in remembrance of Professor Anstruther A. Lawson, late of Sydney University, whose memory is still green in that institution. In spite of lack of flowers I venture the following diagnosis:

Utricularia Lawsoni, sp. n.

Valde similis Utriculariae paradoxae sed videtur multo robustior, paene carens setositate illius speciei, i.e., U. paradoxae. Segmenta terminalia foliorum satis glabra. Flores et fructus ignoti.

Plant with the habit of the Angolan *U. paradoxa* F. E. Lloyd and

G. Taylor (pl. xi, fig. 2), but differing from that species in the absence of stiff sharp trichomes on the segments of the leaves, in its size, which is much larger, and in bearing traps sparingly on the leaves instead of only on the stolons. There are two sets of stolons, those which run more or less horizontally in soft mud or sand, and bearing numerous traps of the *vulgaris* type (p. 102) and resembling in particular those of *U. resupinata* (p. 96, figs. 4, 10). From the horizontal stolons arise vertical ones bearing leaves, and these arise upward (resembling little trees) in the supernatant water. This plant was collected long ago by Mr. Charles Moore, as is evident from a single fragment which was cut off from a specimen floated out on brown paper, and is now in the Melbourne Herbarium. Type material (pl. xii) in British Museum of Natural History. Co-types at Melbourne, Sydney, Brisbane, Perth and Kew.

Only two species in the world are so far known. From the structure of the trap they are evidently of the *vulgaris* group, with, however, the peculiar, above-noted habit. Flowers and fruit unknown.

Note

When collecting *Utricularia*, in addition to herbarium specimens, some good, entire material should be preserved in fluid (75% alcohol, or 5% formalin, the former preferably). Above all in importance is the adequate collection of the buried parts of land forms. Bits of the soil must often be carried home and the substration freed from the underground parts with great care. Running water helps; and one plant thus recovered is better than a dozen carelessly pulled out. Sometimes, when the substrate is soft, it can be washed away in nearby water if available. The specimen should not be allowed to dry, but be placed at once in the preservative. In case of floating forms, one should not put too much in a bottle, as it dilutes the fluid too much. It can, of course, be changed into fresh solution.

KEY TO ILLUSTRATIONS

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1. Diagrams of the narrow door-threshold angle type, above, and below, of the wide door-threshold angle type, of entrance mechanism. 2. *U. cornuta*, trap. 3. Sagittal section of entrance of same. 4. *U. recurvata*; *U. Lawsoni*. 5. *U. nana*. 6. *U. albina*. 7. *U. globulariaefolia*. 8. Sagittal section of entrance, *U. globulariaefolia*. 9. *U. Kirkii*. Right: transverse sections through the door. 10. *U. recurvata*; *U. Lawsoni*. 11. *U. (Biovularia) olivacea*. 12. *U. calliphysa*. 13. *U. orbiculata*. 14. *U. Lloydii*: one of the dimorphic types. 15. *U. Lloydii*. The second type. 16. *U. rupensis*.

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1. Entrance mechanism, *U. vulgaris* type. The door in set posture. v, velum; 3, 4, directions of approaching prey. 2. The same, the door open. 3. Entrance mechanism, *U. purpurea*. 4. The same, door open. 5. *U. dichotoma*.

monanthos. A: The entrance mechanism, the door in relaxed posture. B: Diagram to show the set and relaxed postures of the door. 6. *U. dichotoma*. 7. *U. violacea*, front and lateral side views. 8. Polypompholyx. Above: Lateral view of trap with the lateral wing raised to show the entrance. Below: Sagittal section of the trap. d, door; t, threshold; c, floor of ante-chamber; r, ridge along upper side of stalk; ic, large intercellular space; s, s, transverse patch of bristles. 9. *U. tubulata*; cf. III—6-8. 10. *U. lateriflora*, sagittal section (see Fig. 12). 11. *U. reniformis*; *U. biloba*. 12. *U. lateriflora*,: set and relaxed postures of the door. 13. *U. caerulea*. 14. *U. multicaulis*. Left: Entrance with overhanging rostrum. Right: Rostrum *en face*. 15. *U. longicilliata*.

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1. Flowers of *U. capilliflora* (left) and of *U. Dunstani* sp. n. (right). The upward standing filaments should be much longer (see Figs. 11 and 12). 2. *U. capilliflora* F.v.M. u.l., upper lip of corolla; u.s., upper sepal. The lobes of the lower corolla are often half as long again. 3. *U. Dunstani*, sp. n. 4. Fruit of *U. Dunstani*. 5. Trap of *U. Dunstani* and of *U. capilliflora*. 6. *U. Wallichiana*. 7. *U. Singeriana*. 8. *U. Hamiltoni*. 9. *U. Mooreï*, sp. n. 10. *U. albiflora* (trap as in Fig. 17). 11. *U. Dunstani*, sp. n. 12. *U. capilliflora* F.v.M. 13, 14. Flower and 15. Leaf, *U. Hamiltoni*, sp. n. 16. *U. lasiocaulis*. 17. *U. Holtzei*; *U. albiflora*.

PLATE XI.

1 *U. Mooreï*, sp. n. 2. *U. tubulata*, from type material, National Herbarium, Melbourne. 3. Trap of *U. tubulata*.

PLATE XII.

U. Lawsoni, sp. n. Shadow picture of type material, British Museum Natural History.

EXCURSION TO BAYSWATER.

Saturday, August 29, was a spring-like day and fifty members of the Club, also Dr. Johan Mauritzon, a visiting botanist from Sweden, took part in the excursion. Leaving Bayswater railway station the party walked in a northerly direction along the railway line and devoted some time to plants growing in the enclosure, many of which were in flower, such as *Leucopogon virgatus*, *Platylobium obtusangulum*, *Daviesia corymbosa*, *D. latifolia*, *Hibbertia acicularis*, *H. stricta*, *Hakea sericea*, *H. pugioniformis*, *Goodenia ovata*, *G. geniculata*, *Billardiera scandens*, *Pultenaea Gunnii*, *Indigofera australis*, *Dillwynia cinerascens*, *Kennedya prostrata*, *Spyridium parvifolium*, *Euphrasia collina*, and *Correa rubida* var. *virens*, a variety with greenish flowers.

Everywhere *Hovea heterophylla* was met with, displaying its bluish flowers; *Hardenbergia monophylla* was equally conspicuous. Herbaceous plants were well advanced and many in full bloom made a fine display. Among those noted were *Chamaescilla corymbosa*, *Cassia willisii*, *C. parvifolia*, *Dichopogon strictus*, *Craspedia uniflora*, *Helichrysum scorpioides*, *Gnaphalium japonicum*, *Microseris scapigera*, *Brachycome decipiens* and *B. cardiocarpa*.

Reaching the Dandenong Creek we were disappointed to find that many of the Silver Wattles (*Acacia dealbata*), which formerly lined its banks, had been destroyed, although the few remaining trees in full bloom were seen at their best. Other Acacias in flower were *Ac. melanoxylon*, *Ac. ornata*, *Ac. verticillata*, *Ac. stricta*, *Ac. diffusa*, *Ac. acutissima* and *Ac. myrtifolia*. The search for orchids was rewarded by finding four species, viz.: *Diuris maculata*, *Pterostylis pedunculata*, *P. longifolia* and *P. nutans*. A specimen of *nutans* with variegated foliage was found.

J. W. Audas.

MAJOR T. L. MITCHELL, EXPLORER AND NATURALIST

By Chas. Daley, B.A., F.L.S.

Thomas Livingstone Mitchell, son of John Mitchell, of Carron Ironworks, was born at Craigend, Stirlingshire, on May 15, 1792. He was educated at Edinburgh, and at the age of sixteen years volunteered for service in the Peninsular War, in which British troops were then engaged under the Duke of Wellington in Spain.

Being skilful in drawing and draftsmanship, young Mitchell was employed on military survey. In the year 1811 he was made ensign, and later lieutenant, in the 95th Regiment, and served through the whole campaign, being present at the battles of Ciudad Rodrigo, Badajos, Salamanca, San Sebastian, Vittoria, and the Pyrenees, for which service he received the Peninsula Medal with five clasps. At the close of the war he was selected by the War Department for the important work of planning and modelling the battlefields, and the respective positions of the rival forces in the war. This engaged his time and energy for five years, when he went to Sandhurst Military College, and in 1822 was promoted to the rank of captain, and four years later to that of major.

In the year 1826, Mitchell was offered, in recognition of his services, the position of Assistant Surveyor-General in New South Wales, with reversion of the position. Accepting this, in 1827 he arrived in Sydney and entered with vigour upon his duties. In 1828, on the death of William Oxley, he became Surveyor-General. His first work was the co-ordination of previous surveys into a comprehensive map of the whole colony to enable it to be divided into counties. To this end he carried out effectively the first trigonometrical survey in Australia, and was thus enabled to produce what was known as the Three Sheet Map of the nineteen counties of the settlement, an outstanding work testifying to his skill and proficiency in his profession. The work of transforming tracks into permanent roads by means of convict labour was systematically performed under his direction and oversight, the main road north to the Hunter River, the great western road to Bathurst, and the highway to Goulburn proving of great service to the expanding settlement, in which towns had to be laid out, roads provided, reserves made, and bridges constructed. In addition to the arduous duties of survey work, Mitchell, like his predecessor, did most valuable service in exploration, in which he conducted three important expeditions, the first in 1831-2 to the north-west, in 1835 along the Darling River, and the third in 1836 to Australia Felix. On return from the last undertaking Mitchell went, in 1837, to England, where he published his great work—*Three Expeditions into the Interior of Eastern Australia*. For his signal services Queen Victoria knighted him, the University of Oxford

conferred the D.C.L., the Geological Society a Fellowship, and the military authorities promoted him to be lieutenant-colonel.

On his return, with renewed vigour he resumed the onerous duties of his office, greatly increased by the needs for internal communication.

In 1844 he was elected as a representative of Port Phillip District in the New South Wales Legislative Council. On finding that Sir George Gipps expected him, although elected as an independent member, to vote as a Government nominee, he immediately resigned.

In 1845 he conducted an exploring expedition into Tropical Queensland, and published the Journal of his discoveries. In 1851 he was commissioned to furnish a report upon the goldfields of New South Wales.

In addition to his official work he was interested in literary, scientific and artistic pursuits, his many published works showing his versatility. In 1853 he re-visited England, and on October 9 died, after a short illness, at Darling Point, Sydney.

The Third Expedition

On March 17, having mustered his following at the Canobolas Valley, west of Bathurst, Mitchell, with the best-equipped expedition ever despatched in Australia, began his journey, under instruction from Governor Bourke, to trace the course of the Darling, proceed up the left bank of the Murray for some distance, and return via the Yass Plains. His company comprised Mr Stapylton, surveyor, and 24 men, of whom nine had been with him previously, and all either under sentence or surveillance. Each had special duties allotted to him, and Mitchell's firm but sympathetic treatment secured their loyalty, devotion and efficient service. Piper, an aborigine, with his lubra, was taken as a guide, and two other natives were also attached. The expedition had 70 bullocks, 15 draught horses, 100 sheep; also five bullock-drays, two covered carts, a boat-carriage conveying two boats, one within the other. If to these be added camp equipment, supplies, tools, utensils, firearms, chains and tackle, scientific instruments and varied impedimenta, the magnitude of the undertaking can be perceived. The course taken was along the Lachlan River, which in wet years had so baffled Oxley's attempts by spreading out into extensive and impassable swamps. This year, a dry one, it was a succession of waterholes, so travelling was comparatively easy. The Lachlan was traced to the Murrumbidgee, and the latter to the Murray River, a base camp being formed about a mile below the junction, from which Mitchell made a diversion with part of his force to the Darling River in order to verify Sturt's recognition of it in 1830. Returning to the camp the Murray was successfully crossed, and progress made through fine pastoral

country up the left bank of the river past the present sites of Swan Hill and Cohuna. Then changing the route to the south-west, Mitchell ascended Mt. Hope and Pyramid Hill, continued westward and discovered successively the Loddon, Avoca, Avon, Richardson, Wimmera, MacKenzie and Norton Rivers, ascended the Grampians at Mts. William and Zero, then at Mt. Arapiles. Turning south parallel to the Victoria Range, the Glenelg and Wannon Rivers were discovered, the coast being reached on August 19 at Discovery Bay.

On returning in a north-easterly direction, a brief visit was made to Portland Bay, where the Henty's, the first Victorian settlers, were met with. Mt. Abrupt, south of the Grampians, was ascended by Mitchell, the Pyrenees crossed and named, Mts. Alexander and Macedon ascended, the rivers Campaspe, Coliban, Goulburn, Broken and Ovens being passed over, previous to the Murray being crossed opposite Howlong. Return to Sydney was made via the Murrumbidgee and Yass Plains.

Major Mitchell, a man of keen observation and of a robust constitution, accustomed to field work, in constant contact with Nature in all aspects of the Australian bush, gives in his Journal a most interesting record of the natural features of the country passed through.

Capable and methodical in all his work, he records at each camp the readings of barometer and thermometer, direction of the wind, and character of the weather. He gives the width, depth and rate of flow of the streams met with, and carefully notes the physiography and the nature of the country en route. In directing his course he would ascend mountains or elevations perhaps miles distant to obtain triangulations and mark the contours and variations in the land surface. He made a collection of the rocks, and even of the soils derived therefrom, noting the geological character, the presence of sedimentary rocks as at the Grampians, of igneous rocks as at Macedon, of granitic masses as at Mt. Hope, of volcanic action as at Mt. Napier, of fossiliferous tertiary limestone along the Glenelg River, etc. He studied the origin of the numerous lakes, west of the Grampians, some fresh, some salt, with gypsum deposits. In his second expedition he had explored the caves with osseous breccias in the Wellington Valley, and later at Buree, where remains of extinct marsupials, etc., freely occur. From the fossils obtained and submitted to Professor Owen, two species of a new genus, *Diprotodon*, several of *Macropus*, the giant Kangaroo; the Wombat, *Phascolymus Mitchellii*, a species still existent, and remains of *Halmaturi*, *Phalangers*, *Hypsiprymnus* and *Dasyurus* were recognized and described.

His observations on the living fauna are valuable. In addition to the ordinary marsupials observed, near Swan Hill a tailless animal, *Chaeropus ecaudatus*, resembling the Jerboa, was cap-

tured. It was about 10 inches in length, having two toes like a pig in the front feet. A marsupial, *Dipus Mitchellii*, as small as a field-mouse, with a long brush tail, was obtained. These were named by the naturalist, Mr. Ogilby, and deposited in the Sydney Museum. A tree-climbing rat, building a nest in a tree, a flat-tailed rat, and a rat-eared bat were also observed. A number of our common birds was noted, but the most prized was a specimen of a Superb Warbler of blue plumage with white wings. With his artistic facility the Major preferred to represent admirably with his brush the Mitchell Cockatoo, *Cacatua leadbeateri*, having a scarlet and yellow topknot. He also made a fine study of the head of the Australian Eagle, *Aquila audax*. He found that the Murray Cod, *Gristes Peelii*, was confined to the northern rivers. Other fish noted were a Perch with large scales, *Cerna Bidyani*, and the Eel-fish, *Plotosus tandanus*. Bream and Schnapper were caught in the Glenelg River. A small land-shell, *Truncatella filosa*, was found in numbers on the shore of Mitre Lake. The ordinary Mussel was found to survive in waterless lakes by working down to moisture underneath.

Deeply interested in the native race, with a hostile tribe of which his men unfortunately came into conflict near the Murray, the Major gives much information as to their manners and customs, uniformity of language, their rites, ceremonies and superstitions, tribal etiquette, methods of hunting, fishing, netting wild-fowl, cooking, food restrictions, constructing shelters, and modes of burials. The making and use of their various weapons, their artistic baskets, kangaroo-skin cloaks, etc., are described; also their sleeping customs, fireplaces, ash-hills, the treatment of the "balyan" or bulrush for the food content, use of edible plants, and of "bool," a drink made from steeping the flowers of the iron-bark in water. He praises the intelligence of the natives, their keenness in vision, hearing and observation.

Of his guide, Piper, he writes: "July 3rd. This was a very busy day for the party—black and white. I cannot fairly say savage and civilized for, in most of our difficulties by flood and field, the intelligence and skill of our sable friends made the 'white fellows' appear rather stupid. They could read traces on the earth, climb trees, or dive into the water better than the ablest of us. In tracing lost cattle, speaking to the wild natives, hunting, or diving, Piper was the most accomplished man in the camp. In person he was the tallest, and in authority he was allowed to consider himself almost next to me, the better to secure his best exertions. The men he despised, and he would only act by my orders."

Mitchell had two other capable native helpers. Tommy Came-first and Tommy Came-last; whilst Turandury, a widow from the Lachlan tribe, with a child, Ballandella, four years of age, was

an expert guide and interpreter. The child was ultimately taken by the Major into his own household to be trained and educated. Of the native race, he writes: "My experience enables me to speak in the most favourable terms of the aborigines, whose degraded position in the midst of the white population affords no just criterion of their merits. The quickness of apprehension of those in the interior was very remarkable, for nothing in all the complicated adaptations we carried with us either surprised or puzzled them. They are never awkward; on the contrary, in manners and general intelligence they appear superior to any class of white rustics that I have seen."

The Major's blacks were returned to their tribes with gifts. Piper, proud of the attention he received at Sydney, arrayed in the Major's red coat, and with a cocked hat and feather once Governor Darling's, and also decorated with a brass plate, inscribed "Conqueror of the Interior," was conducted back to his tribe at Bathurst.

In the nomenclature of places, Mitchell preferred the musical native names, e.g., Millewa, Yarrayne, Nangeela, Wannon, Wando, Bayunga, Geboor.

Major Mitchell was a keen botanist. In coming down the dry Lachlan River he discovered three new species of *Psoralea*, Scurf Pea, and three of the pretty genus *Trichinium*; also a new species of *Sambucus* or Elderberry and a new *Indigofera* with white flowers. He notes the presence of the *Callitris* or Murray Pine, a *Pittosporum*, various Acacias, and near the Murray, in abundance, the Quandong, *Fusanus acuminatus*, on which he discovered the Mistletoe, *Loranthus quandong*, with bright red flowers. He found that the natives ate the fruits of *Solanum esuriale* of the Nightshade family, and of the *Mesembryanthemum*, also the roasted stalks of a *Picris* and the foliage of the fragrant *Trigonella suavissima*, "Calomba," a new plant with clover-like leaves, which was also relished as a vegetable by members of the expedition. *Eucalyptus rostrata*, river red-gum, "Yarra" of the natives, along the streams, with Dwarf Box "Goborro" on drier areas were the chief Eucalypts. *E. longifolia* and *E. lanceolata* are mentioned, with *E. dumosa* in the Mallee near the Murray. Species of *Calostemma*, *Baeckia*, *Correa* and *Cassia*, with other new plants, were found. Many species of grasses, *Danthonia*, *Anthistiria*, *Stipa*, *Poa*, etc., in rich profusion are noted south of the Murray. Near Mt Hope a pretty white *Anguillaria* (*A. dioica*) was seen, for which the Major suggests the name "Australian Snowdrop." Here also was a striking plant *Phebalium* (*Eriostemon*) *pungens*, and a plant like a *Cistus* (*Pleuranda incana*). A reminder of the Old Land was *Pelargonium Rodneyanum*, which he named in honour of Admiral Rodney's granddaughter, Mrs. Riddell, of Sydney.

Baeckia micrantha, *Daviesia pectinata*, *Pigea floribunda* and *Gyrostemon pungens* were new species, also an attractive plant with orange-coloured flowers, *Ropera aurantiaca*.

At Mitchell's hurried visit to Mt. William, on the exposed summit of which with three men he spent a "miserable night" amid bitter sleet and snow, he collected quite a number of new plants, among which were *Eucalyptus alpina* and *Acacia Mitchellii*, both peculiar to the Grampians. Attractive plants were *Epacris impressa*, the Common Heath, *Correa rubra*, Red Correa (the Club's badge), *Lhotskya alpestris*, Snow Myrtle, *Grevillea aquifolium*, Prickly Grevillea, *G. alpina*, *Leucopogon glacialis*, the Twisted, *L. rufus* the Ruddy, and *L. cordifolius*, the Heart-leaf Beard-heaths. Also the beautiful *Thryptomene ciliata* (Mitchelliana), *Cryptandra tomentosa*, Prickly Cryptandra; *Phebalium bilobo*, with bright red flowers and holly-like leaves; and *Conospermum Mitchellii*. Later were obtained *Pultenaea mollis*, the Soft Bush Pea; *Correa aemula*, the Hairy Correa; *Tetratheca ciliata*, "with large purple flowers, the most beautiful plant met with"; *Daviesia brevifolia*, Leafless Bitter Pea; *Dillwynnia hispida*, Rough Parrot Pea; *Daviesia pectinata*, Thorny Bitter Pea; *Baeckia crassifolia*, Desert Baeckia, etc. Among the many Acacias, *A. sclerophylla*, *A. farinosa*, *A. aspera* and *A. acinacea* were new species. Of Orchids, white, blue, pink and red *Caladenias*, *Diuris palustris*, Swamp Diuris, *Spiranthes australis*, Lady's Tresses, *Burnettia cuneata*, Lizard Orchid, the charming *Thelymitra aristata*, *Pterostylis Mitchellii*, the Purple *Prasophyllum*, also the small *Microtis atrata*, etc., were collected.

Some plant specimens were destroyed through damp, but the Major conveyed to England 77 species, 134 kinds of seeds, and 62 bulbs. The plants were described and named by Dr. Lindley, Professor of Botany, London, the seeds distributed in gardens, the bulbs planted at Chiswick Horticultural Gardens. Some of the names given by Lindley were afterwards changed in the *Flora Australiensis* of Bentham and Mueller. Six Correas given specific rank were reduced to three under revision. In the census of Victorian plants nearly every species under Lindley's name was collected by the Major.*

Mitchell also collected samples of timber, some of which, as we see in the Mulga and other Acacias to-day, were fragrant and attractive when polished.

This was the first botanical collection from the interior of Victoria, plants previously collected in 1802-3 being from the southern coastal fringe.

Mitchell, in his Journal, exhibits his sound judgment and foresight. He fully recognized the suitability of the new province for pastoral and agricultural pursuits, and settlement. He shrewdly estimated the value of the northern rivers system as a ready means

*See list, p. 272.

for future conservation of water and irrigation of the drier areas, and of the Murray River for navigation and as an efficient fertilizing agency.

He appreciated the many advantages possessed by the province in its water facilities, its varied surface, quality of soils, as compared with the area north of the Murray River.

In regard to a question of very serious moment at the present day, in passing through the Mallee scrub near the Murray River, he stressed the great value of the *Spinifex* and *Eucalyptus dumosa* with its extensive root-system, in serving as effective sandstays in arid areas, where, unless protected by vegetation of this nature, erosion of the surface soil was inevitable. He also notes that *Eucalyptus dumosa* is almost indestructible by bush fires.

With true vision he saw the fitness of the land traversed for habitation by energetic and sturdy colonists, and happily named it in these words: "In returning over flowery plains and green hills fanned by the breezes of early spring, I named the region 'Australia Felix.'"

The report of the expedition accelerated the incoming of graziers from the north, Overlanders having already reached the vicinity of Albury. It also attracted settlers from Van Diemen's Land. Later on the publication of Mitchell's book in Great Britain also stimulated emigration to Australia, so that within a decade all available pastoral country in Australia Felix was taken up.

The name "Australia Felix" replaced that of Port Phillip, and was commonly in vogue until separation in 1851, when the official name, Victoria, gradually superseded it, without invalidating its peculiar appropriateness, in regard to the colony's rich, natural endowment, and unequalled advantages for settlement.

In the year 1932 in Victoria there were three memorials on "the Major's line"; to-day, as a result of the consistent efforts of The Historical Memorials Committee there are 32 memorials, with about eight more under consideration or in course of erection.

AUSTRALIAN SPECIES OF *COPROSMA*

Dr. W. R. B. Oliver, Director of Dominion Museum, Wellington, New Zealand, has recently issued an excellent monograph entitled "The Genus Coprosma." The work was published for him by the Bernice P. Bishop Museum, Honolulu, Hawaii.

Coprosma is one of the largest genera in the family Rubiaceae, mostly distributed in temperate areas or mountains of the tropics from Borneo to Tasmania and New Zealand. The genus is of considerable interest to evolutionists and plant geographers, although the flowers are of fairly uniform structure, it has ninety species and nineteen hybrid species. The only apparent method of increase and distribution is by bird carriage, the seeds of the drupe

(fruit) being capable of passing with unimpaired vitality through the alimentary tracts.

Species of *Coprosma* are used for horticultural purposes. *Coprosma repens*, "Taupata", of New Zealand, is cultivated throughout Australia as a hedge plant, where it is known as New Zealand Looking-glass Bush or "Squeakers." Children blow through the folded leaf to make a squeaking noise. It is sold by nurserymen as *Coprosma Boueri*. Some species were used by the Maoris for dyeing New Zealand flax.

There are seven species of *Coprosma* from Australia and Tasmania; six are endemic, whilst *C. pumila* is also widely distributed in New Zealand.

The following are the Australian species, with the distribution, and a key for their determination:

Leaves 1 nerved.	
Stipules minute points on connected leaf bases	*C. Moorei* Rod. Tas.
Stipules triangular	
Branchlets glabrous.	
Leaves broadly ovate, style branches 2-4	*C. pumila* Hook T., V., N.S.W., N.Z.
Leaves narrowly ovate, style branches 2	*C. nivalis* W. Ol. Victorian Alps
Branchlets pubescent	*C. Tadgelli* W. Ol. Victorian Alps
Stipules tubular	*C. nitida*
Leaves reticulate.	
Stipules entire, flowers solitary	*C. quadrifidum* Rob. T., V., N.S.W.
Stipules denticulate, flowers clustered	*C. hirtella* Lab. T., V., N.S.W.

It will be observed that Dr. Oliver has added two new species to the list of Victorian plants, namely, *C. nivalis* and *C. Tadgelli*. The latter species is named in honour of our club member, Mr. A. J. Tadgell, who has done very valuable work in botanical explorations and writings on the Alpine regions of Victoria. Mr. Tadgell was also successful in collecting *C. nivalis*.

Coprosma Tadgelli W. R. Oliver, "Tiny Currant-bush," has linear elliptic leaves, acute, gradually narrowed to a short petiole, 1 nerved, coriaceous, 8 × 2 mm. Stipules obtuse, margin ciliate. Branchlets tetragonous, pubescent. The leaves of *Tadgelli* resemble those of *C. nivalis*, but the pubescent branchlets distinguish it from that species.—P. F. Morris.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, October 12, 1936. The President, Mr. S. R. Mitchell, presided and about 100 members and friends attended.

DEATH OF MEMBER

The President announced with regret the recent death of a valued member, Mr. H. P. McColl, and members and friends present stood in silence as a mark of respect.

LECTURE FOR EVENING

The subject for the evening was an illustrated lantern lecture entitled "In Australian Tropics" and was given by Mrs. P. Hanks. A fine series of coloured slides showing many phases of natural history, together with a good commentary on them, enabled those present to enjoy a very interesting and instructive evening.

At the close of the lecture, the President accorded Mrs. Hanks the thanks of the Club, and members responded by acclamation.

VISITOR

The President announced to the members that Dr. Johan Mauritzon, a botanist from Sweden, who was here on a collecting trip, was present at the meeting.

He welcomed the visitor to the Club, and presented to him a copy of *Victorian Orchids* as a token of remembrance of a very pleasant excursion to Ringwood.

Dr. Mauritzon responded, thanking members for kindnesses extended to him.

REPORTS OF EXCURSIONS

Reports of excursions were given as follow: Arthur's Seat Club Picnic, Mr. S. R. Mitchell; Beaconsfield, Mr. G. N. Hyam; Ringwood, Mr. C. French and Mr. A. S. Chalk.

CORRESPONDENCE

A letter from Mr. Chas. Daley, B.A., F.L.S., thanking the Club for congratulations on the occasion of his golden wedding.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as ordinary members of the Club: Mrs. M. M. Martin, Mrs. A. R. White, Miss A. G. Randell, Miss Ready; and as Country Member, Mr. L. H. Finnis.

GENERAL BUSINESS.

Forthcoming excursions were announced by the leaders, and it was stated that for the Dredging Excursion on December 12, 1936, names must be handed in not later than next meeting.

QUESTIONS BY MEMBERS

Two members submitted questions through the medium of the box, both in reference to birds. Mr. A. H. Chisholm, C.F.A.O.U., answered them.

The questions were:

Question.—A foraging Blackbird was observed in a Toorak garden putting its head on one side towards the ground, and then quickly thrusting in its beak to pull out a grub or worm. Was the bird listening or looking (or both) for the insect?

Answer.—The bird probably was listening.

Question.—Recently an Emu-Wren was flushed from its nest of three young. The bird was thought to be a male, with blue throat. Is it usual for a male Emu-Wren to nestle or feed young, or was the male in its rapid flight mistaken for a female? The young birds in the nest were almost fully fledged.

Answer.—Identification probably correct. The male Emu-Wren certainly helps in feeding young, Mr. Chisholm said, although he had not seen it brooding.

NATURE NOTES

Mr. Coghill reported that he saw a Jackass with a blue ring on its leg.

Mr. F. S. Colliver mentioned having seen a Jackass flying off with a giant worm at Gippsland, and being brought to the ground by the worm wrapping itself around the bird's wings to such an extent that human intervention was necessary to release the bird. Mr. A. H. Chisholm stated that this was not a rare happening.

Mr. C. French spoke about orchids being destroyed at Frankston. It was decided that this matter be referred to the committee for consideration.

EXHIBITS

Mrs. P. Hanks.—Specimens to illustrate the lecture, including: Pearl shells, Darwin: Staurolites, Cloncurry; Corals, Fitzroy Island; basket made from Pandanus, Palm Island; fruit of Flame

tree (*Brachychiton acerifolius*), Fluorspar; flower of Kapok tree (*Bombax malabarica*), Northern Territory; fruit of Date Palm (*Diospyros maritima*), Adelaide River; fruit of *Pandanus odoratissimus*, Darwin; leaves and fruit of *Bruguiera gymnorrhiza* from Adelaide River; leaves, fruit and bark of the Broadleaf Tea Tree (*Melaleuca leucodendron*), Adelaide River; bark of *Alstonia constricta*, fruit of *Hakea persicharia*, Fluorspar; leaves and fruit of *Acacia timsii*, Fluorspar; *Unio* sp. (?), Adelaide River; land mollusca from bower of the Great Bower Bird, near Brock's Creek.

Mrs. Knox.—Wood opal from Gippsland.

Mr. D. J. Paton.—Orchids from Boronia, including *Caladenia Patersoni*, *C. reticulata*, *C. Menziesii*, *Prasophyllum elatum*.

Mr. S. R. Mitchell.—A series of Pseudomorphs (i.e., false forms) including: Opal replacing marine shells from Stewart Range, South Australia; Opal replacing Glauberite from White Cliffs, New South Wales, Limonite replacing Pyrite; Quartz replacing Felspar, Mt. Bischoff, Tasmania; Barite replacing a coral from Woori Yallock, Victoria; Opal replacing wood from White Cliffs, New South Wales, Tasmania; Idaho, U.S.A.; Arizona, U.S.A.

Mr. F. S. Colliver.—Four specimens of fossil botany that once were described as different genera, and then many years after were found to be possibly different portions of the same plant. The specimens shown were *Calamatis grickaui* Bron.; *Asterophyllites equisetiformis*; *Annularia inflata* Lesq.; *Sphenophyllum emarginatum* Bron. (The Calamatis is the main stem and the other three are heteromorphic branches.)

EXCURSION TO RINGWOOD

This excursion took place on Saturday, October 10, and was attended by sixty members and friends, probably a record attendance for a F.N. Club afternoon excursion.

The weather was dull and a few light showers fell, which, however, did not damp the enthusiasm of the members present. From Ringwood we proceeded to a good collecting ground about a quarter of a mile on the north side of Pine Mount or Luffmann's Hill. Quite a number of orchids in flower were noticed, viz.: Brown Beaks (*Lyperanthus suaveolens*), dark brown and yellowish-green varieties, Bearded Greenhood (*Pterostylis barbata*), Broad-lip Duiris (*Duiris palachila*), Alpine Greenhood (*Pterostylis alpina*) (rather rare in this locality), Wax Lip, Caladenia, Sun Orchids, and other common species. Sixteen species of orchids were in flower and about three other species which had just finished flowering were observed.

One of the party discovered a double white flowering Native Heath (*Epacris*); this form is rare.

After a walk of about four miles Mitcham Station was reached about 5.15 p.m.

C. FRENCH.

CLIMBING HABITS AND FURTHER NOTES ON HIBERNATION OF THE ECHIDNA

By EDITH COLEMAN

Several male Echidnas sent to me after "Prickles" had lost her companion, exhibited extraordinary climbing habits.

The first, a half-grown male Echidna from Yea, received on November 17, 1935, fasted for five days. He then emerged from his box and ate a hearty meal, after which all his energies were devoted to finding means of escape. From 8 a.m. until 5 p.m. (except at meal times) he climbed the wire walls, prised up the flooring-bricks (even four or five bricks cemented together!) and burrowed in the hard, clay floor of his enclosure. He climbed right to the iron roof, usually from the corners, where walls are at right angles. By pressing two feet on each wall he obtained a firm hold while inserting his snout into a higher mesh. Three times he escaped before I could return him to the country.

In twenty days this individual strengthened my view that the Echidna is neither crepuscular nor nocturnal. Not once did he emerge after dusk, as one might have expected him to do, to continue his quest for freedom. Taken to Sherbrooke Forest, a new locality, he made off without hesitation as soon as released.

On December 15 two half-grown male Echidnas were brought from the Zoological Gardens. I was to release the less suitable one. As I anticipated, from the number of broken spines they bore, both were adepts at climbing. One of them was also an expert burrower. When not eating they, too, spent the hours in a tireless quest for liberty, but always retired at dusk, not to emerge throughout the night. At whatever hour I flashed a torch into their boxes I found them asleep. I tested this many times, during both "crepuscular" and "nocturnal" hours. They climbed beautifully, and descended with jack-tar nimbleness. Several times, failing to obtain a footing on the iron roof they fell to the floor. On two occasions one appeared to be hurt and lay motionless for some time. It was obvious that, without cruelty, I could not confine an adult Echidna. Had "Prickles" not needed a companion I should not have tried to do so.

I had placed the newcomers in the outdoor run, but, as this was not netted overhead they were out as soon as my back was turned. One of them was then released, but as the other (we named him Sandy from the colour of his coat) had not recovered from his fall, I decided to keep him until he was stronger. The outdoor run was then wired above. Neither "Stickles" nor "Prickles" had attempted to climb out of this enclosure, nor did they attempt to climb out of their sun-bathing playground, though I think they could have done so at the corners. During "Stickles'" first few months she certainly escaped on four occasions from her small

sun-bathing tank. This she did by standing on a brick which enabled her snout to enter a small hole near the top of the tank. But this could hardly be called "climbing" when compared with the activities of the male Echidnas.

On March 4, 1936, a healthy, rather more than half-grown, Echidna came on trial. He led me a pretty dance. Several broken spines should have warned me. Indeed I removed him from a wire wall at the home of the friend who offered him to me, but as I managed this quite easily, I allowed myself to hope he would settle down. He merely added to my notes on the climbing activities of Echidnas. (It was quite clear that he, like the others, was never out after dark.) The Echidna when climbing uses its snout very cleverly as a fifth foot. Placed in the outdoor run, the newcomer climbed to the top of a paling fence (6 feet 6 inch palings on a ten-inch plinth) with the same facility as he had climbed the wire netting. He did so by ascending at the corners, where two paling walls were at right angles. As there was no wire netting he could obtain but little help from his snout, so that the climbing was done by spreading and pressing his feet on two opposed walls. It suggested intelligence, I thought.

Though he enjoyed his meals and even allowed me to handle him, this Echidna, too, refused to accept an enforced habitation. A few days later he was set free on a watershed reserve in Healesville. As soon as released he flattened himself like a lizard, and slid off reptile-like, among grass tussocks.

In the meantime "Sandy" had been placed in the outdoor run with "Prickles." He was eating well, but had not yet attempted to climb since his fall. Cod-liver oil, fresh cream, and a newly-laid egg daily, were slowly working a change in him—of body, if not of heart. "Prickles" obviously liked his company. She would lick his head, and nose his ears, though "Sandy" was never responsive.

As I wished to confirm last season's notes on hibernation I gave the Echidnas more natural conditions. I ceased to handle them, and did not carry them to their old sleeping quarters, but left them to sleep in a huge heap of humus. They loved this warm mound, and made delightful burrows in it. Even with my arm extended to the shoulder in these tunnels I was unable to reach them.

Hibernation, 1936

"*Prickles*"

On March 3 "Prickles" did not emerge from the mound of humus. She missed again on April 10. She hibernated for 3½ days from April 18. On emerging she drank much water and then slowly ate a little food. She seemed very drowsy, but next day was quite vigorous. She missed another day on May 5, and was only out for half an hour on May 13. She missed another day on May 14 and was only out for an hour next afternoon. She hiber-

nated again from June 6 until September 8 (94 days) and again for a final period of 19 days on September 9.

I watched her emerge after her 13-week period. With her fore-feet she scratched away the grass at the entrance of her burrow, and at once set off towards the water-vessels—twenty-five feet distant. Coming to a fresh mound of grass, placed there while she

"Stickles" "climbing" into bed.

was hibernating, she turned at once, and ambled along a remembered track that led to the water. She drank continuously for six minutes, as I counted the seconds, then returned, climbing easily over the new mound, to where "Sandy" lay sunning himself. She nosed him for a moment or two, but, finding him disinterested, used her inquiring nose to better purpose on the moist soil in which larvae seemed to be numerous. When her food appeared she did full justice to it.

"*Sandy*"

"Sandy" hibernated for five days from April 17. He emerged at 9 a.m. and was very shaky. He ate very little food and appeared

Plate XIII

Quite at home on two feet

drowsy. He returned to the mound at 3 p.m., burrowing into another part of it. On this day he was dusted liberally with pulvex, for certain brown vermin which I had never seen on "Stickles" or "Prickles." He was too drowsy to protest much. He hibernated again for 4½ days from May 5, emerging at 3 p.m. on May 9. At first he was very shaky and ate his food while lying down, eyes half closed, snout resting on the saucer. He remained out, apparently too weak, or too tired to burrow, until 5 p.m., lying on a small heap of humus. As a cold night was threatened I covered him, where he lay, with grass, and left him. Next morning I found that he had gone to the big mound. From a deep depression in the small heap it was evident that he had left it, and returned to it, before finally retiring to the big mound. He was out next day basking in warm sunshine, rather furtive, but was eating well.

"Sandy" hibernated for a further period of 10 days from May 13. He seemed refreshed, I thought, when he appeared, though he moved slowly. He was a little thinner but I did not weigh him, as I wished to interfere as little as possible with a natural course of events. He hibernated again from June 1 for a period of 51 days, emerging at noon on July 21. He ate no food, and soon returned to the mound. From July 23 he hibernated for a fifth period, this time of 45 days. His final liberation lasted for 18 days, September 9-27. He is now eating well and seems to be stronger. So far he has not resumed his old climbing habits, but I am not very optimistic on this point. He will be released on the earliest signs of discontent.

It will be noted that "Sandy," a half-grown male Echidna, has hibernated for six periods, 133½ days in all. "Prickles," a half-grown female, has hibernated for three periods this season, the total number of days being 117, as against only 5 days last year. She appears to be about the same age as was "Stickles" who died suddenly on October 11, 1935. (An examination of the internal organs showed that she was not yet mature.) It is, I think, quite probable that the short period of hiberation was responsible for her death, and that food should have been withheld during those periods when, under natural conditions, it would not have been available to the Echidnas. It may be assumed that they would sometimes come out to bask, merely, and would retire, foodless, to their burrows.

Summing up, the hibernation periods for 1936 are as follows.

"Prickles":

April 18-21	4 days
June 6 to September 8	94 ,,
September 9-28	19 ,,
Total	117 days

"Sandy";

April 17-22	5 days
May 5-9	4½ "
May 13-23	10 "
June 1 to July 21	51 "
July 23 to September 6	45 "
September 9-27	18 "
Total	133½ days

Note.—A change of gender will be noted with regard to "Stickles" and "Prickles." As the masculine pronoun had been used for several months before their sex was apparent, it was as difficult to change as a familiar name. In the family "Prickles" is still referred to as "he."

THE 1936 ANNUAL EXHIBITION

The 51st Annual Exhibition was held at the St. Kilda Town Hall on October 6 and 7. On this occasion, the show was opened by the President, Mr. S. R. Mitchell.

The exhibits were more extensive than usual, extra space being available by the utilization of the adjoining supper-room. This allowed for a greatly-improved method of staging by the Plant Classification section and for the adoption of separate tables for Victorian district exhibits. Districts represented included Taradale (Central) North East, Warrandyte, Mallee and Grampians. Miss Jean Galbraith and her helpers provided plenty of informative tickets and students expressed their appreciation of the extended layout, which gave them more opportunity for close study.

In the main hall the most conspicuous exhibits were the Interstate Flower Section kindly collected and transported by the Shell Company of Australia, tastefully staged by Mrs. C. Barrett and helpers. Included in this were two fine individual garden-grown exhibits, one from Mr. Burdett, of Basket Range, South Australia, which occupied the front of the stage, and another from Mr. Ashby, of Blackwod, South Australia, which formed a pyramid facing the entrance. Tables of flowers from Tasmania, New South Wales and South Australia were also a bright feature. Flanking the interstate exhibits were tables of cultivated native flowers from the gardens of Messrs. S. A. Robertson, of Sale, Geo. Coghill, J. W. Audas, and Harold Jenkins. An interesting exhibit of Victorian flowers collected by the Burnley Horticultural School students; the Orchid section (Miss Coleman); a special Grampians exhibit collected by Messrs. Chas. French and J. Firth, including a rare double form of *Epacris impressa*; and a table of Centralia flowers from Mr. Morris, of Broken Hill, completed one of the most decorative displays of Australian flowers ever staged.

A fine collection of coloured photographs of Australian flowers was shown by Mr. H. Reeves in the supper room. The stage was occupied by thirty-five cages of Budgerigars staged by the Budgerigar Society, each containing birds of a different colour, illustrating what scientific breeding has been able to produce from our native green and yellow bird. Colours ranged from pure yellow to blues and mauves. Other special exhibits included radiographs of Australian fauna (Mr. Fergus) illustrating a new branch of nature study and one which will probably reduce the necessity for dissection. Miss Ellen Clarke sent a collection of Victorian crayfish illustrative of her recent article in the *Naturalist*. Mr. Sykes showed and explained a comprehensive collection of spiders under the title of the "Spider Zoo." Mr. V. H. Davey exhibited an observation bee-hive which clearly showed the various types of comb and brood. The Forests Commission had an extensive exhibit on this occasion illustrating the various destructive pests of timber—insect and fungal. The fungal exhibits were attractively mounted on logs. Photographs of the giant eucalypts known to exceed 300 feet, and a comprehensive series of photos. showing erosion due to removal of forest cover, also created interest. A collection of birds' nests was shown by the National Museum. The sectional exhibits were as follow:

Anthropology (Dr. Wishart and Mr. F. Smith).—Australasian, Polynesian and Melanesian artefacts, weapons, etc. Outstanding exhibits in this section were a fishing kite from the New Hebrides and some fine axes from New Guinea. A table of aboriginal work from various missions was staged by the Victorian Aboriginal Group and provided a contrast to those from the unsophisticated tribes.

Entomology was represented by cases from the collections of Mr. J. A. Kershaw and Mr. A. N. Burns.

Conchology (Mr. C. J. Gabriel) was of special interest this year on account of the simultaneous publication of the handbook *Victorian Sea Shells*, written by Mr. Gabriel. His exhibit showed a comprehensive collection of the species figured in that book, together with many other shells of economic and scientific interest.

Geology (Messrs. Colliver and Frostick).—This section is always particularly well ticketed, which greatly adds to its interest. The building stones of Melbourne; a series to illustrate the time scale of fossils; quartz crystals and a many-hued collection of mineral ores (Mr. S. R. Mitchell) were amongst the features of this exhibit.

Mammals.—Live exhibits lent by Mr. David Fleay included juvenile specimens of the Grey Kangaroo and Wombat. Echidna, native cats, opossums and other marsupials were under the care of Miss Wigan and Miss J. Harper.

Marine Biology (Mr. and Mrs. Fraeme) was represented by many specimens. A pearl from a fresh-water mussel, corals, Leafy Sea Dragon, the Stone Fish, Tree Climbing Fish of Queensland, and a Boot-lace Worm many yards long, were some of the more interesting exhibits. A series of shark, eel, goanna and snake skins were also shown to illustrate their possible economic use.

Microscopes were displayed in the side room under the leadership of Mr. Blackbourn during the evening sessions and he was assisted by a willing demonstrator at each microscope or projector. This section always interests the general public, who seldom have a chance of observing natural objects invisible to the naked eye.

Reptiles (Mr. Geo. Malcolm).—In this section were several live snakes, including a 10-foot Diamond Python, a green tree frog and also some aquaria containing specimens of veil-tailed goldfish.

The Plant Stall (Messrs. Hammett, Robley and Salau) and the Cut Flowers Stall (Misses Bolton and Hart) again contributed handsomely to the finances of the Show.

The Bookstall and Enquiry Desk was well patronized, and efficiently conducted by Mrs. V. H. Miller and Mr. Chas. Daley. The new Shell Book sold well during the exhibition.

General organization was in the hands of Messrs. S. R. Mitchell, L. W. Cooper, W. H. Ingram and G. N. Hyam. The attendance was approximately the same as for two days of last year's show and is therefore well below that of the years prior to the depression. A rather disquieting feature is the fact that purchases of tickets by members is less than half what it was last year. A gratifying feature was an increased attendance of children and a novelty was introduced by the provision of a questionnaire relating to exhibits to ensure their interest. About 250 were returned and small prizes were awarded to the twelve children who returned the most complete and best answers. Mr Swaby kindly prepared the questions and marked the answers. As the staging of the Show entails a great deal of work by the organizers and is of great importance to the Club, it is hoped that this lack of interest by some members will not continue.

In addition to the names above mentioned the Club has to thank many who helped in some degree to stage one of the best exhibitions we have had. At least 150 people contributed either by help or exhibits and many of them are not members.

—G.N.H.

Dr. J. Mauritzon, of Sweden, wishes to obtain specimens of insects. Will members please co-operate in this matter?

ERRATA

Vol. LIII, page 114, line 17.—"1883" after October 9: page 118, line 24—*truncata*, instead of *cuneata*.

FOSSIL LOCALITIES IN AND ABOUT MELBOURNE

By F. S. COLLIVER

PART I—ROYAL PARK CUTTING

For the first of this series I have chosen the railway cutting at Royal Park. Originally meant for railway traffic it has become well known as a locality where many first attempts at fossil collecting have been made.

Many years ago the Railway authorities, acceding to a request by those interested, among whom were members of this Club, agreed to keep the section reasonably open to collectors, and also not to plant the so-called Pig Face.

A note of interest and a moral can be here stated. Possibly the first thing the visitor to the cutting will notice will be its far greater width than is apparently necessary for railway purposes. The reason for this is that the Railway authorities required a large amount of filling for the Spencer Street yards and obtained most of it from this locality. The moral is not to accept all deposits as being *in situ*, without first applying tests; in this case the tertiary rocks have been dumped on to recent deposits, and they may prove (in the future) a puzzle to some careless geologist.

Dr. G. B. Pritchard, a Club member at the time, was apparently the first to separate these beds, and he called the lower beds "Eocene Age" and the upper beds "Miocene Age" or the Balcombian and Kalimnan series respectively. A distinct fauna is preserved in each bed, and the species agree generally with the assemblages to be found in the Lower and Upper beds of Muddy Creek, near Hamilton, which are listed under the same series names by Pritchard. The better preserved specimens are to be found in the red bands overlying the white sands and clays. Here the fossils occur as casts and impressions in an iron oxide mineral known as Hematite, and they are of the older age, i.e., the Balcombian series. The younger age (or Kalimnan series) fossils occur in fine iron sandstones at the top of the cutting, but in number or variety they cannot equal the lower beds.

A good geological hammer, a flat chisel or two, tissue paper, small boxes and paper for general wrapping are very necessary. The specimens as collected should be marked to indicate from which bed they were taken. Haphazard collecting should not be even thought of, as two different ages are represented by fossil beds here, and the beginner is apt to mix the fauna.

To collect the fossils, use the hammer and chisel to break out pieces of the red rock, and carefully look at the fresh surfaces. Casts or impressions of shells are sure to be seen; most likely they are small, but the next piece may yield a large specimen. If necessary, carefully reduce the size of the specimen, always remembering that to reduce too much very often means a valuable specimen

badly broken or even entirely lost. Wrap the specimens separately, but keep the casts and impressions of the one fossil in the same wrapping; and remember that an impression is very often of more use than the cast. The writer will be pleased to assist by naming the specimens where possible.

At the Melbourne end of the cutting it will be noticed that the red beds overlie a deposit of clay. Closer examination will show a spheroidal structure in the clay, and this is one of the indications of weathered basaltic rocks; in fact, this clay was at one time good sound basalt, perhaps better known as bluestone, and as it underlies the tertiary rocks, it is known as "Older Basalt."

Some years ago, another rock was also visible just near here, and it consisted of a small conical outcrop of sandstone, being portion of the bed rock of Melbourne and therefore of Silurian age. At the present time, this is covered by detrital material. The visitor should note the difference between the clay and the ironstone. The clay shows just as a mass, but the marine tertiary has distinct layers of deposition. This is one difference between the sedimentary and the volcanic rocks.

Shells are by far the commonest finds, although sea urchins, sea mats (polyzoa), corals and even a shark's tooth have rewarded the writer's search. There is always the possibility of collecting something entirely new, e.g., for instance, on one occasion a large specimen of Cucibulum, which is a genus of univalve shells, was also found by the writer.

The Geological Survey Map of this area shows that fossil leaves and fruits were collected from the red sandstones in the early days.

The following is a list of the more common fossils from the Royal Park cutting, and many of these should reward the first attempt of visitors at fossil hunting.

Echinodermata—
Psammechinus woodsi Laube
Cidaroid plates and spines
Crustacea—
Crab carapace and chelae
Polyzoa (Sea Mats)
Numerous species
Brachiopoda (Lamp Shells)—
Magellania garibaldiana Davidson
Magellania insolita Tate
Scaphopoda (Tusk Shells)—
Dentalium nantelli Zittel
Cephalopoda—
Aturia australis McCoy
Gastropoda (Univalves)—
Voluta ancilloides Tate
Conus ligatus Tate
Conus heterospira Tate
Cypraea brachypyga Tate
Natica sp.
Cerithium flemingtonensis McCoy
Cassis exigua T. Woods
Astralium johnstoni Pritchard
Haliotis naevosoides McCoy
Lamellibranchiata (Bivalves)—
Lima bassii T. Woods
Limatula jeffreysiana Tate
Barbatia celleporacea Tate
Cucullaea corioensis McCoy
Nucula sp.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, November 9, 1936. The President, Mr. S. R. Mitchell, presided, and about 100 members and friends attended.

LECTURE ON NATIVE FAUNA

The lecture for the evening, "Indigenous Fauna at the Zoo and in the Bush," was given by Mr David H. Fleay, who has under his care the Australian Section of the Zoological Gardens. The lecture was illustrated by moving pictures. Particularly interesting were the studies of young birds and animals, also a series of slides showing some of the rarer marsupials.

The President accorded the thanks of the Club to Mr. Fleay for his most interesting and instructive lecture.

CORRESPONDENCE

From the Shell Company of Australia, stating that it was greatly indebted to the ladies of the Club for assistance in arranging the Company's exhibit at the Wild Nature Show.

Letters from J. Leonard and J. W. Woodburn, who were the successful scholars in the Questionnaire Contest at the Show, thanking the Committee for the prizes awarded them.

REPORTS OF EXCURSIONS

Reports of excursions were given as follow: Toolern Vale, Mr. S. R. Mitchell; Botanic Gardens, Mr. L. W. Cooper for Mr. P. H. R. St. John; Kinglake, Mr. L. W. Cooper for Messrs. A. A. Brunton and W. H. Nicholls.

ELECTION OF MEMBER

On a show of hands Capt. G. McLaren was duly elected as an ordinary member of the Club.

COUNTRY VISITOR

The President announced that a country member, Mr. W. Champion Hackett, of Adelaide, was present, and welcomed him to the meeting.

QUESTION BY MEMBER

Question.—Sparrows were seen stripping leaves off chrysanthemum bushes. The leaves had no aphis or thrips on them. Were the birds using the leaves for their nests?

Answers.—Mr. W. H. Ingram suggested that the leaves were used for nesting purposes, as he had noticed Sparrows pulling pieces from asparagus creeper.

Mr. A. H. Chisholm thought that the leaves were stripped in a spirit of mischief, and that often buds and flowers were stripped for no other apparent reason.

NATURE NOTES

Mr. A. R. Proudfoot reported that a Kookaburra had been seen taking the young of a Yellow-winged Honeyeater.

Mr. F. S. Colliver, with the aid of the epidiascope, spoke on *Euryzygoma dunense*, a fossil marsupial from the post tertiary of the Darling Downs, Queensland. This animal had the possibly unique characteristic of the width of skull being greater than the length, the type specimen measurements being: width 680 mm., and length, 634 mm.—maximum measurements in both cases.

EXHIBITS

Mrs. M. E. Freame.—Marine life, including a live Elephant-fish and shell (*Scaus antipodes*), *Philine angasi* and separated shell; Pheasant Shell and egg capsules; Sea Hare, shell and egg girdle; Sea Snail (*Natica* sp.) and girdle; Sand Snail (*Saniator fragilis*) and egg girdle; Sea Slug (*Stomatella*) and shell; Razor Shell (*Solen* sp.).

Miss A. Cornish.—100 sponges collected at Anglesea.

Mr. E. E. Pescott.—Disarticulated skull and claws of King Island Wombat.

Mr. C. French.—Three interesting Grampians plants in flower, viz.: Rosy Bush-Pea (*Pultenaea subalpina* (*rosea*)), Blue Tinsel Lily (*Colectasia cyanea*), Swamp Heath (*Epacris paludosa*).

Mr. S. R. Mitchell.—Shell money from the Eastern Solomons; alluvial Topaz, Sapphire, Zircon and Cassiterite from Torrington, New South Wales; crumpled Slate from Bunker Flat, Victoria; Slickenside (collected by Mr. H. Reeves) from the Eastern Wonder Mine, Blackwood.

Mr. F. S. Colliver.—Carbonized remains of a Grass Tree, taken from clay bed 104 feet below the surface of Princess Street, North Carlton, in 1900, during Board of Works excavations. Specimen from collection of Dr. G. B. Pritchard.

PTEROSTYLIS SQUAMATA R.Br. AN IMPORTANT DISCOVERY

By W. H. NICHOLLS

The Scaly Greenhood (*Pterostylis squamata*) is an extremely rare glabrous species, usually under 25 cm. in height. In general the whole plant is similar to *P. rufa* R.Br., but has smaller flowers —usually few (1-3), rarely up to 8. It is coloured like *rufa*, and has more stem-bracts, 6-8, seldom fewer; the lower ones are imbricate. It has also a withered basal rosette at time of flowering.

Apex of galea shortly pointed, lower lip pendent, lobes about 1·3 cm. long; labellum ovate-oblong, fleshy, markedly glandular; extremely irritable, *deeply channelled* (*no mesial ridge*), tip straight or almost so, bifid;[1] lateral margins and sides of the thickened and narrow base beset with long setae; column wings almost quadrangular; upper margins not toothed or ciliated.

The writer has long sought this rarity among Greenhoods, and interested folk throughout Victoria and elsewhere have been asked to keep a sharp lookout for it, but without result until this season.

Originally collected by Robert Brown, Matthew Flinders' botanist, in Tasmania, *P. squamata* has only been definitely recorded from Port Lincoln, in South Australia, by R. S. Rogers,[2] and R. D. FitzGerald has recorded a very fine form from New South Wales,[3] but the Victorian Records have always been regarded as "doubtful."

There are no specimens of *P. squamata* in the National Herbarium, Melbourne; the late Baron von Mueller had personally labelled an undoubted specimen of a comparatively new species, i.e., *P. pusilla* Rogers,[4] as follows: "This is the true *P. squamata*"; but there is no doubt concerning its true identity.

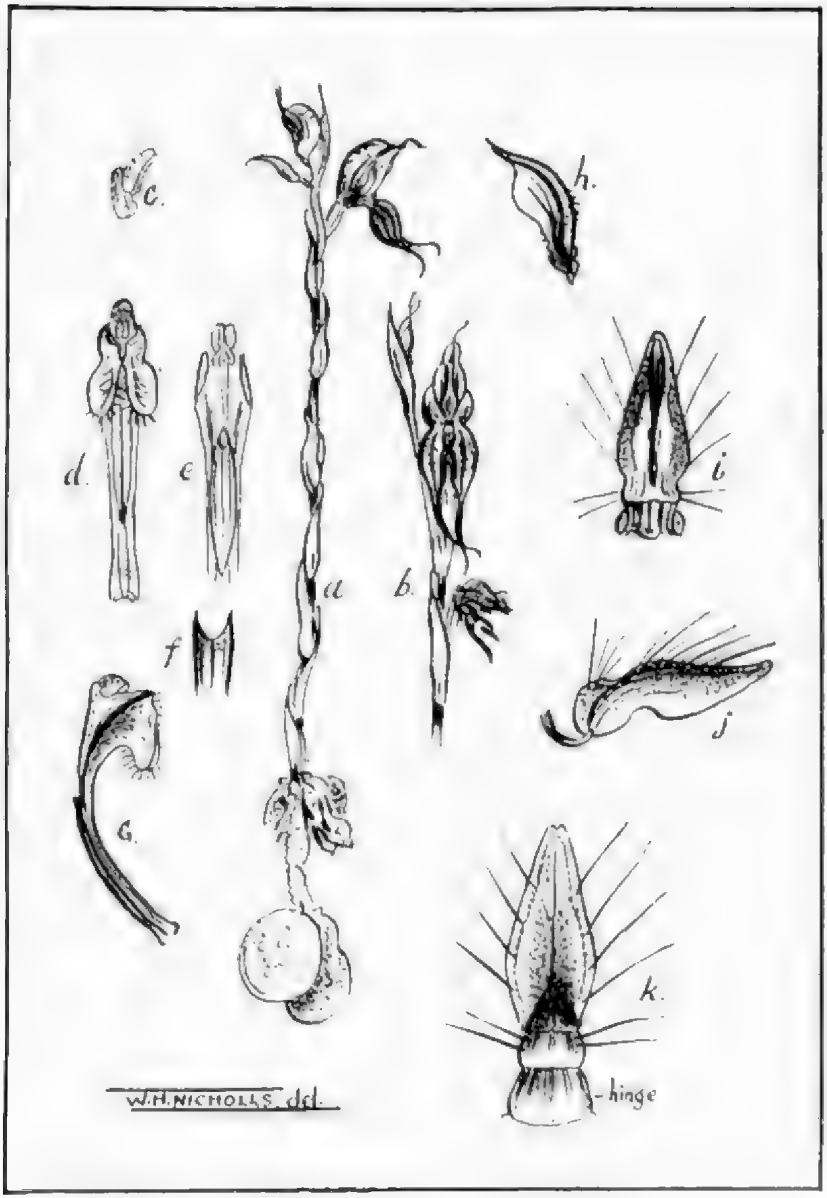
The main reason for writing this paper is the fact that the elusive *squamata* has at last been found in Victoria. Two fine examples were received from Benalla, in north-east Victoria, on November 10, 1936. These specimens were found by Messrs. Victor R. Say and J. Stephens. Mr. Stephens first discovered a colony of "beautiful grey-green pterostylis rosettes" early in the season (August), and both gentlemen visited the locality of the find on November 5, eventually discovering two separate colonies within a radius of one mile. The plants were located on a dry, rocky hillside. One colony of about twenty plants was growing in rather good leaf-mould, between rocks; the other patch was discovered in more open country. The largest specimen—a very

1. In the Benalla specimens, the tip of the labella varied from slightly emarginate to obtuse.

2. *Trans. Royal Society of South Australia*, vol. xxxviii, 1914, pp. 240-42, pl. xv.

3. *Australian Orchids*, R. D. FitzGerald, vol. 1.

4. *Trans. Royal Society of South Australia*, vol. xlii, p. 26, pl. iii.



Pterostylis squamata R.Br.

fine example—was 28 cm. in height, bearing eight flowers. Two other specimens had two and three flowers respectively. All the others were past their prime, the blooms having withered.

Both Mr. Say and Mr. Stephens are to be congratulated on their surprising discovery, which definitely establishes this species for Victoria.

Dr. Rogers gives some interesting facts concerning *P. squamata* and allied forms, as follows: "The true distinction between *P. rufa* and the other two (*P. squamata* and *P. Mitchellii*) would appear to be that *rufa* is the representative of those rufous forms which have a membranous labellum, whereas *squamata* and *Mitchellii* represent the forms with thick, fleshy labella. Therefore, although there may be some justification for regarding *P. Mitchellii* as a variety of *P. squamata*, there seems to be very little for regarding either of them as a variety of *P. rufa*.

It is probable that less confusion will be occasioned by retaining the specific rank formerly assigned to these three plants, than by regarding two of them as mere varieties of the other.

After careful examination of living plants, I am convinced that *P. squamata* is a good and valid species. It has not hitherto been recorded from South Australia, and so far it has reached me only from one locality, viz.: Port Lincoln, where it was found blooming towards the close of November."[2]

Dr. Rogers kindly forwarded the Port Lincoln specimen (No. 4527a) for my inspection. Even a casual examination indicates the distinction between this species and its allies, and fully justifies Dr. Rogers' conclusions.

The examination of the fresh Benalla specimens convinced the writer that upon the labellum characters alone the species is distinct, the most salient features being the deep channel traversing almost the full length of the lamina, and also the peculiar formation of the base of the labellum—more noticeable when viewed from above (see illustration).

The upper portion of the oblong-elliptical stigmatic plate is also interesting. The upper portion forms a definite hood and the tips had to be forced apart (see Figs. e, f). This hooded character is referred to by FitzGerald in his description of *P. Woollsii*.

KEY TO ILLUSTRATION

Pterostylis squamata R.Br.

a, *b*—specimens from Benalla (Vic.) (reduced).
c—pollen masses.
d—column from front.
e—column head, wings removed to show empty anther, rostellum and hooded head of stigmatic plate.
f—upper portion of stigmatic plate, free.
g—column from side.
l—petal.
i—labellum from below, showing obtuse tip.
j—labellum from side.
k—labellum from above, showing deeply-grooved lamina, emarginate tip, etc.

(All dissections enlarged variously.)

THE TOLL OF THE BEACHES

By FREDERIC WOOD JONES

I suppose that the student of no other avian group is so dependent upon chance and adventure for providing his material as is he who would make some study of the Petrels and Albatrosses. He is dependent on adventure, since to visit any of these birds in their breeding haunts means, as a rule, a precarious landing upon some island situated in unquiet seas. He is dependent on chance, since, short of visiting the islands upon which the birds breed, he must await the hazard of stray specimens being cast ashore upon accessible mainland beaches.

The opportunity for adventure can only come to most of us at infrequent intervals: but the opportunities of chance wait upon every winter storm that sweeps our coasts. The toll of the beaches is always being added to; but there are times and seasons when wave-cast birds come ashore in unusual and surprising numbers. There have been times when the southern shores of Victoria have been littered with corpses of the local Mutton Bird (*P. tenuirostris*), and on occasions the bodies of Prions are strewn in numbers along the tide-line of many of our beaches. And, with these birds, there is always the chance that some more unfamiliar Petrel has come, wind-blown and wrecked, among the jetsam.

A Diving Petrel has been found at Ballarat, and a Wilson's Storm Petrel at Marshaltown, and these are the extreme advance guards of storm-driven wanderers, the rank and file of which are to be found among the wrack along our southern beaches when the storm has passed.

There is a wealth of ornithological material coming ashore upon our coasts, decomposing and being disintegrated, and so lost to science for ever. Only a little is ever preserved. Iredale, in New South Wales, Whitlock, in Western Australia, and Condon, in South Australia, have already done splendid service in gathering and preserving the toll of the beaches over limited areas. But it should be possible to achieve far more than can possibly be effected by these isolated efforts, instructive and important though their results have been.

As a rule, the Albatrosses, Shearwaters and Petrels that come ashore, wrecked in winter gales, arrive in a condition good enough for many of the purposes of science. Some are sufficiently fresh and perfect to suffice for the preparation of museum skins; for recording the colour of the soft parts, for collecting of the parasites and for making anatomical specimens. This is the ideal: that a bird should be picked up and sent to a museum within a short time of its coming ashore. Obviously this cannot always, or even often, be achieved. A fresh bird cast up by the waves runs various hazards in different localities. In certain parts of Victoria, if it is

not retrieved fairly soon after its arrival, it will almost inevitably be carried from the beach by foxes.

On one occasion I visited the coast of Western Victoria upon which an eye-witness had noted the arrival of a vast flock of Mutton Birds in a dying condition. He had seen them cast up by the waves in thousands, and strewing the beach around a headland (Point Danger), so that the shore was covered with their brown corpses. We went together to the spot a few days after the disaster. I was in search of the heads of the birds from which to prepare skulls: but I did not secure half-a-dozen heads, nor was there a single bird upon the beach. Strewn through the low bush for half a mile inland were the remains of several hundred birds, carried from the beach and torn by foxes. The whole vast flock had been carried off and distributed over the inland bush, a wing here, a body there, and nothing left whole. In almost every locality on our southern beaches a bird will not lie for long upon the wet shore before sea lice destroy its soft parts in winter or blowflies invade it in summer. But, despite all these chances, our Museums could be greatly enriched with much-needed cabinet skins if systematic efforts were made to salve fresh birds soon after their arrival at the mercy of the wind and waves.

Apart altogether from birds being picked up in such perfect condition as to be capable of preservation as museum skins, are those cast beyond reach of the waves to dry up and become natural mummies. A dried up and fairly intact bird may be just as easy to identify, to examine and to measure as a museum skin and, moreover, it may possibly be prepared as a complete skeleton. Short of complete fresh birds and complete dried up birds, there are the decomposing remains that may be found on most beaches. Of these there is always something of value to ornithological science. The head may be more or less intact, and a skull may be prepared. The whole corpse may retain enough feathers for identification, and parts of the skeleton may be secured. There is little or nothing of a wave-cast member of the Tubinares that is not of use to the ornithologist whose interest in avian structure is not limited to feathers.

With these ideas in view, I have attempted to secure correspondents in various places along our Victorian coastline. Mr. A. H. Chisholm has given generous publicity to this scheme, and through his agency I have received some valuable help. For the purposes of the present communication, I will limit myself to the results achieved by co-operation with my oldest correspondent in Victoria, who has undertaken the patrolling of a comparatively short line of shore in Western Victoria. During the last few years I have received from this source material from which I have prepared 120 perfect skulls of *Puffinus tenuirostris*, as well as other parts of the skeleton and numerous spirit specimens. Of the New Zealand

Muttonn Bird (*P. griseus*) I have obtained 12 skulls and part specimens, as well as spirit-preserved whole birds. The Fluttering Shearwater (*P. gavia*) is represented by five fresh birds, one skull and one skeleton. Of the Albatrosses, the Black-browed Albatross (*D. melanophrys*) is represented by the two fresh birds and six skulls and the Shy or White-capped Albatross (*D. cauta*) by eight fresh birds and eight skulls.

Of the White-headed Petrel (*Pterodroma lessoni*), I have received three decomposed specimens, from which skulls and part-skeletons were prepared, and of the Great-winged Petrel (*P. macroptera*) one decomposed bird. Two heads of the Giant Petrel (*Macronectes giganteus*) produced perfect skulls, and two examples of the Cape Pigeon (*Daption capense*) provided skeletons. Prions of various types have provided one skin, over forty skulls, and several spirit specimens; and the Diving Petrel (*Pelecanoides urinatrix*) is represented by two skins, half a dozen skulls, and several spirit specimens. This is the toll of the beaches as it has been gathered by the efforts of a single correspondent in a very limited area of the southern coast of Victoria.

EXCURSION TO TOOLERN VALE AND COIMADAI

The Club excursion to the Toolern Vale Sanctuary was held on November 17, under favourable weather conditions. Dr. J. Mauritzon, of the Lund University, Sweden, accompanied the party.

The principal object was ornithology, and several species of birds, with nests, were noted. Rufous Whistlers were reported by Mr. Davey to be very numerous this season, and their song constitutes a happy feature of the Sanctuary; several pairs were seen, and one nest under construction.

Other species noted were: Yellow Robin (nest), Speckled Warbler (with young), Yellow-tailed Thornbill (two nests), Orange-winged Sitella (nest), Grey Fantail (nest), Grey Shrike-thrush (nest), White-eared Honeyeater, Brown-headed Honeyeater (nest), Yellow-winged Honeyeater (nest), White-browed Babblers (several used nests).

Owing to shortage of time, the party was unable to visit the more remote parts of the Sanctuary, where nests of Spotted Pardalote, Striated Thornbill, Mistletoe Bird, Brown Thornbill (nest has two entrances), Kookaburra, Tawny Frogmouth, Grey Currawong, Goshawk, White-winged Chough and numerous Blue Wrens are under observation.

Mr. Davey mentioned that a Kookaburra recently was seen to dive into a garden shrub and carry off to a nearby tree a bird, which it beat against a bough for several minutes to remove the feathers. Upon being called, Mr. Davey seized his gun, crept swiftly behind some shrubs, and fired into the thick foliage close behind the Kookaburra. The surprised bird dropped its victim and fled to another tree. Upon alighting it began to "laugh." It was found that the victim was a mature Yellow-winged Honeyeater, a very active bird. Probably it had been pounced upon by the Kookaburra while bathing in the dew-laden foliage of the shrub.

Later in the afternoon we visited West Coimadai, where Mr. W. H. Nicholls conducted us to very good botanical collecting grounds. A fine sight was acres of Daphne-Heath (*Brachyloma daphnoides*), interspersed with Tantoun (*Leptospermum flavescens*), in full flower. Among the orchids collected were the Duck Orchid (*Caleana major*), Brownbeards (*Calochilus Robertsonii*), Ruddyhoods (*Pterostylis pusillus*) and the Wax-lip (*Glossodia major*).—S.R.M.

NOTES ON SOME UNUSUAL COLOURINGS IN ORCHID FLOWERS

By THE REV. H. M. R. RUPP, Raymond Terrace, N.S.W.

1. *Diuris punctata* Sm.—Yellow-flowering form. The Rev. E. Norman McKie, of Guyra, on the New England tableland, sent excellent specimens of what I was at first disposed to regard as a new species of Diuris, found on Mr. T. P. Skinner's property, "Green Valley," Guyra. Critical examination, however, proved that in every morphological detail of importance the flowers conformed perfectly to the type of *D. punctata*. The following is a description of the colouring: Dorsal sepal and petals canary-yellow, the elongate lateral sepals green. Dorsal sepal veined on the lower half of the inner surface with purplish veins. Petals on purplish or purplish-brown claws. Labellum chrome yellow, with a few minute brown spots about the two parallel ridges

I recollect many years ago finding the heliotrope *D. punctata* in western Victoria, with a strong and delicious perfume. In New South Wales I have never yet found it fragrant, though it is common in many districts. But immediately I opened Mr. McKie's parcel, the perfume of Mr. Skinner's yellow flowers recalled to mind that of the Victorian *D. punctata*, which I had not collected for forty years.

2. *Dendrobium linguiforme* Swz.—Yellow-flowering form. This came from Mr. F. Fordham, Brunswick Heads, Northern New South Wales. The type has white flowers, and I had never previously heard of any variation. Mr. Fordham sent flowers only in 1935, and these were bright yellow. In 1936 he gave me a small plant, which bore one raceme: the flowers, however, were very much paler than those of 1935. The variety came from the Casino district.

3. *Dendrobium Beckleri* F.v.M.—Lilac flowers. This also reached me from Mr. Fordham. Typically the flowers are whitish or pale green, with purplish veins on the segments; labellum white, with crisped bright purple margins. Mr. Fordham's flowers are pale lilac, marked as in the type. Mrs. C. A. Messmer, of Lindfield, states that this year (1936) she noticed a few individual flowers on her bush-house plants with this lilac tint.

4. *Bulbophyllum Elisae* F.v.M.—Dark brown flowers. Mr. F. A. Weinthal, of Roseville (Sydney), sent this from the Dorrigo forests. The normal colour is vivid green

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The Committee of the Field Naturalists' Club of Victoria invites members of kindred societies who may be visiting Melbourne to attend the Club's meetings.

BIRD NOTES FROM SPERM WHALE HEAD

Since 1924 I have endeavoured every four years, during the month of September, to make special observations on the bird life in the Lakes, National Park, and adjacent areas at Sperm Whale Head. The object in view was to ascertain the following data: (1) the average number of species to be seen each day during the first week in September; (2) the total number of species to be noted for the week; (3) the number of days during the week on which each species is noted; and (4) the total number of species to be observed during the month. Thus, from these records it is possible to judge, with a reasonable amount of accuracy, whether any particular species or bird life generally is decreasing or otherwise.

A reference to the result of my observations up to 1928 was published in the *Victorian Naturalist* (June, 1929, Vol. xlvi., No. 2). In September, 1932, I was, unfortunately, absent from the locality, so the following year an attempt was made to carry out the necessary observations, but I was unable to complete them. This year (1936), however, there has been favourable opportunity for making a further record, the result of which is most gratifying, in that it indicates that bird life on the whole is being fully maintained in the locality. This fact is revealed by the following comparative figures:

	1924	1928	1933	1936
Total number of species seen during week	56	53	50	51
Most seen on any one day	37	34	32	34
Daily average during week	29	28	26	28
Total number seen during month	71	72	*—	76

*Incomplete.

It is pleasing to report that some of the smaller birds, rarely seen or were not recorded in 1933, are now much more in evidence; among these are the Willy Wagtail, Grey Fantail, Striated Thornbill, Spinebill Honeyeater, Red-tipped Pardalote, and the White fronted Chat. Notable among "absentees" are the Brown Flycatcher and the Yellow-tailed Thornbill; the latter species, once commonly seen, has not been recorded for many years; its complete disappearance is unaccountable. Most water-birds are apparently holding their own; these include the Black Swan, Silver Gull and Caspian and Crested Terns. Cormorants, perhaps, are rather too numerous—at least, that is the contention of the local fishermen.

An interesting fact is the recording, this year, of the beautiful White Egret on five days during the week, whereas it was not included in previous lists. Of ducks, the Australian Teal and Mountain Duck predominate, the latter being on the increase; nests or young broods of both species have been seen, this season, on swamps and waters at, or adjacent to, Sperm Whale Head. Other nests observed in the vicinity of swamps were those of the Black Swan, Spur-winged Plover and Black-fronted Dotterel; previously

a nest of the last-named species had not been reported from the locality.

Newcomers recently recorded are the Australian Spotted Crake and the Little Grebe. The presence of Crakes had been suspected, and confirmation was made possible through the discovery of a freshly-killed specimen—a Butcher-bird's quarry—fastened in the fork of a swamp paperbark. Three introduced birds are definitely on the increase

The Starling is multiplying rapidly, and is likely to become the commonest species of the open-timbered country—at the expense, I fear, of certain indigenous birds; already it has been noticed that hollow limbs, formerly used as nesting-sites by Diamond Birds, Parrots, etc., now are occupied by Starlings. The Blackbird first appeared at Sperm Whale Head about 1921, when it was erroneously recorded as the Spangled Drongo. Its loud calls and mimicry are now quite often heard in the bush, so evidently it has come to stay.

Though not a resident species, the Goldfinch has, of late, been more frequently seen, sometimes in flocks of thirty or more; its movements are influenced, chiefly, I think, by food supply.

The House Sparrow is seen only occasionally, though it is plentiful at Paynesville township, four miles across Lake Victoria; obviously, conditions here are not to its liking—a fact which, I venture to say, will not give cause for any feelings of regret.

Paynesville. FRED BARTON.

MALLEE IN THE NORTH-EAST

I believe that no record has been published of the existence of any specimens of Mallee in the north-east of Victoria, though it is known that *Eucalyptus viridis* grows very near Rushworth.

Some years ago I was much interested to learn from my brother-in-law, Cr. W. Frederick, of Ciniambo, near Dookie, that there is a considerable quantity of mallee in the Gwangardie hills, about ten or twelve miles from Violet Town, and including a few specimens on the Violet Town-Nalinga road, which I had, at a little distance, mistaken for specimens of *Acacia pycnantha* of spindly growth

On September 22, 1936, guided by Mr. Frederick, I visited a spot a few miles to the east of that mentioned above to see and measure some of the timber, which I had been told was unusually large.

The site was a stony hill where grew *Eucalyptus melliodora* and *E. polyanthema*, *Acacia pycnantha* and *A. acinacea*. A few flowers were in bloom: *Caladenia carnea*, *Glossodia major*, *Lissanthe strigosa*. *Veronica perfoliata* was plentiful, but it was only in bud.

Some mallee (*E. viridis*) was growing by the roadside and we took some measurements, as follows:

No. 1—Girth at 18 inches was 36 inches; height about 35 feet.
No. 2—Girth a little less; height about 40 feet
No. 3—Girth at 18 inches was 24 inches. This had fallen and measured 34 feet.

In an adjoining paddock there were many mallee trees, not growing densely, however, over an area of several acres.

We measured the girth of several and estimated the height, using a 24 foot fallen sapling to aid us. Following are the measurements:

Girth at 4 ft.	*Estimated Height*
1. 3 ft. 5 in.	46 ft.
2. 2 ft. 5 in. (without bark)	50 ft. 6 in. (fallen and measured)
3. 3 ft. 8½ in.	57 ft.
4 5 ft. 7 in.	(Not recorded)
5. 5 ft. 0 in.	55 ft.
6. 5 ft. 9 in.	60 ft.

I did not think to make any estimate of the average size, but from memory I should say that most of the trees were over thirty feet in height, but as a rule much more slender than any of those actually measured.

—A. W. R. VROLAND.

Note.—It is doubtful if the presence of *Eucalyptus viridis*, the Green Mallee, in the north-east of Victoria, has hitherto been brought under notice. It is a locality where one hardly expects to find mallee vegetation. Throughout Victoria, however, there occur sporadic and sometimes fairly extensive patches of mallee eucalypts as, e.g., in the approach to the Werribee Gorge, the Whipstick Scrub from near Eaglehawk to Kamarooka, the vicinity of Rushworth, and the scrub north of Inglewood. A mallee congener, *E. Kitsoniana*, Gippsland Mallee, is found on the isthmus north of Wilson's Promontory, and a specimen was obtained south of Sealers' Cove.

There are, no doubt, other patches here and there away from the usual mallee habitat in the north-west, and the question arises whether these isolated clumps are residual plants from a remote period when mallee vegetation had a much more extensive range towards the centre and south of Victoria: or are they, as is possible, intrusive migrants from the north-west district.

It would appear from the data furnished by Mr. Vroland that, under favouring conditions of soil and rainfall some mallee eucalypts assume a more robust habit of growth and a more definite arboreal character than is customary in the dry north-western areas.

In the cases specified it would be of interest to know if the characteristic root system, of which *Eucalyptus dumosa* is a typical example, undergoes modification with the increased height and girth of the trees.—C.D.

EXCURSION TO KINGLAKE

The Cup Day (November 3) excursion to Kinglake attracted an attendance of thirty members, the weather being particularly fine. Mr. and Mrs. A. A. Brunton kindly placed their week-end cottage, situated on the Sugar loaf Road, at the disposal of the party and this was made headquarters for the day. Walks were taken to the gullies on Mr. Brunton's property, and also to the beautiful but little-known Mason's Falls in the Kinglake National Park. One of the outstanding sights of the day was the large areas of the Rosy Heath Myrtle (*Baeckea ramosissima*), in full flower, the colour varying from deepest pink to nearly white.

Many other wild-flowers were observed: the Gorse Bitter Pea (*Daviesia ulicina* var. *ruscifolia*), the Handsome Flat Pea (*Platylobium formosum*), the prickly Parrot Pea (*Dillwynia juniperina*) and the Creeping Grevillea (*Grevillea repens*), being particularly fine. Among the orchids collected were the Common Bird Orchid (*Chiloglottis Gunnii*), Pink Fingers (*Caladenia carnea*), a beautiful colour form of a new National Park record in the Early Caladenia (*Caladenia praecox*) and *Calochilus Robertsonii*, commonly known as Brownbeards.

—L.W.C.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, December 14, 1936. The President, Mr. S. R. Mitchell, presided, and about 100 members and friends attended.

CORRESPONDENCE

From Miss Raff, thanking members for their expression of sympathy in her recent bereavement.

From Mr. F. A. Cudmore, thanking the Club for the sympathy extended to him in his bereavement.

From Mr. Edwin Ashby, thanking the Club for copies of the *Naturalist* sent him to replace those lost in fire some time ago.

REPORTS OF EXCURSIONS

Reports of Excursions were given as follow:—Heathmont, Mr. F. S. Colliver, for Mr. E. Wilson; Beaconsfield, Mr. A. S. Chalk; Eltham, Mr. Chalk, for Mr. Tonge: Hobson's Bay, Mr. G. N. Hyam.

ELECTION OF MEMBERS

On a show of hands, the following were duly elected as Ordinary Members of the Club:—Miss M. Ferguson, Mr. L. W. Langford, and Mr. G. O'Neale.

PRESENTATION

The President, on behalf of the Committee, presented to Mr. C. J. Gabriel a bound copy of *Victorian Shells*, as a token of appreciation for his valuable work.

Mr. Gabriel, in thanking the Committee, referred to Miss Joyce Allan's invaluable help. Her drawings of shells were perfect.

The President stated that a copy had also been bound for presentation to Miss Joyce Allan.

The President announced that the Committee had decided to present to each member who had joined since May last a Club badge.

The President then extended the season's greetings to members, and the Secretary responded on their behalf. The meeting was adjourned for the Conversazione, and supper was served in the downstairs room. This pleasant innovation was fully appreciated.

EXHIBITS

Mrs. M. E. Freame.—Specimens taken on the Club's dredging excursion, including Bubble Shell (*Philine angasi*), Chitons, Pillbugs, Sea Squirts, Ghost Shrimps, Scale Worms, Crabs, Sandhoppers, Barnacles, Worms, etc. Also Hermit Crabs, Prawn and complete carapace and other marine specimens.

Mrs. C. Barrett.—Snake Flower Orchid (*Cymbidium suave*), from N.S.W. Specimen grown in glasshouse.

Mr. C. Barrett.—Growing plant of the Moonwort (*Botrychium lunaria*), received from Mr. H. Morgan, Cobungra, Victoria.

Mr. A. Cornish.—Fairy Penguin, found on Anglesea Beach, and head of Dog Fish, found on Hampton Beach.

Mr. E. S. Hanks.—Timber of commercial "Sandalwood"; also portion of water-bearing root of *Eucalyptus oleosa* (Oil Mallee), from Iron Knob, S.A.

Mr. C. J. Gabriel.—Marine Shells. *Chlamys glaber*, Linn, to show varieties; specimens from the Mediterranean; also *Dacosta australis*, Sow. from N.S.W.; *Gastrochaena tasmanica*, T. Woods, from Victoria; and *Humphreyia strangei*, A. Adams, from Victoria.

Mr. S. R. Mitchell. Precious and common Opal, opalized wood and opalized shells, from White Cliffs and the Stewart Range, S.A.

Mr. C. French.—Copy of Dr. John E. Gray's *Lizards of Australia and New Zealand* (London, 1867), a rather scarce publication.

Mr. Brunton.—Fossils, trilobite and coral, from Kinglake, Vic.

Mr. F. S. Colliver.—Specimens of the oldest land plant in the world (*Baragwanathia longifolia*), Lang and Cookson. This is an Upper Silurian fossil from the 19-Mile Quarry on the Yarra track, and the age was determined by the associated Graptolites.

Mr. Ed. E. Pescott.—Flower of *Dais cotinifolia* (Thymeliaceae), the South African Daisy bush, exhibited to show close affinity with the Australian *Pimelea*; flowers of *Elaeocarpus reticulatus* (*cyaneus*), the "Blueberry Ash" (cultivated), native to Eastern Australia; flowers of *Sarcochilus Fitzgeraldi*, F. v. M., the "Wedding Orchid," Tambourine Mountains, Queensland (cultivated); water-colour drawing of *Moloch horridus*, the "Devil Lizard," by Miss Rosa Fiveash; book, *The Entomology of Australia*, by G. R. Gray, 1833, showing coloured plates of *Phasma*.

POLLINATION OF CALLA LILY
(*Zantedeschia aethiopica*)

BY EDITH COLEMAN

The so-called "Arum" or Calla "lily" of cottage gardens (*Zantedeschia aethiopica*) is out of fashion, but garden lovers who have seen its pollination will always find space for a plant. Though resembling an Arum, the Calla lily is not a pitfall inflorescence, as it is so often described. The minute florets are pollinated, according to the best floral traditions, by Hive Bees (*Apis mellifica*), which visit them for their abundant pollen.

The apparently obvious explanation of certain structures frequently proves erroneous. Each genus appears to be the embodiment of highly original and ingenious adaptations, which secure pollination.

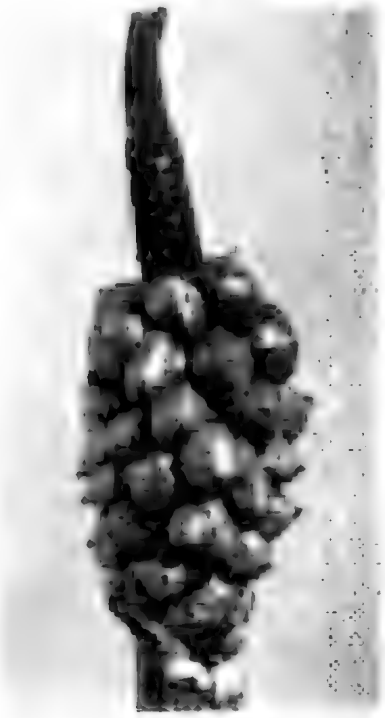
Upper patim of spadix of Calla Lily, bearing male florets withering, and ovaries swelling.

Zantedeschia is no exception to the rule. I have seen nothing more impressive in flower pollination than the busy "Deborahs" moving swiftly over an orange-coloured spadix, scratching away at white heat in order to pack a few more grains on baskets (corbiculæ) already banked high with pale yellow pollen.

In *Zantedeschia* the petaloid spathe is chalk-white, not green, as in *Arumitalycum* (described *T.N.*, Jan., 1936). Seeing its dazzling purity in sunshine, one cannot doubt that it serves to signal the willing bee, and, one assumes, from a considerable distance. Male and female florets are borne on a fleshy spadix. There is no sterile terminal portion, the florets covering the whole of the spadix.

At the base are sessile, funnel-shaped female florets, with, scattered among them, a few infertile, ovate male florets. The

female florets, carpels merely, have neither petals nor sepals. Each one terminates in a white, glandular stigma, which is cushion-shaped until pollination takes place, or until the close of its period of receptivity, after which the rounded, stigmatic disc sinks, forming a shallow cup. The rest of the spadix, right to the summit, is covered with crowded, much-flattened, sessile stamens, the anthers dehiscing by minute apical pores.

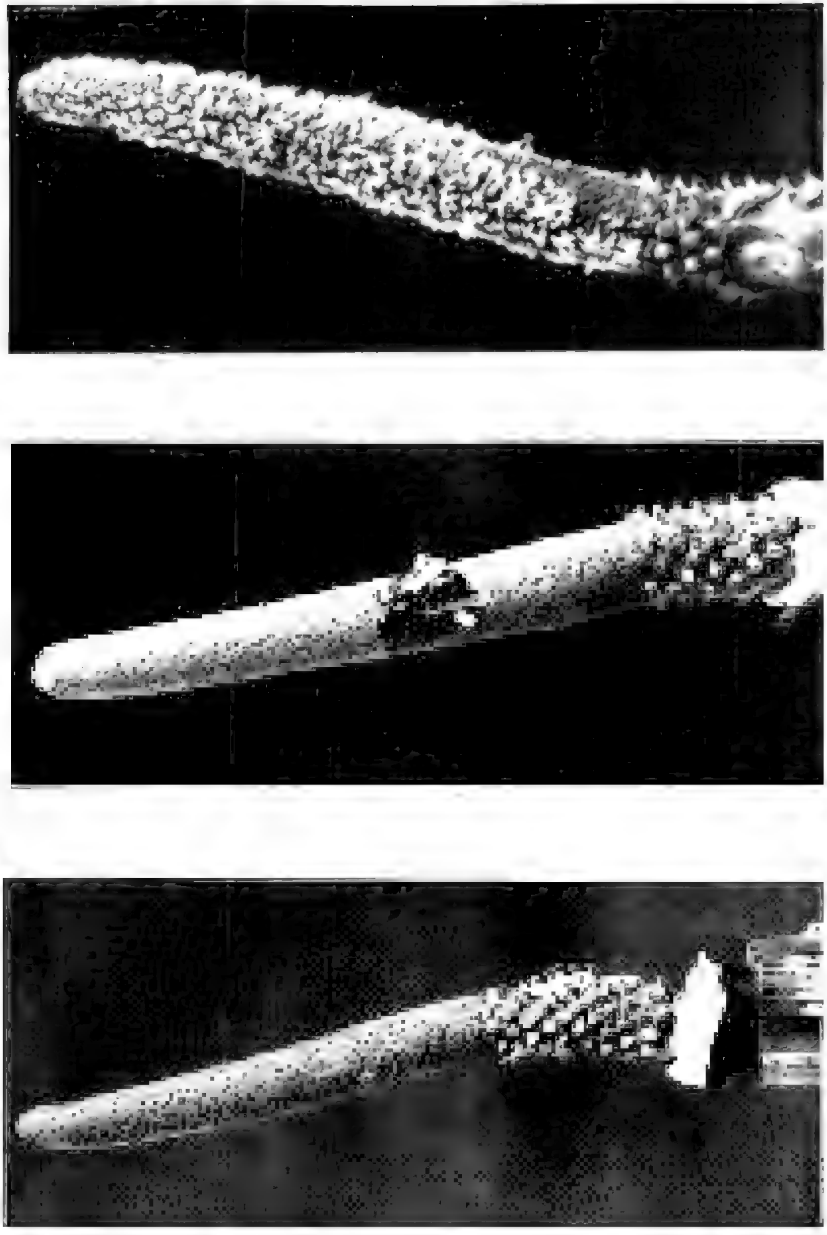


Ripe fruits of Calla Lily, showing efficiency of the pollination.

The pollen of most flowers is discharged *en masse*. In *Zantedeschia* a grain at a time is emitted from each tiny pore until the whole of the stamens are veiled in pale pollen. One may rob the bees of a spadix. Let it lie for a few days to see the shedding of pollen, which lies in wavy lines, like fine sugar. Without the bees, pollination would be impossible, for male and female florets are effectively separated by their periods of maturity. Though no pollen is produced by the sterile male florets, interspersed among the carpels, bees traverse the whole spadix, thus pollinating receptive female florets with pollen collected on their hairy legs and under-surface. I have seen four bees in a spathe at one period, each with corbicula piled high. One may see a bee hover about a spathe while she packs more closely her rough masses. She will then re-enter the spathe for yet a little more of the precious dust before flying to the hive. It is a pretty sight to see the busy brown workers on a vivid orange spadix, against which the baskets of pale pollen show so clearly.

When pollen is abundant, the bee makes orange-coloured paths as she works up and down the heavily-powdered spadix. Burdened with great, rough masses, often nearly as large as her abdomen, she is forced to alight on leaf or spathe while she packs it neatly into her baskets, otherwise her flight must be greatly hampered. I have watched bees at work on the Calla lilies from 7 a.m. until dusk, always confining their activities to these plants while

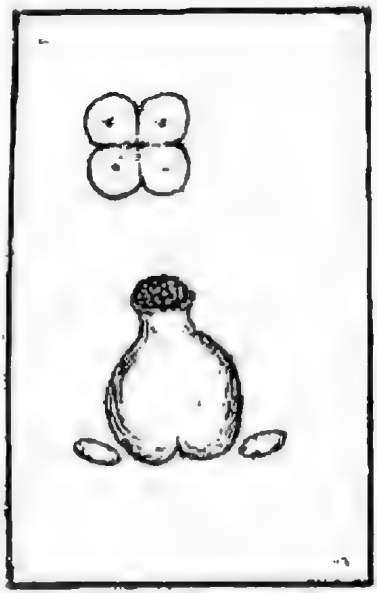
Plate XIV



pollen is plentiful. Only once have I seen a bee on a spadix with pollen of two colours in her baskets. It was late in the afternoon. I assumed that, having exhausted the pollen of flowers upon which she had been working, she came to the Calla lily to complete her load, reluctant, no doubt, to return to the hive with half-filled baskets.

When dehiscence of the anthers commences, the single grains are hardly visible to the unaided eye; yet one may see her alight, with empty panniers, and, next moment, the foundation of her load is laid! One is impressed by her infinite patience in collecting pollen grain by grain, and of such minuteness. Later, when the stamens are veiled in an abundance of pollen, she is just as expert in dealing with it. The grains have a very adhesive exine, so that they cling together, a feature which facilitates packing into baskets. They are thus never dispersed by wind, nor are they adapted to dusting insect bodies. They must be consciously removed by their patient collaborators.

The flowering of *Zantedeschia aethiopica* covers a lengthy period. The spathes are visited by bees until pollen is exhausted. Certain small insects find the florets attractive, but, as they appear to die within the spathe, even though the passage is wide enough to permit their escape, they cannot be regarded as "official" pollinators. I have examined a number of them under a lens. None of them bore pollen on its body. They are exquisite little creatures, and, if removed from the spadix, are very active. Some have been sent to Mr. J. Clark for an opinion concerning the object of their visit to the spathes. They appear to be interested in the infertile male florets, which probably provide palatable tissues. A leaping spider frequents many spathes, and finds in the small insects an easy prey. The fruits do not invite dissemination by birds. They make no advertisement, but remain hidden within the spathe until they become swollen and burst the convo-



Above: Much-flattened male florets (sessile stamens merely), with minute apical pores. Viewed from above. Below: Female floret (carpel), with rounded glandular stigma. Two infertile male florets also shown.

lated portion of it. Sometimes the stem bends, just below the spadix, and ripe, yellowish fruits fall to the ground, or are cast out by the wind.

Though pollination is invited, increase is not dependent upon seed. A creeping rootstock, as every gardener knows, makes the Calla lily a very successful competitor for space. It is frequently found as a garden escape. In the south-western corner of Western Australia I saw acres of land covered with beautiful specimens. Mirrored in every pool and the rivers they fringed, they made a delightful picture.

KEY TO PLATE XIV

A. A spadix, showing (below) female florets with pollen on stigmas. Male florets (above), just mature, and shedding pollen a grain or two at a time. B. The same spadix, turned round, nineteen days later, with stigmas withered, pollen clinging in masses. C. A spadix showing bee with pollen baskets partly filled. The masses will be smoothed, and more pollen added. Pollen emitted a grain or two at a time, from minute apical pores, is gathered with infinite patience.

EXCURSION TO ELTHAM

The morning of November 28 was very hot and oppressive, and only eight members, including the leader, took part in the excursion to Eltham. In the afternoon the wind changed to a cool southerly, making conditions more pleasant for the outing. "Bird life" was not so plentiful as we could have wished, much of the timber having been cut out, disturbing the nesting of many birds. However, several nests containing eggs or young were noted, including one of the White-plumed Honeyeater, and one of the Brown Flycatcher. Among the birds seen and heard were, Sacred Kingfisher, Rufous-breasted Whistler, Bronze-winged Pigeon, White-winged Triller (one of the male birds was busy building a nest in a Box-tree), Scarlet Robin (and young Robins out of their nests), Grey Thrush, Thornbills, Pardalotes, Cuckoo-Shrike, Olive-backed Oriole, Wattle-birds, Grey Fantail, Rufous Fantail (a male), Yellow Robin and Dusky Wood-swallow. A Tawny Frogmouth was seen sitting on its nest, containing a young bird about five weeks old, the other having left the nest on the previous day.

W. C. TONGE.

THE MELBOURNE BOTANIC GARDENS

A large party attended the excursion to the Melbourne Botanic Gardens on Saturday, October 24, and were favoured with perfect weather conditions. Mr. P. R. H. St. John, a former President of the Club, conducted the party through the gardens, pointing out many interesting features that are often overlooked by the casual visitor. The nursery, propagating houses and heated glass-houses were also visited, the leader explaining the various functions and methods adopted in each. Mr. St. John also gave a short talk on the correct naming of Australian plants, pointing out several cases where the present names are incorrect. It is interesting to note that nearly all of the trees in the Australian Section were planted by Mr. St John himself, during his connection of over forty years with the staff of the Gardens.

The thanks of the members are due to Mr. St. John for his kindness in giving up his Saturday afternoon for their pleasure and education.

—L.W.C.

FOSSIL LOCALITIES IN AND ABOUT MELBOURNE

By F. S. COLLIVER

PART II—BEAUMARIS

To reach this locality other than by motor car, it is necessary to go by train to Sandringham, by tram to Black Rock, and then by motor bus to Beaumaris, alighting at the Beaumaris Hotel. The best collecting grounds are the cliffs and the beach for about 100 yards on either side of the boat sheds.

All the cliffs in this neighbourhood are composed of Tertiary sands and clays, and at several places between Hampton and Mentone, small fossil patches occur; but the richest place by far is Beaumaris, which is well known for the abundance of a fossil Heart urchin (*Lovenia forbesi* T. Woods) and the number and variety of fossil sharks' teeth that have been found there.

On the Melbourne side of the sheds, the cliffs are practically vertical, and a layer of some of these Heart urchins some feet wide will be noticed extending for a considerable distance around the cliffs. Many perfect examples can be picked up on the beach. Just below this *Lovenia* band will be seen a layer of a large white bivalve shell (*Dosinia* sp.); these unfortunately are too chalky to collect; but it is possible to obtain fairly good casts and impressions.

Other types of Sea-urchins—a flat, so-called "Biscuit" species (*Arachnoides australis* Laube) and *Clypeaster gippslandicus* McCoy are also found here, but much more rarely. In searching over the shingle, however, many small triangular fragments, not unlike teeth in appearance, may be found; these are sections of the Biscuit urchin (*Arachnoides*).

Possibly the best-known fossils from this locality are the sharks' teeth. At one time it was possible to dig them from the cliff face, where they occur in a nodule bed. This section is now almost inaccessible owing to a cemented wall being built over the more easily-worked beds. A search among the shingle, however, should yield some examples. They are rarer than they were, but never yet have I failed to obtain a few specimens.

Most of these look like teeth; but some, that once belonged to an ancestor of the Port Jackson Shark (*Cestracion cainozoicus* Chapman and Pritchard) are not unlike small beans, and are not really teeth, but crushing plates.

Besides the sharks, many other genera of fish are represented, and teeth, lower and upper jaws, etc., of Porcupine fish (*Diodon*), Elephant-fish (*Edaphodon*), Stingray (*Myliobatis*), Wrasse (*Labrodon*) etc., are not uncommon.

The mammals are represented by teeth, ear bones (*Cetotolithes*) and skeletal bones of whales, and also teeth of seals. The teeth are rare but whale bone fragments, and sometimes vertebrae, may be picked up on the beach, particularly after heavy seas.

Mollusca are here also, but with the exception of Oysters (*Ostrea*) and some of the more resistant types, they are only obtainable as casts and impressions; fossil Crabs (complete ones rarely) in fragments are common; and barnacles are further trophies to be obtained.

One must be a careful collector in this locality as several different series are well represented.

With respect to the fossils mentioned up to this stage, I have been dealing with those suggested to belong to the Kalimnan series only.

On the beach there are numerous rolled fragments of a white limestone, and fossils, mostly casts and impressions, but sometimes the actual shells, brachipods, polyzoa, and sharks' teeth may be found in them. These are definitely older, and are referred to the Balcombian series, the series name coming from Balcombe Bay, Mornington, where similar fossils, both in type and assemblage, are preserved in a blue clay. Again, similar fossils are to be found in the previously mentioned (Part I) lower Tertiary beds at Royal Park cutting and Muddy Creek.

One of our Club members, Mr. F. A. Cudmore, has discovered these blue clay beds *in situ*, at Beaumaris. They occur under water, well out from the beach, and are only accessible at low tides. These clays contain the white limestone nodules with the casts and impressions which are found on the beach, as well as the other typical fossils of the series, including a fair series of sharks' teeth, and it is believed that the teeth with the bluish stain that are found on the beach came from this clay and are thus referable to the Balcombian and not the Kalimnan (nodule bed) series.

Yet another age is represented at Beaumaris as will be seen from the following: In 1897, Hall and Pritchard (*Proc. Royal Soc. Vic.*, vol. 10, p. 57) recorded a fossil marsupial tooth from the shingle on the beach. The specimen was submitted to C. W. De Vis, who suggested that it belonged to "*Palorchestes*," a genus of gigantic kangaroid animals, and therefore it seems possible that this specimen came from a still higher bed which may be referred to as of Pliocene age.

So at this locality we may collect fossils from three distinct ages, the Oligocene, Miocene and Pliocene, or, as sometimes stated, the Eocene, Miocene and Pliocene.

Before leaving the district it may be well to note the conditions of weathering and of erosion for this part of the Melbourne foreshore. The cliffs here are composed mainly of sands and clays, and as such they offer little resistance to the action of the weather, in fact "atmospheric weathering" goes on far more rapidly than the "sea's erosion," which is proved by the cliffs themselves, as they incline backwards from the shore. Yet generally the sea is blamed for the cliffs falling. Here, and elsewhere, too, far greater

damage is done by the destruction of the natural vegetation, thus allowing the weather full play on the soil.

To the beginner at fossil hunting, it is suggested that all strange things be collected; objects of no value can be thrown away later. The writer well remembers his early days of collecting fossils, and remembers, too, that some specimens now known to be of particular interest were passed over through lack of knowledge.

The following is a list of the commoner fossils from Beaumaris, and the majority of these should reward the earnest seeker for a few hours' work.

BALCOMBIAN SERIES (mainly as casts and impressions)—

Mollusca (Gasteropods)—
- *Cerithium apheles* T. Woods
- *Voluta antiscalaris* McCoy
- *Cypraea* spp.
- *Conus* sp.
- *Cassis* sp.
- *Turritella* sp.

Polyzoa—
- Various spp.

Mollusca (Bivalves)—
- *Cucullaea corioensis* McCoy
- *Barbatia celleporacea* Tate
- *Spondylus pseudoradula* McCoy
- *Limopsis* sp.
- *Glycimeris* sp.
- *Leda* sp.

KALIMNAN SERIES—

Mollusca (Gasteropods)—
- *Liopyrga quadricingulata* Tate
- *Cancellaria wanmonensis* Tate
- *Tylospira* sp.
- *Ancilla* sp.
- *Natica* sp.
- *Turritella* sp.

Mollusca (Bivalves)—
- *Placunanomia ione* Gray
- *Ostrea arenicola* Tate.
- *Ostrea manubriata* Tate
- *Ostrea ingens* Zittel
- *Limopsis* sp.
- *Glycimeris* sp.

Polyzoa—
- Various spp.

Crustacea—
- Crab fragments.
- Barnacles

Fishes—
- *Isurus hastalis* Ag.
- *Lamna apiculata* Ag.
- *Cestracion cainozoicus* Chap. and Prit.
- *Odontaspis incurva* Davis
- *Myliobatis moorabbinensis* Chap. and Prit.
- *Diodon formosus* Chap. and Prit.
- *Edaphodon sweeti* Chap. and Prit.
- *Labrodon confertidens* Chap. and Prit.

Brachiopods—
- *Magasella compta* Sow.

Echinoderma—
- *Lovenia forbesi* T. Woods
- *Monostychia australis* Laube

Mammalia (Whales)—
- *Scaldicetus macgeei* Chap.
- *Setotolithes* sp.
- Sundry skeletal bones

Mammalia (Seals)—
- Odd teeth

THE TASMANIAN NATIVES' STONE IMPLEMENTS

By W. H. GILL (Melbourne)

There exists a very large and definite series of stone implements connected with the many tribes indigenous to Tasmania. Each stone tool was apparently evolved from a distinct type, and presumably was made and used for a special purpose.

It is most difficult to understand why such a large series of types exist, more especially when it is known that the tribes found by white men possessed only two rough wooden weapons and a wood fire-drill. The problem, then, is to discover why so many types of implements were made and what they were used for. The object of this paper is to raise discussion upon this mystery.

A theory has been advanced that a survey of the whole field of Tasmanian stone culture would prove that there either existed a previous race of primitive man on the Island, or that the late race known to us historically retrograded on account of their long period of isolation. With no infiltration of a more virile and warlike people, they gradually became stagnant and lost their vitality and cultures. In support of these possibilities I offer the following facts:—

The Tasmanian natives had a definite series of stone implements of such character that at least two or more phases of culture are indicated.

From the earliest explorers, and up to the last of the Tasmanian race, the only evidence known of their wooden weapons, or any other objects made of wood, is that they possessed a crude spear, a simple waddie about 24 inches long, and a wooden fire-drill.

Nevertheless, they had a most elaborate series of stone implements, which may be classed into about twelve or more distinct types, with many variations in size, and they developed many types of a special character and form totally at variance with the Australian Natives' tools, and they ultimately evolved a very high and perfect technique, probably superior to the Southern tribes of Victoria.

Critical examination of any large collection of Tasmanian stone implements should prove that there exists definite evidence of changes from rough crude forms, and a primitive technique in flaking and chipping to a complete advance displaying perfection of forms highly developed in type and stone culture. This is either proof of a gradual evolution on the part of one Nation from the roughest technique to the most elaborate in forms and workmanship, or that an earlier race existed in Tasmania who were responsible for the rough and primitive cultures.

There is also to be taken into consideration the fact that a great number of the Tasmanian implements show very considerable evidence of patination both in ochreous and blue colours, and as this

question of patination is receiving much attention by English archæologists, with the object of arriving at some clear idea of the age of stone implements by the depth and colours of the patination, its importance should receive attention here.

All stone implements unquestionably were made for a definite purpose, and tradition from ancient times governed their forms and types, and as with the Tasmanian Natives there was no outside influences coming in to create new forms, or change their culture, it is fair to assume that their respective forms remained constant over long periods of time.

The Tasmanian natives displayed no evidence of creating new forms or material advance in their wooden weapons, possessing no spear-thrower to give additional length, precision or speed when throwing their spears, no shield to guard themselves, no wooden food-carriers or domestic utensils of any description, and no boomerangs. And, further, they possessed no creative ornament or carving of any description, or totemic objects of a decorative character. But there exists one curious feature in their culture that has remained constant, that is, the art of weaving, in the making of rush baskets. Is this a further evidence of an outside late culture coming in, and so connected with the race responsible for the more advanced and perfect stone industry? Or does it belong to their original culture belonging to the first comers?

Although there are also many problems connected with the unknown uses of the Australian native stone implements, the mystery attached to the Tasmanian natives' implements is still greater for the reason that they had a much larger series of the use of which nothing is known. Of their known types the following may be classed and accepted as being made and used for definite purposes:

Heavy hand axe: For cutting limbs from trees.

Medium hand axe: For notching footholes in trees when climbing, and for adzing down wood to roughly form weapons.

Scrapers: For gradually forming to shape weapons.

Convex scrapers: For finally rounding the forms of spears and waddies.

Borers: Sharp-pointed tools for boring holes.

Knives: For cutting and general domestic uses.

N.B.—No mention is necessary to include natural-formed stones used as pounders, grinders or hammers, for the reason that they are not either flaked or chipped to form an implement. While refraining from quoting extracts from the many authoritative books on the stone cultures and weapons of the Tasmanian natives, which are generally so contradictory, the following extracts are of sufficient interest to warrant attention in support of the views expressed in this paper:—

(From *Eaglehawk and Crow*, by John Mathew.)

Preface, Page x.—I demonstrated, as I had never done before, that the language of the extinct Tasmanians was the substratum of Australian

languages, leading to the conclusion that the Tasmanians were the first occupants of Australia, and settling, I hope, a question which had previously been in doubt, viz., the relations of the Tasmanians to the Australians. . . .

Page 45.—Having now demonstrated beyond all question, it is hoped, that the Tasmanians were the lineal descendants of the primitive Australian race. . . . .

Page 22.—As compared with the implements and weapons of the Continent, the paucity of these in the hands of the Tasmanians, the rudeness of the forms, and the inferiority of the workmanship suggests a difference of descent in the makers. But the lower skill of the islanders may be easily accounted for by the supposition that their progenitors had already reached Tasmania before the better-equipped race reached Victoria, and that, after the first settlement of the island, which may have been made when it was much more accessible than now, no further communication took place with the mainland. . . .

It is hardly fair to compare the weapons of the Tasmanians with those of the Australians, and from the dissimilarity to deduce absence of racial affinity in the owners, for the isolation of the Tasmanians reduced them to dependence for advancement on a very limited number of minds, and they may have made little or no progress after they crossed Bass Strait, whereas their kin on the mainland were overwhelmed by a race bringing with them superior art, which, once introduced, only faint traces of the work of the primitive inhabitants might be expected to linger on.

It is futile to ask whether all the Australian implements are represented in Tasmania. If the implements of Tasmania be also found in Australia, although of improved manufacture, that should be sufficient to justify the theory propounded herein so far as the argument from such belongings has any force.

The fact that certain weapons of the continental natives are absent from the island forms part of Mr. E. M. Curr's reasons for supposing that the Tasmanians were not of Australian descent, a method of reasoning which would lead inevitably to the conclusion that some of the Australian tribes were not of Australian descent.

If John Mathew's contention that the last race of Tasmanians were the lineal descendants of the primitive Australian race, who were gradually driven south by the new hordes that came in from the north, who crossed over to Tasmania by the original land ridge, then it seems fair to advance the theory that they found a race of people already in Tasmania, whom they absorbed, and that the earlier race are responsible for the rough and crude implements, and the late Tasmanian race known to us historically as responsible for the finer and more perfect implements.

On the other hand is the very definite conclusions arrived at by Professor F. Wood Jones, who is accepted as one of the greatest of our authorities. He declares that the Tasmanian native of our day was never in Australia, but came from overseas. Here are his words, as printed on pages 14 and 15 of his interesting booklet, *The Vanishing Australian Race*:

If the Tasmanians were to reach Tasmania dryshod they must, perforce, have come by a land-bridge in the region of Torres Strait to Australia, and from Australia they must have migrated across dry land that stretched across the present Bass Strait to Tasmania. On this supposition it has become habitual with one school of thought to assume that the Tasmanians at one

time inhabited the mainland of Australia, and from there were driven south into Tasmania by the invading Australian native.

There is not a scrap of real evidence in favour of this theory.

The Tasmanian native almost certainly came to Tasmania as a seafarer, just as the Maori came to New Zealand, and the aborigine came to Australia.

Neither of these authorities discusses the question of what the invaders found when they entered Tasmania—did they find an unoccupied island, or was another race there? Professor Wood Jones states that the Tasmanians were a true Pacific negroid.

On the hypothesis that the Tasmanian natives came to the island either by water or land-bridge, seeking a new country, the following facts are of historical interest:

If they came as a horde or family group, and not as men voyagers, then they must have brought their women with them to multiply, or, again, they came as men voyagers only and found a prior race on the island with whom they were ultimately absorbed; just as the Maoris did on their coming to New Zealand, who found there the prior race of Moriori. And the following facts are important to notice, that the Tasmanians, wherever they came from, brought with them one of the most ancient cultures connected with primitive man, the use of and anointing their bodies with the sacred red ochre—blood—the symbol of life. Also the art of weaving—the making of rush baskets. And, further, a matter of great historical value is that, in connection with their stone culture, they brought with them and retained their specialized individual stone implement types, whose forms are quite distinct, and totally at variance with any existing group types of the stone cultures of any of our Australian natives.

In connection with this important statement is offered the opinion that if these specialized types of stone implements can be traced back to their original creators in the Pacific island, or elsewhere from where the Tasmanians emigrated from, then there lies the solution of the present mystery of knowing definitely from whence they came. Thus their knowledge, customs and use of red ochre, which is in itself a single link in the chain of evidence we possess, proves that, no matter how they came, or where they came from, they knew of, brought with them, and maintained the use of throughout their long period of life, the most ancient cult connected with the life, customs and religion of primitive man.

This, at least, is of supreme importance to help prove that (along with the Australian natives) the Tasmanian natives originally belonged to some branch stock of ancient man.

The stone implements of the lost race of Tasmanian natives constitute the only evidence we possess on the subject of their antiquity. Without exception, their implements are of the Palæolithic period (25,000 years), and generally they possess certain distinct forms and characteristics, such as the "duck-bill," with its most minute chipping technique, the elliptic form of medium-size

hand-axe, the almost perfect "angle" formed implement, the blunt bull-nosed tool, and that still more mysterious stone, the perfectly round "muffin," with the edge elaborately flaked perpendicularly, of which the use is unknown.

Comparison between the most primitive types in forms, with no effort to protect the hands from injury when using the tool, and mostly only roughly flaked, without finally chipping the working edge, and those of the very many distinct forms of specialized implements establishes that there were either two distinct cultural periods, or that the primitive types represent the stone culture of one race, and the perfect types the culture of another race.

YARRA JUNCTION TO BRITANNIA FALLS

By A. J. TADGELL

On a beautiful day early in December I went for a walk out from Yarra Junction, over the verdant countryside, alone yet never alone. My destination was the Britannia Falls, about seven miles distant. I had done the walk twice previously this spring, so I knew what to expect, and I was surrounded all day by Mount Donna Buang, Little Joe, and Mt Tugwell, near which are the Britannia Falls.

I made a detour to find Orchids like *Pterostylis falcata* in a swamp, with *Thelymitra epipactoides*, and nearby, on the less wet ground, *Microtis* and *Prasophyllum odoratum*, for it is a land of swamps, good for collecting in, though not too early in spring. *Drosera binata* was here, also *Mitrasacme serpyllifolia*. This pretty, small tubular cream-coloured flowering plant has flowers so small that even a pocket lens will hardly detect the organs to allow inspection. So I sought the aid of the Government Botanist in determining it. It is so unlike its sister, *M. paradoxa*, that one must be forgiven if the family likeness is unrecognized, and it is regarded as rare and alpine, north-east. Here, at 390 feet above sea-level, it grows outside the swampy conditions, but when the soddened nature of the country has passed it will be abundant in the erstwhile swamps. A lowly, interesting plant, now recorded South.

Two Asperulas are here. This genus was revised at the Royal Botanic Gardens, Kew, in 1928, and is so difficult that experts are deceived by its connection with the Galiums. *A. Gunnii*, which I had previously found on Mt. Feathertop, at 6,000 feet, is here growing on clods of earth just above the water, and nearby in water, clinging to *Poa caespitosa* grass by its rough stems is the tall *A. europhylla*, up to 18 inches high. What a contrast in size!—the former so small as to be easily passed, and the latter so tall, refusing to be unrecognized. But I find I have delayed too long in this interesting swamp, so drag myself away from rich Utricularias, Baurias, Stypandra, tall Epacrids, and handsome *Lycopodium laterale*. I had intended crossing the Little Yarra two hours earlier, if I was to collect round the falls, still some miles distant. The old timber track passes through a long swamp, where are seen *Phragmites*, *Patersonia*, tall *Olearia ramulosa* with many black-heads containing the orange-coloured larvæ of a native fruit fly, Trypetidæ (kindly identified by the Government Biologist). The fine river is closed to fishing all the year round, as troutlets are turned into it higher up, where, even at Powelltown, ten miles distant, it is a beautiful mountain stream.

It is grass-time, so *Echinopogon*, *Microlaena*, *Aira*, *Stipa*, *Dichelachne*, *Poa*, *Danthonia* and *Calamagrostis* are profusely flowering, with *Rhytidosa*,

now *Tetrarrhena*. Although one may reach the Britannia Creek by cross-roads, one of them three miles from Yarra Junction leading to Warburton, and be landed not more than one and a half miles from the falls near Britannia House, I prefer to keep to the discarded tram-track, turning off the main road one and a half miles from the township. The iron rails have been removed from the track, and much material lies stacked adjacent to the railway line, for transmission to Japan, it is said, by way of Melbourne. There are not wanting pleasant collecting areas *en route*. *Banksia collina* is abundant, but showing traces of bad treatment by the disastrous bush fires of a year or two ago, when the whole countryside suffered severely. Tall purple heads of *Comesperma* (*Bredemeyera*) brighten the bush, with lowly Lobelias, two Pultenæas and Dillwynias are in flower. *Hakeas*, three species, and as many of *Leptospermum*, are just over.

Passing the seasoning kilns of the Hardwood Company, the now dismantled track becomes wet, rough, and is little used. Here, *Oxylobium alpestre* and *O. cliptrum* show up, but only a few flowers remain of *O. procumbens*, that was a blaze a month ago, but its flat, pendant pods are pretty with their long, thin, pointed bracts. On the banks is *Marianthus* in flower and fruit, and, flowering profusely, *Gompholobium*: its large sulphur flowers are a delight. Acacias are here abundant also, *A. dealbata, axycedrus, penninervis, verticillata, myrtifolia, diffusa, longissima, melanoxylon* have finished flowering during the past month. *A. paycedrus*, a tall shrub, like *verticillata*, some eight feet high, so different from the lowly form at Sandringham, and so much like the second species as to be regarded, the late Mr. Rodway says, as like a broad-leaved form of *verticillata*.

Innumerable graceful *Alsophila* tree-ferns revel in the mountain gully below, perhaps getting refreshment from the drifting moisture floating backward and forward with the changing winds in the mountains. It is a sign of rain to the young mountaineer if the clouds of mist blow in the required direction, and he learns to note that the Currawong leaves the heights for the lowlands when rainy weather is imminent. A feeder creek comes in on my right hand, and I note *Pomaderris, carices*, cyperaceous plants and centella, *ranunculus plebejus, Stellaria flaccida, Senecio, Gratiola*, and a very pleasant surprise, the old English scented musk (*Mimulus moschatus*).

I have now arrived at a long, steep chute on the mountain side, above me on my right, where timber was shipped down after being carried many miles on trucks from the forests beyond. The old cables and pulleys, and the large heap of sawdust, proclaim aloud what forest giants had been laid low in the past. A white board nailed to a Eucalypt on my left would tell me, if the writing were now visible, that here are the Britannia Falls. The height above sea-level is 770 feet, and the falls themselves are 150 feet from top to bottom. A fireplace indicates where the billy may be boiled, and the creek may be seen a few yards distant. One takes warning of fires from the several large clearings extending up and down the gully sides, made as fire-breaks after the sad times of the past. Nothing else indicates the falls to the stranger, so he must fossick for himself, as I had to do. A track, much overgrown, may be followed for 100 yards, and the sound of rushing water will be an indicator. But be warned, as the track is not only overgrown, but leads uphill, and unseen boulders are apt to come in the way of the unwary. A stick is of little use here. After being painfully struck on the knee-cap, and feeling it bleeding, I rolled over heavily, and was glad to rise and recover from my shock, sitting down the while. I follow up and down stream but the banks are overgrown, and large rocks impede progress and make climbing difficult. This is the source of the Yarra Junction township water supply, and the Trust has laid large pipes running from the dammed-up creek, first to the filtering basins, in the ground, to direct the water to the distant households.

Close to Britannia House, and for at least four miles beyond, a nicely-graded road, usable for motor traffic, has been constructed, which runs across a newly built bridge. This passes above the timber chute near the falls, and provides a delightful return journey, though the walk may be continued much further, till some huts are reached, that Boy Scouts have permission to care for and control. A local movement has been on foot for the preservation of the old bridges running along the track, so that firewood might not be made of the bridge material, and in many places, without the corduroy-like flattened timbers, much of the track would be impassable, as I found in the wetter part of my earlier spring visits. The nicely-graded road back this way is delightful to the walker, whether botanist or hiker. The festooned Clematis-covered trees are refreshing, as the broad road passes over the gullies, sometimes on one side, and at times on the other side of the shady, verdure-clad hillsides.

A freak specimen of Indian Pennywort, *Hydrocotyle (Centella) asiatica* was collected, altered by environment from a terrestrial to an amphibian plant. Usually this plant grows in damp situations, and has dark green, thick leaves, toothed and sinuate, with a few crowded red flowers. It increases by rooting at the nodes in thick roots. Often it is matlike. My freak, three feet long, growing on the edge of a shallow narrow pool, was anchored at each end as a terrestrial. It is branchless, and the cylindric stems growing in the water had become flat and membraneous, with closely-set scales like the teeth of a saw. At the nodes are crowded rootlets, some being as long as 10 inches and 12 inches, similar to the flattened stems, with additional thread-like or hairy rootlets at intervals of half an inch. The leaves are several inches apart, with spike-like edges resembling soft prickles, and are on long stalks. Was the plant reaching out for the earth at the bottom, and could it survive after the pool had dried up? This plant has known medicinal virtues.

Other rarities found were the Buttercup (*Ranunculus lappaceus*), with ten petals (usually found with four or five petals only), and two species of Microtis Orchid (*M. parviflora* and *M. oblonga*), both blotched, viscid, and infested with thrips.

AN UNUSUAL BLOW-FLY VICTIM

An interesting case of fly strike was encountered recently, while hunting for insects in the low coastal scrub at Black Rock. The day was warm, and Blue-tongue Lizards were on the move. One of these reptiles, which I had picked up to examine for ticks, had a wound about half an inch in diameter on each side of its body—just as if someone had shot it with a rifle of small calibre, and later decay had enlarged the openings. The holes appeared to communicate with the body cavity, and as the lizard strained to escape my grip, I was aware of something rising to the surface in each wound. Numerous maggots were lying close together, and side by side, with their heads directed into the lizard's vitals. Using a pair of forceps, we endeavoured to obtain specimens, but at the first touch the maggots rapidly dispersed into the body of the host. We killed the lizard, and found, on opening it up, maggots in every part of the body cavity. However, actual attack of the tissues was confined to the original wound and its neighbourhood, and to the flesh about the vertebral column. In the latter part many ribs and vertebrae had been completely stripped of flesh. Miss Raff, who examined the larvae, pronounced them to be those of one of the sheep blow-flies.

ROBIN D. CROLL.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, January 11, 1937. The Senior Vice-President, Mr. Geo. Coghill, occupied the chair. About 90 members and friends were present.

It was announced that the President, Mr. S. R. Mitchell, the Hon. Secretary, Mr. F. S. Colliver, and several other members of the Club, were attending the meeting of the Australian and New Zealand Association for the Advancement of Science, at Auckland, New Zealand.

The Chairman took the opportunity of wishing all members a happy and prosperous New Year.

Capt. G. McLaren, a new member, gave an interesting address entitled "A Ramble in New Guinea." He showed many fine lantern slides and moving pictures dealing with native life and customs, including some valuable films illustrating a visit to Tench Island, which had not hitherto been visited by a white man and whose inhabitants are completely primitive. He related many incidents illustrating the psychology of the Polynesians and Melanesians in this area. A number of questions asked and answered indicated the interest of the members present.

CORRESPONDENCE

From Miss Joyce Allan, of the Australian Museum, Sydney, acknowledging the presentation by the Committee of a bound copy of the Shell Book and assuring the Club of her further assistance in the future.

ELECTION OF MEMBERS

On a show of hands the following were duly elected: As an Ordinary Member of the Club: Captain G. McLaren; as Country Members: Messrs. G. McIntyre, Balranald, New South Wales, and Albert Green, of Macedon.

NATURE NOTES

Mr. W. H. Ingram referred to Blackbirds eating caterpillars voraciously. Mr. V. H. Miller stated that he had observed Starlings at Colac gorging themselves on caterpillars.

Mr. Chas. French said that he had attended a flower show at Anglesea and in a class for wildflowers had noticed a vase containing at least 1,000 native orchids, and another containing almost as many.

It was resolved, on the motion of Messrs. French and Proudfoot, that this matter be referred to the Committee for consideration.

Mr. Charles Barrett mentioned the necessity for 500 acres of the Corranderrk area at Healesville being added to the Sir Colin MacKenzie Sanctuary, especially for Koalas. On the motion of Messrs. Barrett and Hyam, the matter was referred to the Committee for immediate attention.

The meeting then adjourned for the Conversazione.

EXHIBITS

Mr. Chas. French.—Specimens of *Spiranthes siensis*, "Austral Lady's Tresses," and cotton-like scale insects, *Pulvinaria tecta*, on *Kunsea*; both exhibits were from Warburton.

Mr. A. R. Varley.—Tortoise shell; operculum from *Turbo jourdani*; Ivory nut from Solomon Islands, marine fungus from Point Lonsdale; "dilly-bag" from Bloomfield River, North Queensland; mangastan from Java.

Mrs. Chas. Barrett.—Orchid, *Cymbidium iridifolium*; and a lily (*Crinum* sp.) from Queensland; both cultivated in a glass-house.

Mr. H. Stewart.—Ninety species, mostly in flower, of flora collected at Mount Buffalo, altitude 4,000 to 5,600 feet, including: *Aciphylla simplicifolia*, Mountain Aciphyll; *Brachycome calocarpa*, Lobe-seed Daisy—achenes immature; *Caladenia carnea*, white forms; *Cardamine dictyosperma*; *Epacris breviflora*; *Hakea vittata*, showing two seasons' fruit; *Hierochloe redolens*, Sweet Holy-grass; *Hymenanthera dentata*, Tree Violet—foliage only; *Lotus australis*; *Phebalium podocarpoides*, *P. squamulosum*; *Pimelea alpina*; *Podocarpus alpina*, Mountain Plum Pine—foliage only; *Tricoryne elatior*, immature flowers; *Wahlenbergia vincaeflora*, immature flowers.

STUDY OF THE SOIL

The Study of the Soil in the Field is the title of a very useful and interesting little book by G. R. Clarke, Lecturer in Soil Science in the Department of Rural Economy, University of Oxford. It is published, at the Clarendon Press, under the auspices of the Imperial Forestry Institute, University of Oxford. The author has made a special study of the field aspect of soil work, which demands, not only an extensive knowledge of natural science, but also "a faculty for keen and accurate observation of details which are by no means easy of observation." Russia leads in pedology, but Europe and America are not far behind; and even in Australia we have soil scientists who are doing much valuable work. And field work is of the first importance; when a soil sample is taken from its environment it "dies."

FURTHER NOTES ON AUSTRALIAN *UTRICULARIA* WITH A CORRECTION

By FRANCIS E. LLOYD, D.SC. (Wales), F.R.C.S., F.L.S.

Last April, in company with my colleagues in the Department of Botany of Sydney University, I visited a locality rich in four species of *Utricularia*, one of which was *U. biloba*. It being the close of the season this plant was scarce, and was found growing on the higher and drier portions of the habitat, a small, sandy swamp fed by drainage from surrounding low rocky and sandy hills. Unfortunately this locality, included in the suburb of Malabar, near Sydney, referred to in my previous paper in this magazine (*Vict. Nat.*, liii, 91-112, Oct., 1936) as La Perouse, which is the general locality on the north shore at the mouth of Botany Bay, is soon bound to disappear, as a habitat of native flora, before the advance of town building.

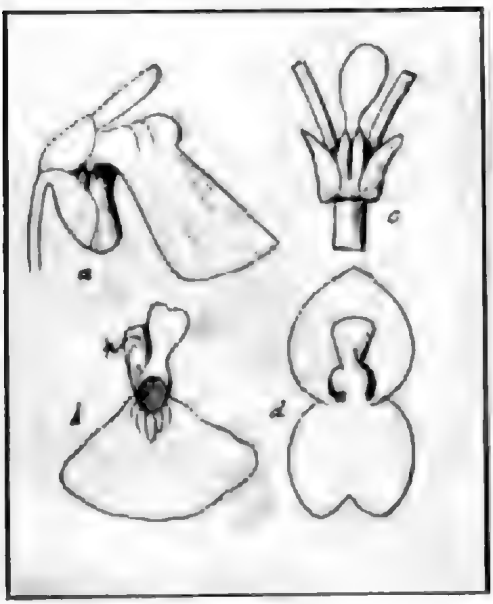


FIG. 1

a, Lateral view of young flower, somewhat distorted by pressure; *b*, front view of corolla; *c*, scales subtending floral pedicels; *d*, calyx with ovary sp. spur.

The substrate on which *U. biloba* grew was a dense mat of fibrous material mixed with a little sand, and very few evidences of leaves could be seen. On exhuming the buried parts I found only stolons, and no leaves, except a few spatulate ones which turned out to belong to *U. cyanea*. It was noticeable that the end of the flower scape was buried at a considerable depth, about 5 cm. The traps were found to be of the *U. vulgaris* type, which are found also on *U. stellaris* and *U. flexuosa*, to mention Australian species, but in particular detail they are identical with those of *U. resupinata* of North America, and some other species. The failure to find the leaves of this plant was the more disappointing because of the absence in any of the current descriptions, all based on the

original of R. Brown (Prod. 432): "Leaves very small and rare at the time of flowering" is the sum of information.

A few days later another visit was paid to this swamp, and I found in a little pool in some depth of water the complete body, with exception of scapes of which there was no evidence, of a plant which appeared so unique in form that I was taken by surprise. The only other species which it resembled, and that closely, is *U. paradoxa*, F. E. Lloyd and G. Taylor (in press) found in Angola, West Africa. The plant consists of a network of fine horizontal stolons buried in the mud with branches ending as leaves sent up into the supernatant water. Illustrations were afforded on plate 12 and fig. 2 of my paper (l.c.). A search in various Herbaria (Sydney, Melbourne, Brisbane, Perth) failed to discover any material corresponding with the plant in question, save only a small fragment collected by Mr. C. Moore,[1] probably in the same locality or in one of the ponds of the now Centennial Park, Sydney, where it was found also by Miss Alma Melvaine, of Sydney University. Moore's fragment, which had evidently been seen by Ferdinand v. Mueller, was a part of a leaf, but it remained unidentified when I found it in Melbourne.

FIG. 2
Shadow photographs of floral parts. Specimen in Sydney Herbarium.

In the absence of evidence to the contrary, I concluded that I was dealing with a novelty, and I described it, "despite a lack of flowers" (I quote from my cited paper), under the name *U. Lawsoni*.

On my return to Sydney, we again visited the locality above described, and we now found the plant in flower in the pool which had previously yielded the sterile material. This time I was able to get the plant entire out of the loose mud so that the scapes came out with stolons and leaves attached. On examination it turned out to be *U. biloba* R. Br. This was December 28, 1936. At this time we could find no flowering scapes except in the pools and ditches in deepish water. In places not submersed I found mats of minute leaves showing the branching form characteristic of the species, but no scapes. *U. Lawsoni* must therefore be discarded. Instead of a new species we have, however, com-

plete knowledge of a plant previously known only by its flowers and scapes.

The plant consists of a widely-spreading and frequently branched horizontal system of thread-like stolons penetrating the muddy substratum at a depth of four to five cm. The lower end of the scape is colourless to this depth, as this arises from one of the horizontal stolons, it being, with them, buried in mud. From these stolons leaves also arise through the mud into the supernatant water where they branch, and have the appearance of little trees. The stolons are provided with many traps on rather long, delicate stalks. Traps occur to some extent on the green exposed portions of the leaves, but these are much smaller and not often well developed. The basal part of the scape bears several rhizoids, again similar to those of *U. vulgaris*. The main axis of a rhizoid near the base bears very short branched leaves, the segments of which are tightly curved, the whole, with its neighbour serving as an anchoring system of barbed struts. The scape is tall (upward of 40-50 cm.) and is very brittle. The flower in addition to being generally blue in colour has two yellow swellings on the palate. The pod is orbicular, about 3 mm. in diameter. The seeds are angular, due to mutual compression on the large orbicular placenta. The scales of the scape are "basisolute," that is, the base is prolonged backward making the scale peltate.

The form which is produced when the plant grows in mud covered with deepish water stands in distinct contrast with that which is produced in wet sandy turf. The leaves of the former are long and much branched, in the latter minute and simple, being merely a tapering, terete leaf of few mm. length, or somewhat longer and having one or two branches, correspondingly short. Densely packed, they form a mat with a curly, green nap quite different from the green mats formed by other terrestrial forms with spathulate leaves. The plant cannot strictly be called terrestrial; it has two forms, an aquatic and a terrestrial.

O. Schwartz (*Plantae novae vel minus cognitae Australiae tropicae*, p. 98) cites *U. biloba* as a primitive Australian terrestrial form with which his *U. ceratophylloides* is in close relationship. Through the kindness of my friend, Professor von Wettstein, of Berlin-Dahlem, I have received a small fragment of the type material of *U. ceratophylloides*, examination of which shows that the traps are quite those of *U. vulgaris*, and are therefore similar to those of *U. biloba*. Both on this count and because of the basisolute scales as well as, as we now know, on the general form of the vegetative parts, the comparison made by Schwartz is just enough. As to the "blue" flowers, this is less certain, but I have not seen them. But it may be seriously questioned that *U. biloba* is a "primitive Australian form." The traps, with basisolute scales and the form of the plant body are all cosmopolitan in type. With

Schwartz's view that Kamienski's system is due for revision I can only agree.

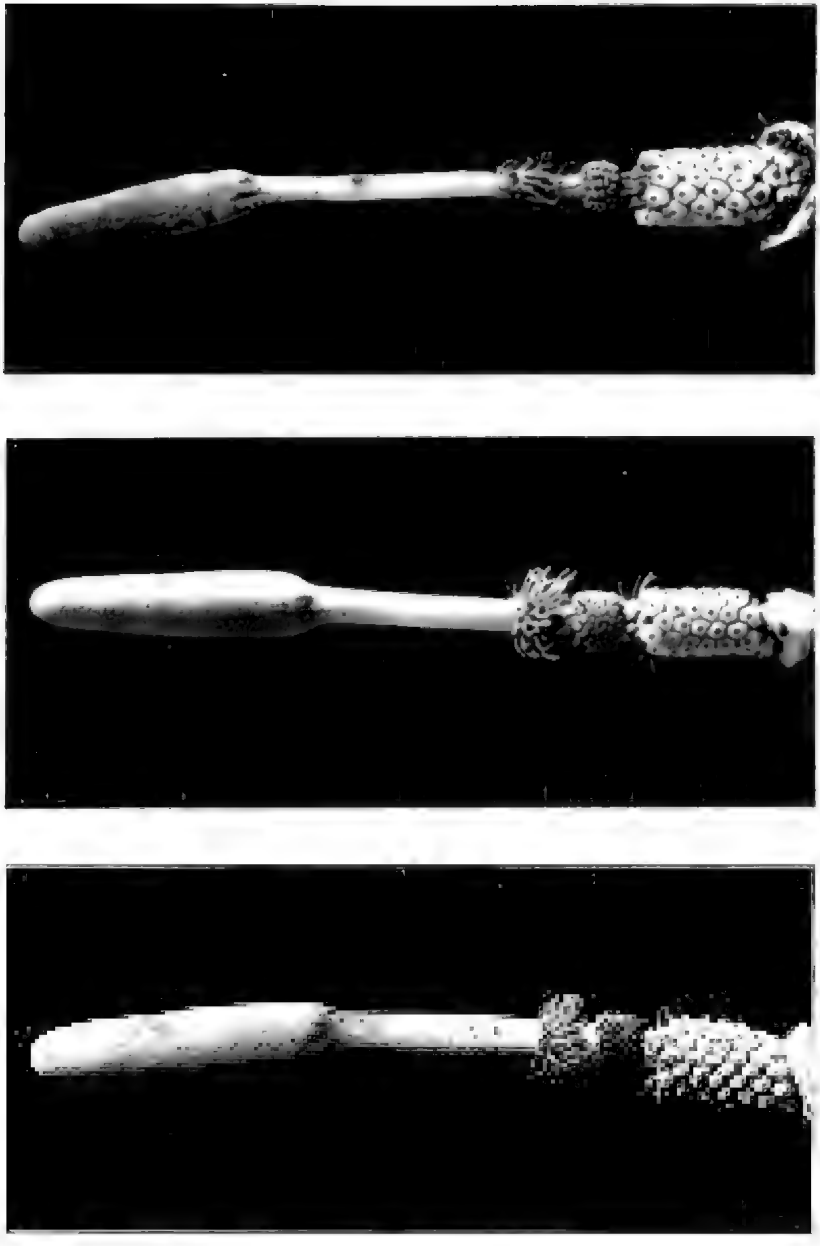
U. simplex R. Br.: I found this very small plant near Albany, Western Australia, probably in the type locality. The underground parts are very scanty and fragile, and very difficult to exhume. These were found to be quite like those of *U. lateriflora*, including the traps, which are among the smallest found in any species of *Utricularia*. The figure in my previous paper (l.c., p. 96, fig. 12) shows the structure. It is interesting to note that R. Brown associated these two species without any knowledge of the parts other than the flower and leaves, which latter are of doubtful value. The flowers are of very similar form. There are three species known of this type of trap, *U. calliphysia* Stapf, found in Borneo and in Ceylon (if the Ceylon plant is this species), *U. simplex*, Western Australia, *U. lateriflora*, south-west Australia and Tasmania.

Utricularia "rotundifolia": In the Sydney Herbarium there is a single sheet bearing scanty material of a species with long scapes (60 cm. or more), bearing long (4-5 cm.) ligulate or somewhat spathulate leaves and anchoring fibres. No traps or other substratum had been collected. One mature flower and one young flower allowed an accurate description. Calyx: upper lobe broadly ovate, almost orbiculate, obtuse; lower lobe similar but deeply emarginate; corolla: upper lip, contracted above the base then spreading into a cordate upper part, the upper limb being emarginate; lower lip: spreading, ca. 2 cm. broad, the sides forming an angle of ca. 100-110 degrees with each other (much less than in *U. volubilis*, for which it might be mistaken, particularly as it grows in the same region), the lower edge forming the segment of a circle, slightly crenulate. Spur short and very obtuse. The colour is pink or purplish. The scapes of the specimen have basifixe scales and show no tendency to twist into spirals, so that it is probably not a climbing plant. The label reads as follows: "R. Brown, Iter Australiense, 1802-5 / (Presented by direction of J. J. Bennett, 1876) / *Utricularia rotundifolia* / King George's Sound / Ex Herb. Hort. Bot. Reg. Edin." The name and locality are written by a hand other than Brown's. There is no *"rotundifolia"* recorded for Australia, at all events, and the name is quite inappropriate. It would be appreciated if collectors in the region where Brown did his first collecting in Australia would look for this plant. The accompanying figures show the known characters of the plant (figs. 1 and 2).

ERRATA, *NATURALIST*, JANUARY, 1937

Corrections, *Naturalist*, Jan., 1937, page 147: Beneath the caption, for "patum" read "portion." Fourth paragraph: for "*Arumitalycum*" read "*Arum italicum*." Page 148, sixth paragraph: for "dehixing" read "dehiscing."

Plate XV



POLLINATION IN AUSTRALIA OF THE VEINED-LEAF CUCKOO-PINT, *ARUM ITALICUM*

By EDITH COLEMAN

The remarkable method of pollination in the Mottled-leaf Cuckoo-pint (*Arum maculatum*) has often been described. That of the Veined-leaf Cuckoo-pint (*A. italicum*) is even more

Left: *Arum italicum*, showing clubbed spadix. Right: Fruits (green), which later become scarlet. Clubbed spadix withered.

interesting. Under cultivation, plants of this species are more robust, their florets proportionately larger, so that pollination may be followed without the use of a lens, though one is useful in revealing the structure and the opening of the florets.

It is a handsome plant with attractive arrow-shaped (hastate) leaves, which are veined with white, not mottled as in *A. maculatum*. The lobes of the leaf are longer and more spreading. The

clubbed spadix is yellow, not purple or pink, as in the smaller species. The inflorescence consists of a fleshy spike (spadix) on the lower part of which are many rows of closely packed, sessile, male and female florets.

At the base of the spadix are six irregular rows of fertile female florets without styles, which are no more than vase-shaped carpels, each one bearing at its apex a much divided, transparent stigma. Later, from compression, the carpels become squat and obscurely pentagonal in shape. Above them are two rows of infertile female florets with styles. Then follow five or six rows

Micro-photo. by O. H. Coulson.

"Moth" midgets (*Psychoda*), which pollinate *Arum italicum* (enlarged).

of fertile male florets, stamens without filaments merely, their bright yellow anthers dehiscing by lateral slits. Above these are three rows of infertile, tailed florets, probably abortive stamens, though opinion on this point is divided. These I shall term "bristles." All the florets are naked. Thus the plant wastes no energy in producing unnecessary protective parts or signals. Petals and sepals are not needed either for protection or attraction, while the conspicuous yellow club and an unpleasant odour signal the pollinating agents.

As male and female florets mature at different periods, outside

agency is essential for their pollination. The florets are markedly protogynous, the females maturing from one to three days earlier than the male florets. Hot weather appears to hasten development of the stamens, when the difference is less marked. The fleshy spadix is enveloped in a green, leaf-like bract (the spathe) which is convoluted, and constricted at a point opposite the "bristles," forming a closed cylinder below.

When the female florets mature a faint, foetid odour is apparent —a powerful attraction to hundreds of small moth-like flies (*Psychoda*). These find an easy passage *into* the cylinder, but to return is another matter, the ring of "bristles" acting on the old curved-teeth rat-trap principle, to the confusion of the small visitors. In their quest for freedom the baffled captives wander over the female florets at the base of the cylinder. The stigmas of these florets are receptive and readily accept any pollen brought by the flies from a spadix on which male florets are mature.

After pollination the silvery stigmas wither and become brown, a drop of nectar now showing in each brown centre. All this time the anthers above have been tightly closed. In from twenty-four to seventy-two hours they dehisce by lateral slits, shedding their pollen on the hosts of living and dead captives below—pollen which is impotent on the now non-receptive stigmas. It will be noted that, with dehiscence of the anthers the barrier of "bristles" has withered, and contracted towards the floral axis, leaving a passage between them and the constricted portion of the spathe. Thus any living flies may now depart, carrying with them pale, golden dust, from the male florets above, with which they will pollinate receptive female florets on a younger spadix.

The fact that their withering coincides with dehiscence of the anthers suggests that these "bristles" may be regarded as infertile male florets, the "tails" representing filaments. Signs of effective pollination are soon apparent. The ovaries swell and become green. The spathe droops, and the club, no longer needed as a signal, withers and becomes brown. Effective fertilisation is seen in hosts of seedling plants which spring up wherever there are fallen fruits.

All the insects that visit my plants belong to the genus *Psychoda*. They are exquisite, moth-like flies, whose iridescent wings are very large in proportion to their small bodies. On warm days they flock to the spathes in hundreds. The "cylinder" may be half filled with flies. Many die before dehiscence of the anthers above, and the consequent withering of the ring of "bristles" to allow their escape. An adequate number survive, to ensure the pollination of female florets in another spathe.

The flies are most numerous at about 11 a.m. when the temperature of the spadix is probably higher, and the attracting odour more powerful. Experiments in this direction have shown that

in several *Arums* the temperature at certain periods may be higher, by some 5 deg. Fah. than the surrounding air. The pollen grains have only a very slightly adhesive exine and are well adapted to dusting insect-bodies rather than to carriage in masses. The efficiency, of the small pollinators is evident in the hosts of red fruits and, ultimately, the seedlings that appear.

Key to florets on spadix.

It must be admitted that, in a garden, the Cuckoo-pint is a great monopolist. With a rapid vegetative increase, it is not dependent upon seed for reproduction. I have counted twenty-five small tubers (twenty-five potential plants) upon one parent tuber! The effective pollinary device doubtless serves two important purposes: to carry on the species should the parent stock perish, and to safeguard young plants from any recessive defects which may be latent in the parent stock.

The fruits are said to be harmful, but they are eaten by birds without ill effect. The Blackbird and the British Song-Thrush strip them from many a spadix in my garden. I have seen an Oriole feed them, whole, to an importunate baby—ten fruits in succession. My sudden movement sent the mother to cover. The baby uttered a few imperious calls, but, finding that they did not bring his mamma, the big bully hopped down and fed himself! Wattle-birds evidently appreciate the "pulp" which surrounds the seeds. I have seen them puncture and dislodge many fruits. Doubtless they carry many of them away to exploit at leisure. The seeds are thus widely dispersed.

Caution should be exercised where there are children. There is certainly an acrid juice in the stems of the Veined-leaf Cuckoo-pint which leaves a stinging sensation in one's fingers.

I am indebted to Mr. P. R. St. John, of the Botanic Gardens, and to Mr. J. Clark, of the National Museum, for the names of plant and insects. Both are always generous in giving such assistance.

Mr. Clark tells me that the *Psychoda* are not named in the Museum collection, and that, at present, there is no literature on the Australian species. Very little is known about them, though they are sometimes abundant in moist places. Mr. O. H. Coulson kindly photographed the insects.

KEY TO PLATE XV

Pollination of *Arum italicum* in three stages:

A.—A spadix, with spathe cut away, showing (from the base upward) mature female florets, each with a silvery, receptive stigma at its apex; a few infertile female florets with styles; immature male florets; down-pointing, tailed florets forming the "trap."

B.—Female florets have been pollinated, stigmas withered and brown, ovaries swelling; male florets still immature. Many insects in the "cylinder."

C.—Anthers of male florets have shed their pollen; "bristles" have withered and no longer block entrance to cylinder. Living flies have escaped carrying pollen on their bodies. Many dead flies at base of spadix.

KEY TO ILLUSTRATION ON PAGE 170

Key to florets on each spadix:

I.—Infertile florets, probably male.
II.—Male florets (mature) with anthers dehiscing by lateral slits.
III.—Infertile female florets with styles.
IV.—Female florets (carpels) with much divided stigma at apex.

[*Note.*—This paper should have appeared before the one by Mrs. Coleman published in last month's issue, in which reference is made to *Arum italicum*. The two papers were received together and inadvertently that on the Calla Lily was sent to the printers first.—EDITOR.]

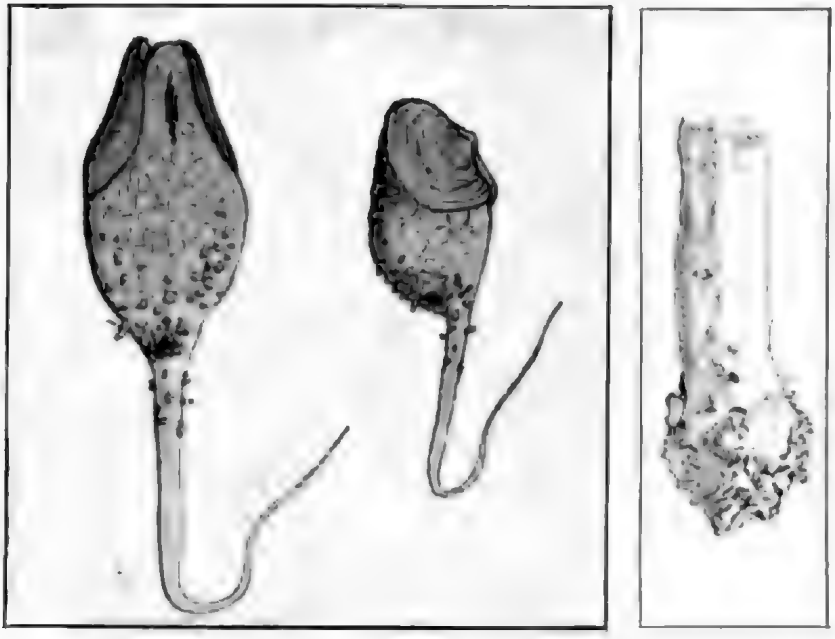
HUMPHREYIA STRANGEI A. ADAMS: A PECULIAR BIVALVE SHELL

By CHARLES J. GABRIEL

At a recent meeting of the Club reference was made to an interesting Victorian mollusk, *Humphreyia strangei*, which is not infrequently met with on our shores and in Tasmania, New South Wales and South Australia. It was described in 1852 in the *Proceedings of the Zoological Society of London*. One often hears it referred to as a "Tube Shell," the animal in reality attaching itself when young by the ventral edges of the shell, and during its progress to the adult stage extending the valves behind into a tube, the tube being attached by its base to a shell or stone and sometimes showing much distortion in growth.

Dredging excursions by the writer in Western Port have from time to time yielded very excellent specimens of *Humphreyia* in living condition, some of which may be seen in the National Museum, Melbourne. During one of these expeditions, in 1905, at a depth of four fathoms on a stony bottom between Phillip and French Island, the writer took a juvenile form with the

animal. For examination and comparison this unique specimen was placed in the hands of the late Mr. E. A. Smith, Conchologist at the British Museum, who found the state of preservation was not sufficiently good for minute study; but in the *Proceedings of the Malacological Society of London* (March, 1910) he made some very interesting observations, as follow:



Humphreyia strangei, Young (highly magnified), after E. A. Smith. Right: Adult.

"Shell very small, 5 mm. long, 4 high, consisting only of two flattish valves which are placed over the dorsal end of the ovate-globose body of the animal, covering only a limited portion of it, and diverging at the umbones at about a right angle. They appear to be closely attached to the surface, and exhibit, within, faint anterior to posterior adductor scars. Externally the valves are covered with a thin, pale, olivaceous periostracum, which is more apparent towards the outer margin than at the umbones. The surface exhibits fine yet quite distinct lines of growth, radiating series of minute granulations towards the umbones, and faint traces of radiating sculpture upon the rest of the valves. The hinge is edentate, and consists merely of a ligament attached just below the extreme margin of the valves posterior to the umbones. Interior of the valves white, almost silvery, concentrically wrinkled here and there. The body of the animal is enclosed in a sack-like mantle, is soft, ovate-globose, terminating posteriorly in a thin whip-like process. . . . What may be the function of the flagelliform extension of the body I cannot offer an opinion upon. Can it possibly be an anchoring appendage?"

The Victorian Naturalist

Vol. LIII.—No. 11 March 3, 1937 No. 639

THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, February 8, 1937. The President, Mr. S. R. Mitchell, presided, and about 100 members and friends were present.

LANTERN LECTURE

The subject for the evening was an illustrated lantern lecture on "Erosion," given by Mr. W. J. Lakeland, of the Forests Commission. A fine series of slides, showing conditions that bring about erosion, and its results, both in Australia and overseas, was shown.

The President thanked Mr. Lakeland for his very interesting and instructive address, and stressed the position in America to illustrate the need for conserving our forest cover. Other members expressed appreciation of the lecture.

ORCHID DESTRUCTION

With reference to the reported wholesale gathering of orchids at Anglesea, the Hon. Secretary reported that the Committee had decided to send a letter to those concerned, pointing out that orchids were protected, and asking for help in the "Plant Protection Act"

DEATHS OF MEMBERS

The President referred with deep regret to the death of Mr. J. Stickland, a Foundation Member, and of Mr. Jarvis, a Country Member. The death of Dr. R. Tillyard was also mentioned. Members stood in silence as a mark of respect.

REPORTS OF EXCURSIONS

Reports of excursions were given as follow: Seaholme, Mr. J. J. Freame; Mt. Buffalo, Mr. H. C. E. Stewart; Kallista, Mr. L. W. Cooper for Mr. A. J. Swaby; and a brief report of the Science Congress Meeting in Auckland was given by Mr. S. R. Mitchell and Mr. A. S. Kenyon.

GENERAL BUSINESS

Mr. A. S. Kenyon read an extract from a letter from Hermannsburg Mission Station, stating that the laying on of water had greatly benefited the aborigines there. Further contributions to the fund were needed to pay off indebtedness.

Mr. Charles Barrett suggested that a letter be sent to Mr. R. Eadie at Healesville, congratulating him on the fourth anniversary of "Splash's" captivity. This was agreed to.

NATURE NOTES

Mr. V. H. Miller recorded the presence of the Pilot Bird at Mt. Buffalo, and stated that he had observed a Scrub Wren feeding a young Fan-tailed Cuckoo. He also spoke of the vandalism in the park, and stated he would bring the matter before the Committee for consideration.

Mr. F. S. Colliver said that he had been told that a pair of eagles nested on the ground at Toora.

The meeting then adjourned for the Conversazione.

EXHIBITS

Mrs. Fenton Woodburn.—Luminous Fungus found at Black Rock, and Sea Horses from Port Phillip Bay.

Miss A. Cornish.—Sea Urchins (*Maretia* sp.), known as sea mouse, with and without spines, from Mornington and Seaford respectively.

Mr. H. F. Reeves.—Coloured photographs of Australian flora, and also a photograph of a Bulga Park Scene.

Miss E. K. Turner and Mr. T. S. Hart.—Plants collected at Mallacoota during December, 1936, and January, 1937, including *Dianella coerulea*, which must now be restored to the list of Victorian plants.

Mr. C. J. Gabriel.—Marine shells from Victoria: Cowries, *Umbilia hesitata* Iredale, and white variety, and *Conus anemone* Lam., and white variety.

Mr. F. S. Colliver.—Geographical specimens from New Zealand, including wind stones from the Clarence Delta, pumice from Mt. Ruapehu, and sinte, with plant impressions, from Rotorua.

Mr. S. R. Mitchell.—Adzes of greywacko, drill points of jasper and chalcedony, flakes and scrapers of obsidian, from Waiki Beach, New Zealand. Model of Maori fire drill, wood and bone.

The Committee of the Field Naturalists' Club of Victoria invites members of kindred societies who may be visiting Melbourne to attend the Club's meetings.

ON THE DISCOVERY OF FUSULINID FORAMINIFERA IN THE UPPER PALAEOZOIC OF NORTH-WEST AUSTRALIA: WITH A NOTE ON A NEW BIVALVE

By FREDK. CHAPMAN, A.L.S., HON. F.R.M.S., and WALTER J. PARR, F.R.M.S.

What are the Fusulinids?

The Fusilinas, as a group of more or less spindle-shaped Foraminifera, were first brought under notice in 1829 by Gotthelf Fischer (1771-1853), who was born at Waldheim, in Saxony, and became Professor of Natural History in 1804 in the University of Moscow. Fischer de Waldheim, as he is generally called, was the first worker to use the term "palaeontology" as applied to the study of fossils, although it appears to have been employed at about the same time (1834) by de Blainville.

Fischer de Waldheim, in his studies, in 1829, of the Upper Carboniferous or Mountain Limestone of Miatchkovâ, near Moscow, and from which the older buildings of that city have been built, found myriads of small foraminiferal shells making up the bulk of these Russian limestones, from which, as the blocks were broken, the little *Fusulina cylindrica* dropped out like rice grains. So important a part, in fact, do the Fusulinas play in the formation of these Mountain Limestones, that they are comparable to the Nummulites which form a large portion of the Eocene limestones of Southern Europe, Egypt and India; the latter are, however, of much younger age, occurring in the Lower Tertiary.

For a long time these Palaeozoic Fusulinas were regarded as belonging to one genus until, in 1877, Prof. Valerian von Möller separated other recognizable forms, giving them new generic names, as *Schwagerina* and *Fusulinella*. Since that time other genera have been proposed, increasing their number to nineteen.

As to the age of the fusulinids, they all occur within a fairly limited geological range of time, namely, Lower Pennsylvanian to Upper Permian in America; whilst in Europe (the Mediterranean region) *Fusulina* is found at the base of the Coal Measures (Upper Carboniferous), and *Verbeekina* and *Schwagerina* in the Lower Permian (Artinskian) of Palermo, Sicily. In Asia numerous genera are recorded from the Upper Carboniferous to the Upper Permian, of India, China, Sumatra and Japan.

The fusulinids are therefore good zone fossils, and as such, and from the fact that they are often associated with petroliferous rocks, as in the oil country of Russia and Texas, are very important from an economic outlook.

Australian Occurrence

The present discovery is primarily due to both Dr Arthur Wade, A.R.C.S., F.G.S., and his geological party working for the Freney

Kimberley Oil Company, and to Miss K. L. Prendergast, B.Sc., of the University of Western Australia, who also recognized the relationship of the fossils to the fusulinids. To Miss Prendergast and to Dr. Wade we are indebted for the opportunity of examining these rock specimens and fossil remains in detail.

Samples from two localities have been forwarded to us by Miss Prendergast. They are as follows:

"B 131 (samples wrongly numbered, loc. correct). Six miles north-west of North-West Hill, Kimberley."

"B 146. Fossils from the calcareous, ferruginous stone scattered on the surface, at south-west corner of the North-east Structure at Bell's Ridge, Kimberley."

In a letter received from Dr. Wade (to F.C.) on 30/11/36 he states that "This material is from the highest beds of the Upper Ferruginous Series, which I have put down as of Upper Permian Age, and is just below the fresh-water beds of the Erskine Series."

Macroscopic Description of the Rock

A reddish to dark-brown ferruginous breccia, with patches of cream-coloured fragments on the fractured surface. Some of these lighter fragments show numerous small nacreous bivalved shells, described below as a new specific type of a genus not previously included in the Australian fossil fauna, namely, *Carbonicola* McCoy. *Carbonicola*, and its allied genus *Anthracomya*, are used for zoning the Coal Measures (Upper Carboniferous) in North Staffordshire and South Wales. The present Permian examples may be regarded as micromorphs or survivals of the Carboniferous fauna elsewhere and show a strong resemblance to *Carbonicola similis* (Brown).

The brecciated matrix in which these bivalves are enclosed may have been derived from a slightly older rock, probably of lacustrine or brackish water origin, as indicated by the genus to which these abundant little shells are referred. No other fossils, excepting a small bivalve resembling *Leda* sp., were seen in association in these brecciated fragments containing the *Carbonicola*. The latter were somewhat crushed, in most cases, before their inclusion in the sediment, but are very abundant and in places closely packed together.

The fusulinids in this rock, and which seem to be indigenous, are here referred to the genera *Verbeekina* and *Neoschwagerina*. They are represented by only a few fragments of the tests, in a poor state of preservation. Two of these were counterparts of a fractured surface of one test (one of these since lost in investigating its structure), which shows a cavity indicating a large initial chamber or proloculus and the succession of whorls surrounding the axis of the shell. The remainder, referred to *Verbeekina*, are fairly numerous in fragments, these being now almost or entirely

converted into claystone, with only vestiges here and there of the original shell-wall.

Microscopic Description of the Rock

In thin section this ironstone rock is seen to contain occasional quartz-grains, partially altered shell-fragments, both of brachiopods and bivalves, the latter chiefly *Carbonicola*, and fragments of polyzoa. Other remains present show strip-shaped and curved fragments with a comb-like ornament on one side and which may possibly have a relationship to fusulinid organisms; also a few doubtful radiolarian tests, ostracod valve-fragments and replacements of rotaliform foraminifera. The rock-crushings yielded a doubtful specimen of the foraminifer, *Rhabdasis*.

Description of the Fusulinids

Class **FORAMINIFERA**. Family **FUSULINIDAE**.
Sub-family **Verbeekininae**. Genus **Verbeekina** Staff, 1909.
VERBEEKINA sp. Plate XVI, figs. ? 3, 4, 5.

The shell is ovoid and with approximate diameters of 8·5 x 10 mm. It consists of numerous volutions, up to 16. The first three whorls each measure about 0·35 mm. in height, the later coiling is less regular and the whorls generally lower. The proloculus has not been seen, but from the evidence obtained in making the sections, it is small. The wall is thin, consisting of a tectum and keriotheca, and measuring up to 0·05 mm. in thickness. Number of chambers to the whorl doubtful on account of the preservation of the shell, only an occasional septum being visible. The septa are plane. No parachomata are visible in the axial sections.

The present species is represented by four fragments, all from Sample B 131, and it has, therefore, not been practicable to attempt more than a generic determination. The genus *Verbeekina* is known only from the Permian of the Orient.

In fig. 3 we illustrate a fragment of what might appear to be a fusulinid genus belonging to the Sub-family *Neoschwagerininae*. The wall-structure is similar to that of the form described above, except that septula seem to be present. These structures we regard, however, as of inorganic origin and merely due to the differential staining of the material in filling the chambers. That they are not septula seems to be definitely determined by the following: (a) Their irregular shape, placing and length, all of which are unlike anything known in the *Neoschwagerininae*, (b) some of them divide and others anastomose; (c) the majority extend from the roof to the floor of the chamber, but this is not the result of the pendant septula meeting the parachomata, as no structure corresponding to the latter is present. For these reasons it is considered that the genus represented is *Verbeekina*, with undoubted specimens of which it is associated.

Sub-family **Neoschwagerininae**. Genus **Neoschwagerina** Yabe, 1903.

NEOSCHWAGERINA sp. Plate XVI, figs. 1, 2.

This genus is represented by a fragmentary specimen, embedded in matrix, from Sample B 146. The natural fracture reveals an axial section of the test, which has a longer diameter of 13·5 mm. The proloculus is ovoid and large, its lesser diameter being 0·6 mm.; owing to the imperfect preservation of the specimen the larger diameter is uncertain. There are approximately 25 whorls, the first three of which are comparatively low, measuring each about 0·24 mm. in height. These are followed by six closely-coiled whorls, each with a height approximating 0·13 mm. The remaining whorls increase in height gradually, until a height of 0·6 mm. is reached. The chambers are very numerous, numbering about 80 in the ? 20th whorl, and are then 0·4 mm. in length. The septa are plane and are separated by short, fairly thick septula, with apparently an axial septulum alternating with each septum. The wall is thick, measuring 0·1 mm. in thickness, and consists of a tectum and keriotheca.

In its very large proloculus, the present species resembles *N. megasphaerica* Deprat, which occurs with *Verbeekina* in the upper part of the Middle Permian of Tonkin. Deprat's species differs, however, in having only twelve whorls, which regularly increase in height as added.

Description of the Bivalve

Class **PELECYPODA**. Family **CARDINIIDAE**. Genus **Carbonicola** McCoy.

CARBONICOLA MINUTISSIMA sp. nov. Plate XVI, fig. 6

Description of Holotype: .

Shell small for the genus; ovate, oblique, umbo moderately inflated; rounded anteriorly, ventral edge rather strongly convex; umbonal ridge developed, especially towards the post-ventral angle. Surface polished, nacreous, smooth near umbones, with concentric ridges more or less rounded, 6 in type.

Length, 2·7 mm.; height, umbo to mid-ventral, 2 mm.; thickness of valves on the umbo, ·8 mm.

Holotype, from loc. B 146, Bell's Ridge, Kimberley, Western Australia (coll. by Dr. A. Wade).

General Description of Species

The great variation of this species, in characters other than size, is seen in the following:

Umbones often more depressed than in the type specimen.

Concentric rugae up to nine, with more or less numerous finer (intermediate) concentric lines.

Plate XVI

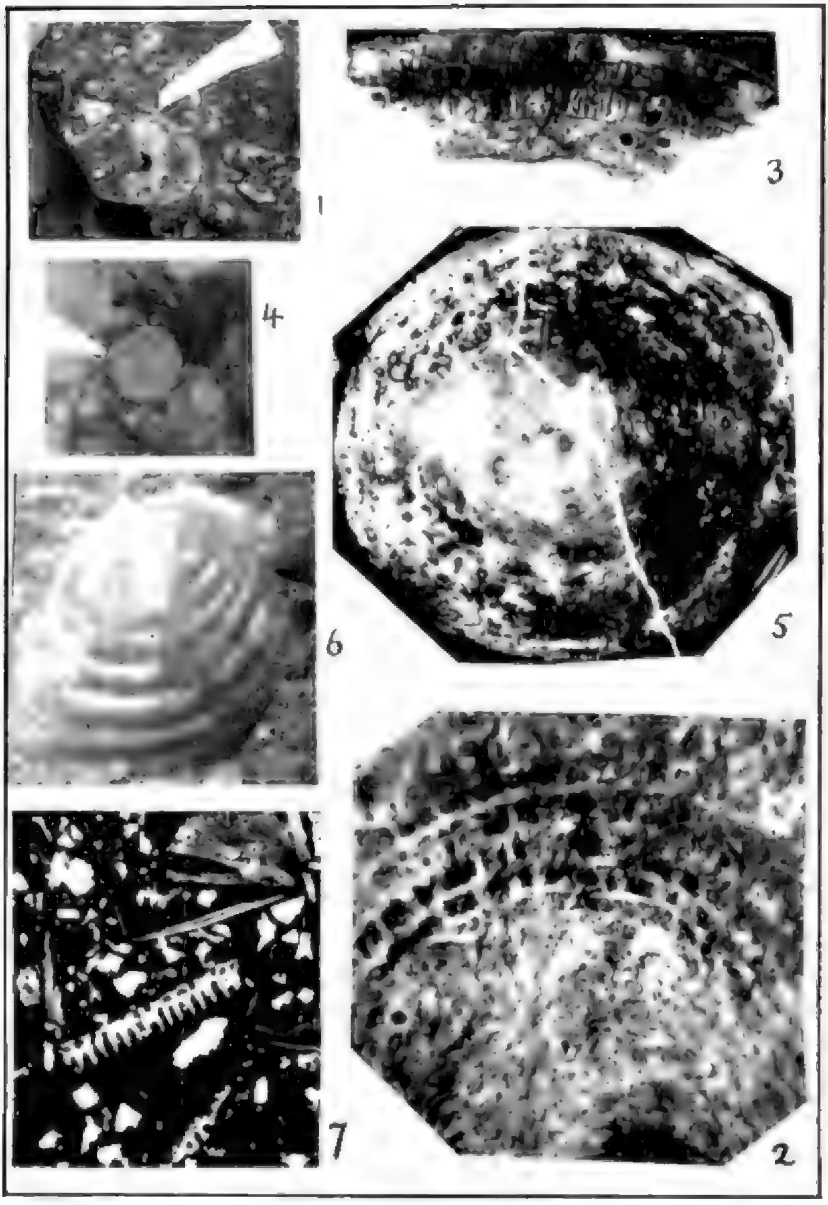


Photo. F.C.

Neoschwagerina, Verbeekina and Carbonicola from the Permian. Kimberley, W.A.

Interior of valves show cardinal area widely curved, with blunt cardinal tooth and posterior lateral.

In thin section a nacreous layer, both internal and external.

Thickness of shell averaging 1 mm. at the thickest part.

These tiny bivalves may be at once distinguished from the somewhat similar phyllopods, *Estheria*, by having a distinctly shelly and layered test, rather than a corneous one, by the character of the hinge-line, and by the irregular nature of the concentric lines of growth.

The above species is commonest at the type locality, B 146, but is also, and more sparingly, met with at loc. B 131.

EXPLANATION OF PLATE

Fig. 1.—*Neoschwagerina* sp. Approximately saggital section, in matrix. Loc. B 146. × 1½.

„ 2.—*Neoschwagerina* sp. Part of same section. More highly magnified. × 12.

„ 3.—? *Verbeekina* sp. Part of axial section. Loc. B 131. × 12.

„ 4.—*Verbeekina* sp. Obliquely sagittal section of another specimen. Loc. B 131. × circ. 1½.

„ 5.—*Verbeekina* sp. A thin section, excentric. Loc. B 131. × 7.

„ 6.—*Carbonicola minutissima* sp. nov. Right valve. Holotype. Loc. B 146. × 18.

„ 7.—Thin section of the matrix of B 146, showing sections of shells of *Carbonicola* and fragments of ? fusulinids, indet. × 37.

SIZE OF AUSTRALIAN PYTHONS

Scientific records of the North Queensland Python (*Python amethystinus*) are desirable. It was reported in a London journal recently, that on Cape York Peninsula pythons 30 feet in length could be seen; while some bushmen say that specimens measuring more than 20 feet are not rare in the Tully and other districts. Kinghorn (*The Snakes of Australia*) gives 21 feet as the limit for this snake; but a specimen 22 feet long was killed on Hinchinbrook Island, where the jungle is said to harbour many "carpet" snakes, as they are called, of fearsome size. A live specimen, captured near Cairns, measured only 18 feet, but "20-footers" are met with in the district occasionally.

THE ELBOW ORCHID

Since its discovery at Cravensville in north-east Victoria (A. B. Braine, 1917), the Elbow Orchid, *Spiculæa Hunttiana* (F.v.M.) Schltr., has been found in a number of districts, but chiefly in the north-east and east of the State (see *Vic. Nat.*, LII, March, 1936, p. 190). While on holiday in the Marysville district during February this year I found this orchid to be well distributed throughout the hills, one specimen being collected in the township itself. Good examples 20 cm. in height, with four flowers, were found on Mt. Gordon, along the Talbot Drive and the Cumberland Road, etc. The majority of the specimens had suffered somewhat, due to grazing—probably wallabies were responsible.

W. H. Nicholls.

A BOTANICAL PROBLEM: AN IMPERFECT ORCHID AND ALLIED FORMS

By W. H. NICHOLLS

Recently I received from Mr. A. J. Swaby specimens of *Caleana minor* R.Br. and of an allied form, designated by the sender as "freak forms" of Robert Brown's plant. Examination proved the latter to be exceptional specimens of Mueller's *C. Sullivanii*—a rare orchid originally found in the vicinity of Mt. Zero (Sullivan, 1882), and in the Wonderland Range (D'Alton, 1924 and 1926), remote parts of the Serra Range, some 40 miles east of the new habitat.

Mr. Swaby writes: "The specimens were collected on the south-west slopes near the summit of Mt. Byron, Black Range (south-west Victoria), by Messrs. Harold Smith, Gordon Fraser and myself. My two friends went to considerable expense and inconvenience to reach the very difficult country where the plants grow, which is rather out of the way of most collectors. We found the specimens in depressions and soaks, always in mossy places; the tubers on the rocks. The 'freaks' were growing in association with *C. minor* and species of other genera."

Mr. Swaby mentions also the vagueness of the reproductive organs in the "freak" flowers ". . . the end of the column never could form an anther, and the labellum has no inclination to move."

Additional specimens of *C. Sullivanii* (excellent ones also) were forwarded to the writer by Miss Lorna Banfield, of Ararat, who collected in the Moyston West district, near Mt. William (10/1/37). The specimens were 16-20 cm. high, and bore as many as eight flowers. These details are of some interest, because the members of this curious genus are all normally few-flowered (I am not including here *C. Sullivanii* because the majority of the specimens received had comparatively many flowers), possessing, as they do, usually one to four blooms; rarely does the number exceed five. The writer has seen but one specimen of *C. major* R.Br. with six flowers, and Mueller records a solitary Tasmanian specimen with eight, but it is true that *C. minor* has not been recorded with more than six; while *C. nigrita* Ldl., a Westralian form, and *C. Nublingii* Nich. (the latter is another instance of presumed degeneracy) are few-flowered.

There appears to be little justification for regarding the plants of *C. Sullivanii* as mere "freaks." The fact of possessing a habit rather more vigorous than that of *C. minor*, and producing more flowers, despite some apparent degree of degeneracy, suggests a longer association with the locality. To my mind the "freak" theory is disproved—a study of the dissected flowers is interesting. The accompanying line drawings, from fresh material, will give a comparative idea of the salient characteristics of all the known species,

thus enabling any reader the more readily to reach his own conclusions.

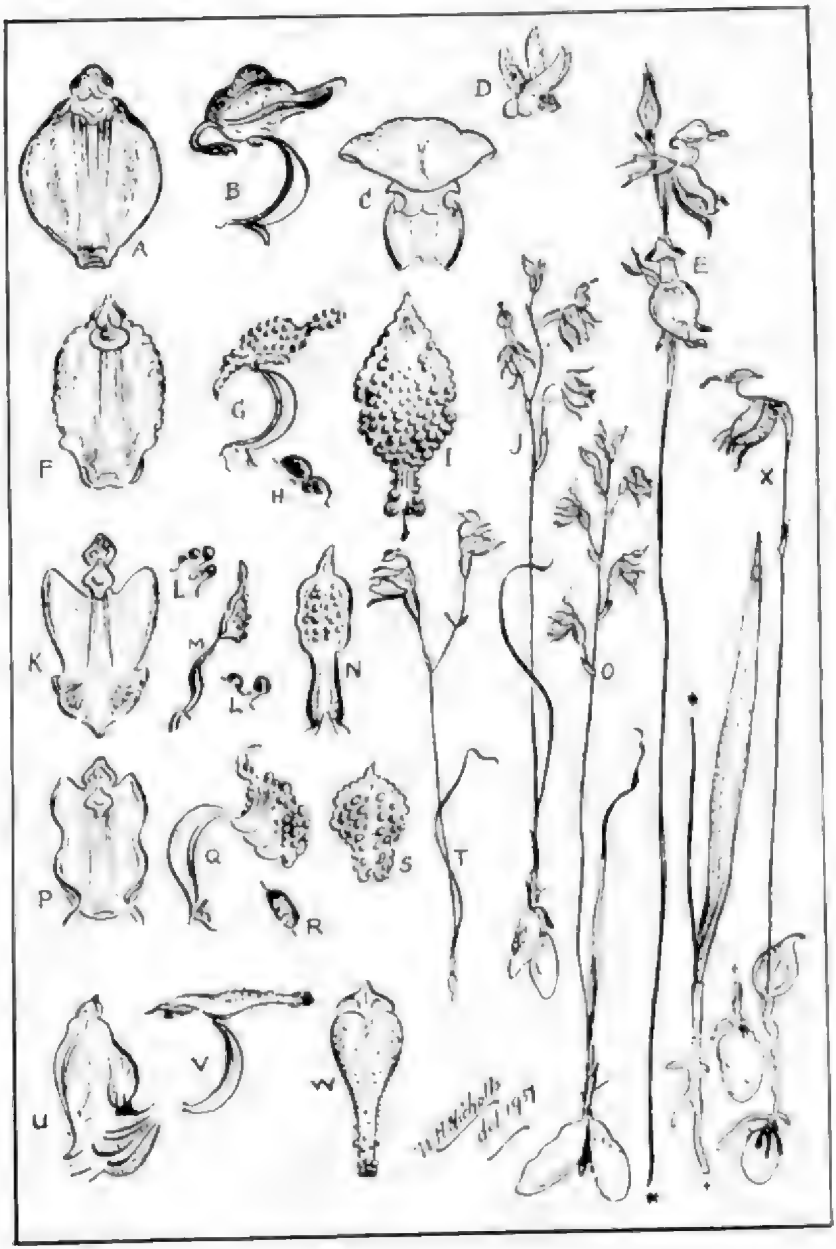
The individual flowers of *C. minor* show practically no variation, except in the unimportant labella-glands; the same must be written in regard to those of *C. Sullivanii*, of which there were approximately 30 individual blooms. The conclusion arrived at was *C. Sullivanii* is a valid form, but perhaps should be regarded as a long-surviving—now uni-sexual—representative of the genus—a transitory form, perhaps; once abundant, but now existing in scant numbers actual and comparative—in isolated and few places; subject to a less severe competition than other possibly extinct types. *C. Sullivanii*, following further degeneration of the stigma, is also doomed to extinction.

I cannot trace prior records of antherless orchids; probably *C. Sullivanii* and *C. Nublingii* are unique in this respect. The simply-constructed labellum of *C. Sullivanii* constitutes—in the absence of pollen sacs—a useless appendage. It is not irritable as in all other recorded species, but still retains some slight degree of sensitiveness, as a relic of the past. The stigma, from a bud just about to expand, was critically examined. It was well-formed, with a slight trace of secretion, which appeared to increase in volume when the flower expanded fully. The labella-appendage was the first segment to relax fully. In it there appeared to be little life; but when some specimens were being photographed later, several labella slowly closed,* and could not be induced to open again. Some time afterwards, however, they were again observed in their former position.

The stigmas in the mature blooms of *C. Sullivanii* are, more or less, misshapen by the formation of irregular granulations, which may be the result of insect action—possibly the agent concerned in the pollination. A strong lens brought to light traces of what were presumed to be pollen grains immersed in the now dry secretion around the margins of the immediate centre of the disc-like stigmatic-plate.

These facts, and the evidence in the turgid, hard ovaries, suggest, not a useless sterile plant, but a member of an association, still performing its work and thus exercising an important influence in nature. *C. minor* is certainly a diminutive counterpart of *C. major*, differing mainly in the presence of marked granulations on the labella-lamina—a character of note in *C. Sullivanii*, but to a lesser degree. Is it reasonable to suggest the association of *C. major* and *C. Sullivanii*, producing as progeny *C. minor*? These two forms are not found in close association, but that matters little. *C. major* and *C. minor* are both fairly plentiful throughout the

*The labellum in *C. Sullivanii* does not, owing to its character, close effectively.



Caleana species.

districts where *C. Sullivanii* has been found, but *C. major* is found *chiefly on the lower levels.*

The presence of *C. Nublingii* in close association with *C. minor* and *C. major* in the Blue Mountains of New South Wales further complicates the problem. If we have to think of *C. Sullivanii* as a freak form of *C. minor*, what is the position in relation to *C. Nublingii*? There are, in the flower parts of Mueller's species (as in all the others), some characters which may be termed characteristic ones (see figures). And who has collected specimens of *C. minor* with as many as eight flowers?—the maximum number so far recorded for any of the species.

NOTES BY A. J. SWABY

Mr. Nicholls has kindly allowed me to read his MS. The interesting views put forward, backed by his wide knowledge of orchids and the genus *Caleana* in particular, must be given due consideration. Further, he had a large number of specimens under observation for some time. Nevertheless, it may be of some interest to have the reasons for my *very tentative speculation*. While the facts are vouched for, I must admit that examination was too cursory for my liking. I was in haste to get the specimens away while fresh. Continuous observation in the field was impossible. The orchids were incidental amongst a great mass of material from a locality rarely traversed, and very difficult of access.

1. None of the growing specimens I saw had any possibility of anything capable of containing pollinia. They exhibited varying degrees of abortive attempt. Some had merely a red, undulate, petaloid lamina, comparable to petals towards the centre of a double rose, or those seen in Iceland poppies late in the season. Others had developed rough patches, deeper in colour, or even raised areas with paired pits. Parallel malformations are quite common in garden flowers where the tendency to make a showy flower, encouraged by selection, has resulted in the sacrifice of the male organs. It is as if the flower had reasoned thus: "I must have seeds and prefer cross-pollination. I shall set myself to attract the pollen-bearers and let others look after themselves." That, as Mr. Nicholls points out from another angle, must result in racial suicide. The type specimen of *F.v.M.* at the National Herbarium, collected by Sullivan, and specimens collected later by D'Alton, are also without anthers and apparently could never have had them.

2. No male plants were discovered. The search on the second visit was made thoroughly by five observers, who devoted the greater part of the day to it. It is extremely improbable that any orchid capable of supplying pollen was within reasonable distance except *C. minor*.

3. The plant at Mount Byron is constantly associated with *C. minor*, of which there were scores. Vegetative features are exactly similar, except where mentioned by Mr. Nicholls.

4. In *C. Sullivanii*, the labellum varied very greatly. The simplest was merely a linear-lanceolate, acute petal without differentiated claw; there was no immediate response to touch; and but one papillus, with a few dots surrounding it, was present. At the other extreme, a deep pouch, *bulging inward*, quite as deep as wide, was covered with papilli; *more prominent toward the centre* of the bulge; the acute tip was very short; and the claw was more in evidence. Response to touch, if any, was very slow. I saw none which had bent down naturally. Between these extremes were several intermediates, sometimes different on the one point. All, however, were a long way from the form of *C. minor*.

(Apart from the question of freak or species, this gradation is very interesting as an indication of the probable history of the evolution of *Caleana*. The bifid "bill" of the duck is the inwardly projecting centre of the pouch; the backward point of the head is the tip of the petal; and possibly the "ears" are the widest part of the lamina.)

5. The stigma has a distinct though short stalk or style. To me, this indicates forgetfulness of "what is expected in the family." The degeneracy amounts to a departure from one characteristic of an orchid. The rostellum, as might be expected with no anthers, is a mere rudiment (or vestige). To hint that F.v.M. would set up a species on a malformed flower may be heresy; but the suggestion has been at least thought-provoking. Doubtless, Miss Banfield, Mr. Smith and Mr. Fraser will be found at dawn, like shooters on "opening day," in their respective hunting grounds, on New Year's Day, 1938. For them, and such others as may be in the *Caleana* country, I would suggest the following:

(a) Leave the plants intact as far as possible and mark the *C. Sullivanii* by a coloured celluloid indicator for future observation from year to year.

(b) Are the pouched labellum, narrow column, stalked stigma, and acute lateral petals beside the column ever associated with anthers capable of functioning?

(c) If not, is there any evidence of flowers with only anthers and undeveloped stigma and ovary?

(d) Are there forms of labellum between the deep cup of *C. Sullivanii* and the duck's head of *C. minor*?

(e) Is there any difference in soil, depth of soil, moisture, or aspect?

(f) What insect is attracted; where does it alight; is it entangled for a short time on the sticky papilli; is it entrapped within the flower by the flexed labellum or only caused to make a frantic exit from narrow quarters; is it quietly lowered while its attention is on the red papilli to brush against the stigma? The leisurely movement in *C. minor* suggests the last. [In my experience the movement is invariably sharp.—W.H.N.] By a double movement, the "head" is gently tilted forward to a sharp angle, and the "neck" even more slowly; and later, bows so that the tip of the head, with the papilli, faces the stigma.

(g) Is there any definite relation between the modifications of labellum and column? The reduction of the pouch and papilli goes contrary to the petaloid modifications of the part of the column which should bear pollen.

(h) Is *C. Sullivanii* ever found far from *C. minor*? [No.—W.H.N.]

(i) Is there any variation in one locality of flower parts of authentic *C. minor*? I found them very uniform. This somewhat discounts the "freak" conjecture. [No.—W.H.N.]

KEY TO PLATE—*CALEANA* SPECIES

Fig. A. *C. major*—Column from above.
" B. " Labellum from side.
" C. " Labellum from rear.
" D. " Pollen masses.
" E. " Typical specimen.
" F. *C. minor*—Column from above.
" G. " Labellum from side.
" H " Glands from lamina of labellum.
" I. " Labellum-lamina from above.
" J. " Typical specimen.
" K. *C. Sullivanii*—Column from above.
" L. " Glands from lamina of labellum.
" M. " Labellum from side.
" N. " Labellum from below.
" O. " Specimen from Moyston West.
" P. *C. Nublingii*—Column from above.
" Q. " Labellum from side.
" R. " Gland from lamina of labellum.
" S. " Labellum-lamina from above.
" T. " Typical specimen.
" U. *C. nigrita*—Column from side.
" V. " Labellum from side.
" W. " Labellum-lamina from above.
" X " Typical specimen.

Note: Figures B, G, M, Q and V show the labella in the *same* relative position.

TREE SPARROWS IN VICTORIA

That the Tree Sparrow (*Passer montana*) is fairly numerous around Melbourne is the opinion of several good observers; though others, notably Mr. Robert Hall, have stated that it prefers to avoid the town and keeps more or less to open country. Probably the urban population of Tree Sparrows has increased in recent years; but still the House Sparrow (*Passer domesticus*) is the dominant species in the metropolitan area, and much more numerous than its ally in some localities.

Mr. E. H. Hanks mentions that Tree Sparrows, which are plentiful in Coburg district, in the autumn "flock" much more than do House Sparrows. Mr. George Mack, of the National Museum, until shown specimens by Mr. Hanks, had not seen the Tree Sparrow in Victoria, and the species is not represented in the Museum collections.

JOHN STICKLAND

The death, at an advanced age, of Mr. John Stickland, has removed another of the pioneers of the Club, he having joined it in November, 1880, six months after its inauguration. During all the lengthy period of his membership he was a regular attender at meeting and excursions, and maintained an unflagging interest in the Club's activities, fulfilling terms of office, and, by means of papers and exhibits, doing a full share towards forwarding the study of natural objects, which is its specific aim.

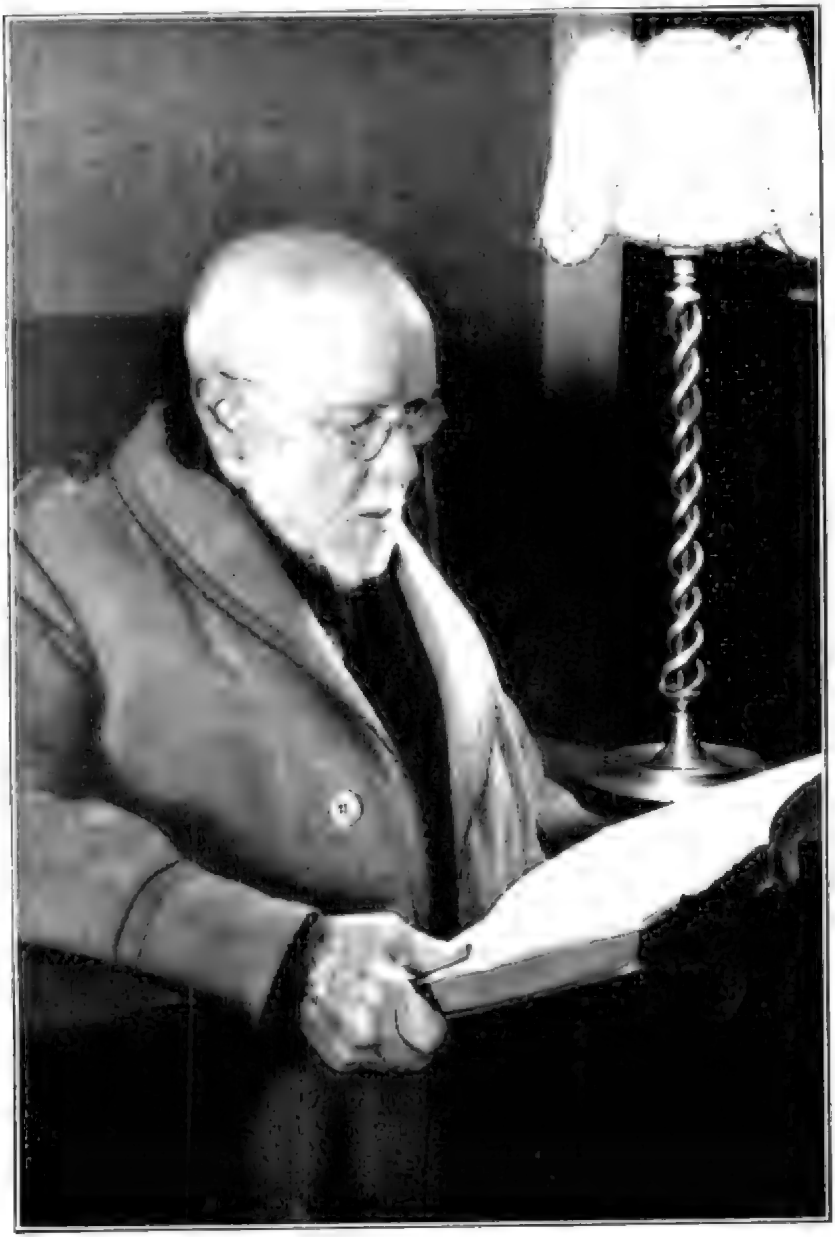
Mr. Stickland's special interest was the study of microscopic forms of life. Some forty years ago there was a development in the work of the Club in the direction of investigating the structure and relationships of living things, and this necessitated resort to the microscope both for the study of organisms too small for the unaided eye, and the internal anatomy of those larger. A number of very enthusiastic workers devoted themselves to the collection of forms of life in which the trend of biological science was stimulating interest. Our late friend was one who joined in these activities and ultimately devoted his attention to the Protozoa—Infusoria as they were then styled. The study and identification of these minute creatures calls for careful manipulation of the microscope, and much patient observation, and he possessed the qualities necessary in no small degree.

He was one of those whose relief from business affairs needs to be something entirely disconnected from them, and who do not find in mere amusement sufficient satisfaction and turn to a field of thought requiring intellectual effort, and affording a prospect of adding to one's knowledge of the world around. Such a disposition evokes respect. On the excursions of the Club John Stickland's collecting apparatus was always at hand, and later, lists of forms noted were supplied. Evidence of his knowledge of the Protozoa is the fact that from June, 1915, to June, 1916, together with two other members of the Club, he systematically, by fortnightly visits, searched the lake in the Botanic Gardens and gave a list of fifty-two forms which he identified. In the *Victorian Naturalist* (Vol. XL, p. 65, and Vol. XLI, p. 84) will be found an article on "The Aquatic Protozoa of the Melbourne District," which amply demonstrates his knowledge of the subject, and application to it.

He was of a modest and unassuming character and could discuss a difference of opinion with an evident desire to arrive at a correct conclusion regardless of preconceived ideas. All those acquainted with him, both in the Field Naturalists' Club and the Microscopical Society, of which latter body he was also an active member, will deeply regret the loss of so worthy an associate.

J. Shephard.

Plate XVII



JOHN STICKLAND

THE BIRDS OF MOUNT BUFFALO

By BLANCHE E. MILLER

Of the birds that frequent the higher altitudes to the north-east of the State, we have scant information. This is all the more surprising when we consider the number of papers on the alpine flora that have been published in our journal.

On the occasion of the first official visit of the Field Naturalists' Club to Mt. Buffalo, twenty-six species of birds were recorded by Miss McHaffie (*Vic. Nat.*, Vol. XX, pp. 148-150). The list gives an accurate idea of the birds that may be seen there to-day, during the summer months, the one rarity being the Green Leek (*Polytelis barrabandi*), which Miss McHaffie mentioned as "seen occasionally amongst the stunted eucalypts or near the creeks."

Twenty-three years later, the Buffalo Plateau was visited by the late Mr. L. L. Hodgson, who was at that time Honorary Secretary of the Club. In a paper which he read, and which was subsequently published (*Vic. Nat.*, Vol. XLIV, pp. 188-196), seventeen species of birds were mentioned, but of these five only had not been previously recorded. This brought the list to thirty-one—all sight observations, seeing that the use of firearms is not permitted in our National Parks.

During the recent week-end excursion of the Club to Mt. Buffalo I was able to add twelve species to the list, but by no means does this exhaust the possibilities. Just why the two previous lists did not include the names of familiar and comparatively common birds such as the White-naped and White-plumed Honeyeaters, the Little Wattle Bird, and the White-throated Tree-creeper, is a matter for conjecture. No Cuckoo had been recorded for the Park until our recent visit, when we saw a White-browed Scrub-Wren industriously endeavouring to supply the needs of a young Fan-tailed Cuckoo. Seemingly, they also are served, who only sit and call incessantly!

An ornithologist of repute has stated that the names of several of the more common birds form the key to the locality in which they were seen. Mt. Buffalo's six would be: The Grey Currawong, digging in the lawns in front of the Chalet, and elsewhere; the Flame Robin, about the rocks in the vicinity of the Gorge—summer visitors these, despite their appearance on the railway posters depicting alpine sports; the Crimson Rosella, which has discovered an easy "design for a living" in the feed-boxes at the stables; the Gang-gang, large companies of these querulous birds; Pardalotes, calling continuously in the snow gums; and the Yellow-faced Honeyeater. Yet the two latter species had not previously been listed.

We have long known that the Lyrebird is quite at home on the granitic heights of the Buffalo, and has been seen at the picnic

ground, and close to the tennis courts. That the presence there of its commensal, the Pilot Bird, had not been noticed hitherto, is somewhat surprising. Of restricted range, we are accustomed to find this small brown bird with its rich, clarion call, in the dense, dark gullies, yet several members of our party both saw and heard the bird on a flat which was very exposed, although mostly covered with low vegetation, and watered by a tiny stream. Knowing that the Pilot Bird is extremely local, we had no trouble in again seeing and hearing at least two birds at the same spot on the succeeding day.

Swifts flying so high over the Chalet that only occasionally could one be detected with the naked eye was a rather rare sight, at any rate, for me, and added another species to the list for the Buffalo Plateau. Some doubt has been expressed as to the possibility of the Swifts finding food at such a high altitude. Mr. F. E. Wilson, the President of the Entomological Society of Victoria, does not doubt that, in favourable circumstances, insect life may reach a considerable height, and points out that it is the height above the ground that counts, not the height above sea-level.

The Official Guide reported the appearance of Yellow-tailed Black Cockatoos, which he considered to be very rare visitors. The late Mr. Hodgson saw a flock "wheeling and circling above the Gorge" on one occasion only. They do not appear on the first list. The scarcity of water-birds on Lake Catani is very disappointing. Earlier in the year a Black Duck was seen with its brood. The presence of a lone Coot at the farther end where the reeds grow in the shallow water suggested that the avine population was greater than appeared to be the case.

Both previous observers record the White-backed Magpie. Miss McHaffie's note reads: "Not particularly abundant, and did not observe any of the Black-backed variety." I feel confident that the Magpies which we saw last year were White-backs, but this year they undoubtedly were Black-backs. This circumstance is further evidence that the northern species, although slightly smaller, is steadily encroaching on areas formerly inhabited exclusively by the southern White-backed Magpie. With our knowledge of how jealously the Magpie guards its territory, even driving out its own offspring when grown, the invasion and occupation by the northern Magpie becomes a matter of exceeding interest. It seems to point to a complete reversal of the opinion held by Mathews that, eventually, the White-back will absorb the Black-back. Furthermore, it affords us an illustration that it is still possible to make field notes on the geographical distribution of even such a common bird. How little we really know; how much there is still to learn!

NOTES ON THE DISTRIBUTION OF CERTAIN ORCHIDS

By the REV. H. M. R. RUPP, Raymond Terrace, N.S.W.

The title sounds rather "dry" if you say it aloud; nevertheless the subject of distribution (whether of orchids or of other plants) is a most fascinating one. You find yourself continually asking: "Why?" and you never use this little interrogative unless you are interested. In this article I propose to ask "Why?" in regard to the range and character of the habitat of a number of our native orchids; but I do not propose to give the answer. Even if I could —which in most of the cases is extremely doubtful—my purpose in writing is not to try to explain the reasons for distribution, but rather to suggest to the large and ever-increasing number of orchid enthusiasts a field of study which has hitherto been little explored.

There must be many who, like myself, are not satisfied with the bare statements that a certain orchid occurs, in abundance, in one locality only; while another, closely allied and with no immediately obvious superiority of constitution, is spread over hundreds of thousands of square miles. We want to know why—and there must be a rational answer.

The first species I propose to discuss is one familiar to orchid folks in every State of the Commonwealth except Western Australia: *Dipodium punctatum*, the Hyacinth Orchid. Now this plant has an astonishing range of habitat, which cannot be satisfactorily accounted for by saying that its health and vitality are unusually dependent on its association with certain mycorrhizal fungi, and that wherever these exist the orchid will flourish. If that be the whole explanation, it is one which should make all scientific workers sit up and take notice. For if the symbiotic relation between the mycorrhiza and the orchid gives the latter power to adapt itself to such extraordinary differences in climate and environment, may not such power be won for higher organisms than orchids by analogous methods? What is it which makes this *Dipodium* equally at home along the shores of D'Entrecasteaux Channel in southern Tasmania, and at Alma Den, one hundred miles west of Cairns in tropical North Queensland? I have collected it myself in the former of these localities, and have lately received a raceme of typical flowers from the latter. I have seen it growing in sand within a few feet of salt-water estuaries on the New South Wales coast, and have gathered it on heavy black soil near Glen Innes at an altitude of nearly 4,000 feet, on country subject to winter snows. What gives it this marvellous adaptability? And what is the secret of its abundance in comparison with the rarity of the closely-allied *D. Hamiltonianum*? The latter is a very similar plant with similar habits, yet it has only been seen in New South Wales and southern Queensland. Though rare, it seems to be capable of

adapting itself to varied conditions, for it extends farther into the dry interior than *D. punctatum* (Coonabarabran, N.S.W.), and has also been located near Sydney (Epping), and on the high western slopes of New England. Yet it is never plentiful. When I received specimens from two localities in 1935, I had not seen it for over twenty years.

Then take the case of *Cymbidium canaliculatum*. Here is another orchid—this time an epiphyte of sorts—with an amazing range of habitat. I have qualified the term epiphyte because our Cymbidiums are not epiphytes in the same sense as a *Dendrobium* or a *Sarcochilus* is an epiphyte. The roots do not grow along the surface of the bark of the host, but penetrate into decayed hollows. This is particularly the case with the species in question. Its most southerly locality hitherto recorded is the Forbes district of New South Wales. From there it extends right to Cape York, and from Cape York it continues round the Gulf country and at least as far as Roebuck Bay in the nor'-west of Western Australia. I have not heard of it near the coast farther south than the Hunter River, but inland, as indicated above, it has been traced to Forbes. North of the Hunter it seems equally happy on either side of the Dividing Range, and I have seen it at an altitude of 4,000 feet on Mt. Kaputar; yet it flourishes on the dry, wind-swept plains of the western country. Why it has not crept down to Victoria and South Australia I cannot understand: it may yet be discovered there, of course. Eucalypts are its favourite hosts, but I have found it on Angophoras, cypress-pines, belahs, and other trees. It is often a very bulky plant.

In contrast to these, take the case of *Diuris venosa*. At about 5,000 feet on Barrington Tops, 60 miles north of Newcastle, this pretty little lilac hued terrestrial occurs literally in myriads. No definite record can be obtained of its existence anywhere else. Similar plateaux to that of Barrington Tops are found elsewhere in New South Wales and other States, but they have been scoured in vain—so far—for this *Diuris*. Why? It is so abundant, and it reproduces itself so prolifically, on the Barringtons that one would expect it to appear in similar situations. Examples to this effect are not lacking in that very locality. *Chiloglottis Gunnii* and *Pterostylis falcata* have not been recorded for New South Wales, so far as I am aware, between the Kosciusko highlands and those of Barrington Tops, but both reappear on the latter; and *C. Gunnii* has now been traced for 40 miles north-east of Armidale on the New England plateau.

Another curious and intriguing case is the distribution of *Chiloglottis formicifera*. So far as Australia is concerned, this species appears to be endemic in New South Wales; roughly speaking, between the Shoalhaven and Hunter Rivers. Yet it is found across the 1,200 miles of the Tasman Sea, in New Zealand.

Pterostylis rufa was credited by the older generations of botanists with occurrence in every State of the Commonwealth. This extensive distribution is doubtful, as more than one species was formerly included in *P. rufa*. No such doubt exists, however, in the case of *P. curta*, of which I have actually handled specimens from every State. It is a far cry from the Atherton Tableland in North Queensland to the south-west of Western Australia, yet such is the range of this Greenhood, which also extends to Tasmania. *P. nutans* has also been reported from Western Australia; it is in all the other States, but has not been seen far north of Brisbane; but it is undoubtedly in New Zealand.

Of much interest is the appearance of comparatively rare species (located in and described from limited areas) in localities many hundreds of miles away from that of the type. It is, of course, not unlikely that the wide gaps may be narrowed by the discovery of specimens in between. Examples are *Caladenia latelata*, a very uncommon species of South Australia and western Victoria, which turned up unexpectedly at Bullahdelah, 70 miles north of Newcastle, New South Wales; *Thelymitra chasmogama*, of the Mt. Lofty foothills in South Australia, discovered on the South Maitland Coalfields, New South Wales, in 1934; and *Lipuris habenarina*, a little-known tropical Queensland plant, which has been found on the north coast of New South Wales.

I trust that these somewhat haphazard jottings may serve to stimulate attention to the interesting problems provided by the distribution.

EXCURSION TO MOUNT BUFFALO NATIONAL PARK, JANUARY 29 TO FEBRUARY 1, 1937

Fine and cool weather prevailed for the third official Club excursion to Mt Buffalo National Park, and in the limited time available during the Australia Day week-end (Jan. 29 to Feb. 1) full opportunity was taken by the nine members and friends comprising the party to visit as many points of interest on the Plateau as possible. The summer at this altitude is the equivalent of the spring in the lower levels; consequently, there was no lack of botanical specimens to examine, though the first flush of the spring blossoming period was just past. Those in the party visiting the mountain for the first time expressed surprise at the wealth of native flora, its variety and quality, with the close proximity of many species to the Chalet.

Snow Gums and several other Eucalypts were still in flower, and this factor brought under notice some of the honey-eating birds from the lower level forests. Exceptionally fine specimens of the Grass Trigger-plant and the Austral Bluebell were met with everywhere. The first outing was around the famous Gorge and then on to Reed's Lookout, where typical alpine flora was found. Strange to some members of the party were the Blotchy Mint-bush (*Prostanthera Walteri*), an uncommon flower with a prolonged blossoming period that appears to be increasing over the Plateau; the Alpine Boronia; the *Helichrysums*; the attractive shrub, *Pomax umbellata*; the Derwent Speedwell; the white *Kunzea pedunculoris*; several species of *Brachycome*, and other species. The next walk, around Lake Catani, revealed a blaze of colour in the "tundra" flora; such species as the Alpine

Marsh-marigold (*Caltha introloba*), *Kunzea Muelleri*, *Phebalium podocarpoides*, *Grevillea alpina*, *Podolepis longipedata*, the Golden Everlasting (*Helichrysum bracteatum*), particularly profuse and dazzling in rich colour, late spikes of *Richea Gunnii*, and the Veined Sun-orchid (*Thelymitra venosa*) in shades of blue and pink. On this walk Mr. V. H. Miller located the Bogong Leek-orchid (*Prasophyllum alpinum* R.Br, *Pr. Tadgallianum* Rogers), so far as can be ascertained, not previously reported from Mt. Buffalo. Other species noted as common to the locality were the Potato Orchid (*Gastrodia sesamoides*); and surely the most beautiful of all Victorian orchids, the Alpine Leek-orchid (*Prasophyllum Suttonii*), which thrives in the open boggy spaces at the head of the lake.

The next day a stroll was taken in the direction of Billson's Lookout and the Haunted Gorge where attention was divided between the superb mountain vistas and further examples of high altitude botany. Here was noted the Tiny Greenhood (*Pterostylis parviflora*), and, after a protracted search, three plants of the diminutive rare Elbow Orchid (*Spiculæa Hamiana*), discovered last year for the first time near the same vicinity. The same afternoon we made the seven miles motor trip to the Horn, the highest point on the Plateau, 5,645 feet above sea-level. Here the botanical interest was even more stimulating. The flora illustrated the manner in which plants survived the battle with extreme alpine conditions in an exposed and seemingly inhospitable region. The native grasses grow exuberantly and the dwarf, stunted Snow Gums make slow but sure recovery after disastrous fires of some 25 years ago. In the descent from the pinnacle at the Horn down the precipitous Wall of China track, we saw the Mountain Plum-pine (*Podocarpus alpina*) flourishing between the granite boulders, and thick tufts of Tussock-grass at approximately 5,600 feet above sea-level. This *Cyanosporus*, one of the eight species native to Victoria, grows at higher altitudes than any other shrub or tree on the Plateau. A little lower down plants of the Mountain Aciphyll were in bloom, which, with the handsome greyish foliage and large white trusses of the Alpine Daisy-bush, together with late flowers of *Dianella tasmanica*, made a delightful picture.

The imposing Monolith not far from the Chalet was also visited. The bush contained further flowers in profusion, notably *Oxylobium alpestre*, the Satin Everlasting (*Helichrysum leucopsidium*); *Goodenia geniculata*; *Epacris paludosa*, and the mountain Heath-myrtle (*Baeckea Gunniana*). Travelling down the mountain on the return journey, we admired fine clumps of the lovely blue Rock Isotome near Mackay's Lookout, and lower down had glimpses of very robust specimens of the Hyacinth Orchid.

Bird life is limited on account of the normal nesting season coinciding with snow and ice conditions, but during the warmer weather many types of birds visit the higher altitudes in search of food, chiefly nectar from the myrtaceous flowers, lizards and Bogong moths and other insects. On the slopes towards the Underground River are haunts of the Lyrebird. One or two mounds were seen, and recent scratchings, while in the distance Menura's vocal mimicry could be heard; but the birds were too far down the mountain to be seen. Mrs. V. H. Miller noted several species of birds not previously recorded for the Plateau, among them the Boobook Owl. Black-backed Magpies were observed in the paddock at the back of the Chalet, where the White-backed variety was noted last year. On two successive days the Pilot-bird was both seen and heard, and one morning a large flock of Swifts, visible only through field-glasses, flew over the Chalet.

It was estimated that at least a hundred native plants were in bloom, and had other parts of the mountain been visited the list would doubtless have been extended. Regretfully it was noted that bushfires had taken heavy toll of the trees and shrubs in recent years; also that it is still necessary to use the National Park timber for the Chalet fuel requirements.

H.S.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, March 8, 1937. The President, Mr. S. R. Mitchell, presided, and about 100 members and friends attended.

LANTERN LECTURE

The subject for the evening was an illustrated lantern lecture on "Australian Wild Flowers," given by Mr G. N. Hyam, the slides in natural colours having been prepared by Mr. H V. Reeves from his own photographs.

Mr. Hyam commended many plants for garden use, and gave interesting notes on some natural hybrids illustrated; further he remarked on the advisability of forming a collection of photographs, covering all phases of natural history for the use of writers and lecturers.

Several members expressed their appreciation of the illustrations, and the President, for the Club, thanked Messrs. Reeves and Hyam.

OFFICERS VISITING ENGLAND

The President announced that the Treasurer, Mr. J. Ingram, and the Assistant Librarian, Mr. W. H. Ingram, were leaving on the following Saturday for England, and on the members' behalf wished them bon voyage and a safe return.

BUSINESS FROM MINUTES

Preservation of the Koala.—Mr. V. H. Miller stated that a deputation was to wait on the Chief Secretary on a date to be fixed.

Evening Excursion to the Zoo.—It was announced that this had been postponed until further notice.

Vandalism at Mt. Buffalo.—The Secretary stated that the Committee had decided to send a letter to the Chief Secretary with reference to this matter.

CORRESPONDENCE

From the Zoological Society of Victoria, inviting membership.

From Mr. R. Eadie, Badger Creek, regarding the forthcoming Club excursion. The President mentioned that "Splash," the

famous Platypus, had just died. Mr. V. H. Miller suggested that a letter be sent to Mr. Eadie expressing the Club's regret.

REPORTS OF EXCURSIONS

Excursions were reported on as follows:—Yarra River trip, Mr. W. Hanks; and Cheltenham, Mr. Charles Barrett for Mr. L. G. S. Butler.

ELECTION OF MEMBER

On a show of hands, Miss F. R. Faul was elected as an Ordinary Member of the Club.

NATURE NOTES

Mr. A. R. Varley mentioned that Platypus were common in the Werribee River at Werribee.

GENERAL BUSINESS

Mr. Charles Barrett asked for an expression of opinion from the General Meeting in the matter of reprints being given to authors of papers published in the *Naturalist*. It was decided that the matter be referred to the Committee for re-consideration.

EXHIBITS

Mrs. Charles Barrett.—Orchid (*Dendrobium* sp.) from Koolpinyah, Northern Territory; and marine shells, from Brunswick Heads, New South Wales.

Mrs. Fenton Woodburn.—Earth Stars (*Geaster fimbriatus*) from Batesford, Victoria.

Miss A. Cornish.—Dendritic markings from Lilydale.

Mr. Charles Barrett.—Satin-banded Spider (*Argiope aemula*), from Balwyn.

Mr. L. W. Cooper.—*Dipodium punctatum* (Hyacinth Orchid), *Loranthus quandang* (Grey Mistletoe), *L. Miquelii* (Stalked Mistletoe), and *Dipsacus fullonum* (Fuller's *Teazel*).

Mr. L. W. Langford.—Tertiary fossils, from Orbost, Victoria.

Mr. E. S. Hanks.—Specimens of Tree Sparrows and House Sparrows.

Mr. A. R. Varley.—Sponges and Polyzoa.

Mr. V. H. Miller.—Stone Axes, etc., from the Melbourne District.

Mr. F. S. Colliver.—Common dendrites from Lilydale, and Dendritic Limonite from Rowsley.

Master A. W. Colliver.—Trap-door Spider's Nest, from Broken Hill, New South Wales.

STUDIES ON AUSTRALIAN AQUATIC FUNGI

By KATHLEEN M. CROOKS, M.SC.

In recent years, investigations have been carried out in different countries, notably Great Britain, the United States, Germany and Denmark, to ascertain the nature of the aquatic fungus flora. Hitherto, in Australia, the attention of workers has been confined to the terrestrial fungus flora, with the exception of records of *Saprolegnia ferax*, in association with a disease in fish.

A preliminary investigation of some of these aquatic fungi has been carried out, using the methods employed by workers in other countries. All the forms collected belong to the group of fungi known as the Phycomycetes, composed of filamentous hyphae without septa, although sometimes they are constricted at intervals.

To obtain the fungi, fine wire-mesh baskets, containing baits of various kinds, were placed in different localities—ponds, artificial or natural, or in quiet running rivers. A long wire anchored the traps to the shore.

The baits used were chiefly fruits of various kinds—apples, plums, prunes, grapes, oranges, bananas, *Solanum pseudocapsicum*, *Crataegus*, *Japonica*, *Cotoneaster*, rose hips, also twigs of various kinds. The traps were submerged for varying periods of three to eight weeks. At the end of this time, the fruits were brought into the laboratory, and washed in running water for a day to remove all traces of mud. They were then transferred to dishes containing sterile distilled water, with loosely fitting covers, so as not to exclude the air, and kept at a low temperature. Examination of the baits was commenced immediately.

In most cases, the fruits, particularly apples, rose hips, *Crataegus* and *Japonica* fruits, were thickly dotted with white to yellowish patches, representing pustules not more than 1 mm. in diameter. The fungi in these pustules were usually members of the Leptomitaceae or Blastocladiaceae, the members of which are rather tree-like in form. They have a well-developed rhizoidal system, and the trunk is of the same or greater diameter than the branches. On the finer branches, the reproductive organs are borne.

The filamentous forms belonging to the Saprolegniaceae, were not visible when the baits were first brought in to the laboratory, but after a few days, the long hyphae commenced to grow out from the twigs or fruit. If boiled halved hemp seeds are placed in a dish with the baits, the filamentous forms will grow out readily on the hemp seeds. These latter forms can also be grown successfully on artificial media, but the forms with a well-developed rhizoidal system cannot be successfully grown in culture.

Twenty different species were examined, and their systematic and physiological characters have been described. Up to date,

only one new species, *Blastocladia aspergilloides* n.sp., and one new variety, *Achlya americana*, var. *megasperma*, nov. var., have been recorded.

The life-history of these aquatic forms is naturally adapted to the environment, and consequently they reproduce in part asexually, by the formation of free-swimming zoospores. The zoospores are formed within a sporangium which, when mature, bursts to liberate the spores, which swim actively by means of cilia. These zoospores are either uni-ciliate or bi-ciliate, and on germination, produce new plants. Sexual reproduction is well known in the forms belonging to the Saprolegniaceae. The male and female organs are different in structure—the female a large spherical oogonium, which is fertilized by the male antheridium—a tube-like structure adjacent to the oogonium. The result of fertilization is the formation of one to many oospores. The germination of the oospores may occur soon after maturity, or it may be preceded by a lengthy resting period.

In the Blastocladiales, sexual reproduction has been described in only one genus—Allomyces, a form not yet recorded in Australia. In contrast to the Saprolegniales, the male and female organs are similar in shape, but differing in colour and also in size, and both contain motile gametes. These gametes resemble zoospores, and are uniciliate, but the male are only about half the size of the female. The male and female gametes unite to form zygotes, which germinate in three to four hours to form new plants.

However, in *Blastocladia* and *Gompodya*, also members of the Blastocladiales, sexual reproduction has not been demonstrated with certainty. Large "resting-spores" are found in *Blastocladia*, and are regarded by some workers as oospores which have developed parthenogenetically, i.e., without being fertilized by an antheridium. These resting-spores are capable of overwintering for a long period—unlike the zoospores of *Blastocladia*, which are extremely sensitive to environmental changes.

LOWER YARRA EXCURSION

This excursion was duly carried out after the launch had twice returned to the wharf to pick up latecomers. About 65 members and friends were present.

The physiography is somewhat difficult, as the Melbourne Harbour Trust has altered the river so much. However, the leader described the river and surroundings as they used to be, pointing out the site of the falls, the mouth of Elizabeth Street Creek, and the site of various bends, including the Devil's Elbow caused by the junction of the Moonee Ponds Creek with the Yarra, and the waters of the Bay, forming a bar behind which the river was forced towards Footscray. The Maribyrnong River also was described; it is in a more natural state than the Yarra.

W. HANKS.

FOSSIL LOCALITIES IN AND ABOUT MELBOURNE

By F. S. COLLIVER

PART III—MOONEE PONDS CREEK.

The best locality in this area is the old geological survey Section, just beyond the bridge over the creek at Ormond Road. To reach there take either a Brunswick or an Essendon tram, alight at Ormond Road, and walk straight down to the creek and along the bank on the Brunswick side for about 100 yards in the direction of North Essendon; then climb down the path leading to the creek bank.

This excursion should not be undertaken in wet weather, the path down the cliff can be dangerous, as the soil is clay. Again, the cliffs are of sandstone, and in some parts overhang, so that care should be taken to inspect the position where it is desired to work, and make sure that no loose blocks are liable to fall during operations.

Close to the path, just before it reaches the actual bank, will be seen a band of friable sandstone, and if pieces of this are broken out with hammer and chisel and examined they will be seen to consist almost entirely of casts and impressions of shells, etc. Occasionally, however, a small shining black patch is noticed; if close examination proves it to be a shell type, it probably is a Lamp Shell or Brachiopod of the genus *Lingula*, allied types of which are still living in Queensland seas, as at Mission Bay, near Cairns. This fossil has a very long time-range, and an interesting point is that this black patch consists of some of the original material practically unchanged; in this case it is not calcium carbonate, but an organic material allied to horn.

Several other genera of Lamp-shells may be found here, and also a few shells, both univalves and bivalves. The Cephalopods are represented by straight Nautiloid shells; starfish are not uncommon, and trilobites sometimes are found. Crinoids, Corals, etc., are all to be found in this locality.

With reference to the above list, the shells are found as casts and impressions, and the crinoids, starfish and corals in a similar state; the trilobites mostly are collected as fragments, but sometimes complete, for example, a large almost perfect specimen of *Homalonotus harrisoni*, McCoy, was found during the early survey work, but very few have been collected since.

The faunal assemblage is typical of the Palaeozoic, and particularly so of the Silurian age section, and these beds are so well developed about Melbourne with their fossils similar over the area that they are called the Melbournian Series. This series, being the oldest near the city, is further called the Bed-rock of Melbourne, and is not replaced by anything older until near Sunbury.

All the material at this section may be termed fossiliferous, but specimens are far more rare in the upper beds, although generally, when found, they are better preserved.

Before leaving the area it will be well to notice several interesting general geological features. At the present locality, the rock wall shows a slight dip, and the bedding as a series of parallel lines; this is because the beds are cut across the strike. These two terms may be illustrated by holding a book up by the back so that the leaves fall apart, and stand out at an angle. The up-turned edges well represent the strike, and the angle the leaves form with the horizontal is the dip.

Walking back along the creek bank several patches of shale will be noticed, and some of these will have a slight coating of white powder. Testing this with the tongue proves it to be alum. It is formed in rather an interesting way. The colour of the shale is due to pyrite, a sulphide of iron mineral, and with the break-down of this and liberation of some of the sulphur together with rain water a little sulphuric acid is formed; this in turn attacks the clay, which is mainly an hydroxide of aluminium and some sulphate of aluminium, the parent of alum is formed. This forms as a whitish powder on the rock faces.

One other point of interest is, that among the hill wash at this locality, Dr. G. B. Pritchard, a Club member at the time, collected several small crystals of amethystine quartz. These are rare, however, for I have looked many times without finding a specimen.

The following are the commoner fossils from this area, and the majority of these should reward the earnest seeker for a few hours' work.

Corals—
- *Favosites* sp.

Crinoids—
- Sundry fragments.

Starfish—
- *Promopalaeaster meridionalis* var.
- *Petraster smythii*, McCoy.
- *Protaster brisingoides* Gregory.

Brachiopods—
- *Lingula* sp.
- *Camarotocchia decemplicata* Sow.
- *Orthis* sp.

Mollusca—
- *Palaeoneilo victoriae* Chap.
- *Nuculites maccoyianus* Chap.
- *Cyclonema* sp.
- *Loxonema* sp.
- *Murchisonia* sp.
- *Orthoceras* sp.
- *Cycloceras ibex* Sow.

Trilobites—
- *Homalonotus harrisoni* McCoy.
- *Ampyx* sp.
- *Calymene* sp.

Plate XVIII

Photo by D. Dickison

Orange-winged Sittella on nest

THE ORANGE-WINGED SITTELLA (*NEOSITTA CHRYSOPTERA*)

By D. DICKISON

Though better known as Tree-runner, the Orange-winged Sittella is quite a common species in Victoria, and it ranges as far north as Southern Queensland. It is more or less a coastal form, but further inland its place is taken by the Black-capped Sittella, which is practically similar in appearance except for the darker feathers on the crown of the head.

Through its habit of keeping to the tree-tops, and being so small in size, the Sittella is not well known except to the bird student, but its twittering notes as it flies from tree to tree may be loud enough at times to attract the attention of persons who are not bird lovers. For the greater part of the year this bird congregates in small flocks of from eight to a dozen individuals, and even during the breeding period these small parties occasionally are seen. The Sittella is a most restless bird. Flying into the top-most branches of either a green or dead tree, it works its way rapidly down the branches to the trunk, and then flies off to another tree, to repeat the performance. Its methods of searching for food are in contrast to those of the tree-creepers, which work up the trunk of the tree to the branches.

It is not usual to find the Orange-winged Sittella close to Melbourne, but some years ago a pair built a nest in a tall Paper-bark tree growing on the banks of Gardner's Creek, not far from the East Malvern Station. On other occasions they have been seen in the eucalypts around Ashburton, but it is now a few years since any have been seen out there.

Male and female are practically alike in appearance, but the female has the feathers on the crown of the head darker than the male. In the box timber beyond Melton specimens with the feathers black on the head have been noted on many occasions, but in all such cases they have been in small flocks with other birds, whose feathers on the heads have been either brown or black brown. It seems hardly likely that the Black-capped Sittella of the dry inland would range so far south, but at the present I am inclined to consider the dark-headed specimens to be merely a form of maturity due to age.

The nest, a beautiful example of bird architecture, is built of small chips of bark and woven together with cobwebs. It is always placed in a sharp fork of a dead branch at any height from 10 ft. to 80 ft. from the ground. Generally three eggs form the clutch; they are thickly covered with black and reddish-brown markings, particularly at the larger end. Incubation takes

thirteen days, and the young ones remain in the nest for a similar period.

The breeding season is at its height in the latter part of October and during November. In Southern Victoria some pairs build as early as the first week in September, but, as with most birds that nest early, the period of building the nest is extended over several weeks, which is not the case later in the season.

Male and female work together in building the nest. They are quite fearless of the presence of a human being near the nest, but if the nest is touched they will readily desert it, even though the eggs may be on the point of hatching. At other times, when they have almost completed the building of the nest, and without being molested in any way, they will suddenly decide to tear the structure to pieces, and build elsewhere, and often the new nest may be three hundred yards away from the site of the old one.

The best time to photograph the Sittella is either during the building period or when there are young ones in the nest. They will then come regularly to the nest, and a good picture of the bird itself can be obtained, otherwise, if sitting on the eggs the bird is too deep down in the nest for photographic purposes.

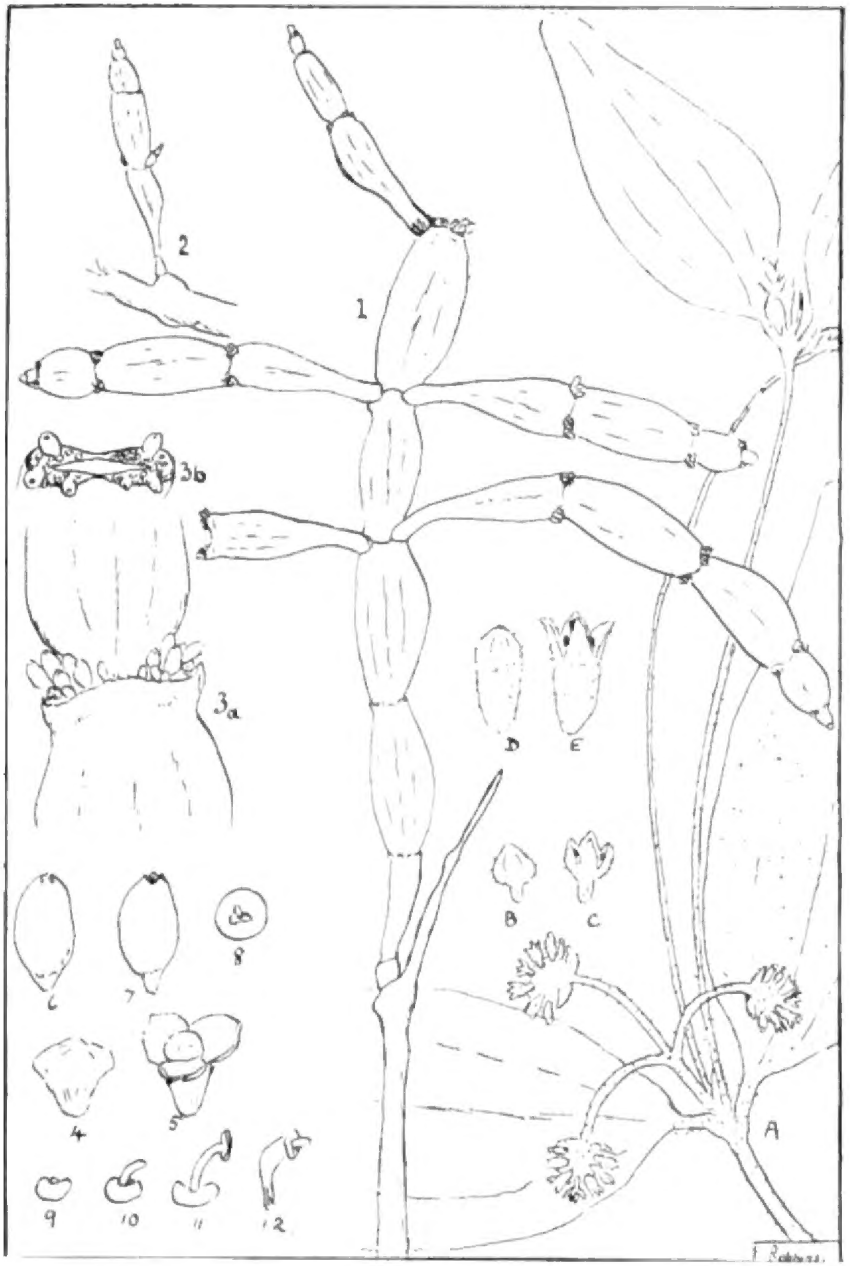
TWO MISTLETOES NEW TO VICTORIA

By FRANK ROBBINS, B.Sc.

In June, 1935, while showing a city friend the famous Pipeclay Creek, Orbost, I noticed a cactus-like parasite on the Lilly-pilly (*Eugenia Smithii*) there. This was identified by the Government Botanist as *Korthalsella articulata*, Jointed Mistletoe, which belongs to the Loranthaceae, but in a different section from the commoner *Loranthus* and *Phrygilanthus*. Another loranth, *Notothixos subaureus*, Golden Mistletoe, closely related to the jointed species, was found by Miss E. K. Turner at Mallacoota (*Victorian Naturalist*, February, 1935). The latter is always parasitic on members of its own family, in this case, on *Phrygilanthus eucalyptifolius*.

Considerable interest is attached to these discoveries, as the British *Viscum* is very closely related, particularly to *Notothixos*, and there are no definite Victorian records of species of this section of the mistletoes. A detailed description, with plates of both these plants, is given by Blakely in his revision of the three genera, *Korthalsella*, *Notothixos*, and *Viscum*, of this section, Proc. *Linn. Soc. of N.S.W.* (1928), Vol. 53, p. 31, *et seq.*

At Pipeclay Creek, *Korthalsella articulata* has been found growing only on the Lilly-pilly on about half a dozen trees, distributed half a mile from the mouth of the stream. The plants are mostly small, 6 inches or less, erect, cactus-like, and very difficult to



Mistletoes new to Victoria, *Korthalsella articulata* and *Notothixos subaureus*.

detect amid the host's foliage. The Jointed Mistletoe is rare in South Australia (one report, L. Eyre), West Australia (one report), and Queensland (two reports, plants in each case growing on *Eugenia Smithii*); but is found in many places in New South Wales on more than six different hosts, including the garden Peach. Frequently, it grows to a length of 24 in. in pendulous, compact masses. Two species of *Korthalsella* are known in Australia, and probably three from the Pacific Islands.

The most striking feature of this plant is its unusual habit of growth. Being leafless, the function of leaves is performed by flat, ribbed, jointed stems or internodes, hence the cactus-like appearance. At the joints or nodes, the upper part of the internode is expanded into a socket-like floral cushion, which acts not only as a receptacle for flowers and fruit, but is also the point from which new shoots grow; usually, two shoots, but often three. In *Viscum*, this cushion is a mere band. On this expanded collar will be seen numerous closely-packed, sessile fruits and flowers, with dark-coloured short cilia between them. These ovoid fruits almost encircle the node, being thickest on the broader shoulders.

The flowers are unisexual, and very small, about 1 mm., the males being even smaller. I have observed the male flowers in November and January. They are three-partite, with a globular centre (anthers), and very few are found. The female flower looks just like a fruit with a tiny three-lobed opening at the top, and a tiny stigma. The remains of the perianth can always be more or less distinctly seen on the top of the fruit. Inside each fruit there is a tiny kidney-shaped viscid seed, about ½ mm. diam. I do not know what disperses the seeds, but in November observed a number of seeds germinating on the parent. These, of course, would soon die. I found no evidence of a disc, but the shoot attaches itself to the host by a disc, and after losing the seed, the shoot soon shows the nodose branches with the dark cilia encircling the nodes.

There are ten species of *Notothixos*, four being Australian, and six belonging to the Pacific Islands, etc. They are usually golden stellate or hoary plants, usually parasitic on members of their own family. *Notothixos subaureus* is very common north of Sydney to the Hawkesbury River, and also in parts of Queensland, growing on nearly a dozen other members of its own family, and rarely on plants of other families. In January, 1937, I observed it at Mallacoota growing on *Phrygilanthus eucalyptifolius*, right in front of the hotel, and also in larger quantities near the ocean beach. *Phrygilanthus* is very common there, growing chiefly on *Acacia mollissima* and *Angophora intermedia*.

The plant is compact and pendulous up to 2 ft. in length, the ovate three-nerved leaves, 2-4 cms. long, being dark glossy

green above, and densely covered below with a golden stellate tomentum, thus making the plant conspicuous among the other foliage. The stems, flowers and buds are also covered with this tomentum.

The inflorescence is usually densely tomentose, with three reflexed cymules on a common peduncle. Each cymule is a single row of sessile flowers set in deep notches. The flowers are unisexual and four-partite, and were just beginning to open about January 15. Most cymules had seven flowers, the central one being male and others female.

KEY TO PLATE

Fig. 1.—*Korthalsella articulata*.—Natural size, showing union and fruits.
" 2.—Same, young plant, natural size, showing young shoots and union.
" 3a.—Floral band with fruits and male flowers (Nov.) × 3.
" 3b.—Floral band with some fruits and buds—transverse view from above.
" 4, 5.—Male bud and flower—anthers united in centre.
" 6.—Fruit, showing remains of perianth above. × 10.
" 7, 8.—Female flowers from side and above. × 15
" 9.—Seed. × 3.
" 10.—Germinating seed.
" 11, 12.—Germinating seed—further stages—showing suctorial disc, and young shoot. After Blakely.
A.—*Notothixos subaureus* with inflorescence of 3 cymules. × 3.
B, C.—Male bud and flower. Anther attached within each petal. × 4.
D, E.—Female bud and flower. × 6.

NOTES ON TWO SPECIES OF SPARROWS

The statement that sparrows of two distinct species exist about Melbourne seems to have caused some surprise to a number of our members. Actually there is considerable difference between the two birds, which are easily distinguished in the field (or the street) by those acquainted with them. So far as I am aware, they never interbreed.

The male of the House Sparrow (*Passer domesticus*), the dominant species here, has a dark throat—necktie it has been called—but its female has a plain grey throat and chest. They have yellow bills and have a single patch of white on each wing. In the Tree Sparrow (*Passer montana*) on the contrary, male and female are similar. They each have a dark patch under the bill, chestnut head and nape, two small white patches on the wings, and a black bill. In addition, and best guide mark of all, the Tree Sparrow has a white patch on each side of the head and neck, with a small dark carpatch in the centre of it. This is nearly always visible if a side view of the bird is obtained.

The nesting habits are similar both species building in either trees or houses. At Coburg we have had a pair of Tree Sparrows building in one side of the spouting, and a pair of House Sparrows in the other. Tree Sparrows congregate in large flocks in the autumn. I have noted up to 60. Whenever I have observed a large flock of Sparrows they have proved to be Tree Sparrows, though I have, at times, found a few House Sparrows among them. House Sparrows seem to confine themselves to smaller parties of up to a dozen.

ERNEST S. HANKS.

SWIFTS AND WEATHER

The Spine-tailed Swift (*Hirundapus caudacutus*) which used to appear in very large numbers in the Mersey district, Tasmania, thirty years ago, of late seldom appears here, although still occurring in flocks in other parts of the island. At the time they were plentiful I made many observations, most of which are recorded in back volumes of *The Emu*, connecting their appearance, especially when flying low, with approaching cyclonic disturbances.

Of the few records in recent years, the following may be of interest:—"At Mersey Bluff, on March 13, 1930, at 5 o'clock in the evening, Spine-tailed Swifts were coursing over the scrub, some as low as 5 feet or 6 feet above the ground. The evening was overcast and sultry, after rain a few hours previously. On March 16, at 5.30 p.m., a large number of Swifts passed over the Don Road (where I live) at a fair height, and heading north-west. Next day was fine with light north-west breeze, but on the morning of March 18 the weather became squally and wet." While motoring through Deloraine on March 29, 1932, I observed a Swift flying rather low towards the east; this was after a north-west gale with heavy rain. An observer in that district had shortly before noted a party of the birds appearing in advance of an atmospheric disturbance.

The late Mr. Clive Lord, Director of the Tasmanian Museum, sent me a note confirming in a remarkable way the connection of Swifts with weather conditions. On a beautifully clear sunny morning, he was motoring from Hobart to Tasman's Peninsula when a number of Swifts appeared, flying quite low. He remarked to a friend in the car, "Well, Stuart Dove is out of it this time, with regard to birds and weather!" Before they reached their destination, the sky had become overcast, and the day turned out to be a "soaker."

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THE MILLIPEDES

Lately specimens of Millipedes have been sent to me for identification, but who in Victoria is able to "name" these interesting little creatures? There is no very satisfactory systematic work relating to the Australian Millipedes, excepting that in which Chamberlin describes a number of species, and references to those previously known, but omits to give keys to aid in identification.

An American authority, H. F. Loomis, Bureau of Plant Industry, U.S. Department of Agriculture, has promised for the *Naturalist* a semi-popular paper on Millipedes generally. He has no wish to receive Australian material, if identification be desired, for the American collections at his disposal will, he states, require all the time that he can devote to Millipedes.

C.B.