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of the

FIELD NATURALISTS' CLUB OF VICTORIA

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Hon. Editor: CHARLES BARRETT, C.M.Z.S.

The Author of each Article is responsible for the facts and opinions recorded

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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, April 12, 1937. The President, Mr. S. R. Mitchell, presided, and about 100 members and friends attended.

"KOALA NIGHT."

The subject for the evening was a general discussion on the Koala.

Mr. Charles Barrett, in his introductory talk, gave figures of the killings during open seasons in Queensland. He illustrated his remarks by a fine series of photographs illustrating the Koala's "Expression of the Emotions," and quaint associations with other animals.

Mr. F. S. Colliver then gave a brief note on the "Remains of a fossil Koala," showing photographs of the bones, and stating that the animal referred to weighed possibly five cwt.

Mr. A. H. Mattingley spoke on the utilitarian aspect of the Koala.

Mr. A. H. Chisholm dealt with the slaughter of the Koala in Queensland in 1919 and 1926. He was of the opinion that another open season would not be proclaimed. He showed photographs of the MacPherson Range.

Mr. V. H. Miller stated that Koalas had apparently developed a liking for Mistletoe.

REVISION OF RULES.

The Secretary announced that the Committee had decided completely to revise the Club Rules.

CORRESPONDENCE.

From the Minister for Lands, stating that the Club's letter regarding vandalism at Mt. Buffalo National Park would be sent to the proper authorities.

GENERAL BUSINESS.

Mr. H. Jenkins reported on his excursion to Fern Tree Gully National Park.

The President stated that two Country members—Mr. Chas. Simpson, of Casterton, and Mr. W. W. Froggart, late Govern-

ment Entomologist of New South Wales, had recently died. Members stood in silence as a token of respect.

Mr. George Coghill stated that Prof. Laver had offered to the Club a piece of land near Jehosephat Gully, Kinglake.

On the motion of Mr. G. N. Hyam, seconded by Mr. R. H. Croll, this matter was referred to the Committee.

One of the Auditors, Mr. A. S. Chalk, is now Acting Treasurer, and Mr. Chas. Croll was elected to the position. Mr. Croll will act with Mr. A. G. Hooke.

NATURE NOTES.

Mr. F. S. Colliver said that he had seen many Lyre Bird mounds near the Blue Hills.

Mr. A. H. Mattingley spoke on the processing of fish, and stated that more marine biologists were needed in Australia.

Mr. H. P. Dickens stated that he had observed a Seal just inside The Heads, Pt. Phillip Bay.

The meeting adjourned for the Conversazione.

EXHIBITS.

Mrs. Freame.—Sea Hare, from Sorrento.

Miss A. Cornish.—Bailer and Trochus shells.

Mr. A. H. Mattingley.—Specimen of the plutonic rock on which the Great Wall of China is built.

Mr. C. French.—Specimens of an English Land Shell (*Helix fusca*, Mull) that is destroying Cypress trees near Geelong.

Mr. J. Wilcox.—Specimens of a small Crustacean (*Argulus foliaceous*) which is becoming a pest in private fish-ponds.

Mr. S. R. Mitchell.—Aboriginal artifacts.

The large Wanderer (Butterfly) was fairly numerous in the Geelong Gardens early in April.

To see the remarkable creeper, *Aristolochia*, with wonderful flowers, visit the Geelong Gardens. This plant is growing close to the glasshouses. It is rarely seen in cultivation. If visitors ask for the Curator (Mr. A. Brown) he will, I am sure, be pleased to show them this curious plant, which is also known as the "Dutchman's Pipe."

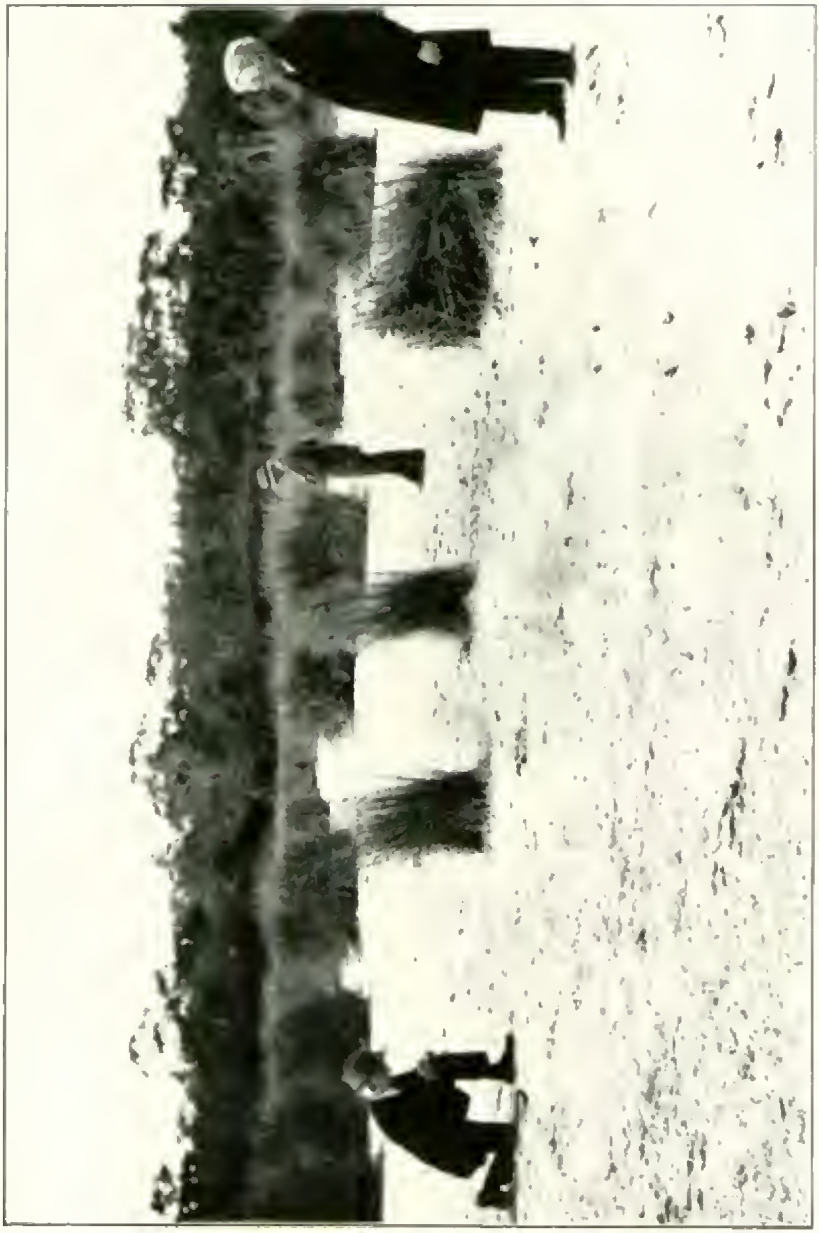
C. FRENCH.

THE CLUB LIBRARY.

Until further notice, the Club Library will be open once a month, from 10.15 a.m. to 12 noon on the Saturday previous to the monthly meeting. This will enable any member who cares to do so, to inspect the Library, and to borrow books from the lending section. The acting Assistant Librarian will be in attendance.

The Committee of the Field Naturalists' Club of Victoria invite members of kindred societies who may be visiting Melbourne to attend the Club's meetings.

Plate I



Emu Swamp, Sperm Whale Head

Photo.: Chas. Barrett.

EMU SWAMP, SPERM WHALE HEAD PENINSULA.

By A. D. HARDY, Hon. Secretary, The Lakes National Park.

One of the many interesting features of the Lakes National Park[1], on Sperm Whale Head, Gippsland Lakes, is Emu Swamp.

We[2] first viewed it on surmounting a low sandy ridge near the Lake Victoria shore of the Park, where, on a small sandy beach at Kangaroo Point, we had disembarked.

From the ridge we looked down on what appeared much like a salt-pan with tussocks growing here and there. Descending, we forced a way through a belt of six-foot high Coast Saw-sedge (*Gahnia trifida*) and crossed a zone of Paper Bark (*Melaleuca ericifolia*), 12 feet to 15 feet high, in the breaks of which, or in little tracts adjoining, the Beaded Glasswort (*Salicornia australis*) compensated with its bright translucent crimson shoots for the general absence of flowers in the neighborhood. The pretty little blue Monkey Musk (*Mimulus gracilis*), was one of the few plants seen in bloom that day, was sheltered by the *Melaleuca*. From the margin there appeared to be a covering of dead algae, extending from side to side excepting where large tussocks grew singly or in clumps, an appearance prompted by my recollection of having identified as an alga (*Lyngbia*) material of the same macroscopic texture. It had been submitted by Mr. Charles French as nesting material of the White-headed Stilt, in a swamp at Laverton (*Vict. Nat.*, Jan., 1912). A mat of bleached algae (*Enteromorpha*) covered the shore rocks of Lake Corangamite.[3]

The dense, white mat of tangled thread proved under magnification to be a species of *Nitella*, a genus of many species which habitually live in varying depths of clear, still water, as in Yan Yean reservoir a few feet deep, in Preston reservoir at much greater depth, and, according to Schimper, in Lake Constance at 100 feet or thereabout. Species are sometimes found in pure aquatic meadow formation or mixed with such as Water Milfoil and Floating Pond-weed (near Frankston in roadside pool), and in Mallee reservoir lakes fed by the Wimmera and its irrigation channels. Species which inhabit brackish water are few, if indeed there are more than the one. This introduces a special interest in Emu Swamp, which, by virtue of the marginal *Salicornia* as well as the salty taste of the *Nitella*, periodically has water of a decidedly brackish nature. The *Nitella* could not be specifically identified because it was either sterile or had, when drying, dropped its spores. It is a very slender plant, the longest, unravelled from the felted mass, being about 4 in., with simple

1. It is intended to prepare a description of this park at an early date.
2. Members of Committee of Management: Messrs. G. Coghill, F. Lewis, Charles Barrett, A. D. Hardy.
3. "Excursion to Lake Corangamite District," *Vict. Nat.*, June, 1918.

whorls of one-celled leaves on an axis about 1/40 in. thick and with internodes about two inches long. Numerous naviculoid Diatoms, including *Amphora* (probably *A. ovalis*) were enmeshed in the weed, these being the only associated algae noted. The swamp has a natural drainage of rainwater from an area of about a half square mile, but when rivers in flood increase the volume in the Gippsland Lakes the water of Lake Victoria rises and flows into such depressions as this, so that, with annual rainfall and occasional additions of flood water, there is salinity which, apart from the concentration due to evaporation, is of varying intensity.

The tracks of kangaroos and emus were numerous and indicated that many of the former and several emus had traversed the area in several directions since the evaporation. The tracks

Photo. by F. Lewis.

Track of Kangaroo when "creeping"

of mature and of half-grown kangaroos were seen, and although most of the emu prints were of full grown birds there were the marks of a chick accompanying one of these. What were these animals doing there? Had they visited the area for water, or out of mere curiosity? or was the soft carpet of dead *Nitella* pleasant to walk upon? There was no sign of scratching or pecking. Except for the "spoor" the felted mass was unbroken.

So, failing to solve the puzzle, we indulged in tracking, with results which would have won praise from Cooper's "Deerslayer" or a Scoutmaster, for although we did not track beyond the confines of the swamp, and so did not come up with the animals, we found enough evidence in the tracks to conceive a mental picture which was almost compensating. Here it was plainly seen that a kangaroo had hopped leisurely across, and there

another had first hopped and then turned from a biped into a "tripod" while, propped on hind legs and tail, it sat up and took notice of its surroundings before creeping, as a "quintipod," using four feet and tail.

Where the marsupials hopped the feet broke through the weed and exposed the black mud, two short parallel indentations and about six feet to the hop; the tail, being only a balancer when the owner is hopping, of course left no impression. The track of the creeping animal was of most interest, for in it could be plainly seen the method of progress. From a "sitting up" posture the kangaroo had lowered its front quarters and placed its fore feet well in advance, then, drawing the tail well in behind, it rested on forepaws and tail while advancing the hind feet, now diverging, outside, toes in advance of the fore feet, on which to rest while bringing the "fore and aft supports" into action. In creeping thus, impression is made by both heel and toe,[4] but in hopping the toes only are used. On the *Viteila* mat of Emu Swamp "he who runs may read" the very distinct tracks in all their variety.

A deeper impression indicated where it had "sat up" again and reconnoitered. It was easy to visualise the little forearms hanging limp, the ears erect, and the nostrils delicately twitching as the animal sampled the slight breeze for possibly suspicious signs of danger; and, that discretion was deemed the better part of valor, in exposure, was plainly evident in the resumed hopping: two hops of about five feet, a short pause with tail down, and then long nine foot hops out of the swamp area and away to the sheltering scrub. There were no marks indicating play or fight.

The emu tracks crossed those of the marsupials, and occasionally ran parallel. Although the great birds would weigh as much as these grey kangaroos, they left shallower indents in the mat, which was compressed rather than broken, and so more difficult to photograph. By much circumspection Mr. Lewis managed to get a set of marks with the emu footprints deep enough to have shadows. The emus had leisurely walked with short stride, their beautiful poise and balance shown by the footprints being in an almost straight line.[5]

But we had much else to see in the park and in the Lake Reeve section of the Sanctuary, which includes the park and most of the land and water extending to the ocean, so we left Emu Swamp hoping to see and examine it again under different conditions.

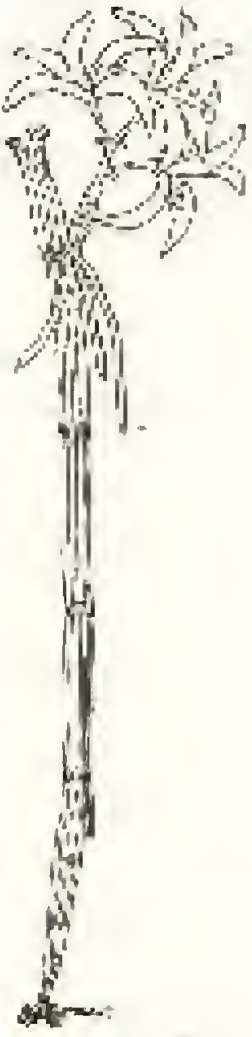
4. Note that the Great Red Kangaroo and the Large Grey Kangaroo in the Melbourne Zoological Gardens frequently creep on their toes, while Grey Kangaroos in an adjoining enclosure place both toe and heel on the ground when so progressing.

5. Seen elsewhere on a Mallee sandhill the Emu footprints diverged and the larger stride indicated haste as well as insecure foothold.

"FREAKISHNESS" IN ORCHIDS.

By THE REV. H. M. R. RUPP.

Abnormal flowers are not infrequent among orchids, some species apparently being more liable to develop "freaks" than others. For instance, *Cymbidium canaliculatum* often exhibits "doubles," two or more flowers being completely united on a single peduncle — the latter, however, generally being itself abnormal, i.e., it consists of two or more stalklets united into one. In these "double" flowers all segments are not always developed; but I possess a flower of this species which has 4 labella, 4 columns, 12 sepals, and 8 petals.



The abnormal *D. falcorostrum* described in the article

Two curious examples of abnormal development have recently come under my notice, both plants belonging to the genus *Dendrobium*. Those who are familiar with this genus know that many species are naturally increased or propagated by the formation of little "aerial" plants on old stems. A small shoot appears at one of the nodes, and at its base roots form, either attaching themselves to the parent stem or hanging free in the air. The shoot then gradually develops into a normal plant, which finally drops off the parent or becomes independent as the old stem dies. I have several well-grown plants of *D. nobile* obtained in this way. Among our native species, *D. Kingianum* is very prominent in this method of propagation. I have also observed it in *D. speciosum*, *D. gracilicaule*, *D. Phalaenopsis*, and many others. I had never, until quite lately, seen it in the case of *D. falcorostrum*, the beautiful "Beech Orchid" of New South Wales and South Queensland. A plant of this species was given to me about two years ago, and although grown under the same conditions as other specimens, it has never done well. In December last (1936), I noticed two small

aerial growths forming on two old stems. One of these was very close to the top of the stem, which was leafless. It developed roots, hanging clear of the stem; but showed no sign of leaf-formation at the apex of the bud. To my astonishment, late in February a raceme of flower-buds began to develop instead of leaves. (The species normally blooms from late August to late September.) Three healthy flowers are now (March) open, perfectly normal except that the perianth-segments are more reflexed than usual. The characteristic perfume is very pronounced.

In a letter just received from Mr. W. F. Tierney, of Cairns, North Queensland, he describes a somewhat similar abnormality in a plant of *D. superbiens*. In this case the "aerial" is right on the apex of the old stem, and practically continuous with it. No roots have developed. (I have seen this happen in *D. Kingianum*, but when the aerial was detached from the parent and kept under humid conditions, roots soon appeared.) The aerial is about 7 inches long, and has developed leaves. Two perfect flowers have now opened, "out of season," as in the case of my Beech Orchid. These freakish performances are both very interesting.

CRUSTACEAN PARASITE OF FRESHWATER FISH.

By J. SEARLE.

Although an ectoparasite infesting the branchial cavity of freshwater fish, or frequently attached to their skin, the little crustacean (*Argulus foliaceous*) can swim freely and actively when it leaves its host, as it does in the breeding seasons (spring and autumn), and may then be taken in the hand or tow net. The fertilisation of the eggs is internal, and the female lays her eggs in strings on stones or stems of water plants in the streams which it inhabits. After leaving its host, if a fish of the species is not available, the Argulus will attach itself to any other species it happens to meet—it has been been taken on tadpoles.

Argulids that infest migratory fish change with their host from fresh to salt water or the reverse. Although at one time classed among the parasitic Copepods, the peculiarities in structure of the Argulidae (these animals alone among the Copepods possess compound eyes), necessitated their separation as a separate Branch, Branchiura.

Argulus foliaceous has recently developed into a pest in the fish ponds near Melbourne of breeders of fancy fish for aquarium lovers, having been introduced therein, probably, with infested fish imported from Europe or the East. As Argulus breed prolifically (in a string of eggs deposited by a female Argulus on the inside of a bottle in which a few specimens had been placed, I

counted 227 eggs), it can be seen that in a short while they may become a serious pest to the fish breeder or aquarium keeper.

25/3/37: Since putting the few notes on Argulus together three weeks ago, I have gained a little more direct knowledge of their development.

On March 3 a riband of eggs was laid by a female Argulus on the inside of a bottle. They were so placed that they could be examined easily with a hand lens.

On March 25 a number of the eggs had hatched and the young Argulids were swimming briskly in the water. There is no nauplius stage, this having been passed in the egg, born with all the segments and appendages of the adult; although the limbs on the abdomen are rudimentary, the first and second maxillipeds are well developed and provided with strongly hooked claws at the extremity, well fitted for attaching themselves to their host. The first antennae are well developed and furnished with long plumose setae. They are able to swim with remarkable agility.

26/3/37: The eggs are nearly all hatched—over 200 of them. The young larvae are approximately .06 m.m. in length. I have not had an opportunity for a more definite examination of the larva, but from the appearance of the strongly developed maxillipeds I would expect that they would be able to attach themselves to their host soon after hatching, and, unfortunately, I am unable to supply them with a host—even a tadpole. However, I have preserved a number of the larvae for future study, and will look carefully for a moult—as long as the larvae live.

27/3/37: Only *two* Argului visible this evening, moving slowly close to the bottom of the bottle.

The eggs were deposited in a band or riband, five to seven eggs in a row, and close together. The egg-band is about one and a quarter inches in length, slightly curved like a boomerang. The eggs are elliptical, light yellow when first laid, afterwards becoming brownish in colour. When laid they are coated with a gelatinous covering which cements them to each other. There are three rows of dots along each egg.

28/3/37: The young Argulids had all disappeared this evening, and from the number of infusoria present they must have been devoured rapidly, as nothing could be seen of their remains among the debris in the bottle.

MEMBERS' SUBSCRIPTIONS.

Many members have not yet paid their subscription to the Club for the year 1936-37, and the Treasurer will be pleased to have these amounts as soon as possible. Several members also owe small sums for Wild Nature Show tickets.

SIR ALBERT ERNEST KITSON, Kt., F.G.S., F.R.G.S., M.I.M.M., M.A.I.M.M.

1868-1937.

No finer example of the triumphs of perseverance and enterprise can be imagined than the career of A. E. Kitson—"Kittie," as he was always known in a select circle of intimates. The word "admirers" is advisedly not used, as he was as free from pose as it is possible for anyone to be, and he treated all others interested in natural history rather as his instructors and superiors than as pupils. Yet withal he was of an intense seriousness and devotion to the work he had in hand. Not that he confined himself to geology or to any one of its numerous branches: the list of papers contributed to our own journal will reveal that. Geology, of course, came first, with perhaps a leaning manifested towards palæontology; mining, not only with reference to coal, brown and black, but gold and tin, came under his purview; water resources for power on the surface and artesian supplies from below; geography in its most modern sense; natural history in flora and fauna; and, last but by no means least, travel, all were in his ambit and to all he gave somewhat serious but enlivening touch.

Born on March 21, 1868, son of John Kitson, of Manchester, Albert Kitson was educated in India and Victoria, finishing up at the State School at North Winton, near Benalla. In 1886, at the age of 18, he entered for the Civil Service Examination, attaining a creditably high position and a consequent appointment (May 25, 1886), as a fifth class clerk in the General Post Office at the princely stipend of £80 a year. Here he remained, not vegetating, however, for seven years, when he obtained a transfer to the Lands Department—still as a fifth class clerk, but now having had his salary doubled—where he engaged in the fascinating, if monotonous, occupation of keeping the rent roll books. After some years of continuous agitation, the reason for which will appear later, supported by an increasing number of colleagues in scientific work, and in particular by the great Professor Gregory, he was transferred, on September 6, 1899, to the Geological Survey Branch of the Department, then known as the Mines and Water Supply. As James Stirling, then Government Geologist, expressed it in his annual report for that year, Mr. Albert Ernest Kitson, having shown special abilities for scientific research by his writings for various scientific societies, was transferred from the Lands to this Department. This may encourage some of our younger members to contribute more freely to the *Naturalist*.

In addition to his writings, Kitson had put in very solid work at the University and the Melbourne School of Mines, Workingmen's College, covering geology, mining, and surveying. He, however, was still a fifth class clerk, now at the maximum salary

for that position of £200 per annum. For that he carried out detailed geological examinations of the Indi, Eastern Benambra, Mt. Howitt, and Tolmie districts, and began an intensive and most valuable in its after results, survey of the coalfields of Gippsland, with little excursions to the Upper King, determinations of the Eocene polyzoal limestone at Flinders, somewhat similar contentious work on the shell-bearing tertiaries on the coast between the Aire Marsh and Slippery Point, reporting on the prospects of the Goldsburgh goldfield and on the tourist attractions of the Buchan Caves, and again on the artesian bores at Sale. I find that I have omitted tin prospects at Toora and extensions of the coal surveys to Bass, San Remo, Powlett Plains, and Corinella—actually the Wonthaggi area.

Kitson filled in his spare time by the compilation of a catalogue of the Tertiary fossils of Australia. In 1904 Hyman Herman, who had taken the place of Ernest Lidfey as Senior Field Geologist, retired, and Kitson, as the result of a severe competitive examination, obtained that post. After 18 years as a fifth class clerk he had obtained a professional position and was being paid £300 per annum. He had then complete supervision of the coal areas, but owing to his versatile, almost universal, knowledge, was employed on almost everything else under the sun. Professor Gregory, who had left the State, recommended Kitson to take charge of the mineral survey of the Nigerian coast for the Imperial Institute at a very much more lucrative remuneration than the £325 he had achieved in the Victorian service after twenty years of intense service. He left on leave on November 22, 1906. From the Nigerian work he resigned in 1911, to become Director of the Gold Coast Geological Survey in 1915. In this post he remained until his retirement in 1930. Not content with his past achievements, he then, in an honorary capacity, organised the Geological Survey of Kenya Colony, East Africa. There were other than financial recognitions of his outstanding achievements: In 1918 he was made a C.B.E., four years later a C.M.G., and he was knighted in 1927.

The Geological Society of London awarded him the Wollaston Fund in 1918, and the Lyell Medal in 1927. Sir Albert was President of Section C (Geology) at the British Association meeting in 1929. In addition, he was President of the Geologists' Association, Councillor of the Institution of Mining and Metallurgy, and to the last a member of this Club as well as of many other scientific societies. He was a delegate to the International Geological Congress at Toronto (1913), Brussells (1922), Madrid (1926), South Africa (1926), and to World Power Conferences at London (1924), Basle (1926), London (1928), and Berlin (1930). He revisited Australia after the Canada Empire Mining and Metallurgical Congress in 1927. Space will not permit enu-

Plate II

Sir Albert Ernest Kitson, KT., F.G.S., F.R.G.S., M.I.M.M., M.A.I.M.M.

meration of his numerous discoveries of coal, oil, shale, manganese, diamonds, etc. In 1910 he married Margaret Legge, daughter of John Walker, of Melbourne, and seven years after her death in 1920 he married Elinore Almond, eldest daughter of the late Reverend Granville Ramage. His widow and two sons survive him.

Reading over the foregoing, it seems too statistical. Kitson was sincerely religious, an abstainer, and rather serious in his outlook on life; but, notwithstanding, he enjoyed his part in the lighter side of existence. Still his work was his chief delight. An adept in gathering facts, and also addicted to the collecting of auto and artefacts, his object was not the amassing of numbers: he set to work generalizing on his accumulated facts, and in this aspect of geology his deductions were brilliant. The world of science has lost an indefatigable and reliable worker, and we have lost an old and tried companion.

Articles *in The Victorian Naturalist*:

"Geological Notes on Toombulup Goldfield (Benalla)," vol. 13, pp. 90-107.

"Older Cainozoic Marine Fossils near Hexham," vol. 20, p. 91.

"Tramps Through Benambra to Mt. Kosciusko," vol. 22, pp. 89-107.

SWAMPS NEAR MOORABBIN.

By T. S. HART.

In the more settled parts of the sandy country south-east of Melbourne, most of the old swamps have disappeared, but in the eastern part of the district several remain, with more or less of the native vegetation and still visited by some water-loving birds.

A good road and a fairly deep drain now traverse the former Reedy Swamp, some three miles south of Oakleigh, but part of this area carried last spring a dense growth of Swamp Stonecrop, and a small yellow Buttercup. In the water, the White Water-Buttercup was seen. It is easily overlooked, as the plant is almost all submerged and the white petals very fugacious.

In the next valley to the south-west, about a couple of miles east of Moorabbin, there is a considerable area of permanent water. From the east a three chain road (unmade) probably indicates that it was important for stock. The Bulrush, *Typha*, is abundant, but in this district it only occurs in a few places more than usually wet. Clear water among the Bulrushes gives sheltered resorts for duck and other water-fowl, though they show an inclination to leave, when disturbed, for the safer waters at the Benevolent Home a mile down the valley.

Another water, south-west of Moorabbin, remains through the summer. Water Ribbons (*Triglochin procera*) are common as usual, but a considerable area is occupied by the Marsh Club Rush, *Scirpus maritimus*, with a light green colour. Duller patches are a Small Spike Rush. Here and at other places *Azolla* and *Lemna* and apparently *Wolffia* are abundant.

A shallow swamp area near the Highett Recreation Ground dried rapidly during February and March. Its margins were a fine hunting-ground for the White-fronted Heron. It is remarkable how these birds merge in the surroundings, even in this open place. Occasionally the White-necked Heron is seen.

The springs and wet places east of Point Nepean Road differ somewhat from those nearer the coast. The Scented Paper Bark is commoner, and the wet place heaths, the Blunt-leaf Heath and the Pink Swamp Heath (*Sprengelia incarnata*) which is regarded as a good indicator of at least nearly permanent witness. There are several Restiaceous plants. The Twin-leaf Drosera still survives, but is rare. The Spoon-leaf Drosera is rather more frequent, but also seems to require a good oozy place.

Leaves of the Large Tongue Orchid are readily found at places in this eastern part, and it may be noticed that the Horned Orchid has been seen in recent years in a grassy flat near Black Rock, but the valley where these two occurred near Cheltenham is now occupied land.

A rather unexpected feature is the occurrence of salty patches at several places near Moorabbin. At three of these the Beaded Glasswort is found, sometimes in large quantity. The Creeping Monkey Flower is seen occasionally. Sea Barley Grass and a small Plantago are often abundant. These salty areas are not coastal flats, as the valley floors are about 90 to 120 feet above sea-level. The salt is probably present in some of the marine sediments of which the district is composed.

Thelymitra Matthewsii, Cheeseman (*Trans. N.Z. Inst.* xliii (1910), p. 177). This New Zealand species is identical in every particular with the species known in Victoria, from the Grampians Area, as *Thel. D'Altonii*, Rogers. (*Trans. Roy. Soc., Sth. Aust.*, liv (1930), p. 42). The former name, therefore, must be established on Victorian records.

—W. H. NICHOLLS.

Whilst on a collecting trip to the Grampians in company with Mr. J. Firth (a fellow member of the Club), and Gilbert F. Rogers, tourist guide, Halls Gap, I was shown a fine lot of young King Ferns (*Todea barbara*) growing between rocks and a fair distance from water. I had never seen these ferns away from running water or swamps before. Perhaps other members of the Club have noticed King Ferns growing under similar, fairly dry, conditions in mountain districts.

—C. FRENCH.

The Victorian Naturalist

Vol. LIV.—No. 2 June 9, 1937 No. 642

THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, May 10, 1937. The President, Mr. S. R. Mitchell, presided, and about 100 members and friends attended.

DEATH OF MEMBER

The President referred with deep regret to the death of a very old member, Mr. E. J. Dunn, and members stood in silence as a token of respect.

NATIONAL PARKS

The subject for the evening was a lecture illustrated by the epidiascope, on "Some Australian National Parks," given by Mr. A. H. Chisholm, C.F.A.O.U. Numerous interesting pictures were shown and the lecturer described topographical features and the bird and plant life of many Parks in different States.

REVISION OF RULES

Alteration to Rules.—The suggested alterations were read by the Assistant Secretary, who formally moved that these alterations be ratified at the next meeting.

Land at Kinglake.—The Secretary announced that the Committee had decided to suggest to Prof. Laver, that as the area was so close to the National Park at Kinglake, it be handed over to the Trustees of that park, in which the Club had an interest.

REPORTS OF EXCURSIONS

Excursions were reported on as follow: Badger Creek, Mrs. Chas. Barrett; Botanic Gardens, Dr. C. S. Sutton.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as Ordinary members of the Club: Miss Irene Straker, Miss Doreen Lane, B.A., Miss M. H. Fogeut, Dr. W. Kent Hughes, and Mr. J. L. Bignell; and as a Country Member: Mr. Fred Barton.

ELECTION OF AUDITORS

Messrs. A. G. Hooke and C. Croll, nominated at the last meeting, were duly elected as auditors.

NOMINATIONS FOR OFFICE BEARERS, 1937-38

The following nominations were received:

President: Mr. A. H. Chisholm, C.F.A.O.U.

Vice-Presidents: Mr. Geo. Coghill, Mr. R. H. Croll.

Hon. Treasurer: Mr. J. Ingram.

Hon. Librarian: Dr. C. S. Sutton.

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

Hon. Editor: Mr. Chas. Barrett, C.M.Z.S.

Hon. Secretary: Mr. F. S. Colliver.

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

Committee: Mrs. Chas. Barrett, Miss Wigan, Messrs. G. N. Hyam, A. S. Kenyon, V. H. Miller, H. Jenkins, J. W. Audas, H. C. E. Stewart, E. E. Pescott, A. C. Frostick.

EXHIBITS

Mrs. J. J. Freame.—Pelts of so-called Indian Opossums.

Misses Knox.—Stone for use in a sling; Australian stone axes.

Mr. A. R. Varley.—Polyzoa and Serpularians, from San Remo.

Mr. A. Mattingley.—Kylie from the George River, North-western Australia.

Mr. E. E. Pescott.—Lime gourds, pestles and mortars and spatulas used in the preparation of betel-nut for chewing; specimens from Dobu, Papua, 1900.

Mr. F. S. Colliver.—Two species of the so-called "Stinging Coral" (*Millepora*? sp.) from Queensland.

While in South Africa, about fifty years ago, the late Mr. E. J. Dunn discovered a new *Streptocarpus*, which was named in his honour, at the Royal Botanic Gardens, Kew, England, and figured in colours in *The Botanical Magazine*. This species was used for hybridization and was one of the original parents of the *Streptocarpus* now grown in glasshouses all over the world. *S. Dunnii* is a tuberous plant with one very large leaf and a stem of a dozen or more pink flowers. Mr. Dunn was present at the African farm of Mr. O'Brien when a Kaffir came in with one flower of a white *Watsonia* stuck over his ear. The geologist and the farmer went in search of the plant, which was found, and subsequently named *Watsonia O'Brienii*.

POLLINATION IN AUSTRALIA OF *ASCLEPIAS FRUTICOSA* L. (*GOMPHOCARPUS FRUTICOSUS*)

By EDITH COLEMAN

Asclepiads vie with orchids in the beauty of their pollinary mechanism. As in orchids, the pollen is compounded into masses, but instead of a sticky gland, by which they become attached to pollinating agents, the Asclepiads have a wonderful clipping device which "*clamps*" the masses to some part of the bodies of visiting insects.

Fruits of *Asclepias fruticosa*. Note geotropic movement of pedicels to bring opening underneath.

One of the most interesting members of this family is the Swan-Plant, or Cotton-bush (*Asclepias fruticosa* [*Gomphocarpus fruticosus* R.Br.]), a shrub native to Africa, which is common in the three eastern States of Australia. In Queensland it has multiplied to such an extent as to become a pest. Fifteen plants in my garden, grown from seed sent from Queensland, have provided many opportunities of observing removal and transference of pollen.

Although native bees, blowflies (*Calliphora* sp.) and sugar-ants pollinate some flowers, I think the hive-bee must be regarded as the official pollinator. Small black ants also visit the flowers, but these are apparently able to obtain nectar without payment. The absence of sticky hairs suggests that ants are not unwelcome. Nor does the clammy, white sap, which exudes freely when leaves or stem are broken, appear to trouble them. Indeed, it appears to be palatable to some of them.

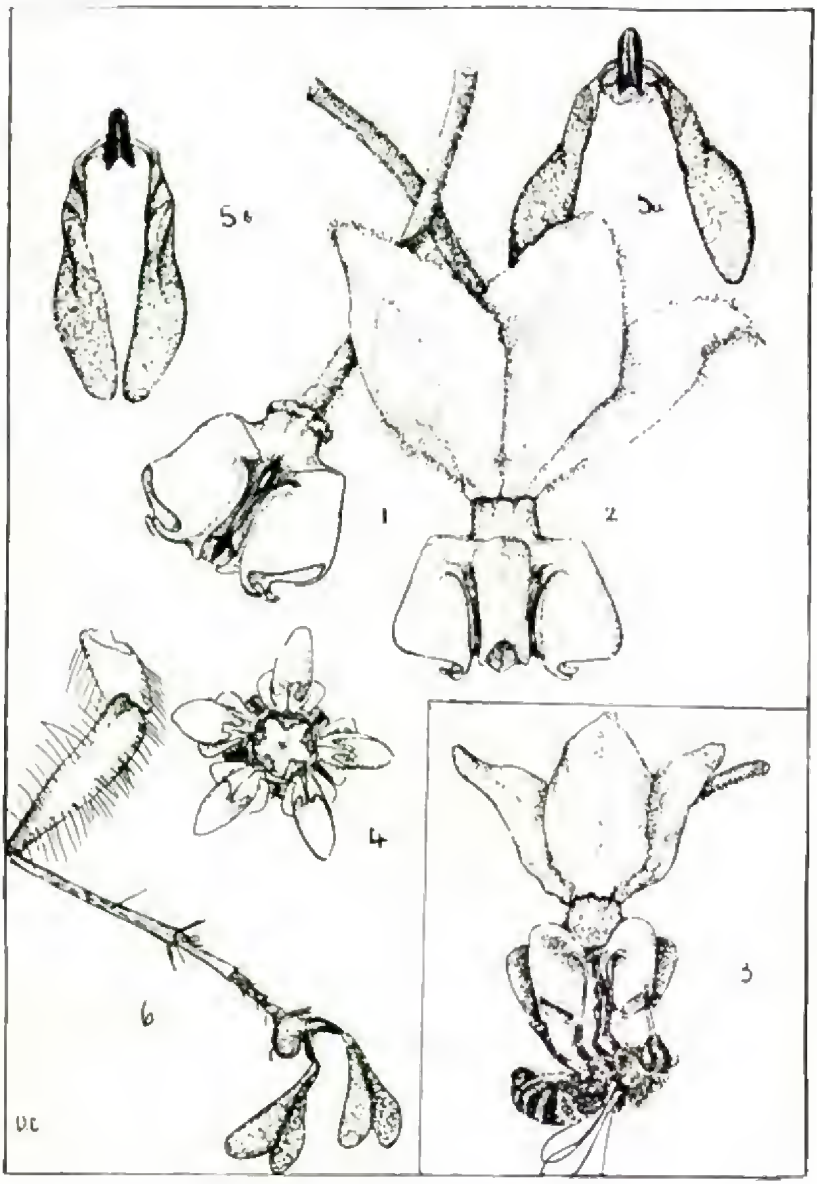
Hive bee bearing 18 pollinia, 16 clipped to claws of feet, 2 (not shown) on hairs beneath thorax.

Hive bees visit the flowers more freely than any other insects. I have seen them gathering nectar at 6 a.m. and as late as 8 p.m. (December). Sugar-ants are numerous only in the evening. By torchlight one may see many, with pollinia attached to their feet. Blowflies are seen with their front feet so laden with pollen that they look like the "splay"-feet of certain weevils.

In the flowers of *Asclepias fruticosa* (*Gomphocarpus fruticosus*), a fleshy stigma is surrounded by five adnate anthers, the opposed wings of which form five slits, as in *Araujia* (*Vict. Nat.*, May, 1935). Alternating with the slits are five hollow, fleshy appendages (corona) which secrete nectar. These nectaries are on either side of the slits, not beneath them as in *Araujia*. The pollinia are connected by means of rather broad bands (retinacula) with a hard shiny body, the corpusculum. Together they form the translator. Until loosened by an insect, the dark corpusculum is attached to the stigma-head. Down the centre of it is a narrow furrow which opens out at the base into a notch wide enough to allow the entrance of a narrow body, such as the claw of an insect's foot.

The top of the stigma-head is smooth and shiny. It affords no foothold to the bee. Moreover, the flowers, when ready for pollination, are almost inverted. Thus the bee is upside down as she explores the nectaries. She can only hold on by gripping her feet on the slits. It is significant that she never attempts to hold on by gripping one or more of the five nectaries. As her foot takes its grip one sees it slide into the wide end of the slit. With further movement it is carried up towards the narrow end, above which the dark corpusculum blocks the way of escape. Here the claw of her foot is caught in the notch at the base of the corpusculum, and held fast. The pull of the bee releases the corpusculum from its seat on the stigma-head. The notch closes more tightly on the claw, which now carries away the whole translator. The

Plate III



Pollination of *Asclepias fruticosa L.* (*Gomphocarpus fruticosus*)

pollinia are wide apart when withdrawn, but their hygroscopic arms twist as they dry on exposure to the air, bringing the masses closer together, so that they are readily introduced into another slit. This hygroscopic movement of the retinacula increases the grip of the notch on the insect's foot.

As the bee leaves the flower, or swings round to explore another nectary on the same flower, her foot, with the attached pollinia, slips into the wide end of another slit. This time, when the foot is drawn upward towards the narrow end of the slit, the masses are often too bulky to follow. One, or more, of the elastic arms will be almost sure to snap, leaving the pollen within easy access of the stigmatic spot beneath the slit.

Frequently a bee is seen with one or more complete translators on every foot. The one illustrated on page 16 had also a translator clipped to hairs on the under surface of her thorax. One may see a foot bearing three translators (six pollinia) slide into a slit with a stroking action, and emerge minus all, or part of its load.

Occasionally the bee leaves with a jerk, suggesting that some effort is necessary to free her foot when it is loaded with pollinia. Sometimes she does not trouble to withdraw her feet at once, but reaches across to the nectary of another flower with her feet still held in slits. As she sips, her body is arched to span the small circumference of the disc upon which she finds no footing. Very rarely does her body touch the disc. She is thus upside down as she moves round to each of the five nectaries, swinging by her feet. While the hive-bee has no difficulty in overcoming the mechanism, other insects are not always so fortunate.

Blowflies, native-bees and sugar-ants are occasionally trapped, not having strength to withdraw an overloaded foot. Blowflies appear to dislike the masses on their feet, or perhaps they find the pollen palatable. One may often see them trying to preen it off. Probably the pollen makes it difficult for their pads to adhere to the smooth surface. One fly was held fast by three feet in one slit, with another foot in a second slit. Each of the three feet had attached to it a complete translator and part of another. One rarely sees pollen on the hind feet of flies. Probably these feet are not used in holding on as are those of the bee, but adhere to the smooth slits by means of their pads. It is possibly quite by accident that they enter the slits, whereas the bee's "stroking" action appears to be deliberate. Twice I have seen a fly swinging by a leg for some seconds, buzzing round several times, before it could free itself. I have found two flies and two small native bees dead in flowers, held fast by a foot.

It seems strange that nectar is not lost from the pendant flowers, until one notes the small appendages that cover the basal half of the opening, like the "lid" of a shaving mug. There is really only a very small quantity of nectar in each tiny

"crater" which occupies only one-third of the cucullus. One admires the infinite patience of the bee as she gathers drop by drop the nectar she may never eat. But then, bees have for ages practised that community service which we humans preach.

It is interesting to compare the pollinary mechanism with that of *Araujia*, and to note that a relatively small difference in the position of the nectaries, with regard to the slits, completely changes the position on the insect's body to which pollinia are clipped. In

Left: An immature follicle. Right: Mature follicle, opened naturally.

Araujia the nectar-well is *beneath* a slit. Thus an insect's proboscis, on leaving the nectar, slides into a slit. But in *Asclepias* the nectar-wells lie *between* the slits, so they can be explored without mishap to a proboscis. It is the feet that are clipped.

As the Wanderer Butterfly, *Danaida archippus* (*Danaus menippe*) visits the Swan-plant to deposit her eggs upon its leaves, one of the chief food-plants of her larvæ, I fully expected to find her acting as an occasional pollinator. It is probable that both male and female Wanderer sip a little nectar, in which case there is little doubt that their feet would carry away pollinia. So far my plants have escaped their attention, so I have had no opportunity of examining the feet of a Wanderer after a visit. I should be interested to hear if other naturalists have done so. In the case

of the Mistletoe Butterfly, Imperial White (*Delias harpalyce*). I have seen both male and female visiting Mistletoe flowers.

In the absence of insects, flowers of the Swan-plant are completely sterile. My plants produced 208 fine follicles. There are 44 on one plant and 28 on another. These two plants are in the front, in the best part, of a rather poor bed. Those at the back produced fewer flowers. When it is remembered that many flowers were gathered, and that my persistant attentions may have worried the patient collaborators, their efficiency as pollinators cannot be questioned.

The method of seed-dissemination is interesting. In the early stage the flower-stalks are directed upward at an angle of about 45 degrees. As the flowers mature, the stalks bend downward, the peduncles remaining vertical and becoming rigid (lignified). (The union of pedicel with peduncle forms the "head" of the swan.) When the follicle splits, the opening is underneath, and the protruding mass of tufted seeds is thus readily dispersed by the wind. At the present time (May) my plants are "snowed over" with a cloud of silky seed-plumes.

The plants are attacked by an aphis, deep gold in colour, with black legs and eyes, exquisite but troublesome creatures. When first born they are of a pale yellow with translucent white legs and dark eye spots. At once, on leaving the mother's body, they move away to sink their "beaks" into the milky sap of the stems. For eighteen months I worked assiduously in keeping down these beautiful but hungry hordes. Then, having neglected them for a few days, they multiplied so rapidly that I lost control of them. They have greatly disfigured the plants.

My next article deals with the pollination in Australia of the American Yuccas, and will record the interesting discovery that these plants are not so wholly dependent for pollination upon Pronuba moths as we have believed. For 75 years a small moth has been regarded as the only insect capable of pollinating Yuccas. Only a single instance of naturally-set seed has so far been recorded beyond the range of the moth.

KEY TO PLATE III

Fig. I.—Fleshy stigma-head with slit between two nectaries in which feet are caught.

Fig. II.—A flower, side view, showing three nectaries, also position of slits.

Fig. III.—Position of bee in gathering nectar, proboscis in nectary, feet in slits.

Fig. IV.—View from above of stigma-head, showing smooth disc (centre) surrounded by five nectaries (corona). Note small appendages which act as a partial lid to nectary. Between each pair of nectaries the dark corpusculum is indicated.

Fig. Va.—Translator, as withdrawn, with pollinia wide apart, furrow of corpusculum not fully closed.

Fig. Vb.—The same after hygroscopic action of the arms. Furrow closed.

Fig. VI.—Leg of fly with two translators attached to claws.

EDWARD JOHN DUNN, F.G.S.

The Club has lost one of its oldest members, old both in the sense of association with us and and in the number of his years, which tallied nearly ninety-three. He was the son of Edward Herbert Dunn, of Cheltenham, England, and was born at Bristol, Somerset, on November 1, 1844, when Victoria was barely ten years of age. Coming to Australia as a child with his parents, Beechworth saw the days of his youth when that mining field was at its zenith. There at the age of sixteen he joined the Lands Survey Branch as a junior, and four years later was taken on the Geological Survey staff.

In 1869, the great Selwyn, Director of Geological Survey, failed to see eye to eye with the government of the day—the second McCulloch government, with J. F. Sullivan as Minister for Mines—and the excellent staff was dispersed and its outstanding work discontinued. Selwyn, of course, went to Canada; but Dunn, still a young man, went to South Africa, where he became Geologist to the Capetown Administration. Here, while travelling though the Karoos and hinterlands of the Cape, he imbibed his first draughts of ethnological research, studying the living Zulu, the still remaining Hottentot and the last disappearing remnant of that living-fossil race, the Bushman. He made extensive and well-selected collections of their weapons and implements and also of the prehistoric races, going back, as he asserted then, and which has since proved to be so, to primeval man. He was connected with the first discovery of diamonds on the Vaal River. In 1873 he broke the continuity of his South African work and returned to England, where he further continued his studies, working at the German Street School of Mines. Returning to the Cape, he married in 1875 Elizabeth Julie, daughter of Clement Perchard, of Jersey. Strangely enough, his work in South Africa was largely concerned with the general glaciation of that country, an experience of great use to him later in the Victorian correlations of the Ovens and Werribee series of conglomerates.

In 1883, after publishing his excellent geological map of South Africa, Dunn again visited Australia. It may have been a holiday, but it was then he discovered the identity of the glacial conglomerates at Wooragee, near Beechworth. Some years later, 1886, to be exact, Dunn left South Africa, having determined the structure, glacial and other, of the Karoo beds, having mapped the Stormberk coalfield, having indicated the auriferous possibilities of the Rand banket beds, and incidentally having added *Streptocarpus Dunni* to science, for Australia as the envoy of British and foreign financial interests. Mining was on the boom in both Australia and New Zealand. Broken Hill, beginning to be revealed in its true colours as the greatest non-ferrous field in the

Plate IV

Photo. by Ruth Hollick Studio, Melb.

Edward John Dunn

world; Croydon and Mount Morgan in Queensland; the Kimberley, Southern Cross and Yilgarn, with indications of the Bailey find, in the west; and many big ventures in New Zealand, had attracted the eyes of the mining world.

Dunn reported specially on Mount Morgan and Broken Hill, and also on many other properties, including the Gippsland black coalfields. Between whiles he carried on a mapping of the Heathcote rocks, discovering the Cambrians for the first time in Victoria, and sowing the seeds of the great dispute about the Heathcotian series. Later on, 1890-93, Dunn did perhaps his best work in demonstrating the essential structures of the Bendigo goldfield and its relation to Castlemaine. During the same period he discovered the glacial deposits, for which he had a rare flair, in north-west Tasmania. Still working on the coal problem, he established an identity between the South African Dwyka conglomerates and the conglomerates of eastern Australia, the underlying formation of our chief coal deposits. It was in 1904 that he sowed the seeds of trouble for himself by accepting the position of Government Geologist in succession to the illustrious Professor J. W. Gregory. This position he retained for eight years, retiring in 1912, after having created, in face of Government opposition, which can only be guessed at, for Dunn never whimpered, the Geological Museum and Mines Laboratory; having by a system of intensive boring located the Wonthaggi coal seams under the Powlett River Plains; and having started the now thriving tourist industry by his popularizing Mt. Buffalo, the Garden of the Gods as he yclept it, and the Buchan Caves.

A small matter but one well worth mentioning was his insistence upon the use of the Buchan marbles in interior decoration. The wonderfully beautiful stairways to the Reference Room in the Public Library are due to his efforts. Another small matter is the *Acacia Dunnii* (the gigantic-leaved wattle) discovered by him at the mouth of the Victoria River, Northern Territory. Following this memoir is an incomplete list of his writings, major and minor. They stand as silent witnesses. The foregoing is a record of work, and no better description can be given. Indefatigable, never satisfied until he had arrived at an explanation of any and every matter, he lived for his work and satisfied his admirers much more than he satisfied himself.

No better example can be adduced than his bubble-bleb theory of the formation of australites. In 1884 he was elected a Fellow of the Geological Society of London, which Society in 1905 awarded him the Murchison Medal, the highest honour in its power. To quote the words of one intimately associated with him during his control of the Geological Survey of Victoria and one who had every opportunity of penetrating beneath his skin, no easy thing: "An outstanding field geologist and an able adminis-

trator. In Victoria the geological surveys carried out, and reports on economic geology issued, under his direction, form a lasting memorial to his sterling qualities."

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MAPS

1883—Geological Map of South Africa.
1890—Geological Map of Mitchell River District, Gippsland.
1909—Geological Map of Victoria, showing Auriferous Reef Outcrops.

A.S.K.

BOTANICAL NOTES AT MALLACOOTA

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

These notes are based mainly on observations made last New Year, when I was invited to accompany a camping party. I had also specimens collected in previous years, at the same season, by Miss E. K. Turner, who showed me several interesting localities. Some of these plants have already been exhibited and recorded in the *Naturalist*. Although late in the season for many kinds of flowers, a large number of species was identified, including several which occur in Victoria, in the eastern parts only.

Early observers often reached Mallacoota by difficult roads; by boat from Genoa; but the settlement is now easily accessible by a good road. Several different types of vegetation can be reached within half an hour's walk from the township, and the very attractive steeper country to the north-east may be conveniently reached by boat. The climate is that characteristic of the far east of Gippsland—good rainfall, and much of it in summer, which makes for luxuriance in vegetation, especially in such favoured spots as the lower parts of the valleys.

At the township you find yourself in a grassland with scattered trees, no doubt formerly well covered. *Angophora intermedia* is the chief tree at this part, with some fairly tall Black Wattles and the Bracelet Honey Myrtle (*Melaleuca armillaris*), both as trees and as dense bushes. Along the actual margin of the lake, with a low cliff or short slope, are the Coast Banksia and some typical eastern plants—the large Mock-Olive (*Notelaea longifolia*) and the Blue Olive-berry (*Elaeocarpus cyaneus*), with fringed flowers, and the well-known *Pittosporum undulatum*. The Mock-Olive and Olive-berry belong to quite different families. In the forest close behind, the Eucalypts are not always easily identified, flowers and fruits being mostly out of reach. Bloodwoods (*E. gummifera*), formerly called *E. corymbosa*, are plentiful, and the fallen fruits establish their identity. The very distinctive young growth calls attention to the Silvertop (*E. sieberiana*).

In the undergrowth the Shrubby Trachymene (*T. Billardieri*) is conspicuous in summer. This plant is very variable in leaf shape. The Wart-flower (*Tylophora barbata*) twines among the low vegetation. This is an asclepiad climber, but does not show the milky juice usual in the family or at least not readily. The Dusky Coral Pea (*Kennedya rubicunda*) occurs at places. On the ground near the settlement are large patches of the Lilac Lily (*Schelhammera undulata*), an attractive little plant with some flowers at midsummer. It is reputed rare. A trailing Lobelia (*L. purpurascens*) has the upward aspect of the flower nearly white, but tinted behind and often coloured on the back of the leaves. The Fanflower (*Scaevola ramosissima*) is common, though rather thinly scattered, as well as *Dampiera stricta*, a smaller blue flower,

and more upright plant of the same family. *Anisopogon* is a rather formidable Spear-Grass with its three awns and considerable penetrating power. It is a fine example for the study of the grass spikelet as it does everything on such a large scale. Another unusual plant is the Curlywig (*Caustis flexuosa*), a sedge with very twisted growth and leaf sheaths at intervals on its stems, which give it the aspect of a plant of the Restio family. Another Caustis (*C. pentandra*) occurs at moist places, but this is a more widely-known plant. The Woolly Xanthosia (*X. pilosa*), also found, has its flowers few together and is somewhat woody, so that it is not at once seen to belong to the Carrot family.

Near the main road there are some wet flats, the road naturally avoiding the more defined gullies. It is not always easy to say which plants belong to the wet ground, as with summer rain the forest as a whole is moister than in many other districts. *Restio complanatus* was found in these flats and several others of its family. *Lycopodium densum*, a rather robust form of club moss, is plentiful at places. The Flax-leaf Heath Myrtle (*Baeckea linifolia*) seems definitely to belong to these flats. It is a shrub with slender branches and had a few flowers in January, apparently beginning. It is recorded also in a somewhat different form in a moist situation near Mt. Imlay across the border. The Mistletoe (*Loranthus vitellinus*) occurs in the forest, nearly always high up, but its fallen flowers reveal it. The flowers are large and bright coloured and the plant often quite attractive. Near the coast, but not in the actual coastal scrub, the yellowish patches of the Golden Mistletoe are seen. All we observed were associated with other Mistletoes (*Loranthus vitellinus* and *Phrygilanthus eucalyptifolius*). Definite examples were obtained of the Golden Mistletoe parasitic on each of these.

South-west of the township, near the coast, there is a large area of dwarf scrub with patches of stunted trees, which may conveniently be called moorland. The present edge of the forest is abrupt and the trees somewhat stunted, which may indicate some clearing, but the moorland presents a type of vegetation of its own, in conditions due to exposure to wind and perhaps wind-carried salt. Few flowers or fruits were seen on the trees and the foliage is not always quite normal. Some tree patches about 10 or 12 feet high were Angophoras with very little doubt. One patch at least about 8 ft. high with a few buds is best as a stunted form of *Eucalyptus eugenioides* (*E. Muelleriana* seems less likely). The leaves were thick. It does not seem necessary to call it a variety; it may be only a result of the environment.

The low moorland vegetation consists largely of Casuarinas—*C. distyla* and *C. paludosa*. The Dagger Hakea occurs in low dense bushes crowded with flowers in January. In the forest it is taller and not dense. *Bredemeyera ericinum* is here of smaller growth than usual and the flowers deep coloured. In fact deep colours are

common in this area, as in Common Heath, some of which was in flower, and in *Orthoceras strictum*, the Horned Orchid. In this moor also is the Flag, *Patersonia sericea*, deep purple, but its colour is, I think, usually deeper than the Patersonias near Melbourne. Other plants here include the Large Tongue Orchid and a Thysanotus, the Fanflower already mentioned, the Prickly Guinea Flower (*Hibbertia acicularis*), the Daphne Heath (*Brachyloma daphnoides*) and a small Boronia.

One of the most remarkable plants is the Lobed Spyridium (*S. serpyllaceum*), a miniature among the Rhamnaceae, sometimes only a few inches high. Its small size at this locality is noticed by the Baron, as I take it that this is his locality given as "mouth of the Genoa River." A variety of *Senecio australis* with toothed leaves (var. *Macrodonta*) occurs with the tree patches. One of the eastern Geebungs, *Persoonia lanceolata*, occurs as scattered bushes in the moorland, perhaps more as the land curves over toward a creek. Near the headland coast teatree and *Melaleuca armillaris* give some shelter.

The lower parts of many of the valleys have a vegetation of especial interest, including several kinds of trees and various climbing plants, some of which are of large size. Lillypillies (*Eugenia Smithii*) are prominent with Bolwarra (*Eupomatia laurina*). The Eupomatia often shows slender upright growth which curves over and sometimes even looks like a halt climber. The young foliage is large and bright and aromatic; flower buds were present in January on low growth, but we did not see any of the flowers which are said to be strongly scented. The large Pittosporum also occurs, and the Notelaea and Elaeocarpus already mentioned. The Notelaea varies in its leaf shape and size and the fruit colour changes with the degree of maturity, but all examined seemed referable to *N. longifolia*.

The largest of the climbers is a true grape-vine, *Vitis hypoglauca*. Its thick stems form great loops from tree to tree. Some former support has gone, leaving lengths of the climber in mid-air. The Stalked Doubah, *Marsdenia rostrata*, is also common, with the peculiar flowers and milky juice usual in the Asclepiad family. Another woody climber is the Morinda (*M. jasminoides*). It was of smaller growth, but we found an opportunity to obtain flowers where a fallen tree had brought down the climber with it. The Tecoma is rather more widespread, not confined to this kind of valley. *Smilax australis* is a climber of the Lily family, of a peculiar section, with net veining in the leaf. It climbs by tendrils and is armed with substantial prickles, so that it is a well-known impediment to travel. The Wombat-berry (*Eustrephus latifolius*) belongs to a quite different section of the Lily family. It is an asparagoid climber, somewhat resembling in aspect the broad-leaf Asparagus (or *Myrsiphyllum*) of gardens, which is often called Smilax in error. True Smilax is quite different.

The Rasp-fern (*Doodia aspera*), with tinted fronds, is sometimes abundant, and in a gully in the steeper country at the Narrows we found the Creeping Polypody (*Cyclophorus serpens*). In this gully also the Grass Flag, *Libertia paniculata*, was found. Nearby a steep hillside descends to the Narrows. Here we found the Flax Lily (*Dianella coerulea*), confirming the occurrence of this species in Victoria. Here also were the Prickly Shaggy Pea (*Oxylobium trilobatum*) and the Twining Guinea Flower (*Hibbertia dentata*). At the foot of the slope *Dodonaea triquetra* occurs, as well as the common *D. viscosa*. The Muttonwood, *Rapanea* (or *Myrsine*) *Howittiana*, occurs near the Lillypillies, but is not so limited. It extends westward also as far as the valleys of the Keilor Plains. Some examples showed an abundance of the purple fruits clothing the stems just below the foliage. This habit of flowering on old stems behind the present growth is said to be frequent in some dense warm forests elsewhere. Upstream the Lillypilly valleys merge into ordinary forest valleys, with such familiar trees as the Hazel Pomaderris and Blanketleaf (*Bedfordia salicina*).

The coastal hummocks did not present any unusual features at the parts visited except a large form of the Sword Sedge (*Lepidosperma gladiatum*). The sandspit between the entrance and the cliffs carried little but Cakile, but this is new ground. At the few places visited on the outer coast I did not find any examples of the Scented Fanflower (*Scaevola calendulacea*), nor of *Senecio spathulatus*, nor *Stackhousia spathulata*, though these occur at Lakes Entrance. They might be found on further search. On the cliff west of the entrance there are good plants of *Alyxia* and some *Correa alba*.

Among the rarer plants found at various places were the Black Bogrush (*Schoenus melanostachyus*), a Pultenaea, apparently a non-prickly form of *P. stipelioides*. The Moluccа Bramble, which ranges from Orbost to the Philippines, was seen; it has a rather attractive red flower. Five species of *Persoonia* were observed. Other interesting species, though scarcely rare, include the Tick Pea (*Desmodium varians*), seen at various places. Several species of *Helichrysum* were found, including *H. oblongifolium* and *H. Baxteri*. The Showy Cassinia was also seen. A few late flowers of *Tetratheca* were collected and seem to include both *T. pilosa* and *T. glandulosa*. No doubt many plants not in flower escaped notice. *Correa rubra* occurs in a form with a slightly pink tinge in the red flowers, differing in flower and leaf from the red Correa at Fernbank, near Bairnsdale, and more resembling a tall form found near Kalimna, *Scutellaria mollis*, had been found in previous years, and exhibited. A *Mitrasacme*, probably *M. polymorpha*, was observed at more than one place. *Drosera spathulata* was seen in a roadside drain in black moist soil. *Goodenia barbata*, recorded for Genoa, occurs on the road some distance west of that township.

The Herbarium staff has kindly compared several of the less familiar plants, for which we tender our best thanks.

THE SINGING HONEYEATER AT CAPE SCHANCK

By BLANCHE E. MILLER

To the bird-lover, autumn can offer observations as interesting as those of the spring. It is then that the movement in the bird world is at its zenith. No longer tied with the cares of domesticity, many species sally forth to other localities in late summer. They are not migrants in the true sense, nor exactly nomads. Rather, they "get away for a change," an excellent idea that we humans might well copy voluntarily, without paying a fee to our medical adviser for such good counsel.

Towards the middle of April last, we journeyed to Cape Schanck, a locality which, hitherto, we had not visited. Black-faced Cuckoo-Shrikes were gathering in preparation for their flight north to a more congenial clime, and the first contingent of Flame Robins had already arrived from their summer homes in the mountains. One of the first birds to attract our attention was, surprisingly, the Singing Honeyeater, *Meliphaga virescens*, formerly known as *Ptilotis sonorus*. To an older generation, this attractive bird was unknown on the eastern side of Port Phillip Bay. On the western side it is well known. We have observed the Singing Honeyeater as near to Melbourne as the Werribee River, where Keartland knew it, years ago. Although nearly half the number of our weekly excursions have been to some portion of the Mornington Peninsula, never before had we chanced to see this species. A diligent search through the available bird literature revealed the fact that if *sonorus* —as I prefer to call it - had been observed previously, it had been seldom recorded. Mr. J. G. Mann has had the Singing Honeyeater nesting near his home at Frankston, and, in answer to an inquiry wrote such a charming account of his experiences that I may surely be pardoned for taking the liberty of sharing it, *in toto*, with my fellow-members. Mr. Mann writes:

"It must be fifteen years ago that a pair of Singing Honeyeaters came to my bush home here and soon became tame. The female especially was a great pet and would alight on my hand and let me carry her into the house to the cupboard where the sugar was kept and feed off my palm. The male would never do that, but would come to the verandah at my whistle and eat sugar off the rail. They nested close to the house—a flimsy lace-like nest—and reared a pair of young each summer, sometimes twice in the same summer; but though they brought their young to the verandah for food until fully grown, they then chased them mercilessly away, so that, excepting during the season, there was never more than one pair. On April 13 (or almost exactly to that date) they disappeared, and were never seen until September 13, when they returned, just as tame as ever, and came straight to my outstretched hand. This went on for about six years, until one summer, after they had reared a second pair of young, I noticed one morning that

"Matilda" (as I called my little favourite) was very dopey and would not eat. She sat on my hand and I carried her to the birds' bath and put her in the shade at its edge. A couple of hours afterwards I found her lying dead. Her mate hung about for a day or two and then was also found near the same spot—both of them, I am sure, dying of old age.

"Their latest pair of young remained in their place, and either they or their descendants have been with me ever since, always absent during the winter, and though nesting regularly here near the house, never increasing permanently in numbers. It would be interesting to know where their young go to. I have occasionally seen them about the Peninsula, but only rarely, and also where they migrate during winter. It is a month now since the present pair have attended my morning levees, and I shall not see them until mid-September."

Putting into practice the theory that "any place is a good place so long as it is out of doors," early in May we decided again to visit Cape Schanck. Although, by the calendar, our second visit was some three weeks later in the season, the day was more suggestive of late summer. On the cliff near the lighthouse the roof of a building is securely moored to Mother Earth to withstand the gales, but as if to refute the implied libel, Bass Strait reflected the intense blue of the noonday sky. There were literally acres of Flame Robins, resplendent in their new livery. Amongst the Banksias, the harmony of the Grey Butcher-bird contrasted sharply with the clamorous calls of two species of Wattle-birds, but there was another call—strange, yet familiar. Imagine our delight to find that the Singing Honeyeater was still present, not merely an odd pair, but in large parties. At a conservative estimate the groups must have numbered fifty birds.

So here is a further problem for the field worker. Do the Singing Honeyeaters intend to winter there, or may we be even bolder and wonder whether they are, after all, permanent residents. Judging by Mr. Mann's experiences, I think not. As the Club is to visit Cape Schanck shortly, it will be of interest to notice whether these birds are still there. Members who are not familiar with the Singing Honeyeater should see the coloured plate in Mathews' work. There is also a good figure in Leach's *An Australian Bird Book*.

While agreeing with the cabinet worker that "a sight observation, unaccompanied by skins, is a great dis-service to scientific ornithology," as a field naturalist, may I be permitted to point out that many of our birds have definite characters easily recognizable when seen at close quarters, or with the aid of field glasses, which make their identification not only possible but accurate.

MELBOURNE BOTANIC GARDENS

On the occasion of the visit of the members of the Club to the Melbourne Botanic Gardens on April 24, the weather was perfect, and, considering the season, the lovely Gardens were looking their best. There was a good attendance of members and friends, who were fortunate in having as their mentor Mr. P. R. H. St. John, whose knowledge of the Eucalypts is so well and widely recognized.

Making our way along the Australian Border, with a short excursion to the Domain bordering that road, to the lawn at the south-east corner where several trees are to be seen to the best advantage, each species was described in turn. Then the party crossed the Gardens to the north-west exit, where other species in the vicinity of the Temple of the Winds were examined.

Of the list appended almost every species was seen. On comparison with the "List of Victorian Plants in Cultivation in the M.B.G., December, 1909," said to have been compiled by the late Mr. F. Pitcher, it is found that 12 of the 37 Victorian species of Eucalypts there named are no longer to be seen there, and that the present total of about 64 species contains only 33 known to occur in Victoria.

The general opinion of members is that the area devoted to the Australian plants is inadequate for giving a proper representation of even the Victorian flora, let alone that of the whole country. The area is at present crowded, and few additions appear to have been made of late years. Even if the several species unnecessarily repeated were reduced to single specimens there would be room for the introduction of only an inconsiderable number of others. It is thought that for the benefit of students of our flora, and to give overseas visitors a better idea of it, a considerable slice of the northern end of Government House reserve might well be included in the Gardens, and devoted entirely to native plants; or that some other area apart altogether from the Botanic Gardens, and without attractiveness to picnic parties, should be selected, where our trees and shrubs might be seen growing as far as possible under natural conditions.

Eucalypts now in cultivation in Melbourne Botanic Gardens and vicinity:

aggregata, D. & M. Black Gum.
albens, Mig. White Box.
Baileyana, F.v.M. Stringybark.
Baueriana, Sch. Fuzzy Box.
Behriana, F.v.M. Bull Mallee.
Blackburniana, Maid. Ironbark Box.
Baristoana, F.v.M. Gippsland Box.
botryoides, Sm. Mahogany Gum.
calophylla, R.Br. Marri.
canaliculata, Maid. Brown Grey Gum.
cinerea, F.v.M. Mealy Stringybark.
citriodora, Hook. Lemon-scented Gum.
cladocalyx, F.v.M. Sugar Gum.
cneorifolia, DC. Kangaroo Island Mallee.
corniia, Lab. Yate.
diversicolor, F.v.M. Karri.
diversifolia, Bonpl. Soap Mallee.
elaeophora, F.v.M. Long-leaf Box.
eremophila, Maid. Tall Sand-Mallee.
eugenioides, Sieb. (*scabra*, DC.). White Stringybark.
eximia, Sch. Yellow Bloodwood.
ficifolia, F.v.M. Red-flowering Gum.
gamphocephala, DC. Tuart.
grandis (Hill), Maid. Toolur.
gummifera (Hochr.). Bloodwood.
hemiphloia, F.v.M. Grey Box.
Huberiana, Naud. Rough-barked Ribbon Gum.
leucoxylon, F.v.M. Yellow Gum.
Lindleyana, DC. Kayer-oo.
longicornis, F.v.M. Red Morrell.
longifolia, L. & O. Woollybutt.
Macarthuri, D. & M. Camden Woollybutt.
maculata, Hook. Spotted Gum.
maculosa, Baker. White Brittle Gum.
Maideni, F.v.M. Spotted Blue Gum.
marginata, Sm. Jarrah.
megacarpa, F.v.M. Bullich.
melanophloia, F.v.M. Silver-leaved Ironbark.
melliodora, A. Cunn. Yellow Box.
microtheca, F.v.M. Flooded Box.
Muelleriana, Howitt. Yellow Stringybark.

multiflora, Poir (*robusta*, Sm.). Swamp Mahogany.
multiflora, Poir. (*robusta*, Sm.).
occidentalis, Endl. Swamp Yate.
ovata, Lab. Swamp Gum.
paniculata, Sm. Grey Ironbark.
pilularis, Sm. Blackbutt.
piperita (*aromatica*, Dom.). Peppermint Stringybark.
Planchoniana, F.v.M. Bastard Tallowwood.
platypus, Hook. Round-leaved Moort.
polyanthemos, Schl. Red Box.
propinqua, D. & M. Small-fruited Grey Gum.
punctata, DC. Grey Gum.
resinifera, Sm. Red Mahogany.
rostrata, Sch. (*Camaldulensis*, Dehn.). Red Gum.
rubida, D. & M. Candlebark.
rudis, Endl. Moitch.
saligna, Sm. Sydney Blue Gum.
sideroxylon, A. Cunn. Red Ironbark.
siderophloia, Benth. Broad-leaved Ironbark.
Sieberiana, F.v.M. Silver-top.
Smithii, Baker. Blackbutt Peppermint.
squamosa, D. & M. Scaly-bark.
steedmani, Gard
stricta, Sieb. Scrubby Gum.
Stuartiana, F.v.M. Apple Box.
triantha, Link. White Mahogany.

The following species were in cultivation in the Botanic Gardens in December, 1909, but are not now to be seen there:

alpina, Lindl. Grampians Gum.
amygdalina, Lab. Black Peppermint.
dumosa, A. Cunn. Dumosa Mallee.
globulus, Lab. Tasmanian Blue Gum.
goniocalyx, F.v.M. Mountain Grey Gum.
Gunnii, Hook. Cider Gum.
haemastoma, Sm. Scribbly Gum.
macrorhyncha, F.v.M. Red Stringybark.
obliqua, L'Herit. Messmate Stringybark.
pulverulenta, Sims. Silver Mountain Gum.
regnans, F.v.M. White Mountain Ash.
tereticornis, Sm. Forest Red Gum.

(Old names retained, new names in parentheses.)

—C.S.S.

EXCURSION TO SIR COLIN MACKENZIE SANCTUARY

In winter sunshine, about sixty members and friends arrived at the Sir Colin Mackenzie Reserve on Saturday afternoon, April 17, and were met by Mr. Robert Eadie, M.B.E., Honorary Curator, who conducted the party round Healesville's wild zoo. Before our departure, Mr. Eadie, in acknowledging a vote of thanks, gave some interesting facts concerning the work done at the Sanctuary and outlined plans for the future. The acquirement of extra land was vital for the preservation of the Koala, he declared. The area sought was 349 acres, controlled by the Aborigines' Protection Board, which was reluctant to part with it, although it was just rough bush country and had little grazing value. The area, however, contained a great number of the Koalas' favourite trees, *Eucalyptus viminalis*, and other Eucalypts that were essential to provide food for the animal. It had now been proved that the Koala would live and multiply in the Sanctuary.

Mr. Eadie emphasized that there must be no slacking in the efforts to obtain the area in question. Seventeen years ago it was proclaimed a sanctuary for native game, and the time had now come when it should be made a sanctuary in the best sense of the word. Other countries had set aside thousands of square miles for the protection and preservation of the fauna; to their everlasting credit the authorities in those countries had done the fair thing by their native animals. Further they had created attractive domains where the animals could be seen by all visitors, thus fostering tourist traffic. Yet we had a Government hesitating to transfer a piece of rough bush country from one Department to another. It was no wonder that enthusiasm was damped and nature lovers were discouraged.

(Mrs.) C. Barrett.

A SELF-TAMED LYRE-BIRD

When men were putting up a camp near Labertouche, some weeks ago, they noticed a Lyre-bird was close by, ready for pickings in the newly disturbed ground. No moves to alarm it being made, gradually it became tame. In a few days, it could be closely approached, and at the end of a week or two, fed from the hand of any man at the camp.

Nearly all day the bird remained around the tents, but at night always flew off over the creek, to where apparently it had a secure home. With the approach of colder nights, however, it soon acquired a taste for artificial warmth, and now is often seen near the fires about the camp, or in the huts, and may stay at the camp all night. Although it can still be fed from the hand, it finds living so easy that one needs a tasty morsel to tempt it out of its usually complacent and reserved mood. Of cameras, tools and ordinary noises, the bird takes not the slightest notice, and close-up photographs may be taken in any position it will condescend to occupy. It objects to being handled, but has been enticed on to men's knees many times, and is obviously not in any concern for its safety.

Why did such a shy bird come to the camp at all? The reason probably is to be found in the fact that it had an injured right leg or foot, which made it difficult to obtain food in ordinary conditions. The foot is seldom used in standing or walking even now but scratches again effectively. I consider that the bird would be well able to look after itself in the bush now, if it desired.

Some argument has taken place as regards its sex. At first, general opinion was that it was a young male bird, but it now appears that the camp pet is a female. Whatever its reasons for staying at the camp, it is a most interesting example of what can be done to win the confidence of wild bush creatures.

R. W. Bond.

SUGGESTED ALTERATIONS TO RULES

Rule 2. Objects of the Club.—It is proposed to add "and to take action to protect native fauna and flora, and national monuments, and to form collections of natural history specimens.

Rule 3. Night of meeting.—Instead of meeting "in the second week in each month" to read "on the second Monday in the month."

Rule 4. Membership.—Alteration of conditions for Honorary Membership. The suggested reading is: "Honorary members, who shall be entitled to all the privileges of Ordinary members, shall be persons who are distinguished for their attainments in some branch of Natural Science, or who have been members of the Club for a period of forty years. The nomination of a person as an Honorary member must be approved by the Committee and the election conducted in the same manner as that of ordinary members."

No alteration is suggested in the case of Ordinary, Country or Associate members.

In the case of Life members it is suggested that the new reading shall be: "Life members. Ordinary members may become Life members on payment of twenty pounds in one sum, provided that after twenty years membership as ordinary members the Life member's subscription be reduced by £1 per annum for every year of continued membership. Life members shall be entitled to all the privileges of Ordinary members."

Rule 5. Subscriptions.—It is proposed to include the words "and payable." The new reading will be: "All subscriptions shall become due and payable on the first day of May in each year."

Rule 6. Balloting for Admission.—It is suggested that instead of the words "black ball," the words "adverse vote" be substituted.

Rule 7. First year's subscription.—It is proposed to add: "Provided that persons elected after the first of November shall be entitled to the privileges of membership on payment of half the annual subscription."

Rules 8, 9 and 10.—No alteration.

Rule 11.—The wording of this rule will be slightly altered and the quorum at a Committee meeting shall be five instead of three. The new reading will be: "The members shall elect, as hereinafter provided out of their own body, the following office-bearers: President, two Vice-Presidents, Treasurer, Librarian, Assistant Librarian, Editor, Secretary, Assistant Secretary and a Committee of five persons, who, together with the above-named office-bearers and with the immediate Past President, shall constitute the General Committee of Management of the Club's affairs, and at all meetings of the Committee five shall form a quorum."

Rule 12. Election of office-bearers.—It is suggested that the words "in writing" be deleted. The phrase relating to nomination will then read: "Candidates for the vacant offices shall be nominated at the previous ordinary meeting."

Rule 13. Filling vacancies.—It is proposed to delete the word "up" in the last line, it being superfluous.

Rule 14. Papers sent to the Club to be submitted to the Committee.—It is proposed to delete this rule entirely and to substitute: "The Committee shall arrange suitable lectures, papers, discussions and demonstrations to be given at the meetings of the Club."

Rule 15. Printing Committee.—It is proposed to delete this entirely.

Rule 16. Duties of the Treasurer.—It is suggested that the word "expenditure" be used instead of "payments," and the word "statements" instead of "the same." The new rule would then read: "It shall be the duty of the Treasurer to receive all sums of money due to the Club, to pay only such accounts as may be ordered by the Committee, to keep an account of such receipts and expenditure, of each person's subscriptions, and of all moneys owing to and by the Club, and to produce statements when required by the Committee. All cheques to be signed by the Treasurer and Secretary."

Rule 17. Duties of Librarian.—It is suggested that the words: "Assistant Librarian" be added.

Rule 18. Duties of Editor.—It is proposed that this rule be altered to read: "It shall be the duty of the Editor to edit the Club's journal, and all other publications of the Club if so authorized by the Committee."

Rule 19. Duties of Secretary.—It is proposed to use the words: "Secretary and Assistant Secretary" instead of "Secretary or Secretaries."

No other alterations suggested.

The Committee of the Field Naturalists' Club of Victoria invite members of kindred societies who may be visiting Melbourne to attend the Club's meetings.

The Victorian Naturalist

Vol. LIV.—No. 3 July 9, 1937 No. 643

THE FIELD NATURALISTS' CLUB OF VICTORIA

The Annual Meeting of the Club was held in the Royal Society's Hall on Monday, June 14, 1937. The President, Mr. S. R. Mitchell, presided and about eighty members and friends were present.

BUSINESS FROM MINUTES

Alteration of Rules.—Mr. R. H. Croll moved that the amended rules, as published in the June *Naturalist*, be adopted. Mr. E. E. Pescott seconded the motion. Mr. G. N. Hyam moved as an amendment that the original wording of Rule 12 be retained. Mr. V. H. Miller seconded the amendment, which on being put to the meeting was lost. The original motion was then put and duly carried.

Excursions.—The President asked members to suggest localities for excursions; the new programme was being drawn up by a sub-committee.

Library Shelving.—Dr. C. S. Sutton reported that the new shelving had been erected and was very satisfactory.

CORRESPONDENCE

Protection of the Golden Water Rat.—A letter from the Chief Secretary's Department, stated that this matter was the subject of investigation at the present time.

REPORTS OF EXCURSIONS

Excursions were reported on as follow: Werribee Gorge, Mr. F. S. Colliver; National Museum, Messrs. A. S. Kenyon and S. R. Mitchell; Cape Schanck, Mr. S. R. Mitchell; Sherbrooke, Mr. H. C. E. Stewart.

ELECTION OF MEMBER

On a show of hands Mr. F. Morley was elected as an ordinary member of the Club.

ANNUAL REPORT AND BALANCE SHEET

The Annual Report was read by the Hon. Secretary, and on the motion of the President, Mr. S. R. Mitchell, seconded by Mr. V. H. Miller, it was adopted.

The Balance Sheet was read and explained by Mr. A. S. Chalk (Acting Hon. Treasurer). After congratulating Mr. Chalk on a clear and lucid explanation of the Club's financial position, Mr. Geo. Coghill moved that the Balance Sheet be adopted. Mrs. Chas. Barrett seconded the motion, which was carried.

PRESIDENT'S LECTURE

A very interesting lecture on "Crystals," illustrated by the epidiascope and a large selection of hand specimens, was given by Mr. Mitchell, who first outlined the subject, and then, by models, showed the various orders into which mineral forms are grouped. The remainder of the lecture took the form of a running commentary on the specimens as shown by the epidiascope.

ELECTION OF OFFICERS, 1937-38

Mr. S. R. Mitchell welcomed Mr. A. H. Chisholm, C.F.A.O.U., as the new President, and thanked members for the help given him during his own term of office.

Mr. Chisholm, taking the chair, expressed his thanks to members for electing him to the office of President, and wished the Club a successful year.

The following officers were declared duly elected:

Vice-Presidents: Mr. Geo. Coghill, Mr. R. H. Croll.
Treasurer: Mr. J. Ingram.
Librarian: Dr. C. S. Sutton.
Assistant Librarian: Mr. W. H. Ingram.
Editor: Mr. Chas. Barrett, C.M.Z.S.
Secretary: Mr. F. S. Colliver.
Assistant Secretary: Mr. L. W. Cooper.

On a ballot being taken the following were elected: Mrs. Chas. Barrett, Messrs. G. N. Hyam, A. S. Kenyon, H. C. E. Stewart and E. E. Pescott.

GENERAL BUSINESS

Donald Macdonald Memorial.—The President stated he had inspected the proposed site for a park and bird sanctuary. A Macdonald Evening will be held by the Club in the near future.

Australian Section at the Botanic Gardens.— Dr. C. S. Sutton stated that the Australian flora was poorly represented in the Melbourne Botanic Gardens. The President suggested that the matter be held over until the next meeting.

NATURE NOTES

Mr. Charles Barrett described a pied Blackbird seen on several occasions recently in the gardens adjacent to Elsternwick railway station.

Mr. V. H. Miller mentioned that a white Blackbird, a true albino, was to be seen at Albert Park. Mr. Chisholm stated that such specimens were not rare.

The President displayed and gave a note on some Vegetable Caterpillars.

CONVERSAZIONE

At this stage the meeting adjourned for the Conversazione.

EXHIBITS

Mr. S. R. Mitchell.—Large collection of minerals to illustrate his address.

Mr. E. E. Pescott.—Flowers of the Royal Grevillea (*G. Victoriae*), a rare mountain species from Mt. Hotham. Also an unusual form of aboriginal pecking or chipping stone, from West-central Victoria.

Mr. C. Daley.—Quartz crystals (clear, amethystine yellow, ferruginous and smoky), also calcite on quartz, and iron pyrites from Bendigo; staurolites from North Queensland; garnets from North Queensland; azurite from Kapunda.

Mr. F. S. Colliver.—Abnormal quartz crystals, from Tasmania; pyrite crystals, from Broken Hill and Bendigo.

DROSERA NUMBS COLLECTOR'S FINGERS

To the Editor, *Victorian Naturalist*

Mr. Albert Morriss, 74 Cornish Street, Railway Town, Broken Hill, New South Wales, writes me as follows:

"There is to my knowledge only one species of *Drosera* in this district (*D. Indica*), and that grows in the sandstone country eighty-six miles NE. of this town, and is to be found only in good seasons close to rock pools. . . . On picking some plants I noticed a distinct numbness of the fingers which soon disappeared after rinsing in water. . . . I asked other persons to help pick the plants . . . they all very soon confirmed my own sensations."

The above excerpts from a personal letter prompt me to ask the co-operation of any one in a position to observe this observation, to check up on the matter. Mr. Morriss failed to observe the phenomenon in the case of other species. Those in possession of several species at the same time might place equally active flies on similar leaves of *D. Indica* and others, and observe if the insect succumbs more quickly on the one than the other.

FRANCIS E. LLOYD,
Box 842, Carmel, Calif., U.S.A.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR TWELVE MONTHS ENDED 30th APRIL, 1937

RECEIPTS

Balance at Banks, 30/4/36—			
State Savings Bank	£469 0 2		
Less E. S. & A. Bank Overdraft	9 1 6		
			£459 18 8
Subscriptions—Arrears	£28 3 0		
Current	207 10 2		
In Advance	16 5 0		
		£251 18 2	
Wild Nature Exhibition Receipts		104 17 3	
Cash Sales of—			
Victorian Naturalist	£10 0 3		
Shell Book	54 6 3		
Plant Census	1 18 6		
Fern Book	2 6 0		
Badges	1 5 0		
		69 16 0	
Advertisements in *Victorian Naturalist*		2 17 0	
Donation		1 0 0	
Hire of Epidiascope		1 10 0	
Interest Received—			
Best Fund	£1 5 0		
Savings Bank Current Account	9 11 3		
On Commonwealth Loan	14 0 0		
		24 16 3	
Sundry Items		3 8 6	
			460 3 2
			£920 1 10

EXPENDITURE

Victorian Naturalist—			
Printing	£151 0 6		
Illustrating	57 10 8		
Despatching	6 9 0		
		£215 0 2	
Wild Nature Exhibition Expenses		59 2 0	
Reprints		4 10 6	
Postage and Freight		9 16 2	
Account Books, Printing and Stationery		21 3 1	
Donations—			
Victorian Advisory Council for Flora and Fauna		4 4 0	
Rents—			
Royal Society's Hall	16 0 0		
R.A.O.U. for Committee meetings	2 10 0		
		18 10 0	
Caretaker for Royal Society's Hall		1 10 0	

General Expenses, Insurance, Bank Charges, etc.	3 2 10		
Cost of Club's Conversazione, held Dec., 1936	6 11 0		
Cost of Producing Shell Book	92 1 0		
		£435 10	9
Balance at Banks, 30/4/37—			
State Savings Bank	400 10 5		
E. S. & A. Bank	84 0 8		
		484 11	1
		£920 1	10

STATEMENT OF ASSETS AND LIABILITIES ON 30th APRIL, 1937

ASSETS

Arrears of Subscriptions, £46, estimated to realize, say		£25 0	0
Wild Nature Show Tickets unpaid		1 5	0
Bank Current Accounts—			
State Savings Bank	£400 10 5		
E. S. & A. Bank Ltd.	84 0 8		
State Savings Bank Special Trust Account	12 15 3		
		497 6	4
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 cost		70 0	0
Stock of Books and Badges, at valuation—			
Fern Book	£46 5 0		
Plant Census	6 5 0		
Shell Book	30 0 0		
Club badges	3 0 0		
		85 10	0
		£1,479 1	4

LIABILITIES

Late Mr. Dudley Best Fund		£50 0	0
Char-a-banc Fund		2 2	0
Special Trust Account		12 15	3
Subscriptions paid in advance		16 5	0
		£81 2	3

Examined and found correct on 14th May, 1937.

CHAS. CROLL
A. G. HOOKE } Honorary Auditors.

A. S. CHALK,
Acting Hon. Treasurer.

FIFTY-SEVENTH ANNUAL REPORT, JUNE, 1937

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

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

The membership is as follows: Life members, 7; Ordinary members, 203; Country members, 74; Associate members, 33; total, 317. There is a decrease of 39 compared with last year's roll.

We record with sorrow the deaths of six members of the Club: Mr. J. Stickland (1880-1937), Sir A. E. Kitson (1893-1937), Prof. A. H. S. Lucas (1893-1936), Mr. E. J. Dunn (1911-1937), Mr. H. P. McColl (1924-1936), and Mr. C. Simpson (1935-1937).

Attendances at the meetings have been well maintained, and on many occasions the seating accommodation has been fully taxed. The second room is still in use for the display of exhibits, which have been varied and interesting, although sometimes comparatively few. The Committee appeals to members to make this part of the meeting even more interesting and instructive. The Nature Notes contributed were welcome, but here again it is felt that many more items could be placed before the meetings.

All of the meetings this year have been held in the Club Rooms, at the Royal Society's Hall, and the epidiascope has proved its worth as a means of allowing suitable illustrations as well as slides to be used by the lecturer.

A comprehensive series of lectures was given during the year: Presidential Address ("Fields for Naturalists"), Mr. G. N. Hyam; "Australian Vanishing Birds," Mr. A. H. Chisholm, C.F.A.O.U.; "Grasses," Mr. P. E. Morris; "Major Mitchell, Explorer and Naturalist," Mr. C. Daley, B.A., F.L.S.; "In Australian Tropics," Mrs. P. Hanks; "Indigenous Fauna at the Zoo and in the Bush" (with a motion-picture), Mr. David Fleay; "A Ramble in New Guinea," Capt. G. M. McLean; "Erosion," Mr. W. J. Lakeland; "Australian Wild Flowers," Mr. H. Reeves and Mr. G. N. Hyam; "Koalas," Mr. Chas. Barrett, and others; "Some Australian National Parks," Mr. A. H. Chisholm.

The December meeting took the form of a social evening, which proved to be a popular innovation.

During the year thirty-one excursions were held, while four were cancelled for various reasons; latterly the excursions have been very well attended. The sub-committee for excursions asks, as usual, for suggestions as regards localities.

Volume fifty-three of *The Victorian Naturalist* has been completed. The aim is to increase its size and the number of illustrations. Increased membership is necessary if this is to be done. It is suggested to the incoming Committee that any profits from the next Wild Nature Show be expended on the *Naturalist*. Many

Plate V

Photo. by C. Stuart Tompkins, Camberwell

Mr. S. R. Mitchell
President Field Naturalists' Club of Victoria, 1936-7

papers, of popular and scientific interest, appeared in the volume, and it is hoped that similar papers will be forthcoming from members and others during the coming year. Our journal is still the leading publication of its kind in the Commonwealth and it is the constant aim of the editor to make it even more comprehensive and valuable. That it fills a place in scientific periodical literature is shown by the constant demand for it from overseas institutions.

The Club continues its activity in preserving the wild life of Australia and from time to time members have reported to the Committee various breaches of Fauna and Flora Protection Acts, and cases of vandalism; these have been referred to the proper authorities for action.

Matters that have been inquired into include: Proposed national parks, Greater Melbourne as a sanctuary, protection of the Bustard in the Northern Territory, protection of native birds, King Orchids on sale in the markets, protection of native Orchids, additional areas for reservations at Badger Creek, preservation of the Koala, destruction of Orchids at Anglesea, and vandalism at Mt. Buffalo National Park. At the Committee's suggestion, additional rangers have been appointed.

To the three sub-committees (Geological, Park Lands and Native Reserves) operating, is now added a fourth to care for the interests of new members.

The National Monuments movement is progressing, and leading members of the Club are collecting information regarding oversea efforts in this direction. A large number of public and private bodies have promised support in this matter. Again the Committee asks members to bring under notice any objects or places which they consider should be "National Monuments."

Co-operation with kindred societies has been maintained. Delegates attended the Auckland meeting of the Australian and New Zealand Association for the Advancement of Science. We are represented on the Council of the League of Youth and will continue to co-operate in its efforts to interest young Victorians in nature and civics.

The South Australian Naturalists' Club, Australian Aboriginal Group, New South Wales Rangers' League, Newcastle District Horticultural Society and the Children's Week Committee have been assisted at their annual shows. The Club was also represented at the official opening of the Mt. Arapiles National Park, and Tree Planting at Melton.

The Victorian Advisory Council for Flora and Fauna, with Mr. C. Daley as secretary, is active and much good work has been done during the year. Your Committee again voted £4/4/- towards the expenses of the Council.

The Annual Wild Nature Exhibition was held at the St. Kilda Town Hall, and a very comprehensive display embracing all branches of natural history was staged. Owing to careful manage-

ment we are pleased to report that a profit was made. The Show Committee drew up a questionnaire covering all groups of exhibits. Prizes were offered for the best paper returned. This was very popular with the children, and numerous adults asked for copies of the questionnaire for their own information.

The Hon. Librarian reports that numerous books and pamphlets have been bound during the year, and a number of new books purchased. More library accommodation has now been provided.

The Club's second Nature Book, *The Shells of Port Phillip*, was published, and met with a great deal of appreciation. The Committee presented to Miss Joyce Allan, the artist, and Mr. C. J. Gabriel, the author, specially bound copies of the book.

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

A revision of the "Rules" has been prepared by a sub-committee and these are presented for confirmation to this meeting.

Messrs. J. and W. H. Ingram having gone to Britain on a holiday, Mr. A. S. Chalk was appointed acting Treasurer and Mr. H. C. E. Stewart acting Assistant Librarian.

Grateful acknowledgments are tendered to the following: Mr. J. E. Dixon (cash donation), The Shell Company (for the very fine display of wild flowers staged at the last show), Miss M. Agnew, Mr. C. French, Mr. H. C. E. Stewart, and Mr. Albert Green (each a gift of books).

A comprehensive expression of thanks is extended to all members and friends of the Club who have helped toward the advancement of the Club and its activities.

We regret to announce that, after being a member of the Committee for twenty years, Mr. C. Daley has withdrawn from an official position in the Club. We extend to Mr. Daley our sincere thanks for many services rendered, and also our best wishes for his future.

During the year eleven ordinary Committee meetings were held, and the attendances of offices were as follow: Messrs. L. W. Cooper and F. S. Colliver (11), Mr. S. R. Mitchell (10), Mr. H. C. E. Stewart (9), Messrs. G. N. Hyam, A. S. Kenyon, W. H. Ingram and V. H. Miller (8), Messrs. C. Daley, J. Ingram, E. E. Pescott and Dr. C. S. Sutton (7), Mr. Geo. Coghill (6), Messrs. C. L. Barrett and A. H. Chisholm (5), Mr. A. S. Chalk (3).

S. R. MITCHELL, President.
F. S. COLLIVER, Hon. Secretary.

UNUSUAL TYPE OF GROUND-EDGED STONE IMPLEMENT

By S. R. MITCHELL

Two interesting specimens of ground-edged implements of an unusual type were received recently from Mr. K. J. Goddard, of Nicholson Station, East Kimberleys, Western Australia. They are hand-axes with a comparatively long cutting edge on one side and the opposite side embedded in vegetable cement.

The larger specimen (top figure in plate) measures 5·5 inches in length and 3·5 inches at the widest part, including the cement hafting, and is about one inch thick. It has been fashioned from a large flake of indurated siliceous mudstone, one side of which is a fairly plane surface. The opposite side has had numerous flakes struck off, thereby reducing its thickness. The two faces converge to a comparatively thin edge, which has been improved by grinding off the higher parts.

The smaller specimen (bottom figure in plate) measures 3·7 inches in length and 2·8 inches at the widest part. This also has been fashioned from a large flake of similar indurated siliceous mudstone, having one fairly flat surface and opposite it two smaller surfaces, which meet in a median ridge 1·2 inches in height, which gives the implement a roughly triangular cross section. The meeting of one of these smaller planes and the larger forms the cutting edge, 2·5 inches in length, which has been sharpened slightly by grinding. The other edge has been embedded in cement for the protection of the palm of the hand. Both specimens are covered with red ochre and are polished in places, evidence of use as hand tools.

Mr. Goddard states that tools of this type were used by the Gninnigh tribe of aborigines as hand-axes or choppers for the rough shaping of wooden water vessels and shields.

The third implement was found by the writer in 1924 on a coastal midden at Port Kembla, New South Wales. It is composed of a coarse metamorphic sandstone with the weathered surface showing numerous black spots, probably chiastolite. It measures 5·5 inches in length and 3·4 inches at the widest part, and tapers from the back towards the cutting edge from 1 inch to 0·6 inch. Both sides are flat surfaces due to splitting along the bedding planes of the sandstone. The cutting edge, which is quite straight, measures 5 inches, extending almost the full length of the implement, and has been produced by grinding two flat bevels meeting at an angle of 55°. The grinding is confined to within 0·5 inch each side of the cutting edge, and was evidently done on a flat whetstone. A piece has been broken away from the dressed part since the implement was made.

R. E. Etheridge, Jun., in *Proc. of the Linnean Society of New South Wales*, 1890, vol. v, describes a similar type of implement

from a grave at Long Bay near Botany. He states: "The implement is five inches in length having a width of three inches. Instead of being ground to a cutting edge at one end, it is so along one of the longer sides. It is composed of micaceous sandy shale—and is a little thicker than $\frac{1}{8}$ in."

W. W. Thorpe and Frederick D. McCarthy, *Records of the Australian Museum*, vol. xix, figure four ground-edged implements of a similar type, selected from a series of eighteen specimens from the Australian Museum Collection. They state: "As will be apparent from the location given they are not merely a local variation of the normal type of ground axes but are, it seems, an implement made for a definite purpose. In the collection they are termed skin dressers, a purpose for which they are eminently suitable and which was their most probable use." The similarity of these specimens to those from the East Kimberleys suggests an identity of use, and the possibility of their having had vegetable cement attached to them for greater comfort in handling.

Considering the wide use of gum cement in the hafting of ground-edged axes and knives by the Australian aborigines, it seems reasonable to assume that some of these implements were hafted in a like manner.

NOTES ON A PROTOZOAN *SPIROSTOMUM* (*SP.*)

By DESMOND WENTWORTH

During last summer an opportunity occurred to study an interesting protozoan which is probably a species of *Spirostomum*. These animalcules made the backyard fishpond of the observer their habitat. Their presence was first noticed as a whitish deposit on the sediment at the bottom of the pond. Upon observation this deposit was found to contain thousands of the protozoans. During the day a few only were to be seen swimming freely in the lower depths of the pond.

Owing to the fact that this species unusually is large (sometimes being as long as 2 mm.) it is readily visible to the naked eye. As it was desired to obtain for experimental purposes a quantity free from foreign matter, a special method of collection was required. This led to an interesting discovery in regard to a peculiar characteristic of these protozoans.

One warm night, while intending to observe a pet frog which inhabits the pond, the writer was very surprised to find a whitish "scum" on the surface of the water and around the lily leaves. Under the microscope it was found to be a living mass of *Spirostomum*. Subsequent observations revealed that on some nights the swarms are very dense, while on other occasions no signs of the protozoan may be seen. While it is certain that warmer temperatures are more favourable to their presence, there appear to be

Plate VI

Photo. by H. V. Reeves

Unusual type of ground-edged stone implement

(*top*) East Kimberleys, W.A.; (*middle*) Port Kembla, N.S.W; (*lower*) East Kimberleys, W.A.

other unobserved conditions necessary to produce this swarming effect. This is indicated by a chart of observations made on fourteen consecutive nights at a period when the protozoans seemed to be plentiful. On nights which were similar in weather conditions the results of observations differed. It is very definite that swarming does not take place during the daytime, and that the animalcules are rarely visible during the daytime, excepting a few free swimming ones and others lying on the sediment at the bottom.

Although thousands of specimens were examined, all appeared to have attained full size. Occasionally conjugation was noticed but not to any great extent. While they are being examined in a watch glass or a hollow glass block, it is common to see them suddenly contract for no apparent reason, not all together but independently of each other.

Briefly, the features of this *Spirostomum* are as follow: Color, milky white; length about 2 mm., and 8 or 10 times the width, thickness being about 1/20 of the breadth. The fat body is covered completely in short cilia and a buccal canal extends for about two-thirds of the length of the body, ending in a spiral grove leading into the mouth. An unusual feature is an alimentary canal running the length of the body.

There does not appear to be any available description appropriate to this extremely interesting species; in fact, the only other variety the writer has seen (collected in an eastern suburb) differed in many essential details and it appears probable that this variety might be an undescribed one. The writer would welcome correspondence from anyone who has made any observations relative to this protozoan or similar types. It should be added that the purpose of this paper is not to describe what might be a new species, but merely to record some of the habits and characteristics of a protozoan.

Chart of Observations of Occurrence of Spirostomum in Pond

Date	*Time*	*Temp. of Water*	*Temp. of Air*	*Weather Conditions*	*Remarks*
13/12/36	9 p.m	62°	62°	Mild night, sky overcast.	Swarms on surface. Fairly dense
14/12/36	10 p.m.	61°	58°	Showery.	Swarming slightly less than 13th.
15/12/36	10 p.m.	69°	68°	Showers during night.	Light swarms, particularly on edge.
16/12/36	10 p.m.	71°	70°	Mild night; rain during day	Swarming fairly well; on edge and surface pits.
17/12/36	11 p.m.	71°	68°	Close night, shower before reading.	Swarm lighter than earlier in night and before change.
18/12/36	10 p.m.	74°	67°	Warm night	Swarming fairly densely in parts of pond.

19/12/36	12 p.m.	75°	73°	Warm night, sky clear.	Swarm lighter than usual.
20/12/36	10.30 p.m.	72°	65°	Drizzling rain.	Much lighter than earlier in night.
21/12/36	11 p.m.	70°	63°	Mild night, clear sky.	Scattered lightly over surface of pond.
22/12/36	11 p.m.	70°	66°	Mild night.	Same as previous night.
23/12/36	11 p.m.	65°	60°	Mild night.	Fairly light swarm; scattered over surface.
24/12/36	12 p.m.	62°	56°	Clear sky.	Very light sprinkling.
26/12/36	10 p.m.	66°	60°	Cool night and clear sky.	No signs of protozoans to be seen.
27/12/36	10.30 p.m.	71°	67°	Mild night and clear sky.	No signs of swarms to to be seen.

EXCURSION TO WERRIBEE GORGE

In attending the Coronation Day excursion to the Werribee Gorge, some forty members and friends paid tribute to one feature of the Bacchus Marsh area, to the manifold mysteries of which more than eighty scientific papers have been dedicated by Victorian geologists, the earliest dated 1861 and the latest read last May and as yet unpublished.

Leaving the cars at the termination of a road traversing the lower part of the Gorge, a short walk brought the party to a cliff cut in the glacial tillite on the southern side of the river, where, a halt being called, Mr. S. R. Mitchell spoke briefly concerning this material. It was emphasized that the tillite was composed of a collection of pebbles and boulders of miscellaneous rock types set in a hardened matrix of finer rock meal, the larger fragments being derived in many cases from outcrops untraceable and unknown. The finer material representing the ultimate comminution of the larger rock fragments frozen fast in the basal layers of a former ice-sheet, and either rounded and polished, or characteristically striated and facetted, as the ice moved over and scoured the rock surfaces upon which it once rested. This section, capped by Tertiary gravels at the point in question, is one of many common in the whole area, and which elsewhere, inclusive of the glacial tillite and boulder clay, and the fluvio-glacial conglomerates and sandstones, show a total thickness in excess of 2,000 feet.

In discussing the origin of the glacial deposits it is necessary to go much farther afield than Bacchus Marsh. For such widely separated areas as Coleraine, Derrinal, and the Beechworth district show deposits of similar morainal material, which is also found in the neighbourhood of Kyneton, and has been identified in bore cores from the Mallee. Furthermore, during the glaciation of Victoria, the whole of the southern portion of Australia simultaneously suffered from the action of an ice-sheet which has left traces of its harvest of rock specimens in Western Australia at a point as far north as the tropic of Capricorn. Consideration of the age of the glaciation, on the other hand, takes us still farther afield, for it has been referred to the Permo-Carboniferous glacial epoch, during which period a phenomenal, though still causally debated climatic fluctuation resulted in the glaciation of not only portion of Australia, but much of the Southern Hemisphere as well; since ice-born rocks of Permo-Carboniferous age have been identified in South America, South Africa, India and Antarctica. It may be of interest to compare this, the current valuation of the evidence, with the attempt of A. R. C. Selwyn[1] in 1861 to demonstrate the glacial character

of the Bacchus Marsh material. At which time such an apparently ludicrous suggestion was for long ignored, and though more than thirty papers mention the area in the interim, it was not until 1892 that E. J. Dunn[2], from evidence obtained in the Derrinal area, was enabled to indubitably establish a glacial period for Victoria.

With respect to the direction of the ice movement, a certain amount of evidence can be inferred from the orientation of the striae incised in the underlying rock surfaces, or glacial pavements. There are four generally known pavements in the area, while a fifth, which occurred in the Gorge itself, has unfortunately been buried. From these and other such pavements in the areas mentioned above, the general trend of the ice movement in Victoria is regarded as having been from west of south to east of north; while similar evidence shown by glacial pavements in South Australia suggests a movement from east of south, to west of north. Hence it has been concluded that as long continued erosion had, prior to the glacial period, reduced much of the area now known as Victoria to one of low relief, the extensive snow-fields necessary as the gathering ground of the ice-sheet were situated on an elevated, and since vanished, *terra incognita* lying to the west of Tasmania, from which the sheet radiated in its descent to the lower glaciated region. So that the ice-sheet moved over the land bridge which was to become subsequently depressed to form the sunkland now occupied by the waters of Bass Strait, in the floor of which may outcrop some of the parent masses of the rocks occurring as untraceable fragments in the glacial conglomerates, while other such outcrops are doubtless buried beneath later superficial cappings of the Tertiary sediments and lavas to the south.

The next point of interest was reached after a walk along the edge of an aqueduct set in the northern wall of the Gorge, which leads past the almost sheer section of the southern wall known as "Daintree's Cliff." The precipitous character of the walls at this point is due to the resistant Lower Ordovician shales and sandstones through which the river has hewed its course. These sediments, containing in places marine fossils, are the oldest rocks outcropping in the area. They were originally laid down horizontally in a rather shallow sea, to become elevated above sea level and acutely folded with the development in places of reversed faults, during earth-movements of perhaps two periods operating subsequently to the Lower Ordovician, and prior to the close of the Silurian periods. At the top of "Daintree's Cliff" the folded Lower Ordovician rocks give place to massive outcrops of glacial till, the discordance of the bedding of the two series plainly marking an unconformity. At the eastern end of the section, nearly opposite the lower shelter shed, a lateral and intermittent tributary stream has occupied the trough of a synclne in these folded rocks, and when running, enters the Werribee as a small waterfall issuing from a hanging valley.

After lunching at "Daintree's Cliff" the party divided, some electing to ascend to the top of the Gorge, the remainder to continue the exploration of its upper reaches. Under the joint leadership of Mr. Mitchell and Mr. Colliver the more adventurous spirits searched for the glaciated pebbles common in the neighbourhood of the upper shelter shed; gauged the depth of the Gorge—variously estimated at 850, 800 and 600 feet—from a vantage point to the west of the shelter shed; and inspected a large striated boulder at the top of a rise near this latter point. From the end of the aqueduct, the remainder of the party wended a rather precarious way over boulders in the stream bed, to a part of the Gorge narrowed by the resistant weathering of a large quartz-felspar-porphyry dyke cutting across it. Penetrating the Lower Ordovician sediments along a line of weakness, this dyke has induced in them a narrow, though patchy, contact metamorphic aureole, best seen on the southern side of the river. It is doubtless an aschistic hypabyssal satellite of the granitic intrusion particularized as Adamellite,

which forms the walls of the Gorge in its upper reaches. And since the Adamellite was probably intruded into the Lower Ordovician sediments during the Lower Devonian period, the dyke also belongs to this period: at least, as the dyke has a glacially striated surface it is certainly Pre-Permo-Carboniferous.

From the foregoing notes the variation in width of the Gorge should be apparent. It is moderately "V" shaped in its upper reaches where the walls are granitic, narrowest at the dyke just below Pyramid Rock, narrow in the neighbourhood of the Lower Ordovician rocks of "Daintree's Cliff," and broadens considerably as the latter give place to the glacial till near its mouth, where it is terminated by the semi-dismantled scarp of the Rowsley fault. Extending for nearly thirty miles in an approximately north and south direction with an average height of about 800 feet, this scarp represents the western, and the Selwyn fault the eastern fracture line of the low-lying area known as the Port Phillip Sunkland. The latest movement along it has also been largely responsible for the rejuvenation of the Werribee River, which latter has resulted in the formation of the Gorge. And since this last movement is considered to have been Post-Newer-Basaltic, in other words, late Pliocene or early Pleistocene in age, the Gorge has been excavated in the geologically brief space of perhaps one million years, so that its formation must be included among the most recent changes effecting the area.

Should any member desire further information on the geology of this fascinating locality, an excellent popular account by Professor E. W. Skeats will be found in the *Walkabout* for December, 1936; a valuable summary of the geology, with a bibliography, has been written by Associate-Professor H. S. Summers;[3] and a comprehensive account of the physiography by Dr. C. Fenner;[4] all of which must be acknowledged in the preparation of this report.

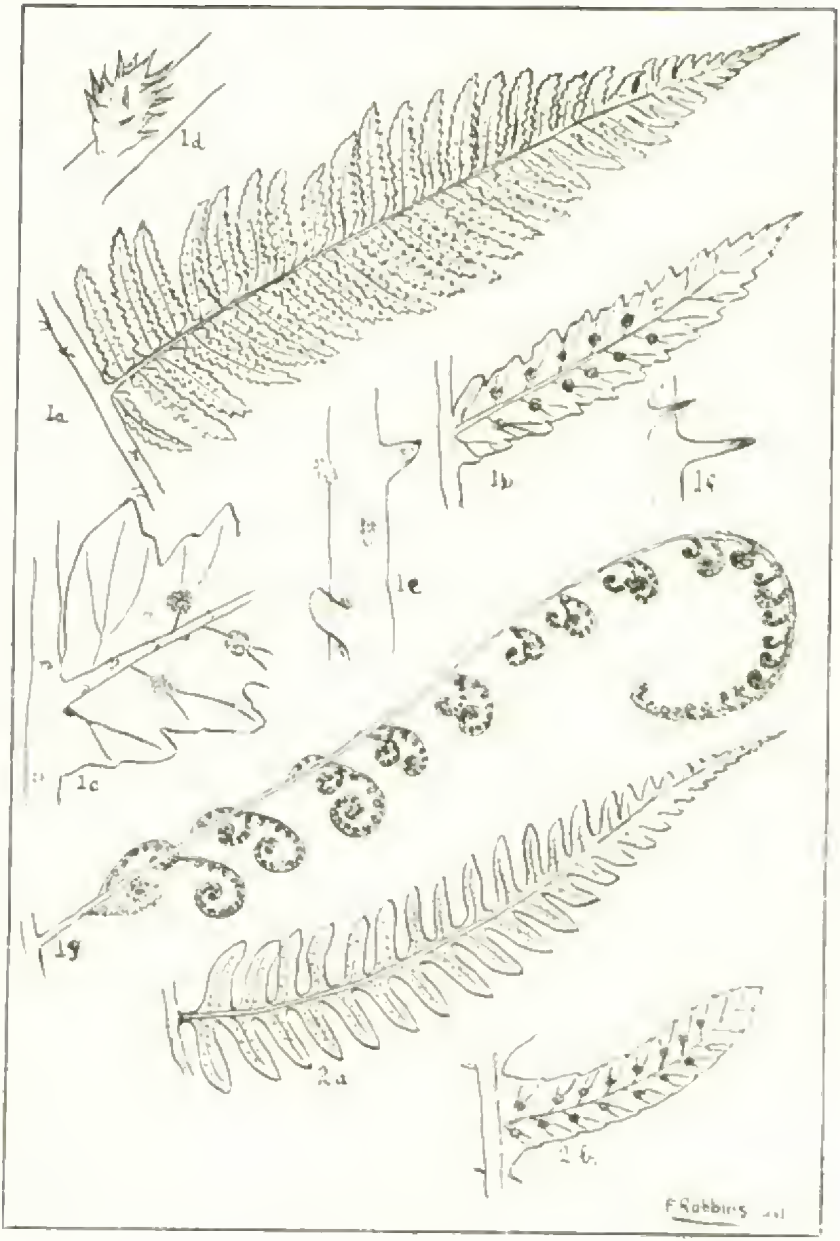
References

1. A. R. C. Selwyn: *Catalogue of the Victorian Exhibition*, pp. 176-189, 1861.
2. E. J. Dunn: *Special Report Department of Mines, Vic.*, p. 5, 1892.
3. H. S. Summers: *Pan-Pacific Sc. Congr. Proc.*, vol. ii, pp. 1632-1648, 1923.
4. C. Fenner: *Proc. Roy. Soc. Vic.*, N.S., vol. xxxi, pt. i, pp. 176-313, 1918.

A. C. FROSTICK.

The Club's stock of the *Naturalist* for April, 1936 (No. 12 of Vol. LII) having become exhausted, the Hon. Librarian would be very glad to receive copies from members who may have no further use for them.

Plate VII



Alsophila Leichhardtiana, a Tree-Fern new for Victoria

A TREE-FERN NEW FOR VICTORIA

By FRANK ROBBINS, B.SC.

On the eastern side of Mt. Drummer, eastern Gippsland, there is an extensive rain-forest jungle, which I attempted to explore in March, 1937. I was not successful in penetrating far into it, but among the 104 or more ferns and flowering plants noted, there were several interesting finds: *Alsophila Leichhardtiana* F.v.M. (Prickly or Hard-stemmed Tree-Fern); *Cyathea medullaris* (Black Tree-Fern), very rare in the State, and not recorded for eastern Victoria; and *Plantago debilis* R.Br., new record for Victoria; I had previously seen this near Orbost.

My attention was first drawn by the black slender stems with the drooping black, dead fronds near the top. The sori in the cup-like indusium at once pointed to *Cyathea*. There were only a few specimens, but a little farther down the gully, another tree-fern became quite common. Its extremely prickly nature and absence of indusium pointed to an *Alsophila*, new for Victoria, which later it was proved to be (by Government Botanist).

Alsophila Leichhardtiana has been recorded as common in coastal scrubs of Queensland, Maroochie (common), and in New South Wales from Port Jackson, Blue Mountains, New England, Clarence River, Hastings River, McLeay River, Tweed River, Illawarra, etc. This fern is 10 feet to 15 feet in height, with a very thin trunk, and resembles *Cyathea medullaris*, except for absence of its black appearance and drooping dead fronds. The extremely prickly bases of the fronds, particularly in the smaller specimens, make its identity unmistakable. *Alsophila australis*, our common Rough Tree-Fern, also has this characteristic, but only to the extent of roughness.

The fronds of *Leichhardtiana* are bipinnate, but the edges of the leaflet are definitely serrate, whereas in *A. australis* the leaflets are almost entire. The veining is similar for both species as also is the position of the sori on the nerves. There is a tendency to 3-forked nerves in some of my specimens. Another feature is the dark mealy surface of the underside of the ribs of the fronds, due to dark brown prickly scales (stellate hairs?). The points of these scales are of deep brown-red colour. The "prickles" grow mostly on the underside of the midribs and toward the base of the main rib are up to 5 mm. long, sharp, rigid and somewhat resembling those on a raspberry. Another conspicuous feature is the greyish appearance at the top of the trunk, which is due to the presence of numerous long greyish linear scales or hairs. The appearance of a young frond unrolled to full extent is also very striking, reminding one of a host of millipedes coiled up.

The Prickly Tree-Fern and *Cyathea medullaris* are both difficult to remove and grow in a fernery. One hopes that no fern enthusiasts will raid this rare little clump, where one is within hearing of the horns of motor-cars on the beautiful winding road just above.

References

BAILEY: *Litho. Ferns Qld.*, 38.
F.v.M.: *Fragm.*, v, 53-117.
BENTHAM: *Flora Aust.*, vii, 711.

Key to Drawings

1 (a)—*Alsophila Leichhardtiana* F.v.M. Secondary pinna (× 1).
1 (b)—Leaflet (× 4) showing sori and nerves.
1 (c)—Same (× 10) showing nerves, sori, and prickly scales.
1 (d)—Prickly scales.
1 (e)—Prickly probtuberances on primary pinna.
1 (f)—Prickly probtuberances on base of petiole (main rib).
1 (g)—Primary pinnal of young frond (about 3-4 ft.) (× ½).
2 (a)—*Alsophila australis*. Secondary pinna.
2 (b)—*Alsophila australis*. Leaflet.

DROSERA PLANCHONII, Hk.f., "CLIMBING SUNDEW"

In various works on the Victorian Sundews, the "Climbing Sundew" is named *Drosera Menziesii* R.Br., and *D. Planchonii* Hk.f. and *D. Menziesii* R.Br., var. *albiflora* Benth., are given as synonyms. During the course of some revision work on the Australian Sundews we discovered that *D. Planchonii* Hk.f. and *D. Menziesii* R.Br. are distinct species, and find that *D. Menziesii* is native to Western Australia, while *D. Planchonii* is indigenous to South Australia, Victoria, Tasmania and New South Wales. We have not examined any Queensland specimens.

The following key should help in the determination of the two species:

Drosera Menziesii R.Br.

Flowers five or more in the terminal inflorescence, petals purple. Style segments numerous, entire and free almost to the base. Sepals narrowed at the base, narrow obovate and incised and fringed with long glandular hairs at the apex. The back clothed with appressed silky hairs. W.A.

Drosera Planchonii Hk.f., "Climbing Sundew"

Inflorescence few-flowered in a simple or very rarely once-forked loose raceme. Petals white, often pinkish. Styles divided into very numerous dichotomous branches arising from five free basal branches. Sepals obovate ovate, with the back slightly hairy, but the margins of the apex with long fringed hairs.

It should be observed that *D. Menziesii* R.Br. will be deleted from the Victorian Flora and *D. Planchonii* Hk.f. added. The plant figured in Professor A. J. Ewart's *Flora of Victoria* is *D. Planchonii* Hk.f., not *D. Menziesii* R.Br.

AUDAS, ST. JOHN AND MORRIS.

The Victorian Naturalist

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday, July 12, 1937. The Senior Vice-President, Mr. Geo. Coghill, presided, and over 100 members and friends attended.

The Chairman referred to the recent appointment of the President to the position of editor of *The Argus* newspaper. Mr. Chisholm had sent a letter apologizing for non-attendance at the meeting owing to his absence from Melbourne.

SUBJECT FOR THE EVENING

The subject for the evening was an illustrated lecture on "The Ice Age in New Zealand," given by Mr. F. A. Singleton, M.Sc. The illustrations consisted of lantern slides showing glacial topography in various parts of the world, a fine series of New Zealand views taken by the lecturer, and two motion pictures, one of which dealt with the Franz Josef Glacier. The lecture was of great interest and the Chairman expressed the thanks of the Club to Mr. Singleton.

WILD NATURE SHOW DATES

The Chairman announced that the Committee had decided to change dates of the Wild Nature Show to October 26 and 27.

NEW EXCURSION LIST

It was announced that the proposed new Excursion List had been placed on the notice board for the information of members and their consideration.

REPORTS OF EXCURSIONS

The excursion to the Geological Survey Museum was reported on by Mr. F. S. Colliver (for Mr. Geo. Brown, Secretary of Mines).

ELECTION OF MEMBER

On a show of hands Mr. W. A. Miles was duly elected as an ordinary member of the Club.

NATURE NOTES

Mr. A. D. Hardy remarked that a *Eucalyptus ficifolia* tree with dark crimson flowers was just coming into bloom in Studley Park Road, Kew; and that other trees in the locality with flowers of the same hue bloomed about Christmas time.

At this stage the meeting adjourned for the conversazione.

EXHIBITS

Mrs. Fenton Woodburn.—Talon of Wedge-tailed Eagle.

Miss A. Cornish.—Worm shells on stone, from Brighton, also large species of bivalve shell of the genus *Pinna*.

Mr. H. F. Reeves.—Seed cases of Eucalypts.

Mr. F. S. Colliver.—Zeolites from the Older Basalt of Flinders, including Analcite, Natrolite, Stilbite and Gmelenite.

Mr. S. R. Mitchell.—Minerals from Flinders: Stilbite, Natrolite, Analcite, Gmelanite, Calcite, from the Basalts; Hornblende and Anorthoclase from dykes.

THE REV. JAMES WILSON

When the Rev. James Wilson died, on June 21, at Cheltenham, Victoria lost a veteran botanist and nature lover. He was 82. Born at Essex, England, trained for the Congregational ministry at Chestnut College, he came to Australia in the 'eighties and settled at Beechworth, being appointed to the Congregational Church there. During his college days he became interested in palæontology and botany and brought out a small collection of fossils. At Beechworth he came into contact with the late Edward Dunn and under his influence formed a collection of minerals and gems from the Beechworth district. He was also interested in the flora and submitted many specimens to Baron Ferdinand von Mueller, with whom he carried on a correspondence for some years. Some of his findings were the first records for the North-eastern District.

After leaving Beechworth Mr. Wilson lived at Albury for a year or two, then transferred to Beaconsfield, where he resided for many years. He found much to interest him in the flora of the Beaconsfield district, particularly the orchids. The well-worn condition of his copy of Mueller's *Key to the System of Victorian Plants*, testifies to the frequency of its use in determining his finds. In later years, he collected fungi rather extensively for the Lloyd Herbarium at Cincinnati, Ohio, U.S.A. *Mehmogaster Wilsonii*, a fern gully loving species, found in the Beaconsfield Hills, was named in his honour.

Our sympathy is extended to Mr. F. E. Wilson, one-time President of the Club, in the loss of his father.

Lantern Slides for Sale.—Mr. Tom Tregellas, 19 Chatham Road, Chatham, wishes to dispose of his collection of lantern slides. The subjects include many birds and their nests, wild flowers, etc., and the price is threepence per slide. Mr. Tregellas was one of the first naturalists to visit the Pink Lakes of the Mallee, and also a pioneer in photographing the Lyre-bird at home.

Plate VIII

Photo. McCoy Society

Fig. 1.—Adult Diving Petrel (*Pelecanoides urinatrix*) photographed on Lady Julia Percy Island

THE DIVING PETREL OF THE BASS STRAITS

By Frederic Wood Jones

The little Diving Petrel of the southern coasts of Australia (*Pelecanoides urinatrix*) appears to be entirely lacking a popular name among fishermen and others who might be supposed to have some knowledge of the bird, and it is a remarkable fact that I have not yet come across a fisherman or a lightkeeper who even recognized the bird when shown a specimen. It is certainly by far the most obscure and least known of our resident breeding sea birds.

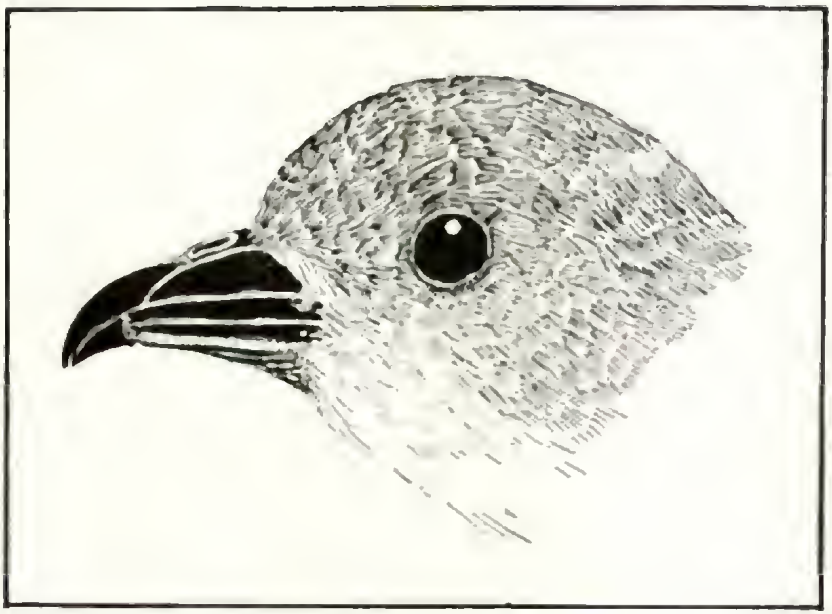


Fig. 2

Head of adult bird to show the characters of the beak

There are several reasons for this ignorance on the part of those who might be expected to be familiar with it. In the first place, it does not seem to fly in flock formation in the Bass Straits as the Prions and Shearwaters do; it is therefore not familiar to the sailor or the fisherman. It is moreover an extremely hardy little bird and, though its powers of flight are so inferior to those of most members of its order, it very rarely comes ashore wrecked in winter gales; it is therefore unfamiliar to the longshoreman. Unlike the Prions, it is not easily dazzled by light and so does not dash itself to death (as the Prions do)

at the light-houses around the coasts; it is not a bird that light-keepers know. Lastly, it arrives at its breeding island after dark and it flies in, one or two at a time, low over the water and not against the skyline (as the Mutton-birds do) and it therefore does not force itself upon the notice of those who chance to live upon its breeding islands.

Two days and nights were spent by members of the McCoy Society camped on Lady Julia Percy Island, in January, 1936, before the presence of the birds was accidentally revealed by one flying straight into the arms of a man who was making the hazardous ascent of the cliffs by night. It is, therefore, necessary to adopt some caution in attempting to define the breeding limits of the bird on our offshore islands. Of the South Australian islands I have visited (and in many cases camped on)—St. Francis, the Franklins, Flinders, the Pearsons, Evans, Eyre, Goat, Bird Rock, Price, Greenly, Guano, Althorp, Wedge, South Neptune, Hummock, Black Rock, all the islands of the Sir Joseph Banks group, Wardang and Troubridge. Although my visits have been mostly during the breeding season, I have never found any trace of a Diving Petrel on any of the islands and I very much doubt if the bird has a breeding station in South Australian waters; but it must be remembered that there are still many South Australian islands that need ornithological investigation.

In the Bass Straits, the classical breeding area of *Pelecanoides* is North-east Island, a small island lying off the larger Deal and Erith Islands, in the Kent group. This island has been visited by ornithologists from Melbourne on more than one occasion. In November, 1890, the Field Naturalists' Club of Victoria visited the island and found the burrows "containing mostly young birds nearly fledged." Messrs. J. Gabriel and G. A. Keartland landed on November 24, 1895, and added some further notes upon the breeding of the birds on the island. It was also reported as breeding on "White Rock off the East coast of Tasmania" by Mr. Arthur Oldham on August 22, 1907. North writes of its breeding seasons "on the islands of Bass Strait, and those off the North-western coast of Tasmania and Southern Tasmania"; but he does not mention the names of any of the islands. Mathews records it as nesting on "Cliff Island of Wilson's Promontory." This is doubtless a misprint for Cliffy Island.

I have visited Cliffy (January 18, 1935) and made a fairly thorough examination of its very limited area by daylight, and have also questioned the lighthouse keepers and their families concerning the presence of the birds. The light on Cliffy is a death trap for Prions and the cats of the Station bring in their bodies almost every day of the year; but no one on the Station had ever seen a bird anything like *Pelecanoides*, nor could I find any trace of it upon the island. Such a finding does not conclusively

negative the possibility of its breeding on the island, for light-keepers are often singularly unobservant of the bird-life around their stations. Of the Bass Strait and Tasmanian islands, I have visited Citadel, Swan, Goose, Deal, South Bruni, Betsy, Iron Pot, Tasman and Maetsuyker and on none of them have I found any signs of the Diving Petrel. On North-east Island, Keartland describes their breeding as follows: "Their nests are either in burrows, crevices in rocks, or under low spreading bushes. A single egg constitutes the sitting."

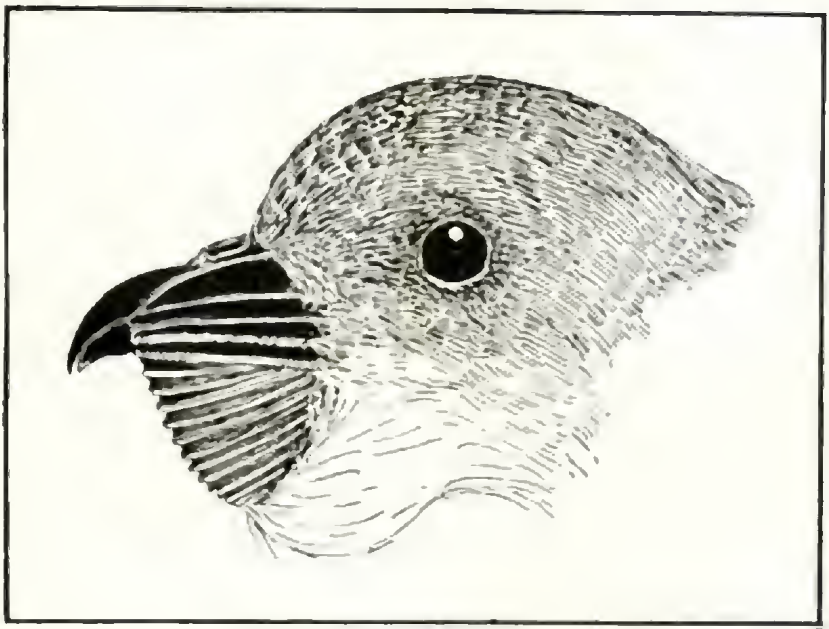


FIG. 3
Bird with buccal pouch distended

Buller, quoting Campbell and referring to "some isolated islets in Bass's Straits," says "each female bird deposits one egg only in a burrow, which is from 6 to 8 inches deep, under ground or under a ledge of rock." North says "the single egg of this species is deposited at the enlarged end of a burrow in the earth, or sandy soil, from one to two feet in length." On Lady Julia Percy Island, lying off Port Fairy, Victoria, the members of the McCoy Society camped from January 10 to February 22, 1936. To this island the birds came after dark, the first arrival being detected in the beam of an electric torch at about 9 p.m. They invariably came in low over the water and arrived either singly or in pairs. Their

advent is almost silent. It was just possible to hear the bat-like fluttering of their wings in the dark and to catch, every now and again, the faint note that they utter as they hovered over the boulders of the talus slope. The note is very like the sound made by a new-born puppy seeking for its mother; and as the birds flew around among the boulders this note was re-echoed from holes deep beneath the great volcanic rocks that lie in confusion at the base of the cliff.

Each bird had to be followed in the beam of a torch until it alighted and started to scramble down some chink from which an answering note had come. After great labour two homes were opened beneath the boulders during the second week of January. In the one was a pair of birds sitting on the long-dead remains of a grey downy chick and in the other there was a cracked and addled egg. Obviously the breeding season was over and yet the birds continued to come to their old homes until the end of our visit, though long before this date the Prions, which had been breeding on the island, had deserted their breeding ground. It seems quite certain that the whole of the Diving Petrel population of the Lady Julia Percy Island breeds (as do the Prions) in the deep crevices between boulders on the talus slope and that none of them make burrows into the soft earth on the plateau of the island.

The living bird is a very beautiful little creature. (See Figure 1). It is sturdy and robust in build and is apparently quite fearless when taken in the hand. The shining black dorsal surface and the brilliant white breast are set off by the wonderful colour of the legs and feet. The colours of the soft parts of the living bird are as follows: Bill is not (as always described) wholly black: for a pale grey or dirty white band runs along each side of the lower border of the mandible in both sexes (see Figure 2). The iris is of such a dark brown that the eye appears almost entirely black. The tarsi, on all aspects, are a beautiful light turquoise blue, the digits are turquoise blue on the dorsal and black on the plantar surface. The webs are sepia brown to black at their free margins shading to bright blue at the sides of the digits. The claws are black. The most remarkable feature of the bird is the distensible pouch developed from the floor of the mouth. This pouch, which closes up like a concertina in the resting position, is clothed with black naked skin and is present to the same degree of development in both sexes (see Figure 2). The down of the newly hatched young is a delicate brownish grey; the area around the eye and the neck being nearly naked.

The measurements of adult specimens from Lady Julia Percy Island are as follow:

	Sex	*Wing*	*Bill Length and Breadth*	*Tarsus*
1	♂	121	18·5 × 8	27
2	♂	125	16 × 8	27
3	♂	120	17 × 8	26
4	♀	122	17 × 7·5	25·5
5	♀	117	17 × 8	27
6	♀	122	15 × 8	26·5
7	♀	116	16 × 7·5	25
8	♀	122	17 × 8	26
9	♀	120	17 × 7·5	26·5
Average		120·5	16·7 × 7·8	26·2

These measurements do not differ in any marked degree from those given by Murphy and Harper for twenty-five specimens of *P. urinatrix urinatrix* from various New Zealand and Tasmanian localities:

Average Measurements (Murphy and Harper)

Sex	*Wing*	*Bill Length and Breadth*	*Tarsus*
♂	122·6	16·2 × 8·1	26·1
♀	116·8	16·4 × 8·1	25·3
Both sexes	119·7	16·3 × 8·1	25·7

and, as the same authors have pointed out, *P. urinatrix belcheri*, the sub-species erected by Mathews for the Australian and Tasmanian bird in 1912, does not differ in any material way from typical New Zealand specimens. The average measurements of the type of *P. urinatrix belcheri* and four other Tasmanian specimens in the Mathews Collection are given by Murphy and Harper as follow:

	Wing	*Bill Length and Breadth*	*Tarsus*
Sex not specified	120·7	16·5 × 7·9	25·9

The average measurements of seven eggs from North-east Island (recorded by North) is 41·9 x 32. Lucas and Le Souëf record 41 x 31. Buller and Sandager give, for New Zealand eggs, 38·1 x 30·5 and 38·1 x 31·7. Littler gives the measurements as 38 x 30. The single egg taken on Lady Julia Percy Island measures 38 x 31. Obviously there must be a very considerable variation in size ranging, in recorded examples, from 46·5 to 37·6 in length and from 33·5 to 30 in breadth.

The breeding season would seem to extend from the end of July until December and to be somewhat variable in the different islands in which the bird has been recorded as breeding. Stomach contents were taken from birds arriving during their evening homing flight (when the food is more or less undigested) and submitted to Mr. H. M. Hale, Director of the South Australian Museum, for examination. His report is as follows:

> "Stomach contents.—Remains of four small fishes, possibly juvenile Carangids, which commonly congregate under Medusae at the period of year when the bird was collected; a second species of fish is represented by a fragment of the head. Two Phoronomids of the same species as those present in the stomach of the Prion."

VICTORIAN CAVE POOLS

By C. A. MELHUISH and C. DEANE

[*With descriptions of two new species of beetles, by C. Deane*]

Following up the work of European students on the fauna and flora of "Rock pools," the authors of this article have been endeavouring to discover in Australia traces of the same kind of relation between similar pools and their inhabitants. Some success has been met with, in that pools have been located at several points around the Victorian coast, and the waters of some of them have been definitely established as being suitable to support insect life. For example, we should expect to find beetles of the family Hydrophilidae, members of which have been discovered before by such naturalists as Lea, Blackburn, Barrett, Wilson and others. Two examples of this group, both new species, are given below.

Comparatively few people apparently have realized that certain attractions in the form of limestone caves lie hidden in the cliffs and in the bases of the hills along many parts of our coast. Here we have, down at the sea almost in contact with the waves, caves as truly limestone as are the famous caves at Jenolan, Buchan and others, many miles inland. The stalactites and stalagmites are there to delight the eye of the explorer.

Some of these caves are very difficult of access, the openings being set in the face of steep cliffs, 200 ft. high, which cannot be climbed. And that is not the only barrier: the sea comes right up to the base of the cliffs in many places, thus preventing approach around the beach. One of this class, so far known to us only as Cave "C," is situated about two miles from Cape Schanck, in an easterly direction before one comes to the sandy beach. On March 21 last, the occasion of the second expedition to this locality, the tide was low enough for us to attempt to reach the entrance of the cave. The tide, however, was threatening to cut off the line of retreat, so a search of the interior was postponed. On April 25 the next visit was made, coincident with low tide, but the water was not so low as on the previous occasion, and no one was able to get round.

The cave near the lighthouse, however. Cave "B," on the western side of the Cape, was visited with a view of taking photograph of the stalactites which come down into a pool prettily. But the camera failed us. The stand was off the rail, and, owing to the lateness of the hour and the darkness, could not be fixed. The floor of this cave is steep and slippery, and taking a flashlight photograph is in itself enough for the attention without further complications such as holding the bellows and guessing the focus.

Cave "A" is on the eastern side of the Cape and about opposite Cave "B"; it was the first to be visited by our party. There is another interesting cave at Apollo Bay, about one mile east of the township, or about 150 yards east of the road sign at Cape

Patton. The sketch shows a vertical cross-section, from memory. This cave, with its large pool, was known to some of the old residents of the district, who built a boat and launched it on the pool. In this craft visitors could row through to the inner pool and cave. The boat is now said to be water-logged and to lie at the bottom in one of the inner caves.

A consideration that will appeal to the biologist is whether marine life may abound in these waters, or even rarely occur. The late Mr. A. M. Lea recorded the Carab beetles, *Idacarabus troglodytes*, *I. flavipes* and others in limestone caves; and water beetles might be found also, especially in the better illuminated situations. Sometimes water is found forming pools right at the opening, and therefore, in full daylight.

Samples of the water were taken and analysed for chloride content and other characteristics, resulting as shown in the following table:

Result of Water Examination

No.	*Locality*	*Name of Cave*	*Total Chlorides parts per 100,000*	*Remarks*
1.	Apollo Bay		138	Diatomaceae present
2.	Cape Schanck	Cave "A"		Algae (sea weed)
3.	Cape Schanck	Cave "B"		Mineral character only
4.	Cape Schanck	Cliff face	over 200	Algae (sea weed) pH value (determined by Mr. Allen Budge) = 8·5
5.	Open Sea (Mediterranean)		2,469	
6.	Tap water Melb., 16/1/37		1·2	

These waters evidently should be attractive to some beetles of the family Hydrophilidae, as regards salinity, and in those cases where daylight prevails, should compare favourably with d'Orchymont's "Rock pools" of Europe. Up to the present, however, only some species of Diatomaceae have been found.

The cave at Apollo Bay is not conspicuous from the beach owing to the projection of the under lip. In fact, there have been instances of people going purposely to find it, acting under directions, and even then passing it by.

At Port Campbell, the coastal geology and geography are remarkable; there is a great diversity of attractions. The limestone cave formation with its stalactites is found also in this district.

A question that has been occupying our minds for many years is the cause of the blowholes and other features which occur in

so many places around our coast. If it be assumed that they are due to the encroachment of the sea, combined with the falling in of the earth over the caves, a suggestion is immediately available for consideration (see Figure 1). To one such cave attaches romance: it sheltered for two days the only survivor from the wreck of the *Loch Ard*.

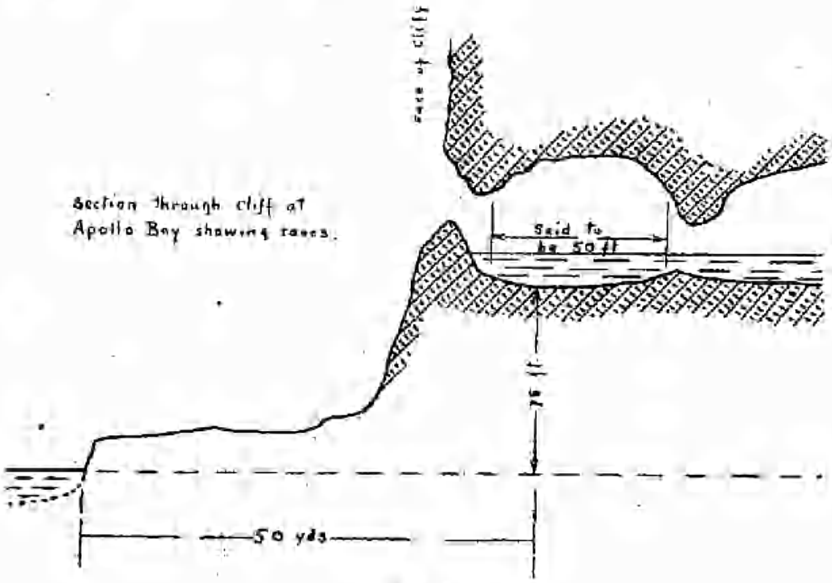


FIG. 1

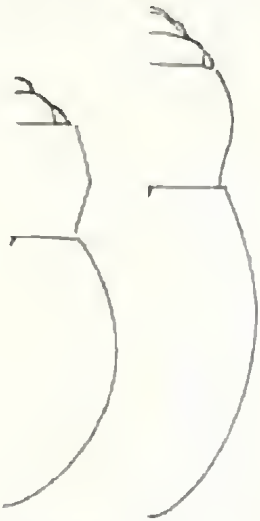
The salinity of the Apollo Bay cave waters, viz., 1.38 parts per 100,000 or 96·6 grains per gallon, is undoubtedly low enough to support freshwater life. Of 119 town water supplies throughout the world, which are included in our notes, chloride content varies from 0·4 up to 29·2 parts per 100,000. But in a town water supply drinking has to be provided for, whereas, in the case of the insect inhabitant, this is not necessarily so. Suffice it to say that some of these caves possess water which is less salt than are many waters generally classed as brackish.

Ochthebius cupreus n.sp.

Oval, very convex, somewhat nitid, cupreous. Head subtriangular, lightly convex, black, opaque; two oblique fossae near base, converging to posterior margin; one globular cupreous tubercule between each fossa and eye. Eyes normal. Palpi robust. Antennae well formed. Pronotum cupreous, widest near apex, convex; median suleus straight, widening slightly before middle; disc devoid of foveae; membraneous margin entire.

Elytra rather short, but covering abdomen, strongly and coarsely punctate-striate; depressed near suture on anterior half. Legs not long. Length, 1·43 mm.; width, 0·68 mm. Habitat: Tambourine, Queensland (Wassell).

Ochthebius cupreus n.sp.



Left: *Hydraena Evanescens* Bl.
Right: *Hydraena castanea* n.sp.

Hydraena castanea n.sp.

Elliptical, lightly convex, olive brown to chestnut, punctate, nitid. Head scarcely subtriangular, concave on sides, narrowly rounded in front, depressed above, ebony black, opaque, glabrous; labrum narrowly notched on centre of front margin. Eyes medium, pale. Pronotum subhexagonal, puntate, nitid, convex and black in centre, lightly concave and yellow brown near sides, anterior and posterior margins concolorous with centre. Elytra strongly punctate, with yellow colour confined to apices. Legs yellow, normal. Length, 1·69 mm.; width, 0·70 mm. Habitat: Marysville, Victoria (Deane).

This differs from *H. Evanescens* Bl., of which I have specimens identified by Mr. A. M. Lea, by larger size, more elongate, much darker, the punctuation coarser, and the pronotum dark on all the elevated central portions. In the specimens of *H. Evanescens* in my collection there is a central dark spot on the central elevated part of pronotum only. From Blackburn's description of *H. Evanescens*, the separation of it from the proposed new specimen is also apparent where he uses size and punctuation for distinction from the other specimens; this same distinction must separate off the new specimens for *H. Evanescens*, since the punctuation as regards its coarseness and the size generally are as in the larger specimens.

PLANT GALLS

By B. BLACKBOURN

No one who has spent much time in the bush can have failed to notice excrescences so common on the leaves, stems, and buds of many Eucalypts and Wattles. They attract attention by their strange variety of curious shapes, many of which are of considerable beauty.

Plant galls are abnormal growths or hypertrophy of the tissues of plants brought about by insects in order to provide food and

Fig. 1.—A Typical Cynipid Wasp.

shelter during their development. They occur on all kinds of plants, from the humble grasses to the largest forest trees, and on all parts of the plant, root, stem, leaves, buds and flowers. Whereas the greater number in this country are caused by members of the Coccid or Scale Insect family, many other kinds of insects have adopted this method of providing themselves with board and lodging. As in the world at large one man's success in a particular venture is made use of by others of a less original turn of mind, so in the insect world we find that galls formed by one species of insect are made use of by other species, which

deposit their eggs in the tissues of the gall and thereby provide comfortable quarters combined with suitable nourishment for their young. All these insects are liable to be parasitized and if galls are kept in a jar and the contained insects bred out, it frequently happens that three or four kinds emerge and one may be at a loss to know which is actually responsible for the gall and which is a parasite or inquiline.

Fig. 2.—A Gall Gnat (Cecidomyid).

The gall-forming habit is not confined to any particular order or family, but has been adopted by individuals from a number of different orders scattered through the Insecta, among them being Thrips, Lerp Insects, Plant Lice, Scale Insects, Wasps and Flies. The vast majority of galls in Australia are caused by the Coccids or Scale Insects. One of the most striking features of this family is the remarkable difference between the sexes. The males, in most cases, are minute, delicate little creatures with a single pair of wings and two or more thread-like tail filaments. Owing to

their small size they are rarely seen by any except those on the look-out for them. The females are comparatively large, wingless, soft-bodied creatures which settle down for life in one spot, and either cover themselves with a scale, or cause a gall to form around them. They exhibit considerable degeneration, in many cases the legs disappear and the antennae become reduced to minute papillae. At the apex of the gall is a small opening through which the male is able to crawl to accomplish fertilization, after which the female becomes little more than a bag of eggs. When these hatch the larvae emerge in countless numbers through the opening in the apex and eventually attach themselves to stems or leaves, resulting once again in the formation of galls.

Although the life-histories of hundreds of gall-forming insects have been studied, comparatively little is yet known as to what causes the tissues of the plant to develop into a particular shape. Why, for instance, is *Apiomorpha duplex* able to produce a four-sided gall with ridged edges continued as two elongated appendages, the largest in the world and peculiar to Australia, whereas *A. pomiformis* produces an apple-shaped gall? Another interesting feature is that, whereas some galls begin to develop immediately after the deposition of the egg by the female, and will continue to develop even though the egg may be killed, in others development is delayed until the egg is hatched. In the genus *Pontonia* (Tenthredinidae) the females inject an albuminous secretion along with the egg which, it is suggested, contains an enzyme that acts upon the plant cells. A gall develops very rapidly, and even if the egg is killed by pricking it with a needle, the gall continues to grow. In one case, after falling from the tree and lying on the ground during the winter, when spring comes, it increases in size and develops chlorophyll.

In the family Cynipidae, the female wasps (Figure 1) deposit their eggs in the tissue of the plant, but the galls do not begin to develop until the egg hatches. It is probable that the larvae exude some secretion which stimulates activity in the cells. This family is noted for the variety of gall-forms produced by its members and also for the alternation of generation exhibited by many species. A typical example is *Neuroterus lenticularis*, which causes lenticular growths on the underside of oak leaves in October in England. The insects remain in the galls all the winter, even though the leaves fall to the ground, and appear as adults in April. They consist entirely of parthenogenetic females which proceed to deposit their eggs deep down among the catkins and young leaves. The resulting galls occur in May and June and are spherical and sappy in character. The generation which emerges from them was originally thought to be a distinct species. Males and females are produced, and, after mating, the females

deposit their eggs at the side of the veins in the tissue of the young leaves, resulting in galls of the lenticular kind. The most striking difference between the females of the two generations is in the length of the ovipositor, those emerging in April have long ones for reaching down between the young buds, whereas the October females have only short ovipositors. A very common Cynipid gall may be found on the stems of Flatweed.

Fig. 3.—Tea-tree with galls.

Among the flies (Diptera) the family Cecidomyidae (Gall-gnats) is noteworthy. These little gnats (Figure 2) are responsible for a great number of galls, some of which are of economic importance. An interesting one occurs on the Tea-tree (*Leptospermum levigatum*) and takes the form of a mass of bract-like scales frequently mistaken for a bud (Figure 3). If the scales are carefully separated larvae and pupae may be found at the bases. These larvae are parasitized by wasps, one of which is a species of *Inostemma* (Platygasteridae) and undoubtedly one of the most remarkable of insect forms. The female (Figure 4) carries her

ovipositor in a horn-like case springing from the anterior end of the abdomen and curving over the thorax. My attention was first drawn to this curious creature by seeing some microscope slides imported from England, and upon looking the matter up I found that the wasp parasitized a Cecidomyid responsible for galls in the blossom buds of the pear in that country. Surely, thought I, we must have something similar in Australia, but enquiry among my entomologist friends failed to elicit any satisfactory response

Fig. 4.—*Inostemma* sp., ♀.

until Miss J. Raff remembered that, two years previously, a specimen with the peculiar ovipositor case had emerged from some Tea-tree galls collected by students; she very kindly searched for and eventually found a specimen tube containing one female and two males.

Later I succeeded in breeding out many of these wasps. Failing to find here anyone able or willing to describe the species it became necessary to send specimens to America. Mr. Robert Fonts, of California, an authority on the Platygasteridae, wrote me that "The species is undoubtedly new, there being no others properly referable to *Inostemma* known from the Australasian Region." In his last letter, dated July, 1936, he stated that he had described the species and would send me a copy of the description when published. This has not yet arrived.

In attempting to follow out the life-history of wasp and host I have been handicapped by my distance from the coast and the difficulty of obtaining young Tea-tree plants in pots which could be placed under glass shades. Gnats have been seen to mate and to deposit eggs deep down in the axils of the young leaves. The eggs hatch eight or nine days later. Wasps have also mated and have been watched while depositing their eggs on and close to those of the gnats, but these eggs have so far not hatched. Time and patience will be needed to solve the many problems suggested. The photomicrographs illustrating this article were very kindly taken for me by Mr. O. H. Coulson from my own mounts.

EXCURSION TO THE GEOLOGICAL MUSEUM

The Geological Museum of the Mines Department, in Gisborne Street, was visited on Saturday afternoon, July 10, by members of the Club, who were met by the Secretary for Mines (Mr. Geo. Brown), the Director of Geological Survey (Mr. W. Baragwanath), and Mr. W. S. Abraham, Officer in charge of the Museum. The extensive changes just completed at the Museum occasioned pleasant surprise. The interior of the building has been entirely renovated. A number of racks have been provided for a display of building stones, granite blocks, etc., additional space has been secured on a lower floor for the transfer of the Geological Library, and a splendid series of geological and scenic photographs grace the walls.

A valuable and unique collection of minerals presented to the State, some time ago, by the late Mr. E. J. Dunn, F.G.S., formerly Director of Geological Survey, attracted much attention. The variety of quartz specimens displayed is exceptionally fine, there being colourless, white, yellow (citrine), violet (amethyst), and black (morian and lydianite) crystals, showing caps of different colours, and sections showing interesting stages of growth. There are also such forms of quartz as agate, carnelian, and chalcedony, showing a diversity of colours and markings.

Other noticeable specimens are crystals of green fluorspar with well-developed faces, purple apatite, and pebbles of corundum in various colours, red, black and blue. Some of these pebbles are dull, but others are highly polished, indicating attrition through long ages. Enhydros, or water-stones, first found at Beechworth, are also shown. These interesting objects resemble crystals in having flat faces which are formed of crusts of chalcedony and, in numerous cases, enclose water and gas, any movement of the imprisoned liquid being clearly discernible. Various stages of the growth of these stones are presented.

Many varieties of Victorian gemstones are exhibited. Of the diamonds in the collection some are colourless, while others are yellow, the largest of each variety approximating a carat in weight. All are perfect crystals. Blue and green sapphires, white, yellow and blue topazes, amethysts, garnets, and blue and green turquoise make a most interesting exhibit. Items of general geological interest include gold-bearing quartz specimens, indicators, hard cores obtained from diamond drilling, representative foreign geological specimens, glauconitic sandstones and crude oil from Lakes Entrance (Gippsland), as well as sandstones, marbles and granites for building purposes. In diagrammatic fashion the workings of the New Morning Star Mine at Woods Point are shown. This exhibit consists of a case containing a number of large glass slides arranged in vertical succession to represent the different levels of the mine.

A NORTH AUSTRALIAN DENDROBIUM.

By W. H. NICHOLLS

Dendrobium dicuphum, F.v.M.—This elegant species is briefly described and commented upon by its author, Baron Sir Ferdinand von Mueller, in *Fragmenta Phytographiæ Australiæ*, viii, 28 (1871), but he had previously described it fully (under *D. bigibbum*), in Vol. vi of the same work. It is one of those forms which range themselves around the superb Cooktown Orchid (*D. phalænopsis*, Fitz.). *D. superbiens*, Reichb.; *D. FitzGeraldii*, F.v.M.; and *D. bigibbum*, Lindl. are other Australian species—all close allies. *D. dicuphum* is well separated from all these forms in several particulars—chiefly that of habit. Bentham refers to this species as *D. bicuphum*, but the meaning is identical.

The specimen from which my drawing was made is in the possession of Mrs. Charles Barrett, of Elsternwick, Victoria, and was collected by her during travels with her husband in Northern Australia in 1933, and exhibited at a Club meeting early this year. One haunt of *D. dicuphum* is at Koolpinyah, about 30 miles from Darwin, where it grows on the Paper-barks (*Melaleuca*), also on other trees in this locality, and is reported as fairly abundant. In Darwin the showy and graceful sprays of flowers are favoured for wedding bouquets, etc., a purpose for which they are well suited.

It is unnecessary to give a full description of this orchid, for the accompanying plate shows its characteristics. The individual flowers are approximately 3 cm. in diameter; the segments of the perianth are pure white—deep purple at the base—thus the flowers possess a contrasting centre.

Bentham gives, in *Flora Australiensis*, vi, a fairly detailed description of *D. dicuphum*; but his material was dried, and the colour of the blooms is incorrectly given. He also records few flowers to a raceme (three or four), in Mrs. Barrett's plant the raceme possessed fifteen.

I am indebted to Dr. R. S. Rogers, of Adelaide (S.A.) for the definite determination of this orchid.

Bentham gives the following habitats for this species: The Liverpool R. (Gulliver), and Port Darwin (Schultz).

KEY TO ILLUSTRATION (DENDROBIUM DICUPHAM, F.v.M.)

Fig. A.—A typical specimen.

Fig. B.—Calli on the labellum-lamina.

Fig. C.—Spur.

Fig. D.—Column head showing wing anther removed.

Dendrobium dicuphum F.v.M.

THE BANDED ANTEATER

One of the rarest of all native animals, the Banded Anteater (*Myrmecobius fasciatus*) is found only in South Australia and South-western Australia. Its doom has been delayed, but with the advance of settlement this beautiful little marsupial must become restricted to a very few localities and finally disappear completely. Its chief stronghold appears to be at Kojonup, Western Australia, for nearly all records of *Myrmecobius* in recent years are from that district.

My brother-in-law, Mr. H. J. Hillier, has a sheep station at Kojonup, and occasionally sees Banded Anteaters on his property. He has captured several, but failed to solve the problem of keeping them alive beyond a few days, though they readily accepted their favourite food—termites—liberally supplied. My daughter, Miss Beatrice Barrett, who has been spending a holiday at Kojonup, in a letter of recent date, gives interesting notes on the habits of *Myrmecobius* as observed by Mr. Hillier:

"Uncle has told me all that he discovered respecting the ways of Banded Anteaters. There is a family of these living on his property. They will not live in captivity. Somebody caught a female with two young ones and gave them to uncle. The mother has no pouch, but a fold of skin, on to which the babies cling with their claws. Supplied with quantities of white ants daily, the captives ate a few with very rapid movements of the tongue, but apparently not enough to keep them alive. Water was given to them, but uncle has never seen a *Myrmecobius* drink.

"Banded Anteaters have poor eyesight, for you can walk within a few yards of one before it takes any notice; yet they are very shy animals and usually run into a hollow log when alarmed. They flatten the whole body when frightened and fluff out the tail, as does a Squirrel, and run so close to the ground that they appear to be legless. Normally, the long tail is smooth and round, but any disturbance causes a spreading out of the hair so that it looks quite bristly.

"This district seems to be the last stronghold of *Myrmecobius*, at least in the West, and even here, at Kojonup, it is not often seen now. Dr. Wm. Hillier (brother of Mr. H. J. Hillier) states that all the specimens he has seen in England came from Kojonup. I believe that many of the poor little creatures are destroyed by bush fires: they run into hollow logs for protection from the flames, and, of course, soon perish. They are able to climb, by the way, and quickly escape from a wire-netting enclosure unless it is roofed in. The people around here are farmers, and not much concerned about wild animals, excepting to know what harm they may do to crops or sheep. The few who are interested have little time to spare for observation of the Banded Anteater."

CHARLES BARRETT.

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, August 8, 1937. Mr. G. Coghill, the senior Vice-President, presided, until after the lecture for the evening, and more than one hundred members and friends attended.

CORRESPONDENCE

From the Secretary for Lands, thanking the Club for bringing "Vandalism at Mt. Buffalo National Park" under the notice of the authorities.

From Dr. Harris, thanking the Club for sympathy expressed in his recent bereavement.

Mr. Coghill announced that a Club member, Dr. R. S. Rogers, of Adelaide, had recently celebrated his golden wedding, and the Secretary was instructed to write congratulating him.

DONATION

It was announced that Mr. Ivo Hammett had presented two books to the Club Library, and that a book of newspaper cuttings relating to the Club and its activities in the early days, collected by the late Mr. D. Best, had been presented by his niece, Miss Best.

REPORTS OF EXCURSIONS

Reports of excursions were given as follow: Melbourne Streets (study of building stones), Mr. F. S. Colliver; Frankston (general geology), Mr. A. C. Frostick.

LECTURE ON THE ANTARCTIC

The subject for the evening was a lantern lecture "With Scott in the Antarctic," given by Capt. Gerald Doorly. A large collection of slides was shown and the lecturer gave a fascinating description of life and adventure down south, and the animals and birds of the Antarctic.

The President, Mr. A. H. Chisholm, expressed the thanks of the Club to Capt. Doorly, who was warmly applauded.

Mr. R. H. Croll stated that Capt. Doorly had written a book: *In the Wake*, which was now available, and expressed the hope that members generally would read it.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as ordinary members of the Club: Miss F. G. Dunn, Mrs. H. Jenkins, Messrs. H. Kendall, John Dawson, J. Hooper and P. Crosbie Morrison.

The following were elected as Honorary Members of the Club: Mrs. V. H. Miller, Messrs. W. M. Bale, Geo. Coghill, J. E. Dixon, Chas. French, J. Searle, J. A. Kershaw and T. S. Hart. The President stated that these elections were made for services rendered to science and to the club.

GENERAL BUSINESS

Mr. G. N. Hyam spoke on the forthcoming Wild Nature Show and asked for the full support of members.

Mr. Hyam also mentioned the recent deputation to the Secretary of Lands with reference to National Parks.

NATURE NOTES

Mr. V. H. Miller drew attention to the number of Magpies killed on Victorian roads by motor cars.

The meeting then adjourned for the conversazione.

EXHIBITS

Mrs. Charles Barrett.—South African orchid, *Dispersis capensis* ("Moederkappie"), from South Africa.

Mrs. E. Freame.—Whales' baleen, teeth and food, from the Antarctic; map of the Bay of Whales.

Miss B. Holland.—Painting of the Lyrebird.

Misses Knox.—Spears from New Guinea.

Mr. H. P. Dickens.—Marine sextant.

Mr. Gilbert Rogers.—Pale yellow form of the Flame Heath (*Astroloma conostephioides* F.v.M. var *flavescens* F.v.M.), a very rare form not seen since 1872; also the type scarlet form for comparison.

Mr. E. E. Pescott.—Water-colour drawing of *Bulbine bulbosa* by the late Oswald G. Lower, of South Australia.

Mr. F. S. Colliver.—Tertiary fossils from Frankston, photographs of geological features noted on the excursion. Also large fossil Brachiopod from the Carbo-permain of Hobart, Tasmania.

POLLINATION IN AUSTRALIA OF *YUCCA FILAMENTOSA*

By EDITH COLEMAN

The American Yuccas, natives of the northern Atlantic coast region of U.S.A., are now cultivated throughout the world. Most of the species have leaves which terminate in sharp points. The popular names, "Spanish Dagger" or "Bayonet" are appropriate. In some species, like *Y. filamentosa*, which is grown in many Victorian gardens, the margins of the leaves in vigorous plants become free, curling into short threads; hence another popular name, "Adam's-needle-and-thread."

It was discovered by Englemann and Riley more than seventy-five years ago, and later confirmed by other observers, that the flowers of *Y. filamentosa* are pollinated by the females of a small, hitherto undescribed, twilight moth, to which Dr. Riley, then State Entomologist of Missouri, gave the name *Pronuba yuccasella*. She alone, of all the world's moths, is able to perform this function, and it is the Yucca only whose ovaries provide food for her larvæ. The females of *Pronuba* have prehensile maxillary tentacles, possessed, it is believed, by no other genus of moths—tentacles which can be used like fingers in gathering pollen from the anthers of Yucca flowers. The range of the moth is restricted to natural habitats of Yuccas, which are said to be sterile in the absence of the Pronuba moth.

Hitherto, in describing the pollination of orchids, asclepiads and other flowers, I have shown that removal and transference of pollen have been a matter of chance, as far as the insects were concerned. Lured by certain attractions they entered the flowers, and, as they secured their booty, they became dusted with grains of pollen; or pollen-masses were clipped, or stuck to some part of their bodies. Even in the case of pollen-collecting bees, as in the pollination of *Zantedeschia*, it is the grains caught by chance on hairy bodies which serve the purpose of pollination, not the pollen which is consciously collected to fill corbicula. But the Pronuba moth deliberately collects pollen from a Yucca flower, and with it she as deliberately pollinates another flower—that is to say, to our limited human understanding it appears to be a very purposeful action.

The creamy flowers are pendulous, a position which prevents self-fertilization, except by insect intervention. As will be seen from the illustration of a flower on page 73, any pollen falling from the anthers has only the remotest chance of reaching the tubular stigmas. The flowers expand and emit their delicate odour only in the evening, when the twilight moth is active. They are closed during the next day and do not open again. The

stigmas are receptive during a period of approximately twenty-four hours after which the flowers wither, and, with their stalks, soon fall, unless fructified, when they may remain for some weeks. In the bud stage the six stamens lie closely pressed against the ovary. When the flower expands the clubbed stamens spread and become reflexed, the anthers standing well away from the ovary. The pistil terminates in three sessile, lufid stigmas, united at their bases. They thus form a short tube with six small lips, the inner surface only of the lips being stigmatic. When receptive the six lips spread open, exposing their inner stigmatic surfaces. After pollination, or at the close of their period of receptivity, the lips fold inward, closing the stigmatic tube. Thus moths are unable to waste time in pollinating a non-receptive stigma, or one which has already been pollinated.

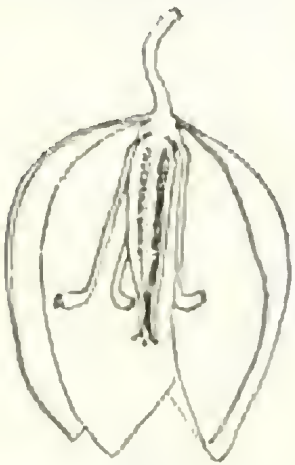

FIG. 1
Section through an ovary of *Yucca filamentosa*

The anthers open before the flower expands. Their cells contract and curl back, expelling the glutinous pollen, which now rests fully exposed on the summit of each stamen. An insect entering the flower *in such a way that some part of its body comes in contact with the anthers* could hardly fail to remove some of the adhesive pollen. Visiting another flower *in the same manner* it will almost certainly brush, with its pollen-laden hairs, the outspread stigmatic lips, *provided the visit takes place during the period of receptivity*, i.e., before the lips close inward.

Entering a flower at dusk, the Pronuba moth visits each anther in turn. Her finger-like tentacles are stretched to their full extent. Her tongue is uncoiled. The maxillary palps are used much as ordinary mandibles are used in other insects in removing pollen towards the spinous tentacles. With these she shapes the pollen into a pellet, the tentacles curving and stretching as she does so, smoothing and pressing, adding a little more pollen from the anther until the moth has gathered as much as she can carry —a mass perhaps three times the size of her head. Holding the pellet under her neck, resting on the trochanters of her front legs, she flies to the ovary of another flower, often on another plant. With her long ovipositor she pierces the wall and deposits, *between two ovules*, a single thread-like egg.

Unless flowers are pollinated, except in a few rare instances, their ovules do not develop into seeds. Immature ovules would be useless as food for her larva when it leaves the egg. Does the moth know this? After inserting her egg, still grasping between those strange finger-like tentacles the ball of pollen, she carries it to the top of the pistil. Using her tongue as a ramrod, she presses some of the pollen into the stigmatic tube. *She has pollinated the flower.* She has done more than that. *She has*

FIG. 2
Expanded flower of *Yucca filamentosa*

taken the vital step which will stimulate the ovules into development of a rich foodstore for her larva, without which it must perish.

The moth now returns to the ovary, again pierces its wall and deposits another egg, *after which she presses more pollen into the stigmatic tube above.*

What impelled the moth to press pollen into the tube above the very ovary in which she had inserted her egg, and to repeat the process when she inserts another egg? Does she know that the lives of her offspring depend upon this step? It is possible

that the custom was acquired by the moth when feeding upon the copious stigmatic secretion. Even now one might assume that she is attracted to the secretion were it not for her habit of collecting and carrying a pellet of pollen to the stigmas, before inserting her tongue into the tube. It is at this point that our links seem weak. One must see the moth at work before one may safely hazard a theory as to why she probes the stigmatic cavity. I think her choice of only young flowers in which to oviposit may be explained by the condition of the pollen which, being adhesive in newly opened flowers, would be more easily collected. Observers do not appear to have noted whether she makes an examination of the pollen, rejecting that which is too dry for her purpose. Her use of the tongue in collecting, or pressing pollen into the tube, does not appear to me to have been definitely established.

Since Englemann and Riley published their observations it has been shown that each species of Yucca is pollinated by a different species of Pronuba moth.

POLLINATION IN AUSTRALIA OF *Yucca filamentosa*

While the Pronuba moth must, at present, be regarded as the official pollinator of Yuccas in America, the present paper will show that they are not so wholly dependant upon the moth as we have believed, and that in Australia, probably also in other countries where bees work early and late, they are pollinated by hive bees.

In August, 1935, I ordered from Hazlewood Bros., of Epping, New South Wales, six plants of *Yucca filamentosa*. To my surprise, I received hardy seedlings, instead of plants struck from offshoots, a common method of propagating Yuccas. Being aware of the remarkable interdependance of Yucca and Pronuba moth, and believing that the latter had not been recorded in Australia, I assumed that the seedlings were the result of artificial pollination. I wrote to the Epping firm for confirmation and was told that they had no need to hand-pollinate: their Yuccas set seed naturally! To further inquiry, Mr. St. John, of the Melbourne Botanic Gardens, gave the same reply. From Mr. G. F. Hawkey I learned that Yuccas in the Sydney Botanic Gardens had not set seed nor had artificial pollination been attempted. I found that Yuccas set seed naturally in Queensland. From the structure of the flowers, and their pendant position, it did not seem to me at all likely that they were pollinated, except very fortuitously, by hymenoptera or other insects.

Knowing of no moth in Australia furnished with the prehensile maxillary tentacles of Pronuba or with an ovipositor capable of piercing fruits such as those of the Yuccas, I wrote for confirmation on this point to Mr. J. Clark, of the National Museum. He

referred me to Dr. A. J. Nicholson, Chief Entomologist at Canberra, who, in turn, referred me to Dr. A. J. Jefferis Turner, Brisbane, a leading authority on our moths. Dr. Turner assured me that the Pronuba is not in Australia. He added, "Unfortunately I cannot answer your question about piercing ovipositors. I know of moths with elongate ovipositors but how they use them I do not know." In reply to a further letter, Dr. Turner wrote: "It is difficult to understand how Yuccas can have produced seed in Australia, and, if true, it deserves investigation."

From time to time I carefully examined Yucca flowers in the Botanic Gardens, at Ringwood, Lilydale and Healesville, and noted in every instance an absence of capsules. As all of these plants grew in public gardens, and as some of them had been mutilated by children, who pulled the leaves for bayonets when playing "soldiers," it seemed probable that seed capsules, also, may have been disturbed. Moreover, as flowers of Yuccas fall so soon after fructification, they may have been overlooked.

In October, 1936, while spending a week-end at French Island, I saw bees visiting flowers of *Y. aloifolia* in Mrs. Bennetts' garden. It was late in the evening. The flowers were just at the opening stage, and the bees were obviously trying to enter them. Examination showed the presence of a little free nectar at the base of the perianth segments. The stigmatic lips were open. The tubes contained a clear, rather viscid fluid. The presence of seedlings in the garden pointed to naturally-set seed. Later, Miss O. Bennetts reported having failed to find capsules on her mother's plants or on those of their neighbours'. The fruits had probably fallen before they were noticed. Seedling plants spring up naturally in Miss Daff's garden at Clematis. Of four fallen flowers sent to me by Miss Daff on May 26, 1937, three were undoubtedly fructified, although the plant flowered so late in the season.

On December 4, 1936, I bought a plant of *Y. filamentosa* in full flower and had it transplanted to my garden. Despite a windy day, only a few of the flowers were lost. The plant did not suffer at all. For the first three weeks it was sheltered on very hot days with a large beach umbrella. I also bought, at the same time, three basal offshoots, each with a fine panicle of flowers, and these, too, were pressed into the ground, and sheltered with umbrellas. To my surprise they have taken root. An offshoot from the stem of *Y. aloifolia* from Mrs. Bennetts' garden rooted vigorously, but that was not so surprising for the stems of this species are really thick rhizomes which have become erect, instead of growing horizontally underground. But *Y. filamentosa* has ordinary underground rhizomes which it does not elevate. Offshoots, however, do spring from the base of the stem, and these produce an increasing number of offshoots.

My reward came the day after the plants were established in the garden when, at 9.30 a.m. I noticed bees flying about the flowers on one of the offshoot panicles. They were probing, with their tongues, between the perianth segments, near their bases. They did not attempt to enter the flowers, which were almost closed. Next day, at 8 a.m., I took two bees which I had seen enter half-closed flowers. Each bee bore a few grains of pollen on undersurface hairs, which examination under the microscope showed to be Yucca pollen. In the next few weeks I saw many flowers visited. Of three bees taken from fully-expanded flowers at 6.15 a.m., 6.30 a.m., and 8 p.m. respectively, chloroformed and examined under a lens, not one bore pollen. The reason is clear.

FIG. 3
Fruits of *Yucca filamentosa*

At these periods they were able to enter the open flowers, sip nectar, and depart *without touching either anthers or stigmas.* But, in pushing into half-closed flowers the bees had brushed against one or more of the anthers. Moving over receptive lips in another flower they would almost certainly leave on them any pollen adhering to undersurface hairs.

Later in the day, when the flowers were quite closed, the bees made no very determined attempt to enter, possibly because they

found no convenient platform, as in orchids and other lipped flowers. An inverted, closed flower does not offer the same facilities as an erect one, so the bees were content to probe from the outside for such nectar as they could reach. In a few days rigid flower-stalks and slightly swollen ovaries were evidence of pollination. I think, therefore, that we may say that natural pollination in Australia depends upon the fact that bees push into half-closed flowers *at a time when their stigmas are receptive.*

Bees also enter the flowers in very early morning and in late evening (6 a.m. and 8.15 p.m. in December), but in these instances they are able to reach the nectar without pollinating the flowers, and for this reason they cannot be regarded as "official" pollinators. All the visiting bees were nectar-gatherers. Although there is an abundance of fully exposed pollen available bees do not appear to collect it. There is often much moisture on the outside of the flowers, which glistens like dewdrops, even on very hot days. Blowflies appeared to be sipping these drops of tasteless fluid.

"Sugar-ants" freely visited the flowers, especially at dusk. These were able to obtain nectar without touching either anthers or stigmas. I examined many under a lens but saw no pollen on their bodies. Miss G. Neighbour told me she had seen "sugar-ants" visiting Yucca flowers in Miss Daff's garden at Clematis. Miss Daff kindly sent me an ant for examination. It bore no pollen. Towards evening the stigmatic tube fills with rather viscid, almost tasteless fluid. This secretion is not necessary to hold the grains of pollen, for they are themselves adhesive. Moreover, a greater quantity is secreted than is necessary as a medium in which pollen grains may germinate. Where fluid is secreted in two different parts of a flower we may assume that it serves two different purposes. Usually that which is most accessible serves to delay those insects which would deplete the supply of nectar without pollinating the flowers; whereas the bribe for legitimate pollinators is secreted in the best position to secure, by its aid, removal and transference of pollen. We have such instances in certain orchids, irises and azaleas.

On January 1, 1937, after almost all the flowers had fallen, I noticed at the tip of every peduncle, the point of its union with the now fallen pedicel, a ball of white sugar, rather larger than a "pearl" of sago, where a drop of sap had granulated. I nibbled some and found them rather like fondant. This sap would doubtless have ascended the flower-stalks and is probably a source of the sweet fluid which attracts ants and bees, and supplements the small amount of nectar secreted by the glands.

It seems very probable that, in America, the stigmatic secretion has an attraction for the Pronuba moth, and that, even in Australia, we may presently find that it is palatable to some insect which will bring about a less fortuitous pollination than that effected by bees.

It is possible that the habit of using her tongue to thrust pollen into the stigmatic tube was originally acquired by the moth when feeding on this secretion, and that she is still responding to a desire for food. On the other hand, it is just as probable that she does not feed at all. Nor would this explain her habit of collecting pollen, and rolling it into a ball for easy transport, *before she visits the stigmas*. The fact that she renews her load as it diminishes implies that she is aware of the necessity to place pollen on the stigmas, to ensure a supply of food for her larvæ. On my plants a number of flowers with rigid pedicels and slightly swollen ovaries were evidence that pollination had taken place. These soon fell and proved infertile.

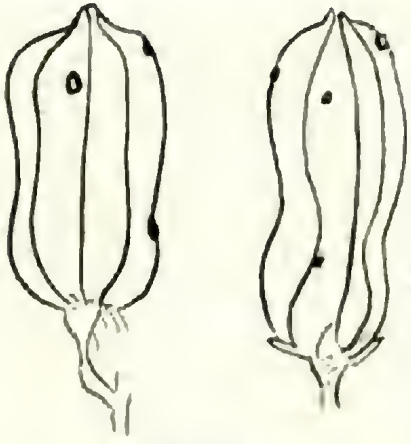

FIG. 4
Moth-pollinated Yucca fruits
(After Englemann and Riley)

Swelling of the ovary is consequent upon pollination, not necessarily fertilization, although it is continued after fertilization. The ovules are so stimulated by the germination of pollen grains that, by the time the tubes reach their micropyles they are ready to receive the fertilizing contents. On January 23 there remained on my plant three fine capsules, one only of which proved to be fertile. They were all of a size, smooth and green, the lines of dehiscence prominently marked. The first-formed fell, February 10 and February 19, and soon shrivelled. The third one fell on March 3. It dehisced in the normal manner. *Some of the seeds have already germinated.*

It seems a low percentage of fruits, but other alien plants, notably certain aloes, exhibit the same reluctance to set seed naturally in Australia. It must be remembered, too, that I lost a few flowers, and that some were gathered for examination. The pendent flowers become erect after pollination. Were the capsules to dehisce in the pendent position the seeds would fall into the rosette of leaves at the base of the stem. In the vertical position facililities are afforded for a more beneficial dispersal by birds, occasionally by wind, when the capsules remain on the plant after the viscid covering of the thin seeds has dried.

According to Englemann and Riley, capsules which have been pierced by an ovipositor show a constriction at a little below the middle. This constriction, shown in the illustration Fig. 4 on this page, is apparent even in herbarium material. As my fruits exhibit

neither holes (made by escaping larvæ) nor constrictions (see Fig. 3, page 76), it is evident that the flowers were not pollinated, after oviposition, by a moth. It may be suggested that the structure of the Yucca flower, which so perfectly prevents self-fertilization, and which is adapted to the needs of only one insect, is likely to bring about the extinction of the species. In their own country, at least, they appear to have become dependant for pollination upon the whims of one extremely rare moth. Against that may be balanced the benefits of an occasional cross, and the fact that, as in other instances of exclusive association of plant and insect (*Cryptostylis* in Australia may be cited), the Yucca does not rely wholly upon seed for increase, but is able to reproduce vegetatively.

The presence of nectar suggests that Yuccas were once pollinated by hymenoptera. As the present paper shows, in the absence of the Pronuba moths the flowers revert to their (probable) original habit. Seedling plants in the gardens of Mrs. Bennetts and Miss Daff are proof that natural pollination takes place in Victoria. (*May I suggest that interesting investigations might be carried out in Australia if entomologists in the U.S.A. would forward cocoons containing Pronuba moths in the pupal state.*)

ACKNOWLEDGMENTS

I am indebted for assistance to Mrs. Bennetts, Miss Daff, Miss Neighbour, Mr. J. Clark, Dr. A. J. Nicholson, Dr. A. Jefferis Turner; Dr. G. T. Moore (Director Missouri Botanical Garden), for literature on the subject of pollination in America; Dr. A. B. Stout (Director of Laboratories, New York), for list of publications; Mr. G. F. Hawkey, for Yucca flowers; Mr. H. Hazlewood, of Epping; Mr. F. Rae (Director of Melbourne Botanic Gardens), who gave me permission to examine Yucca flowers in the Gardens; and to Mr. Bainbridge, who assisted in removing a plant so successfully to my garden.

KEY TO ILLUSTRATIONS

Fig. 1, page 72.—Longitudinal section through an ovary of *Y. filamentosa* showing three clubbed stamens with their anthers contracted and pollen expelled. In centre is seen tubular stigma (section only) with three of its stigmatic lips. Above stigmatic cavity, two rows of ovules are shown.

Fig. 2, page 73.—*Yucca filamentosa*, showing normal position of parts in expanded flower. Note the six stigmatic lips which are outspread, leaving tube open. For photographing, the upper perianth segments have been turned back.

Fig. 3, page 76.—Fruits of *Y. filamentosa*, the result of natural pollination in Australia. Right: Capsule dehiscing naturally. Note that there are neither constrictions nor holes—as in moth-pollinated flowers.

Fig. 4, page 78.—Moth-pollinated Yucca fruits.—Left: *Y. filamentosa*, showing where three larvæ have emerged (after Englemann). Right: *Y. angustifolia*, showing holes made by four escaping larvæ (after Riley). Note the constriction of the capsules.

FOSSIL LOCALITIES IN AND ABOUT MELBOURNE

By F. S. COLLIVER

PART IV—ALTONA BROWN COAL MINE

To reach this locality, take the train to Altona, changing at Newport, and then follow along the line past the station until, on the right-hand side, an old mine dump is noticed; practically behind this and less than half a mile distant, is a long low mound of debris from the more recently worked mine, and this is where fossils may be found.

This area contains a large deposit of brown coal which is excellent in quality, but, unfortunately, the overburden here is something like 400 feet thick and mining by a shaft is the only way in which it can be worked. The cost would greatly exceed that of almost surface dredging as at Yallourn.

Above the brown coal is a deposit of blue clay, the same in type and fossil content as that of Balcombe Bay, near Mornington, and it is of this material that the mound referred to is formed. To collect fossils it is necessary only to walk along the mound and pick up whatever shells, etc., are seen in the clay; a great number should not be expected, as this material has been worked over for many years. Along the base of this deposit, and occasionally even on top of it, are numerous shells (not fossil) from the brackish water swamps that are all around.

The specimens obtainable here are mostly shells, but at the end of the dump numerous large "Forams" of the flattened type may be collected; the clays also contain corals, sponge spicules (generally found in the hands after breaking up lumps of clay), occasional ear-bones and teeth of fishes, spines and plates of sea urchins, and many other typical Tertiary marine fossils.

The hard limestone concretions should be broken also, for often they contain beautiful casts and impressions, and sometimes the actual shell, etc.; these concretions are of the same age as the clays. They are classed as being of the "Balcombian Series," taking the name from the typical section at Balcombe Bay; this series has been referred to the Eocene, Oligocene, and Miocene by different authors.

These Balcombian Series are outstanding for the beauty of preservation of their fossils, many of the shells still retaining their colour and natural polish. Again, the variety and faunal assemblage which point to more tropic conditions than we have in Victoria in this Recent period, together with the number of large specimens, make the blue clays indeed a "happy hunting ground."

One shell which occurs in these Balcombian deposits is of particular interest as it is the largest known Cowry, either living or fossil. The type of *Cypraea gigas* McCoy, described in the *Pro-*

dronus of Palæontology of Victoria, Decade 2, is 8 inches in length; even larger specimens are believed to exist in private collections.

The following is a list of the more common fossils that should reward the earnest seeker in this locality:

Lamellibranchiata—
- *Dimya dissimilis* Tate
- *Carbula ephamilla* Tate
- *Chama lamellifera* T. Woods
- *Barbatia celleporacea* Tate
- *Leda vagans* Tate
- *Limopsis morningtonensis* Pritchard

Corals—
- *Flabellum victoriae* Duncan
- *Placotrochus deltoideus* Duncan
- *Placotrochus elongatus* Duncan

Gastropoda—
- *Argobuccinum maccoyi* Pritchard
- *Phos tardicresens* Tate
- *Ancilla semilaevis* T. Woods
- *Pleurotoma murndaliana* T. Woods
- *Bathytoma rhomboidalis* T. Woods
- *Trivia avellanoides* McCoy
- *Cerithium apheles* T. Woods
- *Bulinella exigua* T. Woods
- *Dentalium mentelli* Zittel

Foraminifera—
- *Operculina* sp.

WILD NATURE SHOW CANCELLED

At its meeting on August 31, the Committee of the Club decided unanimously to cancel arrangements for the Wild Nature Show, announced for October 26 and 27. It was felt that, in view of the infantile paralysis epidemic, it would be not only inadvisable but wrong to hold an exhibition largely intended for young people.

CLUB PHOTOGRAPHIC LIBRARY

The Committee having decided to establish a properly indexed photographic library at the Club Rooms, we are making an earnest appeal to members and others interested to help by contributing prints. In the past, many valuable photographic records have been lost to the community and it is intended to make the Club's collection as comprehensive and useful as possible.

Both historical and present-day records will be kept, and all branches of natural history be represented. Though not available for commercial use, any photograph in the library will be made available, on loan, for scientific purposes, to illustrate articles in the *Naturalist*, and so forth. Every precaution will be taken to preserve copyright and to see that the name of the owner of the negative is given under each photograph published.

Photographic records may be sent to the Secretary or handed in at the monthly meetings.

Mr. H. T. Reeves has generously offered to give whole-plate prints from fifty of his negatives—studies of Australian wild flowers and fungi, including many unusual subjects. Further, he is willing to act as Hon. Curator or Librarian, and take prints, in special cases, from negatives lent to the Club for this purpose.

MELBOURNE BUILDING STONES

During this novel excursion, twenty naturalists, in extending their acquaintance with some of the materials used in its building, made use of the city as a huge museum. The idea of such an excursion was due to a Club member, Mrs. Lamparter, and its furtherance to the Club Secretary, who seized upon such an original suggestion as an emergency measure whereby the blank, occasioned by the cancellation of an excursion originally intended for July 24, could be filled. It was proposed, by those interested, to tour part of Melbourne with the object of examining buildings in which some of the materials listed in "Victorian Building Stones," a Mines Department publication, had been used. And, though rocks from Italy, Belgium, England and Scotland, and Finland, Norway and Sweden, were briefly included in the survey, particular attention was paid to those quarried in this State; it was noted also that rocks from Tasmania, New Zealand, New South Wales and Queensland assumed prominence in some of the twenty or thirty buildings examined.

In view of the anticipated difficulty of keeping the party together in the more congested parts of the city, a route was planned with the object of avoiding such areas, and, at the same time, including as many buildings necessary to the adopted Victorian preference as possible, while limiting unnecessary walking to a minimum. In illustration it may be mentioned that, of almost one hundred buildings listed in the pamphlet, nearly half the number are to be found in Collins Street, which, however, presents the problem of congestion, so that only a small part of the street had been traversed at the close of the excursion. Hence, though buildings in which most of the Victorian stones in use were examined, the excursion far from exhausted the resources of Melbourne as a petrological museum.

Though fifty or more stones are listed in the Mines Department publication, a summary shows that little more than a dozen have been used to any extent, and of these only one-half are commonly met with. Of the remainder,

the greatest number have been used locally, many in one or two cases only; in a few cases a quarry has supplied material for but a single building, some have been used for monumental and other purposes, while many stones included are known only as specimens.

It seems strange that, while one may repeatedly read of the comparative excellence of Australian building stones when contrasted with their imported prototypes, it still remains possible to identify the polished products of overseas quarries in an abundance which should at least be shared by our own. The discrepancy is presumed to be due to the relative considerations of suitability and accessibility governing cost. Yet, to take an outstanding case, the marble of Martin's Creek, near Orbost, which obtained an award at the 1908 Franco-British Exhibition, has been used in the Agent-General's office in London, though there appears to be no record of its use here. Apparently the Victorian rock is more inaccessible or less attractive than the marbles imported from Italy and Belgium.

The unfortunate handicap doubtless is shared by the splendid collection of marbles of New South Wales, which State possesses variegated, brecciated, figured and colour marbles, from more than twenty different localities—claimed by the jurors of the same exhibition to surpass any European stone found in commercial quantities, yet the marble of Caleula, New South Wales, may be seen to advantage in the Manchester Unity Building. Similarly, the red granite of Gabo Island, though mentioned in the Cambridge Museum Catalogue as surpassing in brilliancy the celebrated Peterhead granite of Scotland, and claimed by an Australian authority to be a particularly good stone, easily accessible from the sea, is no more common in Melbourne buildings than are granites of Sweden, Scotland and Finland. Hence it would appear that a consideration of the question of the desirability of a building stone in comparison with its accessibility, presents anomalies which are beyond the comprehension of a plodding petrologist.

A.C.F.

EXCURSION TO OLIVER'S HILL, FRANKSTON

Showing evidence of the latent possibility of rain which, however, dwindled as the day advanced, the afternoon of June 26 favoured the fourteen members and friends who attended the excursion to Oliver's Hill. Unfortunately, an adverse tide rendered an examination of the more interesting cliff-sections at Landslip Point impossible, and the geological features available for inspection were limited to those in the neighbourhood of, and a little beyond, Oliver's Hill—or, more precisely, Oliver's Point—the first high cliff to the south of Frankston. The occurrence of a granitic rock outcropping in, and along the base of, the cliffs at this point, being prominent among the geological features generally included above, first interested us, and attention was drawn to the fact that it was seamed by a series of fairly well-marked joints; numerous xenoliths (*enclaves enallogènes*) had been subsequently intruded by a series of small leucocratic dykes (chiefly aplites and acid veins—some of which, in themselves, showed incipient magmatic differentiation), and, lastly, that it was doubtless a subterranean extension, or apophysis, of the granitic massif forming Mount Eliza a few miles to the south.

The rock from Frankston has been described as "granitite" by Mr. E. G. Hogg,[1] who has also determined samples from the neighbouring granitic outcrops of Mount Martha and Arthur's Seat as "syenite" from the fact that both of these rocks contain hornblende. But, according to modern standards, neither of these two terms are now tenable. For firstly, though it is still used occasionally for rocks better listed as "biotite-granite," the disuse of the term "granitite" has been recommended since it is claimed to lack precision. In the present case, however, it has been used to indicate the subsidiary relationship of the alkali to calc-alkali felspars, and is, in this respect, synonymous with the more modern term "granodiorite." And

secondly, with regard to the so-called "syenites" of Mount Martha and Arthur's Seat, the term has here been used in the original sense of Pliny, by whom it was designed to describe the archæologically famous "hornblende-granite" of Syene, a former Egyptian city in the province of Mudiria. This rock, the "plumite" of Brogger, though once regarded by Werner as the equivalent of the rock from Syene, has very important characteristics of its own. Further, hornblende is a not uncommon constituent of the granodiorites, and the Mount Martha rock, though somewhat altered and rather fine-grained, has, in fact, been subsequently determined as such. While, in conjunction, the rock from Mount Eliza has also been classed as a granodiorite from a micrometric analysis by Professor E. W. Skeats.[2] So that it would seem likely, as Mr. Hogg suggests in the paper already cited, that these apparently isolated outcrops are in reality portion of the denuded crown of the same granitic bathylith, separated along the coast by superficial cappings of younger, Tertiary sediments and lava flows, and bounded on the east in part by the ancient Lower Ordovician sediments into which they have been intruded, possibly during the Upper Devonian period. The Frankston example is apparently the most northerly outcrop of the bathylith which, notwithstanding the minor textural and mineralogical variations common in such plutonic intrusions, would appear to be typical of granodiorite.

Proceeding a little farther southward along the base of the cliffs, we reached a fairly extensive aboriginal kitchen-midden, built upon the ramp of an old storm buttress characterized by the presence of large granitic boulders. Later, some facts concerning the main features of the younger rocks overlying the granodiorite were detailed, and several of the landslips which tend to complicate the geological interpretation of the cliff-sections were noted. The representation of the Older Basalt by a soft white clay, and of the granodiorite by a crumbling earthy mixture of kaolin and quartz, was emphasized as a consequence of the tendency toward chemical stabilization by the weathering, and consequent disintegration, of the igneous rocks. And, by a diligent search among the blocks of barren ferruginous grit which strew the narrow beach at the foot of the cliffs, Mr. Colliver was able to discover a singe block of softer fossiliferous material which occupied the attention of the party for some time, yielding a number of fossil casts. Among the most interesting of the fossils collected were a cast of the tooth of a fossil-shark, identified as *Odontaspis incurva* (Davis), and a cast of one of the larger Foraminifera, *Operculina complanata* (Defrance), in which the interior chambers were delicately moulded in the hydrous iron oxide, limonite. According to Messrs. Hall and Pritchard,[3] these blocks of fossiliferous material have been shed from a band only a few inches in thickness, occurring in the ironstone grits of Landslip Point, about twenty feet above the top of the Older Basalt; the original discovery being credited to Mr. A. E. Kitson. Further, these gentlemen regard the deposit as belonging to the Balcombian series, since, while it shows a lithological variation and is not so rich in organic remains, fossils identical with those which typify the grey clays of Balcombe Bay, near Mornington, are contained therein. They also give a faunal list, which since it concerns only the Mollusca and does not include the Selachii and the Foraminifera, also fails to include the two fossils mentioned above.

References

1. Hogg, E. G.: "The Petrology of Certain Victorian Granites." *Proc. Roy. Soc. Vict.*, N.S., vol. xiii, pt. ii, pp. 214, 224, 1901.
2. Skeats, E. W.: "Notes on the Geology of Mooraduc in the Mornington Peninsula." *Proc. Roy. Soc. Vict.*, N.S., vol. xx, pt. ii, pp. 89-103, 1908.
3. Hall, T. S., and Pritchard, G. B.: "Some Sections Illustrating the Geological Structure of the Country about Mornington." *Proc. Roy. Soc. Vict.*, N.S., vol. xiv, pt. i, pp. 32-54, 1901.

A.C.F.

Plate IX

Photo by C. Barrett

Rock-carving at Bantry Bay N.S.W.; possibly meant to represent the Bunyip

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 13, 1937. Mr. R. H. Croll, Vice-President, presided, and about ninety members and friends were present.

Apologies were received from the President, Mr. A. H. Chisholm, and the Senior Vice-President, Mr. Geo. Coghill, who were unable to attend.

The Chairman referred to the recent death of a past member of the Club, Prof. A. J. Ewart; and all stood in silence as a mark of respect.

ABORIGINAL ART

The subject for the evening was a lecture on "Aboriginal Art," given by Messrs. A. S. Kenyon, M.I.E. Aust., and Chas. Barrett, C.M.Z.S. Slides and photographs shown by the epidiascope illustrated the speakers' remarks. At the close, several questions were asked by members, and Mr. Kenyon replied.

WILD NATURE SHOW

The Chairman announced that arrangements for the Wild Nature Show had been cancelled owing to the epidemic of infantile paralysis.

CORRESPONDENCE

From an American, Mr. C. P. Guthrie, asking for an exchange of Seahorse specimens.

From the Federation of Melbourne Walking Clubs, inviting Club members to participate in a combined walk on October 10, 1937.

ELECTION OF MEMBERS

On a show of hands, the following were duly elected as country members: Mr. and Mrs. Gilbert Rogers, Mr. T. Anderson, Mr. Alex. Hardie; and as associate member: Mr. Stan. Crichton.

DONATION

The Chairman announced that Mr. A. H. Mattingley had presented to the Club a book, *Poisonous Plants of South-West Australia*. The volume was illustrated in colour and was a valuable addition to the library. On behalf of the Club he thanked the donor.

QUESTIONS BY MEMBERS

A question was asked regarding the identity of a "martin" (mentioned in a book on Central Australia) that is supposed to live without water. Mr. Mattingley stated that it was impossible to identify the bird from the note, and that no bird could live without water, although some needed very little.

NATURE NOTES

Mr. V. H. Miller, referring to his remarks at the last meeting on the "Toll of the Road," stated that a Magpie had attacked a boy on a bicycle almost in front of his car, and an accident was averted only by the car being stopped immediately.

Miss C. C. Currie, of Lardner, in a letter, stated that for the fourth year a Satin Bower-bird had visited her garden and built a bower.

Mr. J. Halliwell, of Mordialloc, sent a note on Night Herons building and being perfectly contented in trees in the schoolground.

Mr. C. Barrett stated that, a few years ago, a Night Heron had been found on Prince's Bridge early one morning.

Mr. F. S. Colliver spoke on a recent find in the Tooronga Brickyards quarry. The specimen (exhibited) appeared to be a fish spine allied to the genus *Onchus*, and was apparently a new record for Victoria. The specimen, found by Mr. Hurse, was in the collection of Dr. G. B. Pritchard.

This concluded the agenda and the meeting adjourned for the conversazione.

EXHIBITS

Mrs. Charles Barrett.—Tree Spider-Orchid (*Dendrobium tetragonum*), in flower.

Mrs. M. E. Freame.—Marine Mollusc, *Philine angasi*, with animal alive in shell.

Mrs. V. H. Miller.—The "Qualup Bell" (*Pimelea physodes*), native only to the Phillips River district, West Australia.

Miss M. Ferguson.—Stone Clubs from New Guinea.

Mr. J. Firth.—Rare double red Common Heath (*Epacris impressa*).

Mr. C. French.—Twelve species of Scale Insects which are injurious to gardens in Melbourne and suburbs.

Mr. H. P. Dickins.—Watercolour paintings of Orchids.

Mr. V. H. Miller.—*Dendrobium beckleri*, one of the "Pencil" Orchids; *D. falcorostrum*, a delicately-perfumed orchid; both grown in glasshouse. Also, *Eriostemon obovalis*, the Fairy Wax-flower, and *Grevillea alpestris*.

Mr. C. Daley.—Home-grown Native Plants, including: *Micromyrtus ciliatus, Lhotzkya genetylloides, Calytrix Sullivani, Chorizema cordata, Correa speciosa,* var. *rubra*; *Thryptomene Mitchelliana, Prostanthera rotundifolia, Grevillea rosmarinifolia,* and *Hedycarya angustifolia.*

Mr. F. S. Colliver.—Limestones from the Carbo-permain of Maria Island and Eaglehawk neck, Pleistocene freshwater limestone from Lara. Also wings of a large flying fox.

BOWER-BIRDS IN GIPPSLAND GARDEN

The Satin Bower-bird has returned to our garden again this year and built a bower. Each year, in July, a Satin Bird appears. In 1935, the blue-black one came first and built the bower; a green-speckled one came four weeks later, and a month afterwards the blue bird disappeared—the green one stayed for some weeks. In 1936 only the green-speckled one appeared: it scattered a few long twigs on a path, tore off every blue flower available, and laid two eggs on the path! It only stayed for four or five weeks. Now, a blue-black bird is here. They are always at the door (but move if you move), and we see them through the windows. It remained for a few weeks. We took no special notice of it, except to grumble when we found we had forgotten to put fruit or milk away (which means inside the house somewhere), or poultry food. Early in September I found in a very dense piece of our garden another little bower with its "drive" or approach. It is a nice playground, the fourth one we have found in this particular locality in the course of thirty years.

(Miss) C. C. Currie,
(Lardner, Vic.)

NIGHT HERONS IN SCHOOLGROUND

Recently I noticed, in the Notes column of *The Argus*, a reference to Night Herons established in a rookery near a pool at the Zoological Gardens. At least they would be quiet there, but what do you think of this? Mr. Rowell, district inspector, first drew my attention to it. In our school pine trees eight Night Herons have a rookery, 25 feet from the schoolhouse windows. Some 45 feet away is our bell-tree; the bell clangs ten times each day for assembly, drill, recess, etc.; yet the sudden loud peals do not scare the birds away; neither does our brass band, which plays for assemblies. Near the Herons' tree also is a physical training class, but the teacher's orders have no effect upon the birds. One peculiar fact, though, is that, walk as lightly as possible under their tree and they immediately waken and stare down at you. Does anyone know a stranger spot for a night birds' rookery than a schoolyard with 400 children racing about, playing and shouting, and a brass band and a school bell?

J. Halliwell,
(Head Teacher, State School Mordialloc.)

Errata.—September, 1937: Page 71, third paragraph, for asclepaids, read asclepiads; page 72, seventh line, for lufid, read bifid; page 74, fourth paragraph, for pendant, read pendent.

THE TAIL OF THE LYREBIRD

By R. T. LITTLEJOHNS

After several winters devoted to photographing the male Lyrebird, one realizes just how much of our interest in *Menura* centres in his wonderful tail. Except during the nesting season, when the trustfulness of the female simply compels attention, visitors pass her by with scarcely a glance, but become wildly excited at even a fleeting glimpse of the male displaying. And even those, like myself, to whom the appearance of the tail has long ceased to be a novelty, find their interest gone when the tail has been moulted.

Perhaps the first observation which may be made is that the old idea of the lyre-shaped tail is something of a myth. An examination of several thousands of tiny pictures on cinematograph film has failed to show the true lyre pattern in any instance. On infrequent occasions the tail is held upright in the shape of a V, and from some viewpoints the lyre is suggested. The resemblance, even then, is not so marked in life as the camera, because of foreshortening, would have us believe. But there is not very much new in all that. Few people now expect a Lyrebird to have a tail shaped like a lyre.

The character of the tail, of course, is familiar to most nature lovers, although the exact number of feathers may not be generally known. The outstanding features of the ornament are the two large outer feathers, which were popularly regarded as the frame of the lyre. These are broad, strong feathers of considerable weight, which measure something over 2 feet in length. Between these are twelve filmy plumes of "osprey" appearance, and in the centre are two long wire-like feathers practically devoid of webbing. That adds up to sixteen feathers in all.

When the bird is walking or feeding, the whole tail is folded and trailed with the upper surfaces of the feathers on view. All these upper surfaces are dark-coloured and the whole tail is inconspicuous and unimpressive. The upper surfaces of the twelve plumes are almost black, whilst the large feathers are dark brown, with about twenty-three bars of lighter brown on each and a black curl at the end. The long wire-like feathers are greyish.

During the display or dance, however, there is a complete change in the appearance of the tail, which, when reversed and spread, presents the undersides of the feathers. The large outer feathers are then seen to be silvery white, with bars of chestnut brown. Each black curl, too, is then conspicuous in its contrast with the whiteness of the remainder of the feathers. The plumes also are silvery white on the underside.

It is an object lesson in the thoroughness of Nature to examine these plumes and to notice how the central rib and the fine delicate barbs are exactly half black and half white. From this difference between the upper and lower surfaces of the feathers

comes the main attractiveness of the display. The transformation which takes place when the tail is changed at the commencement of the "dance" from a dark-coloured and inconspicuous object to a gleaming fan of silver, must be one of the finest spectacles in Nature.

The bars which decorate the two large feathers are worth examining. Not only do they differ in colour from the remainder

Photo. by K. T. Littlejohns.

A typical view of the display, showing the tail reversed over the back of the performer.

of the feathers but they consist of barbs of a different structure. The portion of the barbs included in the coloured bar is hair-like, so that they present an appearance of gauze. The remainder of the barbs are of much heavier structure and form an opaque mass. Some barbs will be found to be of heavy structure at the base, hair-like farther on where they pass through one of the coloured bars and again heavy at the end where they have left the coloured bar.

Encumbered as he is with sixteen feathers each much longer than his body, the male Lyrebird may be expected to appear clumsy

and awkward, but this is not the case. On all occasions the tail is carried with ease and grace. It is remarkable, too, that during a whole year spent actively in dense undergrowth, the bird seldom is found to have damaged the tail. He is, in fact, most careful of it and, when passing through a small space, proceeds with the same caution as the wearer of a new suit displays in negotiating a barbed-wire fence. One of the pictures reproduced, taken after the tail had been worn for a year, shows almost every dainty barb of the filmy plumes still complete.

In late August or early in September, usually, the whole tail is moulted, the large feathers being lost first. With but a triangular stump remaining, the bird presents a ludicrous appearance, a fact of which he appears to be conscious. Until the tail grows completely, in about ten weeks' time, he is definitely more retiring and elusive than at other times. The new tail begins to appear about three weeks after the loss of the old one, and the new outer feathers, in their progress towards maturity, are strongly suggestive of the growing fronds of a tree-fern.

During the present (1937) season the first male bird to moult in the Sherbrooke Forest area was seen to have lost the two large feathers on August 29, but still was wearing the filmy plumes. On September 5 he had lost the whole of the tail. One bird still carried the complete tail on September 19, but his sullen attitude and his silence throughout the day left the impression that the moulting period was at hand.

EXCURSION TO FRANKSTON

As a visit to Frankston during the week had shown that the season was not far advanced, on August 28 we took a route over the sunny hill-slopes to the south-east of the town. Flowers were abundant, but not a large number of species as yet. One of the Bush-peas was afterwards determined as *Pultenaea Readeriana*, named after a well-known botanist. This species was described comparatively recently (1922), and its range is not yet fully known. At two places we observed leaves of the Fringed Hare Orchid (*Leptoceras fimbriatum*). This flowers in late autumn or early winter, but the leaves, with conspicuous red lines, may be found till about October. At the farthest point reached, a shallow depression of different aspect suggested that some other species of plants might occur, and search was rewarded with the little Club Moss, *Phylloglossum*.

Other plants in flower included the Eyebright (*Euphrasia collina*), and a clear yellow form of the Showy Bossea (*Bossiaea cinerea*). Owing to Mr. Audas' illness, I was asked to act as leader. There were about a dozen present.

T. S. HART.

Mr. J. H. Willis has been transferred from the Forests Commission, Daylesford, to the National Herbarium, where his services will be on loan pending the retirement of Mr. P. R. H. St. John. It is anticipated that Mr. Willis will accept appointment as a botanist on the Herbarium staff early next year.

Plate X

Cave of Hands, Glenisla, Victoria Range, Grampians

Photo. by C. Barrett.

THE ART OF THE AUSTRALIAN ABORIGINAL

By A. S. KENYON

It is more than doubtful if the term "art" is properly applicable. Art with us, whether for ornament or for fixing of the artist's idea, is wholly due to leisure, which is the time to spare after the individual has provided for his material wants. With the primitive man, art—so-called—formed at first part of his daily struggle for existence. He used pictorial delineation as he used gesture, both with his idle hands, to convey concepts and information.

Naturally, food requirements,—game, the birds, the quadrupeds, if a kangaroo is rightly so termed—came first. In delineation, tracks came first—as the aboriginal was essentially a tracker and not a hunter or chaser. These—exactly identical in their purport with the gesture terms for the same animals—were followed by the stencil or outline delineation of the object. The opossum was laid on the rock and a line drawn around it. The outline was completed; in colour by marking the outline or filling in the enclosed space; by carving, by pecking or grooving in a similar way. In instances where the rock had an outer skin or patina, the effect of pecking, which exposed the lighter-coloured interior of the rock—generally approaching a pure white—was analogous to that of painting.

Paintings were also made on trees, on the ground, and on sheets of bark used for dwelling construction; carvings—of an extremely elaborate character at times—on trees; outline charcoal drawings on rocks and bark, as well as etching effects produced by smoking the inner sides of bark sheets, and then scratching the outlines of their fancies. When the white man, frequently a surveyor, came on the scene, and made ink—Indian ink—and paper available, the blackfellow readily substituted pen and ink drawing for his bark scratchings.

But a development occurred which precluded the evolution of pictorial art to any extent and which, in fact, impeded such evolution among the civilized races until the close of the dark ages and the renascent casting-off of the chains. Animism, which, to the primitive mind, gives existence—individual existence—to all objects, took delineation under its wing, and art became the hand-maiden of shamanism, of the priesthood and the church. Progress was stayed and art—art of the purposeful and productive type—was to remain stagnant for all the preliminary stages of mankind—up to our own times in fact. The essentially ceremonial nature of art can be seen in the universality of the location of its manifestations.

Each and every painted rock shelter or carved rock is located in a somewhat inaccessible position, though not too remote from camp sites where food may be obtained, and has an outlook or

prospect in some way connected with the deity idea governing all ceremonies, whether educational, as in initiations, or worshipping in connection with totem classes. Another fact, corroborative of the foregoing, is the grouping of those sacred places.

Notwithstanding the impression gained—in the Sydney district, for example—that carvings are promiscuously scattered around in all suitable places, exact survey of these petroglyphs shows that they are arranged in groups on a large scale, and that many—very many—highly suitable and attractive places are without them. In Victoria, for instance, the only rock paintings yet discovered are four in number and are all in one district, that of the Wimmera tribe. Each differs from the other three, in the class or type of paintings, which themselves definitely fall into group classifications or styles in other parts of the continent. The conclusion is inevitable that these rock shelters are the ceremonial places of the tribe, which has the usual dual organization with subdivision, making four totem classes.

Enough has been said to show the essentially religious domination over pictorial art, but ornament, though enslaved a little for the decoration of churingas and performers in rites and ceremonies, kept itself free to a large extent. Ornament in the carving and colouring of shields and weapons was general. In personal adornment, almost wholly confined to the male of the species, the aboriginal has reached remarkable heights. A fully-decorated black has so many ornaments dangling around his features that he has to be led about, being unable to distinguish his way.

Though the shamanistic domination of art kept much of the primitive, even up to pre-Raphaelite days, there are at present more than signs of a reversion to the aboriginal art forms and methods of expression. Indeed, some efforts by blacks of the Diamantina and the Finke have of late been acclaimed as high, if not the highest, effects of modern art.

A RECORD OF ROCK CARVINGS

By CHARLES BARRETT

Student as well as recorder, and the discoverer of more groups of aboriginal rock carvings than one could visit in months of wandering in New South Wales, Mr. B. L. Hornshaw deserves our gratitude. He has devoted the leisure hours of a lifetime to his favourite branch of ethnography—aboriginal art—and made himself the foremost authority on petroglyphs, at least, those in the "galleries" around Sydney.

As a young man, Mr. Hornshaw (who lives at Drummoyne) became interested in rock carvings seen during his rambles in the sandstone country. Later, he decided to make a record of all the groups he could find, chalking the incised outlines to make photo-

Plate XI

Photos. by B. L. Hornshaw.

Groups of Petroglyphs near Sydney, N.S.W.

graphs clear. Nearly every week-end and holiday were devoted to the quest and recording. Very soon, most of the already-known groups within easy distance of Sydney had been visited, and scores of others located, in French's Forest, at Bantry Bay, and elsewhere. Farther afield, then, Mr. Hornshaw tramped with knapsack and notebook and camera. He was surprised by the abundance of petroglyphs, for the Hawksbury sandstone, with its rock shelter walls and great flat rocks, offered a "canvas" to the blackfellow wherever he roamed. There are thousands of symbols and figures and strange imaginary objects carved in the sandstone. Hundreds of groups have been photographed by Mr. Hornshaw, whose note-

Photo. by B. L. Hornshaw.

The "Red Hand" in a Rock Shelter, Kurin-gai Chase, N.S.W.

books contain measurements and data for each group. For he is an amateur who works with meticulous care, and appreciates the value of scientific recording.

I have been often afield with him, and owe my interest in rock carvings to Mr. Hornshaw, who showed me also how to photograph them to best advantage; in brief, shared with me the knowledge gained during his thirty years of gleaning in a fascinating field.

His finds are described in letters that are also invitations; I never go to Sydney without being taken to see a fresh discovery—a group of carvings, usually on an old bora ground, hidden away and yet within cooee, perhaps, of a highway or at least a frequented road. There are rock pictures where children play, and above the beaches beloved of people who care not a farthing for aboriginal art, or anything but sunshine and the surf while they are out in the open.

Among notable groups found by Mr. Hornshaw last year was that at Terrigal. On Broken Head are thirty-one carvings. A Koala, with a young one on its back, is depicted. Other items are two Kangaroos, two Emus, two Goannas, eight fishes, two human hands and a pair of feet, two boomerangs, a fish-spear with three prongs, a Bandicoot and an Echidna; also a shield, hafted axes, and two nulla-nullas. "The most wonderful group I have seen," is Mr. Hornshaw's comment, in a letter. Of special interest is a group on a bora ground near French's Forest road, Manly district, for one of the carved figures probably was meant to represent a Platypus; it certainly is a broad-billed animal, if the body is less convincing; still, I am disposed to accept the identification.

Mr. Hornshaw suggests that a huge reptile-headed figure, with a human standing on top of its back, possibly was intended to represent the mythical Bunyip. It spread across a broad track in the bush at Bantry Bay, and measures 13 feet 4½ inches by 8 feet. A spear protrudes from the creature's back. We spent hours examining and recording every detail of this remarkable petroglyph, which apparently is very old, for portions of the outline are no deeper than a scratch—depth having been lost by weathering.

A KALEIDOSCOPIC CARPET

By A. J. SWABY

Away to the south-west of Arapiles is a red hill, so barren that selectors would not take it as a gift. It is destitute of trees; hence its locality is indicated on the maps by: "Timber reserve, 1,700 acres." On the gently-rounded top, even the hardy Broom Honey-myrtle, over large patches, scarcely attains a height of 2 feet. But there is nothing dead, nothing withered. The plants dare not give up: for how could offspring survive? Our carpet is in one of these patches and about the size of the average drawing-room.

It is early in June. The hard-baked, dark-red soil has received its first soaking for many months. Always, this red must be kept in mind as the ground on which the more delicate colours are laid. The old pattern is not worn; but dull—sage-green, olive-green, yellowish, brownish, and grey—good wearing colours. The fairy weavers have resumed after a long vacation by tinting the mosses. Who said mosses were delicate? Let them lack water for a few hours and they lose colour. After long drying, they may be brittle. In two hours after rain they are awake and flourishing. You see, they have no deep roots to search for water. The must make the most of their opportunities. But these are just here and there. The sombre lichens are also reviving and preparing for their fantastic "fruiting bodies." The Fringed Heath-myrtle soon covers itself with millions of tiny deep crimson buds. All else still sleeps.

July brings little change. Brown buds have appeared on Flame Heath. Some have even thrust forth their strange, pointed flowers. It is not in bushes, from 2 feet to 4 feet high, as you find it about the Grampians and western sandhills; but tall specimens may reach 6 inches.

In those bright, deceiving days of August, when we feel that winter has gone, real activity commences. Brick-red ground, emerald flecks, sage-green patches, and everywhere flaming scarlet beaks. It is the month of Flame Heath. Few know the wonderful winter beauty of this flower. Emus rejoice and feast on it. Common Beard-heath is now covered with microscopic pink buds. Each perfect tuft is merely a raised portion of the pile. Just a few flowers as yet; but enough to bring out the hand-lens, an annual procedure. Erect and Bundled Guinea-flowers are stirring and covering themselves with fresh green buds. A few have spread their golden guineas to catch the sunlight. Everywhere, tiny buds are swelling.

September, of mild days alternating with bleak winds and hail, calls for intense activity. Sage-green pile, close-cropped, scarcely noticed before, suddenly bursts into a blaze of richest old gold and warm crimson. This *Eutaxia* is strangely variable—here, a close mat of minute needles and not above an inch in height—a few miles away, growing to 4-foot bushes with large flat leaves and compact racemes of pale gold. Peach-Heath bells, really bell-shaped, are showing. The Guinea-flowers are overlaid with gold. Fringed Heath-myrtle has now pale pink buds and scarcely opened flowers. Brush Heath, like a woolly mat, covers its branchlets with deep rosy pink. The Desert Heath-myrtle was there all the while; but only now claims notice. Palest lilac-pink buds are dotting the minute plants among the crowded tiny leaves. These midgets may be 3 inches tall.

We come again in mid-October. Feverish bustle has been going on in the meantime. It was then I first saw it, suddenly, on a perfect day after heavy rains. The whole carpet is the brightest pink! The warm gold and crimson of *Eutaxia* are there. Peach Heath bells have multiplied. Flame Heath has had its blaze, but is still glowing. Brush Heath is all rosy. Guinea-flowers are golden still. Fringed Heath-myrtle, Common Beard-heath and Desert Heath-myrtle are in full flush. But all these, with the dark soil, the lichens of orange, silver, grey and black, and the "fruiting" mosses, are merely undertones. The latest arrival, the beauty of the month, is Common Fringe-myrtle. Here, it assumes a colour seldom seen elsewhere. It is even brighter than the rough-leaved form that fills the scrub on the sandhills farther west. You do not now expect towering shrubs of 8 feet; but imagine gnarled veterans, possibly centuries old, 3 inches high! The habit is dif-

fuse, almost prostrate; but every tiny branch turns up to bring the flowers to a common level. In the mass, it is wonderful. The closer we peer, the greater the wonder. Every five-pointed star is perfect. The many stamens form a fluffy mass as dainty as wattle bloom.

Nature is daring in her designs and arrangement of colours. She produces delight where we should not presume to experiment. In all this prodigal mosaic there is still room for many bright purple Wax-lip Orchids. Even an occasional Blue Dampiera is not unwelcome. Tailed Caladenias add nothing to the general effect. It is easy to overlook the long, slender threads of cream and brownish-red. Individually, each is a miracle of Nature's modelling. So, also, is Rabbit-ears.

November has faded the delicate tints of October. The surrounding verdure of the plains of Australia Felix is yellowing. The kaleidoscope has turned again. Crimson-magenta, purple-brown, and dark red are now prevailing; but the tiniest green and red shoots are in thousands. After the great labour of producing seeds that have not the phantom of a chance of life, most of the plants are busy on new foliage. Perhaps they add an eighth of an inch to their stature. I doubt it. These are laterals and the old tips quietly vanish in the summer. As Common Fringe-myrtle remained inconspicuous until early October, now Crimson Honey-myrtle comes out of retirement. Hitherto, it has had only a slightly-puzzled glance. In this November scene it fits beautifully. The purple-brown is supplied by the starry fruits of Common Fringe-myrtle, with the long awns on the sepals prompting the name, *Calytrix*.

More crimson is seen in the Fringed Heath-myrtle. In this place it has never been dominant, although very plentiful. Still, for six months, through crimson, pink, white, pink, and crimson again, the same flowers, not a succession, have peppered the floor. It might be more apt to refer to them as "hundreds and thousands" on "ginger nuts."

December sees the scene darken, for aestivation. The various greens have sobered to withstand the summer glare. There are two exceptions. Broom Honey-myrtle and Broom Heath-myrtle, the one with regular creamy brushes and the other with dainty pure white flowers like small Tea tree, celebrate the season of goodwill. Always in close association, they are singularly alike in habit with terete hooked leaves close appressed. Finally, in the arid heat of January, these deceptively remind the wayfarer of succulent herbage. Then the whole carpet bakes and endures while fairy weavers sleep till June rains rouse both to a new cycle of activity.

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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, October 11, 1937, at 8 p.m. The President, Mr. A. H. Chisholm, C.F.A.O.U., presided, and about 100 members and friends attended.

Reminiscences of the late Donald Macdonald were given by Sir Edward Cunningham, who was welcomed by the President and introduced to the meeting. Sir Edward touched on the ancestry, early life, journalistic ability, and nature writings of Donald Macdonald, and his great friendship for boys.

The President, who succeeded him, referred to Donald Macdonalds' many sterling qualities and his fine journalistic work.

Mr. Charles Barrett, who was his close friend for many years, also paid a tribute to Donald Macdonald.

At the conclusion, a vote of thanks to Sir Edward was moved by Mr. R. H. Croll, Vice-President, seconded by Mr. E. E. Pescott, and carried with acclamation.

The Secretary reported that he had taken part in the Federation of Melbourne Walking Clubs' Annual Hike, with two other members, and that he had given the lecture at the tea interval.

REPORTS OF EXCURSIONS

Reports of excursions were given as follow: Wattle Park, Mr. H. Jenkins; Maranoa Gardens, Mr. L. W. Cooper, for Mr. F. Chapman; Millgrove, Mr. A. H. Chisholm; Mitcham, Mr. J. W. Audas (by letter) and Mr. Chisholm; Frankston, Mr. C. French.

ELECTION OF MEMBERS

On a show of hands, the following were duly elected as ordinary members of the Club: Miss H. Vale, Messrs. Lloyd Williams, F. L. Barkla, and H. Cribb; and as Associate Member, Mr. Ralph Thompson.

NATURE NOTES

Mr. A. D. Hardy contributed a note on the Algae of the Pink Lakes. Miss C. C. Currie, of Lardner, sent a note on Koalas and Magpies.

The meeting adjourned for the conversazione.

EXHIBITS

Mr. C. J. Gabriel.—Marine shells, *Magilus antiquus*, Montfort, from Mauritius, and *Pterospira roadknightae*, McCoy, from the Great Australian Bight.

Mr. E. E. Pescott.—A collection of fourteen lichens, all from a young plum tree, collected at Bamawm, September, 1937; also specimens of *Prostanthera ovalifolia* (cultivated), from N.S.W., October, 1937.

Mr. V. H. Miller.—*Diuris punctata*, Purple Diuris; pot-grown, and flowering for the third year in succession. *Dianella*, sp. from Mt. Tambourine, Queensland, that has been growing in the same pot for about nine years.

Mr. T. S. Hart.—A sedge (*Chorizandra cymbaria*), from Frankston, and traps on a bladderwort found when cleaning the underground part of the sedge.

Mr. C. French.—Rock Tongue Orchid, *Dendrobium linguiforme*, in flower; native of Queensland and N.S.W. Also garden-grown specimen of Slender Daisy Bush. *Olearia* (*Aster*), *tenuifolia*, from Anglesea.

Mr. Robin D. Croll.—*Sarcochilus olivaceus*, in flower (grown by exhibitor). Also Eucalyptus leaf 31 inches long, signed by the late Donald Macdonald.

Mr. F. S. Colliver.—A series of Fossil Tertiary Oysters, including *Ostrea ponderosa*, Zittel, and *O. ingens*, Zittel, from New Zealand; *O. ingens*, Zittel, *O. arenicola*, Tate, and *O. mandubriata*, Tate, from Beaumaris; *O. sturtiana*, Tate, from Cadell's Punt, near Morgan, S.A.; *O. angasi*, Sowerby, from Dartmoor, Victoria.

Mrs. M. E. Freame's exhibit, a specimen of *Philine angasi*, at last meeting, was incorrectly recorded in the *Naturalist*. Instead of the animal being "in the shell," the shell, of course, was covered by the mantle.

EXCURSION TO MITCHAM

About thirty members of the Club attended the excursion to Mitcham on Saturday afternoon, October 2. The weather was delightful, and the country looked well after the morning showers. We visited the Mitcham Reservoir, which is situated on the highest point in the suburban area, being 528 feet above sea-level. We made a detour in an easterly direction, traversing some virgin bush country, where about thirty species of native shrubs were in full bloom, principally of the family *Leguminosae*. An outstanding species of interest was the Thin-leaf Acacia, *A. aculeatissima*, a procumbent shrub. Other trailing plants noted were the Common Apple-Berry, *Billardiera scandens*, with pale-yellow solitary pendulous flowers, and the Love Creeper, *Brachyscyera volubile*, with racimes of beautiful blue flowers. Some good specimens of the Purple Coral Pea, *Hardenbergia monophylla*, in full bloom, entwined the Eucalypt saplings. Also of interest was the Purple-Violet *V. betonicifolia*, the flower-stalks being about six inches long. Two orchids, the Wax-lip Orchid, *Glossodia major*, and Brown-beaks, *Lyperanthus suaveolens*, were noted, the latter being fairly abundant.

J. W. Audas.

NATIONAL MONUMENTS

By G. N. HYAM

The committee appointed by the Council for the Preservation of National Monuments, during the past twelve months has been engaged upon the collection of data in regard to legislation and administration from many countries. Enquiries as to the present position in Victoria reveal that, apart from areas reserved as National Parks and parks in municipalities, other reservations, under such Acts as Forests, Lands, Education and Scenic, appear to be alienable at the discretion of the Minister, Governor-in-Council, or even the department concerned. There is certainly no immediate danger that these reservations may be alienated, but past experience has shown that this may occur, and in many cases reserves have been diverted from their original object, and leases have been granted for such uses as golf clubs and general recreation grounds, or for other sports, in areas that should be reserved for scenic and flora and fauna protection.

No provision seems to exist for the compulsory resumption of any area or object on private property, however valuable as a National Monument; neither is it the function of any existing statutory body to interest themselves in such objects. These are the defects in Victorian legislation which we are aiming to remedy, and every effort is being made to draft a sane and safe Bill which meets all Victorian conditions. We are not attempting to rush matters, preferring to have a concrete scheme before approaching the authorities.

The Committee has been active in taking every opportunity of explaining the movement, and in supporting any local effort for reservations, such as the movement in Geelong for the acquisition of an area at the Dog Rocks. We have also been investigating suggestions for reservations which include the appended list. Some of these are more or less permanently reserved under one of the existing Acts, but it is considered that all should be declared National Monuments to prevent any possible alienation or destruction for any purpose whatsoever. In this list certain trails and tracks are included. The reservation of these is particularly desirable. Canada and the U.S.A. have many miles of similar scenic trails permanently reserved, and their immediate natural objects properly protected.

The Committee would be pleased to have any further suggestions from members of objects or areas that should be included, and would particularly welcome photos accompanying suggestions.

SOME PROPOSED NATIONAL MONUMENTS

Mt. Herbert.—Bendigo district, between Ravenswood and Kangaroo Flat, about one mile east of Calder Highway, where it passes through deep cutting. Magnificent panorama.

One-Tree Hill.—Bendigo. Fine panorama. Profusion of Wax-flower, Golden Wattle and Bush-pea.

Blue Mount.—Trentham district. Fireguard tower, used by Forestry Department. One mile from Trentham-Ballan Road.

Mt. Blackwood.—Korobeit, near Bacchus Marsh. One of the finest views near Melbourne; easily accessible from road leaving Western Highway at Myrniong.

Werribee Gorge.—Bacchus Marsh. Geology and scenery.

Lerderderg Gorge.—Bacchus Marsh. Geology and scenery.

The Bluff.—Rowsley. At northern end of Brisbane Ranges, on upper Parwan River; a unique panorama, where the basalt plain breaks down to the coastal plain.

Pyramid Hill.—Pyramid. Historical, panoramic and geological.

Mt. Buninyong.—Ballarat district. Extinct volcano; panorama; one-way traffic roads to summit; excellent steel tower.

Red Rock and Warrion Hills.—Colac district. Unique lake panoramas.

Mt. Porndon.—Pomborneit. Near Prince's Highway. High conical hill, even visible from the Pyrenees; height 949 feet; road passes foot of it from Pomborneit railway station, between Colac and Camperdown.

Mt. Leura.—Camperdown. Height 1027 feet; road to summit.

Mt. Rose or Lawson's Lookout.—Castlemaine. Reached by road through State Pine Forest; good tower; height 1,600 feet.

Kalimna View.—Castlemaine. At edge of town.

Organ Pipes.—Sydenham. In Jackson's Creek; geological interest.

Woody Hill.—Donnybrook. On east side of line near railway station.

Cabbage Tree Palms Reserve.—East Gippsland.

Henty's House.—Merino. And English oak nearly 100 years old.

Furnston's Tree.—Healesville. Mountain ash on Mt. Monda track; 62 feet girth, about two miles from top of Blacks Spur.

Loughnan's Hill.—Ringwood. Height 600 feet; accessible by road on north side of town.

Aboriginal Stone Workings.—Lancefield district. On Mt. William.

Old Limestone Quarries and Aboriginal Anvil.—Geelong district. In Moorabool River valley, near Batesford, at foot of Dog Rocks.

Basalt Caves and Portion of Stony Rises.—Pomborneit. Near Mt. Porndon; the caves are reputed to be the largest of their kind in the world; the Rises are unique, as far as Victoria is concerned.

W.A. Flowering Gum.—Oakleigh. At Metropolitan Golf Club.

Tarli Karng.—North Gippsland. On the slopes of Mt. Wellington; it has not been decided how this unique tarn got there.

Melba Gully.—Crowes. About the finest Beech tree gully in the State.

Turton's Track.—Beech Forest.

Barham River.—Apollo Bay. Beech trees.

Station Peak.—You Yangs. Historic and scenic, but only 1,100 ft.

Deadcock Creek.—Near Lindenow. A tributary of the Mitchell River. Unique botanical specimens. Scenic.

Ada River Forest.—Between Warburton and Noojee. A section of this should be set aside as a magnificent Mountain Ash area, and being close to Melbourne.

Mountain Ash Forest.—Near Mt. Disappointment. The forest is the equal of the Ada River area, and is probably mature. It extends for about five miles down the slopes of the Great Dividing Range, towards Jack's Creek Cascades. The Metropolitan Board of Works has cut a track connecting the latter and the main firebreak going east from Mt. Disappointment.

Mt. Howitt Track.—Connecting Mansfield and Dargo. It goes up the Howqua River Valley, which many consider the most beautiful in Victoria, passes right over Mt. Howitt, about 5,700 feet, and close to The Cross Cut Saw and Terrible Hollow, thence over the Howitt High Plains, and drops into the Wonnangatta Valley to Dargo. An extension would be from Wonnangatta cattle station to Talbotville, site of Grant, Dargo High Plains, to Mt. St. Bernard Hospice. Again, from Mt. Howitt, a mining track traverses a series of high plains running south to Mt. Tamboritha and Mt. Wellington, the Connor's Plains and Mt. Arbuckle mining tracks.

Bogong High Plains.—Average height, 5,500 feet. From Harrietville a track goes up the Bon Accord Spur to Mt. Feathertop, thence via The Razorback to Mt. Hotham, and Bogong Plains, Mt. Bogong (6,308 feet, our highest peak), and Staircase Spur to Tawonga. The Bogong Plains should be a National Monument for summer and winter.

EXCURSION TO WATTLE PARK

About forty members and friends met at Wattle Park on September 18, in a gale of wind. Several isolated groups of native flora were inspected en route to the large plot reserved for native flora only, and which was planted by members of this Club. The Curator, Captain Curtis, gave a short history of the Park. At this stage a downpour of "red rain" added to the discomforts of the party, and only a few remained to be shown several nests in the eastern end of the Park, which has been left practically in its natural state. One nest in particular—that of a Bronze-winged Pigeon, aroused considerable interest, being built on the top of a stump only a few feet from the ground.

H.J.

SPRING-TIME FUNGI AND A GIANT *BOLETUS*

By J. H. WILLIS

The abnormally heavy rains in mid-October, which resulted in serious flooding over parts of Gippsland, came during a spell of warm weather, and in a sense perpetuated the climatic conditions of late autumn, so favourable to fungal growths.

Lawns throughout the metropolis and suburbs brought forth an interesting harvest, as if by magic: around the Shrine of Remembrance, numerous tiny pearl-grey cushions on the grass indicated the presence of a common puffball—probably *Lycoperdon nitidum* (a form devoid of the mealy warts or minute spines usually covering members of this genus); quaint parasols of *Galera crispa* and *Stropharia semiglobata* (both brown-gilled toadstools) appeared in battalions, soon to shrivel under the sun.

Near the northern Yarra bank, at Anderson Street Bridge, I happened upon a magnificent troupe of "Inky Caps" (*Coprinus comatus*), looking absurdly like some pigmy encampment among the lush grass—each shaggy white cap a perfect wig-wam. Realizing the peculiarity of this fungus rapidly to deliquesce—from a regular snowy cone to an ugly mass of blackish slime in just a few hours—and knowing something of its reputation as a table delicacy when gathered young, my aesthetic sense weakened; later that evening I sat down to a dish that gods might envy!

News soon arrived of wonders in the country, too—titanic mushrooms (*Psaliota campestris*), upward of three pounds in weight, and splendid examples of our noteworthy luminous agaric, *Pleurotus lampas*. The best find of all, however, must be credited to Mr. Paul Fisch, of Doncaster, who collected samples of the giant *Boletus* (*B. portentosus*) near his orchard and hurried them to Melbourne for record. These included two young fruiting bodies (about four inches broad) and one superb specimen weighing *13½ lbs.* and measuring *12½ inches* across the cap, all of which reached the National Herbarium, where they were on view for nearly a week.

Boletus portentosus is probably our largest fleshy, terrestrial fungus, and, being of uncommon occurrence (usually in damp, hilly districts), it always excites interest. I have gathered it several times at Daylesford and near the Dandenong Ranges, but never one so large as the Doncaster specimen. The general colour is olive-brown to khaki, with reddish blotches on the extremely stout, bulbous stem; the pores are at first minute, velvety, and pale yellow-green, expanding to about one millimetre and darkening to golden-brown in matured plants; the soft flesh is very thick and straw coloured, becoming dull reddish-green when cut or broken; apparently nothing is known about the edibility of the species.

Mr. F. J. Rae, Director of the Botanical Gardens, made careful measurements of the large Doncaster *Boletus* when received on

Boletus portentosus; collected at Doncaster.

Wednesday, October 20. To his surprise, by Saturday the great cap had "grown" half as large again; two days later a further increase in size was apparent, yet the weight had dropped by two pounds; thereafter, decomposition set in, the fungus becoming flabby and be-moulded in places and steadily losing weight (doubtless due to evaporation of moisture); the bulbous stem maintained an almost constant apical diameter of seven inches, while the accompanying young specimens also remained unexpanded.

These dimensions were noted by Mr. Rae:

Wednesday, Oct. 20—12½ in. diam., 2 ft. 11 in. circumf.
Saturday, Oct. 23—17½ in. diam., 4 ft. 2 in. circumf.
Monday, Oct. 25—20 in. diam., 4 ft. 10 in. circumf.

Since there was no difference in weight during the five days, it is obvious that the increase in size was not attributable to "growth" in the ordinary sense, but rather to a sudden expansion of the compressed tissues of the fungus on reaching maturity; this "jack-in-a-box" habit is better exemplified by the strange phalloid fungi, where a latticed or star-fish-like receptacle often springs from its "egg" with explosive force. Apparently the two younger samples of *Boletus* had not yet grown to that stage where automatic expansion were possible, and so they remained as when gathered.

Dr. J. B. Cleland, in a valuable handbook on South Australian fungi, mentions that the largest specimen found in his State weighed *7 lb. 2 oz.* Our Victorian example can almost double this figure, and it would indeed be interesting to hear whether any reader can make the present record higher still.

The photograph (page 103) shows the *Boletus* from Doncaster and the two young fruiting bodies before expansion of the cap began.

In collecting a specimen of a rather unusual sedge at the Frankston excursion on October 9, a short piece of the underground stem was cut out with the damp black soil adhering. Later, in breaking away the soil, numerous white threads of a Bladderwort were found in it, with the minute bladders, or traps, well shown. A few of the threads terminated in very small green leaves. It was no doubt too early in the season for flowers, but when flowers of the Bladderworts are collected, the interesting underground or submerged parts are often overlooked. The sedge, with a single large cluster of flowers to one side, proved to be *Chorizandra cymbaria*; the partitions of the stem became quite evident on drying. T.S.H.

On October 9, on Middle Park beach, I picked up a piece of wood riddled with the shipworm, *Teredo*, and placed it in a large jar of water. When examined on October 14, the wood was covered in waving siphons of the shipworm. One was commencing to discharge eggs into the water; at first a few and gradually more freely until they were pouring out, and the siphons resembled a miniature fountain; then the flow slackened, and finally stopped (though an hour later a few eggs were still being expelled). Soon the "larval" shipworm swims about, having developed a crown of "cilia." Some were still moving on October 19. M. E. FREAME.

A SPRING DAY AT CHEWTON

By A. J. TADGELL

A pleasant rail journey of about two and a half hours from Melbourne will bring you to Chewton, and then, if you be geological, you may walk for three miles to Castlemaine. Should you, however, be botanical, the encircling hills will tempt you, and you may wander away at once and find yourself in bushy surroundings. At the end of a day, even if it be unusually dry, as I found it, your specimens will total, as mine did, 100 species in flower out of the 140 natives and thirty-five aliens collected.

Perhaps you may be more commercially-minded and interested in the revival of the local gold mines, and will ask someone you may meet to point out the famous Wattle Gully Mine, that is yielding at the present time the largest share of the gold now being produced in Victoria. You may also be desirous of learning the names of the other half-dozen owners whose mine popper heads show up near by. Heaps of Lower Ordivician slate mark the shafts, so you may be tempted to search for another *Monograptus* from the debris, or during your walk may have noted, in other places, where either prospectors or geologists have broken the softer stone, searching for Lower Darriwell graptolites or gold-bearing indicators. Even before the successful search of recent times for the precious metal, the district went back some eighty years, when rich shallow alluvial ground was turned over from end to end, while later the same ground yielded profits from dredging or pump sluicing.

The three miles between Chewton and Castlemaine do not lend themselves to scenic beauty, and, contrastingly, the ordinary person shudders when he reads of the installation elsewhere of huge dredges and realizes their devastations in the near future. A man once chided me by saying, after my revel in the glory of some natural surroundings: "You know, we cannot keep back the district because you want to grow a few orchids." I am afraid I was wanting in vision, and I thought of the other fellow, who asked what posterity had done for him. At Chewton one passes many potholes of the prospector, deeper shafts, now abandoned by the successful miner, and many waterways and diversions for supplying the liquid, not always valued, but without which so many gold-diggers find their work fruitless. Even the various strata shown in the railway cuttings may cause the thoughtless to stand in awe and attempt to read some sermons in stones. No doubt, years back, the hills around were verdant, covered with Eucalypts and underscrub of many species, so that even the diggers had their visitors, who revelled in spring sunshine, admiring the gentle undulations in the course of their walk.

To me, these conditions still held, and though Forest Creek and Wattle Gully might not be true to their former names, I found, in

a few miles of easy walking, that the day was warm although early in October, and there was much to entrance a botanist. Though the usual water one expected to see was missing in springtime, there was abundant bloom on *Eucalyptus polyanthemos*, and attached to many were strange-shaped gall-makers' homes, hard like the wood of the branches, curiously shaped like the antlers of a deer, or a long-eared fox, in size 1½ in. by 1 in., *Apiomorpha* (*Brachycelis*) *munita*.

Other Eucalyptus species were few, and not tall. No ferns, except *Cheilanthes*, were seen, and very few orchids: *Diuris* (two), *Glossodia*, *Caladenia* (one), and *Pterostylis cycnocephala*. Usually, in spring, many minute forms of plant life abound and gladden a walk, but this year they are not plentiful. *Brachycome exilis*, two minute *Helipterum* (as well as the large Hoary Sunray), two *Microcala*, *Levenhoekea*, *Stuartina*, *Toxanthus*. *Eriostemon obovalis* is prominent, and so is *Prostanthera decussata*; *Euphrasia collina* is always welcome, especially when abundant; a strong specimen of *Persoonia rhamnoides* is in fruit. Two Goodenias are met at intervals, and some six Acacias enliven one's way, including *A. acinacea*, *A. lanigera*, *A. aspera*, *A. pycnantha*, *A. diffusa*, and *A. dealbata*, the latter going off. *Grevillea alpestris* is a fine sight, but its foliage is drab. Several species of *Pultenaea* are showing bursting buds. There are two *Dillwynias*, with first flowers, while two species of *Daviesia* are abundantly in bloom. Ever welcome are *Helichrysum*, *Brachyloma*, *Bulbine*, and *Lissanthe strigosa*, the last, to my disappointment, bearing that blue bloom-like fungus I noted on *Calythrix* in another place, but due, doubtless, to dry conditions. *Cotula coronopifolia* hereabouts has the foliage softer, and the colour of the flowers pale lemon, so different from the rich orange of those growing about Melbourne, although later in the day, when passing through Castlemaine, I found flowers of the normal colouring.

It was an enjoyment thus passing along the streets to see such fine specimens of exotic deciduous trees in their soft spring foliage and their varied spikes and pendant catkins, making a bold showing, for even flowers have their spring loves. There were several *Asperulas* and *Galiums*, so confusing to identify, because of their likeness and changed nomenclature. *Sherrardia*, with its bright blue tiny flowers, that close with the daylight, preferring rocky conditions, and so very much alike to their cousins, the Cleavers and Woodruffs.

Finally, *Hibbertia acicularis*, *Pimelia stricta*, *Kennedya*, not forgetting *Oxylobium procumbens*, whose flowers also love the sun, were welcomed. Grasses were not overlooked in *Demazeria Agropyrum*, two species of *Bromus*, two of *Danthonia*, and two of *Stipa*, *Poa bulbosa*, and others.

FOSSIL LOCALITIES IN AND ABOUT MELBOURNE
V.—STUDLEY PARK

By F. S. COLLIVER

To reach this locality, take the Johnston Street tram to the terminus and walk across the bridge, or take train to Collingwood, walk down Johnston Street, and over the bridge. The first part of this excursion will be down the old road along the river bank to the pumping station. The cliff section here gives a wonderful illustration of the Silurian Sedimentary Series, and shows how much movement has taken place since the original deposition. This series of typical Melburnian sandstones, shales and mudstones appears to be almost vertical just near the gate, but as we walk farther down the track a gradual curve over may be noticed, until a very fine example of an "anticline," or inverted "U" fold in the rocks, is distinctly seen about half-way along. The "syncline," or "U" curve, which always follows an anticline, may be seen just past this, but farther back in the hillside, and many other such folds occur in this locality.

These rocks were, of course, deposited horizontally, and the folds are due to later earth movements. It is owing to this fact that we are able to collect fossils of various ages in outcrops. Near the first anticline is a band of shale that contains hundreds of the fossil remains of an entirely extinct marine animal known to be somewhat allied to the corals. These animal remains are known as Graptolites (*Grapho*, I write; *lithos*, a stone), and may be roughly portrayed as having numerous mouths and a common stomach, and living apparently, in this case, in clusters. It seems more than probable that they lived among the seaweeds, as do their nearest living allies, the "Sertularians."

In the gutter near this part will be found numerous fallen pieces of shale and mudstone, and careful examination of these is sure to reveal the fretsaw-like appearance of some graptolites.

At one time, above this road, and on the hill overlooking the falls, there occurred an outcrop of sandstone, with casts and impressions of Brachiopods, etc., of Silurian age, and similar to those found at Moonee Ponds. Recent search failed to reveal the outcrop, and it seems that the new road has passed right through it. A very careful search in the sandstone blocks near this locality may be rewarded. From here we must continue up the Studley Park Road to the road that enters the park. Just beyond the track is a deposit of red sands which are portion of a once vast sheet that covered nearly all of Melbourne, and now exists only on various hilltops. Fossils in this deposit are rare, but F. Chapman has recorded a possible cast of the common Beaumaris Kalimnan Sea-urchin, *Lovenia forbesi*. He mentions that freshwater sponge spiculus are fairly common.

One should not leave this locality without noting the fine series of volcanic "dykes" (now shown by clay bands) that intrude through the Silurian series, particularly along the Studley Park Road between the bridge and the hilltop. One other very good dyke may be seen near the pumping station; here the clay has weathered away, and the dyke is shown by a gash through the Silurian; on the walls, however, some good specimens of mica may be collected, this being the more resistant mineral of the original rock. We are unable to give a definite age to these dykes, but they are younger than the Silurian, and older than the Tertiary; this is proved by the fact that they intrude through one and not the other deposits.

A careful collector should obtain specimens of the graptolites (*Monograptus* aff. *dubius*), possible specimens of the common brachiopod (*Camarotechia decemplicata*), and freshwater sponge spicules.

KOALAS AT LARDNER

We have been acquainted with Native Bears all our lives; since my people came to Gippsland, very much so. They have been very numerous at times, and the year Klondyke was opened up one met naked Koalas everywhere in our bush, of which we had large areas. A Koala skin then was worth 10d. But I wanted to mention that there has never been a Manna Gum-tree on our land, and few in the district, except the one we planted, and there has never been a Koala in that Gum yet.

In 1895 we were guilty of putting a tin band round a White Gum, to save its life from Native Bears, but there were plenty of these trees in the bush paddocks nearby. At present we have only three Koalas (since the fire in 1932), and these have come from elsewhere, for there was nothing left alive in our bushland. We are sure that they have not increased. Two Koalas come to the garden, where there are some Box-trees planted. We sowed Yellow Box seed, but are told that the trees are Grey Box. The Koalas use only these Grey Box-trees and the White Gums, though there is a great choice, including Messmate, River Red Gum and Karri.

We are accustomed to seeing Koalas (before a wet spell), and, of course, they are a great interest to visitors. Has anyone noticed that clear water is a necessity to them. My brother wonders why, but it seems that they must come to a wooden bucket to drink. This bucket is kept in nice order for the dogs—not for poultry.

My sister walks across to the Lardner Post Office, as postmistress, every afternoon, one mile—mostly across our own land—and sees twelve Magpie nests on her way, all but one in trees on our land. Two are at the house door, and both birds come for scraps. I think they mean to exchange worms for the pieces of bread, meat or butter, because they bring beakfuls with them. There will be a nice lot of young Magpies for the mushroomers and ferreters to shoot next year!

(Miss) C. C. CURRIE.

Lardner.

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, November 8, 1937. The President, Mr. A. H. Chisholm, C.F.A.O.U., presided, and about 100 members and friends were present.

The President welcomed Mr. Noel Lothian, returned from New Zealand. Mr. Lothian will go to the Royal Botanic Gardens, Kew, England, and remain for two years.

Mr. Robert Eadie, of Badger Creek, Healesville, was welcomed as a new member, and Mr. Tom Eades as a visitor.

DISCUSSION ON SNAKES

The evening was devoted mainly to a "Snake Symposium." Mr. Robert Eadie spoke on the value of snakes in preserving the balance of Nature. He considered that they deserved protection.

The President read out a number of questions relating to snakes and their ways, and invited answers from members.

Some of the questions and answers were as follows:—

How many kinds of snakes are there in Australia?

Ans.—105 venomous species and varieties and 34 non-venomous species.

What are the sizes of the largest snakes recorded in Australia?

Ans.—Black Snake, 8 ft. 4½ in.; Brown Snake, 7 ft. 2 in.; Copperhead, 5 ft. 2 in.; Death Adder, 34½ in.; Tiger Snake, 5 ft. 8 in. (this was the famous snake known as "Gunga Din"). The largest poisonous snake in Australia is native to Cape York district, often it reaches a length of 11 ft. These figures were given by Mr. Eades.

What is the life span of snakes?

Ans.—They do not live long in captivity; natural span unknown.

Which are the most venomous snakes?

Ans.—Mr. Eades stated that the Tiger Snake had the most potent venom of any species in the world, being 75% greater than that of the Cobra of India. Following the Tiger came the Copperhead, Brown and the Black Snakes, in this order.

How many young are produced at a time?

Ans.—Miss Dyall stated that she had counted 14 young Black Snakes. Mr. Chisholm stated that the Tiger Snake may have upwards of 50 young at one time.

Can snakes "talk"?

Ans.—Miss Dyall reported she had heard a Tiger Snake bark

like a small terrier when cornered. Mr. A. S. Chalk had heard a Tiger Snake make a sound between a cough and a hiss. Mr. Eades had never heard a snake make any noise other than the hiss, and, when very angry, a noise something like a sneeze.

Can snakes hear?

Ans.—The President stated that snakes could perceive vibrations.

Are snakes susceptible to music?

Ans.—Snakes, though unable to hear sounds that we generally hear, are susceptible to certain pitch vibrations. The President and Mr. Charles Barrett both gave this answer.

How long can a snake stay under water?

Ans.—Mr. A. D. Hardy had timed a Black Snake, which stayed under water for 25 minutes. Mr. F. S. Colliver observed a snake in Queensland, which remained under water for approximately 30 minutes.

How do snakes get into forks of trees some feet above the ground?

Ans.—Mr. Eades stated that Black Snakes and Tiger Snakes could not climb smooth-boled trees; a Brown Snake could climb a small tree. Carpet Snakes, being constrictors, were able to climb trees. Venomous snakes had no power of constriction.

Do snakes leave odours?

Ans.—Mr. Eades stated that snakes in captivity had a bad odour; dogs very definitely could pick up the scent. In nature, however, Mr. Eades was unable to detect the odour of a snake. Black Snakes, when shedding their skin, emitted an offensive odour.

Can snakes hypnotise small birds and mammals?

Ans.—The President said "Yes," and quoted the case of some Heath Wrens observed by him near Sydney. The birds' actions in the presence of a snake indicated that they were under a "spell."

Does an apparently dead snake live until sundown?

Ans.—No; but snakes are subject to nervous spasms when apparently dead.

Which is the worst enemy of snakes?

Ans.—The President suggested that Hawks and other birds of prey were greater enemies to the snake than was the Kookaburra.

Do snakes swallow their young?

Ans.—The President thought it proved that some species take their young into the mouth in time of danger. Mr. Barrett expressed a contrary opinion.

GENERAL NOTES

Mr. A. D. Hardy mentioned the prehensile power of a snake's tail, and a visitor to the meeting stated that it was possible to make a snake disgorge the contents of its stomach by slowly "flicking" the reptile's body.

CORRESPONDENCE

From IXe Congres Ornithologique International, at Cleres, inviting the Club to send a delegate, and asking that the congress be made known to all members. The congress will take place in Rouen in May, 1938.

REPORTS OF EXCURSIONS

Reports of excursions were given as follows: Beaconsfield, Mr. A. S. Chalk; Springvale, Mr. T. S. Hart; and Footscray, Mr. W. H. Nicholls.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as ordinary members of the Club: Dr. Ethel McLennan, Mrs. M. Murdock, and Mr. R. Eadie; and as country member, Mr. R. L. Black.

GENERAL BUSINESS

The President announced that Mr. R. H. Croll's book, "Wide Horizons," had been published; and that Mr. Charles Barrett had written a small book on the Koala. To both these members he extended the Club's congratulations.

The Hon. Secretary reported that the Club proposed to hold a small historical show early next year, in connection with the Australian sesqui-centenary.

The meeting then adjourned for the conversazione.

EXHIBITS

Mrs. M. E. Freame.—Gizzard plates of marine shell, *Philine angasi*; Teredo shipworms; sponge and skeleton (*Dendrilla gosea*).

Mr. H. C. E. Stewart.—Specimen of *Burchardia umbellata* (Milkmaids), with stem 26 ins. long, collected at Club excursion to Beaconsfield.

Mr. C. French.—Cultivated pink-flowered *Leptospermum* (*L. rotundifolia*).

Mr. W. H. Nicholls and H. T. Reeves.—Photos. of their Cann River-Genoa trip.

Mr. C. J. Gabriel.—Opercula and their shells from various localities.

Mr. Noel Lothian.—*Raoulia eximia* or "Vegetable Sheep," from Mt. Torlesse (4,700 ft. alt.), Canterbury, N.Z.; also *Raoulia* sp. from Mt. Sarawera, N.Z. The first specimen showed the formation of the hard cushions, and the other the mat-forming tendency of the plant.

Mr. E. E. Pescott.—*Sarchochilus Fitzgeraldi*, Ravine or Wedding Orchid, from Tambourine Mountain, Queensland; *Passiflora cinnibarina*, the Victorian Passion Flower (cultivated); wood and bark, showing lace bark layers and medulary rays, of New Zealand Lacebark, *Hoheria populnea*.

Master A. Colliver.—Black Snake and Brown Snake (spirit specimens).

A NEW EPIPHYTIC ORCHID FROM DORRIGO, N.S.W.

Cleisostoma gemmatum, sp. nov.

By THE REV. H. M. R. RUPP, Raymond Terrace, N.S.W.

Planta epiphytica, parvissima cum radicibus aeriis. Caulis brevis cum foliis circiter quinque, angustissimis, fere falcatis, 2-3½ cm. longis. Flores 4-8 in racemo. Sepala ovata, acuta, fere 3 mm. longa, pallido-viridia cum marginibus purpureo-fuscis, et saepe supra purpurea linea. Petala vix 2 mm. longa cum marginibus prominentibus, purpureo-fuscis. Labellum album; lamina brevissima; lobus medius obtusus crassusque cum maculis aurantiacis, lobi laterales falcati. Calcar 3 mm. longum cum membrana interiore angustissima ciliata. Columna rufo-purpurea, brevis cum dentibus brevissimus. Pollinia magna.

Cleisostoma gemmatum, sp.n.
A, Plant growing on twig, natural size; B, side view of flower, enlarged; C, column, greatly enlarged.

A small epiphyte resembling *C. Beckleri* F.v.M., but more leafy and the root-system more aerial. Leaves up to 5 in number, narrow-linear and almost falcate, acute, 2 to 3½ cm. long. Flowers

4 to 8 in the raceme. Sepals ovate but acute, nearly 3 mm. long, pale green with purplish-brown margins, and often a purplish median line on the back. Petals hardly 2 mm. long, with very prominent purplish-brown margins. Labellum white; lamina very short; mid-lobe obtuse and thick, with orange blotches; lateral lobes broadly falcate. Spur as long as the sepals, with a narrow ciliate membrane inside the orifice. Column bright reddish-purple (except the white stigmatic plate), short, with very short teeth. Pollinia rather large, in two pairs on ribbony caudicles.—Dorrigo, N.S.W., Mrs. W. J. Harrigan, October, 1937.

Flowering racemes were sent to me by Mr. G. E. Glissan, of Balgowlah, near Manly. At his request Mrs. Harrigan forwarded a complete plant. I have no doubt at all that this little orchid is new to botanical science. The plant itself, when not in bloom, might be mistaken for *C. Beckleri*; while the tangle of aerial roots suggests affinity with *C. tridentatum*; but as will be seen from the description, the flowers are quite unlike those of either species. Under the magnifier they are veritable jewels of the floral world, the brilliant reddish-purple of the column in particular providing an effect without parallel in other Australian Cleisostomas. For this reason I have chosen the specific name which may be translated into plain English as "jewelled."

At the same time, Mrs. Harrigan sent to Mr. Glissan a two-flowered raceme—and subsequently a single leaf—of a *Sarcochilus* from the same locality. This is very suggestive of a natural hybrid between *S. olivaceus* Lindl. and *S. spatulatus* Rogers; but in the absence of further material I am doubtful of its status. In general appearance it resembles a small *S. olivaceus*, but the lateral lobes of the labellum are prominently spathulate, and there are bright purple splashes on the dorsal protuberance of the mid-lobe.

EXCURSION TO FRANKSTON AND LANGWARRIN

This excursion took place on Saturday, October 9, and was attended by 17 members. From Frankston we followed the railway line to the sand pits, near Langwarrin. A fair number of orchids were in flower, one being a large specimen of *Thelymitra aristata*, which was greatly admired. From the sand pits we walked across country to the Scouts' jamboree ground, where more orchids were found. *Thelymitra antennifera* ("Rabbit's ears") was in hundreds, and, the day being warm, fully out in flower. The Tea-trees, *Leptospermum scoparium* (some pink-flowering varieties) and *L. lævigatum*, and Wedding Bush, *Ricinocarpus pinifolius*, were in full bloom—a glorious sight. We had a very pleasant outing and noted about 17 species of orchids in flower.

C. FRENCH.

THE COLLEMBOLA (SPRINGTAILS) OF VICTORIA

By H. WOMERSLEY, F.R.E.S., A.L.S., Entomologist, South Australian Museum.

In his paper, "Biology of a new Halictine Bee and Specific Descriptions of its Parasites," in *Arbeiten über physiologische und angewandte Entomologie aus Berlin-Dahlem*, Bd. 3, Nr. 4, and Bd. 4, Nr. 1, 1936-37, Mr. Tarlton Rayment has described (page 59) a new species of Collembola found with *Halictus emeraldicus*, under the name of *Entomobrya emeraldica*. Through the kindness of Mr. A. L. Tonnoir, of the Division of Economic Entomology, Canberra, I have now been able to examine the type slide of Rayment's species and to compare it with his description and figures. As a result it can be stated definitely that the species is not new and is not even an Entomobryid, but is the cosmopolitan *Folsomia fimetaria* (L. Tlbg.) which belongs to the Isotomidae. As such it is well known from many parts of Australia and was recorded by myself from Riddell, Victoria, in 1934.

In his paper Rayment further states that his species "is the first springtail to be described from Victoria." Actually the writer has, prior to the publication of Rayment's paper, recorded no fewer than 48 species of this group of insects from Victoria, of which 19 were new to science. The following list gives the species known to occur in this State up to the present time, and those marked with an asterisk were originally described from Victoria.

Family Hypogastruridae

Hypogastrura armata (Nic.)—Recorded in 1933 from Sherbrook Falls, Belgrave, and Studley Park.

Hypogastrura armata v. *inermis* Axels.—Recorded in 1933 from Studley Park.

Hypogastrura pseudopurpurascens Wom.—Recorded in 1933 from Belgrave and Sherbrook Falls.

Xenylla maritima Tlbg.—Recorded 1933 from Studley Park.

Xenylla mucronata Axels.—Recorded 1933 from You Yang Mts.

Ceratrimeria maxima (Schtt.)—Recorded 1933 from Belgrave and Sherbrook Falls.

Odontella lamellifera Axels.—Recorded 1933 from Belgrave and Sherbrook Falls.

Pseudachorutes rhaeticus (Carl)—Recorded 1933 from Belgrave, Sherbrook Falls and You Yang Mts.

Brachystomella parvula (Schffr.)—Recorded 1933 from Studley Park.

**Brachystomella granulata* Wom.—Described 1935 from Wartook.

**Brachystomella furcata* Wom.—Described 1935 from Temby.

**Paranura australasiae* Wom.—Described 1935 from You Yang Mts.

Achorutes cirratus Schtt.—Recorded 1933 from Studley Park and You Yang Mts.
Achorutes hirtellus Börner.—Recorded 1933 from Sherbrook Falls.
Family Onychiuridae—
Tullbergia trisetosa (Schffr.)—Recorded 1933 from Sherbrook Falls, Belgrave and You Yang Mts.
**Tullbergia australica* Wom.—Described 1933 from Sassafras.
Family Isotomidae—
**Cryptopygus australis* Wom.—Described 1934 from You Yang Mts.
Folsomides exiguus Fols.—Recorded 1935 from Wartook.
Folsomia fimetaria (L. Tlbg.)—Recorded 1934 from Riddell.
Folsomia fimetarioides (Axels.)—Recorded 1934 from Sassafras and Sherbrook Falls.
**Astephanus denisi* Wom.—Described 1935 from Wartook.
Isotomurus chiltoni (Carp.)—Recorded 1934 from Sherbrook.
**Proisotoma sexoculata* Wom.—Described 1934 from Sherbrook Falls and Sassafras.
Isotoma tridentifera Schtt.—Recorded 1934 from Beechworth.
**Isotoma tridentifera* v. *edenticulata* Wom.—Described from You Yang Mts.
**Isotoma bi-oculata* Wom.—Described 1934 from Sherbrook Falls and Sassafras.
Family Tomoceridae—
Lepidophorella australis Carp.—Recorded 1934 from Sherbrook Falls.
Family Entomobryidae—
Sinella termitum Schtt.—Recorded 1934 from Sherbrook Falls.
Entomobrya clitellaria Guthrie.—Recorded 1934 from Studley Park.
Entomobrya lamingtonensis Schtt.—Recorded 1934 from You Yang Mts.
**Pseudosinella fasciata* Wom.—Described 1934 from Sherbrook Falls and Sassafras.
**Pseudosinella unioculata* Wom.—Described 1934 from You Yang Mts.
Mesira australica (Schtt.)—Recorded 1934 from Belgrave and Sherbrook.
**Mesira nigrocephala* Wom.—Described 1934 from Koroit.
Lepidocyrtus praecisus Schtt.—Recorded 1934 from You Yang Mts.
Lepidocyrtus ralumensis Schtt.—Recorded 1934 from You Yang Mts.
**Lepidocyrtus nigrofasciatus* Wom.—Described 1934 from Mt. Dandenong.
**Paricrypta dandenongensis* Wom.—Described 1934 from Mt. Dandenong.

Family Neelidae—

Neelus swani Wom.—Recorded 1932 from Studley Park.

Family Sminthuridae—

Sminthurides aquaticus Tlbg.—Recorded 1935 from Apsley.

**Arrhopalites drummondi* Wom.—Described 1932 from Sherbrook Falls.

Arrhopalites coccus (Tlbg.)—Recorded 1932 from Belgrave.

**Arrhopalites gloriosa* Wom.—(In the press) from Fern Tree Gully, 1937.

Sminthurinus terrestris Wom.—Recorded 1932 from Burnley and Koo-wee-rup.

Katianna ornata Wom.—Recorded 1932 from Burnley.

**Katianna pescotti* Wom.—Described 1935 from Port Fairy.

**Parakatienna montana* Wom.—Described 1936 from Mt. Buffalo.

**Parakatienna serrata* Wom.—Described 1936 from Mt. Buffalo.

Sminthurus viridis L.—Recorded in 1932 but earlier records probably exist.

**Sminthurus elegans* Wom.—Described 1933 from Mt. Dandenong.

**Dicyrtomina andrewarthai* Wom.—Described 1932 from Sherbrook Falls.

The literature dealing with the Collembolan Fauna of Australia is as follows:

1917—Schött, H. Collembola in Results of Dr. E. M. Mjöberg's Swedish Expedition to Australia, 1908-13.
Ark. f. Zool II.

1932—Womersley, H. Tasmanian Collembola of the Family Sminthuridae.
Proc. Roy. Soc. Tasmania 1931, p. 1-11.

1932—Womersley, H. The Collembola-Symphypleona of Australia.
Pamphlet 34, C.S.I.R.

1933—Womersley, H. A Preliminary Account of the Collembola-Arthropleona of Australia, Pt. 1, Poduroidea.
Trans. Roy. Soc. S.A., LVII, p. 48-71.

1933—Womersley, H. On some additions to the Sminthurid Fauna of Australia.
Stylops, II (2), p. 241-7.

1934—Womersley, H. A Preliminary Account of the Collembola-Arthropleona of Australia, Pt. II Entomobryoidae.
Trans. Roy. Soc. S.A. LVIII, 86-138.

1935—Womersley, H. Some new Species and Records of Australian and New Zealand Collembola.
Tr. Roy. Soc. S.A. LIX, 207-218.

1936—Womersley, H. Further Records and Descriptions of Australian Collembola.
Rec. S.A. Mus. V (4) 475-485.

PERSISTENT JUVENILE FOLIAGE FORMS

By NOEL LOTHIAN

One of the main features of the New Zealand flora is the distinct juvenile form of foliage, and a large number of species, of widely separated families, possess this characteristic. To mention a few: Filices, Taxaceae, Moraceae, Protaceae, Ranunculaceae, Polygonaceae, Cunioniaceae, Rosaceae, Rutaceae, Malvaceae Elaeocarpaceae, Araliaceae, Apocynaceae.

This character is due in all probability to former conditions, of which it would be possible to gain a more accurate idea if these leaf forms were studied. In New Zealand already a great deal of work on the subject has been done, but in Australia little is known, probably on account of the extent of the flora.

The intention of these notes is to draw attention to this peculiar feature, with the hope that any further instances will be recorded.

After the seed has germinated the first foliage leaves appear. To take a familiar example, the phyllodonous Acacias, in this case it is a bipinnate form. This stage is present for a longer or shorter period (depending on the species), and finally a straight change or transition (as in *A. melanoxylon*) to the mature foliage is noted. In Eucalypts the change is not so prominent as it is in the Acacias, i.e., from bipinnate leaves to phyllodes, the change being usually from an obicular, ovate, obovate to lanceolate linear-shaped leaf. Mr. Hunter, a country member of our club, kindly sent me numerous specimens of leaf, and notes on the Currajong (*Brachylon populneus*), which also exhibits this change in foliage.

Baron von Mueller, in his work *Plants Indigenous to the Colony of Victoria*, Vol. 1, page 156, gives the following description of the adult foliage: "Evergreen leaves simple glabrous, thin-coriaceous, those of the adult tree verging into ovate or rhomboid form, long and narrow acuminate, entire or acutely three lobed." Further he states that "the form of the leaves in the juvenile plant are remarkably subject to variation; thus entire or in various degrees cleft into 2-5 obtuse acute or acuminate broad or narrow lobes passing by all possible intermediate modifications into the more normal broad or lanceolate rhomboid-ovate, long acuminate form of those of the aged tree which usually measure from 2 in. to 4 in. in length."

In his notes, Mr. Hunter says, "The juvenile leaves become smaller as the young tree increases in height. The leaves are taken from a sapling 10 feet high, this being the smallest tree I have noticed carrying the full adult foliage. The juvenile leaves are of a rather dark and dull green colour with a distinct reddish tinge to the petioles and main veins. . . This disappears when the tree develops the adult foliage. . . I remember in previous years having seen adult leaves which were much more deeply lobed than any I am sending you, though never as deeply as in the juvenile leaves."

Referring to the extreme juvenile forms, Mr. Hunter says: "They are not at all unusual . . . and in this case the leaves collected occurred with normal juvenile leaves, and its similarity is obvious, only the lateral lobes being shortened and rounded. The other leaves appear to me to exemplify a transition to an obtuse leaf much broader than long.

Very interesting are leaves from a young shoot of a broken branch. "I have gathered these to show that, apparently, when the tree attains maturity it altogether loses its juvenile character, and these young leaves have all the characteristics of the adult foliage except being thinner, and less shiny . . . Eucalypts, for example, in which young shoots on adult tree bear at first juvenile foliage."

In *Brachyton acerifolius* (the Queensland Flame Tree), the change occurs except it is reversed, i.e., instead of finishing with a trilobed ovate leaf the young foliar leaves are of this shape, while the adult leaf is palmately shaped. It is also interesting to note, whereas in the former species the juvenile foliage is many times larger than the adult, in this case it is the adult which is the larger. In *Sterculia rupestris* the change is from simple, linear leaves, to a bi- or tri-compound leaf, and then to a multiplicate leaf.

I would be grateful if any other examples, especially in species belonging to the above, were brought to my notice. I wish to thank the officers at the National Herbarium for the help given.

EXCURSION TO THE MARANOA GARDENS

Visitors to the Maranoa Gardens, adjoining Beckett Park, cannot refrain to note the marked improvement of late years as regards the removal of much of the original plantation which was not truly native to Australia or New Zealand. This point was emphasized by members of the Club, who visited the Gardens, to the number of nearly thirty, on September 25. The leader of the excursion was accompanied by his collaborateur in the work of supervizing the Gardens, Mr. E. A. Vidler. The time of the visit was well arranged, for the blossoming season was nearly at its height, especially among the thirty-nine species of Acacias which now flourish there. Of the Eucalypts, the Gardens possesses forty-two species, and some, now in flower, are attracting the Rainbow Lorikeet.

The Prostantheras are forming a great attraction in the Gardens; among them are the pink *P. incisa*, var. *rosea*, *P. ovalifolia*, *P. rotundifolia*, and the white *P. nivea*. The Glory Pea of New Zealand makes a gorgeous spread of colour in the central bed, while nearby is the deep rich mauve-blue of *Hovea elliptica*. This little reserve of native plants, only 3½ acres in extent, though with a possibility of immediate enlargement, is even at the present time attracting visitors from not only remote parts of Victoria, but even from Queensland, New South Wales and S. Australia. The Gardens are 386·67 feet above sea-level, and thus higher than the township of Healesville. The soil is that of the sandy Kalimnan cover found on all heights in the eastern suburbs, and when mixed in varying proportions, makes a suitable compost for a very large percentage of our native plants and trees.

F.C.

Plate XII

Nest and Eggs of the Eastern Swamp Hen

[Photo. C. Barrett

CLUB OUTING AT BEACONSFIELD

Glorious weather and a smiling countryside wrapped in its rich mantle of spring verdure, provided ideal conditions for the Cup Day outing to Beaconsfield. About 25 members and friends enjoyed the ramble. First "port of call" was the ingeniously constructed nest of the Yellow-faced Honeyeater. Made of bright green moss and lined with yellow rootlets, it was suspended by the rim from a lateral bough of a *Melaleuca* bush, and contained two pink eggs richly spotted with dark red and purplish markings at the larger end. The nest of this bird, one of the most beautiful in the Australian bush, is not at all easy to find, because its colour and texture make it harmonise closely with its surroundings.

We passed on to a nearby swamp, the home of several species of water birds, and soon sighted the Eastern Swamp Hen and the Dusky Moorhen. Two nests of the first-named brightly plumaged bird were located; one, in a clump of rushes surrounded by water, contained five eggs of a warm buff ground-coloured, sparsely spotted in dark brown to purple. Close by, on the bank of the lagoon, in a dense patch of reeds, we found another nest of this species, and, to our surprise, it contained 10 eggs. It would appear, from this extraordinarily large clutch, that two female birds were sharing the nest. It is interesting to record that the locality of these nests was covered by flood waters to a depth of 6 feet to 8 feet a fortnight prior to our visit.

Several nests of the Yellow Robin were inspected; some contained eggs. One always has to admire the neatness and beauty of the nests of this bird, decorated and camouflaged as they are, with lichens. Yellow "Bob" generally is so tame and trustful that it is not a difficult matter to photograph him at the nest. The Superb Blue Wren was much in evidence and we had no trouble in finding several nests of the species, mostly containing eggs. In one nest, which appeared to have been deserted, there was an egg of the Brush Cuckoo, whose attentions the little wren, seemingly, did not appreciate.

Bell Miners were very plentiful, with their incessant "tink tink," and many of their pendulous cradles containing the rich fleshy-pink eggs with darker red spots, were peered into, sometimes with the aid of the mirror. One nest held, in addition to three eggs of the owners, an egg of the Pallid Cuckoo, while another contained an egg of the Fantailed Cuckoo as well as the usual Bell Miner clutch of two. It should be mentioned that the former nest, when seen a week previously, contained only the cuckoo's egg and two of the Bell Miner, the third egg having been deposited when the others were almost incubated. A Sacred Kingfisher calling from the limb of a dead tree, with that peculiar "skirl," the note uttered by most of his tribe during the nesting season, betrayed the location, in one of that tree's hollow limbs, of a nest that contained young.

During our rambling we came across many nests of the Ringtailed Opossum. One of these held a mother and three ruddy-coloured young ones. At our approach all left the home, the three youngsters clinging tenaciously to the back of the mother. The acrobatic movements of the parent and her little family caused much amusement to the assembled group of naturalists. Passing over a fairly clear and open patch of country, we were shown the nest of a Stubble Quail which a week previously had contained two eggs, but now only fragments of shell were to be seen. We could only guess as to the cause of the disaster. A Kookaburra's nest, merely a cavity in the side of the trunk of a Swamp Gum, was noted. A week before it sheltered young, but they had now left to fend for themselves—with the aid of the parents, of course. The birds have used this tree for many years in succession. The frequency of the call of a White-eared Honeyeater led us to suspect

the whereabouts of its nest, which when located, was seen to contain two eggs of the Honeyeater and one of the Fantailed Cuckoo. A Black-faced Cuckoo-Shrike had a nest on a lateral branch of a Peppermint Gum. Two almost fully-fledged nestlings still remained in possession of the overcrowded nest. A lower limb of the same tree supported a Black-and-White Fantail's nest; using the mirror, we saw in it two eggs. The liquid notes of the Grey Shrike-Thrush attracted us to a thicket of *Leptospermum* and we were not surprised to find a carefully hidden nest, which held four eggs. Several other nests of this species were found, some containing young.

The vivacious Grey Fantail was discovered sitting on her exquisite pipe-shaped nest with its pendant "tail," the purpose of which is still the subject of much controversy among ornithologists. We were able to look into this nest from the ground and view the three eggs. Two species of Pardalotes were seen; the Spotted and the Striated. What brilliantly plumaged little birds are Pardalotes! We found the tiny tunnel leading to the nest-chamber of the Striated species, in the wall of a sand-pit. By reflecting the sunlight into the burrow with a mirror, we were able to see clearly the hooded nest, composed of small shreds of bark and grass, within.

After lunch we moved to a spot some three miles further up the Cardinia Creek, towards Upper Beaconsfield, hoping to see the Helmeted Honeyeater; and we were not disappointed, for several of these lovely birds, resplendent in plumes and splashes of bright yellow superimposed on their general colour of olive-green, presented themselves to admiring eyes. But the only nest discovered had been spoiled by the recent flood waters. To see these rare and beautiful honeyeaters, jewels in a romantic setting, as they disported themselves among the young green foliage of the gums that grow on the banks of the creek, alone made the trip memorable.

Walking along a rough cart-track, we espied, in an overhanging Box Tree, a Podargus guarding her nest and two young ones. Many times we heard the rich, explosive notes of the Eastern Whipbird, for we were now in a belt of country in which they revel. A nest was found in a low shrub within a few feet of our pathway; it contained two eggs. A charming bird is this species, whose voice resounds continuously throughout this sylvan dell.

Golden and Rufous Whistlers abounded in each of the localities visited. The song of the Rufous species is, to my mind, the most sustained and musical of all our small songsters' melodies, not overlooking the claims of the Golden Whistler. A number of the flimsy twig nests of both species were located, nearly all containing eggs. Singular to relate, in every instance, the male bird was sitting. We were fortunate enough to make the acquaintance of the Satin Flycatcher and to hear his full springtime song, which is most attractive. On one occasion a Banded Landrail scuttled across our track to regain the shelter of a scrubby marsh.

Of other birds I could write at length, for no fewer than 55 species were listed, but, suffice it to say, that Birdland rose to the occasion and we were treated to an almost continuous concert.

To my friend, Mr. Arthur Adamson, of Beaconsfield, to whom much of the success of this outing is due, I am deeply indebted.

A.S.C.

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, December 13, 1937. The President, Mr. A. H. Chisholm, C.F.A.O.U., presided, and about 120 members and friends were present.

The President welcomed Messrs. J. and W. H. Ingram, returned from a trip to Britain; and wished Messrs. P. R. H. St. John, J. W. Audas and E. E. Pescott, who recently retired from the Public Service, long years of happiness in their leisure.

Mr. Pescott sent an apology for non-attendance at the meeting.

CORRESPONDENCE

Two letters regarding the Pound Bend at Warrandyte as a sanctuary and a native zoo were referred to the committee.

From Mr. Bloomfield with reference to the shooting of ducks. Mr. A. H. Mattingley supported the action proposed: "More sanctuaries suitable for ducks to feed on were needed." Mr. W. H. Ingram stressed the fact that bird life was declining, basing his opinion on observations made in England recently.

Mr. Charles Barrett moved that "This Club expresses strong approval of the Fisheries and Game Department's intention to have no open season for wild duck in 1938." The motion was seconded by Mr. Mattingley and carried unanimously.

REPORTS OF EXCURSIONS

Reports of excursions were given as follows: Seaholme, Mr. J. J. Freame; Frankston, Mr. J. H. Willis; Evelyn to Lilydale, Dr. C. S. Sutton (for Mr. St. John); Springvale, Mr. T. S. Hart.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as ordinary members: Mr. Trevor C. Marshall, Mr. T. P. B. Ward; as country members: Mr. T. A. Robinson, Mr. E. V. Barton; and as associate members: Mr. W. Watkins and Mr. K. A. Barnes.

GENERAL BUSINESS

Mr. V. H. Miller stated that the orchid *Dendrobium falcorostrum* was being sold "by the bushel," apparently from N.S.W. Mr. W. H. Nicholls stated that *Sarcochilus falcatus* was being collected in a wholesale manner in Eastern Victoria. He moved that the Club write to the Rangers' League of New South Wales with regard to the Beech Orchid, and that the case of *Sarcochilus* be referred to

the committee for consideration. Mr. Miller seconded the motion, which was carried.

GIFT OF BOOKS

Mr. and Mrs. Charles Barrett presented a number of books to the Club, and the President thanked them for the donation.

EXHIBITS

The Misses Knox.—Flowers from the Arctic Regions, and prints of drawings by the late Dr. Wild.

Mr. C. Daley.—*Ceratopetalum gummiferum* (N.S.W. Christmas-bush), *Prostanthera lasianthos* (Victorian Christmas-bush) and *Pomaderris apetala*, all garden grown.

Mr. A. H. E. Mattingley.—Death-bone from Central Australia.

Mr. A. Colliver.—Parasitic worm taken from a horse.

Mr. C. J. Gabriel.—Victorian Sand-Snails and species of *Haliotis* (Ear-shells), from various localities.

Mr. V. H. Miller.—Specimens of *Gastrodia sesamoides* R.Br., the Potato Orchid. Nest of *Myzomela nigra*, the Black Honey-eater, collected at Bendigo, November, 1937 (by courtesy of Mr. Marc Cohn). Specimens of *Lomatia longifolia* and *Kunzea pedunculatis*.

Mr. Noel Lothian.—Typical examples of the alpine flora of the South Island of New Zealand, including: *Celmisia coriacea*, *C. Hookeri*, *C. Armstrongii*, *C. hieraciifolia*, *C. discolor*, *C. gracilenta*, *Ranunculus lyallii* (Mountain Lily), *R. Haastii* (a typical shingle-plant); mature and juvenile foliage of *Nothopanax lineari*.

Mr. T. S. Hart.—*Muehlenbeckia rhyticarya*, new for Victoria; collected by Mr. F. Robbins at the Tambo River. *Pomaderris ligustrina*, restored to the Victorian list; collected by Mr. Robbins near Orbost, and by Mr. Hunter near Bruthen. *Salvia sessilis* (weed), collected by Miss Birch, of Tabberabbera (this has spiny fruitlets, troublesome to dogs). Several species of *Euphorbia*.

NATURE NOTES

The President said that a correspondent had asked him to explain "spray" from a Eucalyptus tree. Mr. French stated that this was an exudation from scale insects on the leaves. This was confirmed by Mr. St. John, who had observed "spray" showering from a tree in the Botanical Gardens.

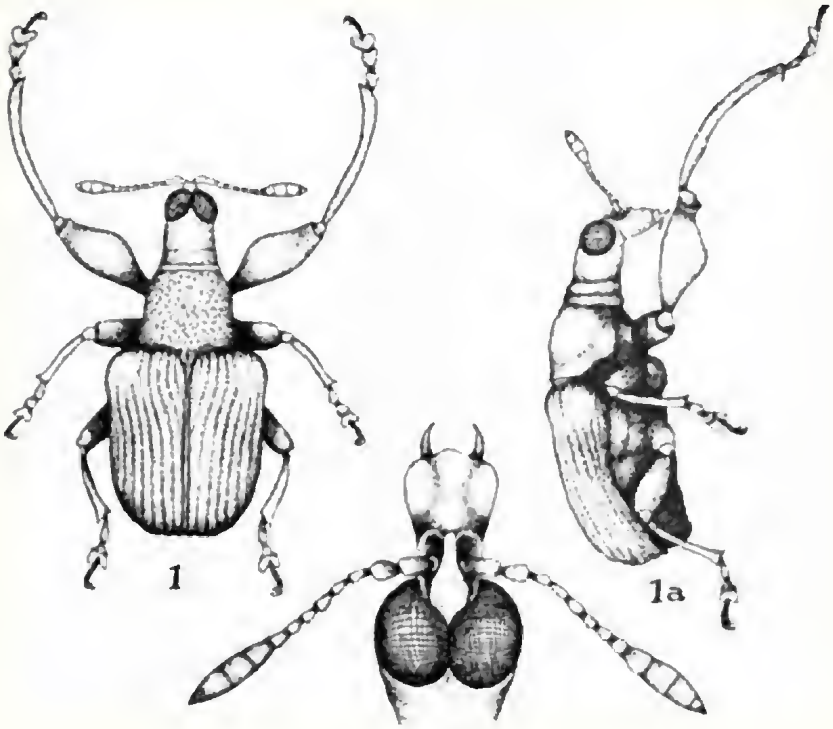
Mr. St. John reported noticing a small maidenhair fern, *Adiantum* sp., growing on Station Pier, Port Melbourne. He also drew attention to the number of cats that were abandoned at the gates of the Botanical Gardens, often to become destroyers of birds.

The President extended Christmas greetings to all. The meeting then adjourned for the conversazione and supper.

ON THE SO-CALLED "ANT LETTERS"

By John McAreavy, s.j.

In the early part of this year a number of small gum leaves, rolled tightly into cylinders varying in length from a half to a quarter of an inch, were brought to my notice. These cylinders when unrolled were found to be sections cut from larger leaves, and regularly marked with rows of distinct, though very small, scratches.



Euops falcata Guer.

1—Dorsal view; 1a—Lateral view;
1b—Enlarged view of head to show mandibles.

Although interesting in themselves, these peculiarly marked leaves aroused further curiosity when correspondents called them "ant letters," and asserted that Bullants were seen rolling the leaves, carrying the sealed cylinders, and depositing them on their middens. Mr. J. Clark, the National Museum entomologist, and an authority on ants, was firmly convinced that the structure of the mandibles of Myrmecii (Bullant tribe) would prevent that tribe from any

leaf-cutting activities, and that the scratching on the leaf surface could not therefore be the work of Bullant jaws. A glance at the mandibles of any live Bullant will show you the reasons for this judgment. Along these mandibles there are a series of large, jagged "teeth," but since only the needle-point tips of the jaws touch, the "teeth" could not cut the leaves.

Leaves of *Eucalyptus macrorrhyncha*, showing the cutting and rolling of leaf sections.

I introduced some of these cylinders into observation nests of Bullants, but they were ignored except for an occasional shifting from one corner to another, together with gravel, dead ants, and similar rubbish. Nor could I discover any other connection between Bullants and the rolled leaves, beyond the fact that these ants have a habit of carrying about such objects when they meet with them

near their nests. I was convinced that some other insect was doing this leaf-rolling, for which the Bullant was being wrongly credited, and some weeks ago my judgment was confirmed. A friend of mine, an amateur entomologist, made a discovery which solved the problem. I went with him to South Morang, and there we watched the whole process of the marking and rolling of sections of gum leaves by a small weevil.

This weevil, identified as *Euops falcata* Guer, belonging to the sub-family *Attelabinae*, is common in Victoria and New South Wales. It is reddish brown in colour, with the antennae and eyes black or blackish brown. Its length is from five to ten millimetres. The front legs of the weevil are almost twice as long as the others in the case of the female; in the case of the male even longer. The tibiae are strongly curved, and the claws are long and slender, suitable for clinging to the smooth surface of leaves even in a strong wind.

Euops falcata works on young gum trees, or young suckers growing out of old stumps, because in each case the leaves are tender, and so easy to cut and roll. Males and females were flying around the leaves when we arrived, but soon we found a female just beginning the work. First she cut a section out of the leaf, working from top to bottom. There is no preference for a particular side, and often a leaf is chosen from which a roll has previously been cut. The section is not completely cut off from the remainder of the leaf, because it is easier to roll the leaf as it hangs free from the branch, than it would be were it lying in thick grass. This weevil we were watching proceeded, as soon as she had the section cut, to mark it with small scratches. To do this she walked backwards around the section, beginning at the edge, and working gradually towards the centre. Her long beak, with which she does both the cutting and marking, is seen under the microscope to be a most interesting mouthpiece. It is shaped something like a spatula, long and broad, and furnished at the apex with a pair of slender, sharp-pointed mandibles wll adapted for the task of leaf-cutting.

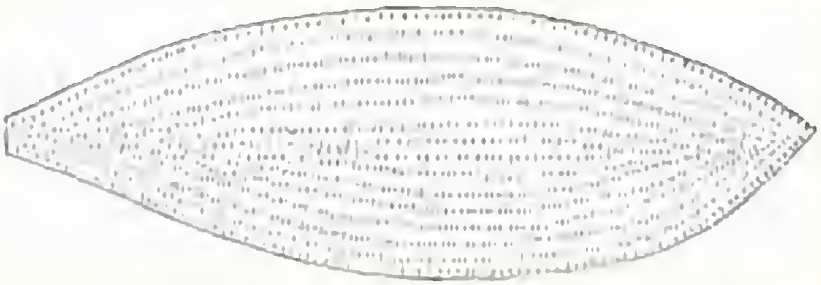
When one side of the section had been completely stamped, the weevil we were observing began immediately to work on the other surface. This time, however, she did not make the rows of scratches quite so close: Possibly this marking of both sides is not a universal practice, since leaves sent to me from Mount Evelyn appear to be marked only on one side.

Up to this stage of the work the male weevil has been standing on the uncut part of the leaf, and has taken no part in the operation. But now he advances and mating takes place. This seems to be an invariable practice at this stage, even though the pair may have mated several times before. The female next goes to the bottom of the section, and very carefully makes a deep cut, about one-sixteenth of an inch from the bottom, and almost right across.

Another much smaller incision is then made a little higher up on the opposite side of the leaf. The weevil can now easily fold up the portion of the leaf below the cut, so as to form a tiny shelf; and in this she lays one yellow egg.

This is the secret of the whole cylinder. It is an egg case. Taking an analogy from the habits of the French Poplar Leaf-roller (*Rhynchites populi* Linné), it probably serves also as a larder for the larva of the weevil. When the egg is laid the *Euops falcata* clings to one edge of the leaf with her peculiar hooked feet, and begins to roll up tightly the rest of the strip. One weevil which I timed took six minutes to roll the leaf. This forms rather a striking contrast to the Poplar Leaf-roller, which Fabre says takes the greater part of the day to roll one leaf.

When the little cylinder is completely rolled, the weevil seals it, apparently by squeezing out sufficient sticky sap from the leaf with her powerful rostrum. She then begins to use her shears again, and cutting off the roll, allows it to drop to the ground.



Leaf of Eucalypt showing rows of scratches on the surface.

The whole work does not take more than half an hour, provided the worker is not hindered in any way. She is sometimes hindered by the male standing stupidly in the way, or by a fight between rival suitors. These fights are very amusing; two long-legged males wrestling on the leaf, each endeavouring to pull his rival off the leaf, or drive him away, by butting him with his adze-shaped beak.

I put about a dozen of these little, metallic-bronze weevils in a glass case, and although they mated, and ate the young leaves of the several kinds of gum tree that I found ready to hand, they did not attempt to roll any leaves. This seemed to show that they require a special leaf for this purpose—the leaf of the *Eucalyptus macrorrhyncha* (Red Stringybark)—on which we first found them working. I decided to put this to the test. As soon as possible I obtained a sprig of this particular gum, and introduced it into the case. Almost immediately the females began to cut and roll the leaves.

When feeding on the leaves they do not eat the edges, but rather the centres, literally picking (or adzing) the lower epidermis, and often breaking right through the leaf with their curved rostrum. In this way, and in their other leaf-cutting activities, they do a considerable amount of damage to young trees.

Finally, in regard to the marking on the leaf surface, I imagine that this is done both to weaken the leaf so that it will roll easily, and to provide gum to seal the leaf as it is rolled. Fabre's Poplar Weevil punctures the petiole of the stalk so that the whole leaf hangs limp. But she does not use any sticky substance to secure her work until the leaf is completely rolled. Consequently the *Rhynchites populi* cannot leave her work as our weevil can, but must continue to hold the leaf firm so that the roll may not come loose.

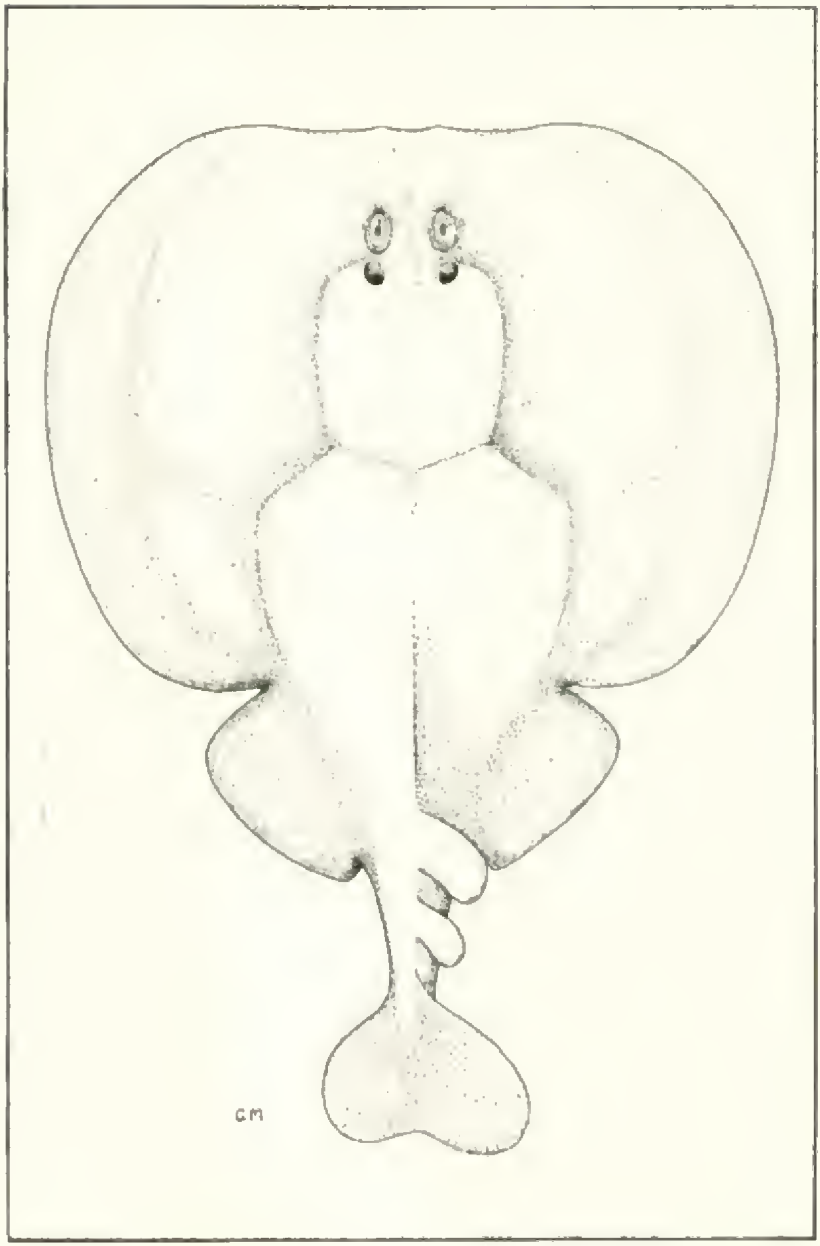
From the cylinders under observation I have still another theory about the marking, but there is not sufficient data as yet to make any definite statement. I hope soon, however, to know the whole life history of this most interesting insect.

A NOTE ON THE ELECTRIC RAY, *NARCOBATUS FAIRCHILDI* (Hutton)

By GEORGE MACK, National Museum, Melbourne

The capture of a specimen of the Electric Ray, *Narcobatus fairchildi* (Hutton), in Victorian waters is so rare an occurrence as to be worthy of record, and the fact that this type of fish possesses an organ capable of producing electricity lends added interest.

The species was described by Hutton (1872) from a specimen taken in New Zealand waters, and later Waite (1909) recorded it as being taken there rather freely in the trawl. Although there is a specimen (mounted) in the National Museum, from Lakes Entrance, Victoria, in 1902, McCulloch (1919) first recorded the species for Australia on a single example taken in the trawl off Cape Green, New South Wales. The same author (1926) again recorded three specimens, one from Bass Strait and two from the Australian Bight, obtained by the Commonwealth trawler *Endeavour*. The present specimen, which appears to be the sixth recognized from Australia, was caught off Port Albert, Victoria, and received in perfect condition from Mr. John Clarke, through the medium of the Victorian Fishermen's Association. It is considerably larger than any previous specimen, measuring 935 mm. (3 ft. 1 in.) in total length, and 675 mm. (2 ft. 2½ in.) across the widest part of the disc. The relative proportions agree very well with those given by McCulloch (1919), but it should be noted that in the first sentence of that author's description, "end of ventrals" should read "end of pectorals."



The Electric Ray (*Narcobatus fairchildi*)

Port Albert Specimen—

Length of disc, from snout to level of end of pectorals, 1·34 in its width; tail from vent 1·37 in length of disc; mouth as wide as distance from end of snout, and equal to distance from anterior of eye to end of snout; width of spiracle 2·36 in space between eyes.

Colour dark brown above, white beneath.

In the Rays, or Torpedoes, as they are sometimes known, the electric organs are situated on each side of the head between the branchial pouches and the inner edge of the pectoral fins, and extend from the upper to the lower integument. The whole consists of many vertically arranged columns with walls of connective tissue, and these columns are subdivided by horizontal walls into numerous compartments. Each compartment is filled with a yellowish gelatinous substance and has a nucleated plate (the electric plate) with numerous nerve-endings. The fifth and tenth cranial nerves which arise from the same lobe of the brain furnish branches on each side; one, anteriorly, from the former, followed by four from the latter. The upper side of the organ is positive, and the lower side negative.

Probably the main purpose of these organs is protective rather than for stunning or killing other fishes as food. It has been stated that the shock produced by the smaller, shallow-water Torpedoes is sufficient to knock down a man, and it is likely that this larger, deep-water form is capable of generating a more powerful charge. In this connection it is interesting to note that in a letter Mr. Clarke states: "Mr. A. G. H. Smith, who hauled in the line, felt a shock and was sick for two days afterwards." The wet line would act as a conductor. The Ray had swallowed a large Flathead (455 mm. = 1 ft. 6 in. in length) which had previously swallowed a strong hook with bait intended for sharks. The specimen was caught two miles off Port Albert bar in twelve fathoms; those taken previously in Australian waters were obtained in from about 50 to 350 fathoms.

I wish to record my thanks to Mr. John Clarke, Port Albert, for making this fine addition to the collections of the National Museum, and to the Victorian Fishermen's Association through which the specimen was received.

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AN ABORIGINAL CEREMONIAL GROUND

AT LAKE WONGAN, NEAR STREATHAM, VICTORIA

By D. A. CASEY,

Hon. Ethnologist, National Museum, Melbourne

In Brough Smyth's book, *The Aborigines of Victoria*, published in 1878, there is a note by Phillip Chauncy, District Surveyor at Ballarat:

"On a little basalt islet in Lake Wongan, about seven miles north-east from Streatham, I observed an ancient aboriginal work consisting of extensive rows of large stones, forming passages up and down, like a maze, at the foot of a little hill. A semi-circular walk, ten feet wide, has been made by clearing and smoothing the rough, rocky surface up the hill and down again, leading to the maze."[1]

Except for this note by Chauncy, the site has never been described, and in recent years its existence seems to have been forgotten. It was visited by the writer during 1937, and its present state recorded.

Lake Wongan occupies a depression in the basalt plain; it is of irregular outline, about one mile long and half a mile wide, and is now usually dry. On the southern side, a long promontory projects into the lake and about 100 yards beyond the end of this promontory is a small island with two distinct hillocks or barriers rising to a height of about twenty-five feet. The sides of these hillocks are covered with loose basalt boulders and stones and on the southern slope of one of them these have been arranged in lines, over an area of about 100 feet by 50 feet.

The stones vary in size up to about three feet in length, but none is so large that it could not have been rolled into place by one man. They have been arranged in line so that they lie alongside one another, or overlap. In some parts two or three stones have been piled one on top of the other so as to almost justify the term "wall," but for the most part the line is only one stone high. It is clear from the present position of the stones that many of them have been displaced, but the "wall" was probably never anywhere more than two feet high. It can be seen from the plan that originally the arrangement was, most probably, a continuous line with five bends on the south side and four on the north.

The "semi-circular walk 10 feet wide . . . up the hill and down again" is not now apparent. Immediately to the west of the stones there is a cleared space about twenty feet wide, but this may have been merely the result of collecting the stones from there. About forty feet to the east of the stones there is another open place running up the hill, but this is between two outcrops of basalt and is probably quite natural. These two clear spaces do not join along the northern or upper side. Where the rock shows on the surface there are now no signs of it having been smoothed in any way, other than by the removal of loose stones.

At the end of the peninsula opposite the island there is an aboriginal camp site, marked by an abundance of stone flakes and chips. These can be found also almost anywhere along the shores of the lake.

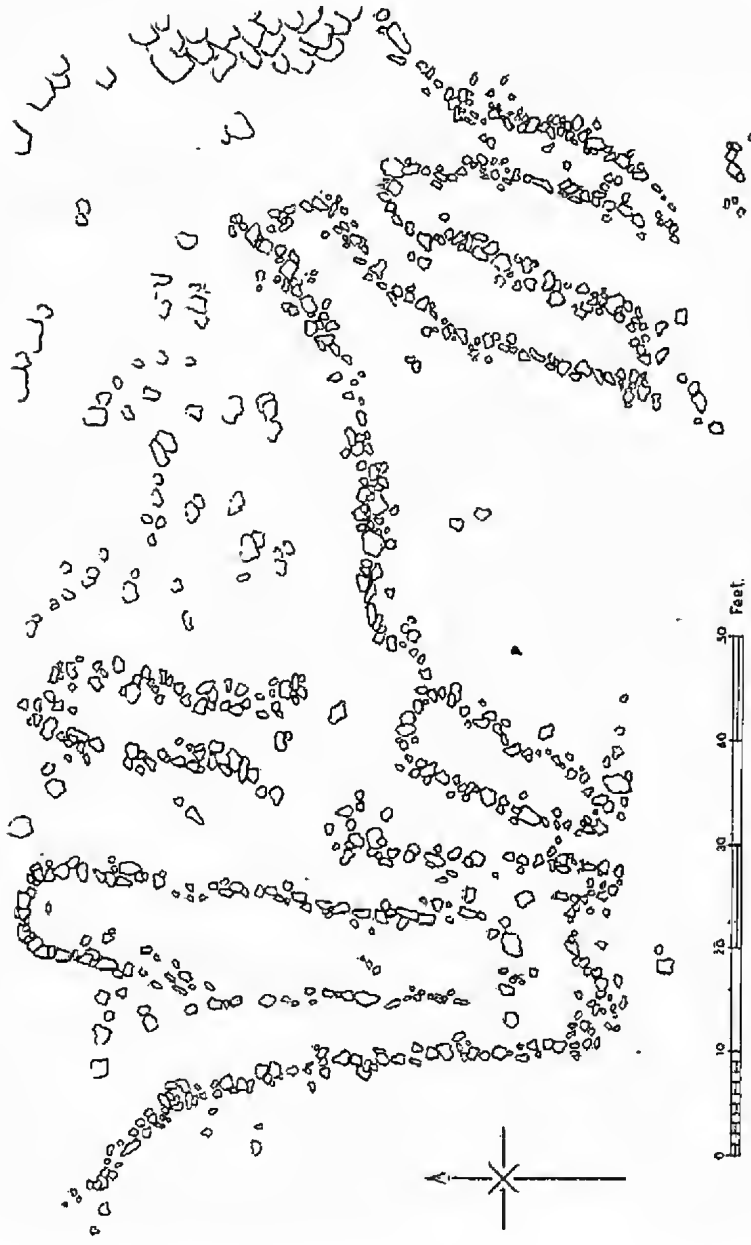
Our knowledge of the aborigines of this area is extremely meagre. Little or no exact information has been recorded about their social organization or spiritual beliefs, and it is therefore impossible to say with any certainty what these lines of stones represent, or to what use they were put. However, by analogy with other parts of Australia, it can safely be assumed that the site was a sacred ceremonial ground of some sort.

Ordered arrangements of stones are not common in Australia, except in parts of the north-west where many of them are known. They do occur, however, in the centre and north also, and in these areas, in every case where their significance is known, they are connected with totemic beliefs and mark local totemic centres. In New South Wales and Queensland a few others have been found, mostly circular or oval enclosures, but these were most probably initiation ceremonial grounds. The initiation ground in eastern Australia was usually a clear circular or oval space, in many cases surrounded by a low earth bank, and it is probable that these stone enclosures had the same function.[2, 3]

In the system of totemism which exists in the north-west, centre, and north of Australia, each totem is associated with a particular spot or locality, which is the home of the totem-spirit and where ceremonies and increase rites are performed. The site is most often a natural feature such as an outcrop of rock, a cave, a water-hole or a tree or trees, but sometimes it consists of an artificial arrangement of stones. These assume a variety of forms. No two are exactly alike. They vary from a simple heap of small stones or a few large stones set on end, to more or less extensive and intricate figures marked out by lines of stones.

Of those which have been described by various writers, two in particular have some points of similarity with the arrangement at Lake Wongan. Professor A. P. Elkin, writing of one in the territory of the Ungarinyin tribe of north-western Australia, says: "It consists of a number of U and J-like and other spaces or 'races,' enclosed by small stones. The stones, which are from six to nine inches thick, are placed on a large, flat, sloping surface of stone. The sides of the 'races' are about two feet apart, while the length of each enclosure is about forty yards. In a couple of instances there are round enclosures at one end of the 'race.' The natives told me that it represented yams."[4]

The other example is in Cape York Peninsula. It is the totem centre of the red kangaroo of the Kantu tribe, and has been described by Ursula McConnel: "Stones ranging from a few inches to two or three feet in height have been placed erect in a



Stone Lines, Lake Wongan, 3/5/37.

long [undulating] line running parallel to the creek along the ridge, and across a gully. These stones are said to be kangaroo, male, female and young ones according to size, going in single file, as kangaroos do."[6]

According to Professor Radcliffe-Brown this form of totemism, based on local totemic centres, is known to extend from the Gascoign River in Western Australia to Cape York Peninsula, and as far south as the Dieri Tribe, east of Lake Eyre.[2] It occurred also on the north coast of New South Wales, and possible traces of it have been recognized on the south coast of New South Wales and on Yorke's Peninsula in South Australia.[5] It may well have extended further over the south-east of the continent, but the totemic beliefs of the natives in this part of the country were never adequately recorded, so it is now too late to say whether it did or not. Thus, while we cannot definitely say what was the function of the Lake Wongan stones, it is at least possible that they may have been a totemic centre.

In any case, the practice of making arrangements of stones must have been rare in the south-east. In Victoria only one other, beside that at Lake Wongan, has been described. It also was mentioned by Chauncy, as having been seen by A. C. Allen, Inspector-General of Surveys, during a journey in the Tattiara country near the South Australian border. It consisted of ". . . a number of stone walls, two or three feet high . . . radiating from a little cave in the ground and forming irregular passages." Its exact location is not known. It is quite possible, however, that others existed, or even exist still, which have not been noted or recorded. It has been reported by Mr. N. O. Mack that lines of stones made by the aborigines existed many years ago, on his father's property, "Berrybank," north of Lake Corangamite, but that they were removed when the land was cleared for cultivation.

As well as those ordered arrangements of stones which were definitely or probably totemic and the enclosures which were probably used for initiation ceremonies, a few other stone enclosures have been reported as "places of disenchantment," where the sufferer was protected from evil influences. Dr. Basedow has described the procedure, and gives an illustration of one in the Victoria River district, in his book, *The Australian Aboriginal*. Eyre mentions another,[7] "at the Murray River."

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FURTHER NOTES ON THE TAILED SPIDER, *ARACHNURA HIGGINSII* L. Koch

By EDITH COLEMAN

The following notes are supplementary to those published in *The Victorian Naturalist*, August, 1932. Together they form a complete life-study of this interesting spider. Each season from forty to fifty females have made their snares in the garden, so that I have been able to add to my notes from time to time, and to check those of 1932.

In the earlier paper, I gave 3-15 as the number of egg-sacs made by one spider. Since then I have seen many strings of 10, four with 15, two with 18, and, this year, one with 25, the owner of which showed ingenuity in looping her long string so that the last-made sacs were within the open sector of her orb. They thus not only had her protection, but formed a cover behind which she was concealed, as she waited at the hub of her snare, in readiness for prey.

This long string of sacs enabled me to see natural emergence of both autumn and spring broods of spiderlings, and to watch their snare-construction when but a few days out of the sacs. On February 26 about 30 emerged, and two days later their number had increased to upwards of 80. Many of them possessed the scarcely-visible short "tail" characteristic of the immature female. About the guy-ropes of the parental snare they made their own small hunting-nets—orbs of about the size of a shilling, with no more than eight or nine viscid spirals. *As all of these nets were complete orbs it is evident that the open sector is peculiar to the adult female, and is intended to serve the special purpose of accommodating her egg-sacs.* Within a week the small orbs had increased to the size of a penny, still with only 8 or 9 viscid spirals.

On March 12 I watched the female spiderlings at work, a beautiful thing to see. Only about fifteen were left near the mother's snare. Others had gone farther afield (spider-method of rationing) or had fallen upon some of the many mischances for which nature allows in providing such large numbers of young. So small they were that it was not easy to follow each movement, though the busy legs were plainly visible as they worked. At 5.30 a.m. only three (outer) viscid spirals had been placed. In the next few moments each had placed 8 or 9. The snare was complete, and in the centre, not suspended behind a twirl of silk in an open sector, in the manner of its parent, was the diminutive huntress awaiting infinitesimal prey. Her short tail and her activity proclaimed her sex. Most of the snares were as perfect as those of the adult. The same discrimination in the placing of guy ropes was evident. Here and there, suspended from a few threads, but with no snares, were other spiderlings, with no visible tails. Examination

under a lens showed them to be males, as idle at this early stage as they will be later, if they survive the perils of infancy.

On April 24 I took two females of about one-fifth the size of an adult female. In each of them the "tail" was half as long as the rest of the abdomen. On May 15 the string of 25 sacs was still intact, even after heavy rain. The owner was spinning a fresh snare daily. It was completed at about 8 a.m. Part only of this snare is seen in the illustration on page 136, as it was impossible to get the whole of the net illuminated. The looping of the string is shown, and the female in position at the hub. In other parts of the garden many females had fallen from their sacs, but the majority were still clinging, almost lifeless, to their precious strings. Some of the snares were incomplete. Others were weather-worn or insect-damaged. The owners appeared too feeble to replace them.

String of 15 sacs camouflaged with wattle leaflets, etc.

On May 21, after a very cold night, the owner of the long string was missing. The suspension-ropes and overhead cable had been well reinforced. I tested them and found them surprisingly strong, and of countless strands. Did the mother know that the strings must be able to resist the winds and rains of winter if her offspring were to survive? Nearly four months later, September 6, this string was still hanging and many spiderlings were emerging. These had hatched soon after, if not at the same time, as the autumn brood, but had remained within the sacs all through the winter. I tested this, during several seasons, by opening a sac or two in various parts of the garden. The long string was still intact on October 13, but next day, after heavy rains and high winds, it had fallen. Although it was still raining there were many spiderlings clinging to a thread or two, but they had spun no snares. Doubtless many perish at this stage, sufficient only surviving to ensure the continuation of the species. Very few have survived the heavy rains that occurred during the third week in October.

Conscious work? The snares of the Tailed Spider are usually made between 4 a.m. and 8 a.m., though the spiders occasionally

work at other periods. Often a snare is made to serve a second day's hunting. Repairs are made at all hours. While the placing of radii and spirals is, to some extent, mechanical, facilitated by the length and position of legs and other parts of the body, the choice of site, the placing of guy-ropes and suspension-lines, and the moving of the hub to co-ordinate with the position of the sacs, seem to call for deliberation. One assumes that these are the result of conscious, rather than automatic action. When I have

Photo, E. Coleman.

String of 25 sacs looped to bring the last-made sacs within the centre of the orb.

transferred a female from one bush to another, she invariably moves, later, to a site of her own choosing. One which I transferred at 5 p.m. moved to a much more suitable position. At 9 p.m. she had all her radii and non-viscid spirals placed, but viscid spirals occupied only a section of about one-third of the snare. She had evidently decided that a section, only, would serve her needs for the night, so turned back upon each of the chosen radii until her trap was "set." I think she was not short of silk, for, next morning at 8 a.m. she had a completed snare.

Did she finish the snare upon which I left her at 9 p.m.? If so it was so neatly done that I could detect no join. It is more probable, I think, that, in the early morning she gathered in, and re-made it.

An illustration of both sexes of this species appears in my earlier article (*Vic. Nat.*, Aug., 1932, p. 84). The word "immature" at the foot of the plate should be deleted. I did not see this addition to the caption until after publication. I had already seen convincing proofs that the midget males were adults.

In succeeding seasons I have seen many of these small, agile, males. Examination under a lens, after the last moult, showed the palps to be those of mature males, just as the last moult of the female leaves the epigyne exposed. Should his attentions be accepted, the midget is carried by the female, perhaps for three days, attached to the epigyne, and is not easily dislodged. To the unaided eye it appears like a grain of brown saw-dust. In February there were sometimes two of these males suspended from a few threads on the outskirts of a snare. One snare had three males (March 5).

In March of this year, through the kindness of Professor W. E. Agar, male and female specimens were weighed for me at the University by Professor Hartung. Prof. Agar notes in his letter to me (17/3/37): "The balance showed 0·6 milligrams for the male, 83·2 milligrams for the female. Prof. Hartung thinks that, under the conditions, the balance would weigh correctly within 10 per cent. Hence it would probably be correct to say that the female is 120-160 times as heavy as the male." Prof. Agar kindly measured two specimens. The body length of the male was 1·5 mm. and that of the female 17 mm.

Following are extracts from letters received from Prof. Sir E. B. Poulton, to whom I had sent specimens:

April 5, 1933: "They are certainly most extraordinary. . . . I have written to Dr. Randell Jackson, thinking he might like to work at them himself. . . . I am most interested in these epigamic proteans."

April 18, 1933: "I sent the spiders to our great authority on northern spiders, Dr. Randell Jackson, who has replied as you will see on the enclosed sheets. You will see that you were right in supposing the males to be mature. . . . All these observations on epigamic behaviour have a great interest for me."

May 20: "I have just heard from Dr. A. R. Jackson, to whom I sent the spiders. He says they are certainly *Arachnura*, and near *higginsi*, but whether a var. or another species (undescribed) he cannot determine without more material in the genus. He thinks that rather too many species have been described in it, and that only two Australasian species have been well characterized, viz., *higginsi* L. Koch, and *feredayi* L. Koch, the latter from New Zealand. Your spiders do not quite agree with either, but may be a var. or form of *higginsi*. He thinks there may be sufficient material in the museums of Sydney and Melbourne to make it safe to determine as a var., or to describe as a new species."

Extract from Dr. Jackson's letter to Prof. Poulton (14/4/33): "They belong to the genus *Arachnura*, and consist of three females and six males, all adult. The genus has a Lemurian distribution, and rather more: Réunion, East Africa, Ceylon, Malaysia, Australia and New Zealand—the last rather extraordinary. Vinson said that the tail was movable and could be flexed dorsally (like a scorpion), but Simon did not observe this in Ceylon. Vinson called his species *A. scorpionides*. Family is *Argiopidae*. The tails in the males seem to be retractile and some of the specimens show different stages of this. In some it is exserted, or partly so, and in others retracted."

ACKNOWLEDGMENTS

I am greatly indebted, for their kind help, to Professor Poulton, Dr. Jackson, Professor Agar and Professor Hartung.

EXCURSION TO SPRINGVALE

The Springvale excursion was held on October 30. The first place visited at the Heatherton Road carried a dense growth of the shrubby Tea-trees, (*Leptospermum scoparium* and *L. myrsinoides*), in full flower, with occasional pink-flowered bushes of the latter species. In the lower ground we examined two species of Hakea, the Furze Hakea (*H. ulicina*), with sharp leaves and rather small fruits, and the Yellow Hakea (*H. nodosa*), in which the fruits are not always as knotty as the name suggests. At the roadside was a good patch of the spreading Flax Lily (*Dianella revoluta*), and the Slender Stackhousia (*S. viminea*).

We then visited an area on the opposite corner which had been partially cleared and some soil removed, but the native vegetation was re-establishing itself. *Aotus* and the common Guinea Flower (*Hibbertia fasciculata*), were abundant, but their best flowering was past. This Guinea Flower is frequently quick to reappear, as are also the *Trachymene* and the Broom spurge (*Amperea spartioides*), seen at other places near. A considerable area was occupied by a Sword Sedge, and in the lower ground were a belt of scattered bushes of Scented Paper-bark (*Melaleuca squarrosa*), and a widespread carpet of *Selaginella*. There were large patches of the creeping Raspwort (*Halorrhagis micrantha*), and many neat little tussocks of the Slender Bogrush (*Schoenus tenuissimus*, formerly called *Lepidospora*), having the fruit of a *Lepidosperma*, but the flower like *Schoenus*.

The most attractive item here was a fine patch of *Patersonias*, both the long-stalked Purple Flag (*Patersonia longiscapa*) and the short-stalked (*P. glauca*). Close by were the deeper blue flowers of the Tufted Lily (*Stypandra caespitosa*).

We visited a grassland area beyond the old racecourse sidings; several plants were noticed, including a clump of the smooth Flax Lily (*Dianella laevis*).

T. S. HART.

Plate XIII

Photo, H. T. Reeves.

The Orange Blossom Orchid, *Sarcochilus falcatus*

THE JUNGLE COUNTRY OF EAST VICTORIA

By H. T. REEVES and W. H. NICHOLLS

Our East Gippsland trip began on October 11, when we travelled from Melbourne to Cann River (Noorinbee), where we were met by Mr. Chas. Cameron, who motored us to his residence at Noorinbee North, 260 miles easterly from Melbourne. Outside Orbost the Gippsland Waratah (*Telopea oreades*) was in bloom, and near Sale we admired a good show of *Diuris punctata*. We were keen on exploring the dense jungles around the Drummer, etc., the habitat of several epiphytal orchids—peculiar, more or less, to the district.

Next morning we requisitioned horses and crossed the Cann River to the northern hills. The banks of this wide stream, with a sandy bed, are well-clothed with vegetation, chiefly Eucalypts, Blackwoods and other Acacias. At the mouths of the many tributary creeks huge vines hang from the tree-tops, giving a jungle-like appearance. At the fords clumps of *Cyperus lucidus* and *Carex polyantha* grew in abundance, with willows on the islands, of which there are several. *Smilax australis* was luxuriant at the mouths; also here and there on the flats; from many tall trees its thorny ropes and large coarse foliage cascaded to right over and into the water. It was in flower, also in fruit. The massed blooms of *Clematis aristata* and *Tecoma australis*—the latter varying considerably in the depth of colour markings—festooned the tangled shrubbery wherever suitable conditions obtained. On the hillslopes *Eucalyptus sieberiana* (Silvertop), *E. scabra* and *E. Maidenii* were the most noticeable gums, the first mentioned predominating. The moist gullies and other favoured places were luxuriant with the golden sprays of *Goodia lotifolia* and other less abundant, but equally attractive, flowering shrubs. And in places more open, the coral-red flowers of *Kennedyra rubicunda* ran riot with the cream bottle-brush blooms of *Melaleuca ericifolia* and *M. squarrosa*, hanging in graceful festoons even to the ground. In such surroundings we saw several large Goannas (monitor lizards), which were preying upon young rabbits; also some Wallabies. Chocolate-brown frogs were congregated on many half-submerged logs in the swamps, and making an almost deafening noise. Large Black Snakes were a nuisance as we pushed our way through the heavy scrub, northwards.

Gang Gang Cockatoos were noisy in the tree-tops, and the "tink tink" of Bell Miners echoed through the valleys. In sight of Mt. Kaye (3,284 ft), the only conspicuous peak of the range, we ventured along a well-hidden ravine where Lilly Pilly trees (*Eugenia Smithii*) rivalled even the great gums in height. At the foot of a waterfall made still more attractive by flowering bushes of *Prostanthera rotundifolia*, we found our first epiphyte. *Sarcochilus*

parviflorus grew abundantly on the moss-covered limbs of a *Pittosporum* tree. Tree-ferns were very fine in this ravine, and the orange-berry clusters of both *Morinda jasminoides* and *Eustrephus latifolius* (Wombat Berry) intermingled with the ebony ones of *Vitis hypoglauca*.

Recrossing the river at a convenient ford we found ourselves in the haunts of the Water Dragon (*Physignathus lesueurii*). It was interesting to watch the reptiles diving into the stream and gaining the security of their burrows; in one small area of the cliff-face we counted more than eighty holes, all apparently tenanted. At another locality a tame-wild Water Dragon was observed; it even allowed us to handle it. The fact that this is a favourite fishing-place probably accounted for its tameness.

In the depths of the jungles the Giant Maidenhair (*Adiantum formosum*) grew.

Many interesting plants were added to the vasculum on the return. Among these were *Lissanthe strigosa*; *Persoonia linearis*—a graceful shrub; *Howittia trilocularis*; *Hibbertia stricta*—common on the hills; *Pterostylis pusilla*—the most easterly record for this ground orchid. Many other terrestrial orchids were seen, all common species. *Diuris longifolia* and *Glossodia major* were plentifully distributed. On the Drummer, *Caladenia præcox* was found, including a colour form—bronzy-pink—originally collected by Mr. Chas. French, at Bayswater. *Glossodia minor* was searched for in many places and eventually found outside Cann River township, also at Marlo. Mr. W. Hunter, surveyor of Orbost District, reports this orchid, previously a doubtful record for Victoria, to be plentiful near Genoa during early spring. Splendid specimens of the Sickle Greenhood (*Pt. falcata*) were found in the extensive *Melaleuca* swamps near Cann River and Noorinbee North.

On October 14, Mrs. Cameron drove us to Mr. Pedersen's property at Noorinbee. A few miles away, in the jungles, *Sarcochilus falcatus* was observed *in situ*; its chief host appeared to be the Tree-Violet (*Hymenanthera dentata*). This showy orchid grows in a certain amount of sunshine on the margins of the scrub. Unfortunately, it is doomed to extinction in this, its only Victorian habitat, unless steps be taken to preserve it. Ferneries in Orbost tell their own tale.

The Creeping Polypody (*Cyclophorus serpens*) was exceedingly plentiful on the trees, here as elsewhere in the jungles. In many cases the great matted colonies of this fern were gay with orange and yellow fronds. The boles of many moss-covered trees and tree-ferns were covered in *Polypodium pustulatum* and *Blechnum Patersonii*. On the hills close by large white-flowered specimens of *Cal. carnea* were collected, and the leaves of *Coleana major* were seen.

Plate XIV

Photo. H. T. Reeves.

The Streaked Rock Orchid, *Dendrobium striolatum*, draping granite boulder

Through the courtesy of Mr. W. J. Dempsey, staff foreman, Forests Department, we were able to visit outlying districts. The country between Noorinbee and Genoa Creek was gay with many flowers. The Purple Flag (*Pat. glabrata*) and the white-flowered *Dip. morœa* bedecked every slope. We explored creeks and likely places en route. At Karlo Creek the Waratah was at its best: the flowers are not crimson but a rich rose-mauve colour. *Cleisostoma tridentatum* was also seen on the trees. In a ferny glade east of Mt. Drummer the epiphytic *Fieldia australis* was collected, both flowers and fruit being present. The unfolding croziers of some of the Gully Tree-Ferns were remarkable in their abundance. *Tmesipteris tannensis*, the Fern Club Moss, also grew on the Fern-trees in abundance.

We intended going beyond Genoa, but the granite cliffs at Genoa Creek invited inspection. Through a grove of Black Wattle we pushed ahead down to the swiftly flowing waters. Silver Everlastings (*Hel. Baxteri*) with *Correa rubra* in association, grew on the slope. Large Water Dragons scurried over the rocky bed of the creek to the safety of the pools, and several Black Snakes were disturbed.

Under the sheltering limbs of Kanooka (*Tristania laurina*) and other trees, many showy flowers were noted, including those of *Sprengelia incarnata*, *Calytrix tetragona* and *Poranthera corymbosa*. On the cliff-face and under its shelter grew *Phebalium squamulosum* and *Helichrysum oblongifolium*. In the dryest positions *Mesembrianthemum aequilaterale* looked very healthy. Clumps of the Tassel Cordrush decorated the flat rock surfaces adjacent to the running water and around the many deep, sheltered pools where the Water Dragons had made themselves scarce. Just below the Main Falls were delightful tufts of many species of fern, including the Coral Fern. An unobservant person might wander here unaware of the great abundance of the small Rock Orchid which covers many large boulders. *Dendrobium striolatum* was indeed plentiful—upright on the very crest, drooping the sides and hanging like graceful eardrops from the roofs of the cool caves beneath. Thousands of golden-petalled blooms made a memorable picture.

Regaining the roadway above we explored the hillslopes. *Grevillea lavendulacea* (?) (a very robust form), with *Hibbertia serpyllifolia*, grew in profusion, and *Leucopogon lanceolatus*, *L. virgatus* and *L. ericioides* were gathered, also *Pultenea prolifera* and *P. Gunnii*. On the return journey the graceful *Euc. salicifolia* was noted, and a large bush of *Solanum violaceum* was the reason for a sudden stop at a sharp bend, where this colourful shrub was admired. *Tetratheca pilosa*, among other plants, were seen, and Golden Goodia grew freely in the valleys.

It was along the Tamboon Road, about five miles south of Cann River, that we first collected *Glossodia minor*. Many fine stands of valuable timber trees were inspected in this and other areas, chiefly *Euc. Bosistoana, radiata* and *Muelleriana*. The visit to Euchre Valley will long be remembered for the fine displays of *Oxylobium ellipticum* (var. *angustifolia*). The Tangle Orchid was growing on the Kanooka Trees in abundance, with Waratahs rising from the midst of tall tree-ferns and the tangle of great vines in the creek valley. It was raining torrents, but we did not mind.

Along the highway where *Hibbertia dentata* festooned the cuttings, patches of tall, large-flowered everlastings were seen. *Helichrysum bracteatum* (Golden) and *H. albicans* var. *commune* were in association. The outstanding feature of this locality was not the Bush-pea, previously mentioned, but the River Acacia (*A. subporosa*). This viscid small-leaved shrub for true gracefulness and beauty of habit cannot be excelled. A fine display of *Boronia Mueller*i was seen on the way home, and *Melaleuca axmillaris*, among other interesting plants, was collected at Noorinbee.

Later The Drummer was re-visited and the habitat of the rare Prickly Tree Fern (*Alsophila Leichardtiana*), which was photographed *in situ*. On the reedy flats near Drummer Creek we collected the Scented Holy-grass (*Hierochloa redflora*), and many Sun Orchids, of which *Thelymitra ixioides* was the most abundant. Beyond Genoa the King Orchid (*Dendrobium speciosum*) was in bloom on the very edge of the rocky cliffs, much of it damaged by wallabies. At Marlo the Curly-wig (*Caustis flexuosa*) was an interesting subject, and Pipe Clay Creek gave us the rare Jointed Mistletoe (*Korthalsella articulata*). *Humea elegans* was about to unfold its graceful plumes, even then reaching a height of over nine feet. The Tangle Orchid was found hereabouts also.

We are indebted to the National Herbarium, Melbourne, for the determination of much of the material collected, and also to Mr. F. Robbins, of Orbost, for his help, which enabled us to reach additional localities.

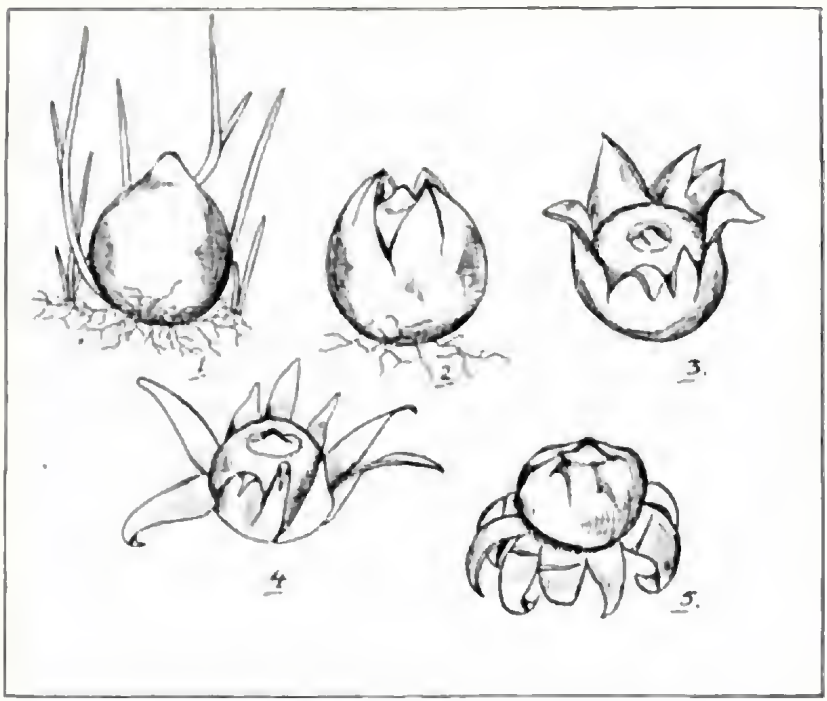
At the Defence Department Explosives Works, Maribyrnong, a pair of Magpie-larks (*Grallina cyanoleuca*) built their mud nest on the junction of two horizontal cast iron cross-pieces beneath a wooden trestle-run, about 12 feet above the ground. Workmen daily used the run, the floor of which stood about one foot over the nest, but did not seem unduly to disturb the birds. The nest could easily be looked into through the interstices of the boards of the trestle-run. Five eggs were laid, and three young were hatched out. On October 25 two fully fledged young left the nest and went with the parents to feed at the river nearby; next day the remaining fledgling followed. The unusual nesting site was probably selected on account of the absence of large trees in the vicinity.

H.C.S.

A SUBURBAN COLONY OF "EARTH-STARS"

By J. H. WILLIS

Those curious little fungi so appropriately called "Earth-stars" (genus *Geaster*) are seldom found except among the fallen leaves of forests or on the sandy scrub-lands of our coastal and dry inland districts and, although they are gregarious by nature, it is unusual to collect more than several specimens at a time.



Geaster sp., probably *G. saccatus*, showing developmental stages from egg.

While removing a vigorous growth of weeds from my home at Brighton, during the latter part of November, I was amazed to find among the tufts of Prairie Grass (*Bromus catharticus*) an enormous colony of Geasters, showing every stage of development from the tiny unexpanded "eggs" to old withered "stars." Dense mats of white mycelium (the vegetative portion of the fungus) were interwoven with the grass roots over an area of some two square yards, and from this "spawn" literally hundreds of fruiting bodies were springing—a careful count revealed more than 500!

The identity of the fungus is uncertain, pending a measurement of the spores, but it is very probably *G. saccatus* (first recorded from Brazil, with very small spores, one four-hundredth of a millimetre in diameter), belonging to the group with raised, fibrillose mouth and hygroscopic rays.

Geasters live upon humus in the ground, but whether there was any mutual relationship between the Prairie Grass, roots and the mycelium which grew among them, or whether the habitat were purely accident, I am not prepared to say. To my knowledge no record exists of so many "Earth-stars" having appeared together in an area so small as two square yards, although other "puffballs" do occasionally appear in vast troups; C. G. Lloyd, Ohio, reports the phenomenon of a paddock so covered with the uncommon phalloid *Lysurus* that it was impossible to walk anywhere without treading on them.

The accompanying line drawings of our Brighton *Geaster* will serve to illustrate the developmental stages from pointed "egg" (1) to old, crab-like "star" (5).

EXCURSION TO HUMPHRIES' HILL, FRANKSTON

A mild, dull day on Saturday, November 20, was ideal for the Club's botanical excursion to Frankston. Twenty-four members assembled at Humphries' Hill at 3 p.m. and enjoyed a ramble of two and a half hours on the hill-slopes toward Mooroodue. All regretted that the time available for exploration was so short, the Humphries' Hill area providing such rich and varied material that a full day could be well spent there.

Despite a rather superficial search, 120 plants were recorded, including 96 flowering species (in 36 different families), 3 ferns, 7 mosses and 13 fungi. *Gramineæ* and *Leguminosæ* were dominant families, with eleven species of each in flower. Of the grasses, two species of *Poa* excited special interest—one, the common Tussock Grass, *Poa caespitosa*, grew luxuriantly in a moist dell with flowering stems eight feet high! while around its roots flourished the delicate and matted form, *P. tenera*, like soft masses of green horse-hair. *Poa tenera* was given a very apt name by Hooker in his *Flora of Tasmania* and it surely merits specific rank, although recent botanists have not attempted to distinguish it from *P. caespitosa*, to which there is very little resemblance.

Orchids were curiously scarce, and only three species were seen during the afternoon—*Calochilus Robertsonii*, *Microtis parviflora* and an asparagus-like shoot of *Dipodium punctatum*.

Of showy flowers, the more conspicuous ones collected were: Blue Tufted Lily, Twining Glycine Pea, Scarlet Coral Pea, Slender Stackhousia (very tall), Love Creeper, Blue Pincushions and Grass Trigger Plants; but for charm of setting, the pride of place went easily to *Mazus pumilio*—a much smaller plant, related to the garden musks. *Mazus* grew as rosettes embedded among the soft green patches of *Poa tenera* in shady dells, its violet, lipped flowers closely simulating blooms of the Purple Bladderwort, a marsh-loving insectivorous plant which was not observed.

Robust specimens of Sweet Hounds-tongue (*Cynoglossum suaveolens*) were unusually fragrant, but the two humble Opercularias which were found did not inspire a very intimate olfactory acquaintance!

The season, of course, was unfavourable to fungi, but the dozen odd species noted were quite representative and colourful—gilled, bracket, puffball and several other forms. *Pleurotus lampas* (the luminous agaric), *Amanita mappa* (a toadstool with offensive odour and nauseating taste), and *Fomes robustus* (a large woody bracket, parasitic on Black Sheoaks) were conspicuous, while an old tree trunk smothered in tiers of the tiny, downy-silver *Stereum vellereum* was strikingly beautiful.

E. I. McLENNAN, B.SC., and J. H. WILLIS,
Leaders.

The Victorian Naturalist

Vol. LIV.—No. 10 February 5, 1938 No. 650

THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, January 10, 1938. The President, Mr. A. H. Chisholm, C.M.A.O.U., presided, and about 100 members and friends were present.

SUBJECT FOR EVENING

The "Subject for the Evening" was an illustrated lecture on "Crustacea," by Miss Ellen Clark, of the National Museum. Miss Clark confined her remarks to the land and fresh-water species. Particular reference was made to the primitive mountain shrimp of Tasmania (*Anaspides*) and its Victorian ally (*Koonunga*). These shrimps are the living representatives of fossils found in the coal-measures of England. The Phreatoicidae, a group of primitive Isopods found in Australia, Tasmania, New Zealand and South Africa, was used to prove the previous existence of a land connection between these countries. The life-history of the large spiny crayfish, illustrated by photographs, was given to show the differences between the Australian and European crayfishes in their breeding habits. Live land yabbies were exhibited and comment made on the extensive damage caused by these creatures in agricultural districts.

At the close of the lecture a vote of thanks was moved by Mr. R. H. Croll, seconded by Mr. Chas. Barrett, and carried by acclamation.

REPORT OF EXCURSION

Mr. S. R. Mitchell reported on the Boxing Day trip to the Anakies and Steglitz.

ELECTION OF MEMBERS

On a show of hands Mr. G. R. Lamparter was elected an ordinary member of the Club, and Master Ronald Merson an associate member.

GENERAL BUSINESS

Mr. A. H. Mattingley, referred to the destruction of sapling timber by campers. The matter was referred to the Committee for consideration.

NATURE NOTES

Mr. W. H. Nicholls said that a Platypus had often been seen in the Maribyrnong River, near the Footscray Park.

Mr. A. D. Hardy recorded as new for Victoria two species of fresh-water algae (*Dunaliella viridis* Teodor and *D. salina* Teodor) from the Pink Salt Lakes, near Underbool.

EXHIBITS

Mrs. E. E. Freame.—Collection of Crustacea.

Miss Ellen Clark.—Various land and fresh-water crustacea, to illustrate her lecture, also a specimen of the Northern Hemisphere Lobster.

Mr. A. R. Proudfoot.—Tooth of Sperm Whale (*Physeter macrocephalus*).

Mr. A. D. Hardy.—Fresh-water Algae, *Dunaliella viridis* Teodor, *D. salina* Teodor, from the Pink Salt Lakes; also *Colacium arbuscula* Stein, from the plankton of Hope Reservoir, Adelaide Water Supply.

Mr. T. S. Hart.—Mat Rush (*Lomandra longifolia*), fruit and seed, from Cheltenham; also unusual plants collected by Mr. W. Hunter at Suggan Buggan: A Raspwort, *Halorrhagis racemosa*, var. *Bauerlenii*, *Boronia dentigera*, and a *Phebalium*, *P. lamprophyllum*; at Combienbar, the Prickly Shaggy Pea, *Oxylobium trilobatum*.

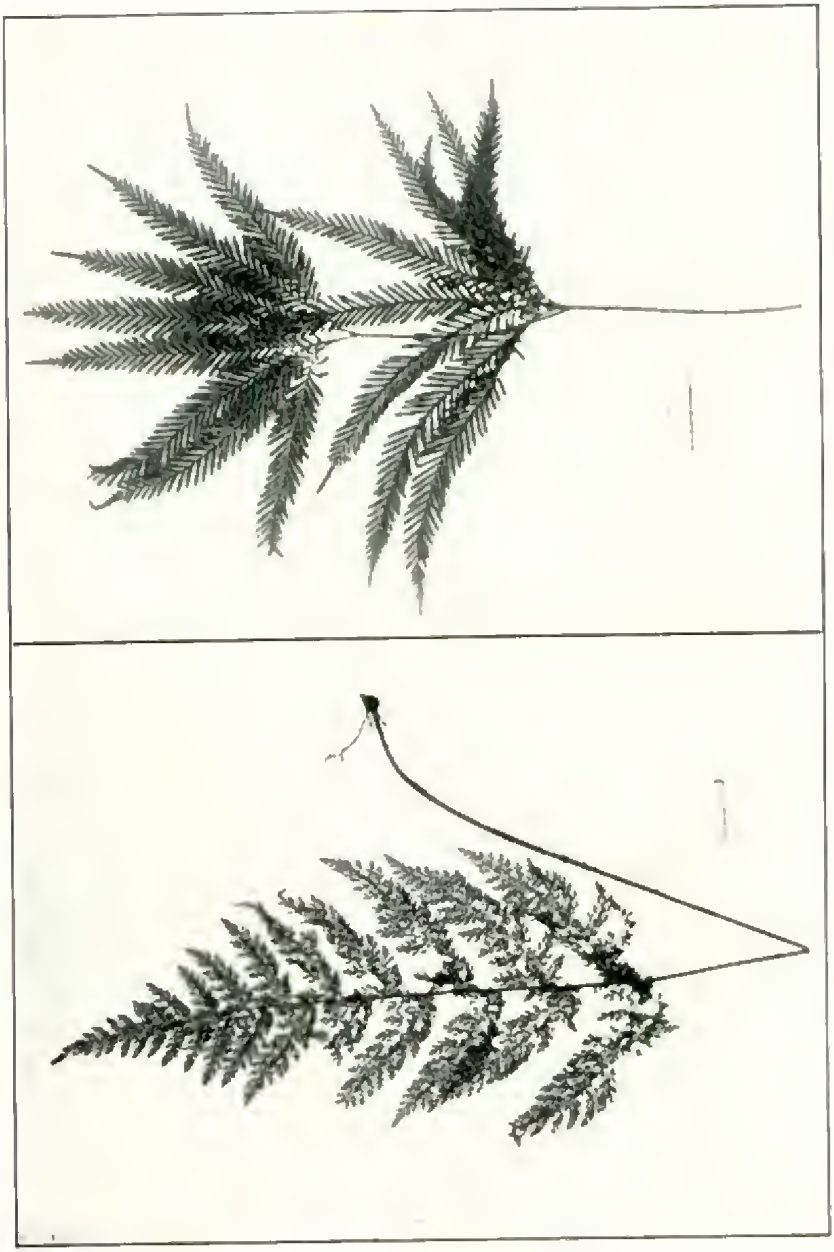
Mr. S. C. Richardson.—Young specimens of the Cat-fish (*Amiurus nebulosus*)—one prepared by the Dawson alizarin process by Dr. L. Richardson, McGill University, Montreal, Canada.

Mr. A. H. Chisholm.—Natural history photographs.

Mr. F. S. Colliver.—Fossil crustaceans, including yabbies, crabs, trilobites, barnacles, phyllocarids, etc.

Mr. H. Stewart.—One hundred and five species of plants; the majority in flower, from Mount Buffalo National Park, altitude 4,000 feet to 5,600 feet, including the following: *Blechnum proserum* (syn. *B. capense*), *Cassinia aculeata*, *Hydrocotyle hirta*, *Hymenanthera angustifolia* (syn. *H. dentata*), *Juncus prismatocarpus*, *Lycopodium clavatum*, *Marcantia cephaloscypha*, *Microlæna stipoides*, *Myriophyllum amphibium*, Broad-leaf Water-milfoil (new locality), *Nertera depressa*, Cushion Nertera (in fruit), *Poa cæspitosa*, var. *affinus*, *Polytrichum* sp., *Scirpus crassiusculus*, *Tetrarrhena distichophylla*, Hairy Rice-grass (new locality), *Pultenæa angustifolia*, Narrow-leaf Bush-pea, *P. tenella*, Delicate Bush-pea.

Plate XV



Gleichenia flabellata R.Br. White and Guy

Lycopodium dissecta White and Guy

FERNS OF MT. SPURGEON, NORTH QUEENSLAND

By C. T. WHITE and D. A. GOY

(Botanic Museum and Herbarium, Brisbane, Queensland)

In the spring of 1936 one of us (C. T. White) spent about ten days botanizing on Mt. Spurgeon, one of the richest botanical fields in North Queensland. It is a granite plateau rising to approximately 4,000 ft. and situated a few miles inland from Port Douglas. The rainfall on the eastern portion around Root's Creek and the Mossman Falls on the Upper Mossman River is very heavy, but falls away rapidly as the plateau recedes to the west and the altitude decreases, the rain-forest becoming drier until at the extreme western end of the plateau, and probably at an altitude of 2,000 ft., it is replaced by a better-class Eucalyptus forest. One of the most abundant species is *Eucalyptus resinifera*, the Red Stringybark or Red Mahogany, which, so far as we know, has not previously been found so far north. No records as to rainfall are available, but the impression from the vegetation is that it is probably about 150 inches in the east and only about half this in the west. As one descends on the western slopes towards the township of Mt. Carbine the usual "Gulf" xerophytic vegetation is in evidence.

In addition to the ferns described for the first time, the collections yielded two new orchids—*Dendrobium Fleckeri* Rupp and White, and *D. Carrii* Rupp and White—and several trees and shrubs which will be described in the next "Contributions to the Queensland Flora."

The following list comprises only those ferns of which specimens were collected; a few very common species were observed but not collected. No list was made of these in the field, so they have been ignored in the present account.

LYCOPODIALES

Family LYCOPODIACEAE

Lycopodium cernuum Linn.

FILICALES

Family MARATTIACEAE

Marattia fraxinea Sm.

Family GLEICHENIACEAE

Gleichenia dicarpa R.Br.

Gleichenia flabellata R.Br., var. *compacta*, var. nov.

Rhizoma repens, ramentis lanceolatis deciduis sparse obsitum. Stipes validus, erectus, subnitidus, glaber. Rhaces ad furcas et subinde rami paleis parvis deciduis lanceolatis fimbriatis obsitae. Frondes 35-150 cm. altae,

compactae, repitito-dichotomae, ramis vel pinnis ultimis 10-15 cm. longis, 1·5 to 2 cm. latis, lineari-lanceolatis, acuminatis; segmentis herbaceis, supra glabris, subtus glaucis, pilis paleaeformis paucis deciduis ad nervos obsitis; margine in parte superiori serrulatis. Sori e sporangiis parvis 2-6 (plerumque 4) compositi.

Rhizome branched, creeping, rather sparsely clothed with small lanceolate deciduous scales. Stipes rather stout, erect, smooth; rhachises clothed with a few small lanceolate-fimbriate, deciduous scales at the forkings, and sometimes along the whole branch. Fronds 35-150 cm. high, repeatedly and compactly dichotomous, the branches sometimes spreading in a horizontal

Hypolepis tenuifolia (Forst.) Bernh., var. *hirsuta* White and Goy.

plane (as in *G. Cunninghamii* Hew, a New Zealand species). Ultimate branches (pinnae) 10-15 cm. long, 1·5 to 2 cm. broad, linear-lanceolate, acuminate, pectinately divided to the rhacis or nearly so, the segments herbaceous, glabrous above, exceedingly glaucous beneath and with scattered, deciduous, scale-like hairs on the veins, the margins serrulate in the upper part. Sori of 2 to 6 (usually 4 or 5) small sporangia.

Mt. Spurgeon, C. T. White, No. 10556, Sept., 1936 (type of the variety), (very abundant, forming thickets along creek banks). Thornton Peak, L. J. Brass, No. 2304, 14/3/1932. Gadgarra, Atherton Tableland, S. F. Kajewski, No. 1101, 8/6/1929 (a fern growing to 1 m. high on creek bank).

This variety represents an intermediate form between *G. flabellata* R.Br. and the New Zealand *G. Cunninghamii* Hew. The former differs in its less compact growth, longer and broader pinnae, larger sori and green or at most slightly glaucous under surface. *G. Cunninghamii* is of extremely rigid growth, has densely scaly stipes and rhachises, very coriaceous texture and the margins of the pinnae are quite entire.

Family HYMENOPHYLLACEAE

Trichomanes sp. aff. *T. bipunctatum* Poir.

Trichomanes parviflorum Poir.

Family DICKSONIACEAE

Dicksonia Youngiae C. Moore

Hypolepis tenuifolia (Forst.) Bernh., var. *hirsuta*, var. nov.

Frondes 1·5 m. altae. Stipes ad basem pilis longis mollibus fulvus densissime obsitus. Frondes supra pilis paucis longis obsitae.

Fronds 5 ft. tall (1·5 m.). Base of stipes densely covered with soft reddish-brown hairs. Rhachises and veins on the under surface of fronds densely clothed with spreading, silky, pale-brown hairs, the hairs sparser on the upper surface.

Mt. Spurgeon, North Queensland, C. T. White, No. 10702, Sept., 1936. (Base of stipes very hairy with reddish-brown hairs. Fronds 1·5 m. high.)

Family CYATHEACEAE

Alsophila Rebeccae F.v.M.

Alsophila Baileyana Domin (*A. Rebeccae* F.v.M., var. *commutata* Bail.)

Alsophila australis R.Br.

Alsophila australis R.Br. var. *glauca* F. M. Bail.

Alsophila Robertsiana F.v.M.

Family POLYPODIACEAE

Leptolepia dissecta sp. nov.

Frondes cum stipite 52-60 cm. altae. Stipes cum rhachi primaria plerumque plus minusve flexuosus, supra sulcatus, pilis longis patentibus setiformibus fulvis obsitus; pilis densissimis basem versus. Laminae 22-32 cm. longae, 15-22 cm. latae, oblongo-lanceolatae vel deltoidae, tripinnatae, acuminatae, firme herbaceae, supra atro-virides, subtus (in sicco) glaucae. Pinnae primariae erecto-patentes; infimae bipinnatae, superiores gradatim breviores sed alte pinnatifidae fere ad apicem frondis, utrinque pilis adpressis setiformibus ad venas parcissime obsitae. Pinnae secundariae lineari-lanceolatae, in parte inferiori pinnatae, apicem versus pinnatifidae, ad 1·3-5 cm. longae et 1 cm. latae; pinnulae infimae pinnatae, segmentis 3-7; pinnulae intermediae paucilobae; pinnulae supremae integrae; segmentae ultimae 2-3 mm. longae, falcatae, lineares vel oblongae, obtusae. Sori numerosi ad apicem venulae in lobis lateralibus pinnae tertiariae dispositi. Indusium membranaceum, magnum, late orbiculari-cordatum saepe praeter apicem lobi protrudens.

Rhizome short-creeping. Fronds tufted, 52-60 cm. high, 15-22 cm. broad, on a stipes about half the total length of the frond. Stipes and main rhachis flexuose, channelled above, densely clothed at least when young with long, spreading, setiform, brownish hairs, the hairs denser and longer towards the base. Fronds oblong-lanceolate to deltoid, tripinnate, acuminate, texture firmly herbaceous, rather dark green above, glaucous beneath (dried). Primary pinnae fewer on one side than the other, erecto-patent, oblique, oblong-lanceolate, shortly acuminate, the lowest ones bipinnate and 7-12 cm. long, 2·5-6 cm. broad at the base, the upper ones gradually shorter but at least deeply pinnatifid almost to the apex of the frond; rhachises channelled above and more or less hirsute, both surfaces with scattered, adpressed,

bristly hairs on the nerves, otherwise glabrous. Secondary pinnae linear-lanceolate, pinnate below, deeply pinnatifid at apex, the longest ones 1·3-5 cm. long and about 1 cm. broad, their lowest pinnules again pinnate with 3-7 segments, middle ones few-lobed, upper ones entire. Ultimate segments 2-3 mm. long, falcate linear or oblong, obtuse. Sori numerous, at the tip of a short veinlet on small rounded lateral outgrowths of the tertiary pinnae. Indusium membranous, large, broadly orbicular-cordate, frequently protruding above the tips of the lobes, with a few bristles at the point of attachment.

Mt. Spurgeon, North Queensland, C. T. White, No. 10574, Sept. 1936 (fern on rock faces in damp places near creeks).

The only other recorded species of *Leptolepia* for Queensland, viz., *L. tripinnata* Kuhn, differs abundantly in having fronds of finer texture, green on both sides, and less finely divided pinnae with larger ovate ultimate segments.

Lindsaya cultrata Sw.

Pteridium aquilinum Kuhn, var. *esculentum* v. Alder v. Rosenb. (*Pteris aquilina* Linn.)

Pteridium aquilinum Kuhn, var. *lanuginosum* Luerss.

Leptochilus neglectus C. Chr. (*Acrostichum neglectum* F. M. Bail.)

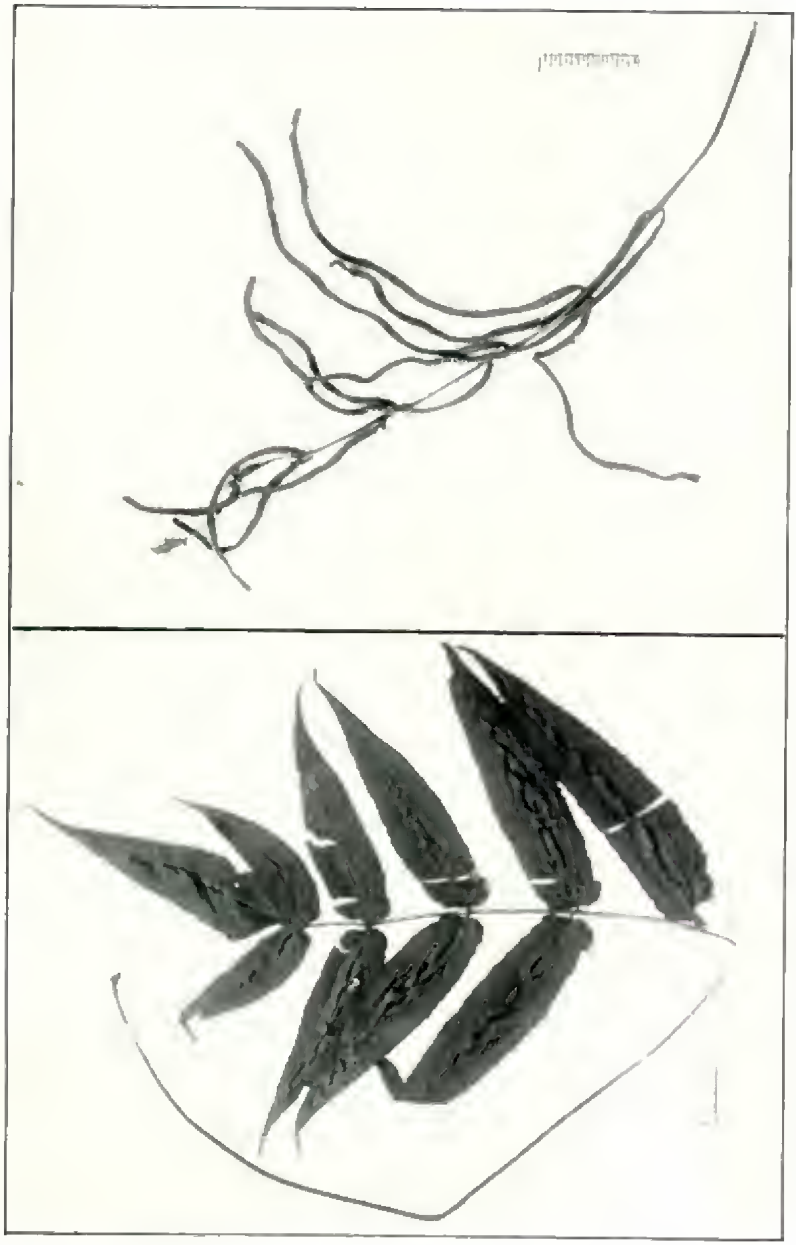
Leptochilus acuminatus sp. nov.

Rhizoma repens. Frondes dense caespitosae. Stipes ad 46 cm. longus, ad basem ramentis fulvis lineari-lanceolatis ca. 3 mm. longis obsitus. Frondes steriles cum stipite 20-69 cm. altae, pinnatae. Pinnae utrinque 2-5, oppositae vel alternae, subcoriaceae, oblongo-lanceolatae, apice longe acuminatae, margine crenatae, 8-17 cm. longae, 2·5-3 cm. latae, binae infimae maximae pinnae laterales obliquae ad basem rotundatae, subcordatae et inaequales; pinnae inferiores breviter petiolatae, superiores sessiles vel plus minusve confluentes et saepe in axilla bulbillo instructae, deinde angustatae et fertiles; pinna terminali integra, bifida vel trifida. Frondes fertiles steriles aequantes; pinnae anguste lineares, 9-19 cm. longae, ca. 4 mm. latae; sori densi, confluentes vel distincti.

Rhizome creeping. Fronds densely tufted, stipes clothed at the base with reddish-brown, linear-lanceolate scales about 3 mm. long, otherwise naked and smooth. Sterile fronds 20-69 cm. high, pinnate, with 2-5 pinnae on each side, the stipes about two-thirds the total length of the frond. Pinnae opposite or alternate, not articulate to the rhachis, oblong-lanceolate, 8-17 cm. long and 2·5-3 cm. broad, the lowest pair the largest, apex rather long-acuminate, the lateral ones somewhat oblique, rounded, subcordate and very unequal at the base, 2·5-5 cm. apart, the margins crenate, the lower ones shortly petiolulate, the upper ones sessile or more or less confluent and frequently with a bulbil developed in the axil; terminal pinna about as long as the largest lateral ones, entire or bi-tri-fid. Occasionally the uppermost segments are narrowed and soriferous. Texture firmly herbaceous-subcoriaceous, dark green, surfaces naked, midrib and main veins more prominent below and distinct to the margin; areolae numerous, often with free included veinlets. Fertile fronds about as long as the sterile ones, pinnate, pinnae narrow-linear, 9-19 cm. long and about 4 mm. broad, the sori usually densely covering the under surface but sometimes interrupted.

A very distinctive member of the genus for Queensland and readily distinguishable from the two previously recorded species. *L. cuspidatus* C.Chr. differs in its much broader, less dimorphic fertile fronds, both fertile and sterile fronds being more or less deeply and obtusely lobed, and both having a long, lobed terminal segment. *L. neglectus* C.Chr. has the very dimorphic

Plate XVI



Leptochilus acuminatus White and Goy (fertile frond)

Leptochilus acuminatus White and Goy (sterile frond)

fronds but the numerous pinnae in both fertile and sterile fronds are decurrent along the winged rhachis.

The sterile fronds of the new species are very similar to those of the Malayan *L. heteroclitus* C.Chr., but the sterile and fertile fronds of the latter species are somewhat similar, while in *L. acuminatus* the fronds are markedly dimorphic.

North Queensland: Mt. Spurgeon, C. T. White, No. 10652, Sept., 1936 (type). (Fern very common everywhere in the rain forest.) Dr. H. Flecker, Dec., 1935 (Herbarium of North Queensland Naturalists' Club, No. 1209).

Monogramma paradoxa Bedd., var. *angustissima* Domin (*M. Junghuhnii* Hook., var. *tenella* Benth.)

Vittaria elongata Sw.

Polystichum aristatum Presl (*Aspidium aristatum* Sw.)

Athyrium umbrosum Presl, var. *tenerum* Dom. (*Asplenium umbrosum* J. Sm., var. *tenera* F. M. Bail.)

Diplazium latifolium Moore (*Asplenium maximum* Don)

Blechnum Patersoni (R.Br.) Mett. (*Lomaria Patersonia* Spreng.)

Blechnum discolor (Forst.) Keys (*Lomaria discolor* Willd.)

Blechnum capense (L.) Schlecht. (*Lomaria capensis* Willd.)

Polypodium Hookeri Brack.

Polypodium selliguea Mett., var. *Sayeri* Domin (*Grammitis membranacea* Bl.)

HAKEA VITTATA AT MOUNT BUFFALO

The Striped Hakea (*Hakea vittata*) is common in Mallee country, and, curiously, grows along the alpine ridge of the North Buffalo, extending along the bridle track for nearly two miles to the foot of Mount Macleod. It is not found on the main Buffalo plateau. The effect of strong north and westerly winds is sometimes seen by the fine Mallee or Central Australian red dust colouring a light pink the snow of the Alpine highlands. It is therefore reasonable to suppose that the light-winged seeds of *Hakea* could have been blown by wind to a great distance, and found lodgment in the exposed granite saddle of North Buffalo, where extremely inhospitable conditions suited the establishment of this interesting plant. Some years ago, young plants were transplanted from the North Buffalo and placed in front of the Government Chalet, where two specimens now flourish as attractive shrubs about six feet in height, with cypress-like foliage. The fruits remain a long time on the plant, and until the next season's flowers appear are of a rich plum colour. As in all the Hakeas, the fruit of the Striped Hakea later becomes hard and woody, and when the thick capsule dehisces two winged seeds are released. With a favourable wind the seeds can be dispersed a considerable distance. Seeds have also been known to retain germinating power for ten years. The little-known *Hakea vittata* merits a place in the gardens of those who like an unusual Australian shrub that does not require coddling and is not particular to soil or aspect.

H.S.

CAVE HUNTING IN VICTORIA

By F. S. COLLIVER

Many caves in Australia have yielded remains of extinct animals, but so far, none of prehistoric man have been found associated with them. In his book, *Geological Observations in South Australia* (1862), the Rev. J. E. Tenison Woods records the results

River Cliff in Nelson District. The arrow indicates cave entrance.

of some cave explorations carried out in the Mt. Gambier district, which, being almost entirely a soft porous limestone, is very suitable for cave formation. Caves exist there in great numbers; many have long been known, and frequently new ones are discovered, some having been found by heavy carts crashing through the surface, others during excavations, etc.

Some of the Mt. Gambier caves have a definite economic use. One receives the town drainage, and, I believe, only once has it

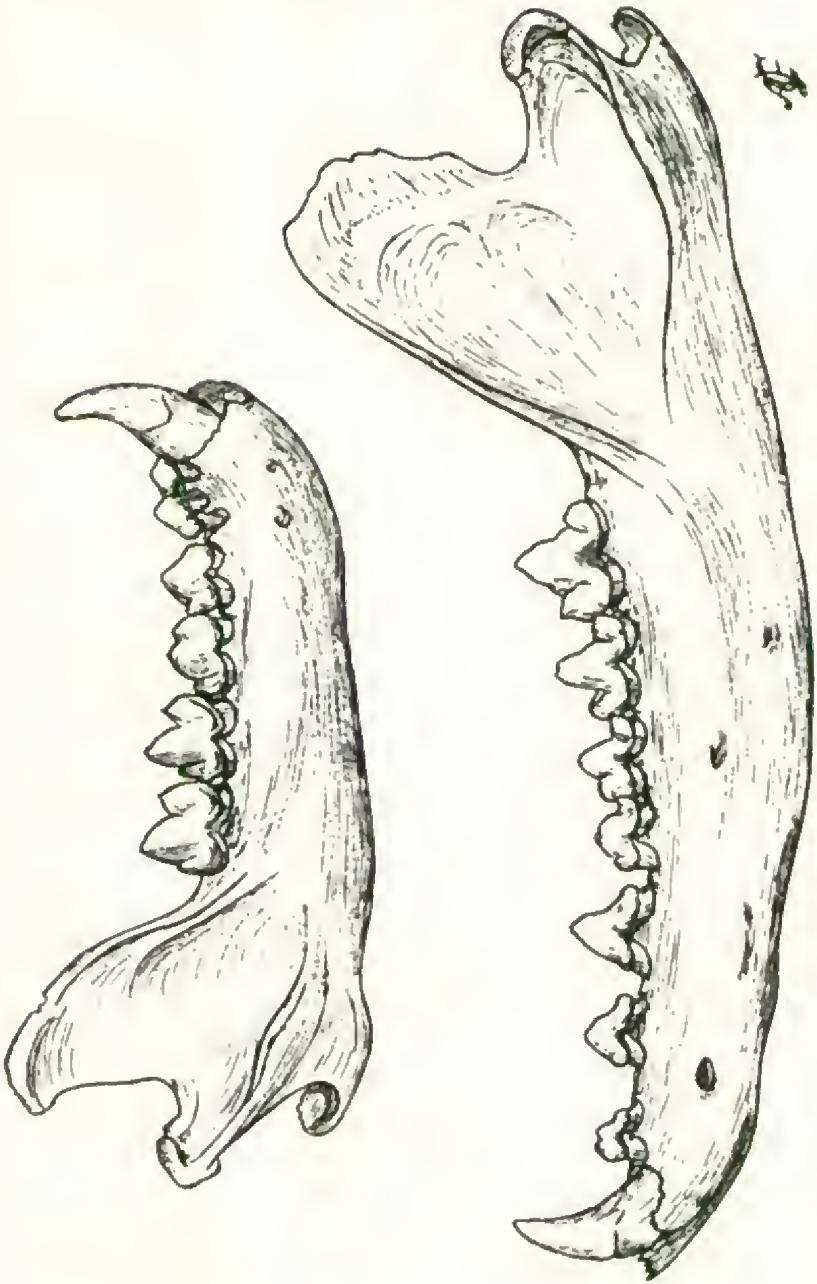
filled up with the storm waters. Another has been used for years as a rubbish tip. Many caves in the district have wonderful hidden beauty with their stalactic formations, and one is particularly interesting from the fact that in it was discovered the more or less petrified body of an aboriginal, who had crept in there to die, after being shot by some early settlers. This pitiful relic of the early days was stolen by an enterprising showman, recovered by the Government, and eventually stolen again; for many years, now, nothing has been heard of it.

Very interesting fossil remains have been recorded from cave earth in the Mt. Gambier district, and it had always been a hope that I might be able to add a little to the knowledge of caves and their fossil contents. Some four years ago a Club member, who had spent his holidays in the district, heard of a cave containing bones, and on his return told me of it. During the following Easter I visited the locality and made a preliminary exploration. The cave contained bones in excellent preservation, and my brief search through the cave earth yielded results in the form of several skulls and lower jaws, as well as a number of skeletal bones. In the next vacation, I spent several days in further exploration, again with very satisfactory results. Altogether I have visited the cave four times, and collected a large number of specimens.

The cave is situated in the Nelson district, some twenty-six miles from Mt. Gambier. To reach the entrance one must climb up a cliff-face from water level. The accompanying photograph gives some idea of the country, and the arrow points to the cave entrance. The bones were all collected by scratching through the cave earth with hands only, and eventually a big excavation, in one place seven feet deep, was the result. Some of the larger limb bones, commonly known as the marrow bones, are splintered, and others show signs of gnawing; proof that at least some of the earlier inhabitants of the cave were carnivorous.

Of the various skulls and lower jaws collected, two were particularly interesting, one providing further proof of the former existence of the Tasmanian Devil (*Sarcophilus ursinus* Harris sp.), and the Tasmanian Tiger (*Thylacinus cynocephalus*) on the mainland. The illustration shows, in the upper figure, a lower jaw of the "Devil"; and in the lower, a lower jaw of the "Tiger." The actual length of the latter is 6¼ inches. Among other animals, remains of which were collected, may be mentioned a Native Cat, a Kangaroo, a Wallaby, Marsupial Mice, lizards and birds; in all, twenty-six species were represented.

As the Marsupial Wolf or Tiger and the Tasmanian Devil are the largest carnivora represented in this collection, and as it is known that these animals frequent caves in Tasmania, it seems probable that they were rivals for the ownership of this Victorian



Top: Lower Jaw of *Sarcophilus ursinus*. Lower: Lower Jaw of *Thylacinus cynocephalus*.

cave, and that most of the other animals had been killed by them for food. Some of the animals in the list are living and common types; others are rare and some are extinct, at least on the mainland.

It seems that my hope has been realized, particularly as the National Museum was glad to accept the specimens I offered to it. My thanks are due to Mr. J. A. Kershaw, and Mr. C. W. Brazenor, the Museum mammalogist, through whose kindness all the skulls and lower jaws were checked over and correctly named; Mr. A. C. Frostick, who visited the cave with me on one occasion, very kindly drew the figures of the lower jaws, and to him also I extend my thanks.

It is my intention to continue in this work, to add to my collections, and later publish a full scientific list of the results of a cave-hunt in Victoria.

LARGE SPECIMENS OF *GASTRODIA*

At the December meeting of the Club, Mr. V. H. Miller exhibited a fine specimen of the "Potato Orchid," *Gastrodia sesamoides* R.Br., collected at Toolangi, which, when fresh, was 47½ inches in length, and had 29 flowers. A rather belated attempt to dry and press it resulted in a loss of about one inch in length. Many of the flowers had become too dry to be placed in position, and fell off. In the immediate vicinity of this giant *Gastrodia* were others, not quite so tall, but much longer than has, so far, been recorded. In *The Orchids of Victoria*, Mr. E. E. Pescott gives the normal size as "Stems from 1 to 3 feet in height . . . having from 2 to 15 or more flowers." The measurements of three others, taken with a steel tape, are as follow: No. 2, 39¼ inches in length, bearing 24 flowers; No. 3, 39¾ inches in length, bearing 18 flowers; No. 4, 42 inches in length, bearing 23 flowers.

As the Potato Orchid does not usually flower every year, it will be of interest to re-visit the locality and see if future flowers are of exceptional height.

B.E.M.

LATE MR. HUGH HUGHES

All members will deeply regret the death of Mr. Hugh Hughes, of Staniland Grove, Elsternwick, which occurred on December 30. He was 77 years of age. Mr. Hughes was elected to membership of the Club in 1918, and was always interested in its welfare, ready to assist at the Wild Nature Show, and in other ways. He was Secretary of St. Clement's Church of England, Elsternwick, Treasurer of the Elwood Freemasons, and a donor member of the Carry On Club.

FLAGELLATA NEW FOR AUSTRALIA

By A. D. HARDY

Early in October, 1937, I had opportunity for a visit to the Hope Valley Reservoir, which is one of the sources of the water supply of Adelaide and is situated a few miles northerly from that city. The Water Supply Department courteously provided a boat and other facilities, so that a tow-net sample of the plankton, remote from the shore, was conveniently obtained. The water temperature was 60° F. and alkalinity indicated by about $p^H 8{\cdot}0$.

Owing to the hurried nature of my visit there was little time available even for a brief examination of the collection, under low-power magnification, before killing with formalin, and thus some interesting features escaped notice. One surprise, before the killing, however, was the occurrence of what appeared to be slow-moving, thick-tailed *Euglena viridis*. Another was that the Crustacea (Entomostraca) were, almost without exception, carrying numerous sessile or stalked green cells.

The Entomostraca comprised Copepoda and Cladocera, the latter being chiefly the Water Fleas, *Daphnia* spp. and *Bosmina longispina*, mostly adults, but with many immature stages. The young Water Fleas (nauplii) did not, as a rule, bear green cells, probably because of the succession of moults.

Some days later the collection was carefully examined, and the supposed swimming Euglena and the cells on the Entomostraca were identified as separate phases in the life of one algal species—*Colacium arbuscula* Stein, Fam. Euglenaceae Lemm.[1]

The habitual association of species of *Colacium* with plankton organisms, especially Entomostraca, was known to Ehrenberg a century ago, and, in 1852, Pritchard, writing of the Infusoria, refers to *Colacium* as "The Friends(?) of the Water Fleas." In Europe and America the Zooplankton, chiefly Crustacea and Rotifera, are the hosts.

At first sight it seems that these minute Crustaceans must be inconvenienced by their lodgers, causing retardation of speed, but there may be compensations. There may be reciprocal service rendered by which the Entomostracan "beast of burden" carries its oxygen generator, while the *Colacium* cells have their CO_2 producer close at hand. Incidentally, the reservoir fish have a ready-made, mixed diet, in which the proportion of vegetable and animal components may be as 1/500.

Professor Fritsch,[2] retains *Colacium* in the family *Euglenaceae*; Professor Tilden[3] in *Euglenineae*; Professor G. M. Smith[4] places the genus in a class of its own, *Colociaceae*.

The doubt as to whether *Colacium* and other *Euglena*-like creatures are animal or plant has long been a matter of discussion

by specialists. "The genus *Euglena* contains forms that are commonly used in both botanical and zoological laboratories. *Euglena viridis* Ehrenberg, as well as other species having chromatophores, are plants, but are in many respects animal-like."[3]

It is characteristic of the genus *Colacium* that the fusiform green individuals swim freely by means of a single whip-lash flagellum, but become stationary on plankton organisms and there secrete a slender mucilage stalk which branches when the cell divides longitudinally, each daughter-cell secreting its own stalk. In due time the cells detach themselves and swim away by means of a newly-produced flagellum. In *C. arbuscula* a long stalk is formed, which, by dichotomous branching, results in a tree-form colony with terminal cells at equal distance from the base. In the South Australian form, stalks of single cells or colonies are of uniform thickness—about 2 micra—but of variable length, the total length of original stalk and branches reaching to over 100 micra in largest specimens.

Encystment such as in some *Euglena* species, e.g., *E. rubra*,[3] is not known so far as I am aware, for *Colacium*, and therefore I attach some importance to the spherical cell shown in Fig. 6 associated with a *Colacium* group. It is similar to others seen singly or grouped in an amorphous mucilage-bedding which kept them attached to the host. The spherical shape, definite cell-wall, and green contents resembling the chloroplastids of *Colacium* were such that I suggest the possibility of these being an encysted condition of this variety of *C. arbuscula*.

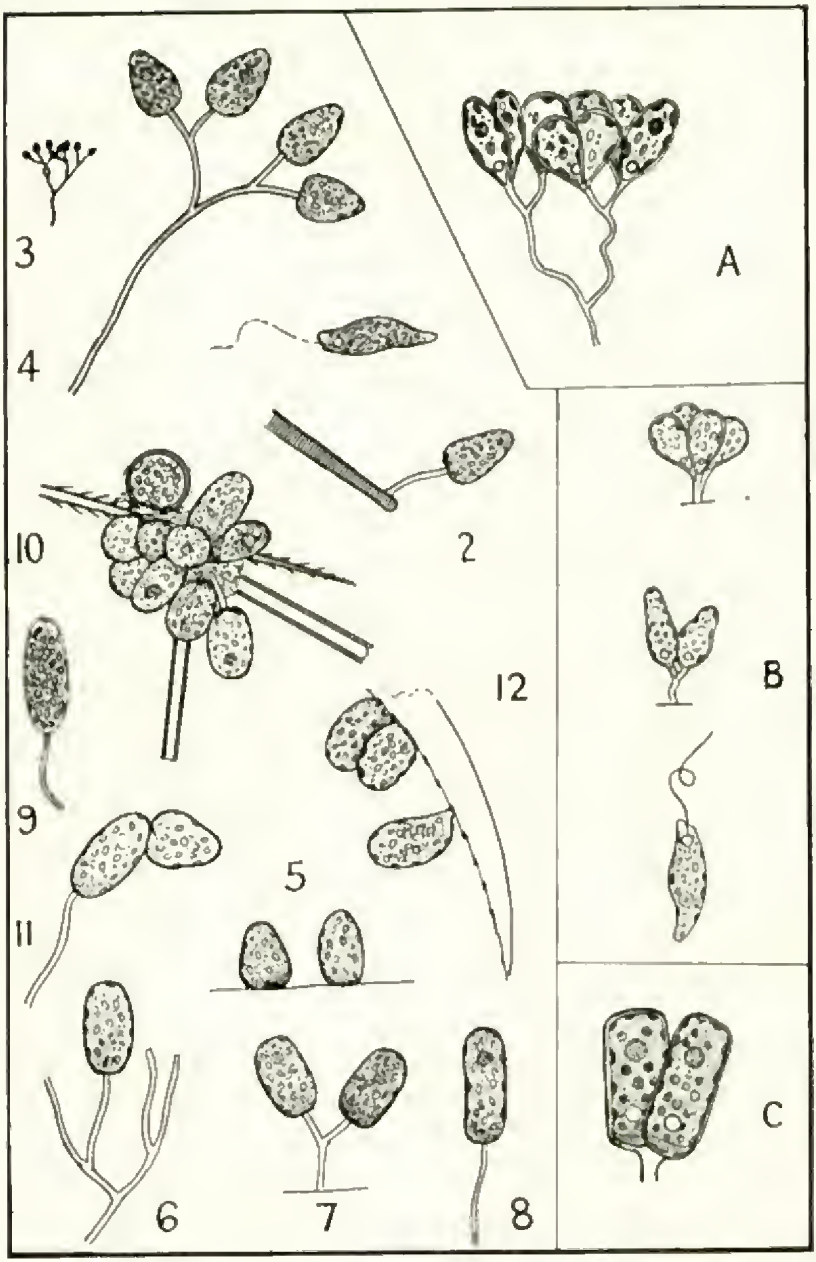
Reference to the plate will show the difficulty in describing the cell shape of this South Australian variety, but my hasty examination of the living material left an impression of a shape best described as *deltoid, with rounded angles*, some approaching a shape almost sub-cordate. In view of the recurrence of the term "spindelform" and the invariable drawing of the cells of *C. arbuscula* with an anterior end tapering to a point at junction with the stalk, a feature that is foreign to the South Australian form, I suggest for the latter the varietal name—polymorphum—with description as follows:

Colacium arbuscula Stein; var. *polymorphum*; n.v.

Cells not tapering to the base as in the type but rounded, elliptical or ovoid; frequently sub-deltoid and then broad-based; in colonies up to eight cells and then on very long stalks with shorter branches; total stalk length up to 100 m.; often short stalked, sometimes clustered; occasionally constricted.

Loc. Hope Valley Reservoir, South Australia

On Entomostraca: Copepoda and Cladocera, *Daphnia* and *Bosmina*, and occasionally on Diatoms *Synedra* and *Asterionella*; rarely on Green Algae (Desmids).



Colacium arbuscula Stein. var. *polymorphum* n.v.

I am indebted to Dr. Ethel McLennan for drawing my attention to descriptions by Lemmermann and Smith, and to the Water Supply Dept. of S.A. for the following particulars of the reservoir: Area, H.L., 149 acres; Alt., H.L., 446 feet; Oct. 4, $p^H 8{\cdot}38$.

References:

1. Lemmermann, E., in Pascher's *Süsswasser-Flora*, 1913.
2. West and Fritsch, *British Fr. W. Algae*, 1927.
3. Tilden, Josephine, *The Algae and their Life Relations*, 1933.
4. Smith, Gilbert M., *The Fresh-water Algae of the United States*, 1933.
5. Hardy, A. D., *Vict. Nat.*, Mar., 1911 (and Lemmermann, *loc. cit.*).

KEY TO ILLUSTRATIONS

Magnification: All figures 1-12, excepting 3, 500/1 (3 is 100/1)

1-12. *Colacium arbuscula* Stein; var. *polymorphum*, n. var.

1. Motile cell (from memory) similar to several seen in plankton.
2. Cell epiphytic on *Synedra ulna*.
3. A colony of varietal type ·100/1.
4. Common form. Mucilage stalk 2μ thick and stalk system total length up to 100μ. Cells 12μ x 8μ.
5. Dissimilar forms adjacent and apparently of same age.

7, 8. Solitary and branched cylindrical forms.

9. An ellipsoid form, as frequently seen, with either single or branched mucilage stalks.
10. A group of short-stalked cells, attached to *Synedra ulna* and seta of *Daphnia*, and what may be an encysted *Colacium*.
11. A sub-deltoid cell, epiphytic on an elliptic cell (two seen).
12. Two sessile cells, and one of abnormal variation, on claw of *Daphnia* sp.

A-C After Lemmermann, for comparison.

LIFE-HISTORY OF GIANT CRAB-SPIDER

In the past twelve months I have been able to complete my notes on the life-history of the Giant "Crab-spider" (*Isopeda immanis*) —the so-called "Tarantula." Each process, from the amazing courtship and mating to egg-laying and emergence of spiderlings, has been closely observed and photographed. The construction of the egg sac, which is one continuous piece of work, not base and lid, occupied approximately twelve hours. Shedding of skin was completed in one hour.

EDITH COLEMAN.

The block of Tailed Spiders' egg-sacs on page 135, January issue of *The Naturalist*, inadvertently was reversed in the printing forme. The lower portion in the printed picture actually is the top.

KOOLAMADOO OR SANDSTONE ISLAND, WESTERNPORT BAY

By ROBT. A. KEBLE, F.G.S.

Since A. R. C. Selwyn visited Koolamadoo Island, known locally as Koolam, and to him and on several maps and charts as Sandstone Island, 84 years ago, as far as is known, no geologist has been there. It is situated in the Inner Western Passage of Westernport Bay, about half-way between Hastings and Crib Point, and half a mile east of the western shore of the Passage. A well-grassed island with a few trees, it has a platform, varying in width, of Palaeozoic rocks surrounding it and extending sea-

Fig. 1.

wards from high-water mark to mud flats that support a growth of mangroves.

Selwyn, in 1854, submitted to the Colonial Secretary a "Report on the Geology, Palaeontology and Mineralogy of the country situated between Melbourne, Westernport Bay, Cape Schanck and Point Nepean, accompanied by a Geological Map and Sections." In this report he refers to Sandstone Island as one of the few places in the Westernport area that afforded him a section of the Older Palaeozoic Series. In his map he shows on the west side of the island undulating beds dipping westerly and south-westerly; no outcrops are shown on the east side. He notes on the map that the strata consists of "white, brown and grey micaceous thin-bedded sandstones ¼ in. to 1 ft.; the only fossil found here was the cast of an Encrinite stem," recorded as B7 in the Geological Survey Collection. His section passes through Sandstone Island.

On this section, on the east side of the island, he records "yellow and brown shale with thin beds of grey and very micaceous sandstone," and on the west side "grey felspathic sandstone and yellow and brown argillaceous shale."

The writer visited the island recently to investigate the Crinoid bed, particularly with a view to ascertaining whether any other forms were present to determine the age of the beds. He found only Crinoids, but the structure of the Palaeozoic rocks present several unusual and interesting features. As Selwyn in his concise notes stated, the Palaeozoic bedrock consists mainly of fine to medium-grained sandstones, usually grey, some felspathic and many highly micaceous, shales of several hues, and occasional bands of quartzite. The sandstones exhibit a certain amount of silification, but, on the whole, less than the Palaeozoic strata on the mainland to the west. The bedrock is found on the platform encircling the island exposed between tide levels. There are a few outcrops on the east side of the island above high-water mark and one on the west side constituting a solid face about 12 ft. in height (Fig. 1). The age of the beds is ascribed to the Silurian; this is problematical, but it is certainly not older. The nearest fossiliferous bed in Palaeozoic beds is about 1½ miles west of Tyabb, where Spirifers and other brachiopods have been found in sandstones in many ways similar to those on Koolamadoo; the evidence from these is inconclusive.

Fig. 2.

Structurally, Koolamadoo Island is a competent asymmetrical anticline striking N. 18° E., and obviously with an inclined vertical plane. This anticline pitches strongly to the south and at the north-east extremity of the island at 30°. The dips of the beds in the eastern limb of the anticline range from 65° to vertical (Fig. 3). The beds on the western limb (Fig 1), for about 5 chains west of the anticlinal axis, dip at 45°; farther west the folding becomes

undulating and pitch southwards at as much as 45°. These undulating folds are exposed in plan on the rock platform and the undulations with their strong pitch exhibit sinuous strikes (Fig. 4) in general trend approximately at right angles to the main anticlinal axis. At some places, a bed on the 45° dipping western limb of the main anticline can be followed round without a break into the undulating folds (Fig. 2), showing that the unusual change in strike is in no way due to faulting.

Fig. 3.

The main anticline on Koolamadoo is typical of those found on the Mornington Peninsula in so far as it has an excess of easterly over westerly dip. Its eastern limb is, however, much steeper than is usually found on the Peninsula. The exposures on Koolamadoo are in fact the most easterly on the eastern limb of the great anticlinorium across the Mornington Peninsula, the main axis of which is near Bald Hill, about three miles north-east of Dromana. The excess of easterly over westerly dip in this

Fig. 4.

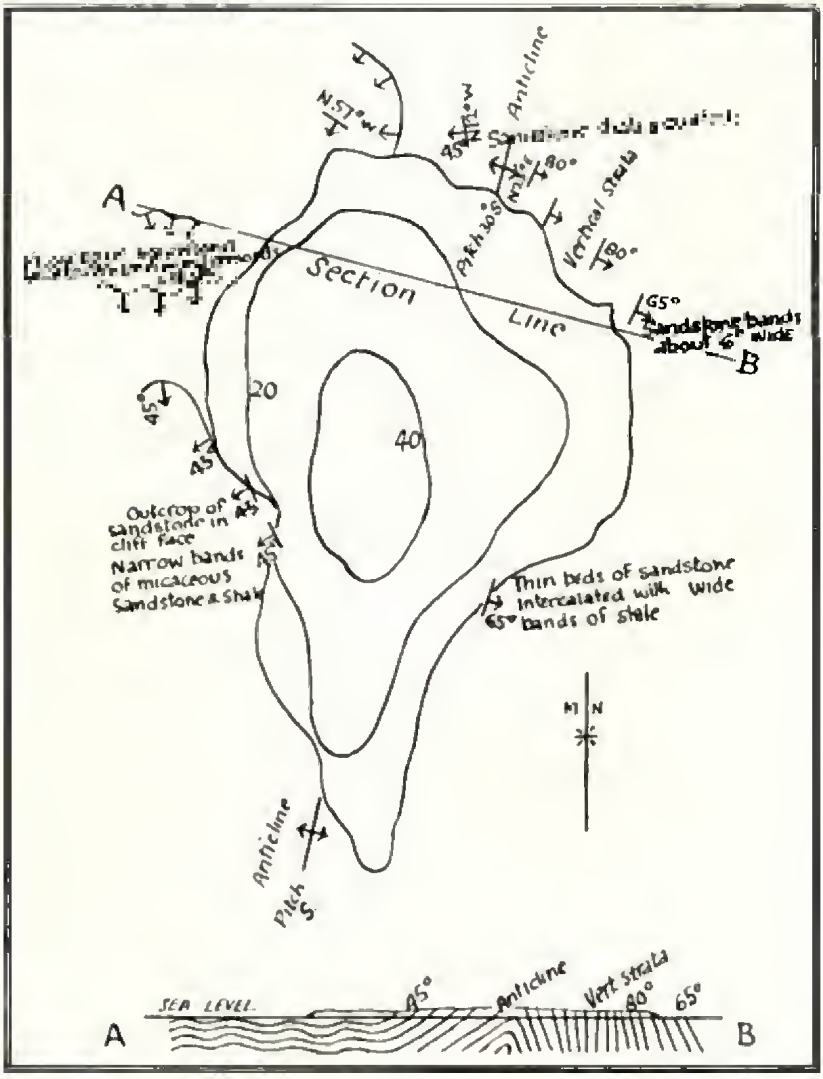


Fig. 5.

anticlinorium brings in successively younger beds to the east, so that from the Bald Hill geanticline one passes eastwards over all the zones of the Lower Ordovician, probably all those of the Upper Ordovician and some at least of the Silurian. If the beds at Koolamadoo Island are Silurian as suggested, the strong easterly dip of the anticline on the island, if persistent, must bring in much younger beds to the east; unfortunately, most of this limb is covered by the waters of the Inner Western Passage.

Silification of the sandstones is responsible for Koolamadoo remaining an island after the subsidence of the Westernport river system. The western edge of the Inner Western Passage, which represents the submerged trunk stream of the sunken river system, is shown in Fig. 5.

Joining the submerged trunk stream are tributary channels (Fig. 5) which head towards the outlets of the several creeks at present emptying into Westernport Bay; they are, in fact, the lower reaches of these creeks that were submerged by the subsidence of the river system. Two of these tributary channels join the submerged trunk stream east of Koolamadoo Island. One heads a short distance south-east of the outlet of the Warrenguite Creek (Fig. 5), passes a few chains south of the island, and, after taking a winding course, joins the submerged trunk stream about half a mile east of the centre of the island. The other tributary channel heads towards the outlet of King's Creek (Fig. 5) and, taking a circuitous course, joins the submerged trunk stream about half a mile east of the north end of the island. The area between these tributary channels is the lower portion of the submerged interfluve or watershed between Warrenguite and King's Creeks, the only part of which remaining unsubmerged being Koolamadoo Island. It was the highest part of the interfluve before submergence, and remained high because silification, particularly along the anticlinal axis, resisted erosion and the planation that levelled the surrounding area. Thus the longitudinal axis of the island is transverse to the general direction of the interfluve.

The tributary channels stop short (Fig. 5) of the outlets of Warrenguite and King's Creeks. Actually, the valleys of each of these creeks are connected with their corresponding tributary channels under the sediment that has been deposited in the bay where the creeks enter. This sediment is the outcome of a recent rejuvenation of the creeks, which, in their lower reaches, are both entrenched.

I desire to thank Mr. Harold W. Wills, who made my visit to Koolamadoo Island possible, and who assisted me in my observations.

CLUB'S BOOK ON SEA SHELLS

Members of the Club who have not already purchased a copy of our second handbook, *Victorian Sea Shells*, are notified that it is obtainable from the Hon. Librarian. Price, 1/6, posted 1d. extra. The book is finely illustrated and the only popular guide to the marine mollusca of Victoria. More than 100 species are described, the majority being also figured. A colour plate, in which 14 shells are illustrated, forms the frontispiece of this valuable and interesting publication, which is sold at less than cost of production. It deserves a wide circulation, especially among school teachers. The author is Mr. C. J. Gabriel, Hon. Conchologist to the National Museum, and a member of our Club.

AT THE COORONG

By CHAS. DALEY

Leaving Adelaide early by car, we slipped through Glen Osmond, and as the well-graded road wound sinuously in many curves upward to surmount the range, were soon in the heart of the lovely Mt. Lofty Range, with its deep-set valleys, steep slopes, sheltered glades, and wooded hills. Leaving delightful range, more open country of farms and pastures is met with, where standing crops, and flocks and herds in good condition, bear witness to a bountiful season for the State. Approaching the Murray the typical Mallee vegetation is gradually reached, in the stunted Eucalypts, Casuarinas, Acacias, Grass-trees, etc., characteristic of its scrubs.

From Murray Bridge the Murray Pine, *Callitris robusta*, sometimes in healthy-looking clumps, in bedraggled patches, or in isolated trees, is frequently passed. The contrast is very marked, and the conclusion impressed, that by careful protection and conservation this fine and useful tree, once so abundant along the Murray and in the Mallee areas, could be preserved or rehabilitated. As with other Australian vegetation in arid areas, and with the coastal Tea-tree, intensive grazing destroys the young and tender plants, leaving nothing to replace or renew the trees which reach maturity. In the case of Tailem Bend, with its outcropping limestone and sparse vegetation, we see how an uninteresting village, by Government means, burgeons into a smart township of employees connected with the district railway service.

Gradually leaving the pines, the country becomes more open, with extensive pastoral holdings, with Casuarinas and gum trees sparsely distributed. The divergent road to Wellington, at the head of the Lake Alexandrina, goes to the right where the River Red-gums mark the course of the Murray. The open spaces become more extensive, with some cultivation of grain towards the Murray, and sheep runs to the eastwards. Rarely is there a homestead descried to indicate human occupation of these plains. There is a notable absence of fauna, except Magpies and many elusive Crows that ignore the passage of cars, but are keenly suspicious of men, especially with anything looking like a firearm. One is reminded that, years ago, when Victorians were called "Gumsuckers," and Sydneysiders "Cornstalks," South Australians were "Crow-eaters," the birds being specially numerous on the sheep runs and wheat plains.

A black woman with a piccaninny is seated by the road, resting against a telegraph post. Farther on we met two aborigines driving in a cart; and, when nearing Lake Albert, a grey-haired aborigine loped along, probably on a "walk-about" from the Murray reservation. Spreading plains with frequent salt-pans and dry shallow depressions stretch away to the eastern horizon. Large areas—evidently at times shallow receptacles of surface water, now dry, present a black appearance. On cursory examination there is generally a growth af salsolaceous character over them. I surmise that the decay of this vegetation is responsible for the darkness of the surface soil above the limestone over these extensive patches, subject to brief submergence by water. In places good wheat land is indicated, and well-grassed pastures are extensive in this scantily inhabited district. Where a gleam of water shows in a depression, Spur-winged Plovers were to be seen and heard as we passed.

Past Lake Albert, a large expanse of water on the right connected with the Murray, birds became more numerous. Black Ducks and Teal, stately Black Swans, occasionally an Ibis, and Pelicans appear to view on the water or in flight above it, while a few Coots or odd Sandpipers were busy on the selvage of the shore. Flocks of Seagulls eagerly foraged for food. Some years ago The Coorong, in its long reaches, dotted with islands, was

a great nesting-place for Pelicans. The wholesale slaughter of these fine birds on their nests, when reported and photographed, evoked indignant disgust and protest. As a result, the cruel practice was stopped, and protection to the birds accorded. In their easy flight in the upper air, Pelicans exhibit unsurpassed grace of movement, and a poise and balance that aviators could not be expected to maintain.

Nearing The Coorong there is much more vegetation. Banksias, Eucalypts, shapely Melaleucas. A nice little country town comes in view not far from the waterfront of the lake. Eastward the road skirts The Coorong, which extends for about 90 miles as far as Kingston. The width varies from about a mile to two miles, and the depth varies with the season, and the volume and strength of the Murray flow modified by tidal action. Due to similar conditions, The Coorong has a counterpart or parallel in the Gippsland Lake system, and most rivers on the southern coastline, the mouths of which are generally closed by the combined action from the west of the strong ocean swell and the prevailing wind in raising the sand barriers, which deflect the river waters continually eastwards behind the windblown sand-dunes facing the ocean. Occasionally in high flood after much rain, the river waters asserting themselves as at the Murray, the Lakes' Entrance, and Lake Tyers, by virtue of their pent-up force burst the sandbar and clear a passage to the sea. When the normal flow is again reached, the bar in time reforms.

The well-formed road runs parallel to The Coorong with its inner sand-dunes and exposed limestone surfaces, headlands, islands and rises, intermittently covered with trees of dwarfish habit. The Mallee here comes right down to the highway, the vegetation, as is frequently the case, acquiring more succulence in leafage from the moisture-laden air, and also a greater density in growth. Here and there the angular Pigface, *Mesembryanthemum aequilaterale*, grows plentifully, and in early days the aborigines regularly visited the coastal district when they could obtain the fleshy fruit as food, the interior of which contains a very sweet, syrupy fluid with a fig flavour, and countless little brown seeds.

At one place where a track diverges north-east to Keith, fifty-one miles, the notice-board states that no water is available on the route. Water, however, is found at varying depths in places by sinking. Near The Coorong there is a drift of moisture to the lagoon. Occasionally the water of The Coorong, when the Murray River flow predominates, is fresh. At our visit the surface was much lower than usual, dry patches usually submerged along its margin being numerous. The undulations are well grassed, and cattle find good pasturage. At one time aborigines were numerous along The Coorong, food being varied and easily obtainable. At several middens examined the remains of bones of many wild fowl were evidences of this, while those of shell-fish were hardly to be seen, although in plenty on the middens across the water. Chips of quartzite, etc., brought from some distance, and also of flint from nodules washed up on the ocean frontage, as in Victoria, were found, but not in quantity. Skeletons and human bones are occasionally unearthed from sandhills bordering The Coorong. In the scrub extending northwards, Kangaroos, Wallabies and Emus are found.

Additional interest attaches to this coastal area where the upraised bed of the ancient capacious Murray estuary dips into the present line of the ocean. This estuary stretched approximately from the present outlet of the Murray as far as Discovery Bay, stretching northward as far as Menindie, on the Darling River, and north-east to the site of Swan Hill, the rivers Murray, Murrumbidgee and Darling then being separate streams discharging into this extensive inlet, until continued elevatory action uplifted the sea-floor to form on a limestone foundation the wide-spreading plains through which "Old Man River"—the Murray—with its captured tributary streams, pursues its long course to the Southern Ocean.

YERINGIAN TRILOBITES

By REV. EDMUND D. GILL, B.A.

A General Discussion on Trilobites, with Notes on the Forms found in the Lilydale District of Victoria

"Trilobites were the first fossils to arrest the attention of naturalists." The first entire specimen was described in the year 1698 by Edward Llwyd, the curator of the Ashmolean Museum at Oxford. Then Linnaeus was the first to recognize their relationship with other crustacea. The name "trilobite" was proposed by Walch, in 1771, it being derived from the longitudinally tri-lobed nature of the carapace. For about a century after that, however, the anatomy of these interesting animals was still imperfectly understood, until the legs were discovered by Billings and Walcott, and finally the antennae and other features.

Although now extinct, this sub-class of the Crustacea is the most striking and not the least characteristic group of fossils of the Palaeozoic Era. In the absence of graptolites, trilobites are used as zonal indices with precision. The world-wide range of many of the Ordivician and Silurian genera is of great stratigraphical value. Trilobites, brachiopods and graptolites are the three forms of life which dominate in the Silurian. From a world point of view, the trilobites reach their acme of development in the Ordivician Age, but in Victoria they are by far the most abundantly represented in the rocks of Silurian age.

The exoskeleton or carapace of the trilobite is composed of chitin, and is therefore well adapted for preservation. This substance resists chemical change to a remarkable degree. H. L. Hawkins, in his *Invertebrate Palaeontology*, refers to "remarkable specimens of Eurypterus (an allied crustacean) found in the Isle of Oesel (North Russia), so perfectly preserved that the carapaces can be detached from the marl and examined by transmitted light. Lenses of compound eyes of Trilobites may also retain their transparency." Furthermore, fossilization of trilobites from the earliest times has been assured by their aquatic habits. Also, they were apparently very susceptible to rapid changes of environment, for, judging by some of the trilobite beds they must have perished in millions when some unusual sedimentation occurred.

Trilobites were probably carnivorous creatures, ranging the sea-bed, scavenger-fashion, for the minute forms of life which could be brought to the mouth under the cephalon. The gnathobases, claw-like appendages of the ventral surface, no doubt aided considerably in this function. The nature of the rocks in which they are discovered, as well as their own anatomy, indicate that the trilobites were marine in habitat, denizens of comparatively shallow waters of moderate temperature. In the Victorian Yeringian series

in shales and limestones associated chiefly with shelly fossils and corals.

The secretion of the exoskeleton of the trilobite is a process altogether unlike the shellgrowth of the Mollusca. It is not secreted by a mantle as with the brachiopods and lamellibranchs, but is provided by the whole surface of the complex jointed body. This thin dorsal shield is in the nature of a continuous cuticle thickened and hardened to form a number of rigid plates. The crust remains thin where a degree of flexibility is required. These things being so, it is obvious that:

(1) Marginal growth as observed in the Mollusca is impossible, and

(2) as the animal grew, it would become too large for its carapace, which would then burst and be shed. So at intervals the trilobite would go through this process of ecdysis, and secrete a new and larger carapace.

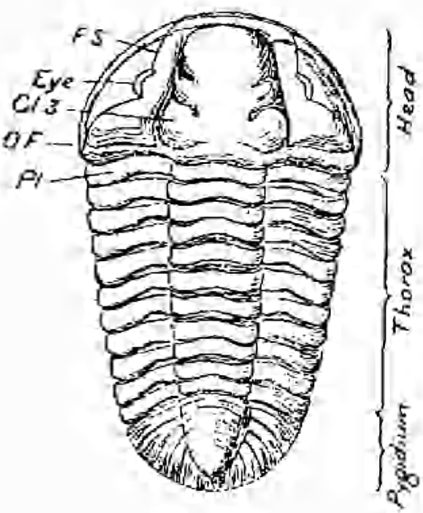


Fig. 1.

The facial sutures, which are used to determine the orders of the trilobites, are no doubt breaks in the carapace to assist the moulting of the head-shield, and particularly of the eyes.

One of the most fascinating features of many trilobites is their eyes. This is particularly so of the Phacopidae, which family is particularly abundant in the Yeringian beds of the Lilydale district. These trilobites possess large, numerous-lensed eyes, the many facets reminding one of the eyes of the common house-fly. Instead of there being one adjustable lens, there are many of fixed curvature, each focusing a small part of the field of vision on to a retinula. The number of facets in trilobite eyes varies from a few to 15,000. *Phacops crosslei*, found near Lilydale, has about 76 facets to the eye; *Phacops sweeti*, from the same area, possesses about 220, while *Dalmanites meridianus*, found at Killara, has approximately 600 facets. In the Phacopidae each lens is separate, with its own cornea. An interstitial test or sclera separates each lens from the next. The large reniform eye of *Dalmanites meridianus*, illustrated in this paper, shows the beautifully regular disposition of the facets. The mould of this specimen shows the rounded surface of the

corneas, while the cast shows the crater-shaped recesses into which these corneas fitted.

The number of facets in an eye is a very definite morphological feature, and is of great value in determining the species. So Etheridge and Mitchell separate their *Phacops sweeti* from Barrande's *Phacops fecundus* chiefly on the difference in the number of lenses. Some variations are due to age and sex, but in the Yeringian forms in question at any rate, those variations are slight. Counting is also affected by incipient lenses, immature in both size and shape. However, thirty-six eyes of one species were carefully examined (viz., *Phacops fecundus*), and the variations were found to be negligible. Two nepionic specimens, only half the length of the full-grown ones, were found to have approximately the same lens count as the mature forms.

Fig. 2.

Examination of these eyes led to an interesting discovery that the common Yeringian trilobite, usually called *Phacops sweeti*, is not often referable to that species, but to the *Phacops fecundus* of Barrande, figured by McCoy in his *Prodromus*. *P. fecundus* has 18 or 19 rows of lenses, with 8 or 9 in the central rows, while *P. sweeti* has 22 rows with 12 in the central rows. That is a strong difference. Further, the writer has noticed that whereas *P. fecundus* is found right through the Yeringian series in question, the form *P. sweeti* has been collected only from the Lilydale mudstones, whence the type was extracted. *P. sweeti* may prove to be of stratigraphical significance.

The following trilobites have been collected in the Yeringian beds of Lilydale and district. The names of the collecting places are appended, and the specimens believed to be new registrations are marked with an asterisk. A question mark after a place-name indicates that the determination of the specimen is not without doubt.

Calymene augustior .. .. Ruddock's Quarry (N.W. of Lilydale, Seville mudstone,* Seville limestone,* Syme's Tunnel (Killara),* Yering (Sweet Coll.).*

C. blumenbachii	"Section 12, Parish of Yering."
cf. *C. tuberculata*	Kilsyth, Upper Yarra.
C. sp.	Syme's Tunnel.*
Cheirurus aff. *gibbus*	Lilydale mudstone, Seville, Upper Yarra.
C. sternbergi	Ruddock's, Seville limestone, Seville mudstone,* Coldstream ("Mic." Black's Quarry).*
Cyphaspis, cf. *bowningensis*	Lilydale mudstone, Seville.
C. lilydalensis	Wilson's Quarry (Old Melbourne road, Lilydale), Seville mudstone.*
cf. *C. yassensis*	Junction of Woori Yallock and Yarra (Nat. Mus. Coll.).*
Dalmanites meridianus	Syme's Tunnel,* Seville mudstone?*
D. sp.	Lilydale mudstone.
Goldius enormis	Lilydale mudstone, Seville limestone.
nr. *G. oblongus*	Lilydale mudstone.
G. greeni	Ruddock's, Wilson's, Seville mudstone?*
Homalonotus spp.	Kilsyth, Wilson's (Cress. Coll.).* Mooroolbark Road,* Yering (Sweet Coll.),* Syme's Quarry.*
Lichas australis	Junction Woori Yallock and Yarra, Syme's Tunnel, Syme's Quarry.* Wilson's (Cress. Coll.).*
Odontopleura jenkinsi	Junction Woori Yallock and Yarra. Syme's Tunnel,* Syme's Quarry,* Ruddock's.*
O. rattei	Junction Woori Yallock and Yarra. Syme's Tunnel.*
O. sp.	White mudstone "between Killara and the Woori Yallock."*
Phacops crosslei	Ruddock's, Killara (Chap. Coll.).*
P. fecundus	Melbourne Hill, Lilydale,* Coldstream,* Seville mudstone,* Syme's Quarry,* Syme's Tunnel, junction Woori Yallock and Yarra.
P. latigenalis	Syme's Tunnel.*
cf. *P. latigenalis*	Lilydale.
P. serratus	Seville, Upper Yarra.
P. sweeti	Lilydale (Sweet Coll.), Melbourne Hill, Lilydale.*
P. sp.	Warren's Quarry (beside Yarra, north of Ruddock's).*
Proetus eryceps	Ruddock's.

This interesting fauna covers seven families of trilobites. The genera *Calymene, Cheirurus, Dalmanites, Homalonotus, Lichas,* and *Phacops* are known to be of world-wide occurrence. It is a significant thing that the order of appearance of these trilobites in our Victorian rocks corresponds, generally speaking, to the order of their appearance in other parts of the world.

It is fascinating to note the designs of adaptation and specialization seen in these animals. There is the rather isolated *Goldius,* with its radial pygidium; the shovel-headed forms appropriate to digging in the mud of the sea-bed; those possessing in a high degree the power of enrolment, like a slater, viz., *Calymene* and *Phacops.* There is *Dalmanites,* with its long tail-spine to provide

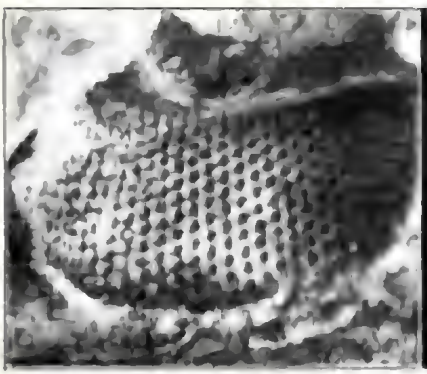


Fig. 3.

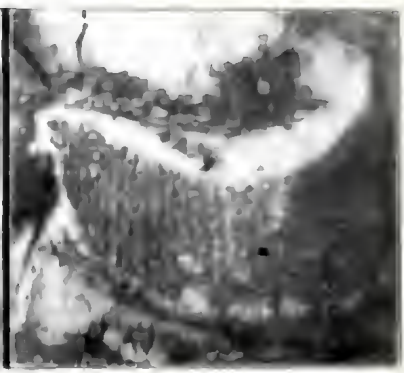


Fig. 4.

good leverage, as in the King-crabs which still survive. Then some have insignificant eyes far from the margin of the cephalon, suggesting that they were mud-diggers; and those with highly-developed eyes set for maximum vision, like *Phacops. Odontopleura* is equipped with a formidable set of spines, reminding one of a hedgehog. The Phacopidae have a warty or granulated ornament. Etheridge and Mitchell found none on their specimen when describing *Phacops sweeti,* but inferred it. That inference has been proved correct, as the writer has discovered specimens showing this ornament.

EXPLANATION OF FIGURES

Fig. 1. *Calymene blumenbachii,* reproduced from Davies' *Introduction to Palaeontology*—

FS = Facial suture. Gl.3 = 3rd glabellar lobe
OF = Occipital furrow. Pl. = Pleuron.

Fig. 2. *Phacops fecundus,* eye.
Fig. 3. *Dalmanites meridianus,* eye. Mould showing cornea surfaces.
Fig. 4. *Dalmanites meridianus.* Cast of same specimen showing lens recesses.

WATER FLEAS AND HEREDITY

[These notes, by Professor W. E. Agar, were written by request, and read at the January meeting of the Club.]

I have used the two common genera of Water Fleas, *Daphnia* and *Simocephalus*, for the following researches on heredity.

1. Advantage was taken of the fact that they have the double mode of reproduction, sexual and parthenogenetic, to make a critical test of modern theories of heredity which have grown out of Mendel's laws. Inheritance of size was investigated in a population of *Simocephalus* which had been bred up by parthenogenesis from a single female. No inheritance of size differences was found at all—large parents produced offspring no larger than those of small parents—i.e., such size differences as existed among members of this population (always measured when carrying their first batch of eggs) were clearly due to environmental accidents such as quantity and quality of food obtained by different individuals, etc. They did not indicate different hereditary constitutions.

In a population of the same species obtained by hatching out a large number of sexually produced eggs, size differences were found to be inherited, as in the case of human stature. The result of these two experiments was to confirm the modern view of genetics, that inheritable differences between the individuals of a species are due to the segregation of genes in the formation of the sex cells, and their secernbriations at fertilization—and that when these are absent, as in parthenogenesis, no inheritable differences arise.

2. The above experiments were carried out at Glasgow. I have also used Melbourne species of the same two genera for an investigation of the "inheritance of acquired characters." The method was to amputate a small portion of one of the antennae of the newly hatched Water Flea. The missing part is quickly re-grown ("regenerated"), but the new part is never so perfectly formed as the original part. The idea was to compel the animals to regenerate the same part of the antennae generation after generation to find if they would come to do it more perfectly as time went on. Even after 100 consecutive generations of practice, however, there was no improvement—nor change of any kind—in the average degree of perfection of the process by individuals of the different generations.

When in Glasgow, I also used these animals for other experiments on the inheritance of acquired characters, and also succeeded in making a cross between two species of *Daphnia*, and followed out the inheritance of the hybrid through many generations of parthenogenetic reproduction. Unfortunately, I could not test their inheritance by sexual reproduction, as the hybrid males were completely sterile—microscopic examination of their testes showed that these were abnormal and produced no spermatozoa.

The Victorian Naturalist

Vol. LIV.—No. 11 March 10, 1938 No. 651

THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, February 14, 1938. The Senior Vice-President, Mr. Geo. Coghill, presided, and about 130 members and friends attended.

SUBJECT FOR EVENING

The evening was devoted to a symposium on "Household Pests." Mr. G. N. Hyam introduced the subject and gave some striking facts as to the destruction caused by insect life. Mr. Chas. French dealt with "Timber Borers" and "White Ants," outlining life histories and detailing methods of control. He stated that creosote and kerosene in equal parts and applied twice either by brush or spray was the best liquid control-mixture.

Mr. R. T. M. Pescott, Government Entomologist, spoke on "Clothes Moths" and "Carpet Beetles." He stated that frequent disturbance was one effective method of control; but it was advisable, where possible, to store materials in airtight containers, with camphor, naphthalene, or, better still, para-di-chlor-benzene. These materials, however, were only effective whilst some of the solid matter remained.

Miss E. Lindsay, research student at the University of Melbourne, spoke on "Silverfish," giving an account of life history and methods of control. Constant war against these pests was necessary as they had periods of hibernation and many could thus be missed; also they were fast breeders. The bait-cards prepared on the formulae of the C.S.I.R. were the best means of control at present known.

Numerous questions were asked and answered. The symposium was a complete success.

CORRESPONDENCE

From the Entomological Society of Victoria, inviting the Hon. Secretary and six members of the Club to an exhibit night.

From the Blind Institute, regarding Floral Week.

REPORTS OF EXCURSIONS

Excursions were reported on as follow: City Streets, Mr. F. S. Colliver, for Mr. A. C. Frostick; Dog Rocks, Mr. G. N. Hyam; Bay Excursion, Mr. H. P. Dickins.

ELECTION OF MEMBERS

On a show of hands Mrs. E. E. Davies was elected as an ordinary member, and Miss Orchid, of Kinglake, as country member.

GENERAL BUSINESS

The Secretary announced that Mr. Ivo Hammett, Mr. E. Keep, and Messrs. C. French and R. T. M. Pescott had presented books to the library, and on behalf of the Club thanked them for their donations.

Mr. C. Barrett introduced Mr. Sydney Porter, of England, and the Chairman welcomed him. Mr. Porter, in replying, remarked on the wonderful birds of Australia, and stated that he intended to return and see more of them.

Mr. Barrett stated that Pelicans were being destroyed, and asked that the Club seek to have them protected. The matter was referred to the Committee for consideration.

The meeting adjourned for the conversazione.

EXHIBITS

Mrs. E. E. Freame.—Toad-fish, Old Wife, Ribbon Fish, Cobbler Fish, Silverside Fish, and young shark.

Mr. S. C. Richardson.—Ammonite from the Lyme Regis, England.

Mr. T. S. Hart.—*Erechthites mixta*, collected by Mr. W. Hunter at Mt. Drummer (hillside, wet jungle). (This species was collected on Goon Murk, south of Bendoc, on a Club excursion in 1889.) Prickfoot and Glasswort, Wild Lettuce, and a Rust Fungus on Selliera, all from Moorabbin.

Mr. V. H. Miller.—Aboriginal stone axe, from Pt. MacDonnell, South Australia; also nest of the Hooded Robin (*Melanodryas cucullata*), from Mornington Peninsula.

Mr. H. J. Reeves.—Coloured photographs of Australian flora; *Humea elegans*, from Orbost (collected by Mr. W. Hunter).

Mr. F. S. Colliver.—Fossil remains from cave deposit in the Nelson district.

ERRATUM

The Victorian Naturalist, February, 1938, page 146: Exhibits at January meeting—Mount Buffalo flora: Delete "*Nertera depressa*—Cushion Nertera (in fruit)," and substitute "*Marianthus procumbens*—White Marianth (in fruit)." Error due to confusion in identification.

Addendum: "Flagellata New For Australia," *Vic. Nat.*, February, 1938, p. 159: "A-C, After Lemmermann, for comparison," add "A. *Colacium arbuscula*; B. *C. vesiculosum*; C. *C. cylindricum*."

SOME HYDROPHYTES OF A MURRAY BILLABONG

By W. J. ZIMMER

In this article no attempt is being made to cover the multitude of plants that appear in the many lakes, watercourses, swamps and billabongs along the Murray River in the vicinity of Mildura. To permit the reader to gain some idea of the water-loving plants commonly found in easily accessible waters, I propose to describe a typical billabong.

Generally shaded more or less by the overhanging limbs and foliage of the ancient River Gums (*E. rostrata*), which form a single-species upper story, the water of a billabong is very clear. After the waters from the annual rise of the river have receded to normal level the deepest spot is about 48 inches. The depth of water regulates the distribution of those plants actually rooting in the mud at the bottom. The degree of dampness of the soils of the immediate bank induces the growth of other less-water-loving species. There are therefore to be seen distinct zones formed by different species according to their particular adaptibility to the immediate environment. A typical billabong usually exhibits five distinct zones, namely:

(1) The plants growing in the very wet soil of the bank (the outer zone).
(2) The plants growing in shallow water, there forming a narrow fringe.
(3) The plants growing in about 18 inches of water.
(4) The plants growing in water between 18 inches and 48 inches deep (the inner zone).
(5) The plants which occur in a cosmopolitan fashion—depth being no consideration (floating plants).

No hard and fast rule can, however, be laid down regarding depth, but there definitely appears to be a marked preference shown towards the above zoning arrangement. The outer zone of plants not actually growing in water is comprised of a predominating growth of the Spiny Mud-grass (*Chamaeraphis spinescens*) which often sends out long leaf-bearing stems capable of floating on the nearby water. The inflorescence is axillary and erect to semi-erect. Here, both species of Nardoo (*Marsilia Drummondii* and *M. hirsuta*) frequently form dense masses. Although the development of the Nardoo is usually weak when soil moisture has been reduced to a low value, occasioned by an unusually rapid recession of the water level, the formation of the sporocarps appears to proceed in an accelerated fashion. Plants occurring on slightly higher ground always have their clover-like leaves (four leaflets) folded together in a vertical position. While they remain floating on the surface of the water, the leaflets are extended,

but the formation of sporocarps does not proceed under water. *Wahlenbergia gracilis* and *Centipeda minima* are also frequently abundant.

Zone 2 is characterized by a dense growth of *Juncus pauciflorus* and *Cyperus Gunnii*, interrupted here and there with patches of the cosmopolitan *Typha angustifolia*, and the hedge-like *Phragmites communis*. This zone is marked by four height classes—*Juncus* attains a height of 18 inches, *Cyperus* 36 inches, *Phragmites* 54 inches, and *Typha* up to 72 inches. None of these is restricted to the Murray. *Limnanthemum crenatum*, with yellow flowers and floating orbicular-cordate leaves on long stalks, together with *Jussieua diffusa*, with floating alternate stalked leaves and two small stipular bladders, occupy positions in shallow water adjacent to the bank. These two species are widely spread and are not confined to the Murray.

The predominating species in Zone 3 is *Myriophyllum propinquum*, accompanied with spasmodically placed patches of the celebrated *Valisneria spiralis*, the Swamp Lily (*Ottelia ovalifolia*) and *Potamogeton crispus*. The remarkable method employed by *Valisneria spiralis* in accomplishing the fertilization of the pistillate flower is too well known to bear recapitulation. *Ottelia ovalifolia* cannot be regarded as a common plant along the Murray. The flowers are bisexual. Soon after fertilization has been effected the petals become flaccid and the flower sinks about two inches below the surface of the water, where the seeds ripen. The seeds are ultimately liberated by a gradual rotting away of the wall of the ovary. The disintegration of the ovary wall commences at the apical extremity, and it slowly extends retroversely to the thick pedicle. To one unfamiliar with this phenomenon, the flowerless pedicles lying just under the water-surface convey the impression that the flowers have been eaten off by water-birds, fishes or water-rats.

The Curly Pondweed (*Potamogeton crispus*), although totally submerged, raises its flower-spikes above the water so that the act of pollination can be consummated. This species pollinated by wind action, as also is *P. sulcatus*, which will be referred to later. *P. crispus* often exhibits the phenomenon of protogynous dichogamy, i.e., the stigma projects from the flower ready to receive the pollen while the petals are still closed. In extremely cold waters, where freezing occurs in the depths of winter, it is said that this species defeats extinction by the production in late autumn of leaf-bearing shoots which drop from the stems before the surface of the water is frozen. These sink to the bottom and use their pointed lower-ends for the purpose of boring into the mud. I have not, however, observed this method of reproduction in Murray waters.

The deeper waters of the central region (Zone 4) are sometimes marked by the appearance of a solitary mud-rooting species, namely,

Potamogeton sulcatus. The lower leaves are submerged, the floating leaves are oval in shape and they have numerous veins. Confined to the north-west of Victoria, this species is often confused with *P. tricarinatus*, which also is frequently abundant hereabouts. During November-December the copious production of pollen astonishes the onlooker. So plentiful is the supply that the mind of one is first imbued with the idea that sulphur has been strewed over the surface of the water. A closer examination reveals the presence of thousands of swollen anthers dispersing pollen of a light yellow colour. This is distributed by the wind.

The only floating species commonly found in these waters is the widely-spread *Azolla filiculoides* var. *rubra*. When the water sinks causing the plants to rest on the mud, this delicate and variously-hued plant has the power of absorbing nutriment from the wet ground, and it thrives as long as there is sufficient moisture. It is, however, at its best when the stems float on the surface of the water and the roots do not come in direct contact with the mud. The roots, however, succeed in collecting a considerable film of minute-particled silt as they float about the billabong. *Azolla* presents a particularly pleasing colour picture which varies from many shades of green to brown and reds of varying intensity.

THE PRICKLEFOOT

The Pricklefoot (*Eryngium vesiculosum*), found in some muddy situations, might at first sight be taken for a thistle, but actually belongs to the Carrot family. Specimens taken at Moorabbin, in February, showed flower-heads in all stages from buds to mature fruit. The earliest flower-head stands in the centre, behind it branches arise, in their turn forming terminal flowers and new branches behind these, and so on. The heads in full bloom show the brightest blue, all visible parts of the flower become blue, except the pollen, even the vesicles on the fruitlets show some blue. The spiny bracts are also blue except their tips. In somewhat advanced buds the colour is whitish and the calyx lobes pointed, anthers and petals turned in.

After the flowers are fully open, the stamens first fall; then the petals turn yellowish and fall, their fringed ends still remaining turned in. When the petals fall, the lobed and ornamental cushion surrounding the styles is well seen. Gradually the blue colour disappears, the bracts resume a greenish colour for a time, but all eventually change to pale brownish. The fruitlets may at last be shaken out or otherwise taken off for examination. They present an appearance curiously suggesting a minute crustacean or an insect. Along the sides are the vesicles, now brownish. At the upper end are sharp and hardened calyx lobes, easily able to attach themselves to clothing, and no doubt to animals or birds. In spite of the spiny bracts, much of the detail of the flower can be seen, but a bract is easily pulled off and a floret separated.

The name *Eryngium* seems to be of uncertain origin. *vesiculosum* refers to the ornamented vesicles on the fruitlets. Prickfoot needs no explanation, the spines of leaves and bracts readily pierce clothing, the stronger bracts can even be persuaded to go through the soft leather of a boot-tongue.

—T.S.H.

FURTHER NOTES ON HIBERNATION OF THE ECHIDNA

By EDITH COLEMAN

An account was given (*Vic. Nat.*, Nov., 1936) of the hibernation of "Sandy," an adult male Echidna, brought from the Zoological Gardens (December, 1935), as a companion for "Prickles," a three-quarters-grown female which hibernated under domestication in 1935 and 1936.

"Sandy" did not take kindly to captivity. Not until he had been severely hurt in falling from the roof of his enclosure did he appear to settle down. In 1936 he hibernated for six periods —in all, 133½ days. He did not again attempt to escape. At the end of March, 1937, he became lethargic. He hibernated for seven days (April 11-18) and for a further period of five days (April 18-23). He emerged from his burrow on the afternoon of April 23, ate his food and retired. As he did not again appear, the mound was opened on September 1, when he was found to be dead, rolled tightly in the usual hibernation position and encrusted with hard clay soil. The body seemed to be perfectly preserved as if air had been excluded.

On both Echidnas there were seen at different times, and in various stages of growth, the large swollen (female) white ticks common to Echidnas. These were removed with forceps, not an easy task, for the sucking apparatus is always sunken deeply into the body of its victim. Smaller brown ticks (males) of the same species were also removed. These do not attach themselves to the animals. Most of the Echidnas I have handled had no external ears, but "Sandy" had well defined conchae that stood out very clearly when he had shed most of his spines from this region. "Prickles," too, has visible ears, though the conchae are not so prominent as those of "Sandy." In the illustration (page 179), "Sandy's" left concha is shown.

In April, 1937, "Prickles" seemed out of sorts. She behaved very strangely at feeding time. Holding up a fore-foot, throwing her head upwards and backwards, she seemed, for a moment or two, to lose power of movement. Saliva dribbled freely from her mouth. She would presently recover, advance and eat her food, rather slowly, interrupted by hiccoughs. By the middle of May she had recovered. She then seemed extraordinarily energetic, and still showed no sign of hibernating. She hibernated for eight days (June 14-22) when she emerged to eat her food, and retired. She hibernated for a further period of nine days (June 24-July 3). She then came out daily until July 16 when she hibernated until August 12, a period of twenty-seven days. There were no further periods of hibernation, although she occasionally missed a day when it rained. She was active on many of the coldest days of a very cold winter.

Thus "Prickles" hibernated for three definite periods totalling 44 days as against three periods amounting to 117 days in 1936, and only one period of five days in 1935. She seems perfectly healthy, eats well, burrows daily in a few holes of her own making, and is glad to be petted or handled in any way.

On January 26, 1938, a telephone message stated that an Echidna had appeared in the garden of a Blackburn resident, "who feared he might have to kill it!" I explained that the Echidna is rigidly

"Sandy" and "Prickles."

protected and offered to remove the animal. It was an adult male, and as I had no difficulty in lifting him from the tin trunk in which he had been placed, I thought he had probably been in confinement and would, perhaps, settle down here as a companion for "Prickles." I had been given permission to obtain one, but hitherto there had been no opportunity of doing so. The newcomer had no intention of settling down. He did not climb, but he was an expert burrower. He dined heartily, and then escaped twice, in twelve hours, so cleverly that I felt he had earned his freedom. Next day he was liberated near the Dandenong Creek. His short visit had stressed the cruelty of confining adult animals.

NEW BUTTERFLY FOR VICTORIA

By A. N. BURNS, B.SC., F.E.S.

Some months ago my friend, Mr. F. E. Wilson, of East Malvern, handed to me a few papered specimens of a small dull brown Satyrid butterfly (*Ypthima arctons* Fabr.) which he had collected at Lake Tyers in January, 1937. Mr. Wilson said he thought that this was a new record for Victoria, and it was. In January and early in February of this year I spent a fortnight in the area bounded by Lakes Entrance on the west, Orbost on the east,

Ypthima arctons × 2½.

Buchan on the north and Lake Tyers on the south, and was fortunate in locating this butterfly at Nowa Nowa. It appeared to be plentiful, though perhaps a little local in its distribution. The type of country where it occurred appeared to be very similar to that in which I collected it freely at Oatley, some fourteen miles south of Sydney, in 1921. As far as I am aware, the previous most southerly authentic record for this species is the Illawarra district, New South Wales.

The genus *Ypthima* is Indo-Malayan, and contains many small, dull-coloured species, which are all more or less similar in appearance. The sexes are very similar in appearance, so much so that a brief description of the male will suffice for both.

Plate XVII

Photo. by R. K. Monro.

Hooded Robin at Nest

MALE AND FEMALE

Antennae fine, considerably less than half the length of costa, clubs gradual and slender. In the forewing only three veins are slightly swollen at their bases, and the cell is just less than half the length of the wing. Forewing, above, smoky brown, a rather large two-papilled ocellus in subapical area, black ringed orange-brown. Hindwing smoky brown—in all examples taken, a small sub-tornal ocellus black, ringed orange-brown. (In northern examples this ocellus is often absent.) Beneath, both wings yellowish-brown with almost transverse striae—darker brown. Ocelli visible as above. If anything, the markings on the underside of the female are paler.

Waterhouse and Lyell give many locality records for this species, in range from Cape York to Sydney; so far it appears to be very constant, and no geographical races have been described. It is possible that butterflies of the genus *Hypocysta* may turn up in the same area, because two species occur freely as far south as Pambula, New South Wales. My reason for supposing this is that I have bred both *Y. arctous* and *Hypacysta metirius* from the same grass in the Sydney district, and I observed this grass at Nowa Nowa. Other butterflies noted on my trip, and worthy of mention, are: *Heteronympha paradelpha*, *Appias ega paulina*—quite plentiful at Buchan, *Danaida archippus*, and the mistletoe imperial white—*Delias harpalyce*.

HOODED ROBIN'S HOME LIFE

At Pearcedale, on the Mornington Peninsula, many birds nest, and Mr. Ron. K. Monro, who has a cottage there, finds subjects for his camera every season. He has been successful at night as well as in the daytime, and some of his flashlight photographs are unique. In November, 1937, a nest of the Hooded Robin (*Melanodryas cucullata*) was kept under observation, and during two week-ends Mr. Monro obtained a series of pictures, illustrating the home life of the small black-and-white bird.

The nest, built in a low Banksia, was only three feet from the ground. There were two eggs and incubation lasted only ten days. The female Robin did all the brooding, being fed on the nest by her mate. Feeding the young was a duty shared, and the food consisted chiefly of very small moths, caterpillars and beetle grubs. The mother bird, on a hot day, often perched on the rim of the nest so that her body and open wings cast a shadow over the brood. Both sexes occasionally practised the "broken wing trick" when the photographer was close to the nest.

A NEW SPECIES OF THE GENUS *CRYPTOSTYLIS* R.Br.

By W. H. NICHOLLS

Cryptostylis Hunteriana sp. nov.

Planta gracillima circa 15-45 *cm. alta caulis carensfoliis bracteosus.*

Flores fere 5-10 *sub-magni; labellum anguste-oblongum, convexum, glandulosum, marginibus recurvis circa* 3·3 *cm. longa; axis basi striæ* 5-*elevatæ breves; lamina medio dense pannosa; apice recurvo.*

A comparatively slender plant, about 15-45 cm. high, leafless in all the specimens seen; stem bracts appressed acute 6-8, not including those within the raceme. Flowers 5-10 rather large, sessile, reversed; the labellum conspicuous in a more or less erect position, narrow-oblong, convex, markedly glandular, margins recurved about 3·3 cm. long, the lower half yellowish-green with red markings, upper portion light red merging into the black "furred" centre; 5 conspicuous, more or less interrupted black lines arising from the concave base (which encloses the column) extending upwards and merging into a broad longitudinal, slightly raised central ridge resembling closely woven black wool, which extends almost to the tip, apex recurved; sepals and petals very narrow, subulate yellow; sepals about 2 cm. long, petals about 1 cm. long.

Column inconspicuous, somewhat resembling that in *C. subulata* Reichb.

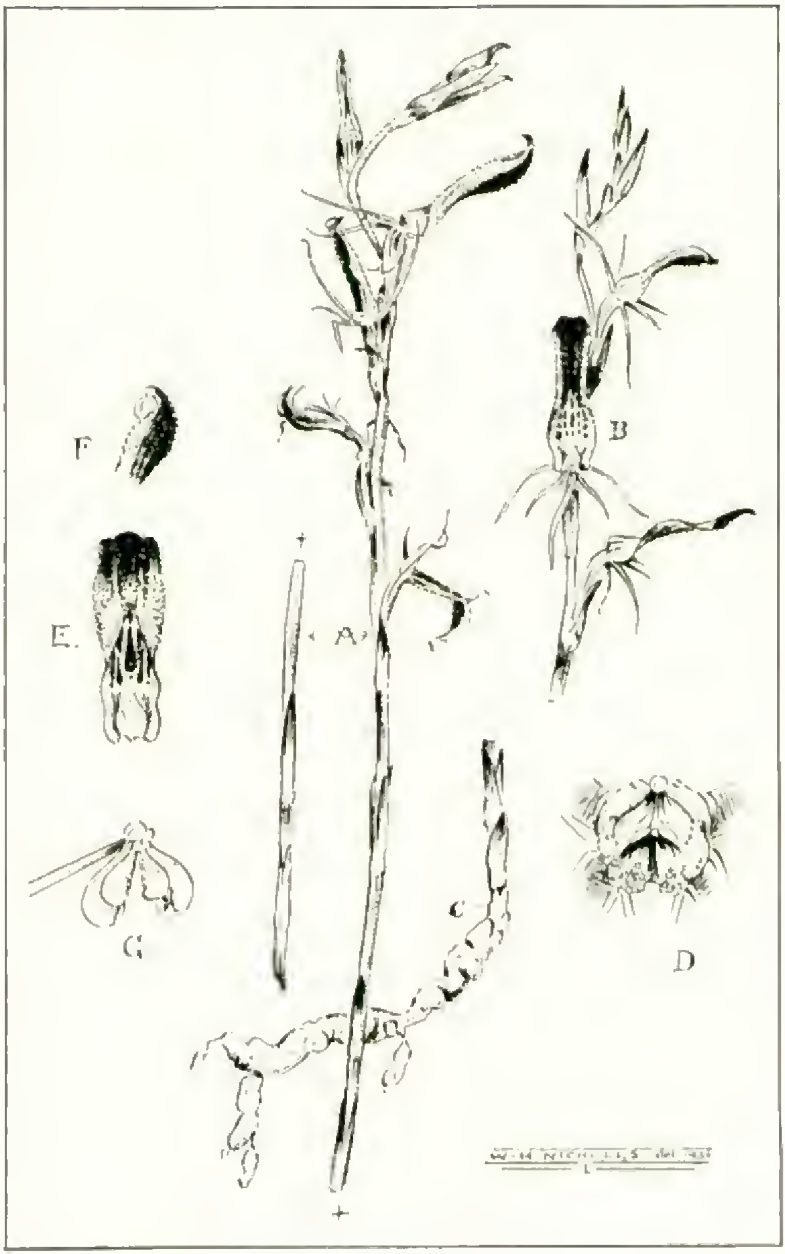
The discovery of a new, and apparently old-established, "Tongue Orchid" in east Victoria is of peculiar interest to orchidologists. The first specimens were found on the Marlo racecourse. The genus is distributed throughout the Malay Archipelago, New Guinea, Formosa, Fiji, etc., and includes approximately thirty species. All the Australian species are endemic. *C. erecta* Br., a New South Wales species, was added to the Victorian Census in April, 1936,[1] and was collected at Marlo also. *C. subulata* Reichb. and *C. leptochila* F.v.M. are found there also.

The other Australian form, *C. ovata* Br., is endemic to Western Australia.

The discoverer of this new form is Mr. W. Hunter, surveyor of Orbost district, whose name the new species will bear. To another Orbost resident I am indebted for detailed data concerning the habit, distribution, etc., of this plant. Mr. A. Wakefield, Jnr., accompanied by his father, found abundant specimens, and his notes are of much value and interest: "Wherever we looked we

1. *The Victorian Naturalist*, vol. lii, p. 205.

Plate XVIII



Cryptostylis Hunteriana sp. nov.

found the new orchid in the country off the old Bemm Road, from Cape Conran to Orbost, a distance of about twenty-five miles. It grows on the coastal grass-tree plains which extend from Marlo eastward from the coast one to six miles, the large Tongue Orchid (*C. subulata*) invariably in association. None of the specimens had leaves and scores of plants were seen."

The Ichneumonid, *Lissopimpla semipunctata*, is concerned in the pollination of this species.[2]

Furred-Tongue Orchid has been suggested as a trivial name for *C. Hunteriana*. Habitat: Marlo plains. Flowering December-January.

(Note.—This orchid cannot at present be regarded as entirely leafless; carefully marked plants will be visited from time to time. It is rather significant that the other three species growing on the plains possess foliage.)

2. For various papers on this question, see Mrs. E. Coleman's articles in this journal.

KEY TO PLATE XVIII

Cryptostylis Hunteriana, sp. nov.

Fig. A.—The type specimen in the author's herbarium.
" B.—Raceme of flowers.
" C.—Rhizome and lower portion of stem with bracts.
" D.—Column.
" E.—Upper portion of labellum with re-curved tip.
" F.—A labellum, showing prominent glandular striæ, etc.
" G.—Pollinia.

ADDITIONS TO LIBRARY

The following books have recently been presented to the Club's library, and are available to members on loan:

Presented by Mr. and Mrs. Charles Barrett:

Outline of Plant Geography (D. H. Campbell).
Captain James Cook (Vice-Admiral Gordon Campbell).
Man and the Termite (Herbert Noyes).
Life (Sir Arthur E. Shipley).
Our Face from Fish to Man (Wm. K. Gregory).
Mathematics for the Million (Launcelot Hogben).
Man Makes Himself (V. Gordon Childe).
What Butterfly is That? (G. A. Waterhouse).
Through Space and Time (Sir James Jeans).

Presented by Mr. E. Keep:

A. H. S. Lucas, His Own Story.

Presented by Mr. Ivo Hammet:

A Plant Hunter in Tibet (F. Kingdon Ward).

Presented by the Authors:

Household Insect Pests and Their Control (Messrs. C. French and R. T. M. Pescott).

AN UNPUBLISHED LETTER FROM THE LATE SIR BALDWIN SPENCER

Through the courtesy of Mr. Charles French, we are enabled to publish the last letter written to his father, the late Charles French, F.L.S., by Sir Baldwin Spencer, K.C.M.G., F.R.S., D.SC. It is dated 5/5/29, from Magallanes, Chile. Sir Baldwin Spencer died in Patagonia from an attack of angina pectoris on July 26, 1929, about three months after writing this letter:

"At last, after a very slow voyage that stretched over ten weeks, all but a day or two, I am in this far-away place on the Straits of Magellan. I came out on a cargo boat called the *Tudor Star* (Blue Star Line). It does not officially carry passengers, so I am formally 'sigued on' as 'Purser,' and my secretary, Miss Hamilton, as 'Chief Stewardess.' We joined the boat in Newcastle, or rather, South Shields, on a bleak, snowy day in January, and saw neither sun, moon, stars nor land till we put in close enough to see Cape St. Vincent to signal—then on slantwise across the Atlantic, till we struck the Brazil coast, which looked deadly uninteresting. I thought of Wallace's *Amazon*, and would like to have seen the inside of the country. Then on, down the South American coast till we were opposite the La Plata.

"We had to put in at a few out-of-the-way Argentine ports, to load frozen mutton—for which I was very glad, as it gave me a chance at least of seeing what the coastal country was like. I thought that some parts of Central Australia were dreary, but this country, at least along the coast, is even more dreary. From the ship, all that one could see was a line of beach, a strip of sand with a little settlement, and a line of absolutely barren yellow cliffs. There were no signs of grass—not a single tree—everything just bare and sterile. The cliffs were the front wall of the great Pampas, that stretched inland as far as one could see. There was nothing on them save small thorny shrubs, and here and there a few Guanachos—a kind of cross between a Camel and a Llama—to look at—also a few Rheas or Ostriches as they call them here, though of course they are much more like Emus.

"Every little town has its 'Frigorifico,' that is, the works to which the sheep are brought down from up-country, and killed and transformed into frozen mutton. The only interesting things, apart from these, were here and there 'kitchen middens' of the old Indians, where now and then you can find chipped stones, or if you are lucky, an arrow-head. They were much like our old middens on the Promontory, and often I wished that you and I were back amongst those, and also the lovely hills; and more especially on the flat by the Darby River, or amongst the Banksias.

"There is no water in these parts, save such as is conserved in underground tanks, so that gardens and flowers are unknown, and all vegetables must be imported. This country would not suit you.

"Like Australians, the people are great meat-eaters, only much more so. Their dietary arrangements are as follow: At 8 o'clock coffee and rolls. At 12 or 12.30 a meal called 'Almeurza,' a kind of combined breakfast and lunch. The menu of my first 'Almeurza' was as follows: Course 1—Cold ham or sheep's tongues, of course plentiful near any 'Frigorifico.' Course 2—Hot roast beef, potatoes and cabbage (the beef off the ship, because cows decline to grow in this country). Course 3—Liver and bacon, potatoes and cabbage. I thought this quite enough meat for one meal, but then came Course 4—Hot pork chops, potato and cabbage. Course 5—Pastry and pudding. Course 6—Bread and cheese and coffee. I hope Mrs. French will remember this if any Argentine friend should call at Kooyong Road.

"I undid a button or two when my hostess was not looking, and lay back and rested awhile. After 'Almeurza' there is an interval until cocoa or coffee is served at 8 or 8.30 p.m. This interval is usually broken by a heavy afternoon tea at 4 p.m.

"We called in at three Argentine ports, Desado, St. Julian and Santa Cruz, and on April 13 entered the Magellan Straits. The country is more interesting, with real hills, and green grass and trees. At one point called the 'first narrows,' they were not more than a couple of miles across—or didn't seem to be—and for the first time I saw Tierra del Fuego. This northern end of the island is comparatively low-lying, but farther south it becomes mountainous. At sunset we dropped anchor off Magallanes, the old name of which, still on the maps, is Punta Arenas.

"It is now quite a flourishing little town, with electric lights and the 'town houses' of a few sheep magnates, round a central plaza, in the middle of which stands a fine statue of Magellan, looking down the Straits, which here run almost north and south.

"From my window in the hotel I also look down the Straits, and can see in the distance the tops of snow mountains forming the very end of the Andes in Tierra del Fuego.

"To-morrow I hope to start off in a little schooner of some 20 tons. We go down the Straits, and then instead of turning west towards the Pacific, go on south through some intricate passages or 'canals' as they call them here, amongst the islands until until we are out in the South Atlantic; then we turn in eastwards into the Beagle Channel, until we come to a little settlement called Ushuaiya, right on the very south of Tierra del Fuego. I have just been inspecting the schooner, which is not exactly what might be called a 'luxury boat,' and I hope the weather will be kind to us.

"Melbourne seems a long way off, and I would much like to be able to run in and have a chat with you—better still, to be seated on the verandah on the Darby flat or outside the old rest house in the evening. Those were the pleasant days and I wish we could live them over again—also the old 'Hermitage' times. Let me have a line.

"Yours ever,

"(Signed) W. BALDWIN SPENCER."

DOWN AT THE DOG ROCKS

Forty members of the Club visited Geelong on January 31, mainly with the object of inspecting the area of 230 acres at Batesford, which may become a National Park; it is under offer and efforts are being made locally to have this very interesting bit of country added to Victoria's permanent reserves, as sanctuary for wild life and a resort for all who delight in spending days, or hours, out in the open. It is portion of the Belcher estate, and retains much of the original flora, including eucalypts. The excursion party, under the leadership of Mr. G. N. Hyam, was most favourably impressed, and the Club wishes Geelong folk success in their project—a Bush Park at Batesford.

Dr. F. Moreton, President, and other members of the Geelong Town Planning Association, met our excursionists on arrival at Geelong, and accompanied them to the Dog Rocks and the proposed park area. Addresses were given by Mr. Hyam, Dr. Moreton, Mr. H. A. Purnell, Mr. F. Colliver and Mr. H. C. Stewart.

PROPOSED PARK AT DOG ROCKS, BATESFORD

The area at the Dog Rocks, proposed as a bush park, is a most admirable one by reason of its accessibility to Geelong, its natural beauty, soil conditions and aspect. The Moorabool River flows through the property. Aesthetically, the site is ideal. From the higher points extensive views are obtained—a lovely panorama of landscape embracing in the distance the thickly wooded Brisbane Ranges, the smooth contours of the Anakies, the rocky silhouette of the You Yangs and the cool waters of Corio Bay.

The vegetation noticed on our visit is typical of the district and, happily, many of the major characteristic species still flourish, and with judicious treatment other forms that may have temporarily disappeared, or have diminished, will undoubtedly reappear and increase. Fortunately, too, very few alien plants came under notice, but none could be regarded as pests, and being mostly of an ephemeral nature, could easily be eliminated.

Eucalypts dominate the botanical scene, the chief species noted included the Manna Gum (*Eucalyptus viminalis*) and the Yellow Box (*E. leucoxylon*). The former was flowering profusely, and many splendid specimens claimed attention with their bark-covered butts and white and yellow branches. A third species, probably *E. polyanthemos*, was seen, but no flowers or seeds were present to determine identification. Of the four Acacias observed, all in vigorous condition, *Acacia implexa* was in flower, occasional flowers on *A. mollissima* on the slopes towards the river, while the ubiquitous Hedge Acacia (*A. armata*) grew on the upper levels. In a small bush of the last-named species four nests of a Babbler were noticed. In some districts the Hedge Acacia is a proclaimed noxious plant, but the late Professor A. J. Ewart questioned whether the proclamation had achieved any useful economic result. The chief objections seem to be the prickles, causing stock to avoid it, and its spreading habit on grazing land. Against this must be credited its value in maintaining the nitrogenous content of the soil. Of native plants, it has no rival as a hedge, and the leaves contribute to the formation of humus.

Examples of the Drooping Sheoke (*Casuarina stricta*) were noted, though signs of its declension in number and vitality were apparent. Several dying trees stood as mute evidence of the effect of grazing. Regrettable also to find only one species of *Proteaceæ* growing, the Silver Banksia (*Banksia marginata*). One or two rather fine trees were covered with fruiting cones and immature flowers. In the ground close by several seedlings showed the young foliage eaten back by sheep or rabbits. A shrub which thrives on the area is the Sweet Bursaria (*Bursaria spinosa*). This grew abundantly, and trusses of late flowers showed here and there. Another prolific shrub flowering profusely was the Common Correa (*Correa rubra*), together with the White Correa (*C. alba*). Mention is also made of two species of *Exocarpos*, the Cherry Ballart (*E. cupressiformis*) and the Pale-fruit Ballart (*E. stricta*); the White Burgan (*Kunzea pedunculoris*), just past flowering; and the Giant Hop-bush (*Dodonaea viscosa*). All these show vigour and impart a typical Australian character to the forest floor.

Another pleasing feature is the variety and abundance of native grasses in the open spaces. A number of sedges and aquatic plants were scanned on the fringes of the river and adjacent pools, but time did not permit other than a superficial examination. Though the prospect did not promise well, two ferns were found. In all more than 50 species of native plants were scheduled for the day's outing, and if more time had been available, many others would have doubtless revealed their presence.

The property at the western end has been partially cleared of timber, and is lightly covered with pasture grasses. Signs of superficial surface soil desiccation by sheep and rabbits were observed on the steeper slopes. If the area is to be adequately preserved, grazing must necessarily cease, while

the erection of a rabbit-proof fence would help materially in the rehabilitation of the natural vegetation. Another factor in the restoration of the bush to be borne in mind is the desirability of humus-forming material accumulating without interference, so no dead timber should be burnt or removed. Opinions differ as to the best methods of reafforestation, but in the case of a bush area such as the Dog Rocks, perhaps the wisest procedure is to first let Nature take her course.

H. C. STEWART.

GEOLOGY OF THE DOG ROCKS AREA

The Dog Rocks area consists in the main of a granite mass, which is certainly allied to the nearby similar masses at Maude, Barrabool Hills, You Yangs. The granite is of one type, a true acid granite, and here at the Dog Rocks is a pink-coloured, coarse-grained rock with porphyritic felspars, which under the microscope is seen to consist of abundant quartz, orthoclase and subordinate plagioclase, biotite and some muscovite. The rock is susceptible to attack by atmospheric weathering agents, and crumbles away to a coarse sand. Dr. H. Summers has classed this granite with those of Cape Woolamai, Gabo Island, and Mt. Buffalo, in his "Alkaline Group," of probable post-Ordivician and pre-Devonian age.

At the Dog Rocks proper, on the eastern flank of the hill, there occurs a discontinuous line of boulders of an entirely different rock now known as "epidiorite." Previous names were trap, hypogene, diabase and greenstone, still in popular use. It was the presence of this rock, as well as the food possibilities of the district, that attracted the aborigines, and from it they fabricated some of their better-class stone weapons. In a hand specimen, this rock is dark in colour, of medium coarse texture, and has a specific gravity of 2·93. Under the microscope it is seen that the rock originally consisted of crystals of augite and plagioclase felspar. It has now been almost completely recrystallized, and consists of the following minerals: partially altered plagioclase, a granular aggregate of albite felspar and zoisite, augite in some part unchanged but mostly actinolite and tremolite, and chlorite.

The earliest description of this rock was made in 1872 by Prof. Ulrich, in the Exhibition Descriptive Catalogue. In 1916 a local syndicate attempted to work the epidiorite of Gleeson's Hill for monumental stone, and these activities were reported on by W. H. Ferguson, J. P. Kenny and A. M. Howitt, of the Mines Department.

A small amount of pyrite is disseminated throughout the rock, and occasionally thin encrustations of pyrite and molybdenite can be seen on some blocks. Alteration of the pyrite has led to the deposition of iron oxides along certain joints, and an analysis made of this oxide gave traces of gold and silver, but absence of platinum. This epidiorite must be regarded as a very ancient (Upper Cambrian) extrusion of a massive volcanic rock known as dolerite, possibly local to the Geelong district, during the following ages (Ordivician, Silurian, and perhaps Devonian) great pressures and temperatures caused many changes in the structure and composition of the rock. Also, about that time the rock was probably intruded and uplifted by the granite. Subsequent denudation has removed a great deal of the Epidiorite, so that now the rock outcrops as roof-pendants on the granite.

Close to this area is the well-known Tertiary Limestone deposit at Batesford, an enormous deposit consisting mainly of "Foraminifera"; and from the evidence it seems that the Dog Rocks and also the You Yangs were islands in the old tertiary sea.

The above notes have been compiled from a paper on "The Relationship of the Epidiorite and the Granite at Barrabool Hills and Dog Rocks, near Geelong, Victoria," by Alan Coulson, B.Sc. (*Proc. Royal Soc. Vic.*, Vol. 42, p. 99); and "Victorian Hill and Dale," by T. S. Hall.

F. S. COLLIVER.

MELBOURNE BUILDING STONES

Sporadic showers just prior to the excursion held on January 15 did much toward limiting the attendance to a comfortable total of fifteen members and friends. During last year, a similar excursion was organized with a deliberate preference for Victorian building stones, so that, on this occasion, a corresponding preference was shown for rocks quarried in other countries and in the remaining Australian States. As in the previous outing, the author of "Victorian Building Stones" appropriated the status of legendary oracle, indirectly proffering the information that, of the forty-one Collins Street buildings listed in the pamphlet, in a little over 60 per cent. of them material from overseas had to some extent been used.

Collins Street became the locus of activity for the afternoon. An attempt was made to vary the consideration of rocks from a strictly utilitarian standpoint with occasional comments upon some of the geological processes active during their formation. Thus, not only were sections of Silurian fossils, transported from Spring Hill (Waldergrave) in New South Wales, examined in the marble facing of Phair's Hotel, but evidence of the effect of abyssal earth pressures also inferred from the minor fault planes traversing and displacing the fractured halves of an occasional fossil mollusc or brachiopod. Similarly, evidence of even more acute diastrophism was noted in the brecciated marble plinth bordering the steps of the Regent Theatre. While numerous basic segregations in the granite facing the T. & G. Building served to illustrate something of the mechanism whereby the parent mass, when in its originally molten state, intruded the surrounding rock formations, engulfing dislodged fragments in its upward passage through the earth's crust, leaving the segregations, or xenoliths, as representatives of those alien rock fragments metamorphosed, but not completely digested by the molten granite at the time of its ultimate consolidation.

Some Victorian rocks either not much used, or not examined during the previous excursion, were pointed out. Among them were the weathered granite of the Warby Ranges, Wangaratta, used in the superstructure of Collins House, and the porphyritic-granite of Trawool, used in the exterior ornamentation of the City Mutual Life Building. While the latter were represented by the granites of Dergholm and Orbost, used in the bases of the A.M.P. Building and the Commonwealth Bank respectively. At the same time, polished columns of Gabo Island granite, in the London and Lancashire Insurance Building, were favourably contrasted with those of the Scottish red granites from The Hill of Fare, Corrennie, and Peterhead; and perhaps not so favourably with the more richly coloured "Carnation Red" granite of Sweden, and the "Balmoral Red" granite of Finland. It was also noted in passing that a number of the rocks listed as granite really belonged to petrographically distinct members of the granite family, notable variants being the porphyritic adamellite of Shap, in Westmoreland, and the so-called "Blue," "Grey," and "Emerald Pearl" of Norway, which does not even belong to the family. And the presence, and post-volcanic origin, of the interesting alkali-rich minerals sanidine, aegirine, and arfvedsonite, infilling fissures in the Bowral "trachyte" of New South Wales, was noted and commented upon. The effect of an acid atmosphere upon the polished face of marble slabs used exteriorly was discussed, and the reason for the weathering of the Jurassic sandstone used in the superstructure of Scots Church explained. A contrast was made between the degree of recrystallization in the true marbles, exampled by the macrocrystalline rock of Angaston in South Australia and the white statuary marble of Carrara, and the fossiliferous limestones, of which the Tertiary limestone of Oamaru, in New Zealand, was taken as an extreme type.

A.C.F.

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, March 14, 1938. The President, Mr. A. H. Chisholm, C.F.A.O.U., presided, and about 100 members and friends were present.

LECTURE ON MOUNTAIN TRIBES

The "Subject for the Evening" was a lantern lecture by Mr. E. W. P. Chinnery, on "Mountain Tribes of Papua and New Guinea." The lecture was illustrated by excellent lantern slides. Of particular interest was a set showing phases of the volcanic eruption at Rabaul. Mention was made of a prehistoric culture.

Numerous questions were answered by the lecturer. A vote of thanks, proposed by Mr. G. Coghill and seconded by Mr. A. W. Chalk, was carried by acclamation, and the lecturer briefly responded.

CORRESPONDENCE

From Mr. Prentice, asking whether any members would care to correspond, and perhaps exchange specimens, with Mr. Lubson, c/o Steamship Trading Co., Port Moresby, Papua. Mr. Lubson is interested chiefly in entomology, but also in botany, geology and bird life.

From Mr. Reg. C. Sprigg, who wishes to exchange South Australian Tertiary fossils for Victorian specimens. His address is c/o University, Adelaide, South Australia.

From Pharmacy College, Melbourne, enclosing extract of a letter from Mr. Thos. Fahey, of Wodonga, who stated that "Jays," after eating fat poisoned with strychnine, pecked at wattle tree buds and in a few seconds had recovered sufficiently to be able to fly away.

REPORTS OF EXCURSIONS

Reports of excursions were given as follows: Heathmont, Mr. L. W. Cooper (for Mr. Wilson); Coburg, Mr. O'Neill (for Mr. Hanks).

DONATION

The President reported that Mr. J. Delancy Forth had presented several useful books to the Club.

GENERAL BUSINESS

The President announced that Mr. and Mrs. E. S. Hanks and Miss H. Bailey would shortly leave for America and Britain, and that Miss V. Fletcher had recently sailed for England. On behalf of the members he wished them all bon voyage and a safe return.

NATURE NOTES

Mr. V. H. Miller said that there was a paucity of nectar in encalypt flowers this season.

EXHIBITS

Mrs. M. E. Freame.—Native ornaments from Vav'au.

Mr. V. H. Miller.—Specimens of *Melaleuca ericifolia*.

Mr. L. Langford.—Fish commonly known as "Blue Devil" (*Paraplesiops* sp.).

CLEISOSTOMA GEMMATUM

By the REV. H. M. R. RUPP

In the December, 1937, issue of this journal I described and figured a new orchid from Dorrigo, New South Wales, under the above name. In a letter dated January 20, 1938, Mr. C. Schweinfurth, of the Harvard University Botanical Museum, U.S.A., informs me that the specific name *gemmatum* was appropriated by King and Pantling in 1898 for an Indian *Cleisostoma*. It cannot therefore be retained for our Dorrigo plant; and I propose to substitute the name *purpuratum*, in allusion to the striking reddish-purple suffusion of the column.

Mr. Schweinfurth adds that the Harvard authorities, following the practice of J. J. Smith, Schlechter, and others, have dropped *Cleisostoma* from the list of recognizable genera. There is no doubt that the group of Australian species under this name requires revision, and that they are not all members of the same genus. It is difficult, however, for us to obtain sufficient material, either of some of our indigenous species, or of representatives of exotic genera to which they should have to be referred. Until this can be done, it seems to me that we have no option but to retain Blume's genus *Cleisostoma* provisionally.

CLUB'S BOOK ON SEA SHELLS

Members of the Club who have not already purchased a copy of our second handbook, *Victorian Sea Shells*, are notified that it is obtainable from the Hon. Librarian. Price, 1/6, posted 1d. extra. The book is finely illustrated and the only popular guide to the marine mollusca of Victoria. More than 100 species are described, the majority being also figured. A colour plate, in which 14 shells are illustrated, forms the frontispiece of this valuable and interesting publication, which is sold at less than cost of production. It deserves a wide circulation, especially among school teachers. The author is Mr. C. J. Gabriel, Hon. Conchologist to the National Museum, and a member of our Club.

THROUGH A WINDSCREEN

By BLANCHE E. MILLER

Newer club members sometimes gain the impression that to see anything worth while entails considerable effort, and the necessity of attending strenuous excursions. Fortunately, we need look no further than the pages of our own journal for evidence to the contrary. "The Gleanings of a City Naturalist," by J. Searle (*Vic. Nat.*, vol. xxxvi, pp. 71-80), is well worth perusal by the sceptics. Those interested in bird life have a rich field for observation, not only in the parks and gardens, and on the ornamental lakes in the immediate environs of the metropolis; a complete list of the birds seen in the city's streets would yield some surprises. It was not my good fortune to see the Grey Duck that held up the traffic on St. Kilda Road one morning, while she piloted her brood across that busy thoroughfare. Nor was I present one evening, when there was a

". . . wild swan winging its westward way,"

a-down the length of Flinders Street.

Even farther afield, the best results are not obtained by a determination to cover a wide area. Rather the reverse, for movement is an alarm to nature in the wild. Sounds may entice some birds to investigate, but if you would share their secrets, you must eliminate sudden movement. A realization of this simple fact explains why my best experiences in the bird world are mainly through the windscreen of a car. The idea is akin to the bird photographer's ruse of building a "hide."

Hearing of a pair of nesting Brolgas in the Western District of Victoria, and not having seen these birds outside of a Zoo, was sufficient incentive for us to undertake a long journey. As we could not definitely date our trip, it was an unavoidable misfortune to find that the owner of the property was absent. However, we were allowed access to the actual field in which the Brolgas had nested. Even the station pup accepted us on face value, climbing into the car and snuggling a friendly face in my lap. It had been stated that the extraordinary large clutch of four eggs had been laid. As there appeared to be only one pair of birds, the possible explanation that two females had laid in the one nest was not applicable. We had no trouble in locating the Brolgas close to a swamp, but, while yet some distance off, they rose with unbelievable ease, and sailed majestically away.

Our guide directed us to a gate opening on to an unmade road that led to the swamp to which the Brolgas had flown. Procuring the car, we proceeded as advised. This time, as we were not on foot, the Brolgas did not resent our presence, and while lunching we had an uninterrupted view of these graceful grey birds, with their leisurely gait—truly picturesque additions to the pastoral

scene. There were other birds near the larger swamp—a White Ibis and a Yellow-billed Spoonbill, and numerous White-faced Herons that looked as if they might be baby Brolgas, so nicely did their livery of grey match that of the so-much-larger birds. Much as we would have liked to have searched for the nesting site, and located the young birds, having been so considerately treated we were loath further to intrude. Regretfully we left this place of natural charm and tranquillity, where, we felt sure, many birds found sanctuary in the fullest sense of the word.

Nest of Brolga, containing four eggs

Northward to Bendigo to see a rare visitor, the Black Honeyeater, was another trip that yielded much that was of interest. We had left our visit somewhat late in the season, for most of the birds had finished nesting. Still, we had a courteous and indefatigable guide in Mr. Marc Cohn, and but for him our journey would have been in vain as far as seeing the Black Honeyeater was concerned. Bendigo's weather did its best—or worst—with a shade temperature of just over the century, but what cared we, sitting in the shade, having an excellent view of the male, female, and juvenile birds that obligingly remained in our immediate vicinity, flying from point to point. Two used nests were found for us, one of which after being exhibited at our own and kindred clubs, was eventually sent to the National Museum. With other advice from Mr. Cohn, our homeward journey proved eventful. A White-browed Wood-Swallow feeding young in a small tree in the Avenue of Honour at Kangaroo Flat was an early windscreen observation.

At Ravenswood, a Red-backed Parrot feeding young by regurgitation was a new and decidedly novel field experience. Perky Crested Bell-birds fed unconcernedly near the car, oblivious of the traffic on the highway, and Babblers became more eloquent when molested. Honeyeaters of many kinds, and Wood-Swallows were busy with family affairs, yet thirty miles farther south the same species of Wood-Swallows were still building, or grappling with the age-old problem of the eternal triangle! An occasional Masked Wood-Swallow often accompanies its White-browed brethren. On the authority of the veteran ornithologist, Mr. Lawson Whitlock, we learn that in south Western Australia, where the Masked is the more common species, the positions are reversed —the White-browed being the casual addition.

There is a fascination about the unerring flight of the Swifts that ever intrigues the bird-watcher. Recently, on the Mornington Peninsula, they were flying very low, across and around the car, and it seemed wiser to seek safety behind the windscreen.

Birds as flat-dwellers struck an unusual note down Geelong way. Starlings, Eastern Rosellas and Nankeen Kestrels occupying the spouts of an old grey gum. So long as we stayed quietly in the car, both Kestrels fed the young birds assiduously, first taking the food to a neighbouring tree and beating it to a pulp, then dropping into the nesting cavity to assist in its distribution. But as soon as we showed ourselves, all interest in the young birds ceased. Tapping the tree trunk had the effect of causing the young Kestrels to crouch down out of sight, although they were plainly visible immediately before. Some tree-dwellers—notably Parrots and Owls—evince more curiosity, and respond to a knocking on the tree trunk by showing themselves. Visiting the same spot a week later, it was noticed that the Kestrels no longer pulped the food, nor did the parent birds assist in its division. Nearby, a pair of Black-fronted Dotterels refused to believe that I was merely part of the scenery, no matter how quietly I waited. Between spasmodic little runs that apparently led nowhere, they stood about disconsolately, jerking their heads as if suffering from chronic hiccoughs, but never by any chance approaching the eggs that we guessed were somewhere nearby. A White-winged Triller rendered exquisite harmony from the very top of a dead tree—a challenge to find the wisps of material that serve for a nest.

A visit to a midland reservoir yielded a long list of water-birds, including the three species of Grebes: the familiar little "Dabchick," the Hoary-headed, and the large Crested Grebe, the two latter resplendent in breeding plumage. One lone Cormorant was seen, these birds not being encouraged where water is stored for domestic use, and large numbers of Duck and Teal—much too nervous to convince one that the close season had been strictly observed. Even the placid Black Swans honked with trepida-

tion on our approach. The floating nest of a little "Dabchick" close to a well-used swimming pool, was kept under observation for some time before the parent bird was purposely startled. In an instant the sitting bird dived out of sight. Then a slim black head came into view as some of the nesting material was deftly drawn over the eggs. Diving again, it reappeared at a different part of the nest, and repeated the act of camouflaging the eggs. Four separate operations were required before the Grebe finally dived and came to the surface of the water some distance away, leaving its nest and eggs looking like an uninteresting mass of debris. No wonder the eggs so soon lose their original whiteness, and become stained and dirty. Why did that Grebe choose such a populous spot in preference to more suitable and secluded sites at the other end of the pool? Does the obvious become too obvious to arouse suspicion, and thereby become proportionately less obvious?

We learn that a bird's call is just whatever you think; so many listeners, so many interpretations. Opinions are divided as to whether the Magpie-Lark calls "Pee-wee" or "Knee-deep," or something entirely different. One bay-side bird leaving its rather new, somewhat damp, mud nest, rather hurriedly as we drew up underneath, caused the whole structure to come hurtling earthward, and with it a newly laid egg. That Magpie-Lark did not use any of the usual calls as it flew off, but kept up a continuous "Dear, dear, dear. . . ." If we accept the fact that all life comes from an egg, that every egg is a potential little life, then it was, indeed, an occasion that merited the call "Dear, dear," if not something more expressive, for not even the combined might of

"All the king's horses, and all the king's men,"

could put that little life back again!

GOULD CENTENARY

It is proposed, in connection with the centenary of John Gould's arrival in Australia, to devote the September or October issue of the *Naturalist* mainly to articles on the great ornithologist, and pictures if they can be obtained. Letters written by Gould are desired for publication; and original notes respecting his life and work. Any member of the Club possessing Gould letters or portraits is asked to make them available, on loan, to the editor of the *Naturalist*. It may be possible to reproduce a Gould plate in colour, but blocks are very costly. There will, however, be half-tone illustrations.

The Gould League of Bird Lovers is arranging to mark the centenary by special celebrations on Bird Day, the third Friday in October. Gould arrived in Tasmania in September, 1838, later coming to the mainland, where he spent about two years, in South Australia and New South Wales. He added some 300 species of birds to the Australian list.

THE KOALA'S WESTERN RANGE

By J. D. SOMERVILLE, Adelaide, South Australia

Recently an interesting puzzle in zoology was brought forward: the dispersion of the Koala along the southern coast of Australia.* Edward John Eyre, on his overland trip from Adelaide to King George's Sound (1840-41), when at Yeer-Kumban-Kauwe (about the eastern end of the cliffs at the head of the Great Australian Bight) was told by the natives that, further along the coast, the trees were of larger growth, and among their branches lived a large animal which Eyre, from the description, readily recognized as the "Sloth" of New South Wales. One of the blacks wore a belt made from the fur of the animal, an inspection of the length of hair and colour convinced Eyre that his previous impression was correct.

There is no doubt that the "Sloth" of Eyre is identical with the Koala. Professor F. Wood Jones recently gave one of the vernaculars of *Phascolarctus cinereus* as the "Native Sloth." Finding nothing on this subject in literature, and having only heard of the Koala in the eastern States and the south-eastern portion of South Australia, I asked the Director of the Perth Museum (Mr. L. Glauert) whether he could give any particulars or a solution of the problem, and in response (*inter alia*) he wrote: "I certainly have no information which leads me to believe that the Native Bear existed in Western Australia a little more than a hundred years ago, although I must admit that I have found the remains in the caves of the Margaret River district, between Cape Naturaliste and Cape Leeuwin, where large eucalypts of several species formed extensive forests before man put in his little axe."

Civilization has disturbed the habitat of animals, probably more so than those of birds. In this connection, Mr. Glauert wrote: "It may interest you to note that when the country north of Israelite Bay was first taken up, the 'Wombat' still existed in that area, although it has been extinct in Western Australia, so far as we know, for over fifty years."

Mr. H. Hale, the Director of the South Australian Museum, and Mr. H. H. Finlayson, Honorary Curator of Mammalia, were of the opinion that the animal was the common opossum. But their opinion was expressed before their attention had been drawn to the fact that remains had been found in the extreme south-west of Western Australia. The Director of the Australian Museum, Sydney (Dr. C. A. Anderson) was of the opinion that the weight of evidence suggested that the Koala was known to the blacks in Western Australia in the living state in the time of Eyre. He ruled out the wombat and opossum as being the animals referred to by the aborigines.

* See Dr. Serventy's article in *The Emu* (vol. xxxvii, p. 169), in which he discusses the isolated location in Western Australia of the Red-capped Parrot. It is most interesting—more particularly his theory of dispersion.

THE WHITE-BROWED WOOD-SWALLOW

By D. DICKISON

In former years, when dry conditions were experienced almost every year in northern Victoria, the White-browed Wood-Swallow (*Artamus superciliosus*) made periodical visits to the southern

Photo. by D. Dickison.

White-browed Wood-Swallow on nest

part of the State, where it would arrive, accompanied by the Masked Wood-Swallow, in flocks comprising two hundred or three hundred birds. However, in later years, probably due to the changeable seasons, this bird has not come south so regularly or in such large numbers. In fact, during the last ten years the absence of *A. superciliosus* near Melbourne has been most pronounced, though an occasional flock has been seen passing over without settling.

Usually it is not until the middle of October that the flocks arrive, but in some years they appear as late as the end of November. If the conditions are suitable, a flock will settle in a clump of timber interspersed with small bushes, in which they can build their nests. For days after their arrival they continue to spend much time on the wing, flying high and in circles above the tree-tops. When migrating, the flocks fly high, and would often pass overhead without being seen if it were not for the fact that they are constantly uttering their call.

If wintry conditions prevail for a few days when these birds are in the midst of nesting operations, they will suddenly depart from the locality. In some such cases I have known their nests to contain eggs which were in an advanced stage of incubation. The nest is a small flat structure, built of twigs, and lined very sparingly with fine rootlets. Generally it is placed on a ledge of a piece of bark projecting from the trunk of a sapling, but the low branches of small bushes are frequently used for the purpose. Occasionally three eggs are laid, but two form the usual clutch. The period of incubation is practically a fortnight, and in that time both male and female take turns on the nest, though the greater portion of the sitting is done by the female, and she is fed on the nest by the male.

The young ones remain in the nest for nearly a fortnight, but often flutter out and perch on the branches of the bush in which the nest is placed. In the event of danger they will hold themselves erect in an effort to harmonize with the surounding dead branches. When the birds arrive late in the season, they commence to build at once; the nest taking only about two days to build, and within a month the young ones are ready to leave the nest. It is then almost another month before the young ones are able to fly sufficiently well to undertake long flights.

Near Melbourne, the White-browed Wood-Swallow takes its departure in January when drought conditions are often in evidence in northern Victoria. Whether these birds move south towards the sea coast and remain there until autumn, or make their way northwards during the hot summer months, is one of the many problems in bird life that have not been solved.

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.

BOOBYALLA AS A HEDGE AND BREAKWIND

By A. J. TADGELL

These notes were primarily written in amplification of a contention that a better substitute existed to the Coprosma hedge proposed by one of our local progress leagues, which decided to suggest *Coprosma Baueri, C. repens, C. Baueriana*, or the New Zealand "looking-glass bush"—whichever you will. My first suggestion as a substitute was the list of Pittospora mentioned by Baron von Mueller in his *Select Plants* list, as to me, a sufferer from a neighbour's love of the Shining-leaf Coprosma: he permits it to grow to a height of fifteen and twenty feet, and it provides abundant food in season for blackbirds and others, which, ridding themselves of the two seeds of the drupe, give me annually innumerable plantlets: causing me to suppose that very soon this plant will appear among the alien noxious weeds. It is almost incredible, but I have experimented personally and counted them: there are up to eighty fruit seeds produced in a piece three inches long, each cluster containing four to five drupes, and each drupe two seeds.

We must not confuse this, as some people do, with the prostrate form of *Acacia sophorae*, but confine it, as the late Mr. Rodway said, to *Myoporum insulare*—which seems to have had numerous vernacular names bestowed upon it, such as "Boobyalla," "Boobialla," "Coast Boobialla," "Bubialo," "Blueberry," "Native Juniper," "Cockatoo-bush," "Palberry," "Native Myrtle." This proves that in different States confusion must reign when using common names. In the generic name it is described from the first identified New Zealand plant, when dot-like breathing pores were found on the leaves in thousands, not perforated and transparent as in other plants. Its species name may have been wrongly applied as peculiar to insular conditions or close to the coast.

In Victoria, *Myoporum insulare* is found not too far inland from the coast only, but in all of our districts except North-east. It flowers at Sandringham from May to December. Its sister, *M. viscosum*, flowers at Sandringham from August to November, and should find a place more frequently in our gardens. The Boobyalla is a natural hedge or breakwind in seaside positions. It revels in seaspray and salt winds. I think it should be pruned from January to April, or say, in the autumn. It is used to rough treatment, and its cuttings will strike in the sand. It will grow as a tree if required or adapt itself to a prostrate form. It has pretty white flowers, and bluish-purple fruit which the birds love. Its vigorous leafage is wedge-shaped, smooth, olive-green in colour, sometimes curled or twisted. The plant is a quick grower, and might be found useful against sand flies and mosquitoes, a virtue attached to it by the aboriginals. If people but knew, they would adopt it as readily as they once did the Tea-tree as a hedge plant.

ROSA FIVEASH: FLOWER PAINTER

By the death of Miss Rosa Fiveash, in Adelaide, on February 13 last, at the age of 83 years, Australia has lost a most lovable personality and a great artist, who specialized in the painting of Australian native flowers. Miss Fiveash had lived in the old family home in North Adelaide for seventy-nine years, she having been born in South Australia. Those who have been privileged to visit her in her home, to see her home and her studio filled with art treasures, to talk with her about her life-work, have a memory to treasure.

Miss Fiveash specialized in the painting of wild flowers, and she was a very capable successor to Miss Fanny de Mole, to whom we are indebted for the first water colour drawings of South Australian flowers. But while Miss de Mole restricted her art to Adelaide flowers, Miss Fiveash searched the Commonwealth for her studies. To orchid lovers, Miss Fiveash is well known for her wonderful studies of Australian orchids, painted to the order of and for Dr. R. S. Rogers, the noted Australian orchidologist. Not only were her paintings of the flowers so true, but they were all artistically beautiful, because she loved the flowers, as well as being a student of them. Further, the dissections and diagrams were always so accurate that the identification of any of the species, combined with Dr. Rogers' full descriptions, was rendered a work of comparative ease.

Miss Fiveash first came under public notice when the Adelaide Art Gallery, years ago, obtained a series of her wild flower studies, purchased, I think, by Mr. R. Barr Smith, a wealthy South Australian pastoralist. The Governor-General, Lord Tennyson, also obtained some of her pictures. To complete her life work, Miss Fiveash presented a large collection of her paintings to the Adelaide Public Library in 1937. The illustrations, coloured, of Australian flowers in Brown's *Forest Flora of South Australia*, an old folio work, were all done by Miss Fiveash. The work consisted of nine parts in all. Her delineations included paintings of such animals as the Marsupial Mole, and the Central Australian Moloch Lizard. Her paintings of aboriginal direction posts or toas reproduced in the *Records of the South Australian Museum*, are models of neatness and brilliant colouring. Miss Fiveash continued to paint until about four years ago, when her eyesight became too poor for further work. She had been confined to her room for about eight months before her death. Miss Fiveash was undoubtedly the foremost botanical artist in Australia, and I know of none who could claim to be her superior. It would be a wonderful monument to her memory and to her work, and also to the untiring energies and abilities of Dr. Rogers, if her orchid studies in the possession of the doctor could be published, together with his literary notes and botanical work.

ED. E. PESCOTT.

SOME ORCHID NOTES

By W. H. NICHOLLS

A glance through the pages of my record book provided these notes. Some definite records widen the area of distribution of certain species.

Dendrobium striolatum Rchb. Nowa Nowa, Roger River Gorge. (N. A. Wakefield.)

Thelymitra Elizabethæ F.v.M. Depford, etc. (W. Hunter.) Often plentiful.

Prasophyllum despectans Hk.f. Orbost. (N.A.W.)

Prasophyllum patens R.Br. Marlo. (W.H.)

Pterostylis grandiflora R.Br. This fine species is very abundant in the Marlo district, where it flourishes with practically no cover other than bracken fern. (F. Robbins, N.A.W., W.H.)

Pterostylis decurva Rogers. Mt. Buck. (N.A.W.)

Caladenia carnea Br. var. *pygmæa* Rogers. This small yet dainty form is plentiful around Orbost.

Caladenia carnea Br. var. *gigantea* Rogers. Usually white flowers, but often exceptionally large. Scattered throughout the Cann River districts.

Caladenia præcox Nich. Mt. Buck, Mt. Raymond. The labellum sometimes very delicately fringed—*ciliate-fringed*. (N.A.W.) Also collected on east side of Mt. Drummer. (W.H.N.)

(The above are East Victorian records.)

Thelymitra Elizabethæ F.v.M. is also recorded from Benalla (NW. Vic.). (J. Stevens.)

Pterostylis squamata R.Br. Mr. J. Stevens forwarded a very fine nine-flowered specimen, and a plant received earlier in the year produced a three-flowered specimen, which was *wholly* verdant green.

Cryptostylis leptochila F.v.M. This species was exceptionally plentiful in the Lockwood (Belgrave) area, where the writer and friends located 89 flowering plants—some were exceptionally large specimens—in a small space under Eucalyptus trees where the scrub for the most part was dense.

Prasophyllum flavum R.Br. A somewhat dwarf specimen "in dry stony soil from Bendoc." (F. Erasmus Wilson, 18/1/38.)

In the list of exhibits in the March *Naturalist* there is *Erechtites mixta*, "Mt Drummer, (hillside, wet jungle)." What I intended was: "Mt Drummer (hillside, *not* jungle)." As Mt. Drummer is mainly known for the luxuriant vegetation called "jungle" in the valley, I thought it desirable to call attention to the fact that this specimen was not from the "jungle." Mr. Hunter had mentioned this to me when he gave me the specimen.

—THOMAS S. HART.