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THE FIELD NATURALISTS' CLUB OF VICTORIA

The general meeting of the Club was held in the Royal Society's Hall on Monday, April 8, 1935, at 8 p.m. The President, Mr. A. S. Kenyon, M.I.E., Aust., presided, and about 100 members and friends were present.

It was announced that the Committee had decided to support, on general grounds, the proposals for new sanctuaries, as outlined by Sir James Barrett in a letter read at the March meeting.

CORRESPONDENCE

From Miss M. Haynes, stating she was in "Gloucester" Private Hospital, in Victoria Parade, Eastern Hill, and would appreciate any native flowers sent her.

It was mentioned that Mr. F. Pitcher was very ill in St. Andrew's Hospital. The meeting expressed the hope that both these members might quickly recover from their illnesses.

REPORTS OF EXCURSIONS

Excursions were reported on as follow: Yan Yean Reserve, Mr. A. D. Hardy; Werribee Gorge, Mr. F. S. Colliver.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as members of the Club:—As ordinary member: Miss V. Fletcher; as country member, Mr. M. I. Howie; and as associates: Miss M. E. Argo and Master Ian Atkinson.

SUBJECT FOR EVENING

Owing to a misunderstanding, there was no paper on the subject arranged for the evening (The Flower and the Bee). The Hon. Secretary, Mr. F. S. Colliver, gave a short history of the Werribee Gorge, and described the various geological deposits in the Bacchus Marsh area, making special reference to the glacial deposits. He concluded with a plea for the better protection of the area.

In the discussions that followed, the President mentioned other evidences of an Ice Age in Australia, Mr. W. Hanks spoke on the basalt in the Somerton area and the dykes of the Jervois Ranges.

Mr. J. A. Kershaw congratulated the lecturer, and stated that a plaster cast of the glaciated pavement, made by the late Prof.

Sweet, and excellent examples of the striated stones were in the National Museum.

Mr. A. J. Swaby suggested that the Club should take steps to have the Gorge preserved, and moved that the matter be referred to the Committee for consideration. Mr. R. H. Croll seconded this motion, which was carried.

The President then thanked the lecturer for filling the gap so interestingly, and adjourned the meeting for the conversazione.

LIST OF EXHIBITS

Mr. J. A. Kershaw.—Specimens of Native Bees (Victorian).

Mr. Ivo Hammett.—Sea Urchins from Lord Howe Island.

Mr. N. Lothian.—Portion of a cone of *Araucaria Bidwilli* (Hoop Pine) from tree growing in the Fitzroy Gardens.

Mr. F. S. Colliver.—Specimens from the Bacchus Marsh area, including Tertiary leaves and fruits from the Korkuperrimul Creek, Schizoneura microphylla from the Triassic deposits of the Bald Hill; Gangamopteris spatulata from the Carbopermain of Bald Hill; Glacial conglomerate and Ice Scratched Stones; and a dyke rock (Quartz Felspar Porphory) from the Gorge.

EXCURSION TO WERRIBEE GORGE

About thirty-five members and friends attended the excursion to Werribee Gorge on April 1. The first stop was made at the Korkuperrimul Creek, where we were met by Mr. James Lidgett. The leader pointed out examples of Tertiary leaves in the Ironstone boulders in the creek bed. It was explained that these were not *in situ*. Specimens were collected, and the party made their way up the side of Bald Hill and inspected the small quarry in the Triassic sandstones. The leader gave a short discourse on the area, and, here again, fossil evidence as to the age of these beds was collected.

A move to the lower quarry in the Carbo-permian of Bald Hill was made. Then we went down to the bed of the creek and followed it for a mile or two, inspecting on the way excellent examples of faults, dykes, ash beds, typical bad lands and canyon country, complete with corors, unconformities, and, finally, examples of vertical dykes of basalt through volcanic ash. We returned to the first stopping place for lunch. The leader outlined the geology of places visited, and gave a brief history of the area examined.

Leaving the car, we walked to the upper shelter-shed, and from several places close by inspected various aspects of the Gorge from above, the physiographic features being pointed out. The more venturesome members of the party, including the oldest present, decided to descend the Gorge, and did so.

F. S. COLLIVER.

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

POLLINATION IN AUSTRALIA OF *ARAUJIA SERICOFERA* BROTHERO

By EDITH COLEMAN

Many nature-lovers have been interested in the capture of insects by the White Bladder flower (*Araujia sericofera* Brothera), an alien plant which thrives in Australia. It is known also as the "Codlin-moth plant," in reference to the trapping of these insects. The silky plumes of the seeds, adapted to wind-dispersal, puff up when mature, filling the large follicles with a kapok-like mass. Hence *Araujia's* most popular name, "Kapok-creeper."

We should not place too much importance on the loss of a few insects. Though many moths and bees are trapped in the flowers, the percentage of tragedies is not high in comparison with the thousands of bees which obtain nectar from *Araujia* without mishap.

During five seasons, a plant in my garden has, I believe, been responsible for the deaths of only twelve bees, five moths and two butterflies (skippers). Yet bees throng the flowers in early morning, and, in lesser numbers, during the day. This season, on a larger plant in a friend's garden, were fifteen trapped bees and two plant-bugs, but no moths. I have watched this plant, too, during five seasons, but have never found moth or butterfly caught in its flowers. The loss of fifteen bees in one season is surely not serious when one notes the many thousands that have feasted without mishap in the flowers of this delightful creeper. Certainly other plants are responsible for more moth and butterfly tragedies.

Watching my own plant, grown from seed kindly sent to me by Mr. W. H. Scott, who first drew my attention to the insect tragedies, I have seen hundreds of bees and many moths enter and leave the flowers. I have examined the proboscides of many of them and found in numerous instances no pollinia attached. Thus these insects were able to reach the nectar and to withdraw without entering a trap. Placed on a flower to recover from their whiff of chloroform, some of them immediately entered another flower.

I have been able to ascertain that a large percentage of the flowers are effectively pollinated, even by trapped insects, and that, in Australia, the pollinary mechanism in *Araujia* appears to be quite as efficient as in other countries where larger insects act as pollinating agents. (In Peru and Brazil, the flowers are pollinated by humble-bees.)

To the botanist, the flowers of *Araujia* are exceedingly interesting. It belongs to a group of plants (*Asclepiads*) whose highly developed flowers are second only to orchids in the de-

velopment of complex adaptations which serve for pollen-transference. In both groups the pollen is generally compounded into more or less waxy or mealy masses. In orchids the pollinia are usually attached to a viscid gland, but the *Asclepiads*, instead of *sticking* their pollinia to bodies of insects, have clipping devices which *clamp* them to tongue or feet (according to the position of the nectaries with regard to the anthers) of their guests.

In *Asclepias*, the nectar secreting spots and the anthers are on the same radius round the stigma head. An insect exploring these flowers will have the pollinia clipped to some part of its foot. We see the same arrangement in the Swan-plant (*Gomphocarpus fruiticosus*), which is grown in many Victorian gardens. In *Araujia* and others, the nectar-wells are not on the same level, but lie just below the anthers. Their visitors will be clipped by the mouth-parts.

Ripe follicle opened to show silvery plumes which puff up when dry.

The structure of the "column," or five-sided stigma-head, in *Araujia*, is seen on Plate I. Fig. I. shows (side view) the gynostegium (pistil and five closely attached anthers). Beneath the five anther-slits are five receptive stigmatic spots. These stigmatic surfaces do not secrete a viscid substance, as in most orchids. Instead, the pollinia are adhesive. The grains adhere to a stigmatic spot first by means of their own adhesive covering, and then by the penetration of their pollen tubes.

Anther - slits which form the trap: The two-celled anthers are expanded laterally into triangular wings, each wing lying close to one wing of an adjacent anther. The central portion of Fig. I. shows a slit formed by one wing of two separate anthers, the right wing of one anther being almost in contact with the left wing of an adjacent anther. Their juxtaposed edges form a slit, narrowing towards the top. This is the "trap."

The wings being of a strong, horny nature, the slits are incapable of being widened except under considerable force, such

as might be exerted by a strong insect. The upper, narrow part of the slit has a clothes-peg action. Below, at the base of each anther-slit, lies a nectar-secreting pit. On the stigma head, at the top of each slit, is a dark, shiny body (the corpusculum), in appearance not unlike the rostellar-gland of many orchids, but, instead of being soft, and viscid when ruptured, like the orchid glands, it is hard and unyielding.

Until loosened by an insect, each corpusculum is seated in a deep depression on the stigma-head, attached securely by a thin membranous flap at its apex. The sides of the corpusculum are rolled inwards, forming a deep furrow. *This furrow, which is slightly wider towards the base and towards the apex, serves as a clipping device.* Each dark corpusculum is connected, by means of two ligulate arms (reticulata) with a pair of somewhat flattened, adhesive pollinia. Though these arms resemble the caudicles of certain orchids, they are not a product of the anther, but of the corpusculum, and are composed, not of fused threads, but of an elastic, gelatinous substance.

Upon the corpusculum and its arms (the translator) depends the transference of pollen.

The pollinia, to which the arms are attached, do not occupy one anther, but lie in a cell of two separate anthers. This is shown in the illustration (Fig. I.), where the corpusculum is seen at the apex of the wings of two separate anthers. The attached pollinia (not seen) lie beneath the wings, whose membranous extensions (apical) partly cover the corpusculum.

Let us now see how pollination takes place. Beneath each slit, formed by a pair of wings, is a receptive stigmatic spot, and below is the nectary. The proboscis of an insect readily enters a nectar-well. In many instances it is withdrawn in the same way, the base of the anther-slit offering no obstacle. *In these circumstances pollination is not effected.*

Pollination, first stage: But frequently a proboscis explores higher up towards the narrow end of the slit, where it is caught in the lower notch of a corpusculum. If no pollinia be attached to the proboscis there is, even now, little difficulty in withdrawing it, *but the corpusculum must be withdrawn also.* The pressure exerted unseats the corpusculum from its bed on the stigma-head by rupturing its apical membrane, so that it comes away readily on the insect's proboscis, carrying with it the attached pollinia, drawn from the cells of two anthers.

The pollinia are wide apart, when withdrawn, but the arms of the translator, which, like the caudicles of orchids, are hygroscopic, twist as they dry, bringing the pollinia closer together, *increasing, too, their hold on the proboscis by closing in the lower edges of the corpuscular clip.* (Figs. Va. and Vb.)

Pollination, second stage: Bearing pollinia, an insect now visits another nectar-well. The pollinia, being close together, are easily

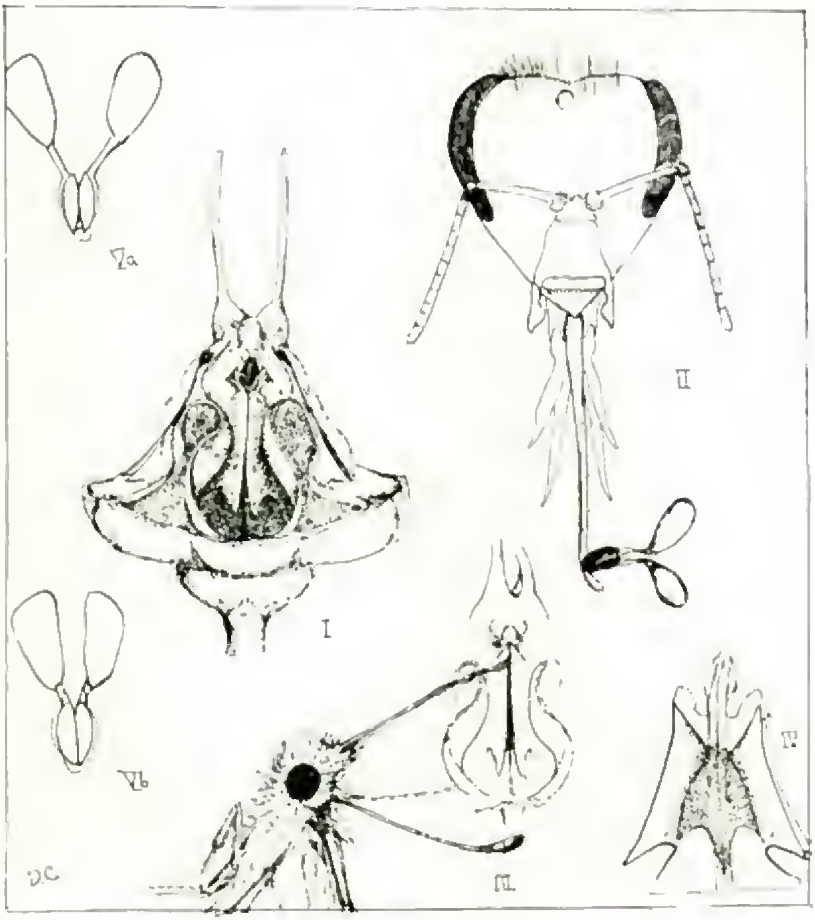
inserted at the base of an anther-slit, and, in some instances, are withdrawn in the same way *without effecting pollination*. But usually, the proboscis explores higher up, where the attached pollinia prevent its withdrawal through the slit. Occasionally, if not securely clipped, a proboscis may be pulled through the slit, *leaving the pollinia behind*. Sometimes a proboscis breaks, the clipped portion and *pollinia being left behind*. Often the arms of the translator snap and a proboscis is withdrawn, with cor-

Flowers of *Araujia sericofera* showing trapped insects.

pusculum still clipped to it, *leaving the pollinia behind*. Occasionally an insect, unable to withdraw its proboscis, dies in the flower.

Sometimes during one visit a translator is pulled off a proboscis by the anther-slit, and a fresh one is attached. As it withdraws in an upward direction it is clipped again by the notch of a corpusculum *in situ*. Some bees are found with two translators attached. In these instances the first translator was clipped to the tongue, but being wedged in the slit the bee was clipped again, on palps or maxillae, by the corpuscular notch, as its tongue slid towards the apex of the anther-slit. The second corpusculum could not be removed owing to the presence, on the tongue, of the first translator.

Plate I



POLLINATION OF *ARACHIA SERICOFERA*.

Key:

I. Stigmatic-head showing (centre) anther-slit with corpusculum at its apex and nectar-well at base. Two more slits and two corpuscula indicated.

II. Head of bee with pollinia clipped to ligula.

III. Butterfly (skipper) with proboscis caught in anther-slit. Above apex of slit is a depression in which removed corpusculum was seated.

IV. An anther, showing lateral wings. Edges of adjacent wings are indicated by dotted lines.

Va. Pollinia as removed.

Vb. Pollinia, showing position after hygroscopic movement of the reticulata.

In all of the above instances pollination is effected, and, if the flower be in the female stage, fertilisation should ensue, for the pollinia are left within reach of a receptive stigmatic spot, towards which, as soon as emitted, the pollen-tubes will travel. In sections taken from pollinated flowers, these tubes are clearly seen under the microscope.

Flowers of *Araujia sericofera.*

Only once have I seen an insect trapped whose proboscis bore no pollinia. This was the butterfly (skipper) illustrated. The corpusculum had been removed by a previous visitor, but the proboscis appeared to be wedged by the twisting of its own parts. Had it pulled directly upward I think it could have escaped.

As may be anticipated, the plants produce a large number of fertile seeds. The stigma-head being receptive during certain periods, at five different points, the flower has five chances of fertilisation. It is essential that pollen should come from another flower, pollen from the same flower being ineffective. Examination of open flowers shows the efficiency of bees and moths as pollinators. Change of colour (yellowing) usually betokens a well-pollinated flower. In these one finds 80 per cent. of the translators removed, and, in 40 per cent. pollinia deposited on a spot favourable to fecundation.

Summing up, pollination of *Araujia* in Australia appears to be quite as effective as in other countries where larger insects act as pollinating agents.

NEW RECORDS OF FISHES FROM VICTORIA
No. 2*

By GEORGE MACK, National Museum, Melbourne.

Family **MURAENIDAE**
Genus **Gymnothorax** Bloch, 1795
GYMNOTHORAX PRASINUS (Richardson)

Muraena prasina Rich., *Zool. Voy. Erebus and Terror*, Fish, 1848, p. 93.

For an excellent specimen measuring 860 mm. (33⅞ ins.), received in November, 1934, I am indebted to the Chief Inspector of Fisheries and Game. It was caught on a long line about ten miles out to sea from Port Albert, Victoria, and was one of three seen for the first time by the fishermen of that locality. Apparently the specimen lived up to the evil reputation that these eels have of snapping with vicious teeth at anything within range.

It is the first record of the genus and species from the southern coast of Australia.

Family **ATHERINIDAE**
Genus **Atherina** Linnaeus, 1758
ATHERINA MICROSTOMA Günther

Atherina microstoma Günther, *Cat. Fish. Brit. Mus.* iii, 1861, p. 401.

Taeniomembras microstoma McCull., *Zool. Res. Endeavour* i, 1911, p. 32, pl. x, fig. 2.

This is the common Silverside or Hardyhead of Port Phillip Bay, and numerous specimens have been added to the collections of the National Museum in recent years by Mrs. J. J. Freame and Mr. A. C. Nilson.

When re-describing *A. microstoma* McCulloch (*loc. cit.*) gave the dentition as follows:—"Teeth minute but distinct, in several rows on the anterior parts of both jaws, none on the sides; a well developed patch on the vomer, palatines toothless." From an examination of a large series it is clear, however, that there are numerous, irregularly placed, minute teeth on the palatines.

Previously recorded from Tasmania, New South Wales, and South Australia.

ATHERINA DANNEVIGI McCulloch

Atherina dannevigi McCull., *Zool. Res. Endeavour* i, 1911, p. 31, pl. xvi, fig. 2.

On two occasions Mr. A. C. Nilson has found a single specimen

*For No. 1, see *Vict. Naturalist* li, 1934, p. 179.

of Dannevig's Hardyhead on the beach at Altona, Port Phillip Bay, and these are now in the National Museum. As this is considered a deep-water form and has not been collected inshore, it is of interest to note that of three other examples in the collections two were found on the beach at Mordialloc, Port Phillip Bay, and presented to this Museum in May, 1877; the third was received from Gippsland Lakes in 1908, but there is no information as to how it was obtained.

A new genus to contain this species has been proposed by Whitley[1] on account of the small scales, and, according to that author, the length of the snout. The latter feature is not apparent, and the number of scales, which differs in almost every species of these small fishes is, in my opinion, purely a specific character.

Previously recorded from Tasmania and South Australia.

Family **EPINEPHELIDAE**

Genus **Acanthistius** Gill, 1863

ACANTHISTIUS SERRATUS (Cuvier and Valenciennes)

Plectropoma serratum Cuv. & Val., *Hist. Nat. Poiss.* ii, 1828, p. 399; Quoy & Gaimard, *Voy. Astrolabe, Zool.* iii, 1835, p. 662, pl. 2, fig. 1.

Described from a specimen taken at King George's Sound, W. Australia, and since recorded from Queensland and New South Wales, it is now possible to add this species to the fish-fauna of Victoria. A specimen was received in 1933 which was collected at Mallacoota in the east of the State.

Family **LOBOTIDAE**

Genus **Lobotes** Cuvier and Valenciennes, 1830

LOBOTES SURINAMENSIS (Bloch)

Holocentrus surinamensis Bloch, *Nat. Ausl. Fische* iv, 1790, p. 98, pl. ccxliii.

Lobotes surinamensis Bleeker, *Atlas Ichth.* viii, 1876, p. 12, pl. cccxi, fig. 4.

This is a wide ranging species, but so far is known in Australia only from the tropical waters of the north-east. It is one of a good number of northern forms which travel south, probably periodically, to at least south-east Australia. It grows to about 30 inches in length, and as a food-fish is stated to be excellent.

The medium sized specimen upon which this record is based was taken at Port Albert, Victoria, and was received in fresh condition.

1. Whitley, *Vict. Naturalist*, 1, 1934, p. 242.

Family **SPARIDAE**

Genus **Sparus** Linnaeus, 1758

SPARUS SARBA Forskal

Sparus sarba Forsk., *Descr. Anim.* 1775, p. 31.

Chrysophrys aries Temm. & Schleg., *Faun. Japon. Poiss.* 1843, p. 67, pl. xxxj.

The Tarwhine ranges north as far as Japan and the Red Sea, and it is known from the waters to the east and west of Australia, but has not previously been recorded from the southern coast. A fine specimen, taken by means of rod and line at the mouth of the Broadrib River, Marlo, Victoria, was received from the Fisheries and Game Department in 1932.

Family **BODIANIDAE**

Genus **Verreo** Jordan and Synder, 1902

VERREO OXYCEPHALUS (Bleeker)

Cossyphus oxycephalus Bleeker, *Versl. Akad. Amsterdam* xiv, 1862, p. 128.

Cossyphus unimaculatus Günther, *Cat. Fish. Brit. Mus.* iv, 1862, pp. 109 and 506.

Cossyphus bellis Ramsay and Ogilby, *Proc. Linn. Soc. N.S.W.* (2), ii, 1887, p. 561.

Verreo oxycephalus Jord. & Snyd., *Proc. U.S. Nat. Mus.* xxiv, 1902, p. 619, fig. 3.

Two specimens of the Pig fish have been received in recent years, which were obtained near Queenscliff and in Port Phillip Bay, Victoria. The species is widely distributed throughout the western Pacific Ocean.

There appears to be no valid reason for the retention of *C. bellis* Ramsay and Ogilby as a separate species. The only difference from *oxycephalus* is the presence of red markings on the sides, but these probably disappear after a fairly lengthy immersion in a preserving fluid. This would explain the lack of such markings in the type of *C. oxycephalus* Bleeker and *C. unimaculatus* Günther.

Family **BLENNIIDAE**

Genus **Petroscirtes** Ruppell, 1830

PETROSCIRTES ANOLIUS (Cuvier and Valenciennes)

Blennichus anolius Cuv. and Val., *Hist. Nat. Poiss.* xi, 1836, p. 288.

Petroscirtes anolius McCull., *Aust. Zool.* i, 4, 1917, p. 90, pl. x, fig. 2.

There are nine specimens of this Blenny in the Museum collections from various localities in Port Phillip Bay, and these constitute the first record of the genus and species from southern Australia.

The marked individual variation apparent in a series has already been commented upon by McCulloch (*loc. cit.*). The full development of the cephalic crest seems to be a peculiarity of the male.

Previously known only from Queensland and New South Wales.

FORESTS COMMISSION AND WILD LIFE.

When asked to comment on the discussion on the Future of Game Birds and the protection of wild life generally, the Chairman of the Forests Commission (Mr. A. V. Galbraith), remarking that the subject was of great interest and importance from several aspects, wrote as follows:—

Wild life, flora as well as fauna, forms an integral part of the State's natural resources from the recreational, aesthetic, and educational standpoints, and, as such, its value cannot be assessed. It has also a very definite value and importance economically.

The forester may claim to have a definite interest in the fauna, for it is within the more thickly wooded portions of the State that the wild birds and animals find a sanctuary. The progress of settlement, accompanied by the clearing of bush land, has led to the gradual retreat of wild life from many former haunts, and in a few cases this has advanced to such an extent as to threaten the continued existence of certain species. It would be a thousand pities if any of our native birds or animals, unique as they are, were permitted to become extinct.

Apart altogether from a natural desire to see the preservation of forms of wild life from a sentimental point of view, the forester is more intimately concerned with one specific aspect of the problem. There exists a vital relationship between this wild life, particularly bird life, and the forest itself. Although it may occasionally be a harmful relationship as far as the forests are concerned, generally it is beneficial. The role of bird life in effecting a natural control of destructive insect pests is a very important factor in minimising the risk of serious harm to forest stands, and from this point of view the forester definitely regards birds as his friends and desires their preservation.

From a forester's viewpoint, one important fact may be emphasised, and that is that the continued well-being of fauna of all descriptions must be seriously affected by the forest fires which are too frequently a feature of our summers. In a bad season, the destruction of wild life must assume enormous proportions, and if optimum conditions for the preservation of wild life, consistent with the advance of settlement, are to be preserved, we must do all in our power to defeat the fire evil. It is not only the direct harm resulting from actual destruction of wild life by fires that is so serious, but also the fact that the forests which form their homes are swept away. In his continual fight against bush fires, the forester indirectly plays a very important part in the preservation of the living creatures which inhabit the bush.

LIPARIS HABENARINA F.V.M. IN NEW SOUTH WALES

By the REV. H. M. R. RUPP.

Liparis habenarina F.V.M., Proserpine, N.Q.

Until about twelve months ago, I knew nothing of this orchid beyond its descriptions in Bentham and Bailey. Then Mr. Ken Macpherson, of Proserpine, North Queensland, sent me "remnants" of a raceme which he had found on a plant growing in the company of *Geodorum pictum* Lindl. The flowers were strange to me, but appeared to agree fairly well with the descriptions of *Liparis habenarina*. One was sent on to Dr. R. S. Rogers, who thought this determination was probably right. The material available, however, was too scanty and imperfect to allow of further investigation. Nobody seemed to know much about this particular species, which appears to have been rarely recorded.

In February of the current year I received a living plant of a terrestrial orchid from Mr. F. Fordham, of Brunswick Heads, N.S.W., who stated that it extended from that locality at least as far south as Byron Bay. The single raceme was past maturity, capsules being well advanced; but there were two or three half-withered flowers at the top. I had never seen a plant like it before, and I realised at once that, whatever it might be, it was "new" for N.S.W. The flowers reminded me of a sketch I had made of the fragment from Proserpine supposed to be *L. habenarina;* but the plant itself was unlike any *Liparis* known

to me. I was too busy to go into the matter for a few days, and this proved rather fortunate: for by curious coincidence, within those few days I received from Mr. Macpherson a perfect dried raceme, and a living plant with a budding raceme, of the Proserpine *Liparis*.

I was now able to make a critical examination and comparison of the plants and their flowers. The result established complete identity except in one point—the New South Wales plant had a very definite terrestrial tuber which the North Queensland specimen lacked. The latter, however, was a much younger plant, and upon examining it beneath the small pseudo-bulb, I found evidence of something broken off. The flowers of both plants agreed with the description of *L. habenarina* as given by Bentham and Bailey; but neither botanist makes any allusion to the *union of the broad lateral sepals* under the labellum. There is a further discrepancy. Both descriptions say, "Habit and foliage nearly of *L. reflexa*." I cannot see that it is possible to apply this statement to the plant now under discussion. *L. reflexa* is very common in New South Wales and S. Queensland. It is usually classed as an epiphyte, and I have once seen a small clump on a tree: but this is exceptional. Almost invariably it grows in *extensive masses* in rock-crevices, on ledges of cliffs, or on the surface of gently-sloping rocks. The leaves are—when fully developed—long, flaccid, and perfectly smooth except for the slight channel above and keel below formed by the mid-vein. The racemes are very rarely as long as the leaves.

In contrast to all this, the Proserpine-Brunswick Heads plant is strictly terrestrial; it does not grow in massed colonies; the leaves are short and somewhat rigid, *prominently ribbed or fluted* longitudinally. Yet if this plant is not *Liparis habenarina*, what are we to do with it? Except in the matter of the connate lateral sepals, I could not describe the flower more accurately than Bentham and Bailey have done in describing *L. habenarina*. Dr. Rogers states that in fragmentary specimens of this species sent from Dunk Island by the late E. J. Banfield, the sepals were connate for barely half their length. In the specimens collected by Messrs. Macpherson and Fordham, the connexion extends for three-fourths. I do not think we can place their plant anywhere but in *L. habenarina*; and one is compelled to conjecture that some mistake was made in describing the habit and foliage as nearly those of *L. reflexa*. Bailey's description follows Bentham's *verbatim*, and in the dried state Bentham may have thought the leaves similar to short leaves of *L. reflexa*.

The habit still constitutes a discrepancy: I think it may safely be said that *L. reflexa* never grows out in the open soil away from rocks. Mueller's name fits the Proserpine-Brunswick Heads plant very well indeed. Mr. Macpherson's discovery brings the habitat some 150 miles south of the type locality (Rockingham Bay): Mr. Fordham's extends it nearly 700 miles.

PROVISIONAL LIST OF THE FLORA OF KINGLAKE NATIONAL PARK.

By A. J. EWART, D.Sc.

Some years ago, the Committee of the Kinglake National Park wished to obtain a list of all the plants to be found growing within its boundaries. Visits have been made from time to time to the Park by Mr. Thomas (now in Queensland), by Mr. Nicholls (Honorary Curator of the University Herbarium), and by myself. As the results of these visits, a number of plants have been collected and identified, and these are given in the appended list. The list, however, is probably very incomplete, and may not represent half the plants to be found within the Park boundaries. It is felt, however, that if a provisional list is published, members of the Field Naturalists' Club, who happen to be visiting the Park, might forward specimens of plants found growing within the Park to the University and in that way a complete list might be obtained in a shorter time than if left to individual effort. It is for that reason that this very incomplete provisional list is recorded.

FLORA OF KINGLAKE NATIONAL PARK.

PTERIDOPHYTA—	Psilotaceae	*Tmesipteris tannensis* Bernh.
	Osmundaceae	*Todea barbara* Moore
	Hymenophyllaceae	*Trichomanes venosum* R.Br.
		Hymenophyllum tunbridgense L. (Sm.)
		H. flabellatum Labill.
		H. australe Willd.
	Cyatheaceae	*Dicksonia antarctica* Labill.
		Alsophila australis R.Br.
	Polypodiaceae	*Pteridium aquilinum* Kuhn.
		Polypodium Billardieri C.Chr.
		P. pustulatum Forst.
		P. grammitidis R.Br.
		Blechnum Patersonii Mett.
		B. discolor Mett.
		B. lanceolatum Sturm.
		B. capense Schlech.
		B. cartilagineum Sw.
		Cheilanthes tenuifolia (Burm.) Sw.
		Asplenium bulbiferum Forst.
		A. flabellifolium Cav.
		Adiantum aethiopicum L.
		Pellaea falcata Fée.
		Dryopteris decomposita Ktze.
		Davallia dubia R.Br
MONOCOTYLEDONS—	Gramineae	*Tetrarrhena juncea* R.Br.
	Cyperaceae	*Gahnia psittacorum* Labill.
		Lepidosperma elatius Labill.
	Juncaceae	*Juncus polyanthemos* Buch.
		J. pallidus R.Br.
	Liliaceae	*Dianella tasmanica* Hk.f.
		Xanthorrhoea australis R.Br.

	Orchidaceae	*Sarcochilus parviflorus* Lindl
		Caladenia carnea R.Br.
		C. dilatata R.Br.
		Chiloglottis Gunnii Lindl.
		Dipodium punctatum R.Br.
		Thelymitra carnea R.Br.
		T. ixioides Sw.
		Lyperanthus suaveolens R.Br.
		Pterostylis longifolia R.Br.
		Microtis porrifolia R.Br.
DICOTYLEDONS—	Urticaceae	*Urtica incisa* Poir.
	Proteaceae	*Grevillea alpina* Lindl.
		Lomatia Fraseri R.Br.
		Banksia collina R.Br.
		B. marginata Cav.
	Santalaceae	*Exocarpus cupressiformis* Labill.
	Chenopodiaceae	*Rhagodia nutans* R.Br.
	Caryophyllaceae	*Stellaria flaccida* Hook.
	Ranunculaceae	*Clematis aristata* R.Br.
		Ranunculus lappaceus Sm.
	Monimiaceae	*Atherosperma moschatum* Labill.
	Cruciferae	*Lepidium hyssopifolium* Desv.
	Droseraceae	*Drosera Whittakeri* Planch.
		D. auriculata Backh.
	Pittosporaceae	*Pittosporum bicolor* Hk.
		Bursaria spinosa Cav.
		Billardiera longiflora Labill.
	Leguminosae	*Acacia melanoxylon* R.Br.
		A. diffusa Edwards
		A. stricta Willd.
		A. juniperina Willd.
		A. suaveolens Willd.
		A. verticillata Willd.
		A. falciformis DC.
		A. dealbata Link.
		A. Oxycedrus Sieb.
		Platylobium formosum Sm.
		Pultenaea scabra R.Br.
		Goodia lotifolia Salisb.
		Hardenbergia monophylla Bth.
		Kennedya prostrata R.Br.
		Hovea heterophylla A. Cunn.
	Oxalidaceae	*Oxalis corniculata* L.
	Geraniaceae	*Geranium pilosum* Forst.
		Pelargonium australe Willd.
	Rutaceae	*Correa rubra* Sm.
	Tremandraceae	*Tetratheca ciliata* Lindl.
	Polygalaceae	*Bredemeyera volubile* (*Steetz.*) Chod.

Euphorbiaceae	*Amperea spartioides* Brongn.
Sapindaceae	*Dodonaea viscosa* Jacq.
Rhamnaceae	*Spyridium parvifolium* F.v.M.
	Pomaderris apetala Labill.
Violaceae	*Viola hederacea* Labill.
Thymeleaceae	*Pimelea axiflora* F.v.M.
	P. serpyllifolia R.Br.
Myrtaceae	*Eucalyptus regnans* F.v.M
	E. obliqua L'Herit.
	E. goniocalyx F.v.M.
	E. macrorrhyncha F.v.M.
	E. australiana R. T. Baker.
	Leptospermum scoparium R. & G. Forster
Araliaceae	*Tieghemopanax sambucifolius* Viguer
Epacridaceae	*Epacris impressa* Labill.
	Monotoca scoparia R.Br.
Apocynaceae	*Lyonsia straminea* R.Br.
Boraginaceae	*Myosotis suaveolens* Poir.
Labiatae	*Mentha Pulegium (intr.)* L.
Bignoniaceae	*Tecoma australis* R.Br.
Compositae	*Olearia lirata* (Sims).
	Helipterum australe (Gray) Ostenf.
	Cassinia aculeata R.Br.
	Erechthites quadridentata DC.
	E. prenanthoides DC.
	Bedfordia salicina DC.
	Cymbonotus Lawsonianus Gaud.
	Centipeda Cunninghamii F.v.M.
	Vittadinia triloba DC.
	Siegesbeckia orientalis L.
	Brachycome scapiformis DC.
	Senecio lautus Sol.
	S. vellcioides A. Cunn.

THE EMPEROR GUM MOTH: EGGS AND COCOON.

Has any member of the Club observed the Emperor Gum Moth actually laying eggs on a leaf? It would be interesting to know what factor determines the position and distance from the edge. Almost invariably, they are in a single line, parallel to and about ¼ inch from the edge. It may be mere coincidence that the newly-hatched caterpillars emerge from the end nearer the edge of the leaf, and are just able to reach the edge and pull themselves clear. But how does the moth place them there?

I have been surprised to find that few people have taken the trouble to watch the details of the spinning of the cocoon. Then the value of the spikes is manifest. They serve as many feet and measures. After the first few supporting strands are fixed, the caterpillar places the spikes against the threads, and steps with them from one to another, while the fore feet are working from thread to thread, filling in the space. Perhaps the most arresting feature of the building is the ease with which the caterpillar doubles round in the narrow space.—A. J. SWABY.

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, May 13, 1935. The President, Mr. A. S. Kenyon, M.I.E., Aust., presided, and about 120 members and friends attended.

The President welcomed a distinguished visitor, Dr. Jiri Baum, Assistant Director of the Museum at Prague, Czechoslovakia.

Mr. Charles Barrett, in introducing Dr. Baum, stated that he was engaged on a motor caravan tour of Australia and other countries, with the object mainly of collecting spiders and lizards for the Prague Museum, and of studying the biology of spiders.

CORRESPONDENCE.

From Mr. F. Pitcher, thanking members for good wishes sent him, and stating that he expected to leave hospital shortly.

From the Bird Observers' Club, regarding a cinema night on May 20.

REPORTS OF EXCURSIONS.

Reports of excursions were given as follow: Oakleigh Links, Mr. G. N. Hyam; Studley Park, Mr. W. Hanks.

ELECTION OF MEMBERS.

On a show of hands, the following were duly elected as members of the Club:—As ordinary member: Mr. T. Holmes; and as associate member: Master John Laurie Provan.

NOMINATIONS OF OFFICE-BEARERS, 1935-36.

The following nominations were received:—

President: Mr. G. N. Hyam.

Vice-Presidents: Messrs. Geo. Coghill, S. R. Mitchell, and A. S. Chalk.

Treasurer: Mr. J. Ingram.

Librarian: Dr. C. S. Sutton.

Assistant Librarian: Mr. W. H. Ingram.

Editor: Mr. Chas. Barrett.

Secretary: Mr. F. S. Colliver.

Assistant Secretary: Mr. L. W. Cooper.

Committee: Messrs. V. H. Miller, J. W. Audas, C. Daley, A. H. Chisholm, E. E. Pescott, and H. Jenkins.

APPOINTMENT OF AUDITORS.

On the motion of Mr. Geo. Coghill, seconded by Mr. C. Daley, Messrs. A. G. Hooke and A. S. Chalk were reappointed auditors.

NATURE NOTES.

Mr. W. H. Ingram described how very young spiders "take off" on their journeys through the air by means of silken threads.

EASTER CAMP-OUT.

The subject for the evening was "The Easter Camp-Out at Moora Valley." The following members who had participated in the excursion spoke on different phases of the trip:—

Mr. A. S. Kenyon, Leader, described the trip itself, and made particular reference to the aboriginal rock paintings in the Grampians. Photographs were shown, and Mr. Kenyon announced that the Cyclone Fence and Gate Co. had promised to supply, free of charge, the necessary wire and uprights to enclose the Painted Rock of Glen Isla and other sites. The Forests Commission would erect the fences. It was also announced that the Club had decided to donate the sum of £5 towards the cost of fencing.

Mr. C. Daley, B.A., F.L.S., spoke on the geology and geography of the area.

Dr. C. S. Sutton gave an outline of the botany of the area, and Mr. E. S. Hanks spoke on the birds seen during the Camp-Out.

Mr. R. H. Croll thanked the President for the excellence of the Easter excursion arrangements, and stated it was one of the best outings which he had attended. Mr. G. N. Hyam added his tribute.

The President invited Dr. Baum to address the meeting.

Dr. Baum stated that he was very pleased to be present. A very fine series of slides, depicting spiders of many kinds, some showing unique postures, was shown, with comments by Dr. Baum.

At the close of the lecturette, the President thanked Dr. Baum, and stated he was only sorry that it had been impossible to allow a full night for the lecture. Dr. Baum replied, and the members showed their appreciation by acclamation.

The meeting then adjourned for the conversazione.

EXHIBITS.

Miss V. Fletcher.—Fungi, *Boletus* sp., and *Cortinarius archeri*.

Mr. A. H. E. Mattingley.—Aboriginal necklace and totemic breastplate, from Herbert River, Queensland.

Mr. C. French.—*Cypripedium villosum* (Lady's Slipper Orchid), India.

Mr. W. H. Nicholls.—Orchids, *Prasophyllum Morrisii*, Nicholls; and *P. Archeri*, Hooker fil, collected by Mr. C. French, at Anglesea, April, 1935.

Mr. V. H. Miller.—Boulder opal specimen, and lizard eggs, containing young.

Mr. Noel Lothian.—Sterile and fertile fronds of *Blechnum lanceolatum*.

Mr. S. R. Mitchell.—Ground-edge axe, chipped-pebble axe, hammer stones, fishhook files, points, scrapers, etc., from Murra Murang, N.S.W.

Mr. T. S. Hart.—Aragonite crystals, from Warrenheip, *Casuarina* sp. aff., *C. paludosa*, from east of Somerville; with *C. distyla*, from Caulfield, for comparison.

A PRAYING MANTIS BUILDS ITS EGG COCOON

I had often wondered how the common Green Praying Mantis made the egg-cocoons. Although they were to be found in dozens in my garden, I had never been present at the building, and had concluded that it was a nocturnal process. On Easter Sunday, however, I discovered one just beginning, and followed the process through.

The insect places itself firmly on the support. The hind legs are held with femurs in line and tibias at right angles to them. They are kept thus throughout, and make the first limiting factor by holding the forward end of the abdomen in one position.

First, a mass of frothy material is extracted, and pressed on the supporting stem. Movement ceases for a while, evidently to allow the foundation to solidify. The egg-placing apparatus is then moved over the mass with something of the motion of a paint brush, gradually adding till a flat face is formed, roughly semi-circular in shape. The form seems to be determined by the reach of the end of the abdomen; but the arch of the wings may have something to do with it. The cerci seem to be very sensitive, and are working over the surface the whole time. It may be mere coincidence that the total width is about equal to the span of the cercus from the centre.

The flat semi-circle is tested for adhesiveness by tapping near the base. When it is sticky enough, the first egg is not laid; but drawn out as the egg apparatus is brought close up under the centre of the wing and pressed again. A few taps along the length of the egg, and it adheres closely. It happens that the length of the egg is just sufficient to place the opening under the centre of the wing. Those coming from one side finish a little short of the centre, and produce an alternation of prominences with two or more eggs to each. After each set of eggs, the painting of froth goes on till the limits are reached.

When the first set of eggs fixes the centre, the cercus of one side or the other lies steadily along the centre line as if holding to the ridge of prominences while the other is working over the surface and measuring, as well as testing the surface. The insect does not move forward as the length of the cocoon increases. The abdomen seems to telescope with the loss of distending cocoon material.

While the work is going forward, the mantis is more intent than a sitting hen. The branch was cut, turned in every conceivable position, and shaken gently. The insect was touched, but showed neither fear nor pugnacity. After the last egg was placed, the covering was painted on to round the end, and the mantis became suddenly active—running off and dodging attempts to capture it. The head, which had remained fixed, became mobile again. The construction took almost exactly three hours.

A. J. Swaby.

MORE INSECT TRAGEDIES.

Pollination of *Nerium oleander*.

By EDITH COLEMAN.

In the pollination of *Nerium oleander* one may witness many insect tragedies similar to those enacted in the flowers of *Araujia*. The white, or pale pink, night-scented flowers invite night-flying moths. Their structure is beautifully adapted to the transference of pollen by moth agency. Short-tongued insects frequently visit the flowers, but these are unable to reach the nectar or to pollinate the flowers.

In October, 1931, I received from Mr. W. S. Davidson, of Wallsend, New South Wales, several tins full of *Nerium* flowers. In every flower was a blowfly, gripped by the mouth-parts, in a trap somewhat similar to that of *Araujia*. I learned from Mr. Davidson that his shrub was responsible for the deaths of thousands of these flies. On a sunny day the buzzing of trapped insects could be heard at some distance from the plant. It was suggested that *Nerium oleander* might be useful in fly-infested localities, on sheep stations, or near abattoirs.

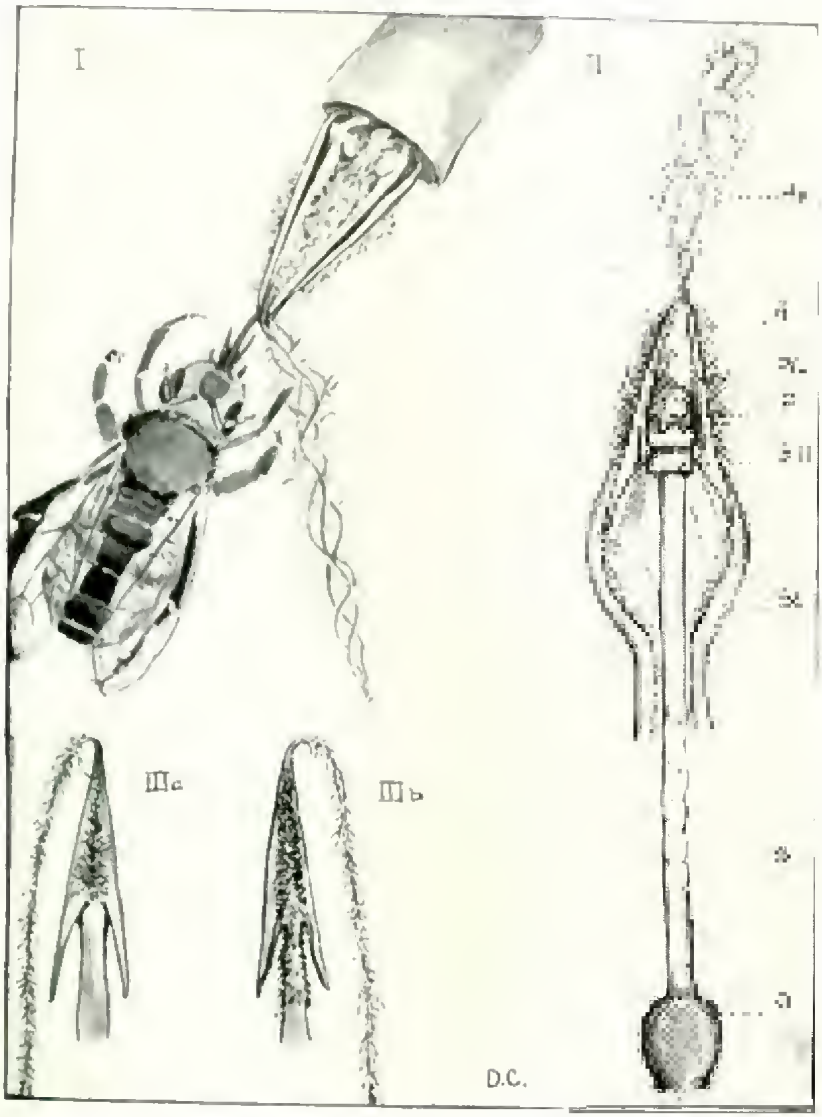
Since 1931 I have examined many more flowers, each with its captive fly. In March last I received a flower containing a trapped bee—the first I had seen.

There are some slight differences between Mr. Davidson's *Nerium* and the common, single-flowered horticultural form of Oleander, but the pollinary mechanism in both follows the same plan. The corolla is, roughly, funnel-shaped. A ragged corona probably aids in deterring the visits of unwelcome guests. Though the juxtaposed edges of the five horny stamens form a slit-like trap, similar to that of *Araujia*, the general structure of the flower is quite different. A flattened, dilated, stigma-head, with a central bi-lobed process, surmounts a long style. A median constriction divides it into two parts, the lower lobe only being receptive.

The upper part secretes a thick, viscid substance, which probably aids the removal of pollen on insect tongues. The five stamens, attached to the middle of the corolla tube, are closely pressed against the swollen stigma-head. The upper cells, only, of the anthers produce pollen. These are situated well above the receptive portion of the stigma-head, so that self-pollination is avoided. The anthers are lengthened into hairy appendages, the twisting of which holds the anthers firmly together at their apices. The slits between each pair of anthers are wider towards the base.

The twisting of the long, feathery appendages into a dense, woolly mass is probably another adaptation which serves to ward off small insects, useless as pollinators. The space above the stigma-head, enclosed by the closely-pressed anthers, forms a

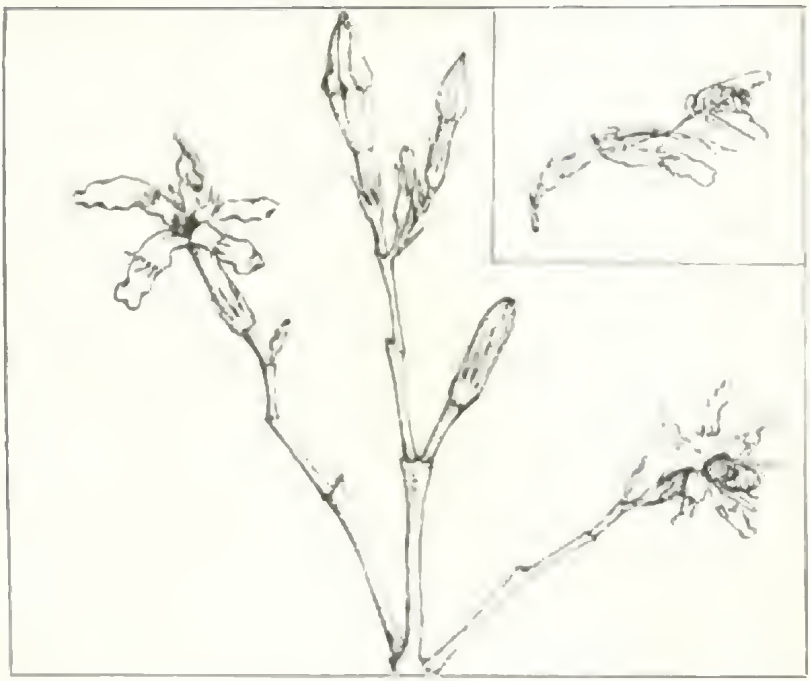
Plate II



Pollination of *Nerium oleander*

cone-shaped chamber. As the anthers discharge their viscid, granular pollen, it is held in this chamber on the tip of the stigma-head, and on the outer surface of the cells, quite beyond reach of the receptive portion of the stigma.

To reach nectar, secreted at the base of the flower, the tongue of moth or bee slides readily between a slit formed by two anthers. Should pollen already adhere to its tongue, some will be left as it passes over the receptive lobe of the stigma-head. To



Nerium oleander with trapped blowfly in one flower. Inset: a flower with part of corolla removed to show how mouth-parts of fly are caught between the anthers.

withdraw from the flower, its tongue must slide over the thickly-viscid upper lobe. Being now smeared with the thick, stigmatic secretion, it can scarcely fail to pick up more pollen as it passes through the cone-shaped chamber in which the adhesive grains are massed. This pollen it will carry to the next flower it visits.

The number of fertile seeds in the long, cylindrical fruits, each fitted with a silky plume, suggests that the pollinary mechanism in *Nerium* is as effective as it is beautiful.

Key to plate:

I. A flower of *Nerium oleander*, with corolla removed to show how the tongue of a bee is caught in a slit formed by two anthers.

II. A longitudinal section through a flower (corolla removed), showing ovary (o.), style (s.), two stamens in profile (st.), stigma-head (s.h.), pollen (p.), pollen-chamber (p.c.), anthers (a.), and hairy appendages (a.p.).

IIIa. A stamen, outer surface showing hairy pad on the anther.

IIIb. A stamen, inner surface, showing masses of granular pollen discharged from anther, also hairs on the inner surface of the filament.

ORCHIDS OF SANDY POINT.

By CHAS. H. PILKINGTON.

(Communicated by C. French.)

Sandy Point and the surrounding district are of considerable interest to the orchid lover. Sandy Point is a small peninsula, situated between Waratah Bay and Shallow Inlet. This country is typical South Gippsland heath plains, while the higher land grows Messmate and Peppermint Gums.

Commencing with the autumn orchids, *Eriochilus autumnalis* may be found in the moister parts of the heath plains before the end of February. This hardy little orchid seems to defy the summer sunshine, which often parches this light soil in a dry season. A few weeks later *Prasophyllum nigricans* may be found, though its small, dull-red flower spike will be missed by most people. *Pterostylis parviflora* is another early autumn species, notable for its stiff, upright growth. During the autumn and early winter thousands of leaves of *Acianthus exsertus* may be seen, but only a small percentage of the plants flower. In the spring, *A. caudatus* may be found, but, as it grows close to the roots of scrub or among ferns, this orchid is not easy to find.

From April till November some species can always be found in the "hummocks." The first to appear, about April, is *Pterostylis obtusa*, but this species is not very common. *P. reflexa* (?) blooms from May until August. In July the first Gnats (*Cyrtostylis reniformis*) and *Corysanthes dicmenicia* appear, and both these species are very plentiful during the next few months. One entirely green specimen of the former was found. In August we have the slender and graceful Maroon-hood (*Pterostylis pedunculata*). Large patches of these orchids occur under the shade of Sheoaks and on southern slopes. I have found a couple of specimens of a green variety, having shorter sinus points than the ordinary ones.

In September and October, on the hummocks, *Pterostylis curta* and *Caladenia latifolia* are flowering; both species are very plentiful, and add beauty to the scenery. *Curta* produces splendid large blooms here, but I have never seen more than one flower on a stem, although I understand that in some localities two, or even three, are not uncommon. A little later we have *Caladenia Menziesii*, but the flowers are not plentiful, as rabbits seem to be very partial to the buds, and also to those of the Gnat Orchid.

On the low, sandy ridges and heath plains orchids are at their best in the spring. *Cyrtostylis reniformis* grows here, as well as in the hummocks, but is later in flowering, while *Corysanthes fimbriata* replaces *C. dicmenicia*. In June or July the first Nodding Greenhoods (*Pterostylis nutans*) are seen, but it is during October and November that these graceful species

are at their best, and growing in thousands, often hidden by thick scrub or ferns.

From September onward orchids become very plentiful. *Prasophyllum fuscum* is an early spring species, and is very hardy. I have found this orchid growing on a bare, burnt tract, after fierce hail showers, the flower being undamaged. A month or two later we find *P. Brainei*, and towards the end of the spring *P. australe* and *P. brevilabre* are fairly common, while one or two specimens of *P. elatum* have been recorded.

In September we have Blue Fairies (*Caladenia deformis*). The shy-blooming Red-beak (*Lyperanthus nigricans*) may also be seen about the same time, especially on country which has been burnt in the previous summer. The dainty *Pterostylis nana* blooms freely in clusters about this time, followed by *P. barbata*. In October some of the most handsome species flower. *Caladenia carnea*, rather rare here, is to my mind one of the most delicate of wild flowers, while the demure little flowers of *C. cucullata* also are very attractive. *C. cardiformis* is fairly common, also *C. Patersonii*, an aristocrat to the tips of its long petals and sepals. *C. dilatata* is common, and blooms until well into the summer.

Then there are the Doubletails. First is *Diuris pedunculata*, confined here to a small patch, but numerous. *D. longifolia* also is plentiful, though often dwarfed in stature, thus belying its name. The handsome Tiger Orchid (*D. sulphurea*) grows to perfection here. *Calochilus Robertsonii* may occasionally be found, though it is rare. *Glossodia major* is abundant. I have seen patches a square yard or more in area where it would be impossible to put one's foot down without treading on several Waxlips.

A walk on a sunny November day is worth while, if only to observe the beauty of the Sun Orchids. The first to appear is the little yellow *Thelymitra flexuosa*, *T. ixiodes*, varying from pale mauve to bright blue, is very common, while *T. longifolia* is not far behind it in number. Occasionally one sees *T. grandiflora*. *T. carnea* is rare.

Leek Orchids are worthy of notice by reason of their ability to hold their own against the plough. They flourish in places from which all other wild flowers have disappeared. I refer to *M. porrifolia*. *M. citrata*, perhaps the most attractive of orchids, is common in the numerous small swamps in depressions on the plains. In December and January the low-lying areas produce *Cyrtostylis longifolia* and *Orthoceras strictum* in considerable numbers. In the fertile, swampy area I have found *Gastrodia sesamoides* and *Pterostylis falcata*, but both species are very rare. In January and February the dainty pink flowers of *Spiranthes australis* appear.

In the timbered country at a higher altitude many orchids grow, but I have not explored this field to any great extent. In early spring *Pterostylis longifolia* is plentiful, while I have found the majestic *P. grandiflora* also. *Burnettia cuneata* has been recorded of this district, also *Caladenia congesta*. The beautiful Hyacinth Orchid, *Dipodium punctatum*, is abundant in the summer.

An easy way to mount Fairy-flies is to drop them direct into Xylol, quickly arrange the wings and legs under a dissecting microscope by means of two fine bristles set in handles, and mount in Canada balsam. For purposes of study this is quite satisfactory, though not, of course, for exhibition. All the genera do not react in the same way to any given treatment, and the only way to become a good mounter is by practice and experiment.

B.B.

NOTES ON THE LEAF-CURLING SPIDER.

By A. D. HARDY.

The following notes are not of general application, but are the result of observation in my garden at Kew, Victoria, and recorded after the reading of Mr. L. S. G. Butler's paper, "The Common and Conspicuous Spiders of Melbourne" (*Victorian Naturalist*, April, 1933, Vol. xlix., No. 12), especially his reference to *Araneus wagneri*.

My garden is crowded with trees and shrubs, and in parts sheltered from strong westerlies, but open to the morning sun, spiders are so numerous that newcomers must experience difficulty in finding suitable locations. If surplus population is not accounted for by migration, then cannibalism, wasps, the Green Mantis, and other natural causes provide against overcrowding. They comprise several species, two of which construct circular snares, one vertical, the other horizontal; another makes an amorphous entanglement, and lurks nearby; a fourth, the subject of my notes, is the Leaf-curling Spider, *Araneus wagneri*, of the family Argiopidæ. This is my most common species. Several others of Mr. Butler's Melbourne spiders are present, but are comparatively rare.

The adult female Leaf-curler is about one inch in length when naturally fully extended, but when composed for a long rest, or is sulky, she hunches herself up, with her knees near her belly, and is then an eighth of an inch shorter. The belly, paunch, or, more politely, abdomen, as a Fabre translator variously has it, is about the size of a large pea, is nearly elliptical in longitudinal section, and projects forward above the cephalothorax. The latter, and the legs, are cedarwood brown; the legs are scantily-haired. The spider weighs about four grains. I do not find the colour quite as in Butler's description; maybe his specimens were immature or spirit-bleached. The following applies to the adult female, after seeing some hundreds: the ground colour of the abdomen is dark-chocolate brown, appearing in two anterior patches, three patches on each side, and a posterior patch, which is continued as a band diminishing forwards along the back. The rest of the dorsal surface and sides appears to be a creamy or yellow dotted area, but that colour is in the meshes of a reticulation of the dark-chocolate brown; the yellow of the dorsal surface may be creamy, or ivory-white. Her shape is fairly constant, but her colour varies in detail.

The Leaf-curler's habits also exhibit variety. She may construct a home or live in a "shack." The webs are of the sectoral orb* type, but are inconstant in number of radii and the polygonal

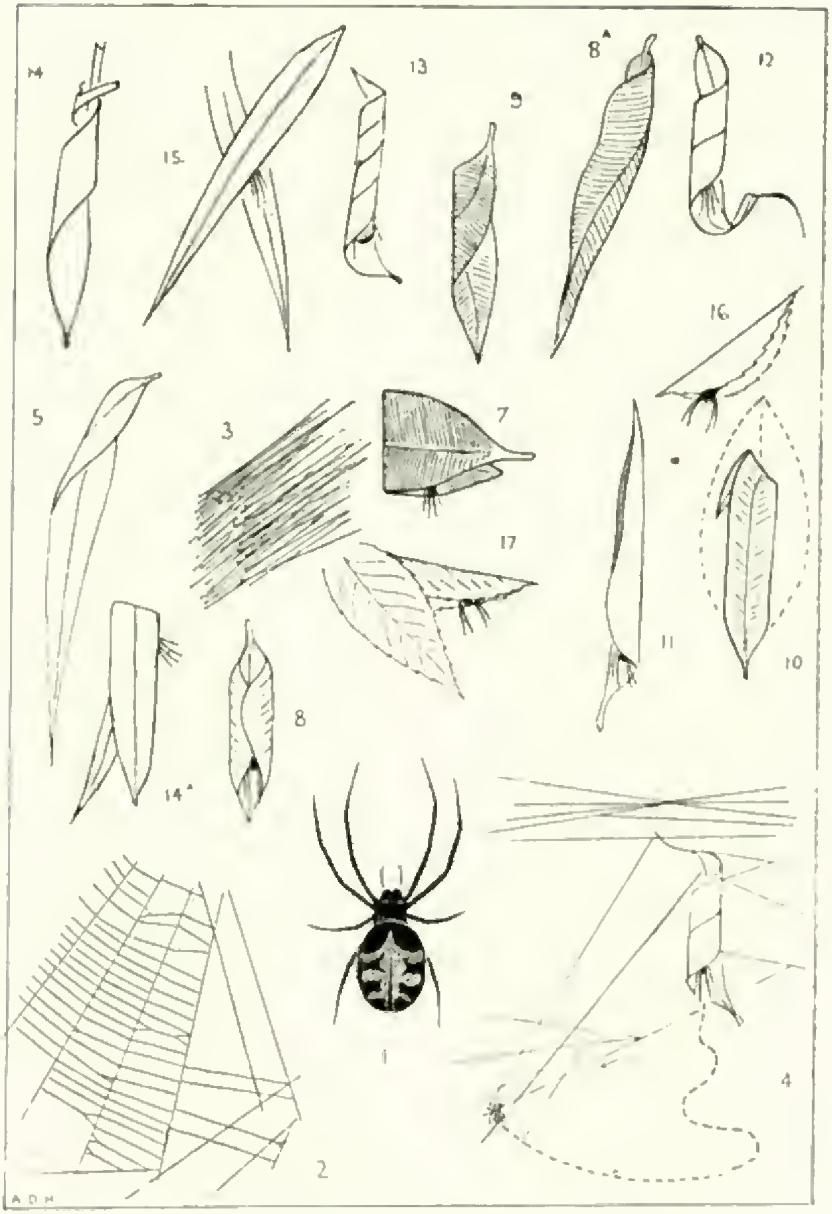
*See Mrs. E. Coleman's sketch, *Victorian Naturalist*, August, 1932, Vol. xlix., p. 87.

concentrics, which are instead of the spiral line of species of *Epeira;* moreover, the lines frequently bifurcate, are often not parallel, and the radii, at times angled, occasionally converge outwards for part of their length; and there is much irregularity and apparent haphazardness in the marginal finish at the missing-sector edges. The radii are 24, more or less, and at angular distance of about 10 degrees; and the concentrics may be 40, 60, or any such number, to over 100, according to along which radius one measures them. She is not only a Leaf-curler; she is a folder and a twister.

Photo. by C. Barrett.

Leaf-curling Spider's retreat and portion of web.

A notable feature of the snares of *A. wagneri* is the large number of horizontal lines or cables, many of them joined at very acute angles. Occasionally I have seen a curtain of such lines descending from either margin of the overhead group, a vertical distance of 9 inches, about 2 inches apart, and in this inverted gutter of open wirework a small stick or pencil could be waved to and fro. The rough sketch may convey a better idea than can be given in words. But, whether the spider satisfies her requirements with horizontals, an irregular entanglement, or constructs a



Leaf-curling Spider and details of home-making.

net for the snaring of her food, she seems to have grown dependent on a shelter, the material for which is ready, or half-made, and which, respectively, she adopts or adapts. This shelter is placed close to the entanglement, or behind the practical centre of the web, sometimes with an opening, where in most "orb" nets there would be a platform; at others a scantily-webbed tunnel connects, or the snare may be before the opening of the shelter, like a curtain, with notched zone and platform complete.

The shelter used by this Leaf-curling Spider is usually a dry leaf, necessarily from the ground, since the leaf is often from a species of plant not growing in the immediate locality, but lies there, on the ground, by agency of wind or yard-broom. Rarely, a growing leaf has been used—so rarely that I may name the species: grape vine, musk, *Olearia argophylla*, *Correa alba*, and a rose. The thin, light, flexible leaves of a bamboo are favoured, and they may be seen suspended between alien plants; rose, lilac, geranium, plum, tecoma, spirea, correa, crassula, etc. Tree leaves: *Eucalyptus ficifolia*, *Quercus pedunculata*, and the leaflets of *Acacia elata*, are used in localities where the bamboo is not available.

The spider's method varies with the size, shape, and pliability of the leaf; the stiff leaf of a eucalypt can be rolled longitudinally, and that is her easiest way in a difficult task; but she sometimes curls it, or folds its sides in "double-breasted" manner, and sometimes essays a transverse fold, in which case the leaf breaks, and then she remedies the defect with a little webbing. The large leaf of the grape vine, in situ, but in autumnal extremis, is adapted by the folding over and turning in of only one lobe, and large, withered geranium leaves are similarly treated. The growing *Correa alba* leaf, elliptical, with axes about 1½ inches and 1 inch, has its sides curved downwards in saddle shape. The rather thin musk leaf, about 3 inches long and 2 inches broad, is in a longitudinal fold or arch; and small, thin leaves, like rose, lilac, plum, diervilla, are usually folded obliquely. It is with the bamboo leaf, however, that *A. wagneri* shows her skill in construction. Bamboo leaves lie flat on the ground, and, once wetted, do not blow about, but defy wind and the yard-broom; those which reach the uneven ground of the shrubbery may be slightly concave, twisted, or crinkled, defects which might spoil their utility. The selected leaf is flat, or slightly concave, and straight.

Now, I have not seen her in the act of hauling the leaf from the ground, but the circumstantial evidence is strongly in support. I have seen leaves dangling between ground and web, and have seen part of a slow ascent, without having seen the source of the motive power. The leaf could not have blown up into the sometimes 6 feet-high positions where fixed. The usual orientation suggests the deliberate putting in place, with the finely-tapering end uppermost; the fact that she occasionally adopts a snail shell, or adapts a cigarette card or tram ticket, shows her intelligence to be sufficient for the task; the snail shell is too heavy to

Araneus wagneri and its leaf architecture.

be blown up, or for her to carry. So I say that she finds a leaf, conveniently below, attaches a thread, climbs to the overhead cables, and attaches the leaf, and hauls it up, so that, if a snare has been made, the leaf, when in position, has its opening near the centre; or, alternatively, that she, having hung the leaf, constructs the net to suit the leaf, and so I leave the onus of disproof on unbelievers. Ash tells of similar haulage by *Theridion reparium.**

This I know: *A. wagneri* will accept a leaf, when she is in need of one, and will use it, if placed in the web, even though it be quite dissimiliar from the one from which she has been forcibly, but gently, dislodged, e.g., a flat bamboo leaf for the short, crumpled leaf of the oak. I have frequently watched her making the spiral turn to the bamboo leaf, her method being as follows: She proceeds about half-way up the left-hand margin of the vertically-hanging flat, or almost flat, leaf, and attaches a line; then she crosses obliquely to the other margin, about 1½ inches higher, and connects the line and hauls tight; this is reinforced with several other lines, which are tightened, and the further part of the leaf is now seen to be bending over to the left till at an angle approaching 45 degrees. Next she goes about an inch further along the right-hand margin, and, from the first point (on the left margin) attaches other lines, which are nearly vertical to it, and gradually pulls the end of the leaf down and round, sometimes pulling the tip over to shield the small aperture at the summit of the shelter. The weight of the spider is about 4 grains, and her bamboo leaf about 3 grains; the weight of the snail shell, 24 grains, more or less, and that of other leaves used: Eucalyptus 12, musk 7, and oak 5 grains. Sometimes she is in a shelter, especially a small spiral, which she has outgrown, and she appears ludicrous, legs in front, and vulnerable abdomen at rear.

Like some other species, the Leaf-curling Spider does not return from a capture, in the web, by the same route, but lets go her hold, swings to and fro in a few diminishing arcs while climbing, reaches the leaf, and backs in until at least her conspicuously-coloured abdomen is hidden, or until only the ends of her front two pairs of legs are visible. A rapid run out, and some quick work in the net, then the drop, and "one, two, three, four, and home:" two seconds for the outward rush, three tragic seconds in the net, and for the drop, swing, and ascent—less than one second!

Most of these observations have been made by lantern or torchlight. The sudden application of an electric torchlight did not cause the slightest visible reaction in any of these spiders, even with the torch almost in contact.

Sensitiveness to quick change of temperature was marked, and in the circumstances of an adult refusing to do anything on a sunny, but coldish, autumn day, when removed from her shelter, and, my time and patience less than hers, I used increased warmth

*"British Spiders," by E. C. Ash, M.R.A.C., F.R.M.S.

as a stimulant. Having first practised on the bulb of a mercury thermometer, in order to keep within reasonable increase and avoid cruelty, I focussed the mild sun rays on her for a rise of a few degrees, such as might be affected by an obscuring cloud passing and revealing the sun on a warmer day. Focussed on her legs or cephalothorax, this had no noticeable effect, but when the lens concentrated the rays on the abdomen she gradually became alert. One might expect that, so stimulated, she would run to the nearby leafy refuge to which her lines were attached, but, No! she remained on the horizontals (there was no net), and commenced spiralling the bamboo leaf which I had given her, and which she, being an adult, would not have manipulated till nightfall.

Younger ones will, if disturbed, and sometimes voluntarily, do construction work in the sun on a warm day, and either old or younger Leaf-curlers will venture out in the glare when the telegraph announces a catch. I leave to arachnologists—or should I say araneologists?—the puzzle of an old spider, which normally works in the dark, and on so cold a night as to make observation irksome, being stimulated to the same task by the artificial application of warmth in daylight. I have used the term "circle" instead of "orb" (except in quoting) for a plane figure, and have avoided perpetuating the term "cocoon" for "egg-sac" or "egg-bag," since by definition a cocoon contains its maker.

REFERENCE TO FIGURES.

All figures rough sketches only, and reduced to about a third size, but the spider slightly larger than life size. Where the spider's legs are shown they rest on web, not indicated.

Illustrations Page 26.

Fig.

1. *Araneus wagneri*, slightly enlarged.
2. Degeneration in web-making, frequently seen.
3. A rare structure, twice seen.
4. The quick way home.
5. Primitive architecture; oblique fold; bamboo.
7. Successful (rare) transverse fold of eucalyptus leaf.
8. "Double-breasted" long-fold; eucalyptus.
8a. Attempt at spiral failed; eucalyptus.
9. Oblique fold of eucalyptus; part spiral.
10. Eucalyptus; margins folded in; tip bent over opening.
11. Eucalyptus; defect in closing remedied by webbing.
12. Bamboo; leaf inverted; surplus tied up.
13. Bamboo; two spiral turns; infrequent.
14. Damaged leaf used; bamboo.
14a. Two bamboo leaves used (one slightly concave); rare.
15. Bamboo transversely folded; rare.
16. Rose leaf; long fold.
17. Growing rose leaf; used after desertion of a dead oak leaf (not indicated).

Illustrations Page 28.

Fig.

18. A, B, C, stages in curling into spiral of a bamboo leaf. A: first attachment; B: strained; C: second attachment; leaf is inverted (unusual).
19. Bamboo leaf, seen dangling at 10 p.m., and
20. Same leaf in position, with spider housed 6 a.m. next day.
21. On a gift leaf, after dislodgment from oak leaf; spider rested for two hours.
22. & 23. Unusual orientation of spider in bamboo leaf.
24. Callistemon leaf; house small and draughty.
25. Almost a vagrant; no webbing.
26. & 27. *Acacia alata* leaflets; improved by webbing.
28. Result of two hours' work; bamboo.
29. After dislodgement from oak leaf and locality, and further dislodgement; fourth bamboo leaf curled in same position.
30. Eucalyptus leaf; part folded, part curled; entrance webbed, rare.
31. Eucalyptus; transversely folded and fractured; webbed to strengthen.
32. Cherry leaf; longitudinal fold.
33, 34, 35, & 36. Oblique folding of short, thin leaves—tecoma, kerria, syringa, rose.
37. Grape vine leaf; lobe folded over and turned in.
38. Bamboo leaf (unusually horizontal); spider on egg-bag inside.

NOTES ON *GAULTHERIA APPRESSA*.

As collectors of our Victorian Alpine flora well know, two only of our plants belong to the Ericaceae family, namely, *Gaultheria* and *Wittsteinia*. Both are rare and protected. They are found in our north-east highlands, in the Lake Mount district, and on the Baw Baws, generally at the height of between 4000 feet and 5000 feet. At higher elevations on our Alps I have sought for them in vain.

Perhaps it will be hard for older collectors to reconcile the changes in some specific names of *Gaultheria*, which the Director of the Royal Botanic Gardens, Kew, London (Sir Arthur W. Hill), gives in his recent interesting contribution to the Journal of the Linnean Society of London, a copy of which is to hand. In future our Australian mainland representative of the genus will be called *Gaultheria appressa*, and with it is a New South Wales variety, *glabra*, while the old and familiar name, *G. hispida*, is to be restricted to one of the species in Tasmania, where Robert Brown first collected the species, which he originally described under that name. Sir Arthur Hill, in 1928, visited the Commonwealth and New Zealand, and when in the Dominion investigated a number of strange forms of *Gaultheria*, which proved to be hybrids of several species that had been confusing botanists for a long time. Some of the problems were solved. Sir Arthur Hill, the late Dr. L. Cockayne, and other leading New Zealand scientists thoroughly investigated the genus, and its ally in the field, in that home of *Gaultheria*. On the mainland of Australia one species only seems to be recognised.

Another genus, *Pernettya*, has so close an affinity with *Gaultheria* that it is sometimes confused with it, so that determinations have been recorded and generic names transposed. This ally is known in New Zealand and Tasmania, but is not represented in Australia. By the recent revision of Sir Arthur and his colleague, Mr. Brian Burtt, two species of *Pernettya* are recorded as from New Zealand, and two species from Tasmania. And, after eliminating certain *Pernettyas* and *Gaultherias*, it has been shown that we recognise six species of *Gaultheria* in New Zealand, two species in Tasmania (one being common to New Zealand), and one species in

Australia, or a total of eight species in the Commonwealth and the Dominion.

As our own main concern in Victoria is with *Gaultheria appressa* and *G. hispida*, it will be sufficient to state here that the change of names is arrived at, not so much from the floral characters, as from the marked differences in the leaf texture and shape, and in the characters of the hairs on the leaves and other parts of the plant. So an old friend has been masquerading under a wrong name, and, instead of our plant existing outside our continent, its exclusiveness now entitles it to specific rank. For this we have to thank the investigators of an enormous amount of material examined in the course of lengthy researches.

Examination was made by Sir Arthur Hill of the material of the genera at Kew, the British Museum, as well as material from New Zealand, Tasmania, and the mainland of Australia, including specimens collected on Mount Donna Buang by the author of the paper. Much Victorian material was also examined, and that also included specimens collected by Von Mueller, Luehmann and French, Maiden, Cambage, and Tadgell, from the Cobboras, Victorian Alps, Mount Bogong, Mount Feathertop approaches, Mount St. Bernard, and the Big River, under Mount Bogong.

The following is an abbreviated description of *G. hispida* and *G. appressa*.

G. hispida (R. Br.).—Branchlets setose; hairs on the branchlets spreading; leaves averaging 5·4 cm. long, and 1.2 cm. broad; pedicels pubescent; leaves slightly hairy on upper surface, and midrib pubescent; leaves thicker and more coriaceous, veins deeply impressed on the upper surface; leaves narrower relatively to length, lanceolate or ovate, acute to acumi., gradually apiculate, bearing reddish bristles; peds. covered with short, downy, white hairs.

G. appressa (A. W. Hill).—Hairs on the branchlets appressed; leaves averaging 4·9 cm. long, and 1·6 cm. broad; pedicels pubescent, and with a few scattered, thicker hairs; leaves elliptic-oblong, or elliptic, abruptly apiculate from an obtuse apex; leaves more or less smooth above in adult leaves, veins scarcely impressed, not hairy above midrib, which may be puberulous; on the pedicels are long, crisped reddish, also short, downy hairs, bristles everywhere appressed.

A. J. Tadgell.

EXCURSION TO NEWPORT

Six members attended the excursion to Newport on Saturday, March 9. Owing to the fact that in the past many rock specimens (ballast) have been discharged from the ships of different countries, this locality is very suitable for an introduction into the principles of petrology. The bulk of the specimens consists of pebbles, which are representative, as a rule, of those more resistant of the harder portions of the parent rock mass to weathering, some of the specimens collected were not normal types. Perhaps they represented parts of the rocks modified by silicification by post volcanic processes, by pneumatolysis, etc., or they may have been enclaves, homoeogenes or autoliths. Many specimens were collected, indicating the main characteristics of the several rock groups. Of the igneous rocks both abyssal, hypabyssal, and extrusive types were noted, together with several members of the metamorphic type, both dynamic and contact, and a few sedimentary rocks were collected and described. In a calcareous rock of the latter series Mr. Colliver was fortunate in discovering several fossil brachiopods, among which was a beautiful spirifer. With the specimens supplied by the locality the classificatory system of the subject was outlined, and a selected series of hand specimens assisted in illustrating the mineral composition of the most important rock forms. In the evening some of the excursionists inspected the collection of Mr. Colliver, and further geological principles were discussed.

A. C. Frostick.

The Victorian Naturalist

Vol. LII.—No. 3 July 3, 1935 No. 619

THE FIELD NATURALISTS' CLUB OF VICTORIA

The annual meeting was held at the Royal Society's Hall on Monday, June 10, 1935, at 8 p.m. The President, Mr. A. S. Kenyon, M.I.E. Aust., presided, and about 90 members attended.

DONATION

It was announced that Mr. V. H. Miller had presented to the Club a stand and canvas cover for the Epidiascope. The thanks of the Club were conveyed to Mr. Miller.

REPORTS OF EXCURSIONS

Excursions were reported on as follow:—Footscray Gardens: Mr. G. N. Hyam, for Mr. D. Mathews; Marysville: Mr. F. S. Colliver read a report for the Leader, Mr. W. H. Ingram.

ELECTION OF MEMBERS

On a show of hands, the following were duly elected as Ordinary Members of the Club:—Miss V. Y. Kimpton, Mrs. H. R. McDonald, Miss Higgins, Miss G. Campbell, Miss O. Mathews, Miss J. E. Sincock, Mr. H. J. Neville Hawkes; and as Country Member: Mr. Chas. T. Fletcher.

ANNUAL REPORT

The Report was read by the Secretary, and adopted on the motion of Mr. C. Croll, seconded by Mr. A. R. Proudfoot. During discussions on the Report it was suggested that an index to the Fern Book be issued, and the meeting resolved that this matter be left to the Committee.

BALANCE SHEET

The Balance Sheet was presented by Mr. A. S. Chalk, who explained the financial position.

Mr. V. H. Miller, who moved that the Balance Sheet be adopted, questioned the survival of the Charabanc Fund.

Mr. J. J. Freame seconded the motion.

Mr. A. H. E. Mattingley suggested that the standing bank account was too large, and should be invested.

Mr. G. N. Hyam referred to the cost of the *Naturalist*, and

stressed the necessity of having new members. He stated that £400 was a very conservative estimate of the value of the Library.

The motion for the adoption of the Balance Sheet was carried.

Mr. A. S. Kenyon then vacated the chair in favour of Mr. G. N. Hyam, who expressed his thanks to the members for electing him as President.

After it had been announced that Mr. A. S. Chalk did not wish to stand for election either as Vice-President or a member of the Committee, and that both Mr. E. E. Pescott and Mr. J. A. Kershaw definitely had decided to retire, it was found that no elections were necessary.

The following are the Officers for the year 1935-36

President: Mr. G. N. Hyam.

Vice-Presidents: Mr. Geo. Coghill and Mr. S. R. Mitchell.

Treasurer: Mr. J. Ingram.

Librarian: Dr. C. S. Sutton.

Assistant Librarian: Mr. W. H. Ingram.

Editor: Mr. C. L. Barrett.

Secretary: Mr. F. S. Colliver.

Assistant Secretary: Mr. L. W. Cooper.

Committee: Messrs. J. W. Audas, A. H. Chisholm, Chas. Daley, H. Jenkins, V. H. Miller, and A. S. Kenyon (ex officio).

PRESIDENTIAL ADDRESS

Mr. Kenyon delivered the Presidential Address, "Science Marches On." He dealt briefly with the progress made in the various sciences during the past twelve months.

The Chairman thanked Mr. Kenyon for his address, and spoke highly of his work during his term of office. He also paid a tribute to Mr. E. E. Pescott and Mr. J. A. Kershaw (who has held office for nearly 37 years), for work they have done in past years.

NATURE NOTES

Mr. A. S. Chalk said that he had heard a magpie mimicking other birds at Beaconsfield.

Mr. A. H. Chisholm said that this was possibly the first authentic record of vocal mimicry by the magpie from a competent bird student, but he had received several letters from children on the subject.

Mr. A. H. E. Mattingley mentioned that wattle-birds were numerous around Melbourne, and suggested that it was due to the abundance of red-flowering gums, *E. ficifolia*.

Mr. A. R. Proudfoot spoke on robins.

Mr. A. S. Kenyon referred to the "cooee bird," and asked whether there was any such species.

Mr. A. H. Chisholm stated that it was a cuckoo well known in northern New South Wales and southern Queensland.

The meeting then adjourned for the Conversazione.

EXHIBITS

Mrs. J. C. Dyall.—The "skeleton" of a Hydrangea bloom.

Mrs. M. E. Freame.—Marine shells of the genus *Olivia*; plant of the Horned Poppy.

Miss C. C. Currie.—Blackfellows' Bread (*Polyporus*), with the fruiting body attached; collected at Lardner, Victoria.

Mrs. T. S. Hart.—Flattened root of a Banksia grown among rocks near Creswick. Adventitious roots of a Casuarina formed in a split fork of the tree (this is a common occurrence), Bairnsdale; creeper strangling a sapling, Orbost; Desert Nightshade (*Solanum lacunarium*), regarded formerly as doubtful for Victoria, specimen collected by W. J. Zimmer, at Walpolla Island, Murray River, Victorian side.

Mr. H. P. Dickens.—Greenhood orchids (*Pterostylis grandiflora*), from Belgrave.

Mr. A. H. E. Mattingley.—Young Black Snakes (*Pseudechis porphyriacus*), alive, and shedding their skins in patches.

Mr. Noel Lothian.—Male and female flowers, also cone of *Casuarina stricta*, from Torquay; collected in June.

Mr. C. French.—Remarkable leaves of the "Scrubby Sheoak" (*Casuarina distyla*). The leaves resemble those of *Cupressus Lambertiana*, and were collected at Anglesea, June, 1935. Specimens of the Comb Fern (*Schizaea* sp.), collected at Anglesea, June, 1935. (These strange ferns are becoming rather rare in Victoria.)

Mr. F. S. Colliver.—Photographs (received from Dr. H. Flecker, Cairns) of the male and female Giant Hercules Moth (*Coscinoscera hercules*), natural size, also photograph of the North Queensland Rock Python (*Python amethystinus*).

FIFTY-FIFTH ANNUAL REPORT, JUNE, 1935

To the Members of the Field Naturalists' Club of Victoria

Ladies and Gentlemen,—

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

The membership is as follows:—Life Members, 11; Ordinary Members, 247; Country Members, 76; Associate Members, 27; total, 361.

This, being a decrease of 13 on the figures of the last Report (1934), is to be deplored, but a drastic revision of the membership list has been made.

We record with sorrow the deaths of two members of the Club, Mr. R. F. F. Lush (1927-35) and Mr. L. Mooney (1930-35).

Mr. F. Pitcher, one of the few surviving original members, happily has recovered from a serious illness.

Attendances at the meetings have been well sustained, the seating accommodation on several occasions being fully taxed. The second room is still in use for display of exhibits. Though

there has often been room for improvement, both as regards number and variety, some very good displays have been staged.

Lectures for the year, in their order, were:—"Early Naturalist Members of the Club, Pt. 1—Botanists and Zoologists," by Mr. E. E. Pescott, F.L.S., and Mr. J. A. Kershaw, C.M.Z.S.; "Birds That Build Playhouses," by Mr. A. H. Chisholm, C.F.A.O.U.; "Wattles," by Mr. E. E. Pescott; "Early Naturalist Members of the Club, Pt. 2—Geologists and Ethnologists," by Mr. T. S. Hart, M.A., B.Sc., Mr. S. R. Mitchell, and Mr. A. S. Kenyon, M.I.E. Aust.; "A Poet Naturalist in Victoria," by Mr. A. S. Kenyon; "Sharks," by Mr. G. Mack; "The East Coast Brush," by Mr. A. H. Chisholm; "The Future of the Game Birds in Victoria" (members of the Club, the R.A.O.U., Advisory Council for Flora and Fauna, Gun Clubs, and the Chief Inspector of Fisheries and Game took part in this discussion); "The Ice Age in Victoria," by Mr. F. S. Colliver; "The Easter Camp-Out at Moora Valley," by Messrs. A. S. Kenyon, C. Daley, B.A., F.L.S., E. S. Hanks, and Dr. C. S. Sutton; and, following on this, a short discourse on "Spiders" by Dr. Jiri Baum, a visitor from Czecho-Slovakia.

Another distinguished visitor to a Club meeting was Major Alan Brooks, an ornithologist from Canada, who spoke on his experiences in New Zealand, and praised the H. L. White collection of skins and eggs in the National Museum, Melbourne.

The various lectures were well illustrated by slides, photographs, etc., and the great value of the Epidiascope is apparent. Two operators have been appointed for the Epidiascope, Mr. A. C. Frostick and Mr. F. S. Colliver, who have control of the machine. The members of the Royal Society have been granted the use of the Epidiascope, and several times during the last year have availed themselves of this privilege.

During the year many excursions were held, but abnormal weather conditions caused the cancellation of twelve excursions, and others were not well attended.

Volume LI. of *The Naturalist* has been issued, and for some months followed on the high standard set by Volume L.; but owing to unforeseen circumstances the Committee, with regret, had to reduce the size of the journal. The Committee regards this publication as one of the outstanding features of the Club.

The Club has continued its activity in endeavouring to preserve the wild life of Australia. Members keep a watchful eye on vendors of plants and animals, and reports are made to the Committee from time to time.

Matters that have been inquired into include:—Preservation of aboriginal relics (rock paintings) in the State; alleged vandalism in the Cheltenham Park; destruction of bone bed at Coburg; protection of the birds of prey; better protection of the Werribee

Gorge area; and provision of more sanctuaries, including Mallacoota.

The Cyclone Fence and Gate Company offered to supply, free of charge, the necessary wire and uprights to enclose the rock shelters at Langi Logan and in the Victoria Ranges, and this Club and the Anthropological Society have agreed to share the cost of erecting the fencing, which will be done by the Forest Commission and the Rotary Club of Horsham.

Besides the Geological sub-committee, which was formed last year, two other sub-committees are now in operation, namely, one to deal with preservation of places of interest to nature lovers, the other a Park Lands sub-committee. Any Club member knowing of some matter which it is considered should be looked into by either of these sub-committees, is asked to communicate with the Secretary, Mr. Colliver.

Co-operation with kindred societies, as the Bird Observers' Club and the League of Nature Lovers, has increased, and the League has been affiliated with the Club under conditions suitable to both bodies.

The South Australian Naturalists' Club, the North Queensland Naturalists' Club, Hall's Gap Flower Show, and the Victorian Aboriginal Group have been assisted by shows staged.

The Victorian Advisory Council for Fauna and Flora, with Mr. C. Daley as Secretary, is still active, and your Committee has again voted £4/4/- towards its expenses.

The Wild Nature Show this year was opened by the Hon. Geo. Goudie. The Melbourne Town Hall was engaged for three days, and all branches of natural history were well represented, members having made special efforts for the Centenary. Unfortunately, owing to numerous other attractions, and the high rental, the show was not financially as successful as usual.

At the Centenary Horticultural Council's display in the Fitzroy Gardens, this Club made itself responsible for the wildflower section, and a very good exhibit was staged. Club members attended throughout the week, and were kept busy giving information.

Last year you were invited to contribute to a fund to put in order the grave of Baron von Mueller; more than sufficient for this purpose was collected, and the balance has been made the nucleus of a fund which members will be asked to subscribe to later, to pay for a plaque of the Baron to be erected at the new Herbarium. This effort is being shared with us by the German Alliance of Australia, Victorian Branch.

During the year an appeal was made through the daily press and *The Naturalist* for relics of Baron von Mueller to be placed in a Mueller Museum at the Herbarium. The Club has made available on loan a photograph showing the Baron's celebrated watchchain.

It was deemed fitting that some members of very long standing

should be honoured, and provision was made in the rules for election to Life Membership of those who have rendered signal service to the Club. Messrs. Geo. Coghill, C. French, and J. Searle were chosen for this honour.

During the year the Forests Commission invited Club members to submit designs for a badge to be issued to rangers to be appointed under the new Wild Flower and Plant Protection Act. Mr. H. P. Dickens submitted the accepted design.

The Librarian reports that numerous books and journals have been bound during the last year, while books in the Library have been better arranged. Exchanges have been arranged with societies and universities overseas, and inquiries for *The Naturalist* have been received from many countries.

A card index to *The Naturalist* was proposed, but the Committee found that the work involved would be too costly, having regard to the limited usefulness of the proposed index.

The Carnegie Institute asked the Librarian to answer a lengthy questionnaire pertaining to our Library. This he did, and our Library is now on the Carnegie list.

The *Fern Book*, published by the Club, is the only popular handbook to the ferns of the State, and should have been better received. Members are asked to make it as widely known as possible. The book was published at a loss to the Club, in order that it might be sold at a popular price. The text of a *Shell Book* has been prepared by Mr. C. J. Gabriel. The matter of publication will be considered by the incoming Committee.

As delegates to the Australian Association for the Advancement of Science for the Melbourne meeting held this year, Messrs. A. J. Tadgell and V. H. Miller were elected.

Your Committee gratefully acknowledges gifts made during the year:—Cash donation, Mr. J. Dixon; Mr. V. H. Miller, a stand for the Epidiascope; the Shell Company of Australia, a fine display staged at the last Wild Nature Show. The thanks of the Club are also due to the Melbourne daily press for generous assistance in bringing the Club's activities before the public, and to members and friends, speakers, leaders of excursions, contributors to *The Naturalist*, lanternists, helpers in show work, and others who have advanced the interests of the Club.

During the year eleven ordinary and two special Committee meetings were held, and the attendances of officers were as follow:—Messrs. W. H. Ingram and F. S. Colliver, 13; Mr. G. N. Hyam, 12; Messrs. L. W. Cooper and V. H. Miller, 11; Mr. J. A. Kershaw and Dr. C. S. Sutton, 10; Mr. A. S. Kenyon, 9; Messrs. Geo. Coghill and J. Ingram, 8; Messrs. C. L. Barrett and C. Daley, 7; Mr. S. R. Mitchell, 6; Mr. A. H. Chisholm, 5; Mr. E. E. Pescott, 1.

A. S. KENYON, President.
F. S. COLLIVER, Hon. Secretary.

STATEMENT OF ASSETS AND LIABILITIES ON 30th APRIL, 1935.

ASSETS.

Arrears of Subscriptions, £74/1/6, estimated to realise, say		£50	0 0
Wild Nature Exhibition tickets unpaid		2	0 0
Bank Current Accounts—			
State Savings Bank	£472 7 2		
Less E. S. and A. Bank Overdraft	12 10 0		
		459	17 2
State Savings Bank Special Trust Account		12	15 3
Investments—			
E. S. and A. Bank, Fixed Deposit	50 0 0		
Commonwealth Bonds	350 0 0		
		400	0 0
Library and Furniture, Insurance Value		400	0 0
Epidiascope, at cost		70	17 6
Stock on hand of—			
Plant Census, at valuation	17 11 0		
Club Badges, at valuation	1 6 3		
Fern Book, at cost (1676 at 1/1½)	92 10 7		
		111	7 10
		£1506	17 9

LIABILITIES.

Late Mr. Dudley Best Fund	£50 0 0
Char-a-banc Fund	2 15 0
Special Trust Account	12 15 3
Subscriptions paid in advance	13 2 0
Balance of amount held in trust for restoration of Baron von Mueller's Grave	0 3 0
	£78 15 3

Audited and found correct on 6th June, 1935.

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

J. INGRAM, Hon. Treasurer.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR 12 MONTHS ENDED 30th APRIL, 1935.

RECEIPTS.

To Balance in Banks, 1st May, 1934—				
State Savings Bank		£448 1 8		
Less English, Scottish and Australian Bank Overdraft		7 3 1		
			£440	18 7
,, Subscriptions—Arrears	£48 12 6			
Current	223 14 6			
In Advance	13 2 0			
		285 9 0		
,, Wild Nature Exhibition Receipts		231 15 11		

„	Cash Sales of							
	Victorian Naturalist		30	19	4			
	Badges		1	7	8			
	Plant Census		2	3	5			
	Fern Book		32	13	8			
						67	4	1
„	Advertisements in *Victorian Naturalist*					2	17	0
„	Donation					1	0	0
„	Interest received—							
	Best Fund		2	5	0			
	Savings Bank Debentures		9	6	0			
	Savings Bank Current Account		10	19	6			
	Commonwealth Loan		14	0	0			
						36	10	6
„	Refund of Deposit on account Melbourne Town Hall					10	0	0
								634 16 6
„	Baron von Mueller Fund, further amount collected, for restoration of grave							1 16 6
„	Debenture matured, 31/3/35, State Savings Bank							200 0 0
								£1277 11 7

EXPENDITURE.

By	*Victorian Naturalist*—							
	Printing	£170	16	6				
	Illustrating	128	16	5				
	Wrapping and Despatching	22	11	2				
					£322	4	1	
„	Wild Nature Exhibition Expenses				207	2	5	
„	Reprints				2	13	6	
„	Library				13	1	6	
„	Postages and Freight				10	18	11	
„	General Printing and Stationery				17	10	8	
„	Donation to Advisory Council for Fauna and Flora				4	4	0	
„	Rent and Caretaker				22	15	0	
„	Petty Cash and Bank Charges				2	15	7	
								£603 5 8
„	Publication of Fern Book							138 10 9
„	Baron von Mueller, Restoration of Grave							5 0 6
„	Purchase of Epidiascope							70 17 6
								817 14 5
„	Balance in Banks, 30th April, 1935—							
	State Savings Bank				472	7	2	
	Less English, Scottish, and Australian Bank Overdraft				12	10	0	
								459 17 2
								£1277 11 7

Audited and found correct on 6th June, 1935.

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

J. INGRAM, Hon. Treasurer.

WHITEBAIT

By GILBERT WHITLEY

(Contribution from the Australian Museum, Sydney.)

When Captain Cook's men were at Dusky Bay, in the South Island of New Zealand, on Sunday, April 18, 1773, John R. Forster, one of the naturalists, noticed "a small species of fish (*esox*), without scales, resembling a little trout; its colour was brown, and mottled with yellowish spots in the shape of some ancient Asiatic characters," in an inland lake.

This was the earliest mention of an Australasian fish of the family Galaxiidae, the puzzling assemblage of Southern Hemisphere fishes, which includes the Whitebait of New Zealand, and the Mountain Trout, Minnow, Jollytail, Eel Gudgeon, or Native Trout of Australia.

Forster called his fish *esox*, which is Latin for pike, but Cuvier, the French anatomist, separated our fishes from the pikes under the name *Galaxias*, which means The Milky Way, or a galaxy of stars, perhaps in reference to their coloration.

The Galaxiidae are mostly found in fresh water, from sea-level to the tops of mountains; some, like the Whitebait, migrate to and from salt water, but probably do not travel very far out to sea. About seventy species of *Galaxias* (in the broad sense) have been described from the following countries:—

Southern Queensland
New South Wales
Victoria
Tasmania
North and South Islands of New Zealand
Sub-Antarctic Islands of New Zealand (Aucklands, Chathams, and Campbell)
South Australia
South-western Australia
Argentina
Paragonia and adjacent islands
Chile
Magellan Straits
Tierra del Fuego
Falkland Islands
South Africa

In the Australian Museum there are specimens of Whitebait (*Austrocobitis attenuatus*) from Lord Howe Island, South Pacific Ocean, which may therefore be added to this list.

It will be noticed that all these places are included in a huge circle drawn with the South Pole as the centre, and with the circumference near the 30° S. lat. meridian. Only two nominal

species transgress these bounds. *Galaxias indicus*, Day, from Madras, is only superficially like a *Galaxias*, and belongs to some other genus, not yet determined. *Galaxias neocaledonicus*, Weber and Beaufort, from New Caledonia, is also not a true Galaxiid, and may receive the new generic name *Nesogalaxias*. Thus these two species may be dismissed from further consideration.

The remarkable distribution of the now mainly freshwater Galaxiidae has provided food for thought as to the origin of the group and its possible association with land-links now long vanished, or with a hypothetical Antarctic continent. No satisfactory reason seems to have been advanced, but perhaps the best expressed is that of Theodore Gill in the *Memoirs of the National Academy of Sciences*, Washington (Vol. vi., 1893, pp. 107-108), though Regan, Hedley, Waite, and other zoologists have pondered the problem. Gill wrote: "The fresh-water fishes [of New Zealand] must have been derived from the same common source as those of the isothermal portions of Australia (of course including Tasmania) and South America. There may not have been a continuity of land at any one time between South America, Australia, and New Zealand but, at some remote period in the past, it is at least possible that there was a region in which the Galaxiids . . . . were developed, and subsequently representatives . . . . might have found their way into the regions where they now abound. But, it may be urged, such a derivation is only possible, and there may have been other means for diffusion. . . ."

Gill then proceeded to enumerate the possible means of dissemination which had been formulated by various people:—

"(a) The progenitors of the existing species may have been, for example, entombed in masses of ice, and such may have been carried into the ocean and wafted to distant regions, where they may have found congenial waters, been liberated from their long imprisonment, mated, and propagated their race.

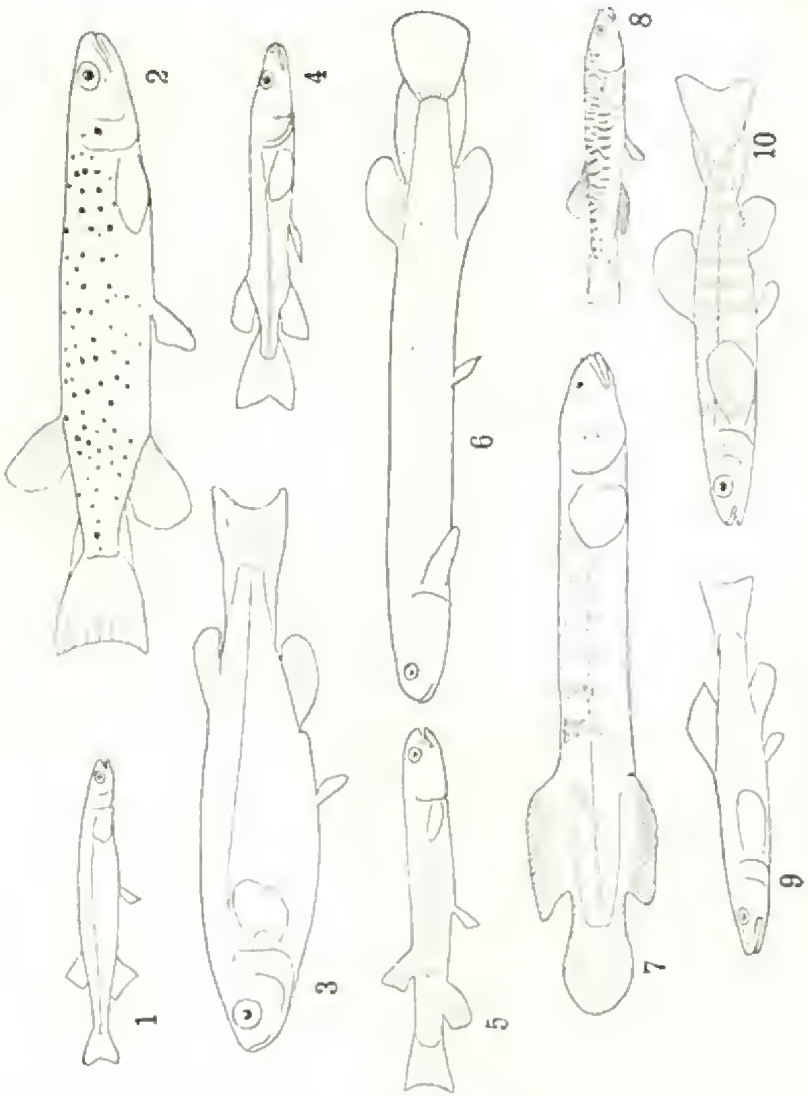
"(b) They may have even survived a long sojourn in salt water into which they wandered.

"(c) They may have originated from congeneric species formerly existing in the ocean, but now extinct therein and restricted to fresh water."

And again: "According to others, community of type must be the expression of community of origin, and the presence of fishes of long-established fresh-water types must imply continuity or at least contiguity of the lands in the midst of which they occur at some one time or other."

Gill considered that while a few kinds of animals might have been distributed "in some such unnatural manner as has been suggested [i.e. (a) and (b), above], it is highly improbable that *all* the forms common to the distant regions could have been so distributed."

Plate III



Generic types of Galaxiidae, from various sources.

Fig.
1. *Austrocobitis attenuatus* (N. Zealand).
2. *Galaxias truttaceus* (Victoria).
3. *Brachygalaxias bullocki* (Chile).
4. *Nesogalaxias* (gen. nov.) *neocaledonicus* (N. Caledonia).
5. *Lyragalaxias* (gen. nov.) *oconnori* (Queensland).
6. *"Galaxias" burrowsius* (New Zealand).
7. *Neochanna apoda* (New Zealand).
8. *"Galaxias" zebratus* (S. Africa).
9. *Querigalaxias* (gen. nov.) *dissimilis* (New South Wales?).
10. *Paragalaxias shannonensis* (Tasmania).

Since we have no knowledge of fossil *Galaxias*, the palaeontological history of the group is unknown, and fossil molluscs and mammals are so similar and dissimilar respectively when compared with their modern representatives that little help can be anticipated from that quarter.

Gill's summing-up was as follows:—

"In the present stage of science, then, we may be permitted to postulate (fishes being congeneric in New Zealand, Australia, and South America) that there existed some terrestrial passage-way between the several regions at a time as late as the close of the Mesozoic period. The evidence of such a connection afforded by congeneric fishes is fortified by analogous representatives among insects, mollusks, and even amphibians. The separation of the several areas must, however, have occurred little later than the early Tertiary, inasmuch as the salt-water fishes of corresponding isotherms found along the coasts of the now widely-separated lands are to such a large extent specifically different. In general, change seems to take place more rapidly among marine animals than fresh-water representatives of the same class."

My own view is that the group originated in the cold southern seas between the present site of New Zealand, and acquired the habit of entering rivers of adjacent land-masses. The waters of Antarctica were too cold for them, and those north of about 30° S. lat. too warm. There is a somewhat parallel case in the Salmon and Whitefish families of Palæarctic regions. Whether the Galaxiids are as ancient as the times when the continents drifted apart, as Wegener postulated, cannot be known, but their ancestors may have been. These fishes, originally marine, came to settle more and more in the rivers of the separating land-masses until the intervening seas cut them off permanently from their fellows. Now, most of the species live entirely in fresh water, breeding there, but some, more old-fashioned than the rest, descend to the sea to lay their eggs, a tribute to tradition.

In this connection, certain other animals with similar distribution to that of the Galaxiidae may be mentioned. Certain shells and loricates are found in South America and Tasmania, as well as on Kerguelen and other isolated circum-Antarctic islands, where *Galaxias* has so far not been found. The Lampreys of the genus *Geotria* are very similar in Australia, New Zealand, and South America. So are some of the purely marine fishes: Barracouta, Kelp-fish, Nototheniids, and others, whilst ornithologists find the same similarity in Petrels, Gulls, and Cormorants from those regions.

In discussing the origin of the fresh-water fishes of New Zealand, W. J. Phillipps wrote (*Nature*, April 3, 1926):—

"The Galaxiidae as a family are worthy of mention in that in New Zealand the highest development and the lowest degeneration

of the family have taken place. Eleven members of the family are known in New Zealand fresh waters, the young of *Galaxias attenuatus* running from the estuaries of rivers in the spring months and forming the chief constituent of the southern Whitebait. Though this species is found both in Australia and South America, it appears to be not nearly so prolific in those countries. Thus, it is quite possible that, in the Cretaceous period, when the New Zealand area was much greater, the Galaxiidae, which had originated here, then spread to adjoining land-masses. The

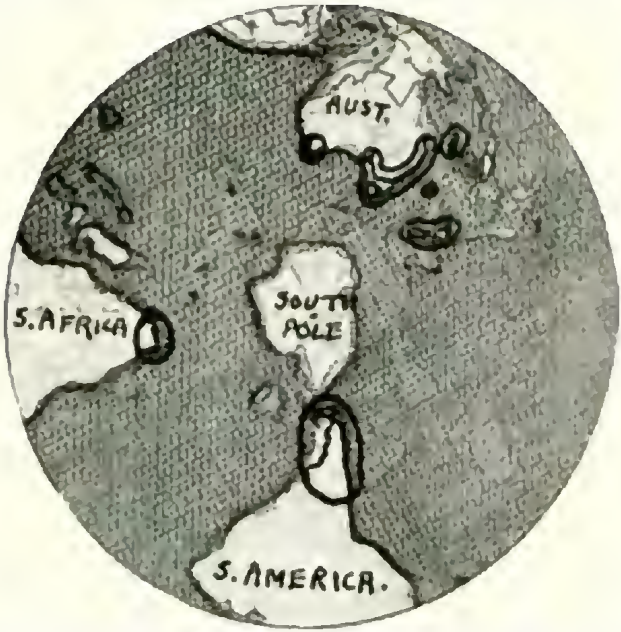


FIG. 1. Map showing circum-Antarctic distribution of the Galaxiidae. (Modified from Matthew.)

degenerate members of the family are *Galaxias burrowsius* and *Neochanna apoda*, the former having almost lost the use of the ventral fin, while in the latter it has quite disappeared. These fish both hibernate during dry weather, and are peculiar to New Zealand." These fishes are figured as Nos. 6 and 7 on the accompanying plate.

The New Zealand Whitebait of commerce consists of the young or larval specimens of more than one species of fish which ascend rivers in hordes towards the end of the year. The chief species is usually called *Galaxias attenuatus*, though, strictly speaking, it should be named *Austrocobitis attenuatus*, since it differs very markedly from the typical *Galaxias* (*truttaceus*). Included with this are the young of the smelt (*Prototroctes* and *Retropinna*), and sometimes other small fishes.

When the Whitebait run, nets of all kinds are used by both whites and Maoris, and the packed mass of succulent fish is either consumed locally or canned for export. The quantity of Whitebait varies considerably from year to year, being dependent upon wet or dry seasons and many other factors. Statistics are difficult to obtain, as accurate figures cannot be compiled from incomplete returns from scattered parts of New Zealand. The average wholesale value is about 2/- per pound, or £11 a cwt., but market prices vary for different ports of the Dominion. One or two thousand cwt. of Whitebait are caught each year, of which several thousands of pounds' worth are exported. Probably the 1932 season constituted a record, as 4,748 cwt. of Whitebait, estimated at 500,000,000 individual fishes, valued at £21,620, were caught in the Dominion. Of these, about 42,000 lbs. were canned for export, the value approaching £4,000. When good runs occur like this, prices drop and canneries pack a limited quantity. Sometimes the annual export value exceeds £7,000.

In view of the commercial importance of Whitebait, the New Zealanders rightly decided that the life-history of the species could not be too fully investigated. Apparently the first naturalist to discover the extraordinary breeding habits of the New Zealand Whitebait was D. H. McKenzie, whose account, in *The New Zealand Illustrated Magazine* (Vol. x., pt. 2, May, 1904, pp. 122-126 and 4 figs.), is most informative. McKenzie's observations were made on the Rangitikei River. After noting that the Maoris used the name *Inanga* for fish-fry, rather than the species of fish itself, and *Inangahua* for the adult Whitebait in the breeding season, McKenzie wrote:—

"In the lower reaches of the Rangitikei River, within tidal limits, are mud-flats and muddy creeks, bristling with salt rushes and stranded brush-wood debris.

"During the months of March and April may be seen at high-water spring-tides countless myriads of small fish, from four to six inches in length, making the water literally boil wherever any rushes or brush-wood exist by the river or creek margin. The water, much vexed, has a slightly milky appearance wherever the fish are most numerous. It is spawning time with the inangahua. The ova clings to the rushes and water-plants near the surface of the water, where it remains till the inanga is ready to burst the shell and commit his puny existence to the tender mercies of his countless enemies.

"The shell-bursting is an important epoch in his history, as it is only attained by a curious conjunction of elements. If, at the critical time, tides are slack or the winds asleep—that crop of Whitebait will be very small indeed. For the ova, when ripe, must be washed from its lodgment on rush or fascine by wind and tide combined, or it perishes.

"Let us suppose that the Pacific has been 'rough to be kind,' that the west wind drove up a strong tide and washed the ripe ova from their respective perches. Soon the young fry emerge from their shells, and are driven or drifted out to sea as inanga of the smallest size, there to receive their baptism of salt water."

He goes on to relate how three weeks afterwards the little Whitebait swarm up the Rangitikei River. Their enemies are fish, birds and insects. They then struggle against the current to the headwaters of the Rangitikei.

They struggle upwards day by day. "At night but little progress is made (so says the Maori), but in the day an advance of a mile in three hours has been marked, where the river fell six to seven feet per mile. . . .

"When the inanga reach their summer homes they enjoy themselves after the manner of their kind for a few brief months till February or March. Then, hey presto! off they go down to the salt tide by companies and by legions, hiding by day, by night frisking, leaping, and tumbling . . . back . . . among the rushes and muddy creeks of high-water mark." This naturalist confessed that he did not know what happened to the parent fish after spawning, but thought that they might spend what remained of their lives at sea.

In more recent years, the foregoing observations on the breeding of Whitebait have been confirmed by Captain L. Hayes, so that the Marine Department at Wellington now possesses a fund of information about spawning grounds, seasons of egg-laying and of ascent, and returns of the fisheries. The old Maoris utilised the Whitebait, and foretold its appearance by less scientific means. Nowadays the fish also serves as a food-supply for the Brown and Rainbow Trout, which have been introduced into New Zealand rivers.

Emphasizing the need for protecting the natural Whitebait nurseries, Captain Hayes observed (*Evening Post*, Wellington, N.Z., October 6, 1931, p. 5, and photos.) :—

"Spawning does not take place until the highest of the spring tides has passed. The ova are thus left 'high and dry' when the tide recedes, and since they are deposited as near the water's edge as the fish can get, and the tides which follow are of diminishing size, there can be no further contact with the water until the occurrence of next spring-tides—at the earliest a fortnight later. . . .

"It has been found that if the spring-tides succeeding those during which the spawning took place . . . do not reach the zone where the spawn is deposited, the eggs remain unhatched until a tide sufficiently high to reach them occurs. . . . The spawning may take place at any time between August and June, but the most

considerable movements of the spawning shoals occur between January and May." He then points out a danger:—

"The eggs are deposited on river banks in hundreds of thousands. Horses and cattle trampling over the ground have been shown to be responsible for the destruction of vast numbers of the eggs."

The use of chemical weed-killers for clearing areas for drainage has been even more destructive. Now the Whitebait spawning grounds are being fenced off, and the Marine Department proposes to license those who fish for the Whitebait when the ascent of the rivers occurs.

The old Maoris reaped a great harvest of Whitebait at about the autumnal equinox. Weirs were constructed in the streams to converge into a narrow opening where a "hinaki" or eel trap was placed. Tons of adult fish were caught in this way. These were sun-dried or hung up in kits in the roofs of the whares, where they were partially smoked. The Maoris also caught the young Whitebait, and, according to E. T. Frost (*Weekly News*, Auckland, November 12, 1930, p. 68), did not regard the adult fish as worth taking when they reascended the river after spawning, probably to wait upstream until joined by the new migration.

In 1932, a restriction was imposed on the season for taking Whitebait in New Zealand, and the Maoris objected. They claimed that the regulations did not apply to members of the native race, as they were immune under the Treaty of Waitangi. "Consequently," concluded their spokesman, "no enactment nor regulation can override the Maori fishing rights, which enable Maoris to catch Whitebait in any manner . . . in any New Zealand water. . . . For this we return thanks to the Father, Son, Holy Mother, the Holy Angels, the Faithful Angels, and their and our own mouthpiece, Piri Wiri Tua, for ever and evermore."—*Taranaki Herald*, November 9, 1932.

The Fisheries Department replied that "actually the regulation refers only to the taking of Whitebait for sale. In this respect it will be strictly enforced on Maori and pakeha alike. Maoris will, of course, be able to take Whitebait for their own consumption."—*N.Z. Herald*, November 15, 1932.

For further information on the subject of New Zealand Whitebait, consult the annual reports of the Marine Department, Wellington, and the files of the *New Zealand Herald* for June, 1930, November, 1930, October-November, 1931, and August, 1932; the *Taranaki Herald* for April, October, and November, 1932; and the *Auckland Weekly News*, November, 1932, for the Premier's reply to the Maoris.

The New Zealanders know more about their Galaxiidae than we do of ours in Australia. A form of Whitebait, similar to if not identical with the New Zealand species, appears from about

August to the end of the year in the coastal streams near Sydney. An account of this invasion, which is too small to be of any commercial value, has been given by McCulloch in the *Australian Zoologist* (Vol. i., 1915, p. 47, 2 figs.).

Annually I have seen the little "minnows" coming up from the sea in a creek flowing across Maroubra Beach, and there are still some large ones there now (May, 1935). Unlike the elvers of the Short-finned Eel, which ascend at about the same season, they do not hide themselves during the daytime, but wriggle gaily through the clear water, just like their Old World namesakes in the poetry of Keats:—

"Where swarms of minnows show their little heads,
Staying their wavy bodies 'gainst the streams,
To taste the luxury of sunny beams
Tempered with coolness. How they ever wrestle
With their own sweet delight, and ever nestle
Their silver bellies on the pebbly sand!
If you but scantily hold out the hand,
That very instant not one will remain;
But turn your eye, and they are there again."

I caught some of these Maroubra fishes and placed them on the bank of the stream. By sudden muscular movements they leapt into the air and gradually reached the water again. Similar observations were made by W. J. Phillipps on New Zealand specimens, for he wrote (*N.Z. Journ. Sci. Tech.*, vii., 2, 1924, p. 119):

"In swimming, the young fish elevates its body anteriorly until it appears to move forward at an angle of 45° to the plane of the bottom. It has a remarkable power of clinging to upright objects, and can jump over 6 feet in a direct line. This forced me to keep the top of the aquarium covered, and even then the smallest fish would climb 6 inches out of the water up the vertical glass sides."

Some curious habits of different species of Galaxiidae have been recorded from Australia and New Zealand. Perhaps the most extraordinary member of the group is the native Mudfish of New Zealand (*Neochanna apoda*), which may be described as a *Galaxias* with small degenerate eyes and without ventral fins (Plate III, Fig. 7). They are found under logs or amongst the roots of trees, in clay or mud, even when all the water has dried up, and are some of the very few fishes in the world which may be captured by ploughing!

In the *Victorian Naturalist* (xviii., 1901, p. 65), T. S. Hall reported: "Twelve *Galaxias* sp. dug up in decayed peat and sand eight inches below the surface at Strahan, Tasmania. There was no water, but the soil was moist enough to harbour worms. They lived when placed in fresh water afterwards" . . . "Fish are reported as being occasionally dug up in the button-grass country, on the west coast of the island, and are stated by a miner to have

no eyes, though otherwise similar." Mr. E. O. G. Scott has recently described (*Proc. Roy. Soc. Tas.*, 1933 (1934), p. 41, pl. vi.) a new Tasmanian species, *Galaxias cleaveri*, found in a cavity in the root of a eucalyptus stump which had been blown out of the ground by explosives. It was kept in captivity both in and out of water. At the end of 65¾ hours in a dry vessel it appeared shrivelled, and was put into formalin for preservation, but, to

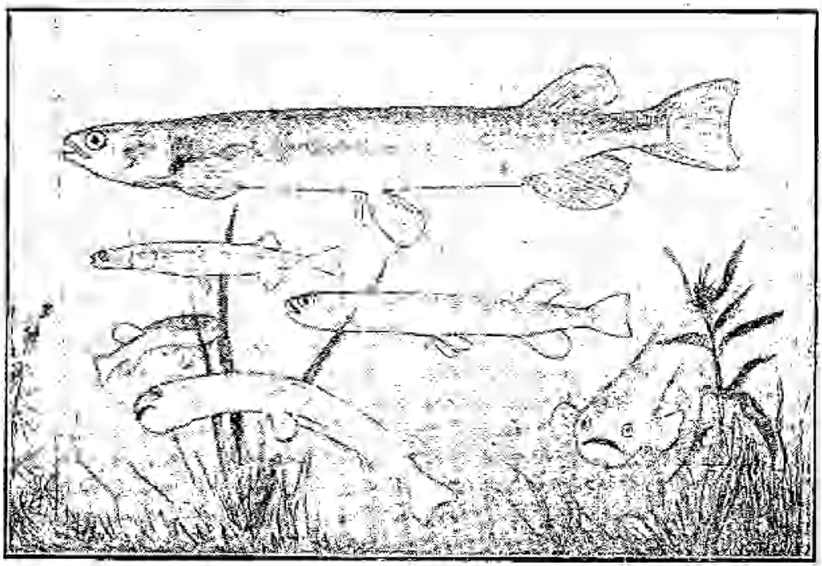


FIG. 2. Whitebait (*Austrocobitis attenuatus*), from New Zealand and Australia (G.P.W., del.)

everyone's astonishment, revived and commenced swimming again. Mr. Scott has also demonstrated that *Austrocobitis attenuatus* can survive out of water for about 25 hours.

Another extraordinary case, probably unique as a fish story, is culled from the *Abstract of the Proceedings* of the Linnean Society of New South Wales for July 31, 1889, as follows:—

"Mr. William Neill, of the City Bank, sent for exhibition 85 small fishes (*Galaxias* sp.), forwarded to him from London. They were a sample of a quantity weighing 224 lbs. taken out of 25 bales of wool shorn on the late Hon. E. Flood's "Midgeon" Station, N.S.W., and subsequently sent to England. The fishes were pumped up from Lake Midgeon in the water used for wool-washing, and became entangled in the wool."

(This reminds me of a small fish found sealed in a tin of Australian fruit by a person in England. The fish had evidently got into the tin with water. An elver of a Short-finned Eel once came through a water-tap in the Australian Museum. At Lithgow,

New South Wales, a Gudgeon blocked a water-pipe, and the following claim was made on the Council: "While we appreciate the efforts of Council to supply the overburdened ratepayers with fish, although minus the chips, we respectfully ask that Council to foot the bill of the plumber (38/7), which is herewith enclosed." —*Daily Telegraph*, Sydney, March 24, 1933.)

As a destroyer of mosquito-larvæ, *Galaxias* is as good as most of our small native fishes, such as *Melanotaenia*, *Pseudomugil*, *Carassiops* and *Ambassis*, and is preferable to the introduced mosquito-eating fishes, which might easily displace ours and become a pest. *Galaxias* is also adept at catching flies. I have noted this habit (*Australian Naturalist*, vii., 1928, p. 59) among some minnows in a pond near Sydney, where a dead rat, floating like a miniature island, attracted numerous flies. The minnows quickly leapt at the flies alighting on this sordid object. Time and again, as I watched, "A gleam of sunlight shone . . . on the fish's silvery gill-cover and moist olive body, as, clinging to the rat by its pectoral fins, it snapped up the fly; there was a little splash as it slipped back into the water, and all was over so quickly that one wondered whether the insect had vanished in a conjuring trick."

I have also seen a Jollytail leap from an aquarium to catch a fly as it flew near the surface of the water, and it did not miss. If only our little minnows were bigger, our anglers would not have had the trouble of introducing trout to the Antipodes—the Australian fishes would have risen to the fly instead.

Mr. E. O. G. Scott, Assistant Curator of the Queen Victoria Museum, Launceston, is at present investigating the different species of Tasmanian Galaxiidae, and has kindly furnished me with a statement of affairs as they stand at present. His researches have shown "that the Galaxiid fauna of Tasmania is decidedly more diversified than has hitherto been realized, and vies in variety with that of New Zealand, traditionally regarded as the headquarters of the family."

Whereas five years ago Tasmania was accredited with but five species of *Galaxias*, Mr. Scott recognises ten or eleven, and he has discovered two new genera as well. One of these he has just named *Paragalaxias shannonensis* (Scott, *Proc. Roy. Soc. Tas.*, 1934 (1935), p. 41, pl. iii.), but the other has yet to be christened by him. This unnamed genus is "intermediate between *Galaxias* and *Neochanna*, resembling the latter in having no teeth on the palate, and in having long, low dorsal and anal fins, and agreeing with the former in possessing ventral fins, though these are reduced." thus recalling the New Zealand *Galaxias burrowsius* (see Fig. 6 on plate herewith)

Mr. Scott (*in lit.*, March 7, 1935) further remarks: "In many streams in Tasmania (as elsewhere) the Galaxiidae have been

wholly or largely displaced by the introduced Salmonidae; this appears to apply with special force to some of the western districts. Where food is abundant, however, they still survive in considerable numbers under these conditions; if well supplied with food, they can be kept in the same pond with Salmonidae.

"There is some evidence to suggest that in Tasmania the Galaxiidae, like the Salmonidae in their native waters, tend to form varietal forms more or less characteristic of different localities when the latter are adequately isolated."

The Galaxiidae are notoriously variable in their proportions, positions of fins, and colours, so that it is difficult to define the various species, and the "systematics" of the group are in a parlous state, in spite of the excellent revision of the family by Regan (*Proc. Zool. Soc. (Lond.)*, 1905, ii., pp. 363-384, pls. x.-xiii.), upon which all later work is based.

Occasionally examples come to light with black spots on the body and fins. Each spot is found to be caused by an object like a pip, embedded just under the skin, and is not a colour-mark. I have found similar bodies in the smelt (*Retropinna*). These things are really the encysted stages of parasitic worms (*Clonorchis*), surrounded by pigment produced by the fish, which is the second intermediate host of the parasite.

Another curious feature about a Tasmanian specimen was the fact that it had two mouths. Apparently the throat had been torn, and the hole in it was used in place of the old mouth. Details of this interesting case, which was mentioned by R. M. Johnston, the Tasmanian naturalist, in 1908, are unfortunately lacking.

As an aquarium pet, *Galaxias* does well, and is very popular with aquarists, as the fish become quite tame, and can be fed from the fingers, chopped worms being a favourite dish. A correspondent of mine, Mr. Frank Walford, kept the Mountain Minnow (*Galaxias coxii*) under observation in a pond in his garden in the Blue Mountains, N.S.W., and they lived even when the water surface was completely frozen for a week. He noted the habits of the species in its natural haunts in mountain creeks, and sent me specimens of its growth stages. His discovery that *Galaxias coxii* bred in fresh water (see *Australian Museum Magazine*, iii., 8, 1928, pp. 274-277, and Fig.) helped to shatter the old belief that all *Galaxias* had to struggle to the sea to breed, and that their geographical distribution was not particularly limited.

There are several kinds of *Galaxias* in Victoria, and it is hoped that the details, meagre though they be, which are given in this article, may act as an incentive to Victorian field naturalists to find out all they can about these extraordinarily interesting and useful little fishes.

NOTES ON "EARLY NANCY"

Anguillaria Australis is perhaps a better name than *A. dioica* for what young folks call "Early Nancy," another inappropriate name. *Anguillaria* is from the name of a one-time scientist.

The species name as first applied should still hold, as the plant is peculiar to Australia. The term *dioica* refers to there sometimes being separate plants for the sexes, but this is not a consistency, as there are several forms or varieties of Early Nancy. One is that of a single flower; another shows several flowers, and in some cases they are all males or all females; again, there may be some flowers wholly male and some wholly female on the same plant, while still again some are combined male and female flowers. So the plant is a strange paradox.

Austral Snowflake is a more suitable vernacular than Early Nancy, as both flowers, garden and wild, have distinct markings on their petals, not unlike those of a Snowflake. Austral Snowdrop was a suggestion of Baron von Mueller, who also called this plant the "Harbinger of Spring," a name it was known by for many years, and a much better one than that now adopted.

My notes give the flowering period of *A. dioica* as extending from June till October. The plant is very variable in height—from almost one inch to nearly twelve inches, according to situation. Frequently the flower has a wide ring of purple around the inside of the petals, broken only by the separate segments. It may be of purplish, pinkish, whitish, or even yellow colour, but the last is one not often seen in Victoria. At any rate I have not found the yellow in a wild state. Some specimens of Early Nancy in my garden flowered for several seasons successfully. Besides being peculiar to Australia, this wildflower is found in every State, from the Northern Territory round to Western Australia. Its peculiar earthy scent or odour is not pleasant to all, and such would not make it so attractive as other Lilies. Many people associate the name Lily with such plants as the African Nile Lily, the Tulip, Lily of the Valley, or Christmas Lily, and do not recognise the beauty of such members of the family as the Shallot, the Onion, Garlic, Leek or Asparagus, in "considering the lilies of the field." *Anguillaria* accommodates itself to locality, and is found from the seaside level to the more mountainous country of 4,000 feet above sea-level.

A. J. TADGELL.

ORCHIDS AT MANLY, N.S.W.

In May last I visited Manly, New South Wales. It is not a good time of year for Orchids, and no rain had fallen for the previous two months; but Deep Creek, Narrabeen, was not unproductive.

This creek is a long extension of the salt-water Narrabeen lagoon, through some very rocky but well-vegetated hills. On the flats grew numerous Casuarinas, and on them we found our first species of Orchid, *Dendrobium teretefolium*. Higher up the creek a fine specimen of *Dendrobium linguaeforme* was seen hanging over the water from a very treacherous-looking Sheoak branch; apparently this had saved it from tourists.

The hillsides above the creek were rich in wildflowers, such as the Flannel Flower (*Actinotus helianthi*), *Crowea saligna*, and Native Fuchsias. Terrestrial Orchids were abundant—*Acianthus* species in bud, masses of *Cryptostylis* species, Greenhood rosettes, resembling closely those of *Pterostyles concinna*, and an occasional flower of *Corysanthes bicalcarata*, among numerous leaves.

The local population is scanty, consisting chiefly of hut-dwellers, their little shanties perched on large flat rocks, over which *Dendrobium linguaeforme* straggles in profusion. One man came out to see what I was doing. I asked him whether any Orchids grew in the neighbourhood. He thought for a moment, took a pace forward, placed a foot on a clump of *linguaeforme*, and said, "No, I've never seen any hereabout." Living close to Nature does not always mean close acquaintance with her.

ROBIN D. CROLL.

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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, May 13, 1935. The President, Mr. G. N. Hyam, presided and about 100 members and friends attended.

REPORTS OF EXCURSIONS

Reports of excursions were given as follow:—Sherbrooke: Mr. H. C. E. Stewart; National Museum: Mr. G. N. Hyam for Mr. J. A. Kershaw.

ELECTION OF MEMBERS

On a show of hands, the following were duly elected as Ordinary Members of the Club:—Mr. A. B. P. Underwood and Mr. H. F. Robley; and as a Country Member: Mrs. Agnes M. Thom.

DONATIONS

The President announced that gifts of books had been received from Miss J. W. Raff, Mr. O'Neill and Mr. Bromby, and on behalf of the Club he thanked them.

GENERAL BUSINESS

Mrs. V. H. Miller gave a very interesting account of some of the Club's Annual Meetings, and pointed out that the state of affairs that had rendered an election unnecessary at the last Annual Meeting had occurred before. On one occasion a great number of nominations went to the ballot.

The President thanked Mrs. Miller for keeping the members in touch with the historical side of the Club, and suggested that possibly she might continue the late Mr. F. G. A. Barnard's *History of the Club*.

Mr. A. R. Proudfoot stated that one of the funniest incidents happened at a Club excursion when a lady member opened one of two similar bags and liberated a collection of live snakes.

THE MASTER MIMIC

The subject for the evening was "The Master Mimic" and was to be dealt with by Mr. F. Lewis, Chief Inspector of Fisheries and Game, Mr. R. T. Littlejohns and Mr. A. H. Chisholm; Mr. Chisholm unfortunately, through illness, was unable to attend.

A unique series of slides depicting various dancing postures of the Lyre-bird, and others of a more general type, all beautifully coloured, were shown by Mr. Lewis, who stated that they were from the best photographs he had taken, over a period of several years, of "Jack?".

Mr. Littlejohns showed slides from photographs of the Lyre-bird taken in its natural habitat under difficulties.

Imitations of the Lyre-bird's minstrelsy were given by Mr. Aleck Walker, at the request of the meeting. He gave numerous other bird and animal calls.

In the discussions that followed Mr. A. S. Chalk stated the slides were the best he had ever seen.

Mr. V. H. Miller spoke of the erection of a tablet to Mr. Tom Tregellas, the man who had made the Lyre-bird famous.

Mr. E. E. Pescott stated that the League of Youth was taking steps to preserve "Tom Tregellas's Log"; and suggested it would be fitting to send to Mr. Tregellas, from the Club, a letter of thanks for the work he has done with respect to the Lyre-bird in particular. He recommended to Club members *The Magic Voice*, a book on the Lyre-bird, by Mr. Littlejohns.

Miss Wigan stated that a specimen of the Lyre-bird at the National Museum was incorrectly mounted. In several museums she had visited in various parts of the world specimens mounted in the wrong pose were exhibited.

Questions about the feeding habits of Lyre-birds, and also on the possibility of keeping them in captivity, were answered by Mr. Lewis.

The President expressed the thanks of the Club to Messrs. Lewis, Littlejohns and Aleck Walker.

The meeting then adjourned for the conversazione.

EXHIBITS

Mr. N. Lothian.—Seeds of *Livistonia australis* (Australian Cabbage Palm).

Mr. Geo. Coghill.—*Grevillea rosmarinifolia* (Rosemary Grevillea), *Thryptomene calycina* (*Mitchelliana*), *Acacia podalyriaefolia* (Queensland Acacia), *Syzygium Smithii*, *Tecoma Australis*, *Eriostemon myoporoides*.

Mr. C. French.—Slipper Orchid in flower (*Cypripedium insigne Sanderae*).

Mr. V. H. Miller.—*Cypripedium insigne* with eleven blooms.

Mr. G. N. Hyam.—Specimens of *Banksia ericifolia*, grown by Mr. Robertson, at Sale.

HIBERNATION AND OTHER HABITS OF THE ECHIDNA UNDER DOMESTICATION

By EDITH COLEMAN

In January, 1935, Mr. V. H. Miller kindly gave me a young Echidna which we hoped might be a suitable mate for Stickles (described *V.N.*, May, 1934). Mr. Miller's Echidna (Prickles, we named him) appeared to be about four months old.

I was away from home at the time, but when I returned, two days later, my husband had taught the newcomer to eat from his egg-cup almost as skilfully as Stickles. A mixture of finely-scraped steak and liver, beaten to a creamy consistency with milk, has formed the chief part of the Echidnas' diet. For the past ten months the use of bran has been discontinued and a vitamin food has been included, as well as tomato and orange juice. Judging from their increase in weight, and their activities, both Echidnas appear to thrive on the diet. Stickles now weighs over 6 lbs. Prickles gained 10 ozs. during his first month here. In less than four months he had trebled his weight.

On fine days the animals are free to supplement the diet with ants, grubs, etc., and they take full advantage of their liberty, even in winter. I have seen them withdraw many cockchafer grubs from the narrow tunnels which they bore into the ground with their snouts. During the autumn many Wattle-goat moth larvae, in their final underground stage, were discovered and enjoyed.

Prickles has enabled me to add to my notes on hibernation. It must be remembered, however, that these deal with the Echidna in captivity. In a natural state the period would probably be influenced, if not governed, by food supplies. The present paper will show that under domestication hibernation is only partial.

Each day maximum and minimum temperature, humidity percentage and rainfall have been noted, also the time of the Echidnas' rising and retiring, and the amount of food consumed. When I have been away my husband has taken these notes. I have been able to check them with averages kindly computed for me by the Commonwealth Meteorologist, Mr. W. S. Watt.

Apart from their diet, the Echidnas are living under conditions as nearly normal as possible. Their activities are confined chiefly to a strip of ground 50 feet by 8 feet, sheltered for its full length on the south by a 6 feet 6 inch paling fence. Tree-lucernes (*Tagasaste*) and native-cherries (*Exocarpus*) keep this run fairly dry and provide excellent foraging for wattle-goat larvae and decayed wood. The trees are very old, and their boles are rotting in parts accessible to the Echidnas, both of which enjoy decayed wood.

Strange as it may seem, soil is freely eaten. We first noticed this habit a year ago, in Healesville, when Stickles spent about 20 minutes in licking up fine soil. Since then I have many times

watched the Echidnas eating both dry and wet soil, as well as wood ashes.

The outdoor run is netted to a height of 2 feet 6 inches. The Echidnas could easily climb out if they wished to do so, but they have never attempted to escape. An Echidna climbs wire-netting with ease. I have seen one climb vertical half-inch mesh wire very quickly by using its snout as a fifth foot.

Two things at once.

When performing his toilet in this attitude Stickles is able to continue his foraging for ants.

We may infer, then, that, so far, my Echidnas realize that their lives are cast in pleasant places. Their sleeping quarters, 12 feet by 8 feet, are in a trellised enclosure, under an iron roof, quite close to the house. Climbing roses shelter this enclosure on two sides. The house, unfortunately, deprives it of sunshine on the east. Members of the family entering the house by the only back door could not fail to note the Echidnas' movements. The floor of this enclosure is covered with deep soil. Their beds (petrol cases with the bottoms removed) are placed on fine dry humus and soil, and are half-filled with straw, under which the Echidnas burrow. Exit holes are provided, and the lids may be lifted for observation.

In order to give the Echidnas as much winter sunshine as possible

I procured a child's playground, 4 feet square, $2\frac{1}{2}$ feet high, with closely-spaced rails. This is readily moved into the sunshine, or on the lawns where the animals may nose into the roots of grass for cockchafer grubs. (This habit probably accounts for a statement that grass-roots form part of an Echidna's diet.) By kneeling down I have been able to see the process of abstracting grubs. To

Stickles photographed on the third day of his hibernation.

facilitate swallowing the grub is pressed and broken in the narrow tunnel. If still two large when withdrawn it is pushed back again to be further pressed, or it may be rubbed with the snout against the Echidna's forefeet. Thus, small as the mouth certainly is, an Echidna is able to dispose of large grubs.

Hibernation:

Hibernation appears to be a very matter-of-fact affair. As a preliminary, great quantities of food and water are taken. At its conclusion the Echidna reappears and takes up its daily routine as if nothing unusual had occurred.

In 1934 Stickles hibernated for a period of six days. All through May he came out at about 8 a.m. and retired between 2 and 3 p.m. He ate and drank more than usual. On June 8 he returned to bed at 11 a.m. *and there was no further appearance until June 14* at 5.30 p.m. (dusk), when I found him almost asleep outside his bed. He seemed shy, but at once placed his nose on my hand. Then he ate a hearty meal. On the third day of hibernation I examined him. He lay quite still, rolled as shown in the illustration on page 57. When I spoke to him his eyes opened momentarily. He stirred a little, and the eyes opened again when he was carried into the sunshine to be photographed. Placed back on his straw he was able to snuggle down without help. Digestion and elimination had apparently been suspended. His box was dry and unsoiled.

There was no further period of hibernation, although, during June, he often breakfasted late. For some days after the long sleep he appeared "dopy," basking when sunny, often falling asleep as he stood. I sometimes noticed that his eyelids were open as he slept, though the nictitating membrane covered the eye. From June 22 his usual habits were resumed, except on very wet days, when he appeared later and retired very early.

This year Stickles has, so far, hibernated for only 5½ days. During the wet days of early April he rose late and retired at about noon. Then for a few days he seemed very restless when in the outdoor run. Heavy rain which fell at this period sent him hurriedly to his "funk" hole. (The only times when Stickles has appeared undignified.) During May he was out early but retired at about noon. On May 31 he rose at 8.45 a.m. and was very energetic. He groomed himself vigorously, spreading out his spines, like a broody hen. At 1 p.m. he burrowed a large hole—the first time he had done this, so I brought him to his sleeping quarters. He scratched about for a while and went to bed at 2 p.m. Next day, May 31, he rose at 10.45 a.m. and, after a hearty breakfast, retired at once. It was cold and windy.

There was no further appearance until June 5 at 5.30 p.m. (dusk). Stickles then ate 2½ cups of food, the meal lasting for two hours, and retired at 7.30 p.m. He played his usual little game with his tray. Each day before starting his meal Stickles will, with his head, push the heavy tray to which his cup is attached, up and down the enclosure, until it is stopped by some obstacle; or he will try to scratch a hole under the tray. (Prickles has never done this, but commences to eat "on pistol-shot.") This play (?) sometimes lasts for ten minutes.

For a day or two after hibernating Stickles appeared sleepy and cold. He would not eat until he had basked—sometimes for two hours. Then he would do full justice to his meal. From June 9 he behaved as usual but breakfasted late on wet days. He appears to dislike wet weather more than frost. Indeed, on frosty mornings

both Echidnas often rise very early. Do they, I wonder, sense the warm sunshine which frequently follows a sharp frost? On June 23 Stickles did not appear. At 4 p.m. on June 24 I lifted the lid of his box. He was not hibernating, and at once nosed my hand and climbed on my arm—his usual method of asking to be lifted. He came out and at once attacked his food. He remained out until

A characteristic attitude. Stickles grooms his tail.

7.30 p.m. Several times since he has remained in bed until 3 p.m., when he was pushed out by Prickles, who preferred that bed. (Stickles likes a box to himself.)

Twice Stickles has spent two days in bed during the past week. (I am writing on July 5.) If I touch him at such times he feels very warm, no matter how cold the day, and is always ready to nose my hand.

Prickles, too, has hibernated for a period of six days. He behaved very much in the same manner as Stickles. From the beginning of May he rose at 8 a.m. and retired between 2 and 3

p.m. He was especially active and hungry. On May 24 he was too sleepy to finish his food—an astonishing happening for Prickles! He retired at 11 a.m.

There was no further appearance until May 30, when he emerged late at night and ate food which had been left for him. (The Echidnas were kept apart at this period so that I always knew

Stickles grooming his head.

which one had emerged.) On May 31 he did not appear until 5.15 p.m. (dusk). He seemed furtive, and left his food when I switched on the light. He had lost his furtiveness when he retired at 7.45 p.m. after a prolonged meal. Next day he was up early, and was very active, showing none of Stickles' sleepiness. He hunted for grubs with his usual vigor, and groomed himself well. His hibernation had lasted for six days, and, like Stickles, as soon as it was over he took up the threads of life just where he had left off. On wet days Prickles returns to bed after breakfast but may emerge for a snack several times during the day. If fine he explores for grubs.

Thus three periods of hibernation have lasted for approximately six days. In each case it commenced in the morning after a hearty meal, and in each case the Echidna emerged at dusk, which had not been its habit previously.

Looking at the chart, one cannot say that hibernation is influenced by external conditions, such as humidity, temperature or rainfall, but it is probable that the latter has some bearing on time of emergence. It is interesting to compare data for two periods of hibernation. It will be seen from the following figures that the mean maximum temperature for one hibernation period was three degrees higher than the other, and that there was a difference of five degrees in the mean minimum temperature for those two periods. In one period the relative humidity was 10 per cent. higher than the other, while the rainfall total for the 1935 period was 34 points as against 59 points for the 1934 period.

Comparison of temperature, humidity and rainfall for two periods of hibernation. Stickles 1934 and Prickles 1935:—

Period Preceding Hibernation (6 days)

Period preceding hibernation, 1934: Max. temp. (mean), 57·2°.
Period preceding hibernation, 1935: Max. temp. (mean), 58·2°.
Period preceding hibernation, 1934: Min. temp. (mean), 31·1°.
Period preceding hibernation, 1935: Min. temp. (mean), 45·7°.
Period preceding hibernation, 1934: Relative humidity (9 a.m.), 92%.
Period preceding hibernation, 1935: Relative humidity (9 a.m.), 82%.
Period preceding hibernation, 1934: Rainfall (total), 3 points.
Period preceding hibernation, 1935: Rainfall (total), 29 points.
Period of hibernation, 1934: Max. temp. (mean), 57·5°.
Period of hibernation, 1935: Max. temp. (mean), 60·4°.
Period of hibernation, 1934: Min. temp. (mean), 38·6°.
Period of hibernation, 1935: Min. temp. (mean), 43·7°.
Period of hibernation, 1934: Relative humidity (9 a.m.), 92%.
Period of hibernation, 1935: Relative humidity (9 a.m.), 82%.
Period of hibernation, 1934: Rainfall (total), 59 points.
Period of hibernation, 1935: Rainfall (total), 34 points.

The above figures were supplied by the Commonwealth Meteorologist, Melbourne data were furnished, as these relate to the climatological station nearest to Blackburn.

July 28, 1935.—So far there have been no further periods of hibernation. On July 19, Mr. W. Roe, of Sorrento, told me that he had seen an active Echidna "about two weeks ago." Paragraphs in two Melbourne newspapers referred to movements of Echidnas (in natural conditions) during June. It is possible that hibernation is only partial even in these circumstances. With reference to temperature: Stickles emerged, after 5½ days of hibernation, on the coldest June day since 1878.

CLASSIFICATION OF EUCALYPTS

By PROF. A. J. EWART

In attempting to classify any group of plants attention should be paid to the general principles upon which modern classification is founded. The earlier botanists classified plants in ways which now appear absurd, as, for instance, into herbs, shrubs and trees, or into groups according to the number of stamens in the flower, following arbitrary lines of division but at least bringing some degree of order out of confusion.

Modern classification is based on the theory of evolution, namely, that all plants are related to one another in varying degree and that in general more complex forms have been derived from simpler ones and these again from still simpler organisms. The plant kingdom may thus be regarded as a dense tree having all its living leaves at its outer surface, while the branches bearing them are hidden from view. The leaves may be regarded as existing species and if lobed or divided would represent species containing varieties. A few dead leaves on the older branches would represent the known fossil species. The twigs to which the leaves are attached are the genera into which species are grouped. The branches represent the families of plants and the larger branches represent the subdivisions of related families which arise from the main trunk.

In dealing with existing species we can only see the leaves at the surface of the tree and not any of the branches, but not any of the leaves are alike and by comparing them we endeavour to judge to which branches they belong. It is obvious that in two branches, which at first diverge widely, some of the twigs at the surface may overlap and make it difficult to judge to which branches the particular leaves belong. That is why botanists often disagree as to the placing of a particular species or the boundary of a particular family.

One is often asked to define what is meant by the term "species." A rough working definition is that it consists of a group of individual plants belonging to a genus such as, say, *Eucalyptus* or *Acacia*, all of which have at least three characters in common not shown or not shown in this combination by any other species of the genus. If some of these individuals have a fourth character, but not others, then the species contains two varieties.

In nature, evolution, like branching in a tree, never follows straight lines but always takes a more or less zig-zag course and the chance of the same organ being affected at each stage of mutation is progressively less at each mutation. Hence, any attempt to found a classification of any group of plants upon the variation of a single organ is completely artificial and is foredoomed to failure.

In a painstaking and laborious compilation, Blakeley, of the

Sydney Herbarium, has recently attempted to place the classification of our native *Eucalyptus* species upon a sound and logical footing. Our native Eucalypts undoubtedly are one of the most puzzling groups of plants to the botanist and yet are so important to the forester that it is essential to have their names on a sound and permanent footing. Hence, Blakeley's attempt would have been most valuable if successful. Unfortunately, he bases his primary classification solely on variations in the stamens, which variations are often so slight that even the trained eye often finds difficulty in distinguishing them, and by using the obsolete practice of basing all his groups upon variations in a single organ he succeeds in perpetrating absurdities such as placing together species which even to the man in the street are widely apart, and in separating into different groups species which are closely related, such as Forest Red Gum and River Red Gum. The former is placed under "Erythroxyla," or red-woods, while the latter, which also has a red wood, is placed under a differently named sub-section.

Even accepting Blakeley's primary divisions based on the stamen, of which he makes eight instead of the usual three, since he has 18 subdivisions based on the same character and since the plant has at least 50 organs or parts capable of independent variation, the chance of his classification being even approximately correct is 1 in 900. A probable accuracy of one-tenth per cent. is not of much value.

Another serious feature is the fact that, according to Blakeley, the genus *Eucalyptus* includes no fewer than 504 species and 138 varieties. Maiden, up to the time of his death, had increased the number of species to approximately 350, excluding hybrids which, when their origin is known, should be indicated by the names of their two parents and not given new ones. Bentham and Mueller recognized only some 200 species, and a large number of the new names are based, not on new discoveries, but on material which has been critically examined by such renowned botanists as these. It is evident, therefore, that Blakeley's criterion of a species must approach more to what the older botanists considered to be varieties. It is to be feared that the modern tendency to species splitting is partly due to the practice adopted in botany and zoology of appending the author's name to each new species, whereas all that is necessary is an indication of where the description of the supposed new species can be found. Nowadays workers in systematic botany find it hard to discover really new species and are tempted to achieve some kind of fame by splitting up old species and giving new names with their own attached.

Another cause of trouble in regard to the scientific names of Eucalypts is the strict application of the priority rule according to which the species name first given to a plant must be retained even if it was originally in a wrong genus or even a wrong family. This

makes haste in publication more important than accuracy of investigation and gives modern systematists an opportunity, eagerly accepted, of digging into old botanical works and altering names in use for a century or more to new combinations with their own names attached. Such changes are rapidly making older botanical works unreadable and are a serious cause of trouble to foresters and to all scientists interested in the economic uses of plants.

Every forester knows the two Red Gums by their names of *E. rostrata* and *E. tereticornis*, and these names have been in use for over a century. Yet we are now told they must be changed in all text-books, reports, plantations, gardens and herbaria to *E. camaldulensis* and *E. umbellata*; in the first case because the name appeared in a European Botanic Gardens list before the plant was properly described; and in the second case, because a German botanist who received a specimen thought it was a Tea-tree and described it under that genus before it was properly recognized by the English botanist, Smith, as a species of Eucalypt.

A law is only valid if it is accepted by a majority of the people for whom it is made. Even if a large minority refuse to accept it, it cannot be enforced. Plant names are made for the convenience of those using them, and it is certain that a plebiscite among all those using the scientific names of plants would reveal an overwhelming majority against these absurd and confusing changes of name.

The section of the International Botanical Congress which represents systematists has twice refused to establish lists of *nomina conservanda* to preserve the names of common economic plants from alteration. As *Eucalyptus* is practically a wholly Australian genus, it might be argued that we are justified in taking matters into our own hands. Eucalypts are now, however, widely grown all the world over; but, on the other hand, it is contrary to botanical practice to establish a new species unless a locality where it grows wild can be given. The suggestion has been made that a committee should be set up containing a representative of the Council of Scientific and Industrial Research, a botanist, a forester, and a horticultural expert or botanic gardens representative to prepare and publish a list of recognized species of Eucalypts and to investigate all cases in dispute. Such work is not easy and cannot be done in a day. It took a committee twelve years and nearly 100 meetings to establish a list of common names for the 2,000 plants of the Victorian flora. Even if it took four or five years to do the same work for the scientific names of Eucalypts, it would be time well spent, provided that all Australian botanists, gardens, and Government herbaria accepted the findings.

If such co-operation were assured and the scientific names of Eucalypts placed on a permanent basis, the gain to foresters, to the timber industry, to horticulturists and to scientific investigators would be so great as to amply pay for the labour involved.

FIG INSECTS

By B. BLACKBOURN

Symbiosis, the partnership of two different organisms for their mutual benefit, provides an interesting study. One of the most striking instances is that afforded by the Fig Insect in relation to the Fig tree. Extermination of the one would inevitably lead to the disappearance of the other. Without the agency of insects the stimulation necessary for the development of the fruit and the

Photomicro. by O. H. Coulson.
Fig Insect, female.

production of fertile seed could not take place as, in the cultivated varieties of *Ficus*, the male and female flowers occur on separate plants and are enclosed in hollow receptacles from which other insects are excluded. The tree therefore supplies special nurseries for the rearing of the young Fig Insects. These take the form of abnormal ovaries, incapable of producing seed, but which develop into galls after an egg has been deposited in each by the female wasp, and these abnormal ovaries occur in the same receptacles as the male flowers.

Caprification, the process of hanging caprifigs (the variety containing male flowers) in Smyrna trees which bear female flowers only, was an old custom based on the belief that figs would not mature unless it was carried out. Possibly the originators of the custom had no idea why the process had the effect desired. In

California it is agreed that the culture of the Smyrna fig necessitates simultaneous cultivation of caprifying varieties in which the insects can live.

Fig Insects are among the most remarkable of the Chalcid wasps. Sexual dimorphism is very pronounced as may be seen by a glance at the accompanying photomicrographs, kindly taken for me by Mr. O. H. Coulson. The male is a wingless, soft-bodied insect superficially resembling a termite, with stout jaws, poorly developed middle legs, and a long pointed abdomen usually carried folded underneath the thorax. The female is more normal in appearance, with prominent ovipositor and well-developed wings. Her head, long and narrow, is furnished with two flattened processes studded with teeth which she uses to cut her way into the fig in order to deposit her eggs.

There are said to be 500 species and varieties of *Ficus* in which the caprifying phenomena are known to vary widely. *Ficus roxburghii* may be taken as a good example. Two distinct fruits are born on different trees, one containing normal female flowers capable of producing fertile seed, the other, male flowers and modified female flowers incapable of producing seed. In both, the canal at the apex leading from the cavity to the open air is firmly plugged with a dense mass of scales. (A fig, as botanists know, consists of a highly-developed receptacle which has grown in the form of a hollow chamber, the walls of which are covered internally with the flowers.) The ovaries of the abnormal female flowers are well developed and covered with a thin skin easily pierced by the ovipositor of the female wasp. These develop into galls containing male and female insects. The ovaries of the normal flowers, on the other hand, are covered with a thick tough cuticle quite impervious to the ovipositors. The two fruits are outwardly similar in appearance and grow to a certain stage, after which, they wither and fall off unless Fig Insects gain access to the interior. Upon this occurring, a greatly increased flow of sap is set up with hypertrophy of the fruits, and the interior of the cavity becomes filled with liquid. When the insects in the gall-fruits are nearly ready to emerge, the liquid dries up, leaving the cavity empty.

The males always emerge first. Each selects a gall containing a female, gnaws a hole through its wall, and, inserting its long tubular abdomen, fertilizes the female *in situ*. The males then make a concerted attack on the scales plugging the canal at the apex of the fruit and by dint of numbers eat a tunnel through to the outside, at the same time chewing up many of the male flowers, the stamens and pollen along with other debris, falling to the bottom of the cavity. Upon reaching the open air, those males, which are not snapped up by the many enemies lying in wait, fall to the ground and die. Soon afterwards the females emerge through the opening made for them by the males, having in their exit become dusted

with pollen, and, after a short pause to clean themselves up, set off in search of fruits in a suitable stage of growth wherein to deposit their eggs. They appear to be perfectly competent to select one in the right condition and they attack the plug of scales at the entrance to the cavity and endeavour to force their way in. Of the large number that make the attempt very few succeed in reaching the interior. The successful ones immediately search for suitable places in which to deposit their eggs.

Photomicro. by O. H. Coulson.

Fig Insect, male.

As mentioned previously, in the female fruits the ovaries are covered with a thick tough skin which the ovipositor of the wasp cannot penetrate and the insect crawls about in a futile attempt to oviposit until it dies of exhaustion. During the process, however, the pollen adhering to the insect becomes transferred to the stigmas of the female flowers, resulting in the production of fertile seed. If the fruit entered is a male fruit the wasp deposits her eggs in the ovaries of the abnormal female flowers and the stimulation thus caused results in the development of galls and the hypertrophy of the receptacle. So difficult is it for the female insect to force her way through the wad of bracts into a fruit, she invariably loses her wings in the process, together with most of the pollen which she carried from the male fruit. The extraordinary development which immediately takes place in the fruit is probably due to the stimulation provided by the ovipositor in piercing various parts of the flower in the insect's unsuccessful attempts to deposit her eggs in the ovaries.

REVISION OF *THE AGARICACEAE OR GILLED FUNGI*

(Published in the April *Naturalist* of 1934)

By J. H. WILLIS

Massee concludes his General Introduction to *British Fungi* with the following words: "There are no such things as sharply defined families, or genera, or species in nature; such exist only in books."

Admittedly a sweeping statement! but not without some foundation in fact. Of all living organisms, surely fungi show the most extreme morphological variations within a species—variations of size, shape, colour and habit that seem often to defy all accepted bases of classification. In dealing with remote forms of one species, it not infrequently happens that the systematic botanist is deceived into errors of determination, because he fails to trace any connection between these forms, and it is only by long years of patient observation in the field that he comes to learn the typical form and limits of each species. Elias Fries spent almost 70 years of his life studying the agarics of Sweden and it has been rightly said that he knew them as no man ever knew them before, or perhaps ever will again; records of such work as his are almost beyond censure and will endure the tests of time.

Since contributing an article on Victorian Agarics to the *Naturalist* of April, 1934, I have prosecuted further studies on the species listed, comparing each of them closely with descriptions in Dr. J. B. Cleland's recent Handbook, *Toadstools and Mushrooms and Other Larger Fungi of South Australia*, June, 1934. It is now apparent that I have made several mistakes in my article, which may be accounted for by personal inexperience, the lack of available literature on Victorian fungi, and the fact that many of our agarics, while closely resembling old, established species, have been given new names by Dr. Cleland.

However honest my mistakes may have been, I feel in duty bound to publish a revision of those species which must be altered in the light of Dr. Cleland's determinations and as a result of my own further inquiries. Notwithstanding the change in nomenclature of the following 14 species, one cannot be dogmatic in naming Australian fungi and certain other alterations may still be warranted, but I believe that the list as now revised approximates very closely to the truth.

1. For *Amanita spissa* read *A. grisea* Massee and Rodway.
   (Cleland uses a Tasmanian name for this common and variable Continental plant which approaches *A. spissa* Fr. as described overseas.)
2. For *Pholiota pumila* read *P. sub-pumila* Cleland.
   (Apparently the same plant which Cooke recorded from

Australia as *P. pumila* Fr., but larger than this long-established species.)

3. *Cortinarius cinnamomeus* read *C. austro-venetus* Cleland.

(Cleland gives a new name to what has been considered merely a green variety of *C. cinnamomeus* (Linn.) Fr., and calls the dark brown form *C. sub-cinnamoneus*).

4. For *Russula foetens* read *R. pectinata* (Bull.) Fr.

(Our common creamy-brown and very acrid Russula seems closer to *pectinata* than *foetens*, which has a larger pileus, larger spores, and a very pronounced, disagreeable smell. It differs also from *R. pectinatoides* Cleland, in having a very peppery taste.)

5. For *Hygrophorus Llewellinae* read *Cantharellus lilacinus* Cleland and Cheel.

(Though agreeing with Cook's description, and closely resembling a Hygrophorus, this beautiful lilac species is surely the same as the plant referred by Cleland to the genus Cantharellus. The writer must also acknowledge an error in the spelling of "*H. Lewellinae*" Kalch.)

6. For *Flammula sapinea* read *F. excentrica* Cleland and Cheel.

(Two rather closely related species.)

7. For *Panaeolus papilionaceus* read *P. retirugis* Fr.

(This black-spored agaric so common on manure was called *P. papilionaceus* after much thought; in Victoria it seems to lack the moist surface with prominent reticulations, ascribed to *P. retirugis*, but Cleland uses the latter name for South Australian specimens of undoubtedly the same fungus.)

8. For *Mycena coccinea* read *M. viscido-cruenta* Cleland and Cheel.

(The blood-red Australian plant closely resembles *M. coccinea* (Sow.) Quel., from which it differs in having a glutinous cap and stem.)

9. For *Mycena flavo-virens* read *Leptonia viride-marginata* Cleland.

(The writer referred this rare green agaric to a large form of *M. flavo-virens* Cooke and Massee, in the absence of spores—a careless thing to do. He has subsequently found the spores to be those of a *Leptonia* (pink and angular) and the plant is almost certainly *L. viride-marginata* of Cleland, though the gills lack green edges and the spores are much smaller than in the latter species.)

10. For *Nolanea papillata* read *N. pascua* (Pers.) Fr.

(The two species are related, but Cleland uses the latter name for our common plant, which is rather more robust than *N. Papillata* Bresadola.)

11. For *Omphalia fibuloides* read *O. chromacea* Cleland.

(Cleland adopts a new name for our little orange-yellow agaric, so common everywhere on bare ground.)

12. For *Pleurotus nidiformis* read *P. lampas* Berkely.

(The two names are concurrent in Cooke's *Handbook of Australian Fungi*, but the descriptions are very incomplete and probably refer to one and the same plant. *P. candescens* and *P. phosphoreus* are probably also synonyms of *P. lampas*, with which Cleland identifies our large, luminous agaric.)

13. For *Pleurotus petaloides* read *P. viscidulus* (Berk. and Br.) Cleland.

(The Victorian form is doubtless related to *P. petaloides* (Bull.) Fr., from which it differs in having a darker, viscid pileus when moist.)

14. For *Marasmius erythropus* read *Collybia elegans* Cleland.

(A "border-line" species between *Marasmius* and *Collybia*; it is not quite *M. erythropus* (Pers.) Fr. (with pallid cap, velvety red stem, and distant gills) and Cleland has almost certainly classified it aright.)

"AUSTRALIAN SPIDERS AND THEIR ALLIES"

In this handy work (published by the Royal Zoological Society of New South Wales) Mr. W. W. Froggatt, the veteran Australian entomologist, has added another to his many publications on natural history. Information in regard to Australian spiders is sparse, and not readily available. This little book, written in a popular, pleasing, and informative manner, contains a fund of interesting matter on the subject, dealing with different species of spiders, and the structure, habits, and life histories of these useful creatures.

Ticks, Mites, Centipedes, Scorpions, Millipedes, Slaters, and Wood Lice are also dealt with, the parts they play in the lives of mankind, domestic animals and plants, whether useful or injurious, being described.

Practical advice as to the treatment of bites, and as to the eradication of noxious pests among the species described is plainly given. The book is well and clearly illustrated by photographs and drawings, and a bibliography of popular books on Spiders and Ticks adds to its usefulness.

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

HIBERNATION OF THE PLATYPUS

By ROBERT EADIE, M.B.E.

In my book entitled *Life and Habits of the Platypus* published recently, were given some records which I had made regarding hibernation. These showed that in the winter of 1933 "Splash," my tame Platypus, had several periods of what I believed to be hibernation. They, admittedly, were not of long duration, but were sufficient to create the belief that the Platypus was a hibernating animal.

A repetition of this behaviour was looked for in the winter of 1934, but it was not repeated. Observations made during the present winter (1935) have given similar results. In my book I indicate that the changed life, environment and food might bring about a change in the habits of the Platypus, particularly with regard to hibernation. This reasoning would appear to be correct as the following circumstances will illustrate.

During the whole of the winters of 1934 and 1935 a Platypus has been in captivity in the Sir Colin MacKenzie Sanctuary at Badger Creek, Healesville. This animal is confined in an area which gives ample scope for movement and the enclosure has been constructed so that the conditions may conform as nearly as possible to those in which the Platypus usually exists when living its normal life. In the winter of 1934 this animal had several periods of seclusion and these, in the matter of time, approximated very closely to the retirements of "Splash" in the previous winter.

The present winter was, therefore, looked forward to with much interest—for the behaviour of the Platypus would probably determine whether it should be classed as hibernating or not. The result of the observations made leave little doubt about the matter. Correct records have been made—the times of seclusion carefully noted and registered. Without going into every detail of these observations, it will probably suffice to give in general terms the periods from May 23 to July 22.

During the last week in May the Platypus was seen on only two days. In June it was visible on seven days only. Up to July 22 only five appearances have been made.

It is interesting to note that the periods of retirement are from four to five days, or about 100 to 120 hours. More than the average or normal amount of food is consumed at reappearances. In all other respects the Platypus shows no change from normal appearance. One would expect to find more shyness exhibited but there is no apparent difference in this respect.

I am convinced that the Platypus spends a considerable part of the winter months in hibernation. In an endeavour to obtain information from other sources I asked several people who are living close to the river haunts of the Platypus for assistance. I

desired to ascertain whether the Platypus was observed in the rivers as frequently in the winter as in the summer. All replies indicate that the animal is rarely seen in the winter.

The statements could, of course, be used as further evidence of hibernation, but it must be remembered that mostly the rivers are in a turbulent condition during the winter. In these circumstances the observations would be more difficult to make. However, I give the statements for what they are worth.

Without relying upon any such evidence I am now quite satisfied that sufficient data are available to settle the question—once and for all—that the Platypus must be regarded as a hibernating animal. It is of interest to note that the mating and nesting season coincides with these periods of hibernation. Further, that the Platypus nests and lays its eggs at the same period as all water or web-footed birds do. *The Platypus has web feet.*

The famous "Splash" has now been in captivity for two and a half years and is nearly three years old.

ONION GRASS AND PIGEONS

At Black Rock recently I witnessed several house pigeons tugging vigorously at Onion Grass (*Romulea bulbicodium*). They pulled till the plants came away, exposing bulb and roots. They had discovered the farinaceous nature of the corms.

Our footpaths and much of our grasslands are vividly green with what appears to be long slender tough grass, but is discovered to be this *bulbicodium*. One would, if lacking in experience, hesitate to declare as a pest this pretty Cape Iris, especially if seen on a warm day in August when its reddish, purplish, white, cream, or bluish Crocus-like flowers make our footpaths and pastures so gay as to hold revel during the flowers' sun bath, for they will close again by nightfall with the declining warmth of sunshine. The size of the flowers is most variable; sometimes they measure under ¾ inch, but again expanding the funnel-shaped perianth to quite 1¼ inches.

I was fortunate in August, 1933, to discover, at Harcourt, a new colour for Australia of this Cape Iris in yellow forms, that would superficially, when growing in damp situations, deceive even expert botanists. On inexact examination they would at once declare the plant to be "Yellow Stars," or the Amaryllid—*Hypoxis glabella*—of our Australian States and not suggest the little-introduced Iris from the old world. When the size of the flowers agree, only the two pointed bracts or spathe holding the flower will proclaim the iris.

Unfortunately, Nature would appear to have been too prodigal in providing for the reproduction of this exotic. Not only has it a glossy-coated and protected bulb or corm, but after flowering it produces a capsule that lies close to the ground and which will even dig itself into the earth. This contains numerous angular seeds. The stalk or former scape usually thickens and becomes elongated towards maturity, curving downwards. It is also unfortunate that the plant is indigestible, unpalatable and of little food value to stock. One cannot fail to notice the discoloured yellowish tinge of the foliage in maturity among the grasslands when it is drying off with the approach of the warmer days of spring.

The family of *bulbicodium* seems to be a never-ending study to the specialist who still has it under review and he remains undecided or, indeed, he was until very recently.

A. J. TADGELL.

DISCOVERY OF A NEW ZEALAND ORCHID ON LORD HOWE ISLAND

By the REV. H. M. R. RUPP, Woy Woy, N.S.W.

In this journal for October, 1932, I pointed out that scientists who are opposed to the theory of a former land connection between Australia and New Zealand are not justified in stating that the differences in the flora of the two countries are so great as to constitute a strong argument against this theory. Actually both countries contain not only a number of the same genera, but many identical species. Thus, among the Orchids, 18 genera and at least 24 species are identical. Additional interest is now given to the subject by a recent discovery by Dr. C. H. Jaede, of Mascot, N.S.W., on Lord Howe Island.

Bulbophyllum tuberculatum.

The orchid flora of Lord Howe, though comprising only a few species, is very interesting. There are two species of *Dendrobium*—one endemic and very distinctive [*D. Moorei* F.v.M.], the other a variety of the Australian *D. gracilicaule* F.v.M. A single species of *Cleisostoma* (*C. erectum*) is also endemic. These were the only known epiphytes until Dr. Jaede visited the island in February of the present year. Upon his return he sent me specimens of a small epiphyte, with a few diminutive budding racemes. It appeared to be a *Bulbophyllum*, and after careful examination I was struck by its resemblance to my herbarium specimens of the New Zealand *B. tuberculatum* Col. The first raceme opened a flower in June, and I felt justified in expressing a definite opinion that the plant was *B. tuberculatum*. I sent this raceme, with two pseudobulbs and leaves, to Dr. R. S. Rogers, who has now confirmed the determination. So we have the very interesting fact that in the orchid flora of this small island, nearly equidistant from Australia and the extreme north of New Zealand, Commonwealth and Dominion meet. *Dendrobium gracilicaule* var. *Howeanum*, though distinctive in features of minor importance, is readily recognizable as a variant from the Australian type; while *Bulbophyllum tuberculatum* has until now been regarded as endemic in New Zealand—chiefly in the North Island.

Published descriptions of the species make no allusion to the glandular-hispid character of the peduncles, pedicels, and ovaries. This feature is quite perceptible even in dried New Zealand specimens, and is very prominent in the Lord Howe plant.

THE SEA SERPENT?

STRANGE MARINE CREATURE OBSERVED OFF COAST OF QUEENSLAND

By A. H. E. MATTINGLEY

Some of the many reports of appearances of the Sea Serpent have been accepted as worthy of credence. Any reliable information, however meagre, should be recorded. The following account of a strange creature seen off the coast of north-eastern Australia, and believed to be the Sea Serpent, is perfectly authentic. The sketch and anatomical description were communicated to me by Oscar Swanson, of Townsville, Queensland. He wrote:

On Sunday, August 18, 1934, a party consisting of a William Quinn, my son, Harold, and myself, were out in a small motor launch, intending to fish near the Fairway Beacon, at the end of the Platypus Channel, four miles from Townsville. The previous day I sighted four whales in the bay, and was anxious for my lad to get a close-up view of a whale, so, on leaving the Breakwater, we were on the lookout for them. Shortly after, the lad drew our attention to four dark objects on the water, past the Fairway Beacon, and about three miles from us. We kept looking at these objects, and they had us puzzled. We could hardly believe our eyes when we got close enough to discern a Sea Monster. We were so interested in it that we did not realize what might happen if it came at us, and got within 150 yards, when it submerged, going down like a submarine, sinking slowly. Then we thought it would come at us, and we turned to make for the Beacon, which has a ladder to the top on which a lamp is lit.

We were wishing that we were in a speed boat. We stowed the little fellow up forward under the bit of decking we had, and hoped for the best. I might mention that the sea at this time was as smooth as glass. After about five minutes the monster arose again in the same place (coming up just like a submarine). We were about three-quarters of a mile past the Beacon; on reaching it we caught hold of the ladder and watched to see what movements the monster would make. After waiting half an hour and seeing no movements, excepting the head swaying from side to side, as if watching us, we decided to make back to town, get rid of the boy, and get a camera, as it looked as though the monster would stop there all day. On reaching the jetty wharf, I rang Mr. Jim Gibbard, sub-editor of the *Townsville Bulletin*, who picked up a press photographer, Mr. Ellis, and, armed with two cameras, we once more set out (without the boy).

As the pressmen were getting into the boat, we noticed the S.S. *Marella* coming around Magnetic Island, and making for the spot where the monster was, and our hopes

of seeing it on the surface grew faint, as the noise of our little boat had made it submerge, while the noise from the steamer would be more likely to make it disappear. It took us half an hour to get to the spot where it was last seen, but the steamer had frightened it. On the way out, Mr. Ellis thought he saw two dark objects about 20 feet apart, deep down, and this may have been the monster, as it put its head up near a man fishing in a small dinghy just outside the breakwater, at 3.30 p.m.; and he lost no time in getting home.

You will see, by the rough sketch submitted, what the monster was like. The head rose about 8 feet out of the water, and resembled a high turtle's head, the mouth remaining closed. The head was about 8 feet from the back of the head to the front of the mouth, and the neck was arched. The colour was greyish-green. The eye (we could see only one, being side on) was small in comparison to the rest of the monster. The other part in view was three curved humps about 20 feet apart, and each one rose from 6 feet in the front to a little less at the rear. They were covered with huge scales about the size of saucers, and also covered in barnacles. We could not get a glimpse of the tail, as it was under the water.

A week before, a monster was seen at Mourilyan Harbour by a fishing party in a large launch, and the description given by them tallied with what we saw, only the creature made a loud noise as it swam around their boat, about 50 yards away. A week later, it was seen around Bowen, and the account in the *North Queensland Register* describes what was seen there. A week later, the M.V. *Trentbank*, on her way to Canada with a shipment of sugar, sent a wireless to Townsville that they had sighted the sea monster off Mackay. Some weeks later, when a motor boat, the *Rahata*, was coming north from Brisbane (to fish for the kingfish season off Palm Islands), one of the crew, a man named Mills, was on deck, when he saw the monster a few feet off the boat. This was further south, near the Barrier Reef. He described in our paper that he saw two big humps about 25 feet apart, of a grey-greenish colour, covered with scales the size of saucers. He did not see the head or tail. He said that when he had read of the monster, that, like a lot of others, he thought we had too much rum aboard (as it happens, we are teetotallers), but was quite convinced that the sea monster existed after what he saw.

(Signed) OSCAR SWANSON.

Mr. Swanson further stated that there was no sign of fins and that there was a dark line along the back, but as the monster was motionless he could not discern what power it used to swim. It had no mane or sign of legs, as far as he could make out. The scales were shiny in the sun and seemed to be butted and perpendicular. There were many barnacles on the body, some the size of soup plates, whilst the scales were the size of saucers.

On many occasions I have encountered in the tropical seas of Australia several species of sea snakes mostly under 8 feet in length. When we remember that most of the land snakes of Australia are under 6 feet in length and many are venomous, as also the sea snakes whose tails differ from the whip-like structure of land snakes in that they are rudder-like and in shape resemble the tail of an eel to enable them to propel and balance themselves in water, then we are confronted with the problem of the shape of the Sea Serpent's tail and whether that creature, if it exists, is venomous or not. It would in all probability possess a rudder-like tail as a means of propulsion, and, doubtless, be a constrictor.

EXCURSION TO SHERBROOKE FOREST

More than 40 members and friends took part in the Club excursion to Sherbrooke on June 15. All present saw Lyre-birds under favourable conditions, the antics of several birds being closely watched, while their mimicry was listened to with delightful interest. The birds do not seem to be adversely affected by the increasing number of visitors to this accessible haunt; in fact, they appear to be more approachable each season.

The outing proved very successful from a mycological standpoint. Mr. J. H. Willis was present. He gave an informative talk on a wide range of specimens collected, and later accompanied an enthusiastic party on a fungus foray along about a quarter of a mile of track. Perhaps the most interesting find was the rarely seen *Vibrissea tasmanica*, a tiny dark-green "Pin-head Fungus." A colony of this curious ascomycete was located by Miss Effie Powles, growing under a fallen log. The number of species collected on the excursion was 68, against 63 on the previous year's foray. The total number of species recorded for the area, on the two excursions, is 102.

The following is the list of Fungi noted and named by Mr. Willis:—

Agarics:

Armillaria mellea (Honey fungus).
Cantharellus cibarius, var. *australiensis* (edible).
Collybia radicata.
Collybia velutipes ("Velvet Foot").
Cortinarius castaneo-fulvus.
Cortinarius rotundisporus (bluish).
Crepidotus globigerus
Flammula excentrica.
Hebeloma sp. (large, densely clustered, yellow).
Hygrophorus russula.
Hypholoma fasciculare.
Hypholoma sub-lateritium.
Laccaria laccata.
Marasmius sp. (hair-like stem and very few gills).
Marasmius sp. (long stem, lilac cap).
Marasmius sp. (evil smell, small, white).
Mycena capillaris.
Mycena epipterygia.
Mycena filopes.
Mycena galericulata.
Mycena rorida (glutinous stem).
Mycena sp. ("Pixie's Parasol")
Panus stypticus (poisonous)
Pholiota sub-punila.
Pholiota sp. (smooth moist tawny cap and umbo).
Paxillus panuoides.
Pleurotus lampas (luminous).
Pleurotus sp. (pink and shell-like).
Psathyrella disseminata.
Psilocybe echinata.
Xerotus Archeri.

Coral Fungi:

Clavaria cinerea.
Clavaria crispula (?).
Clavaria inæqualis.
Clavaria pyxidata.

Polypores:

Polyporus anthracophilus.
Polyporus Colensoi (with multifid, flaccid caps).
Polyporus gilvus.
Polyporus lateritius.
Polyporus melanopus.
Polyporus rudis.
Polystictus brunneo-luteus.
Polystictus cervino-gilvus.
Polystictus versatilis.
Polystictus versicolor ("Rainbow Fungus").
Trametes lilacino-gilva.
Boletus luteus (under pines).
Ganoderma applanata.

Miscellaneous:

Hydnum repandum.
Hydnum sp. (snow-white).
Myxomycidium pendulum.
Stereum illudens.
Stereum lobatum.
Stereum vellereum.
Tremella fuciformis.
Bovistella glabrescens } (Puff-balls)
Geaster triplex } (Puff-balls)
Lycoperdon nigrum (?) } (Puff-balls)
Octaviania australiense } (Puff-balls)
Octaviania sp. (white) } (Puff-balls)
Leocarpus fragilis (Slime Mould).
Lycogala epidendrum (Slime Mould)
Peniophora sp. ("White-wash Fungus").

Ascomycetes:

Chlorosplenium aeruginatum.
Ciboria strigosa.
Helotium sp. (white)
Leotia marcida.
Vibrissea tasmanica (green "Pin-head Fungus").

A.G.H. and H.S.

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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 12, 1935. The President, Mr. G. N. Hyam, presided, and about 90 members and friends attended.

APOLOGIES

Apologies were received from Mr. and Mrs. V. H. Miller. The President announced that Mrs. Miller had been involved in a car accident while on the way to the last Club excursion, and one of her ribs had been broken. The Hon. Secretary was instructed to write a letter of sympathy to Mrs. Miller.

CORREPONDENCE

From the Federation of Walking Clubs, inviting members of the Club to attend a combined walk through the Sherbrooke Forest on Sunday, October 6.

REPORTS OF EXCURSIONS

Reports of Excursions were given as follows:—National Museum (Palæontology), Mr. F. S. Colliver read a report for Mr. F. Chapman; St. Kilda Gardens, Mr. G. N. Hyam for Mr. V. H. Miller; Aquarium, Mr. F. S. Colliver for Messrs. Green and Smith.

ELECTION OF MEMBERS.

On a show of hands the following were duly elected:—As a country member: Mr. Melbourne Ward; and as an associate: Edric W. Manning.

GENERAL BUSINESS

(a) Plaque for Herbarium.—The President gave a short account of this matter up to the present time, and then announced that to cover the Club's proportion of the cost of the plaque a collection would be taken up. This yielded £2/18/3. The President announced that approximately £2 was still required.

(b) Forthcoming Excursions.—These were spoken to by their respective leaders. Mr. A. S. Kenyon announced a special Excursion to the Big Desert, from September 6 to 12, 1935.

NATURE NOTES.

Miss C. Currie, a country member from Lardner, sent in two interesting notes: one on a Satin Bower Bird building a bower quite near to the house, the other on the Starlings, and their value as insect destroyers.

Miss Chisholm mentioned her recent visit to Koala Park, near Sydney, and stated that the animals were thriving.

Mr. A. D. Hardy gave a very interesting note on the red snow that recently fell in Victoria, and stated that he had separated the dust from the snow, and had examined it microscopically.

SUBJECT FOR EVENING

Mr. E. E. Pescott, F.L.S., gave a very interesting talk on British Wild Flowers, illustrated by means of the Epidiascope. He paid particular attention to the parent types of many of our well-known garden flowers.

WELCOME TO VISITOR

The President announced that Miss Isabel Walker, a member of a Nature Club at Aberdeen, Scotland, was present, and on behalf of the members extended to her a very hearty welcome.

EXHIBITS

Mr. L. W. Stach.—A small collection of common Victorian Recent Bryozoa, including *Scuticella plagiostoma* (Busk, 1852) and *Amathia inarmata* (Macgillivray, 1887), from Flinders; *Triphyllozoon moniliferum* (Macgillivray, 1860) and *Tubucellaria hirsuta* (Lamouroux, 1812), from Western Port; *Cellaria setigera* (Pergens, 1887) and *Electra pilosa* (Linnaeus, 1758), from Torquay, and *Cornucopina tuba* (Busk, 1852), from Shoreham (Western Port).

Mr. Noel Lothian.—*Sarcochilus falcatus.*

Mr. C. French.—*Sarcochilus falcatus,* from Queensland.

Mr. H. Jenkins.—*Grevillea* (Hybrid).

Mr. A. D. Hardy.—Desert sand from Victorian Alps.

GOOD WORD FOR STARLINGS

In a letter to the Hon. Secretary of the Club, Miss C. C. Currie, of Lardner, states the case for the Starling:

"Personally, we feel very indebted to Starlings, which have cleared out the immense numbers of grasshoppers with which we farmers had been contending.

"The grasshoppers came at the latter end of October, and were with us until the frost. Starlings have done more to help the man on the land in this part of Gippsland than the rabbits (which are serious pests) have done harm. At present Starlings are digging out the beetle grubs, of which there are thousands eating the grass roots."

RECOLLECTIONS OF "THE BARON"

By WALTER S. CAMPBELL

When I first became acquainted with that renowned botanist, F. von Mueller, he held the offices of Government Botanist of Victoria and Director of the Botanic Gardens, Melbourne. At that time, many years ago, the Botanic Gardens presented a very different appearance from that of to-day. They were then in a most unsatisfactory condition, attributable, it was considered, to lack of funds to support them, as well as mistakes in management. The Director, although a wonderfully able botanist, was not a landscape gardener. However, he had introduced then many plants of considerable economic value and interest to those, like myself, seeking information about both exotics and indigenous forms. I heard that the Baron desired to afford as much information as possible about economic plants.

In the year 1873 von Mueller was deposed from the office of Director of the Melbourne Botanic Gardens, and J. R. Guilfoyle, of Sydney, was appointed in his stead. The public had been grumbling considerably about the condition of the Gardens, and most unfavourable comparisons were frequently made between Melbourne and Sydney Botanic Gardens, greatly to the advantage of the latter. A change in the management and large expenditure of money on the Melbourne Gardens was considered to be imperative.

Guilfoyle, doubtless, had received an excellent training in horticulture under his father, who had supervised, or partly supervised, and laid out the beautiful and extensive gardens of the late Thomas Mort, at Darling Point, overlooking Double Bay, and known as Greenoaks. He afterwards established a plant nursery at Double Bay, well known to all who took an interest in gardening. I visited the place many times, once or twice with the late R. D. Fitzgerald, of "Australian Orchids" fame. At the nursery we were shown some plants, suited for planting in warm districts, including coffee and tea. These were intended for the son (afterwards Director of the Melbourne Botanic Gardens) and his brother, who had taken up land on the Tweed river, in the north-eastern corner of New South Wales. The two brothers, I believe, engaged in sugar-cane growing for some time. Before that, at a meeting of members of the Acclimitisation Society of New South Wales, Mr. Guilfoyle, jun., brought a fruit of *Diospyros kaki*, the Japanese date plum or persimmon, the first, I think, produced in Australia, now abundant. This created a considerable amount of interest. The plant was grown by Mr. Guilfoyle, sen., at Double Bay.

It is needless to refer particularly to the vast improvements effected at the Botanic Gardens by Mr. Guilfoyle, assisted by ample funds. Indeed, the saying was that "the gardens had been paved with bank notes."

As may well be imagined, Baron von Mueller, who was a very sensitive man, felt his deposal very keenly indeed. Some time after the change occurred my wife and I were enjoying a holiday in Melbourne, and took the opportunity of paying a visit to the Baron, whom we found occupying anything but pleasing looking quarters. He was busy at work in a room, which must have been very uncomfortable for him, crowded with dried plant specimens from his huge herbarium, and the atmosphere was very stuffy indeed. He welcomed us warmly, apoligised for his surroundings, and his inability to offer us tea, and we had a long and interesting conversation.

He poured out his troubles about his deposal from the Botanic Gardens, and his difficulties concerning his herbarium. He blamed one of the Ministers of the then Government for all that, and the reason for the Minister's action was that the billet of Curator was needed for "Mr. Casey's wife's cousin"! Poor old gentleman! It was very pathetic as he almost sobbed out his plaintive story. I felt sorry for him. He produced his insignia, explaining the different orders conferred upon him, of which he was exceedingly proud, especially that of Knighthood from the British Government. He begged me to call upon him again, but that was the last opportunity of seeing him. However, we corresponded for years afterwards. I think he took a fancy to me because I had been a pupil of Dr. Woolls, and not for my interest in plants or nature subjects.

The Baron was deeply interested in the vegetation of localities in New South Wales, with which I was acquainted. He liked to hear about the places where different species of eucalypts flourished, and the soils in which they grew, as well as about various other kinds of plants which luxuriated in the Tweed, Richmond, and Clarence River districts, as well as in the west and north-west.

In June, 1889, Dr. Wm. Woolls wrote to me: "I have just read the accompanying note from Baron von Mueller. Can you tell me for his information whether the two species of *Nymphæa* extend to the northern rivers of New South Wales? Mr. Bentham records *N. gigantea* from the Clarence, and joins *N. stellata* with it, but you will see that the Baron regards them as distinct, and as easily distinguished."

I was familiar only with the species said to be *N. gigantea*, and informed Dr. Woolls, but I promised to look out for these two *Nymphæas* when I visited the district again. That occurred in 1892. I had seen *gigantea* here and there about the Clarence

River and in lagoons in the north, and also I caught a glimpse of the flowers in Tuckombil Creek, a rather large affluent of the Clarence, near the village of Woodburn. Travelling from the Richmond River overland to the Clarence, I had to wait half a day for the mail coach, so I took the opportunity of taking a row in a boat with a friend up Tuckombil Creek to see the waterlilies.

It was a wonderful sight to see the hundreds and hundreds of splendid blooms standing above the handsome large leaves. I managed to secure some good photographs, and on my return to Sydney contributed to the *Sydney Morning Herald* an article about the lily. I also, sometime afterwards, when at Woodburn again, collected a considerable number of fine blooms, and brought them to Sydney in a wooden box in perfect condition. Some of these I sent to Dr. Woolls, and others I gave to a seedsman in Sydney, who exhibited them in his window in King Street. I doubt whether such blooms had been seen in Sydney before. Sometime later Mr. Searle, the seedsman, obtained some specimens, had them enclosed in ice, and sent them to Her Majesty Queen Victoria, who, I believe, admired them greatly.

Dr. Woolls was much pleased to see the flowers, and wrote, "My dear Campbell, I am exceedingly obliged for the splendid specimens of *Nymphæa gigantea*, which you sent by Mr. Twine yesterday. . . . The specimens of other plants which you sent are highly interesting to me."

Shortly afterwards (December 2, 1892) Dr. Woolls wrote: "My dear Campbell, I am sorry to trouble you just now, as you have so much literary work on hand, but if without going much into detail you can satisfy the Baron respecting the *Nymphæa*, you would be rendering him a service. I had occasion to write to him on some other matters, and quoted your remarks about the lily. He seems to have been so much interested in them that instead of answering my questions he has *referred only* to the extract from your letter, and to the specimen of double *Diuris*, which young Fitzgerald found on the mountains."

I sent some photographs of the *Nymphæa* at Tuckumbil Creek to the Baron, who wrote: "In the latter part of this month, dear Mr. Campbell, I was thrown into deep mourning, and this disturbed my mind so much from the duties for some days that you only now receive an answer to your kind letter, and the expression of my best thanks for sending me the beautiful photograms of *Nymphæa gigantea* prepared by yourself, also the large leaf. I knew since 1859 that it extended southward to the Clarence River, and it does not seem to have been found further southward. My reason for communicating with our esteemed friend Dr. Woolls on the subject arose from an idea that perhaps

Nymphæa cærulea (better known from its more recent name, *N. stellata*) might also occur in New South Wales. Both these superb plants are companions through much of Eastern Queensland and Northern Australia, the *N. cærulea* being generally rather smaller and having the leaves not serrated and differing in some other respects."

When travelling about the northern portion of the Northern Territory many years later, and coming across water lilies of different species, every here and there, in lagoons and creeks and rivers, I thought of the Baron and Dr. Woolls, and gathered armfuls of beautiful and deliciously scented species, and regretted that they could not have seen these. Several times when waiting for the train to take in water at the Darwin river, I gathered numbers of blooms of *N. stellata*, and took them to the landlady at the Hotel at Darwin, who adorned her dining-room with them, being highly pleased to receive them.

In 1894 I sent the Baron a number of photographs of artesian bores with the water flowing from them. He wrote in acknowledgment: "8/2/94—It is most kind of you, dear Mr. Campbell, to send me the photograms so aptly and admirably prepared by you. They give me the first real idea of regions never visited by myself. I have your honoured name with 'fecit' to each."

The last letter I received from the Baron in his handwriting was the following:—

16/2/96.

"Without wishing to be intrusive, dear Mr. Campbell, I like to mention that I am reminded of my promise to send to Europe fruits (not very many) of *Atkinsonia ligustrina* for anatomic further studies by a monographist of Loranthaceæ. As this is the season when they ripen again I would be so very much beholden to you, if the time is not missed, to obtain these fruits. Mr. Moore, through Mr. Betche, obliged me already to obtain roots in alcohol, and as I do not like to trouble him again, especially at his very advanced age, and fluctuating health, so I can't think of anyone else but yourself to fly to in this case. I fancy some people at the top hotel on the Blue Mountains must know where the *Atkinsonia* grows, and a dried specimen of the plant might be sent to them for finding the living bushes. Therefore, perhaps a single letter would bring us this requisite as a result, and I would willingly refund the remuneration to the gatherer. With regardful remembrance. Yours, etc.,

(Sgd.) FERD. VON MUELLER.

"Do you like to join the great Royal Horticultural Soc. of England? I will gladly be your sponsor."

NOTES ON *CRYPTOSULA PALLASIANA*, Moll. 1803 (BRYOZOA)

By Leo W. Stach

While collecting on the reef at Rickett's Point (Port Phillip Bay), numerous pale pink circular zoaria of *Cryptosula pallasiana* were found encrusting the under surface of boulders. Specimens examined later in the laboratory proved to be living, and the following observations were made.

Protrusion and Retraction of the Polypide.—The protrusion of the tentacular ring of the polypide is a slow gradual movement due to the steady contraction of the parietal muscles which expand the compensatrix, and thus increase the internal pressure of the fluid in the body cavity. This pressure gradually forces the polypide through the aperture as the operculum opens to permit entry of water into the compensatrix, thus compensating for the loss of volume in the zoecium due to protrusion of the polypide. The tentacles are first extended distally as a cylindrical bunch, and are then suddenly opened out in radiating fashion, facing upward. Counts of the tentacles showed that their number varied from fifteen to seventeen in different polypides, this being a slightly greater range than that recorded by Calvet (1900) from Mediterranean specimens, which had sixteen to seventeen tentacles.

A slight tap on the container is sufficient to cause retraction of the polypide, which is accomplished by a few rapid spasmodic jerks, due to violent contraction of the strong retractor muscles which are attached at one end to the base of the tentacle sheath and at the other end, to the proximal body wall.

Protozoan Commensals.—Attached to the ectocyst covering the frontal of several of the zooecia, numerous peritrichous ciliates with long contractile stalks were observed. Several colonial forms (*Zoothamnion*, sp.) were also noted. The rare occurrence of avicularia or bird's beak appendages in this species allows them to remain on the bryozoan without molestation. This association is probably quite harmless, since the polypides of zooecia encrusted by these forms functioned quite as actively as those without them. These commensals probably derive part of their food from disintegrating excrete pellets.

Voiding of the Faeces.—This can only take place when the polypide is protruded.

The pellet may stay close to the tentacular ring into which it is often drawn by the currents set up by the cilia of the tentacles. If this occurs, the polypide is retracted, and then the tentacles are rapidly protruded, thus pushing the pellet away from the vicinity of the polypide.

Nomenclature of the Species.—Magillivray (1879) described and figured this species under the name "*Lepralia pertusa* (Esper)," but a comparison of Macgillivray's specimens of this form with typical Mediterranean specimens of *Cryptosula pallasiana* (Moll, 1803), from Naples shows them to be indistinguishable. This original wrong identification by Magillivray has caused quite a lot of confusion in the naming of this species in the collections of early Victorian workers on the Bryozoa, since *Hippodiplosia pertusa* (Esper) is also fairly common in Victorian waters. Both of the above species are practically cosmopolitan in their distribution.

Cryptosula pallasiana is peculiar in having no external ovicell, the egg being developed in a membranous sac formed by a dorsal outgrowth of portion of the sheath, and on this character Canu and Bassler (1925) erected the genus *Cryptosula* for its reception.

Cryptosula pallasiana is readily distinguished from *Hippodiplosia pertusa*, which alone has external ovicells, by its elongated aperture constricted close to the proximal rim, the latter species having a sub-circular aperture.

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NESTING OF THE EMU

By W. J. ZIMMER

Although the Emu is not commonly seen about settled areas in the north-west of Victoria, in some of the more remote areas it is seldom disturbed, and nests successfully.

Finding a nest of the Emu, despite its size and the fact that often it contains as many as a dozen eggs, is an art. The best method is "tracking up" the imprints of feet in the sandy surface soil. Dense, low mallee is a good place, and if rain has fallen, so much the better, for fresh tracks are then more easily found, and followed. As one approaches the nest the footprints converge more farther afield, often they are isolated tracks, and wander about considerably.

It is not usual to see the bird on the nest, for she generally leaves as the searcher approaches. However, once a nest is

Plate IV

Typical Nest of the Emu in the Mallee.

Photo by W. J. Zimmer.

located, a very quiet advance may enable one to observe the bird sitting on the eggs. Young birds are always timid, and leave the nest if they see anything unusual or hear the slightest noise. Old birds will, however, stay near the nest, and if the searcher remains still he can obtain an excellent view.

Photo. by W. J. Zimmer.

Emu's Nest and Eggs.

The nest is composed of a low layer of mallee bark, surrounding the eggs, which lie on the ground. Sometimes Porcupine Grass (*Triodia irritans*) is used instead of bark.

Foxes are partial to Emu eggs, and often raid a nest when the owner is absent. I have seen eggs bearing distinct teeth marks. When protecting the nest the mother bird emits a low, roaring sound, similar to muffled drumming, and shows considerable courage.

During the last six years these interesting birds have at least held their own. Outback, flocks of from 4 to 12 are frequently met with. The birds are possessed of a natural curiosity, coming up to inspect a car if the occupants remain quiet and still.

TOMMY McCRAE, ABORIGINAL ARTIST

By CHARLES BARRETT

Tommy McCrae was a member of the tribe of aborigines whose territory included the Wahgunyah and Corowa districts. Born, perhaps, a century ago, he was in his 'teens before he even met a white man, and his life until nearly manhood was that of the blackfellow, still free to wander, with his tribe, hunting with primitive weapons, fishing in the Murray River, as the ancestors had done for centuries, and varying the food quest now and then by fighting. He was destined to become, if not famous, at least widely known, and is remembered still as Victoria's most gifted aboriginal artist.

His black and white drawings of native life, camp and hunting scenes, blacks and settlers, are masterpieces of primitive art influenced by civilization. Our aboriginal artist developed his talent along lines which it could not have followed had he never seen white man pictures and drawings. Untutored he was, but became his own teacher, and from sketching on dried mud with a broken stick, graduated to pen and ink and paper. His drawings are realistic, and he was able to give life to figures of men and animals; to make them tell a story and act it.

The silhouette style of drawing Tommy favoured, though aboriginal rock carvings and cave paintings usually are in outline, exceptions being the red hand impressions and figures "pecked out" in the stone, as at Mootwingee, N.S.W. Some of those who use black paper and scissors for picture making are less successful than was Tommy McCrae with a pen, a penny bottle of ink, and any old piece of paper. When his gift was discovered he was provided with materials, including a sketch book (pocket book, rather), in which he did his first permanent drawings.

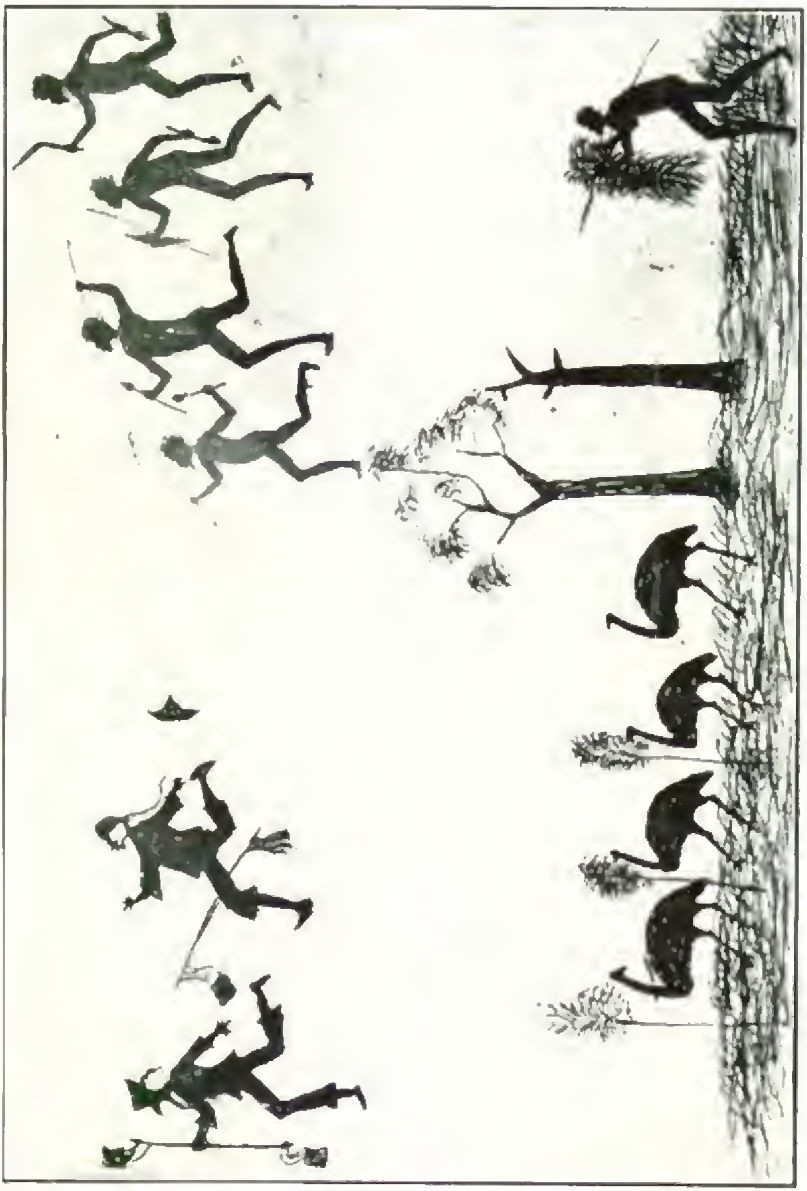
The aboriginal artist died in 1901, and two of his latest drawings, done in 1900, are among those preserved at the National Museum, Melbourne. One is here reproduced, together with a photograph of Tommy McCrae, for the loan of which I am indebted to Mrs. J. A. Foord, of Rochester, who also kindly supplied these notes for an artist's biography:—

"It is interesting to hear that you are writing an article on Tommy McCrae. My father, Mr. R. Kilborn, was the first Justice of the Peace in the district of Wahgunyah, and had known Tommy and his tribe since the early 'sixties, and had a fair collection of their weapons, as well as many sketches, etc., by Tommy.

The tribe's small reservation was close to our home, and we saw them fairly frequently. My father took a keen interest in the natives, and assisted them in many ways. When they wanted to see my father on any official affairs it was always a formal, "I wish to see Mr. Kilborn Justice, please." A private call, a friendly "Where Mr. Kilborn?"

Tommy was very delighted when my father got him to do a book of

Plate V



Done in 1900 by Tommy McCrae, of the Wahgunyah Tribe, who died in 1904

sketches for Lord Hopetoun. The sketches were made in the usual two-shilling drawing book (mentioned above). I think two different books were used, as Tommy had an accident with the ink, which overturned on one. He used to arrive at intervals, and with a broad smile, ask for "More ink, please." I believe he always did his sketching, his men, etc., from the feet up. My father personally presented the book of sketches to Lord Hopetoun, who, he said, was most interested, and seemed to be genuinely pleased to have them. Local interest was aroused, and Tommy had various sketches to make, and I hope found some profit from it.

I remember how broken-hearted Tommy was when his children were sent to Koondrook. He came to the house, and, with tears, begged my

Tommy McCrae.

father to use his influence to allow him to keep the children. Father, of course, did his best, but they had to go, and I think Tommy was rather disappointed with my father in this matter, as he had always been able to provide all their other wants. My father was most indignant over this affair, and all the family's sympathies were with Tommy, as it seemed unnecessarily cruel.

Tommy was a very fine type of native, with a most pleasing, happy expression, and a very kindly man. When my brother George had met with a serious accident some years ago, every day, usually Tommy or someone from the camp, would come and make inquiries, often bringing fish for the patient. When my brother was convalescent, Tommy taught him to net. Tommy had a waggonette, in which he drove the family to the local township, races, and other gatherings. The men, of course, always

occupied the seat; the women and children and dogs (many of these) were packed on the floor of the waggonette, the happiest, jolliest looking party imaginable. The rather quaint thing was the distinction they always made between two of my brothers. The elder one, George, and so called by our family, they always spoke of, and to, as "Georgie." My other brother, many years younger, was always Mr. Alec. The only photograph I have of Tommy was taken when he was an old man.

We often gave Lily, Tommy's wife, and Tilly, another member of the camp, morning or afternoon tea. And they did so enjoy a decent cup and saucer, with nicely cut bread and butter and cake. Their manners were perfect. It was a pleasure to see them.

Further interesting details are given by Mrs. Foord's mother, Mrs. G. C. Kilborn, of Wahgunyah, in a letter to me, written in response to the request for an outline biography of the aboriginal artist:

Tommy was an aboriginal of the Murray River tribe, and as a young man was employed as a stockman on Andrew Hume's Brocklesby Station, near Corowa. In that capacity he made several trips to Melbourne with cattle for market. On one of those occasions he witnessed the opening of the Hobson's Bay railway.

Tommy's first drawings were made in a pocket book, in 1865, for my father, who, realising that drawings by an Australian aborigine would become valuable as time went on, provided Tommy with several drawing books and pens and ink, and had them filled. One of these he gave to Lord Hopetoun just prior to his departure from Australia. Tommy must have made a good deal of money by drawing, as a great many people supplied him with books, etc., and paid him 10/- per book.

Tommy was a well-known identity throughout the country between Albury and Yarrawonga. In his later days he and the oldest members of the tribe travelled from place to place in a covered wagonette, followed by the others and a pack of dogs, of all breeds and sizes, on foot. Part of Tommy's outfit consisted of half-a-dozen fowls, and whenever he was ready to move off to a new camping ground the fowls would fly up into the waggonette and make themselves comfortable until they arrived at their destination. Then the rooster would hop down to the ground and crow, and the hens would all follow him and commence scratching for their tucker. A photograph of that caravan would be valuable if one were in existence to-day.

There is a son of Tommy McCrae's at Lake Tyers Aboriginal Station, and some years ago I sent him a photograph of his father, also one of Tommy's drawings. Jimmy McCrae has a son who is also somewhat of an artist—pen and ink sketching. If you ever happen to go to Tyers and see Jimmy and mention my name he will probably say he remembers Georgie. Although he was taken from Wahgunyah when a small boy some 30 years ago or more (Tommy McCrae died at the Blacks' Reservation, Lake Moodemere, about four miles from Wahgunyah, on October 16, 1901.) The record of his death in my father's diary reads: "Tommy McCrae, an old acquaintance since 1858, died at his camp this morning. The only aboriginal I ever knew who drank no intoxicants."

I do not know where Tommy was born or how he got the name McCrae, or his age when he died. I have a photograph of Tommy's lubra, Lily."

If ever a "History of Aboriginal Art" is published, a chapter, freely illustrated, should be devoted to the art of Tommy McCrae.

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, September 9, 1935. The senior Vice-President, Mr. Geo. Coghill, presided, and about 100 members and friends attended.

Apologies were received from the President, Mr. C. N. Hyam, and Mr. A. S. Kenyon, who, with other members, were attending an extended excursion to the Big Desert.

CORRESPONDENCE

From the Royal Australian Ornithologists' Union, regarding a camp at Marlo from October 22 to 30, 1935.

REPORT OF EXCURSION

Mr. J. W. Audas, F.L.S., read a report on the excursion to Frankston.

GENERAL BUSINESS.

Mr. E. E. Pescott, F.L.S., brought under notice the way in which the Wild Flower Act was being disregarded. He mentioned a poster recently issued by the Railway Department, which showed visitors collecting native flowers at the Grampians—a forest reserve.

On the motion of Mr. Pescott, seconded by Mr. J. W. Audas, the Hon. Secretary was instructed to write to the Forests Department and the Railway Department.

Mr. A. H. Mattingley said that an excursion, arranged by the Gould League, to Dandenong Ranges was being held on October 25, and he asked for the Club's support.

Mr. A. H. Chisholm referred to the death, which occurred recently, of Mr. W. S. Campbell, at the age of 91 years. He moved that a letter of sympathy be sent to Mr. Campbell's daughter, who lives in Sydney. This was seconded by Mr. E. E. Pescott and carried.

Mr. Chisholm also mentioned an article in the September *Naturalist*, and asked whether any of the members present had heard a female Emu making a roaring sound. It was generally believed that, like the female cicada, she was voiceless.

Mr. F. S. Colliver reported that the species of Cone shell, whose bite had caused the death of a man in Queensland recently, was *Conus geographus*.

Mr. Underwood stated that he had plants of the English Crocus for distribution to members.

Mr. Charles Barrett, who had been ill, was welcomed back to the Club meetings, and thanked the members for their welcome.

The Secretary announced that through the efforts of the Club the Nankeen Kestrel and the Black-shouldered Kite were now to be protected for the whole year.

SUBJECT FOR EVENING

The subject was "A North Queensland Night," Mr. A. N. Burns and Mr. F. S. Colliver being the speakers. A very large selection of photographs of Queensland natural history subjects (kindly lent by Dr. H. Flecker, of Cairns), was shown and commented on by Mr. Colliver; then a series of slides and photographs illustrating a recent trip by Mr. Burns and four others, with a running commentary by Mr. Burns.

EXHIBITS

Miss E. K. Turner.—Turkey Bush, from Callawadda, Richardson River (a more definite locality than the north-west).

Mr. A. N. Burns.—Orchids in flower (*Dendrobium falcorostrum* and *D. pugioniforme*), from Queensland; also a very large collection of corals, shells, and other specimens from North Queensland.

Mr. T. S. Hart.—Nodding Blue Lily (*Stypandra glauca*), from Walsoa, Upper Murray; *Pimelea* sp. from the same locality. Specimens collected by M. Thosburn.

Mr. Noel Lothian.—A collection of North Queensland plants from the North Queensland Naturalists' Club.

Mr. C. J. Gabriel.—Land shells from Queensland: *Hedleyella falconari*, Reeve; *Thersites bipartita*, Ferussac; *T. incei*, Pfr.; *T. pachystyla*, Pfr.; *T. blomfieldi*, Cox; *T. fraseri*, Gray; *Planispira rudis*, Hedley; and *Papuina poirctiana*, Pfr.

Mr. C. French.—Orchid, *Dendrobium falcarostrum*, in flower.

Mr. F. S. Colliver.—Feather Stars (*Antedon*, sp.), from the Great Barrier Reef.

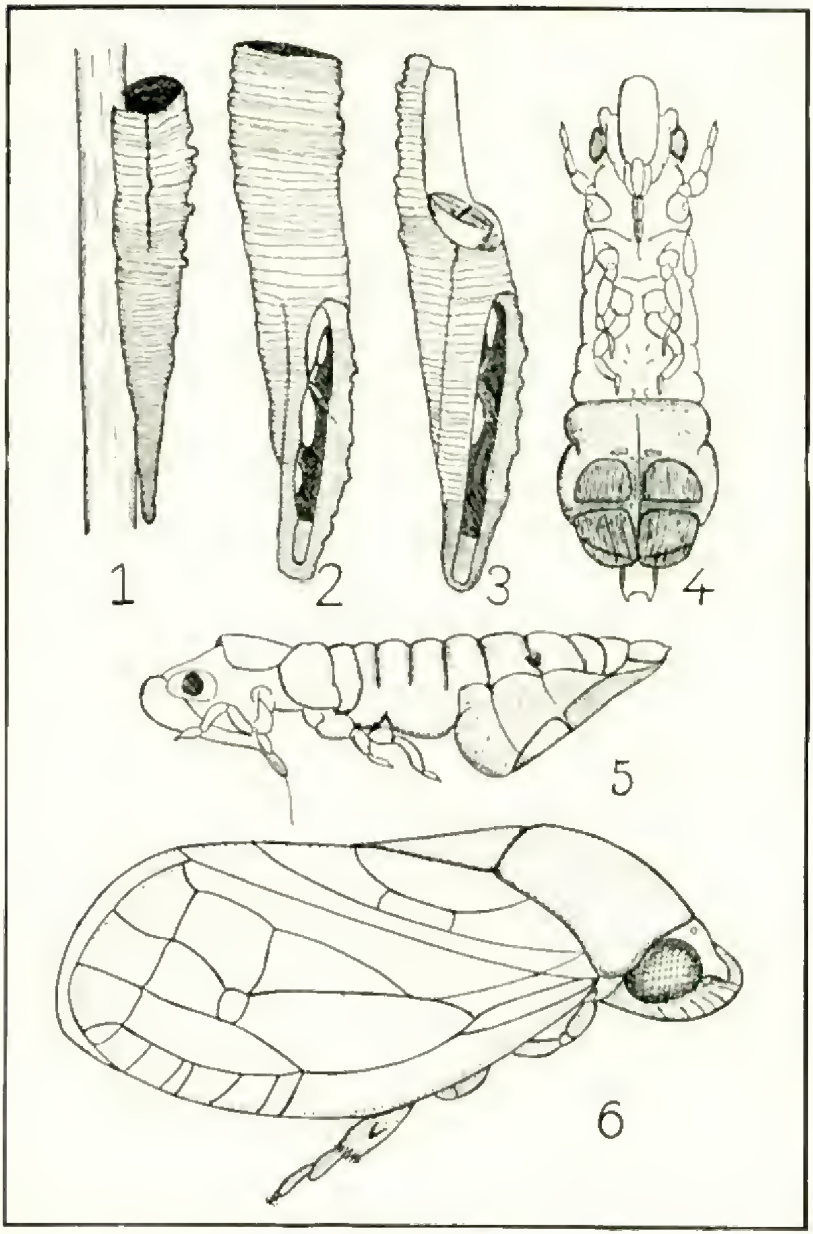
Mr. A. H. Chisholm.—Specimen of the Death's-head Spider.

Mr. Geo.—Collection of garden-grown native flowers.

Mr. W. H. Nicholls.—White Feather Orchid (*Dendrobium aemulum*, R.Br.), with 25 racemes; from South Queensland.

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 VI



Life History of the *Hindola compacta*

VICTORIAN LEAF-HOPPERS, TREE-HOPPERS, AND FROG-HOPPERS

By J. W. EVANS, M.A., F.R.E.S.

Introduction

The Jassoidea or Leaf-Hoppers, Membracidæ or Tree-Hoppers, and Cercopidæ or Frog-Hoppers, have probably been more neglected by entomologists in Australia than any other group of insects. The explanation of this may be because few of the species concerned have complex life-cycles, and none of them are of great beauty. Also the majority are small in size and inconspicuous.

The purpose of this paper is to direct attention to certain aspects of the biology of these insects, and to render possible the identification of a few of the commoner Victorian species.

Structural Characteristics

The Homoptera, to which these three groups of plant-hoppers belong, include also the Cicadas and the Fulgoroidea, and in a separate division of the sub-order, Scale Insects, Aphides, Psyllids and White-Flies. They are characterized by sucking mouth-parts, which consist of four needle-like stylets enclosed in an outer sheath or labium, and by having forewings of the same consistency throughout.

Life History

Eggs are laid in slits made in the bark of the food plant, sometimes singly and sometimes in rows. The female insects are equipped with saw-like ovipositors with which the slits are made. The young insects, or nymphs, resemble the adults, save for the fact that they lack wings. These gradually develop, an increase of the wing-pads being visible after each moult. The adults of all the species in the three groups discussed are seldom seen flying, although equipped with fully-developed wings. If disturbed they will leap into the air, subsequently taking short flights. The nymphs of the majority of the Jassoid species will also jump if disturbed, but in the case of the Eurymelidæ, the hind legs of the immature forms are adapted only for clinging and running.

Cercopidæ

The Cercopidæ, commonly known as "frog-hoppers" or "spittle insects," are poorly represented in Victoria. They can readily be distinguished by the character of the swollen frons (front part of the head), and the fact that the hind legs are spineless and bear one or a few strong stout spurs. (Plate VII, Fig. 2a).

While all the Australian species are small, ranging from one-quarter to half-an-inch in length, this family is represented in New Guinea by broad, brilliantly coloured insects, almost an inch in length. The most interesting species that occur in Australia belong to the Machaerotinæ. The nymphs of insects in this sub-family, in their habits, resemble molluscs rather than insects. Not only do they live in calcareous shells somewhat similar to those of the gasteropod genus *Dentalium*, but they close the entrance to their shells with a door or operculum.

Fig. 1, Plate VI. shows one of these shells attached to a eucalyptus twig. It is half-an-inch in length, and is open at the top end. In Fig. 2 the shell is seen removed from the twig, and part of the head and mouth-parts of the insect are visible. In Fig. 3 a piece has been broken off the top of the shell, disclosing the operculum, while in Figs. 4 and 5, the nymph is seen removed from the tube. The operculum consists of the modified fourth, fifth and sixth ventral abdominal sclerites, the actual chitinised plates being on the fifth and sixth segments. In life the insect rests upside down in its tube, the top of the tube being filled with a clear liquid. It feeds by sucking sap through the aperture of the tube visible in Figs. 2 and 3. Space prevents further description of this insect, but as it and other related species are abundant on gum trees, a fascinating field of investigation awaits someone with sufficient interest and patience. How does the insect breathe when immersed in liquid; how does it form its tube, and since this species is frequently attacked by parasitic flies, how do the parasites reach their prey?

The adult female insect (*Hindola compacta*, Walker), is a quarter-of-an-inch long. The underside of its body is black, the head and thorax yellowish-green, and the wings a shiny hyaline brown. The male is entirely black in colour and considerably smaller in size. Mr. H. Hacker a few years ago published some beautiful photographs of these insects. (Hacker, 1922).

The commonest frog-hopper found in Victoria is *Bathylus albicincta*, Erichs (Plate VII. Fig. 2). The adults, which are beetle-like in appearance, are brown, with white stripes on their forewings, and feed on many introduced weeds and native plants. The nymphs live concealed in masses of froth or spittle. A clear description of how this froth is formed is given in a non-technical paper written by Mr. W. E. China (China, 1927). *Phlaagra parva*, Don (Plate VII, Fig. 1) is another common Victorian Cercopid. The nymphs of this species are gregarious, and are responsible for the large masses of disfiguring froth often seen on wattle trees. The adult insect is brown, and can be recognized by its long head. A closely related species feeds on Casuarinas.

Membracidæ

The Membracidæ, or tree-hoppers, as they are called in America, can be recognized at once by the extraordinary development of their pronotums. The pronotum is the dorsal thoracic segment immediately behind the head. Not only does the pronotum cover the whole of the thorax, but it even reaches to the apex of the insect's body. The commonest Victorian species is *Sextius virescens*, Fairm. (Plate VII, Fig. 3). This species is pale green in colour, but for the head and the front part of the pronotum, which are brown. Together with its nymphs, it may be found feeding on several species of *Acacia*. The adults, if molested, are unwilling to take to flight, but will dodge round the branch on which they are sitting, in an attempt to keep it between themselves and the intruder. Both nymphs and adults are attended by ants, which feed on their excreta, not on the secretion of any special gland. Several other species occur in the State, the majority being black or brown in colour.

Jassoidea

The Jassoidea, usually inappropriately called "leaf-hoppers," since many are arboreal, comprise an immense assemblage of forms, ranging in size from one-fifth of an inch to one inch in length. Of the Australian fauna, two families and several genera are peculiar to this continent. Since in a paper of this nature it would be impossible to attempt even a brief survey of the whole super-family, attention is directed to one family only, the Eurymelidæ. This family has been chosen because it contains many large brightly-coloured species, and must therefore be familiar to most field naturalists.

Insects in this family are commonly known as "frog-hoppers," possibly because in an early text-book on Australian entomology they were included in the Cercopidæ, which are the true "frog-hoppers." While the hind legs of most jassoid insects bear rows of strong spines, those of the eurymelids have only a few spines, and a small number of those are mounted on enlarged bases, somewhat similar to the spurs of Cercopids (Plate VII, Fig. 4a). Everyone must at some time have observed colonies of Eurymelids sitting along the branches of gum trees, frequently all stages together, and invariably attended by ants.

The commonest species is *Eurymela fenestrata*, Le P. and S. (Plate VII, Fig. 4). Like many other Eurymelids, it is very variable in colouration, and may be shiny black or brown in colour, with one, two or three round white markings on its fore-wings; some varieties even have no white markings. The abdomens of the black varieties are a brilliant scarlet. Other common Victorian species are *Eurymelops rubrovittata*, A. & S. (Plate VII, Fig. 5)

and *Eurymeloides pulchra*, Sign (Plate VII, Fig. 6). *E. rubrovittata*, like *E. fenestrata*, is about half-an-inch long, and is black, with transverse red stripes on its thorax and fore-wings. *E. pulchra* is a smaller, more slender species, which is black with orange eyes, orange markings on the thorax, and yellow, occasionally pink, transverse stripes on the fore-wings. The abdomen of the last-named species is yellowish-green.

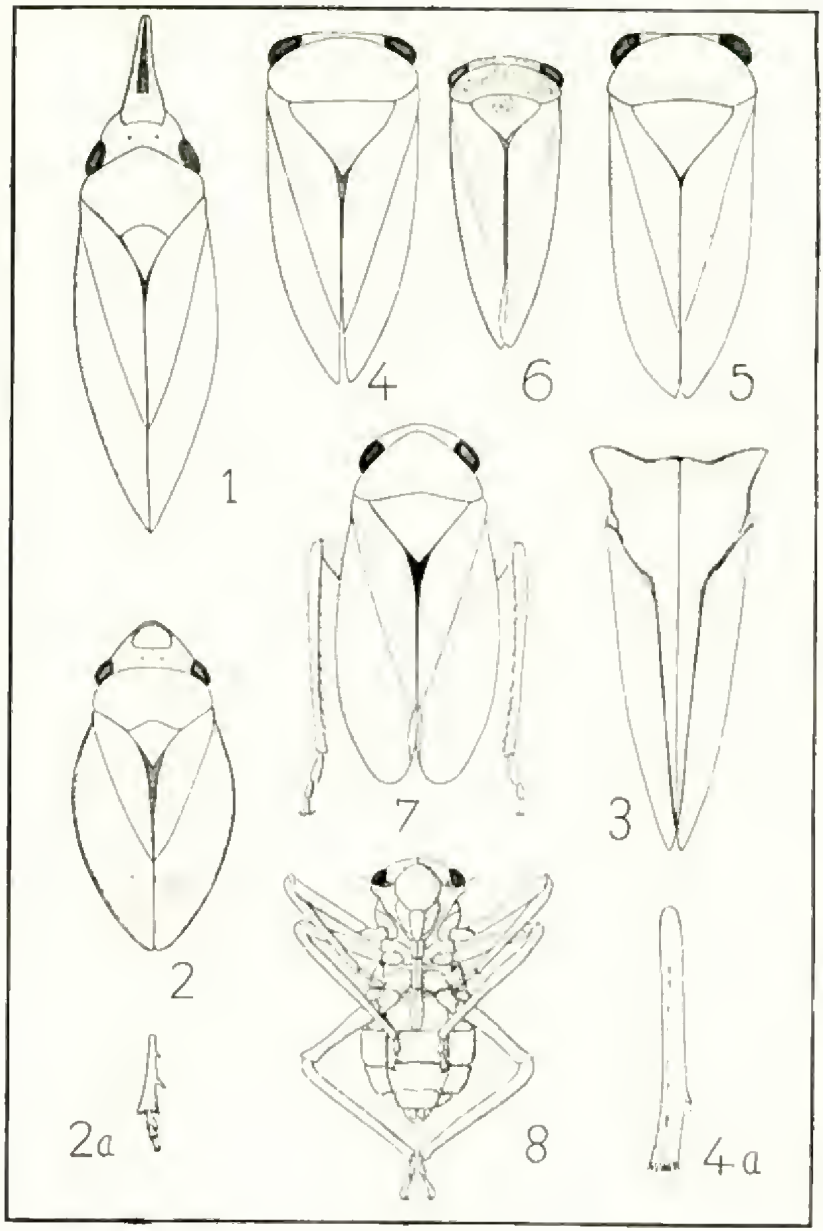
The Eurymelidæ can be divided into three groups. One group, the Eurymelinæ, are mostly black in colour, with white or coloured markings, and feed only on eucalyptus trees. Another group, the Opoinæ, consist largely of smaller species, although some of its tropical representatives are almost half-an-inch in length. Insects in this sub-family are not confined to Gum trees, but in addition feed on a variety of trees and shrubs. A common Victorian species (*Opio multistrigia*, Walker), which is black in colour with longitudinal yellow stripes on its fore-wings, feeds on Casuarinas. The third sub-family, the Pogonoscopinæ, are like the Eurymelinæ confined to trees of the genus *Eucalyptus*, and not only are they attended by ants, as are all species in both the other groups, but they actually live in ants' nests. The head-quarters of the Pogonoscopinae are in Western Australia, but at least one unnamed species occurs in Victoria. In addition to figuring the adult of *Pogonoscopus myrmex*, China (Plate VII, Fig. 7), a drawing is given of the nymph of the same species (Plate VII, Fig. 8), to show its extraordinary long spider-like legs. The Eurymelidæ, which are confined to Australia and the neighbouring islands, are of especial interest because in habits they resemble the Membracids rather than the rest of the Jassoid insects.

Conclusion

Many of those who are interested in entomology are principally collectors; they collect insects as others collect postage stamps, and frequently consider that small obscure species are not worth the trouble of mounting. Some are more interested in observing the habits of insects, while others like to unravel their life-histories. There are also a few, who, in addition to collecting, like to be able to name their catches correctly.

I would appeal to those in the first category to add to their collections even the smallest leaf-hoppers they find; they may be of the very greatest interest and importance to a systematist one day. To those who are more interested in living insects than in cabinet specimens, I would point out that much remains to be learnt about these creatures, and entertainment can be got from even watching them. Finally, I will be pleased to assist, as far as I am able, those who like to name and be able to classify their collections.

Plate VII



Victorian Frog-hoppers and Allied Insects

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Evans, J. W., 1931, "Notes on the Biology and Morphology of the Eurymelinæ." *Proc. Linn. Soc. N.S.W.* 56 (3).

KEY TO PLATE VI.

Fig.

1. Calcareous tube containing nymph of *Hindola compacta*.
2. Tube removed from the twig.
3. Tube with part of the top broken away to show the operculum.
4. Nymph removed from the tube; ventral view.
5. *Hindola compacta*; adult.

KEY TO PLATE VII.

1. *Philagra parva* (Cercopidæ).
2. *Bathylus albicincta* (Cercopidæ).
2a. *B. albicincta*; hind tibia and tarsus.
3. *Sextius virescens* (Membracidæ).
4. *Eurymela fenestrata* (Eurymelidæ).
4a. *E. fenestrata*; hind tibia and tarsus.
5. *Eurymelops rubrovittata* (Eurymelidæ).
6. *Eurymeloides pulchra* (Eurymelidæ).
7. *Pogonoscopus myrmex* (Eurymelidæ).
8. *P. myrmex*, nymph; ventral aspect.

EXCURSION TO FRANKSTON

Thirty members took part in the botanical excursion to Frankston on Saturday afternoon, August 24. Proceeding in an easterly direction we passed along the tea-tree bordered road for about a mile. Advancing into open heathy country, we noted the showy Parrot Pea, *Dillwynia floribunda* growing profusely and flowering freely; also *Hibbertia* or Guinea flowers, of which were seen the species *H. sericea, fasciculata, stricta, and aciecularis*.

The Coast Acacia, *Acacia sophoræ*, was in full bloom, and in a flourishing condition. The beautiful Eye-bright, *Euphrasia collina* (which has parasitic roots on grass roots), was in flower. The Common Flat-pea, *Platylobium obtusangulum*, Pink-eye, *Tetratheca ciliata*, Common Correa, *Correa rubra*, var. *virens*, Showy Bossea, *Bossiæa cinerea*, Common Heath, *Epacris impressa*, Purple Flag, *Patersonia glauca*, Common Beard Heath, *Leucopogon virgatus*, Common Aotus, *Aotus villosa*, and Golden Bush-pea, *Pultenæa Gunnii*, made a gorgeous display.

Returning by the same route, we walked in a southerly direction to the Frankston Heights, then a mile or two through heathy country to the Sweetwater Creek. Along its banks the Scented-paper-bark, *Melaleuca squarrosa*, and Swamp-paper-bark, *M. ericifolia*, were just coming into bloom. The Eucalypts were about equally distributed, and comprised the silver-leaf Stringybark, *Euc. cinerea*, var. *multiflora*, Swamp Gum, *Euc. ovata* Manna Gum, *Euc. viminalis*, and Common Peppermint, *Euc. australiana*. Only three orchids were seen in bloom, viz., Tall Diuris, *D. longifolia*, Maroon Hood, *Pterostylis pedunculata*, and Blue Fairies, *Caladenia deformis*.

THE AUSTRALIAN VIVIPAROUS RIVER SNAILS

By BERNARD C. COTTON

(Contribution from the South Australian Museum.)

Australian fresh-water snails have received little attention from investigators. The present paper deals with those included in the family *Viviparidæ*.

Commonly known in Europe and most countries of the Northern Hemisphere as "River Snails" or "Banded River Snails," they are peculiar in that they retain the eggs until hatched and so bring forth the young alive; the female shell is slightly bigger than that of the male in the European species.

The Viviparids are gill breathers and have a corneous, concentric operculum for closing the aperture of the shell. The snout is prominent, and the eyes are placed on short stalks outside the base of the tentacles. Living specimens are commonly found in the marginal mud of slow rivers and in lakes.

As might be expected, Australian species are peculiar and readily separable from those of other countries; they are all included in the two genera *Notopala* and *Centrapala*.[1] The former differs from the typical *Vivipara* principally by the microscopic granose spirals found in all Australian species of the genus, which may be, for convenience of identification, divided into two groups, A and B.

A. Without spiral colour bands.

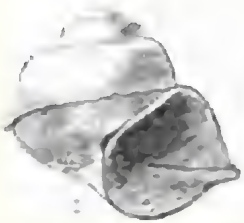
B. With spiral colour bands.

Notopala hanleyi Frauenfeld

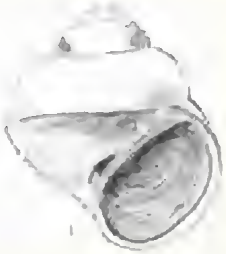
Notopala hanleyi Frauenfeld (Fig. 1) is the genotype and occurs commonly in the Lower Murray. It is a fairly solid, globose shell with a dark green to greenish brown periostracum, and is of fairly common occurrence on Murray native camp sites, but not so common as the larger and more succulent fresh water mussel, *Hydridella australis* Lk. Closely related to *Notopala hanleyi* is an interesting fossil species, *Notopala wanjakalda* Cotton (after the native name for the type locality), which is found in the Murray River banks at Sunnyside, South Australia, at a height of forty feet above present river level. This remarkable fossil (Fig. 2) shows a complete range from smooth to prominently unicarinate forms which are never seen in living Australian species.

1. Cotton, B. C., *Rec. S. Aust. Mus.*, V, No. 3, pp. 339-344, 1935.

Although the next species, *Notopala sublineata* Conrad (Fig. 3) may have some indication of narrow colour bands in some specimens, it is usually unicoloured green, and comparatively rather coarsely spirally sculptured. There is also a tendency to acute angulation of the bodywhorl (the specimen illustrated is an extremely angulated individual), but this never approaches the prominent keel seen in *Notopala wanjakalda* Cotton. This angulation does, however, suggest a close relationship to the South Australian fossil, and one suspects that the latter has become extinct through climatic changes, and that the climate of the Lower Murray area may have been warmer than that of the present Darling River Area when *Notopala wanjakalda* Cotton was a living shell. A delicate, unicoloured light green species,



Notopala wanjakalda Cotton.



Notopala sublineata Conrad.

which occurs commonly at Innamincka, Cooper's Creek, S.A., appears to be unnamed, so that it is here described as:—

Notopala barrettii sp. nov.
(Fig. 5).

Shell subglobose, conic, comparatively narrow, rather thin, smooth except for exceedingly fine spiral granose lirae; unicoloured pale yellowish green; bodywhorl rounded, umbilicus very narrow; whorls four plus the protoconch of one whorl; aperture subovate, a little pointed posteriorly; outer lip continuous with the columella; operculum corneous, concentric, a little pointed posteriorly, nucleus subcentral, nearer the columella margin. *Holotype* Height 21·5 mm., diam. 16 mm., Innamincka, Cooper's Creek, S.A., living, buried in river sand. S.A. Museum, D.11559. Named after Charles Barrett, the well-known Australian naturalist.

Notopala polita Marten (here re-named *Notopala gatliffi*, sp. nov., after the late J. H. Gatliff, as *polita* is preoccupied by Frauenfeld), from the Balonne River, Queensland, is very closely allied to *Notopala sublineata* Conrad, from the Darling River, N.S.W., but may be distinguished from the rounder whorls.

From Queensland comes *Notopala alisoni* Brazier, a microscopically spirally sculptured species, recalling *Notopala barretti* Cotton, but distinguished by its wider umbilicus and darker colour.

Notopala waterhousei Ads. and Aug.

Notopala barretti sp. nov.

A giant among the river snails of the spirally banded group is *Notopala waterhousei* Ads. and Ang. (Fig. 4) from North and Central Australia, attaining to about two inches or more in height. Although large, it is of delicate structure, dark brownish green and obscurely three banded above the periphery of the bodywhorl. In Central and Lower North Australia, *Notopala kingi* Ads. and Ang. is found. It has a tendency to obscure banding above the periphery, and is evidently a small relation of the former species, but rarely attaining to one-third the size.

Another banded species, from North Australia is *Notopala essingtonensis* Frauenfeld (Fig. 6), to which is closely allied

Notopala essingtonensis Frauenfeld.

Notopala tricincta Smith.

Notopala tricincta Smith (Fig. 7) also from North Australia, but on the latter there are three slightly raised dark brown spirals.

Notopala australis Reeve is another banded species which sometimes shows a tendency to angulation on the bodywhorl as in

Notopala sublineata Conrad. *Notopala affinis* Marten, from North-west Australia, is yet another banded species related to *Notopala essingtonensis* Frauenfeld.

Distinguished by its unique colouring, olivaceous above the periphery, greenish below, and livid purplish on the spire, *Notopala dimidiata* Smith, an obsoletely banded species from the Victoria River, North Australia, is easily separable from any other Australian species.

Centrapala lirata Tate (fig. 8), a depressed wide-mouthed, spirally sculptured species, is quite distinct from any other fresh-water snail known, and comes from Cooper's Creek at Innamincka.

From a perusal of the foregoing it is evident that some scheme of geographical distribution may be formulated for these river snails, but, as in the case of all fresh-water mollusca, there is a considerable overlapping of faunal areas, and also haphazard dispersal to contend with, which has led to many anomalies in local distribution.

The author[2] has recorded a case of the large fresh-water mussel *Hyridella australis*, Lk., being carried by the "Black Duck" *Anas superciliosa*, and this means could obviously be used to carry a creature otherwise incapable of passing from one area of water to another.

Wallis Kew,[3] cites numerous instances of isolated ponds becoming stocked with various fresh-water mollusca and plants within quite a short time after formation. Probably the chief factor in enabling this transportation of fresh-water species is their hardiness. River snails, like fresh-water mussels, will survive for weeks in the dried mud of rivers and lakes.

To quote Wallis Kew again[4] "an Australian *Unio*[5] . . . having already survived in a dry drawer for 231 days, packed up (after being tested in water) and forwarded to England, reached Southampton in a living state 498 days after its capture, and was subsequently 'restored to its element, with full vital powers,' in the care of Dr. Baird, of the British Museum."

The author would be pleased to receive specimens of fresh-water mollusca, accompanied with name of locality where found, and, preferably, with the animal intact.

2. Cotton, B.C., *S. Aus. Naturalist*, XV, 4, p. 113, pl. 11, 1934.
3. Kew, W., F.Z.S., "The Dispersal of Shells," pp. 7-26, 1893.
4. Kew, W., loc. cit., p. 28.,
5. *Hyridella australis*, Lk. probably.

NOTES ON THE BREEDING OF TASMANIAN DEVILS

By DAVID FLEAY, B.Sc.

(Curator, Australian Section, Melbourne Zoological Gardens.)

In spite of his ungainly, ugly appearance, his whining snarls and unpleasant smell, the Tasmanian Devil is a creature of many amusing antics and distinctly unusual ways. Moreover, his position as the second largest of living marsupial carnivores, soon, perhaps, to be the largest when the rare Thylacine finally disappears, invests him with a peculiar interest.

Devils vary a great deal in disposition, though naturally they become very surly tempered and suspicious when disturbed.

One small female (eventually sent to Toronto, Canada) was a perfect virago, and she had to be isolated from others because of her obsession to kill both male and female of her own kind.

The sound of breaking teeth when two Devils interlock their broad powerful jaws during a fight is indeed a sickening sound. Should two animals take a violent dislike to one another it is safe to say that the sounds of combat are louder and more startling than those made by any other marsupial. Vicious snarls rising to fierce screams, interrupted by the clashing of teeth, are heard from afar in the night air, and unless the animals are separated the quarrel has fatal consequences for the vanquished Devil. Even in the normal course of events the Devils in the Zoological Gardens are noisy. They whine and snarl apparently in a "good humoured" fashion when they happen to encounter one another while scampering about the yard, and the noise of bones being crunched also carries for a long distance. Several of the large male Devils are warriors of previous fierce battles, and they show various stages in the loss of their teeth. One unusually big fellow has all four canines broken off completely.

Like most marsupials Devils cannot stand continuous exposure to full daylight. Ultimately this causes them to become blind. Nevertheless they are fond of appearing occasionally and stretching out to bask luxuriantly in the sunlight.

The pouch of the female is a very complete enclosed receptacle, and in this respect the Tasmanian Devil differs remarkably from such other members of its family, as Tiger Cats, Native Cats, and Phascogales, in which the maternal shelter is but a scant open area. In those Devils which I have examined the pouch develops from its resting condition in April, and this naturally is a sign of the pairing season. From this time onwards the pouch is extremely moist, and a deposit of reddish pigment is left on any object coming in contact with its interior.

In the mating season of 1934, the male of one pair of Devils at the Melbourne Zoological Gardens adopted a marked proprie-

Plate VIII

At 15 weeks, the sparsely haired little Devils, with eyes just open, hang tenaciously to the mammae when turned out of the pouch

Photos by D. Fleay

Showing that the four young at 15 weeks of age, can still be carried completely inside the forwardly opening pouch

tary air towards his smaller mate (the female Devil is much slighter in build than the male); and at night, when I visited the enclosure, he would rush forth with bared teeth, uttering sharp angry sniffs, as only a Devil can, and also short coughs, sounding like "Horace!" as he attempted to jump upwards and bite.

Usually he moved about the enclosure with that clumsy, cantering movement typical of his kind, but, like the Tiger Cat (*Dasyurus maculatus*), Native Cat, and male Possums (*Trichosurus*), he frequently "showed off" by dragging his hind-quarters on the ground, the tail at the time being held up at an angle, as he sniffed, or more correctly snorted, with an air of pure conceit. The female accompanied these proceedings with sustained growling whines from the direction of her lair, raising the volume sharply when the male Devil rushed up to her as if to make sure she did not move from the nest.

In their dark retreat the animals constructed quite a comfortable bed from various chaff-bags and small bundles of straw which they gathered up and carried in. When one of the animals visited the water dish at night it was both interesting and amusing to listen to the distinct "clop-clopping" noise, audible at 15 or 20 yards distance as the Devil indulged in a noisy drink. On warm days they occasionally emerged during daylight, and wallowed in the water dish; while at night they amused themselves by chewing up woodwork and in digging shallow burrows in the ground.

The subsequent notes do not describe the growth and development of young from this pair of Devils, for none was found in the pouch of the female that season.

Though not born in captivity, the little animals now to be described furnish a fairly complete account, for their mother has since (1935) produced another family in captivity. From this later litter it has been possible to calculate fairly accurately the age of those now under discussion when in the mother's pouch they arrived from the Tasmanian bush in 1934. The mother Devil, a very quiet-tempered animal, entered the collection at the Zoological Gardens on July 19, 1934, and her pouch contained four very small pink "joeys" (the maximum number), each of which measured one and a quarter inches in length. From their size and the observations on our present family of Devils (1935) their age at this time was five weeks, which carries the time of birth back, approximately, to June 15, as a working date. In passing it is interesting to note that the 1935 "litter" was born at least four weeks earlier than that of 1934. Early in August, at the age of seven weeks, the thick-set baby Devils were two-and-three-quarters of an inch in length. They were still pink in colour and active in the

movements of their small limbs, though hanging tenaciously to the stretched mammæ inside the pouch.

The pouch was extremely moist, the "joeys" themselves being quite wet, and contact with the pouch left the usual reddish stain on one's fingers. The young animals made slight squeaking noises, and the hindquarters of one projected from the pouch entrance as the mother moved about. She was extremely nervous, made no attempt to bite, and her taste in food was fastidious for a Devil. Raw meat was refused, but birds, rats, and rabbit heads were eagerly taken.

Towards the middle of August, the hitherto pink bodies of the young animals began to show darker pigment, first of all on the ear-tips; and with their increasing bulk, three of the "joeys" would now hang half out of the pouch when the mother was lifted up by the tail for an inspection. The pouch, too, became more relaxed with the increasing bulk of the family, its interior being profusely white spotted and glandular.

On August 19, at nine weeks of age, darker pigment was also evident on the tail tips, and the first signs of thin hair appeared on the head and fore-quarters. The small feet were quite well developed, and possessed able grasping powers. A week later again, while the mother dozed in the daytime, the four were noticed lying with their bodies completely outside the pouch and heads within, but when she moved about they were completely enclosed and hidden away. However, the more comfortable habit of lying partly outside the pouch while the mother rested was now frequently noticed.

At eleven weeks, the young animals measured four inches in body length, and the dark pigment of the body was most pronounced, throwing into prominence the future white chest and rump markings. The quiet nervous mother still accepted handling with no display of resentment, and it was discovered, at this stage, that she had a keen appetite for hen eggs. She objected to raw meat, whether it happened to be horse-flesh or beef; but she heartily appreciated birds, rats and rabbits, as well as the eggs.

Usually the thoroughness with which Devils treat their meals is remarkable, for fur, feathers, viscera, and bones are completely swallowed, and relics of the meal are difficult to find. In fact, an excellent example of the scavenging propensities of the Devil was noted in the open-topped yard inhabited by four adult specimens some months ago. One evening a Muscovy duck flew in by accident, and next morning only a fragment of beak and a few scattered feathers were found, and this on top of the usual liberal meal!

However, to return to the young Devils, gradually the short black fur grew on the small bodies, extending from the fore-

Plate IX

Male Tasmanian Devil

Photos by D. Fleay

Young, aged 32 weeks, clinging to the sides and back of the mother

quarters backwards. The little animals still fitted completely into the pouch during the mother's nocturnal rambles, and not yet had they been seen apart from their tenacious grip on the extensile mammæ. Strong sucking noises were heard from

Photo. by D. Fleay.

Tasmanian Devils.
Photographed at 19 Weeks' Old.

them in the daytime. They were still blind, but the sensory papillæ with small vibrissæ were already prominent on their heads. On September 26, at the age of fifteen weeks, it was noticed that the young Devils' eyes had opened for the first time. The animals now measured five-and-a-half inches from the nose to the tail base, and the white chest marking made a marked contrast to the black fur of the body, which was now quite well grown. However, they continued to cling tenaciously to the mammæ, and, as shown in the illustrations, though they had attained a considerable bulk, all of them could still be hidden away within the pouch at once. One photograph shows the young ones hanging outside the pouch, and in the other they are represented by a large bulge in the pouch wall. The position of this bulge emphasizes the fact that in contrast to the backwardly opening maternal shelter of kangaroos and Possums that of the Devil opens forward, or in other words, the roomy part is anterior to the opening.

The first sign of the young Devils relinquishing their tenacious and continuous hold on the mammæ and lying free in the nest

was discovered on October 1, when they were aged fifteen weeks and a few days. This means that the mother carries her "joeys" with her during foraging excursions for at least fifteen weeks, but from this stage onwards it is possible for her to leave the babies in the nest, and thus afford herself greater freedom during her absences in search of food. However, whether she does leave them behind at such times is a matter of conjecture, for the complete pouch and the tenacious grip of the young for many weeks yet, provide quite a different case from that of the Dasyures. When lifted away from the parent, the young animals uttered anxious whimpering, yapping cries, similiar to those of a very young puppy, and the mother Devil now became quite fierce and dangerous to handle. The baby animals quickly clung to the fur of the mother's sides and back with teeth and claws when released. [The forefeet have unusual grasping powers in young Devils.]

On being disturbed from sleep where they lay in the shelter of the mother's body, the little fellows lost no time in obtaining a grip on the mammæ. From here it was almost impossible to dislodge them unless a finger was pressed firmly over their nostrils until they opened their mouths and thus lost a hold. At the age of eighteen weeks they were seen to indulge in playful antics during the daytime, skipping about and tumbling over the mother like puppies. Though of a totally different colour they now resembled young Native Cats in their sharp-featured faces, which lacked the bluntness of older Devils.

When separated from the mother they clung in a heap to one another, yapping vigorously, and they bit one's hand quite sharply though unintentionally in order to secure a good grip and not be left alone. Unfortunately, one young Devil, the only female of the litter, disappeared on October 17. It had apparently squeezed through the netting during the night, and no trace of it was ever found.

At twenty weeks of age the remaining young Devils were seven-and-three-quarter inches in body length, with small tails measuring an additional three inches, and they still clung tenaciously to the mammæ when drinking.

Some of the traits of their kind were evident, and they now met any attempts at handling on my part with typical sharp sniffing noises, and they uttered high-pitched moaning snarls, while sharp-toothed little jaws gaped threateningly. It was thought advisable at this advanced stage to separate the young animals from the mother each night. Accordingly they were permitted the freedom of a lighted room in the evening, and their antics at the "play-age" were observed.

After two or three appearances, the sharp-nosed young Devils gained confidence, and scampered actively beneath couches and

chairs in all corners of the room. When two of them happened to meet they usually halted a few paces apart, and then made a mock attack upon one another by rushing forward with open mouths, and adopting a very fierce appearance.

However, they were much more furtive than Native Cats (*Dasyurus viverrinus*) at a corresponding age.

At the age of twenty-two weeks or, roughly, five months, the young animals measured twelve inches in total length, and they were quite big and strong. They had practically ceased to rely on the mother's mammary glands for nourishment and adult food in the shape of rabbits' heads, birds, beef, etc., was more and more appreciated.

Unfortunately the educative process was not methodically continued, owing to busy work with other animals, and the little Devils were still semi-wild. It was inadvisable to afford them any chance of using their sharp teeth, while their prolonged whining howls and sharp sniffs, coupled with the mother's fierceness, made them a spitfire family indeed. However, in spite of this vigorous resistance to interference they were full of fun, and lively spirits, and ventured far out into their enclosure during daylight, affording visitors quite a diversion as they played with one another and rolled over their mother.

Later they were removed to the new open-topped earthen runs provided with wooden floored "caves" and pine needle nests in the Australian section. Unfortunately quite a tragedy occurred here in late February of 1935.

One of the young animals, which had shown signs of sickness, died one evening, and the mother and remaining young showed the thorough scavenging trait of their kind in falling upon their deceased relative and devouring all of him with the exception of the head, even though a plentiful supply of suitable food was provided as usual.

In reference to the voracious habits of these animals, it is interesting to note in passing that the late Clive Lord, of Hobart Museum, stated that he was informed by bushmen that Devils followed up the kills of the larger and faster Thylacine or Marsupial Wolf and devoured the carcases, from which only choice portions had been removed. In these scavenging habits and also in their clumsy strong build, Devils bear a resemblance to Hyenas.

In May, 1935, the mother animal, which had been separated from her surviving young ones, and mated with a large male Devil, produced her second family. On this occasion three joeys were found in the pouch. Her original young ones of 1934 were only a little more than half-grown at the age of twelve months, and thus it would seem to be fairly certain that the young animals are not mature, and do not breed in Nature until their second season.

CHARLES STUART, AN EARLY AUSTRALIAN BOTANIST

By C. DALEY, B.A., F.L.S.

No feature in the character of Baron Mueller was more outstanding than his faculty for enlisting ready services and arousing the keen enthusiasm in others in the collection and study of native flora. In every part of the continent under the stimulus of his encouragement ardent botanical collectors could be found. One of the earliest to come under the spell was the subject of this sketch, concerning whose life very little is known.

Charles Stuart was born in England in 1802. Sir William Hooker[1] states that at various times from 1842 Stuart was collecting plants in Tasmania for Ronald Campbell Gunn.[2] Mueller, in a letter, mentions meeting him shortly after arriving in Adelaide, in 1847. From that time Stuart became a collector for the Baron. Maiden, in his *Memoirs of Australian Botanists*, has a brief reference to Stuart. Of his career before coming to Australia no information is available. Apparently he was a man of good family and education, a neat and legible writer in correct English prose, and a careful and accurate observer of plants.

Some time ago Mrs. Sinclair, of Croydon, New South Wales, a niece of Baron Mueller, entrusted to me a packet of twelve letters written by Charles Stuart from Van Diemen's Land[3] to Dr. Mueller at Adelaide. From these letters can be gleaned some insight into the life and character of Stuart while collecting for Mueller, for whom he plainly evinces the greatest admiration and respect. Stuart, if not a nurseryman by training, seems to have followed that occupation both in Adelaide and Van Diemen's Land.

The first of these letters mentioned, dated May 22, 1848, and easily decipherable although the ink has somewhat faded, is from Launceston. The writer mentions having made a collection of plants for Mr. Giles[4], of Adelaide. He has secured employment, evidently in gardening operations, with some time available for collecting indigenous plants, and will send the specimens obtained. Incidentally the correspondence shows that Stuart had collected plants in South Australia, probably at first for Gunn, and later for Mueller, who had evidently befriended him.

Recently he had gone by the brig "Henry" to Van Diemen's Land, the stormy voyage taking ten days from Adelaide to Laun-

1. Hooker, father and son, Sir William, Sir Joseph, eminent English botanists, 19th century.
2. Gunn, Roland C. (1808-81), botanical collector, Tasmania.
3. Van Diemen's Land, so named by Tasman, 1642. Was re-named Tasmania in 1853, on the cessation of transportation thereto.
4. Giles —, a botanical collector at Adelaide in the "40's" and "50's."

ceston, the passage costing £3. It is evident that at this time Stuart was in straitened circumstances, and the Doctor had given him timely assistance, for he gratefully writes, "I shall not easily forget your kindness to me, and shall endeavour to repay you." Since arrival, being unsettled, he had done scant collecting. "I have not been able to send you anything worth your acceptance . . . but I now send you by the brig Henry, a box with a few specimens this week." Bad weather and flooded streams had prevented a journey to the mountains. He mentions sending a box of plants and a letter to Mr. Giles at Adelaide, and asks his patron to tell him that they would be at Mr. Fairlee's, Hindley Street.

In "the 40's" postal delivery was irregular and uncertain. Envelopes were not yet in use, quill pens were used in most cases. Each of Stuart's letters, folded neatly, has a three-cornered lap insertion on the back, on which a sealing-wax wafer is placed to close the letter. On the front is the address:—"Dr. F. Müller, care of Messrs. Büttner and Henzenroeder,[5] Chemists and Druggists, Rundle Street, Adelaide." This was the firm which first employed Dr. Mueller. No stamps were as yet used, letters being paid for, or perchance sent in someone's charge for delivery. Stuart writes that a Mr. Stephens had sold his collection of plants and empowers Mueller to settle with him. If there is no money to receive Stuart would try and send some on the "Henry's" next voyage. He has plenty of employment, but at low wages. He will send a number of plants shortly, and entreats Dr. Mueller to write to him, and send the names of the plants he was examining at Stuart's departure from Adelaide.

He specially asks for the name of a creeper near *Billardiera*, and that of a blue-flowered linear-leaved plant, also in *Pittosporeæ*. "If you could give me the natural orders of them I think I could remember what is in the collection without the aid of a duplicate." He is at length settled in a place with conveniences for preserving specimens, and has "let slip no opportunity of obtaining them for you and for no one else, as I shall not do it for profit, but the pleasure of having your correspondence." . . . "I shall be glad if you could write me perhaps by the "Henry." She generally remains about a week or ten days at Adelaide. . . . Any directions which you may give me respecting specimens I will attend to." He gives the address—"Care of Joseph Bonney, Esq., Woodhall, near Perth, Van Diemen's Land."

The second letter is dated July 24, 1848, from the above address, where Stuart is employed in some plant nursery work, with greenhouses, etc. The letter deals mostly with a request to

5. Henzenroeder, H. Collected at Kangaroo Island, 1849-51, forty-four plants previously unrecorded, which were sent to Bentham by Mueller.

recover his box and its contents from Mr. Giles. Some money is due to him with which he wishes Mueller to pay a debt, evidently to release his property, and send him any balance. "I am afraid I am giving you more trouble than I ought, but depend on it I shall use every exertion to collect for you here. . . . I can leave for a week or two when I like in the season, so that I anticipate a good harvest of plants. I have a good many mosses, lichens, etc., ready to send you by the next trip of the "Henry," but am daily expecting a lot of specimens from Hobart Town which do not exist on this side of the isle (120 miles), and which as soon as I receive I will forward you altogether. I have had some trouble in getting fronds of the Treefern, *Cibotium billardieri*, or *Dicksonia* of R. Brown, but have succeeded at last. . . . You say you found *Eriochilus autumnalis*, it also exists here plentifully. I see you have named two plants, *Daviesia umbellatum*, and *Pomaderris ellipticum*, which are different to the plants known here under those names, which I will explain when I send you specimens of them."

He asks that if Mueller gets his collection from Stephens he will name the specimens as numbered. He promises to secure some dried herbs wanted by Büttner, has written to Giles for seeds of *Clianthus*, and would be glad of some plants of *Drosera whittakeri*. He has a *Chara* or *Nitella* for Mueller which he has never seen before. "The mosses are hardly in fructification, but by and by I will surprise you with them."

In a separate note Stuart alludes to two plants before referred to. "I send a bit of a plant not yet generally in flower, which I took to be a *Cryptandra* from its habit until I found a few untimely flowers about 1 foot high, also a climbing plant growing on dry rocks with much the appearance of *Jasminum*, flowers immature; but you may perhaps recognize it. The foliage on the same plant varies much in some cases. I have obtained the leaf *quite* entire. It seems out of place here, as it suffers from frost."

In the next letter, January 8, 1849, Stuart writes that the season has been bad. Snow is on the mountains, rivers are unfordable, preventing a long excursion; but he has collected all available plants in the neighbourhood. He will make up with the next lot, it being the time for mountain plants which he desires to show Mueller. There may be some species overlooked among those he is sending, some of which are from Gunn and others.

He reports that the lot sent, mostly *Cryptograms*, by the "Henry" was lost with the vessel, and cannot be replaced until the next season. He hopes for better success with the lot he is sending by the "Tamar." He has had two letters from Giles, who wrote that he had refused £3 offered him by Mueller on the ground that Stuart had deprived him of a list of plants made for him. Stuart

denied all knowledge of any list, and asks Mueller to pay Giles out of £4/14/- he has in hand, £1/14/- from Stephens, and £3 sent by Stuart. If Giles refuses he can sell Stuart's box, for he will pay him no more, for "the excuse about the list is a rogue's trick." He is afraid that the seeds, specimens, books, etc., in the box are by this time of little worth, but there are letters he would not like to lose. "I am really sorry, my dear sir, to give you so much trouble, but knowing how I am situated I think you will excuse it." Stuart gives Mueller an order for the box. "I will send you seeds by and by of all I can collect. I shall number them according to this sending of which I have retained duplicates. Please send an answer on receipt of this, as I shall be anxious to hear from you in the meantime. . . . You will see many plants here identical with those in South Australia." He asks for seeds of *Donia formosa* by letters. If Giles should not take the £4/14/- he asks that it should be sent to him, less expenses through the Bank of Australasia.

On April 25, 1849, Stuart writes that he is sending a box of plants, without awaiting news of the receipt of the last, as "the passage is often very long."

"I trust that no accident may occur to prevent you receiving them, as I am afraid you might think me neglectful of my promise to you. The present box contains many scarce plants, and I assure you, without wishing to magnify my exertions, that I have had much difficulty in procuring them, owing to the fact of this being one of the most unpropitious seasons. I have found in the higher regions many plants actually killed, and others prevented from flowering by the severity of the weather. I have been tolerably successful in collecting specimens of ferns. You will find the greater part of what was known in this island. There is one remarkably scarce one, the *Alsophila*, which I spent much time in finding, and then only met with one plant. It is arborescent, but is never found growing in company. I never saw above three plants, the tallest about 15 feet high in the caudex. Hooker sent particularly to Gunn for it, and stated that there was not one poor specimen in England. The *Schizea* is also rare on this side of the island. The *Epacridæ* have suffered severely from the weather on the mountains, and they generally flower early. I was unable to procure several plants which I wished to do, particularly the *Anopteris glandulata*, which only grows in very remote spots on this side of V.D.L., but hope to do so at some future time. Rest assured, my dear sir, I will do all in my power for you."

He recommends as a correspondent a Mr. Archer, of Deloraine, an amateur botanist, who has a talent for drawing, useful in studying the minute parts of Orchids, etc. "You will please take

notice that the names I have attached must not be taken for granted in any case, as I have received them from various quarters, and without authorities that I could depend upon; but such as they are the names may serve for some little guide to you in your investigations. Can do little this season owing to much work. Will look out for *Cryptograms* to replace those lost in the "Henry." The specimens are numbered, and duplicates kept, in case further information re specimens is desired. There are few *Musci* to be got at the present."

He regrets the loss of his books through Giles' retention of his box. "Although not of extensive use to me, they were the best I could afford, so that now I must trust to my memory alone, as my circumstances will not allow me to purchase more, as I have to work hard for a trifle."

He asks for names of specimens sent "merely for my own gratification, as I have relinquished collecting plants for anyone but yourself. I think the *Algæ* have been washed away by the floods."

(To be Concluded.)

A NEW GRASS—*DANTHONIA NUDIFLORA*.

By P. F. MORRIS.

In the mountainous regions of south-eastern Australia and Tasmania large herds of cattle and flocks of sheep are depastured during the seasons in which snow does not fall. The species of *Danthonia* in such localities are often much relished by stock of all classes. There is much botanical work to be done to elucidate the species of this useful genus. Mr. A. J. Tadgell, a member of the Field Naturalists' Club, while on one of his periodical botanical explorations in January-February of 1930, collected on the Bogong High Plains towards Mount Nelson, at between 5,000 feet and 6,000 feet, two small species which he took to be one plant, but dissection proved them to be distinct. One plant is closely allied to the group to which belongs the New Zealand *Danthonia nuda*, Hook f, while the other, herein described as *new to science*, is allied to *D. pilosa-D. penicillata* group. Baron von Mueller noticed the botanical differences in this plant and has labelled it with the names *D. pilosa*, R.Br. var. *nudiflora* F.v.M., and later named a

Plate X

Danthonia nudiflora, P.F.M., sp. nov.

similar specimen from the same locality (Cobboras Mountains 5,000-6,000 feet) *Danthonia penicillata.* The original description and figure of *D. penicillata* is given in Labillardiere's *Plants of New Holland* (1804). I have compared Mr. Tadgell's specimen with the figures, description and specimens, but *it does not agree.*

Through the courtesy of Sir Arthur Hill and Mr. C. E. Hubbard, of the Royal Botanic Gardens, Kew, England, I have been able to examine most of the types of Australian species of *Danthonia.* I here raise Mueller's label name to specific rank, namely *Danthonia nudiflora.* The other plant mentioned will be dealt with in one of a series of articles on *Danthonia* to be published later. The figures, together with the description, should be a guide in the determination of *Danthonia nudiflora.*

DANTHONIA NUDIFLORA. P. F. Morris, sp. nov.

Gramen perenne, rhizoma breviter repens. Culmi erecti, vel basi geniculati, rigida, 14-28 *cm. alti. Foliorum vaginae internodiis breviores, glabrae; ligulae ciliorum minutorum reductae; Laminae lineares, convolutae vel involutae* 5-10 *cm. longae* 1-1·5 *mm. latae. Racemi* 9-15 *cm. longi;* 5-10 *spiculati,* 5-6 *flores. Glumae subaequales* 10-12 *mm. longis,* 5 *nervis.*

A perennial grass with short rhizome; culms 14-28 cm. high, tufted, erect, rigid, densely covered with old sheaths at the base, with 2-4 narrow leaves often reduced to 2 cm. long below the middle of each culm. Leaf sheaths smooth; ligule a fringe of short silky white hairs; blades rigid, acute, inrolled, sub-pungent, glabrous, 5-10 cm. long, often reduced to 2 cm. Panicle raceme-like, narrow, fairly stiff, with 5-10 spikelets, the lowest branches sometimes 2-3 spiculate; branchlets unequal, short (1 cm.) to very short (0·2 cm.) long; spikelets sometimes almost sessile to branchlets, pedicels shorter than the florets. Spikelets 5-6 flowered purplish and straw coloured or purple and green; glumes subequal narrow lanceolate, acute glabrous 10-12 mm. long, lower glume 5 nerved, upper glume with three distinct and two indistinct nerves, glumes slightly longer than the largest florets (including the awns). Florets with awns 10-12 mm. long, the awns and upper portion purple, the base (flowering glume) straw-coloured. Flowering glume naked on back, oblong-lanceolate in profile, 3-3·5 mm. long. Back of the flowering glume smooth, shining, straw-coloured, the front with two distinct or obscure tufts of white hairs below the middle of each side, otherwise glabrous, smooth; callus conspicuous, bearded; palea hairy on back, linear-oblong, cuneate blunt and notched; ovary glabrous, grain shining, light brown.

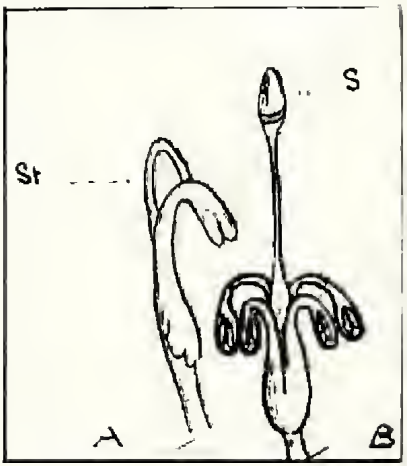
Danthonia pilosa, R.Br, var *nudiflora* F.v.M., Cobboras Mountains 5.000-6,000 feet, F. v. Mueller (on labels in National Herbarium, Melbourne—type specimen). *D. penicillata* of Mueller, Cobboras Mountains (in National Herbarium, Melbourne); Bogong High Plains, Victoria, February, 1930, A. J. Tadgell.

POLLINATION OF *HAKEA LAURINA*

By EDITH COLEMAN

In comparison with the beautiful contrivances by which orchids and asclepiads secure cross pollination the process in *Hakea* appears, at first glance, a somewhat rough and tumble affair. Closer study, however, shows between insect and flower the wonderful co-ordination one has become accustomed to anticipate.

Separation of the sexes is Nature's widely employed method of preventing undesirable pollination. They may be separate on the same plant (dicœcious) or on separate plants (monœcious). Even when the sexes are produced in the same flower (hermaphrodite) they may be as completely separated by their differing periods of maturity.



Hakea laurina.

A. Bud showing looped style (St.) with stigma-head held between lobes of perianth.

B. Expanded flower, stigma-head (S.) now free. Perianth segments curled back, anthers empty.

In *Hakea*, as in many members of the *Proteaceæ*, *Compositæ*, and some other families, the anthers open and discharge their pollen on the stigma before the flower expands. How, then, is self-fertilization avoided?

The shape of the flower in the "Pincushion," *Hakea laurina*, is interesting. A long style terminates in a cone, or thimble-shaped stigma-head. Each of the four perianth parts bears on its concave apex an ovate, sessile, two-celled anther. In the bud stage the apex of the style is closely held between the perianth lobes, the anthers forming a shallow cylinder, in the centre of which the stigma-head is inserted. In such a situation self-fertilization while in bud can only be averted by separate maturity periods of the sexes.

Owing to the lengthening of the style, while its apex is still held between the perianth parts, it becomes looped. The direction of growth, instead of being vertical, is towards the imprisoned stigma-head, the loop of the lengthened style bursting through the perianth-tube while the stigmatic knob is still held captive by its four lobes. Not until the anthers have discharged their pollen do the perianth lobes part to free the green stigma-head, which is

Plate XI

Hakea laurina. Buds, flowers and fruits

seen to be covered with pale yellow pollen. In such close proximity self-pollination, in bud, is inevitable, unless the sexes be separated by their maturity periods. (Unless the stigma head has been released perfect fruit is never formed—proof that self-fertilization does not take place.) At this stage the pollen is ripe, but the small stigmatic surface is not yet moist or receptive.

A touch with a soft brush will remove every grain of pollen, for they are held neither by stigmatic secretion nor penetrating tubes. But even at this stage the stimga-head serves an important purpose in the cross-pollination of individual flowers, either in separate clusters or on different trees, for it acts as a salver, which accepts and presents to its visitors the pollen discharged upon it.

Photo. by O. W. Coulson.

Hive bee with pollen from flowers of *Hakea laurina.*

When all the buds have opened a cluster of flowers has the appearance of a sphere of styles—a floral pincushion.

The styles are the "pins," while the cone-shaped heads of the "pins" will represent the stigmas with their coating of pollen.

Not until the anthers are empty do the flowers send out their urgent message to bird and bee in a copious flow of nectar. A cup, formed by the adjacent bases of the perianth segments, is soon filled to overflowing. Great spheres of nectar suspended just outside the nectar-cup glisten seductively in sunshine, and soon both birds and bees flock to the banquet.

From 10 to 15 bees may be seen collecting nectar in one flower-cluster, and as they scramble over the sphere of pollen-laden stigma-heads the grains are caught and held on hairy legs and undersurface. It is easy to follow the transference of pollen from hairy bodies to the receptive stigmas in older flowers. The bees are all nectar gatherers. A full load may be obtained from one flower, so copious is the flow.

One sees no pollen-baskets filled. The bees are obviously not collecting pollen for the hive, as they serve the purpose of the flowers. This is seen in the photograph of a bee kindly taken for me by Mr. O. W. Coulson. Much of the pollen had been lost in transit through the post. The photograph was taken three weeks after capture of the bee. Being dry the character of the beautiful triangular grains is not apparent.

While nectar-loving birds visit the flowers of the Pincushion-flower, bees are the most efficient pollinators. In this district Wattle-birds (*A. chrysoptera*) freely visit the clusters, and while, doubtless, pollinating a few flowers, damage many others. Non-lignification suggests that the flowers are not adapted for bird pollination. Where large numbers of fertile fruits are produced in one cluster, it is safe to assume that bees are the pollinating agents, and that birds are responsible for the pollination where only one or two capsules in a cluster produce fertile seed.

Hakea laurina grows freely in the South and Stirling districts of Western Australia. It is widely cultivated in all the States, and thrives in warm sunny situations, where it forms a handsome shrub or tree.

WILDFLOWER SANCTUARY AT ARARAT

Bridal Hill, Petticoat Gully! The names have come to us from the diggers who, under the spell of the "yellow curse," first tore up the virgin bush and left the hillsides pitted with holes, but now the Wattles are blooming there again, and the scarlet trails of "Running Postman," Golden Guinea Flower, Gold-dust Acacia, Orange and yellow *Grevillea alpina*, and *Tetratheca* are a blaze of colour.

Great excitement prevailed on Ararat in the last days of March, 1859, when word flew round the mining camps that a man and his wife had come on a good run of gold near the old workings at Bridal Hill, first opened by an overland party from Adelaide, named Bridal. In compliment to the lady, the place was called Petticoat Lead. This lead, like those who mined it, is probably forgotten, but any Ararat child could direct the stranger to Bridal Hill, about two miles north of the town on the Western Highway.

Within easy distance of the town, the variety and abundance of the wildflowers there have long since made it a favourite walk on fine Sunday afternoons in the Spring, and now it is likely to become a place of special interest to the field naturalist, for the Ararat Rotary Club, anxious to preserve some small section of typical bush country in this part of the State for the delight of future generations of Australians, has secured an area of 140 acres as a reserve for native flora and fauna. The idea originated

Plate XII

Dehiscing fruits of *Hakea laurina*
Left : A bee-pollinated cluster. Right : A bird-pollinated cluster

with members of the Ararat Field Naturalists' Club, who were alarmed at the steady disappearance, owing to advancing settlement, of the natural wildflower gardens around Ararat.

The reserve might well be called an orchid hunter's paradise. In some parts Waxlip orchids are so plentiful as to form a mauve carpet, and diligent search will reveal among them at least three of the "spiders," the children's favourites—*Patersonii, dilatata* and *cordiformis*—while of the other Caladenias, *deformis, cucullata* and *carnea* are plentiful. Near a small patch of the magnificent *Thelymitra grandiflora*, on an old mullock heap, the tiny spiral leaves of *Thelymitra d'Altonii* were discovered two years ago. This rare orchid, which had only previously been found in the Grampians and had been lost sight of there for nearly thirty years, is now (September) in bud here again. Other representatives of the Sun Orchid growing in the reserve are *ixiades, aristata, pauciflora, carnea, antennifera and Macmillanii*. Helmet orchids, the Nodding, Dwarf, and Trim Greenhoods, are flowering, also splendid spikes of the Tall Greenhood, and later there will be the Bearded Greenhoods, three or four of the Diuris, *Calochilus Robertsonii, Prasophyllum Brainei* and *Pras. odoratum*. In the Autumn sharp eyes are rewarded by a sight of the Elphin Leak Orchid and its fairy-like sister, *Prasophyllum nigricans*, and then, too, there are other Greenhoods, *Pterostylis parviflora* and *P. alata*.

The reserve is lightly timbered, mostly with Stringy-bark and Yellow Box and Golden Wattle. There are still a few Banksia trees and Casuarinas.

L. L. BANFIELD.

AROUND RAVENSWOOD

By A. J. Tadgell.

Ravenswood naturally recalls the fact that the name originated in the number of Crows or Ravens, and these are still heard cawing, or their shadows are cast over one as they fly overhead in the glorious sunshine of a cloudless day. Truly, with the Australian poet we say: "High noon and not a cloud in the sky to break the *glorious* heat." We substitute another adjective, as it is a different time of the year. And the warmth of Spring with the moisture-laden paddocks sets one hiking for miles in a glee.

We are deposited upon the old narrow wooden platform at Ravenswood a few miles distant from Mt. Alexander. The clean grass paddocks with most of the native trees removed have a natural boundary on their horizons in sharp, high hills, also cleared for sheep pasture. Birds abound; parrots, crows, cockatoos, cuckoos, magpies and others call or whistle unceasingly. Our way at first leads towards Lockwood (five miles), but we make the main Castlemaine-Bendigo noisy road, no place for one seeking rest "far from the city's dust and noises," and, as it seems to be constantly in need of repair, much of its bush traces are lost by the general clean-up. The creek names, with their signs for motorists, do not seem

euphoniously chosen. Bullock Creek and Buck Eye Creek are plain enough, but have nice monier or granite-constructed bridges across which motor cars or cycles are constantly rushing in some form of pursuit. The road passes at least one or two mansions set in the adjoining grassy fields and paddocks.

The long trail leads round to our right, and ultimately crosses the big hill adjacent to the half-mile tunnel through it, that has been made necessary for the two sets of rails on the northern railway system. There is no warning to trespassers to keep out of these open spaces, so we are able to explore the soddened countryside covered with its Spring verdure. First we find *Acacia ovina*—sister of the Bidgee-widgee—then the Native Hop-bush *Dodonaea*, just showing the setting flowers. Then a prize is promised in a large bush of dark lance-shaped leaves, shining, that at first puzzles us, as the cup-shaped light green or yellowish-tinged calyces assume the shape of an unknown flower till some are found with attached styles or later the falling flowers, and we recognize the glabrous form of *Correa virens*, always welcome to the botanist collector.

A handsome dwarf purple *Swainsona* is abundant in damp places, and another sight to behold is the Dwarf White Sunray or sagegreen leaved Helipterum forming masses of star-spangled carpets everywhere. Droseras or Sundews of at least three species, including the Crimson, glisten in the sunlight. Two species of *Grevillea*, with rosy or crimson flowers, are at hand. Tetrathecas are always welcome with black eye-like sacks in the centre of their red-petalled flowers. Creamy Stackhousias, sometimes whitish or pinkish, call to you to notice them. At least four species of *Acacia*, including *A. acinacea*, are there.

We cross the steep ridge at the tunnel, and what a view! Northward, the City of Bendigo, seven miles distant, spread out in a magnificent panorama. At our feet is the flume that is supplying Bendigo's water from the Coliban. We meet man and wife on the silvan ramble, and when we ask them do they enjoy the country although they live in it, receive a scathing reply that neither would live in Melbourne, for you can walk in the bush and see beauty all around you and all the time. Give them an ambling horse for preference, but never train or car which rush through space, and the sitter sees little but a madcap in a rushing, whirling landscape. I agree with them, and the old-time lovers enjoy birds, beasts, and flowers, as I do, in simple and natural conditions. And is not this my purpose in my roundabout walk that will continue for another three miles back to the starting point? This, too, in glorious sunshine on a cloudless day in Spring, when everything talks aloud and cries out to the Nature-lover to stay. Who cannot enjoy David Grayson and his "Friendly Road" under these conditions?

Three miles back to Ravenswood from here, our chance friends observe, "Yes, you have ample time to get there before sunset." So with a goodbye to both and to their noisy fox terrier I resume collecting Wahlenbergia's first flower for the season, or tall Yellow Stars, or Early Nancies, at least 9 inches high, in all forms. Orchids are rare. Only one *Caladenia deformis* is seen, but *Diuris pedunculata* abounds. Several *Haloragis* are coming into flower, even the tall *H. elatus*. *Plantago varia* are flowering profusely, and so is *Ranunculus lapaceus*. An odd *Carex vulgaris* is gathered, while of course at this time of year the introduced irid *Romulea bulbicodium* abounds in tiny drab white flowers or of beautiful large vieux rose that make a handsome setting in the grass. One must not forget the beautiful sleek white ferret lost by the rabbiter, but now gone bush on the creek-side, and which disappears into a rabbit-hole bent on a natural feast. A bucolic calls to me, but regrets he has no place where he can house this pretty little animal.

The most interesting plants seen were:—Grass, *Aira minuta*; Pea, *Swainsona behriana*, very close to Black's *S. oroboides*, two composites, *Helipterum cotula*, so like *H. variabile* and *Toxanthus muelleri* like a minute *Helipterum*.

JOHN HENRY GATLIFF

At the age of 87, on September 14, Mr. J. H. Gatliff died, and Australia lost a veteran conchologist; many of us, a friend. He was a member of the Club for many years, from time to time contributing papers to the pages of the *Naturalist*.

John Henry Gatliff was born at Leeds, Yorkshire, in 1848, and came to Australia when nine years old. With his parents, he resided at Geelong, and at the age of eighteen entered the Bank

J. H. GATLIFF.
(From a photograph taken some years ago.)

of Victoria at Ballarat, later joining the staff of the Commercial Bank. For many years he was manager and finally became inspector. In this capacity he journeyed as far afield as Port Darwin. He was a born soldier, and during his first occupation was a commissioned officer in the Ballarat Rangers. With soldiering in the blood, two of his sons served in the South African War, while five sons participated in the Great War, one, Captain Frank Gatliff, was killed in action.

Familiarly known as the "Father" of Victorian conchology, the late Mr. Gatliff took a keen interest in the subject and was ever ready to impart his knowledge to the beginner; indeed, it was a joy to him and ungrudgingly he devoted many hours in the identifiying of specimens for those who shared his interest. Other

branches of natural history had charms for him, plant life especially, but his inclinations chiefly turned towards the marine mollusca. Besides practical research work, he did shore collecting and explored the bays by systematic dredging expeditions, in several instances with the writer as his companion.

Containing numerous extremely rare forms, the Gatliff collection of 7,270 species, numbering many thousands of specimens, is among the notable private collections of the world. The specimens are in wonderful condition, and with its systematic arrangement and a complete catalogue, the collection should prove most valuable to the museum or conchologist who acquires it.

In recognition of his work numerous species were named after J. H. Gatliff, and his recent appointment as Honorary Conchologist to the National Museum, Melbourne, was a delight to him. "A List of Some of the Shells of the Marine Mollusca found on the Victorian Coast" was his first contribution to the *Naturalist*, in 1887. Other papers of note were "Description of *Voluta* (*Amoria*) *spenceriana*, from North Queensland;" "Description of a new Victorian Cone, *Conus segravei*;" "Description of Two New Australian Varieties of Cowries;" "Catalogue of Victorian Estuarine Univalve Mollusca." The writer and the veteran dealt with the "Brachiopoda of Victoria," and collaborated in several other papers on Victorian mollusca.

Pritchard and Gatliff, in the *Proceedings of the Royal Society of Victoria*, provided Australian students with a most useful work in the "Catalogue of the Marine Shells of Victoria," and Gatliff and Gabriel contributed to the *Proceedings of the Malacological Society of London* "Description of a new *Phasianella* (*P. tomlini*) from Western Australia."

Our friendship lasted for more than forty years, ending only with the death of the lovable man, who had an ever-increasing circle of friends.

C. J. Gabriel.

CARNIVOROUS OPOSSUMS

Regarding the report of Brush-tailed Opossums taking chickens on the Bulba Reservation, Lake Macquarie, New South Wales, the Hon. Secretary of the Bulba Trust (Mr. J. J. Moloney) writes: "The manager of the island has assured me that he caught the Opossums in the very act of "cleaning up" the chickens. . . . This extraordinary action on the part of the Opossums cannot be traceable to a shortage of natural food. The forest timber on the Reservation would support many thousands of Opossums. . . . There are no carnivorous animals on the island. We do not allow cats and dogs on the Reservation, and the original idea of the formation of the Reserve was that, being on island, it was safe from the depredations of foxes. I have had very long experience on the land, and this is the first time that I have learned of the Opossum being a flesh-eating animal."

CLASSIFICATION OF EUCALYPTS

The Editor, *Victorian Naturalist*.

Sir—

In the *Victorian Naturalist* for August, Professor A. J. Ewart has taken me to task on the classification of the Eucalypts, and criticizes me for basing the primary divisions on the morphology of the stamens instead of taking into consideration other organs. He cannot be too conversant with the subject as the stamens formed the basis of classification of the species by Bentham, Mueller and Maiden, while I have used them to advantage for nearly forty years, and I know of no better character whereby a species can be placed definitely in its proper section or division at a glance. When that is done other characters are employed in tracing the species to its proper position, and the method adopted is similar to that in use in nearly all botanical works. Even Professor Ewart himself has followed the example of the above botanists, and in his own works, "Handbook of Forest Trees of Victoria for Victorian Foresters" (1925), and "The Flora of Victoria" (1930), when discussing Eucalypts, he says: "The primary divisions are based on the character of the anthers, (1) Parallelantherae, (2) Renantherae, (3) Porantherae."

It is not to say that, because Professor Ewart is a professor of botany, he is also an authority on Eucalypts and is qualified to speak with assurance. He has written something about them and, therefore, he must be judged on his work, especially on his last work. Two splendid opportunities were open to him to write up the species indigenous to Victoria on evolutionary lines, and it seems strange that he did not make full use of the opportunities, but seemed content to try to follow the path that other workers had blazed. In the "Handbook of Forest Trees of Victoria for Victorian Foresters," his treatment of one of the most important groups of trees in Victoria would have been more helpful to the forestry students and to all those who wish to know something about Eucalypts, if he had divided the species into their natural groups, some of which are so distinctive as almost to merit generic distinction, such as Ashes, Boxes, Bloodwoods, Ironbarks, Peppermints and Stringybarks. Similar criticism is applicable to his latest work on the Eucalypts in "The Flora of Victoria."

However, I can claim to have made an honest attempt to define the natural groups and to place them in the most probable ascending order insofar as our knowledge permits, and think I have shown that the enormous genus can be classified naturally into Sections, Subsections, Series and Subseries, and embrace all the characters which Professor Ewart advises his readers in "The Flora of Victoria," page 797, to use, namely: "buds, flowers, fruits, bark and branches with adult and juvenile foliage," and many others which he did not quote. In dealing with a large group of plant like Eucalypts, it is advantageous to divide the species into small groups, as the points of difference between species are more strongly emphasized. Professor Ewart's criticism of the anther system seems illogical when the excellent camera lucida illustrations of those organs are consulted.

I refrained from making the Key too technical; my object was to make it in such a way as to be useful for the botanist, forester, and layman alike, and to give those who wished to know something about our most characteristic plants some idea of their size, form, habit and utility, without having to wade through elaborate descriptions. The utility notes in a Key of this kind are to some extent new, and were inserted mainly to help those who are in search of information quickly. I have made full use of obvious characters because they are almost in daily use by those working on the genus, whether bushman, forester or botanist, and for that reason I have deliberately indicated in most of the Series the types of plants within the

Series. In Eucalypts, above all plants, we cannot dispense with the obvious characters as an aid to determination of the species, even if they do remind us of the ancient classification of plants.

Professor Ewart considers it "a serious feature" to add additional species to those described by Bentham and Mueller, and his statement that "a large number of the new names are based, not on new discoveries, but on material which has been critically examined by such renowned botanists as these" (Bentham and Mueller) is inaccurate. Nearly fifty of the new discoveries are based on new material, and seventeen on material supposed to have been seen by the above botanists. Even if those botanists did examine the material, it is wrong to assume that their findings are correct in every case, as almost every worker who has access to old material invariably disagrees with many of the old determinations, because he is often in possession of facts which were unknown to early workers. I am sure these old botanists never thought for one moment that they had described all the species belonging to this protean genus, more especially when they were fully aware that the botanical exploration of this great continent was far from being complete. On the other hand, the above botanists did not devote upward of forty years of their lives to the study of the genus as did the late J. H. Maiden, and to him the increase in species is mainly due, for it was his labour that paved the way for others to carry on the work he so successfully clarified by his great research into every known species, and his investigation of old collections in herbaria abroad.

My criterion of a species or a variety does not differ from that of the old botanists, and I would remind my critic that many old varieties, after critical examination, have been raised to specific rank by botanists the world over. In regard to the Forest Red Gum, *E. umbellata* (*E. terebricornis*) and the Murray Red Gum, *E. camaldulensis* (*E. rostrata*), I make no apology for keeping them apart as they fall into two small distinct groups, although they both have red timber, and so have many others.

I cannot agree with Professor Ewart "that the modern tendency to species splitting is partly due to the practice adopted in botany and zoology of appending the author's name to each new species," and that "workers in systematic botany . . . are tempted to achieve some kind of fame by splitting up old species and giving new names with their own attached." The statement is an insult, not only to botanists and zoologists, but to all scientific workers, and is indignantly resented by them. Personally, I do not take Professor Ewart's remarks seriously on this point, but I do feel for the band of sincere and earnest workers whose one aim is to solve their problems truthfully, as they realize that it is the only reward worth striving for.

Priority rule seems to be a sore point with Professor Ewart, notwithstanding the fact that it is accepted by many leading scientists throughout the world. I am a firm believer in priority rule, and if it can be proved that an old name is valid it should take precedence over the more recent name. No man, or group of men, should be given power to suppress a valid species, no matter how old it may be. The fault of its non-recognition does not lie with the author, but is due to the negligence of subsequent workers in failing to extend their researches far enough to embrace the earliest records of the species in question. The idea of protecting a specific name from change that has been in use for a long time is a wrong one, and it is an injustice to the author of a still older valid name, and is likely to lead to confusion and much controversy at any time. The botanists' slogan should always be—Let the oldest specific name stand, especially if packed up by a description, and, if possible, a figure or a type specimen—because in the early days it was the custom to describe plants briefly, and, therefore, due allowance should be made for any discrepancy.

The objections to the change of nomenclature usually come from persons who are not scientifically interested in the study of systematic botany, but are more concerned with it from a commercial standpoint, and, therefore, have no sympathy with botanical workers whose one aim is to bring botanical nomenclature into line with the scientific practice. Such people raise all sorts of objections and imagine that the restoration of an old name involves the republication of all their literature, when their whole difficulty could easily be overcome by simply writing down the name of the species and its synonym thus—*Eucalyptus racemosa* Cav. (E. Crebra F.v.M.), as is the usual practice with botanists and workers in all branches of science throughout the world. The trouble in Australia in recent years has been the domination of botany and science generally by the commercial element. Science must lead, and commerce follow.

As regards changing names, Professor Ewart did not hesitate to change the name *Eucalyptus rostrata* to *E. tereticornis* var. *rostrata* in his "Handbook of Forest Trees of Victoria for Victorian Foresters," 301, 1925, and again restore the species under the former name in "The Flora of Victoria," 821, 1930; and in the latter publication, page 809, he took up the name *E. gummifera* (Gaertn) Hochr. in preference to *E. corymbosa* Sm., a name that had been "in use for a century or more." But that happened five years ago, and he seems to be in the habit of changing his mind every five years on nomenclature, and as this is "the year of grace," he now complains about taking up the name *E. umbellata*, instead of keeping to the more recent one, *E. tereticornis*; yet, strange to say, *E. gummifera* and *E. umbellata* were both described and figured by Gaertner from material supplied by Banks and Solander, the former as *Metrosideros gummifera*, and the latter as *Leptospermum umbellatum*. B. P. G. Hochreutiner, in Geneva, restored the former name in Candollea, ii, 464, 1925, and Dr. K. Domin, of Prague, the latter, in Bibliotheca Botanica, heft 89v, 467, 1928. One cannot understand Professor Ewart objecting to one name and not the other. I firmly believe that both botanists acted wisely and well. For my part, I would rather restore one old valid name than make a dozen new species, for I regard it as an act of justice. Had these names been restored thirty or forty years ago there would be no fuss about them to-day.

The suggestion "that a committee should be set up containing a representative of the Council of Scientific and Industrial Research, a botanist, a forester, and a horticultural expert or botanic gardens representative to prepare and publish a list of recognized species of Eucalyptus and to investigate all cases in dispute" does not come well from one who will not conform to the rules of botanical nomenclature himself (see *Journal of Botany*, lvii, 69, 1919). Such a committee, if formed, would be doomed to failure as it would be dominated by commercial influence, and, on the other hand, it would be outlawed by the International Botanical Nomenclature Committee abroad. Systematists outside Australia would not conform to its findings, and matters would be worse than at present.

The "Key to the Eucalypts" is based on the rules of botanical nomenclature, and an honest attempt has been made to bring uniformity into the Eucalyptus literature, both botanical and vernacular, and that is why the list of species and synonyms was compiled. Botanists abroad sometimes work on Australian collections, and investigate the question of synonymy, and they do not hesitate to restore old names that botanists here were fully aware, that according to the Vienna Rules, had priority over the name in use. If we do not follow the rules we should not complain about those who do.—Yours, etc.,

WILLIAM FARIS BLAKELY.

Hornsby, N.S.W.

FROGS DEVOUR SNAKES

By DAVID FLEAY, B.Sc.

Curious snake stories are by no means uncommon the world over; but they are usually flavoured with a great deal of imagination. However, extraordinary occurrences witnessed during the past few months in the new open-air snake enclosure of the Melbourne Zoological Gardens, have convinced even the most sceptical people that unbelievable things may happen.

On this island of serpents with its rocks, hollow logs, and single tree surrounded by a moat of water, are approximately one hundred adult venomous inhabitants which, unless hungry, live in "harmony" with numbers of frogs. Anxious moments are experienced on occasions, when two snakes happen to seize the same frog, for, unless separated, the larger reptile swallows not only the frog but the smaller snake as well.

In March of this year numerous families of baby snakes, mainly members of the Tiger species, were born, averaging thirty or more to each "litter," and with the arrival of the infant snakes, extraordinary troubles commenced. Wild Kookaburras made unobtrusive visits, departing with small wriggling snakes; Nankeen Night Herons arrived after dark and devoured frogs; and, most astounding fact of all, the frogs revealed a hitherto unknown habit, and devoured many baby snakes!

These attacks upon the juvenile serpents became matters of almost everyday occurrence, though not always did honours fall to the frog. As an instance of such a fight, there occurred one afternoon a classical duel of amazing duration. A lively young Copperheaded snake eight-and-a-half inches in length, glided out from cover for a late afternoon sunbath, when it was spied by a small Golden Bell Frog two inches in length. Slowly and deliberately the big-eyed amphibian began to hop towards the little reptile. The snake sensed danger from this wet-skinned ogre and retreated; but its pursuer persisted in approaching, and eventually the tiny serpent, forked tongue flickering rapidly in and out, was forced to turn and face its adversary. With a quick movement the frog engulfed the little snake's head and clamped its jaws fast. Then began a furious struggle with the threshing body of the pinioned reptile writhing and twisting in all directions. Repeatedly it turned the frog upside town and coiled about its head and body; but grimly the amphibian retained a hold.

Each time the snake relaxed its struggles, the frog lost no time in jerking down a little more of its victim's body. Five hours later, at 9 o'clock in the evening, a party which was being conducted through the Australian section of the Zoo. by torchlight, saw the frog squatting stoically in the self-same spot hanging grimly to the half-swallowed victim, which had almost ceased to struggle.

Plate XIII

Golden Bell Frog (*Hyla aurea*) with tail of Copperhead Snake protruding from mouth after a struggle of 22 hours

Photos by D. Fleay

Golden Bell Frogs swallowing the same young Tiger Snake from opposite ends

The victor made little progress overnight. Apparently an overwrought stomach refused to speed up its functioning, and by morning, the now thoroughly dead snake still projected about two inches from the frog's jaws. In the afternoon, twenty-two hours after the commencement of the struggle, the frog was photographed with the final piece of the tail just visible. Unmistakeable evidence of the little snake's resting place showed in the curious bulge of the frog's distended abdomen.

However, quite a tragedy now occurred, for, when the overloaded frog was picked up and posed for its picture with the tip of its victim's tail still protruding, it became most apprehensive of the photographer's intentions. Internal disturbances of a violent nature were observed, and gradually more and more of the dead reptile's tail was regurgitated with the frog actually helping the disgorgement with its fore limbs. Within a few minutes, the crowning misfortune of that great swallowing feat occurred when with the complete disgorgement of its victim, the frog had its twenty-two hours of hard work brought to nought.

Many times since has a similar battle taken place, though none approaches it in duration of time involved. However, the most amusing incident was the one in which two frogs attacked one little snake simultaneously from opposite ends. One attacked the head, and the other the tail, each swallowing until at last their jaws met in the middle of the victim. Here they meditated over the problem for an hour or two, until the more energetic of them made up its mind and wrested the prize from the other. It may be thought that these occurrences are due to the captive conditions, but when it is considered that frogs are notorious cannibals, even devouring smaller members of their own species, it requires no great stretch of imagination to understand that infant snakes would form attractive prey in Nature. Along the vast swamps of the Murray River and its tributaries millions of frogs emerge from cover after dark to hop about in search of food, and it is an interesting fact that small Tiger snakes also move about in the open on warm nights, when they are safe from the keen eyes of diurnal bird marauders. In the daytime one generally has to turn over logs and stones in order to discover the baby snakes.

The old and popular story of snakes swallowing their young was also witnessed during the same period as the previous interesting incidents, but not perhaps in quite the way that bushmen hold such a "phenomenon" to occur. In the Zoo enclosure adult snakes occasionally overtook frogs replete from a heavy meal on a small snake, and being sluggish, they fell easy prey to the big snakes, which were made more keen in some cases by a recent sloughing of the skin. Thus many a "mother" snake avenged the "baby snatching" by unwittingly swallowing both a frog and her own young one at the same time.

HABITS OF THE EMU

By A. D. HARDY

Can an Emu swim? Yes; at least "Bill" could. A few years ago when I was on a visit of inspection of The Lakes National Park on Sperm Whale Head peninsula, Gippsland Lakes, I visited the Valve Oil Company's bore, which is near Pelican Point corner of the park. There I saw a young Emu which, because of an injury to its hip, had been deserted, and so came to be cared for by Mr. Andrew, the company's geologist, and his wife. He was named "Bill," and, if out of sight, answered to that name when called. He was as playful as a puppy, and at the request of his friends performed a number of antics, including undignified rolling on the ground with his feet kicking in the air.

I was incredulous when told that he would voluntarily enter the water of the brackish lake (Victoria), so a demonstration was arranged for my benefit. Bill, who should have swam alongside the boat jetty when Mr. Andrews walked out it to the end, refused; so he was picked up, carried to the end of the jetty, and dropped into the lake. This did not cause him any apparent discomfort; he swam leisurely to the shore on a course parallel to the jetty and about six feet from it. He swam with the ease of an aquatic bird, but with a slight list to port common to his gait on sea, or on land because of his injured hip. On reaching the shore he limped up to the level where the debris of the Tea-tree grove littered the ground, and there rolled and wriggled as a dog would do, but to dry his striped plumage.

Alas, poor Bill! I join with Mr. and Mrs. Martin, and the Barton family, of "Banksia," Point Wilson, in affectionate remembrance of the playful and plucky little chap who, during his antics, his swimming, and even his walking must have suffered some pain. His hip trouble increased, and it was a sad day for those who knew him when this young emu had to be destroyed. He was a native of the park.

The little response evoked by Mr. Chisholm's query at the September meeting of the Club "Does the female Emu make any sound?" indicated that few members had experience of these birds. Further information should be of interest. The only Emu that I have heard make a sound was one in the Ballarat Gardens; I was told by an attendant that it was a female.

In the *Sydney Mail*, of June 12, 1935, p. 47, there is an illustrated article entitled, "The Inquisitive Emu." One picture is from a photograph showing an Emu at Lone Pine (Queensland) in the act of turning its eggs. The article is by several contributors, and the subjects dealt with include the bird's speed (40 m.p.h. flat out and 30 to 35 m.p.h. over a considerable distance); desertion of young at time of danger, a stratagem to draw the enemy in pursuit and away from the chicks; the killing of the birds by early settlers for the four gallons of oil (illuminant and for embrocation cases of rheumatism), which one large carcase yielded; height and weight, respectively, 7 feet 2 inches and over 90 pounds; the flesh for food appearing and tasting much like beef (Allan Cunningham and Dr. Leichhardt quoted in support), etc. From *Emancipated*, contributed by "Kingsley," the following quotation may have some value in reply to the query by Mr. Chisholm:

"Among the very few members of the avian tribe in which the females are emancipated is the Emu. Here the lady does the courting, and the male looks after the young. Mrs. Emu, when courting, does so by 'booming,' by means of the enlarged air sacs in her neck, and seeks a fresh spouse every season." According to this contributor the female Emu has not only a voice, but a compelling one.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, October 14, 1935. The President, Mr. G. N. Hyam, presided, and about 80 members and friends attended.

CORRESPONDENCE

(a) From the family of the late Mr. W. Scott Campbell, expressing thanks for the letter of sympathy received from the Club.

(b) From the Railways Department, in reference to the recently-issued Grampians poster showing figures with wild flowers.

(c) From the Forests Commission, relating to the Grampians poster.

(d) From Miss N. Gross, Hawksburn, regarding short nature walks on Sundays.

REPORTS OF EXCURSIONS

Reports of excursions were given as follows:—Wattle Glen, Mr. L. W. Cooper; Hanging Rock, Mr. G. N. Hyam; Brisbane Ranges, Mr. H. C. E. Stewart, for Dr. C. S. Sutton.

ELECTION OF MEMBER

On a show of hands, Miss Hyndman was duly elected as an ordinary member of the Club.

GENERAL BUSINESS

The President stated that the Wild Nature Show had been well attended; a feature was the number of schools (26) which sent parties of pupils. Special thanks were due to Mr. Charles Barrett for arranging publicity, and to the ladies for the very fine work they had done. The Club tendered thanks to all helpers, of whom there were more than 160.

The President then read a letter from the Shell Company conveying thanks to the Ladies' Committee for help given in arranging the Company's display.

Mr. A. D. Hardy explained how the Wild Flower Act regulations were infringed, and the difficulties the Forests Commission had in proving offences.

NATURE NOTES

Mr. Noel Lothian said that a Black Duck in the Treasury Gardens led her brood across to the Fitzroy Gardens every day.

Mr. V. H. Miller mentioned some Pardalotes which were burrowing under a railway station platform. He had observed them for some time, and they were undisturbed by his presence.

Mr. F. S. Colliver spoke on the habits of the "Mud Skipper" (*Periophthalmodon barbarus* Linn), a fish that lives on the tidal mud flats near Cairns, North Queensland.

Mr. A. D. Hardy described the swimming powers of the Emu, particularly a tame young bird at Sperm Whale Head.

Mr. J. A. Kershaw stated that the Emus at Wilson's Promontory were good swimmers, and had even been known to enter the sea.

SUBJECT FOR EVENING

The "Subject for the Evening" was an illustrated lecture, "Pollination of Flowers," by Mrs. Edith Coleman, who read an interesting paper. Following this, a large series of photographs, sketches, etc., showing pollen, stages in the pollination, and insects responsible for pollination was shown with the epidiascope.

The President expressed the thanks of the Club to Mrs. Coleman. The meeting adjourned for the Conversazione.

EXHIBITS

Miss Smith.—Sea-urchins, from Adelaide.

Mr. Noel Lothian.—White form of *Bredyaenia involuta*, collected at Sandringham in September; also a white form of *Hardenbergia*.

Mr. A. D. Hardy.—Lantern slide of Emu swimming.

Mr. T. S. Hart.—Three unusual flowers in *Abutilon*, one with seven petals, two conjoined, but otherwise normal; two conjoined with eleven petals, the extra one where they join. Garden-grown.

Mr. A. H. Mattingley.—Quandongs (*Santalum acuminatum*), fruit and seeds; also Bindi Bindis (*Calotis* sp.), both from Central Australia.

Mr. A. J. Tadgell.—A native parasite, the Broomwort (*Orobanche cernua*), garden-grown, perhaps for the first time in suburbia; also a new grass, the Naked-flowered Wallaby Grass (*Danthonia nudiflora*), from Bogong High Plains.

Mr. C. French.—Specimen of *Epacris impressa*, "Common Heath," red variety, with double flowers. Rare; from Mt. Evelyn.

Mr. F. S. Colliver.—Photographs of the "Mud Skipper" to illustrate nature note; also Silurian and Ordovician reef-building Corals, from America.

Mr. Geo. Coghill.—Garden-grown native flowers.

ANTHELA NICOTHOE—AN INTERESTING MOTH

By DAVID FLEAY, B.Sc.

On December 31, 1932, a battered, rusty kerosene tin was turned over beneath a row of pine trees where the Prince's Highway crosses the creek at Waurn Ponds, on the Colac side of Geelong. Sheltering both in it and under it was a crowd of at least forty huge "Woolly-bear" caterpillars—and the clustered bristly mass was made up of black, reddish-brown, brown and even sandy individuals. Not one of these fine larvæ measured less than 2¾ inches in length, and each displayed a vertical yellow stripe extending down the middle of the epicranium or "face." Among them, and in the various corners of the tin, were the old brittle cocoon cases of a previous generation, showing that this particular site had been a favoured refuge for several seasons.

(Photo by D. Fleay.)

The cocoon of *Anthela nicothoe*, showing the innumerable brittle spines projecting in all directions.

The fact of finding these unusually large caterpillars sheltering gregariously in a tin which, from the mass of fæces, showed evidence of a long tenancy, seemed to justify further observations. Thus these "Woolly-bears" from Waurn Ponds eventually arrived in Melbourne, where they were transferred to a suitable roomy cage with glass and gauze sides. They spent the day in hiding beneath leaves and pieces of bark, as noted at Waurn Ponds, and they emerged after nightfall to crawl about actively, but being practically fully fed and well grown, they showed no appetite for food. From January 6, 1933, onwards, one after another, the now very sluggish creatures gradually enclosed themselves in large cocoons of white silk, but within a few hours of commencing to spin this covering what a change came over those delicate white objects! In each case the transforming caterpillar shed its spines and pushed them out through the silk covering, until the cocoon

was a formidable, brown prickly mass. One touch caused innumerable brittle spines to penetrate the skin, and these gave rise to a maddening irritation.

It was necessary to exercise extreme caution in touching the cage from this time onwards, for the cocoons were fastened in numbers to the angle between the lid and the walls, and odd spines

(Photo by D. Fleay.)

"Woolly-bear" larvæ of *Anthela nicothoe*.

had an unhappy knack of finding one's hands, no matter how great the care taken. Pupal cases of this type are familiar objects at times, on the trunks and in the hollow limbs of eucalypts, and it is always advisable to give them a wide berth. Obviously a "slumber case" of this kind in which the pupal life is spent is fairly safe from molestation during the quiescent period.

On January 24, a little more than a fortnight after pupating, the imagos, or moths, began to emerge, and continued to do so over

a period of seven days. The females varied considerably in size, and after crawling forth and expanding their wet, crumpled wings, they were seen to be pale yellow, heavy-bodied insects, with bordered wing-tips. Two conspicuous spots adorned each fore wing, and the average measurement across the extended wings was 3¼ inches. Occasionally they stayed for days in one position without moving at all. They laid masses of large, chocolate-coloured eggs all over the empty cocoons and on the wire and walls of the cage.

(Photo by D. Fleay.)

Female moth (*Anthela nicothæ*), empty cocoon and cholocate-brown eggs.

On the other hand, the male moths were smaller, measuring only 2¾ inches across the wings. They were an attractive rich fawn in colour, with the usual characteristic dots on the fore wings much less definitely marked. In addition, unlike the long, thin antennæ of the female, those of the male were conspicuously pectinate or ribbed.

So active were these pretty male moths that any emerging overnight rarely had intact wings by morning owing to their rapid flight and ceaseless battering against the glass walls of the cage. They smashed themselves to fragments in a very brief time, and only lived a few days.

Two male specimens were discovered and brought in about the same time by a lad living in the Toorak district.

The females in the cage remained alive for a varying period of

10-12 days or more, and died after completing the laying of their eggs.

On being shown these large, showy moths, Mr. John Clarke, of the National Museum, identified the species as *Anthela nicothæ* Bdv. Possessing no economic importance, and having no popular name, this moth belongs to the family *Anthelidæ*, found only in Australia and Papua, and in which very hairy larvæ are characteristic. Mr. Clarke stated that, like all species of *Anthela*, it is very variable, both in size and colour, and it is widely distributed throughout southern Victoria and Tasmania. As far as its feeding habits are concerned, it is practically omnivorous on native vegetation, for the food of members of the genus ranges from grasses to eucalypts. Mr. J. A. Kershaw, who has previously made observations on *Anthela varia*—readily distinguished from *A. nicothæ* by the strongly produced and pointed front wing apex—states that he has noted the "Woolly-bear" larvæ feeding on a wide range of leaves, notably on those of acacias, which appear to be a generally favoured food. Mr. Kershaw has also shown the caterpillars of *A. varia* to be found on geranium leaves in the garden. However, the Waurn Ponds larvæ of *Anthela nicothæ* were nowhere near acacias, or even eucalypts. They were beneath a grove of pine trees in cleared country, and with the exception of the native grass, the only likely food trees were those in a small neglected orchard some forty yards away. The larvæ of *Anthela nicothæ* are not thought to be gregarious, like the famous processional caterpillars (bag-shelter moths) of the family *Lymantriidæ*, and evidently those found in the old tin had sought out the most likely place in an area of little shelter for a diurnal retreat, and for the purposes of pupation. Returning to the eggs laid in the cage by the female moths, it was discovered on March 24, a month after they had been deposited, that large numbers of egg-shells were empty, and myriads of baby "Woolly-bears" were crawling about energetically. In most cases they set to work immediately and devoured their empty "cradle" shells. Even at this stage each of the minute creatures had the vertical "facial" streak of yellow quite pronounced, and when touched they automatically curled into a tight ring and dropped to the floor of the cage.

In order to determine which was the most suitable food plant of those readily available, the tiny caterpillars were supplied with leaves of geranium, grass, various eucalypts, *Albizzia pseudacacia* and "pussy willow."

However, the sight of crowds clustering on a spray of Albizzia, coupled with the rapid disappearance of the small pinnules, testified to appreciative appetites, and settled the question.

The first ecdysis, or shedding of the cuticle, was observed to take place on April 9, sixteen days after the time of hatching, and

the larvæ immediately grew about twice their original size. Their colour was more vivid, and a longer brush of hairs was noticeable projecting from the fore part of the body, immediately posterior to the thoracic region. However, this uneven arrangement of hairs was soon lost as the larvæ increased in size. Gradually, following the various ecdyses through the year, the long-haired larvæ increased in size. In daylight they carefully hid themselves away, though one would imagine that, with their covering of distasteful spines, they had little to fear from feathered enemies in the natural state. As usual, night time found them feeding voraciously on the fresh leaves supplied. They showed neither hesitation nor distaste in attacking the leaves of *Acacia dealbata* —the Silver Wattle—which was substituted on several occasions, but grasses of several kinds were rejected.

(*Photo by D. Fleay.*)

Yellow female moth (*Anthela nicothoe*) on right. Wing spread, 3¼ inches. Fawn-coloured male on left. Wing spread, 2¾ inches.

By the end of November, 1933, the fifty larvæ, which had been retained after a surplus of several hundred had been liberated, were approaching the size of the parent generation when found at Waurn Ponds eleven months previously. Among them was noted again a considerable variation in colour. Odd specimens were black, the majority were brown, and two outstanding caterpillars were notable for their pure yellow colour.

Commencing on December 5, just a month earlier in the sum-

next season than their predecessors of 1932, the well-grown "Woolly-bears" began to spin their pupal cases, first of all in ones and twos, and then in increasing numbers as the days passed by. On the afternoon of December 7 one of the smooth white cocoons of delicate silk, within which the enclosed caterpillar was feverishly working, was removed from its attachment to the wall of the cage and photographed.

Early the following morning it was pictured again, but now it could not be handled without the aid of forceps, for, as illustrated, the urticating hairs had been worked into the silken covering, from which they projected in thousands, changing the general colour to brown, and presenting a formidable obstruction to interference by possible enemies.

Early in January, 1934, the imago stage of this second generation began to make an appearance from the bristling cocoon cases. However, as there was nothing to be gained from following the very interesting cycle through a second time, the lid was removed from the cage, and as soon as their wings had expanded and dried, after they had emerged from the pupal cases, moth after moth flitted away in the darkness of night.

CHARLES STUART, AN EARLY AUSTRALIAN BOTANIST

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

(Continued from p. 110)

He hopes in a letter dated January 8, 1849, that the boxes were received, and further writes:—"Respecting the specimens left with Mr. Gunn he has in a most unhandsome manner made away with them, and then made a paltry excuse, saying that he thought I should not need them . . . but after the number of specimens I have given him, and information he has got from me, I should not have thought him so bad, but the fact is he is jealous of any person's knowledge of plants lest it should discover his defects." He expresses his opinion of Mr. Gunn strongly under a sense of injustice. "I have forwarded you in the two boxes near 600 genera and species, many of which were not in his possession, and of which you will find duplicates and triplicates." At present he has begun collecting *Cryptogrami* to send in spring. "Respecting your request of specimens of East Indian and Cape plants in cultivation here, there are but few of the latter, and none of the former old enough to produce flowers. . . . I have just got a nice lot of seeds from South Africa, and also from the Swan River. The latter I have not yet sown, and, moreover, they are not yet named. I can, however, make out most of the *Genera*: and if you think it worth while for me to send them, before I send my next bag of specimens I will do so. One or two are

named only, and I see the celebrated *Hakea Victoria* of Drummond, and of which he speaks so much is amongst them. Let me know in your next about this. Now this I am sorry for that I cannot this season send you seeds, being so much confined in my situation, and the gentleman with whom I am living demanding nearly all my time and leisure, but has little taste himself for botany. In my agreement for next year I shall stipulate for more liberty. I only wish that it were in my power to do more."

He is sorry that the Doctor has had so much trouble with Giles, of whom he speaks contemptuously. He asks the Doctor to pay Stephens' account, and remit the balance. He sends a list of things wanted, and regrets that he has not a duplicate of the *Leucopogon* sent, of which more specimens are wanted.

In a letter dated September 6, 1849, Stuart expresses his anxiety, owing to time and distance, in receiving a reply concerning the two boxes previously mentioned, containing 600 genera and species, besides *Musci*. He states that Giles had written to him to obtain about £20 worth of plants "without saying a word about Stuart's box, which he was retaining." He was surprised at his assurance. The Doctor had promised to try to get the herbarium from Stephens. Stuart is glad, and suggests its despatch to him with any cash balance. If the two boxes have not come to hand Mueller is to keep the money "as part payment of your favour to me when I left Adelaide, which kindness, believe me, I do not forget, although our correspondence has been unfortunate, and may give you reason to think that I have not acted honorably, but trust me I have used my best endeavours to be as good as my word, and will continue to do so. I have got a lot of *Musci, Lichenes, Fungi*, etc., for you . . together with some seeds from South Africa, etc."

He intends taking a journey to the eastern part of Van Diemen's Land next month to collect plants, and has to do much work to get time to go out. He enquires as to the identity of a plant he had previously found at the Murray river, which he thought was an *Æuanthera*, but since then a *Jussiæa*. His seeds from Swan river he states are mostly *Proteaceæ—Isopogon, Banksia, Dryandra, Hakea*, etc.

On September 25 he writes much relieved, "It was with great pleasure that I got a letter from you on the 15th of this month." This acknowledged receipt of the two boxes, and sent names of specimens, "a great treat," in default of any other means of obtaining the same, as Stuart has no books. Mueller also sent the specimens reclaimed at last from Stephens, but only half of the original 200 genera and species entrusted to him. Among specimens and seeds missing were *Stenochilus, Grevillea, Viola*, shrubby *Loranthi, Logania, Halgania*, many *Pulteneas*, and their allies, etc. "This is very bad of Stephens' people," he remarks.

He has sent to the Doctor a box of *Cryptograms*, etc., from the Cape of Good Hope. Seeds from the Swan river he has now growing in strange forms. He is sorry to hear that the Doctor, like himself, has suffered from illness, and has had unreliable friends in money matters. He begs that in regard to the little money due to him, his friend will not inconvenience himself. "Although I am poor enough I can do without it at present. There is one thing, indeed, in which you may do me a service, perhaps, which is this. I am much in need of a magnifying glass similar to the one which you have . . . deduct the price . . . I could then notice many characters on small plants. I cannot get any glass of the kind here."

Stuart again speaks of a trip east under difficulties. "How I wish I had the means to take one summer in the pursuit. I would then show you what our island produces." He answers questions submitted *seriatim*. Has not noticed intermediate forms of *Dryandra umbellata* and *D. nivea*. In fact has often observed their determinate character. Will look for the *Leucopogon* wanted, and has sent one which may be the one desired. Apparent differences in a *Drosera* only result from soil and situation. Does not know *Sprengelia propinqua*, but the only two coloured species of *S. incarnata* are in the same relation as in *Epacris impressa*, varieties *alba* and *rubra*. He will take note of *Bossiæa*. Of *Brachycome* there are several varieties not species. He will note this genus. He thinks the Doctor is mistaken in regard to *Brachycome diversifolia*, as the matter of seeding is quite different to *Brachycome*, more like *Chrysanthemum*, the seed being destitute of any appendage or pappæ, whereas that of *Brachycome* has a kind of chaffy rim and membranous; will send seeds of this and others. He only knows the one *Wahlenbergia* sent. Thinks *Myriophyllum amphibium* is *M. verticillatus* in another guise, as the water sometimes leaves it, and it then has a very different appearance; will send specimens. There is what he thinks to be a *Lasiopetalum* or *Thomasia*, a prostrate plant. Has not seen *Dampiera anguillaria—uniflora*. He has sent *Campynema lineare*; *Agastachys odorata*, *Conarrhenes nitida*, *Lomatia polymorpha*, *Taxanthema australis* are growing in very remote localities, knows them well, and will try to get them. He thinks he has seen *Banksia depressa* on the River Mersey, a low bush easily overlooked for *B. australis*; will attend to it and other plants required. "I shall bear in mind all your wants."

In March, 1850, our collector is anxiously awaiting an answer to his letter sent in September per brig "Halcyon," on which he had sent, also, a box of *Cryptograms* and seeds from South Africa and Swan River.[6] He feels illness may have prevented an answer.

6. Swan River. Usual name for the early settlement in Western Australia.

"Only let me hear from you." He has another good collection to transmit with a fine lot of *Algæ* from the East, where he succeeded in getting nearly all he wanted from there. He is "only waiting to hear before sending." He adds: "You cannot think how uneasy I have been about you. Sometimes I think that pecuniary matters have not gone well with you; but do not think for a moment that will cause me to be slack in my endeavours to serve you to the best of my ability—so long as my service be acceptable—at all events do write soon."

The South American seeds have grown well, *Solanum, Passiflora, Hibiscus, Adenanthera,* and some legumes. Of Swan River seeds, a *Gompholobium* has flowered, and he recognizes *Callistemon, Calothamnus, Dryandra, Banksia,* and many legumes, *Chorizema, Brachyzoma, Podolobius,* etc. He will forward specimens when in flower, also plants asked for. Next season he intends visiting the north, where he expects to find plants assimilating more to those of New Holland. "I have, I think, got a new *Boronia* on my last trip." "Anxiously awaiting your reply."

On March 17, 1850, he writes that, in surprise at not receiving a letter by the "Peri," he had written a few days before, but receiving a letter on the 16th at once replies. Mueller has sent him not only the glass which he wanted, but also a present of Brown's *Prodromus*,[7] for which he heartily thanks him, "neither of which were to be obtained here, and will be of the greatest service to me, and perhaps in the end to yourself also. . . . The remittance £4/14/- came safe to hand, but I am sorry if you should have found any inconvenience in that respect, as I assure you I was not in particular need of it."

Mueller had thus settled Stuart's tangled business matters with Stephens and Giles. Stuart further writes that he is sending *Phanerogams* and *Algæ*, and asks for specimens of South Australian plants. "You have, I suppose, not seen Mr. Bunce.[8] I am not acquainted much with him; but from what little I know of him, his knowledge of botany is very superficial. He was for some time in Van Diemen's Land, but may be improved. I observed your notes in the paper sent, which were much to the purpose, and felt flattered by the mention you made of my name." He hopes to make up near 800 species and genera this season. "I had last week an opportunity of purchasing Don's[9] (G.) work, which you were in treaty for at Adelaide when I left. I obtained

7. *Prodromus Flora Nova-Hollandia*, a classic work by Robert Brown, "the father of Australian Botany," a great scientist and naturalist on "The Investigator" under Flinders.

8. Bunce, D. (1873-82). Batman's son-in-law. Collected plants in Tasmania; botanist on Dr. L. Leichhardt's first expedition. Curator of Botanical Gardens, Geelong. Wrote *Australasiatic Reminiscences*, etc.

9. Don, G., published *A General History of Dichlamydeous Plants*, 4 vols. 1831-38.

four volumes new from the press for 20/-, a complete gift. They are all that have been published, and extend to *Labiatæ*, or nearly the whole of Dichlamydeous plants, so that with that and the *Prodromus* I shall get on pretty well." The three *Potamogetons* he had sent were *P. nutans*, *P. perfoliata*, and *P. graminifolia*. He advises Mueller that Mr. Archer, formerly recommended, has been a disappointment to him.

Writing on April 16, 1850, Stuart says that he has sent a box with the fruits of a visit to the east of the island, also kitchen and garden seeds of his own growing with other seeds, and some fine tulips from England. In addition there are *Algæ* with plenty of specimens of nearly all the kinds. He would prefer specimens of New Holland[10] plants to seeds, stating that his employer is "not of a very liberal mind, and hardly thanks me for taking the trouble to raise seeds, so that I shall decline it for the future whilst specimens I can retain in my possession." Stuart may change his residence soon. He is sending seeds from different places, and regrets having no indigenous ones from Van Diemen's Land at present. He enquires as to the Order in which *Cheiranthera* is placed. He had seen Mr. Newman, Superintendent of Hobart Botanical Gardens, who has promised to send him specimens from the southern parts. He intends on the winter evenings to go over his specimens with G. Don's book, which as far as it goes is good, and is followed by Brown's *Prodromus*, which Stuart has had bound with interleaves for notes. In the box sent in a composite from Kangaroo Island for recognition, from seed got there. "It forms a scrub close to the sea-shore, and has a very powerful smell. I wish I had more time when there, but was only about half-an-hour on shore as the vessel was only waiting for a wind. I did not see much strange vegetation near the coast. Chiefly of this plant (Composite); *Bursaria spinosa*, and a species of *Melaleuca* not in flower. I saw much *Algæ*. The *Swainsona* is, I think, different from any I have seen. You will find seeds of it in the box, a very beautiful species, growing in the sand close to the saltwater" (Kangaroo Island). He does not think *Miamestes* exists in the vicinity. The plant *Milligania* he will send. He thought *Tetracarpea* was in *Saxifrageæ* or *Cenonaceæ*.

He is sending *Melaleuca Igranata*, and has 200 or 300 specimens in anticipation for despatch next year. According to R. Brown *Alyxia buxifolia* grows in Van Diemen's Land, but Stuart has not yet seen it, but will look for it at his next coastal visit. He has little time at present. "What a pity it is, my dear sir, that our purses will not keep pace with our wishes in this interesting

10. New Holland, early Dutch name for Australia, as far as 135° E. longitude. The name was loosely used for the continent up to last century. In 1829 Great Britain claimed the whole as Australia, the name suggested by Flinders in 1804.

pursuit, and how few are the patrons here who, with a trifling liberality, could lay open the beautiful stories of Nature. It is difficult to impress this doctrine on those whose pursuit is alone wealth."

He has just received a packet of European plants, and some from New Holland. He will forward specimens when they flower. The Swan River seedlings are thriving. One *Trichinium* or *Ptilotus* is in flower. The only plant of the South American plants to flower is *Solanum ciliatum*. He enquires as to the species of *Passiflora* which is among them. A postcript mentions just having received a letter dated March 24, and that the "Peri" sails to-morrow.

More than a year elapses between this and the next letter, in which time Stuart has had trouble and misfortune.

On July 20, 1851, Stuart despondingly writes to Mueller, who has evidently not received the customary replies to his letters: "After a long silence I scarcely know how to address you to excuse myself, but the truth must be told. I have had nothing but misfortunes of late, which have quite unmanned me. I was for a long time ill, which plunged me into poverty, and when able to work I could get no employment worth speaking of. Add to which I, of course, was in debt, so that staying in Launceston only made things worse." Stuart sought employment in the country, and none knew his address, so Mueller's last letter had only been received a short time ago. He had got unsuitable employment in Hobart for twelve months, precluding any opportunity of "hearing the name of a plant mentioned." He will try to collect in the summer. He thanks Mueller for his kind offer to employ him collecting in South Australia, but could not embrace it. He "has not a shilling in the world," and wishes "to remain unnoticed until I shall have recovered myself a little." With low wages this will take some time.

His plants, letters, books, etc., are at Launceston, where he had to leave them for a debt of about £5. It will take three months to earn it, "so that I fear for the present our correspondence must cease, which gives me much grief to think. Nevertheless I should like to hear once more from you." He is a stranger, knowing no one, and sometimes thinks of giving up "all thoughts of botanical work altogether." He has not had the spirit to write or do anything, which is his only excuse. "I am, in fact, perfectly cast down, and as I am not one of those who choose to make my circumstances known, I can hope for no assistance. I have written more fully on this subject than anyone." I shall not be surprised if I do not hear from you, but I still hope I shall." His address is "C/o H. McNaughton, Hobart Town."

(To be concluded.)

A PAIR OF BROLGAS

By CHARLES BARRETT

From the Western District and other parts of Victoria have come reports that the Brolga, or Native Companion, is increasing in numbers. Protection is proving effective, though it is unlikely that the Brolga will ever again be abundant in this State. Pairs and small parties often are seen; never such gatherings as are common in New South Wales and Queensland. But the Brolga has returned to Victoria and this year conditions most favourable to it have ruled in the Murray Valley and elsewhere. Many pairs have nested and safely reared their broods.

Tungamah is a favoured district; at least ten pairs of Brolgas nested amid the swamps there this season, and residents assure me that the birds are not molested; may even be met with crossing the road a mile or two from the town. One pair, each season for more than twenty years, has nested in an islet in a swamp about three miles out, and their history is worth recording. Mr. W. Saunders, who was born at Tungamah, and has been a nature lover from boyhood, visits the Brolgas' isle always in nesting time. He knows the birds, and they know him, yet remain wary. He believes that the same two birds return each season to claim the old nest and add to the Brolga population.

Of one bird my friend is certain; he recognizes it by a feather gap in the wing. It may, of course, have had several mates; since accidents will happen, but this Mr. Saunders regards as improbable, and in September last, he welcomed back to Tungamah a pair of old "feathered friends" whose visit is an annual event. They stay for a while after the brood has been reared, then depart for haunts unknown. To them, in October, Mr. Ronald Monro, a nature photographer, and I were introduced. The birds were not favourably impressed; they doubted our peaceful intentions, and flew away from their islet long before we drew near. Mr. Monro spent nearly four hours in a hide, a dozen yards from the nest, but his long vigil was fruitless. The birds waded to and fro, always out of range of the camera; they chased off Crows which ventured near, but would not return to the nest. I watched them through field glasses. They did some foraging, and seemed to be unconcerned. There was no dancing. The behaviour of these Tungamah Brolgas was different from that of a pair observed in Queensland; a lively couple which entertained me by bowing and cutting capers on the shore of the lagoon: their movements were more quaint than graceful.

Observations extending over many years are summarized by Mr. Saunders in a recent letter:

Native Companions are not good architects. They start to build their nests early in September, and take about a week to complete the job. The nest is about two feet across, six inches

Plate XIV

Nest and Eggs of Brolga

Photo. by Chas. Barrett.

high, and flat on the top. The birds never go far for building material, using grass, or any kinds of plants that are handy. Nearly always they nest on a small island in a swamp or a watercourse. They will come back to the same place to nest year after year, if not interfered with. After the first egg is laid, two or three days may elapse before the second egg appears in the nest; but as soon as the clutch is complete, brooding begins. The eggs are about four inches in length. Their colour is unusual for eggs of a ground-nesting bird, being white with brown or dark spots, thus they are visible at a good distance, owing to the nest being flat on top. Incubation occupies about a month. Brolgas can ably defend their young against attacks from Crows and Hawks.

The old birds keep the young in the nest for two or three days after they hatch, and if the weather be cold and wet, longer still. For the first week, and possibly a longer period, the parents put food into the young ones' beaks. Spiders, grubs, worms, etc., well broken up by the old birds, are fed to the young. As they become stronger, the food is dropped in front of the young ones, which pick it up. When about three months old, they can eat anything which their parents can eat, such as frogs, yabbies, small fish, bulbs, or yams; even small snakes and grain of any kind.

When the young birds are out of the nest and following the old ones, the latter call to them continually; notes that sound like "crook, crook," much like a hen calling her chicks. The young Brolgas keep on squeaking just as a young turkey does. If one is picked up and gives the little call of alarm, the old ones, hearing it, become very annoyed and try to bluff the intruder by jumping up and down, with wings spread, and calling meanwhile.

Brooding is a duty shared by the two birds. They add material to their nest all the time until the eggs have hatched. If water rises in a flood they will build up quickly to get the nest above level.

The young birds seem to stay with the old ones for about ten months. They seek fresh fields, and do not return with their parents in the following season to the place where they were bred.

THE ORCHID SEASON.

This has been an unusually good season for orchids in many parts of Victoria. Mr. W. H. Nicholls notes the great abundance of Sun orchids. Near Benalla at the end of October thousands were flowering. At least two new varieties were collected, a Caladenia and a Greenhood, and these will be described in the *Naturalist* by Mr. Nicholls, who also has novelties from Queensland and specimens of a rare *Sarcochilus*. Steadily the list of Australian orchids is being extended, and when collectors enter the little-known parts of the Northern Territory some fine new forms may be discovered. Arnhem Land is a promising field. But even in the south, as the present season proves, orchid hunting still may reveal undescribed varieties. A comprehensive illustrated work on the orchids of Australia is overdue, but its production would be very costly.

PLANT LIFE IN THE NORTHERN GOULBURN VALLEY

By J. H. Willis

In autumn - there are stooks of hay, ripe peaches, and grapes in luscious clusters on the vines; cool nights have come at last, and the thirsty plains have changed to welcome swards of green; sundown leaves the wide horizon with a mystic light—pale lemon, pink and blue, merging toward the zenith into the deeper violet-grey of evening.

In winter—short, fine, crisp days are heralded by frost; the citrus trees are beautiful, all hung with colouring fruit; Box-wood fires glow brightly in many a hearth, and perchance the smoke from burning logs of Murray Pine steals like aromatic incense through the night—subtle, unforgettable, intoxicating smell!

In spring—the orchard groves are all a-flower, the roadside Wattles heavy with blossom, and the dreamy air imbued with honeyed scents: the young lambs frisk in fields of lush grass or in paddocks carpeted with native everlastings, while over secluded creek-bends and still lagoons the azure kingfisher skims among the sunbeams or rests, sentinel-like, upon a dead limb, viewing his watery domain of white Swamp Lilies, Yellow Marshwort flowers, and stately rushes: peace is over all.

In summer—the sun glares down from a clear sky, withering up the grass until the land is parched and brown; the creeks are low, or even dry, the fallowed earth reduced to dust which blows away in clouds; mosquitoes whine in the stifling air around settlements; whirlwinds often dance and spin in crazy circuits; mirages glisten on the bare, hot surfaces of roads that stretch for miles without a turning; but, as if in compensation for these harsher moods of nature, the crowning glory of the seasons fills the land—acres upon acres of golden Wheat.

Such are glimpses of the Goulburn Valley—a district rich in God's gifts, but not one to be recommended as a hunting-ground for wild flowers; yet, to a nature lover, the plains are alluring, with a charm all their own, and after rambling over many miles in this part of Victoria I have found its plant life intensely interesting, if not so colourful or varied as that of the Grampians, Mallee, Alps, Gippsland, and coastal districts.

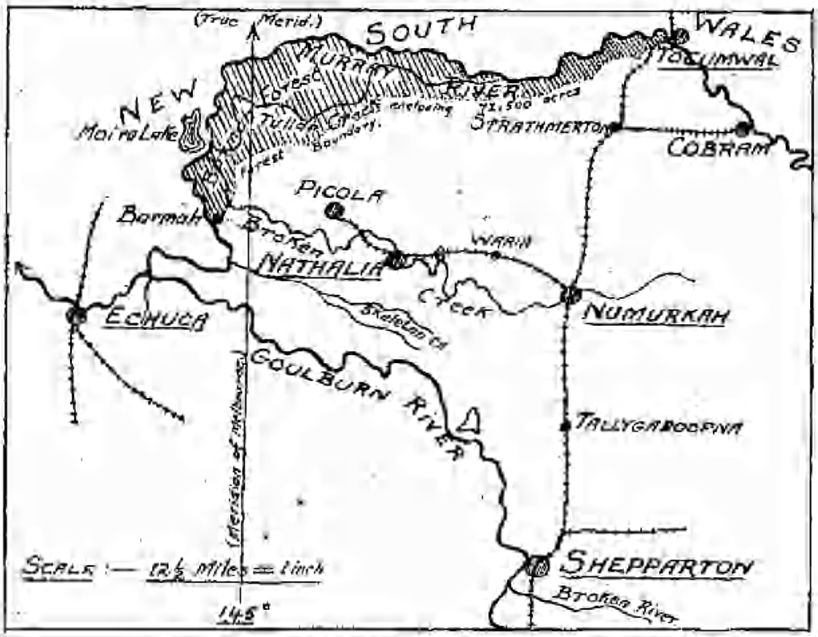
Land selection and cultivation began here about sixty years ago, since when the indigenous flora has been gradually suppressed by agriculture and the introduction of numerous weeds. Comparatively little forest cover or native herbage now remains, except on such undisturbed areas as river frontages, creek banks, and railway enclosures, but these remnants are still sufficient to give one a good idea of the original vegetation. Probably many species of plants have been lost in consequence of tillage and grazing, others are fast becoming rare, and will doubtless vanish before long, so

Photo. by J. H. Willis.

Casuarina Luehmanni (Buloke). Tree 60 feet high, at Nathalia

the recording of any information now possible is surely well worth while.

By Northern Goulburn Valley is meant that area of some 675 square miles bounded on the north and west by a large curve of the Murray River, on the south by the Goulburn River, and on the east by the Shepparton to Tocumwal railway line (see sketch map). This area is situated approximately 120 miles due north of Melbourne, and is traversed centrally from east to west by the Numurkah-Picola railway (20 miles), which practically follows the course of Broken Creek—a sluggish, but rather large and per-



Sketch map of Northern Goulburn Valley area.

manent stream. The natural centre for this district is the busy township of Nathalia, on Broken Creek, whence I have made most of my botanical excursions. A billabong of the Murray, known as Tullah Creek, Deep Creek, Skeleton Creek, and Wakati Creek, also drain the area, which is now intersected by several important irrigation channels.

Physiographically the country is monotonous, being portion of the extensive Murray Basin plains, of some 300 feet elevation, and interrupted only by occasional small rises of drift sand. The soil varies from sand and fine gravel to reddish loam, with heavy, bluish clay in the swampy depressions; these are sedimentary deposits, overlying the old Silurian bedrock at depths of 100 feet or more, and were formed in late Tertiary times by the uplift of a

shallow sea-floor. Mineralized water is pumped from bores in several parts of the district.

Climatic factors include a dry atmosphere, high summer temperatures, with periods of drought, and an average annual rainfall of 16 to 19 inches (which has risen as high or 25 or fallen as low as 9 inches in certain years).

Soil, climate, and geographical position each help to determine the vegetation, which is of a xerophytic, inland type, showing marked similarities to the plant life of the Mallee; this is only to be expected, since the plains of northern Victoria merge climatically and geologically into the north-western Mallee plains, both forming part of one large, geographical unit that extends far beyond the borders of New South Wales and South Australia, with no barriers to plant migration.

Prior to settlement, the plains carried a woodland or Savannah type of forest, consisting chiefly of Grey Box in mixture with Buloke, Murray Pine, Acacias, and other small trees; Black Box dominated a few low-lying areas, pure stands of Murray Pine clothed the sandhills, while here and there the trees thinned out, leaving open patches of grassland. Along the rivers and creeks, and particularly over the Murray flood-plain, magnificent forests of Red Gum existed, with a sprinkling of Yellow Box; even to-day the Barmah Reserve of more than 72,000 acres is the largest Red Gum forest in the State. Undergrowth was scanty, if not absent altogether, and humus almost negligible. Lagoons and swampland supported a wealth of acquatic plants which are still quite well represented in the district.

To quote some statistics for the area, I have found 197 species of indigenous vascular plants, comprising 48 Monocotyledons, 144 Dicotyledons and 4 Pteridophytes; these are distributed in 59 families, of which 29 are locally monotypic, while 3 (the *Gramineæ*, *Leguminosæ*, and *Compositæ*) contain more than one-third of the total species. Introduced plants have been recorded to the number of 75, but this figure is probably far from complete, and it would be safe to say that aliens now represent almost half of the flora. The five largest families of flowering plants are:—

Compositæ (35), *Gramineæ* (18), *Leguminosæ* (15), *Liliaceæ* (9), *Chenopodiaceæ* (8), *whilst Orchidaceæ* and *Cyperaceæ* have each 6 species.

As on other Victorian plains, the native composites and grasses occupy a prominent position, together comprising 27·6% of the flora; these are ground herbs, largely confined to the dry northern regions in Victoria, e.g., *Andropogon pertusus*, *Aristida Behriana*, *Chloris acicularis*, *Brachycome basaltica*, and *Craspedia globosa*. The species named last has earned the vernacular of "Drumsticks" on account of its large, globular flower-heads, terminating leafless stems up to 3 feet long; these golden heads, reared majes-

tically from tufts of silvery grass-like foliage, are quite a feature on stiff, swampy land.

Cyperaceæ, *Juncaceæ*, *Liliaceæ*, and *Orchidaceæ* are represented by at least 25 species, all widespread throughout the State. The six Orchids have been found only along the Nunurkah-Picola railway line, they are *Prasophyllum fuscum* (very strongly scented), *Thelymitra aristata*, *Microtis uniflora*, *Diuris pedunculata* (large, deeply-coloured form), *Pterostylis cycnocephala* and *P. rufa*. With the exception of *Kochia ciliata*, members of the *Chenopodiaceæ* found here are also of wide occurrence in Victoria.

More than half the species of *Leguminosæ* belong to the genus *Acacia*, viz., *A. ocinacea*, *armata* (very rare), *dealbata*, *implexa*, *pycnantha* (rare), *brachybotrya*, *homalophylla* and *sclerophylla*, the last three being true inland forms. *A. homalophylla* (Myall) is a slender tree, occurring in dense clumps, several hundred square feet in area; though rare in the district now, a few typical clumps are known, and one such patch of Myall has been found far east of the Goulburn Valley line, near Lake Rowan (15 miles south of Yarrawonga). Another legume reaching its south-easterly limit here, though exceedingly rare now, is *Cassia Sturtii*. *Swainsona procumbens* is frequent on depressions subject to inundation, and the large, showy flowers of mauve and blue are often seen in table drains, while its smaller congener, *S. Behriana*, favours sandy rises.

Myrtaceæ is represented only by four eucalypts (*rostrata*, *hemiphloia*, *melliodora* and *bicolor*) and *Melaleuca pubescens*—a small and very rare tree, which apparently lives to a great age.

A strange fact is the almost complete absence of *Proteaceæ*, a large group of plants (ranking third in the Australian Flora as a whole) with special adaptations for withstanding dry conditions. Even in the Mallee this family is poorly represented, while here the only species is *Hakea vittata*—a small, slow growing tree, with trunks of hard, dark wood, up to 1 foot thick; it is distinguished from other Hakeas by the slender, curved-pointed needles, and is becoming scarce in the district.

In passing, mention might be made of the tree life in general, which is varied and interesting. At least eighteen plants attain to the size of trees, and these are distsributed among eight families. Besides *Callitris robusta*, *Casuarina Luehmannii*, *Hakea vittata*, *Acacia homalophylla*, *A. dealbata* (of river banks), *A. implexa* (near watercourses, and rare), *Melaleuca pubescens*, and the four eucalypts already noted, these include *Eucarya* (*Fusanus*) *acuminata* (Sweet Quandong), *Exocarpus cupressiformis*, and *Pittosporum phillyraeoides*—all very rare—*Bursaria spinosa*, *Myoporum platycarpum* (Sugarwood), *M. montanum* (Water-bush), and *Stenochilus* (*Eremophila*) *longifolius* (Berrigan) a—small tree, with conspicuous, red and spotted bell-flowers. One very aged

and isolated Quandong had superficial roots of extraordinary length, these being traceable along the ground for a distance of quite 40 feet from the tree, which was no more than 20 feet in height.

Each of the four ferns belongs to a distinct family, and is insignificant in appearance:—*Marsilia Drummondii* (Nardoo) is common in swampy places, where the casual observer might easily mistake its curious fronds for a four-leaved clover; *Azolla pinnata* is a small, floating annual that often covers lagoons and calm stretches of the creeks with a continuous, soft carpet of red-green. Fronds of *Ophioglossum coriaceum* (Adder's Tongue) and *Cheilanthes tenuifolia* (Rock Lip Fern) usually appear in the railway enclosures during late autumn, but die down each year on exposure to the heat of summer.

Mosses and lichens consist of a few hardy, inconspicuous forms, but, considering the dryness of the district, its fungus flora is rather remarkable. Quite a cursory survey has revealed 38 species of the larger fungi, most of which are to be found during rainy weather in autumn; there are at least 14 agarics, 7 polypores, and 15 gasteromycetes ("puffballs"), the last group including several rare species that are practically confined to warm, dry regions.

If Mueller's Geographical Divisions of Victoria are rigidly observed, then the area under consideration lies within the North-eastern division, and the following 16 species, recorded for the North-west only in our 1928 Census of Victorian Plants, might now be recorded also for the North-east:—

Glycoria Fordeana
Eucarya acuminata
Kochia ciliata
Acacia brachybotrya
Acacia homalophylla
Acacia sclerophylla
Cassia Sturtii
Eucalyptus bicolor
Solanum esuriale
Limosella Curdieana
Myoporum montanum
Myoporum platycarpum
Goodenia pusilliflora
Calotis cuneifolia
Brachycome pachyptera
Helipterum variabile

FLASHLIGHT OF FROGMOUTH

The photograph of the Tawny-shouldered Frogmouth (*Podargus strigoides*) at its nest (Plate XVI) was taken by Mr. Ronald K. Monro, of Elsternwick, who is keenly interested in bird photography and has been successful with a number of species. His principal field is Pearcedale, on the Mornington Peninsula. The "mopoke's" nest was built in an upright fork of a peppermint gum, at a height of about thirty-five feet. Early in September it contained two eggs, and Mr. Monro climbed the tree several times, taking daylight photographs. The birds became confiding. To secure a study by night, the camera was fixed to a limb above the nest, focused, and left in position. After dark, the photographer kept watch from below, and when a favourable opportunity occurred, released the shutter by means of a long thread. The flashlight was "fired" simultaneously with the shutter—a synchronized exposure.

Plate XVI

Tawny-shouldered Frogmouth at Nest

Photo. by Ronald K. Morris.

ORCHID NOTES FROM NEW SOUTH WALES

By the Rev. H. M. R. Rupp, Woy Woy

The winter of 1935 has been a nightmare to botanical folks living in the coastal area of this State. Normally the rainfall in my own district from January to September is about 37 inches; this year it was 16. 8 of which fell in January and February. Unaccustomed to drought, the country soon showed distress, and to make things worse the winter was intensely cold, with extremely violent windstorms and severe frosts. Good rain fell in September, but it came too late for the spring ground Orchids, which are conspicuous by their absence. Now we are having another dry spell, with very cold nights. The dryness of the undergrowth has been conducive to extensive bush fires.

The effect of the abnormal season on bush-house Orchids has been curiously variable. Some, especially of course those from Queensland, have been unable to adapt themselves to the severe conditions; yet I managed to bring to flower *Zeuxine oblonga*, a rare little terrestrial from Proserpine. Others have shown no distress, and I have never had such displays of bloom from *Dendrobium Kingianum*, *D. Beckleri*, and *Sarcochilus falcatus*. Flowering at present is an exceptionally attractive form of *D. Beckleri*, of a pale lilac colour. When the buds open they are pink, but the mature flowers change to lilac. This comes from Brunswick Heads, on the North Coast.

Two species have recently been added to our N.S.W. Orchid flora, both previously known in Queensland only. These are *Dendrobium Schneideræ*, a small plant, with drooping racemes of yellowish flowers, and *Sarcochilus Hartmannii*, which is the only serious rival of *S. Fitzgeraldii* as the most beautiful Australian member of the genus. They are closely allied, but distinct, and differing in habit, the former revelling in sunshine on exposed positions, such as *Fitzgeraldii* shuns. The latter has recently been found much farther south than it was believed to extend, Mr W. J. Enright, of Maitland, having collected a fine plant near Bullahdelah, well to the south of the Manning River.

I have already recorded in your columns the interesting association of *Thelymitra aristata* and *Dendrobium Kingianum*. A week or two ago I visited two shady ravines discharging into Hawkesbury waters. In both I found growing on the mossy rocks a very small *Thelymitra*. As might be expected under such conditions, no flowers were expanded. Dissecting one on the spot, it appeared to me to be most probably *T. pauciflora*. However, I took one or two home, and potted them. The very broad leaf then struck me as being unlike that of *pauciflora*, and next day one little flower expanded readily in sunshine, and compelled the conclusion that the plant was really *T. aristata* up to more tricks! What appeals to me as most strange about the vagaries of this

species is that, so far as I can ascertain, it is quite unknown as a normal terrestrial in the coastal area north of Sydney. I have specimens from the highlands of New England, but on the heathlands or in open forests along the coastal belt I have never seen it, nor has it appeared among the Sun-Orchids sent to me from such areas. Yet by associating with the epiphytic *D. Kingianum*, and by stealing into cool, shaded ravines, it creeps right up into South Queensland.

Dr. C. H. Jaede, of Mascot, who some months ago discovered *Bubophyllum tuberculatum* on Lord Howe Island, recently sent me a plant of *Dendrobium gracilicaule*, collected on Mangrove Mountain, near the old Gosford-Sydney road via Wiseman's Ferry. This plant is quite indistinguishable from the Lord Howe Island form known as var. *Howeanum*, which I described informally in your journal of November, 1933. It must be rare on the mainland, for I have had a very extensive experience of the species since 1909, and have never seen this form before except from Lord Howe. The doctor has also sent Lord Howe specimens which show that the flowers there are sometimes quite yellow, with red-brown labellum-markings: but the perianth segments are consistently devoid of blotches in all cases.

CLASSIFICATION OF EUCALYPTS.

By Prof. A. J. Ewart.

It is unfortunate, although perhaps natural, that Mr. Blakely should have taken my rather mild criticisms of some of the principles adopted in his classification of Eucalypts rather personally, and should have retorted by *et tu quoque* arguments.

The objection to the exclusive use of the stamens to distinguish sections and sub-sections of Eucalypts, up to a total of eight sections and eighteen sub-sections, lies in the assumption that, in the early development of Eucalypts, the only organs showing variations were the stamens, which is certainly not the case. It is probable that no more than three groups can be separated by the stamens, and that after that other features must be used, that is, provided we wish to attempt a natural, as opposed to an artificial, classification of Eucalypts.

It is true that, in some groups of plants, wholly artificial classifications are generally adopted, as, for instance, in the mosses, classified mainly by variations in the peristome, although it is quite likely that many mosses placed close to one another because they have similar peristomes, may really have widely dissimilar genetic origins, if we had the means of tracing them. But in groups of plants, where we have a wide range of organs showing variation, no classification can be a natural one which confines not only its primary divisions, but also all its subdivisions, to the variation in one set of organs. It was for that reason that I considered that Blakely, by making undue use of the stamens, had made an artificial rather than a natural classification of the Eucalypts, and had certainly, in some cases, separated Eucalypts which were obviously closely related.

A point that systematists are often apt to forget is that a species has no

real existence at all, but is merely a convenient mental abstraction, to indicate a group of plants which are closely related to one another, but not all necessarily precisely alike. The important thing in nomenclature is not whether we use the names of species or of varieties to indicate such groups, but that we should all mean the same thing when we use the same name. In other words, stability of nomenclature is more important than the names themselves. Suppose, for one moment, that among the chemists there was a special class of chemists called the "systematic chemists," whose duty it was to give the names to the compounds with which the main body of chemists worked, and suppose that these "systematic chemists" gave these names regardless of the work or convenience of the general body of chemists. Suppose, further, that the "systematic chemists" decided to change the names of a large number of chemical compounds to the old names used by early alchemists. There would probably be something like a revolution in the chemical world. Yet these apparently never-ending changes of names are what general botanical workers have now been compelled to put up with for many years, and any protests receive the reply that changes are made in the interests of science.

It cannot be in the interests of science to cause unnecessary difficulties to other workers. Once a name has been applied to a particular collection of plants, only the very gravest reasons should warrant the change of that name; for instance, a difference of opinion as to whether a particular collection of plants is a species or a variety is a matter of little moment, and hardly worth disturbing existing names, if they have been long accepted and in general use. It is only when species names indicate relatively large or comparatively well-defined groups of plants that they are of much importance from a scientific point of view. If the species are unduly subdivided, the names of the smaller groups become of progressively less importance.

To take an instance, Zahn recognizes nearly 800 species of *Hieracium* and subdivides many of these species into from ten to as many as fifty sub-species, which some botanists again would recognize as distinct species. When subdivisions are carried to this extent, the individual names become of very little scientific importance, and it is doubtful, in fact, whether it is worth while using names at all, any more than it would be worth while naming the individual trees in a forest, none of which may be precisely alike.

To put the matter in a few words, the most important things in nomenclature are: (i) that we should all use the same names for the same things, (ii) that when names are once established and generally used they should not be altered except for the weightiest reasons, (iii) that if the groups called "species" are much subdivided it becomes less and less worth while giving them names, and (iv) that those who work with plants should have some voice in determining stability of nomenclature as well as those whose interest in the plant to some extent ceases once it has been given a name.

The power of radically altering the nomenclature of an important group of plants is a very weighty responsibility to leave in the hands of a single individual. It is possible, that in the course of time, we may find small sub-committees on nomenclature set up in each country, and working through a central international committee. It would be the business of these sub-committees to approve or disapprove of all proposed changes of nomenclature. If such a committee existed in Australia, to deal more particularly with the Eucalypts, it would have been possible to sift out at once the grains from the chaff in Mr. Blakely's work, and for all to agree at once to the new system of naming. As things are, it seems likely that we will have pronounced differences of opinion for many years to come, as to the naming of Eucalypts, and until some general agreement is gradually arrived at there is bound to be much confusion, to the disadvantage of all those who deal with Eucalypts either from a scientific or an economic standpoint.

A GARDEN-GROWN NATIVE PARASITE.

The Broomrape, *Orobanche cernua* (or *O. cernua* var. *Australiana*, or *O. Australina*), is rarely found. Only once in forty years collecting have I found it in its native habitat, and then near Lyre Bird Gully, on the eastern slope of Mt. Dandenong. The garden-grown specimen (exhibited at the October meeting of the Club) came originally from Kilsyth, near Croydon, on the western side of Mt. Dandenong. It was sent to Mr. Chas. Barrett, by Mr. A. G. Campbell, and was thought to have had, as its host, a lilac bush or a rose.

The *Orobanche* is leafless, having sharp-pointed scales instead of leaves. It is a close relation of the *Bignonia* or the family Scrophulariaceæ, of which well-known members are *Euphrasia*, *Veronica* and *Antirrhinum*. The flowering spike is dense, and the flowers first show from its base. In this exhibit the colours are yellowish-white, faintly tinged with pink. Each flower has tubular sepals, curved downwards and hairy. This specimen is an attempt to grow the parasite out of its native element, perhaps for the first time, in a suburban garden, and that also close to the seaside, at Sandringham.

When received, the specimen was rather dry. It was potted in a 7-inch flower pot, having wood slips for crocks, and well wrapped in the moss *Thuidium furfurosum*, sandy soil of the neighbourhood being well pressed into the interstices. It was watered, then sunk into the ground in the open, up to the rim of the pot, facing a northerly aspect. The earth in the pot was kept moist, and not wet. When the young crowns appeared they were covered with a top-dressing of more than an inch of leaf mould, well rotted. The potting took place in mid-August; a fortnight later, four crowns appeared. By August 31 there were five crowns, three of which took the lead, and maintained it. No insects or snails attacked the plant. By October 4 six crowns were visible, and soon afterwards eight were showing up, all healthy, four being about 3½ inches high, the others shorter. There was only one original rootstock that I had noticed when planting. The stems were now a little thicker than a lead-pencil, and cigar-shaped, hairy and scaly.

The first flowers appeared from the base of the inflorescence on October 1; somewhat pale in colour, they darkened to a pink blush later. So far only the tall spikes have flowered. The weather has been springlike, warm and alternatively showery and cooler. The weather that the plant seems to like best is warm, rather than the showery, cool days. Aspect not changed.

In Britain, there are what are considered several aspects of *Orobanche*, each one being parasite on its own host, which varies with the species to Legumes, Galiums, *Centaurea*, *Picris*, *Eryngium*, Ivy, *Achillea*, Artemisias, Hemp, Lucerne, or other crops. It is like a dodder in its action, and strangles.

A. J. TADGELL.

EXCURSION TO WATTLE GLEN.

About twenty members attended the excursion to Wattle Glen on September 14, the chief attraction being wildflowers, which are fairly abundant in this locality. Permission from the owners of properties passed through having been obtained on the previous day, the members were able to gather protected plants without infringing the regulations of the Wildflower Protection Act.

Among the large number of species of flowering plants observed were fifteen Orchids, chiefly of the *Pterostylis*, *Caladenia*, and *Diuris* genera. The birds and nests observed included the Striated Thornbill, the Yellow-breasted Robin and the Spotted Quail-thrush. A heavy shower of rain during the afternoon made things unpleasant for a time for those who had not provided umbrellas and raincoats.

L. W. COOPER.

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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, November 11, 1935. The President, Mr. G. N. Hyam, presided, and about 100 members and friends attended.

The President, Mr. G. N. Hyam, welcomed Dr. Priestley to the Club, and invited him to give his lecture, "Animal Life in the Antarctic."

A very fine series of slides illustrating all phases of life in the Antarctic was shown, and a running commentary by Dr. Priestley made a lecture that was greatly enjoyed by all present.

A vote of thanks was proposed by Mr. A. S. Kenyon, seconded by Mr. Geo. Coghill, and supported by Mr. A. D. Hardy, and carried by acclamation.

CORRESPONDENCE

From Mr. Brooks, an entomologist living at Cairns, Queensland, thanking the Club for help in arranging an exchange with an American entomologist.

From Miss Williamson, whose mother, widow of our late member, Mr. H. B. Williamson, died recently, expressing thanks for the letter of sympathy received from the Club.

REPORTS OF EXCURSIONS

Reports of excursions were given as follows: Fernshaw, Mr. A. D. Hardy; Beaconsfield, Mr. A. S. Chalk.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as ordinary members of the Club: Miss A. Wilson, Mr. R. Walford, Mr. F. G. Molyneuse, Mr. A. R. Varley, and Mr. J. D. Firth.

GENERAL BUSINESS

The President welcomed back to the Club meetings Mr. A. H. Chisholm, C.F.A.O.U., who had been ill; and Mr. E. S. Hanks and Mrs. Hanks, who had just returned from an extended car trip through Central Australia and Queensland.

This completed the business for the evening, and the meeting was adjourned for the conversazione.

EXHIBITS

Master Ian Atkinson.—Native money and ornaments from Solomon Islands.

Mr. C. French.—Tall specimen (20 inches) of the Alpine Greenhood, *Pterostylis alpina*, from Dandenong Ranges.

Mr. A. C. Frostick.—Specimens of rocks from Carapook (submitted by Mr. H. W. O'Halloran for identification), consisting of graphic granite, serpentine, chrysotile, and chalcedony. Brief notes shown with each specimen.

Mr. R. H. Croll.—*Dendrobium linguiforme* (Tongue Orchid), grown by exhibitor.

Mr. Geo. Coghill.—Garden-grown native plants.

Mr. A. H. Mattingley.—Aboriginal artifacts from Central Australia.

Mr. Noel Lothian.—Specimen of *Daviesia brevifolia* and *Pultenaea angustifolia*; collected near Torquay in September.

Mr. S. R. Mitchell.—Cut and polished agates and related minerals, including chalcedony, cornelian, onyx, chrysoprase, sardonyx, jasper, ribbon stone and bloodstones. Also examples of ancient seals (probably before the first century) made from chalcedony and cornelian. Also Tellurides of gold and silver from Western Australia, Fiji and Colorado, U.S.A.; gold from Tennant's Creek, Northern Territory, and Fiji, and plate gold from near Albury, N.S.W.

Mr. F. S. Colliver.—A series of Silurian fossils from the Melbourne district, comprising specimens of practically all the classes.

THRUSHES IN THE GARDEN

Each nesting season for the past five years a pair of Song-Thrushes have built in my fernery, and despite the greatest of care and supervision exercised by myself and members of my family, tragedy has always overtaken them, generally (metaphorically speaking) at the hands of the domestic cat. Last year they, or another pair, built their home in a hanging basket a few feet from the ground, and, while it is possible to afford protection, six days a week, I had the mortification of seeing a cat standing on his hind legs scooping out the last fledgeling from the nest when I was returning a little earlier than usual from a Sunday afternoon walk.

This season I have taken extraordinary precautions of assisting the Thrushes to rear their brood, even to the extent of placing material and old discarded strainers for nests and small wire mesh to prevent them being clawed through the lattice. There are many sites, inaccessible to birds-of-prey and cats, yet the Thrushes chose the top of a staghorn fern a foot inside the door for their home, in full view of tradesmen coming and going. I have approached so close to the bird as to see my face reflected in her eye, and during building operations have endeavoured to settle the oft-vexed question, "How does a bird build her nest?" The male assists by bringing the material.

A. B. P. Underwood.

Plate XVII

Stickles and Prickles at Breakfast

THE ECHIDNA UNDER DOMESTICATION

By EDITH COLEMAN

With both of my domesticated Echidnas, Stickles and Prickles, the casting and renewal of skin and spines has taken place in a fragmentary but thorough manner—a somewhat bird-like shedding of spines and an ordinary mammalian shedding of skin. Like hibernation this process is a very matter-of-fact affair and does not appear to affect the animals' health in any way. There is no dejected appearance which is noted in many birds and animals at such times.

Tufts of hair and spines as shed

On June 26, 1934, I noticed that Stickles' body was scurfy. The condition had increased to such an extent by July 8 that I suspected skin trouble. Thinking something was lacking in his diet I added orange juice to the mixture. On July 16 the hair had fallen from his legs and underparts. Single spines were shed when he groomed himself. Others were shed with tufts of skin and hair as shown in the illustration on this page. By July 23 all the spines with overlapping points down the centre of his back had been cast.

In two more days the undersurface was covered with soft, short hair. Black tips of new spines were visible on his head and sides, and in a few more days these were quite prominent, like pin-feathers on a moulting fowl. On July 31 the skin had left the soles of his feet, which were now smooth and soft. All the small spines had fallen on August 23. The largest ones were still quite firm, giving him a rather ridiculous appearance. In five days more Stickles' undersurface was well clothed with long hair, soft and very fine, and by October 6 he was fully armoured with new spines, whose steely-blue tips shone beautifully as they caught the light.

Stickles no longer looked dingy. In December the new hair had greatly coarsened, the spines had lengthened, and by early January he was once more glossy and well-groomed. As late as March 16, 1935, there were still one or two of the largest of the old spines. These were yellowish. The new spines were white, except for their black points. The shedding and renewal of skin and spines, a lengthy process, was now completed. On July 4, Stickles' coat once more became scurfy and the gradual changes noted last season are again taking place.

On May 10, 1935, Prickles' body, too, was slightly scurfy. The condition increased until July 6 when the first spines were freely shed. In a few days most of the head and tail spines had fallen. By July 25 the central line of crossed spines had all vanished. Later both Echidnas lost their sleek, well-groomed appearance.

Probably this skin casting was responsible for Burrell's rather exaggerated assertion that the Echidna is "about the dirtiest wanderer afoot" (*The Platypus*, Burrell, 1927). His statement that the eyelids of an adult Echidna of either sex are frequently found caked with a mixture of earth and secretions from the eyes has not been borne out by the four Echidnas which I have examined at close quarters. Certainly loose skin, which is shed from the eye-regions, as well as the rest of the body, temporarily spoils the appearance of the eyes, but they are by no means dirty.

The Echidna's undersurface, too, is as well groomed as the rest of its body. Such parts as are accessible to the hind (toilet) feet are freely combed. The lower part of the abdomen and area surrounding the cloaca, inaccessible to the feet, are kept clean by rubbing with the snout, with the body half-rolled. The tongue is not used for this purpose.

When Prickles accidentally falls upon his back, he usually takes the opportunity to use his toilet feet on his undersurface. Though obviously an accident I sometimes think he is trying to bluff me into the belief that he rolled over for this very purpose. When ready to right himself he stretches to his full length, rolls swiftly into a half-hoop, and with a "click-beetle" action, is right way up in a trice.

Both Echidnas exhibit a marvellous control of the muscles of the skin. When friendly their spines are flattened, but are erected with incredible swiftness when the animals are startled. At certain times Stickles has shown a fascinating, undulating movement of his spines which I can only compare with the individual movement of each spine in a living sea-urchin. As he has usually at these times been basking in warm sunshine, I have connected the movement, perhaps wrongly, with pleasure. One other habit seems worthy of note. Echidnas are often spoken of as being either nocturnal or crepuscular. So far, my Echidnas have never

A favourite basking attitude in sunny weather

emerged at night, except just after hibernation. In late afternoon, if not taken to bed, they pace up and down the out-of-door run in obvious distress. When taken into their sleeping quarters they at once enter their beds.

An adult Echidna, placed in an enclosure with Stickles, was not content. He spent the whole of the daytime hours in finding ways of escape. He too, always went to bed in late afternoon and did not emerge at night, as one might have expected him to do.

Ten months ago the nails on Stickles' toilet-toes grew alarmingly long. This remarkable lengthening will be noted by comparing the two pictures of Stickles' basking attitudes. I again blamed an ill-balanced diet, and, bearing in mind some verses which were printed in the *British Medical Journal,* I added a vitamin preparation to his diet.

I cannot, of course, claim success for the vitamin preparation, though it must be added that Stickles' toe-nails have not further

increased in length. Moreover, Prickles, who has been given the vitamin preparation right from the commencement of his life at Blackburn, has shown no sign of this abnormal lengthening.

ADDENDUM (NOVEMBER 18)

The above notes were sent to the editor in August. Stickles died on November 10 after a very short illness. As the Echidna appeared to be in perfect health almost to the end, the body was sent for examination to Mr. G. Fethers, B.V.SC., Veterinarian. Following is his report:—

The stomach appeared normal; the small intestines showed a slight inflammatory condition of a catarrhal nature extending as far down as the caecum; the large intestine appeared normal. An occasional coccidia was observed in the large intestine near the caecum but none could be found in the small intestines. We consider, therefore, that this parasite was casual and in no way associated with the inflammatory change. No other parasite was observed. The liver appeared normal, though we were struck with its size. The lungs and heart were normal, and pericardial fluid normal. The mass adhering to the pericardium appears to be a large and oedematous thymas gland, and not of pathological significance. As we are not familiar with the normal appearance of these organs in Echidna, and as we do not know the weights in relation to body size, you will appreciate the difficulty in determining what might be a pathological condition. The thymus certainly appeared to be involving heart action *in situ*, before its removal, but as we do not know the age at which the thymus atrophies in these animals it is not possible to offer an opinion on this matter. There appeared to be complete absence of acute pathological changes in the organs and an absence of parasites commonly found in other species of animals. From these negatives we can only suggest that the animal died from some functional disorder.

Mr. Fethers expressed the opinion that, from the beautiful condition of Stickles, the diet supplied had been perfect.

CHARLES STUART, AN EARLY AUSTRALIAN BOTANIST

By C. DALEY, B.A., F.L.S.

(Continued from p. 137)

Needless to say, this appeal found a sympathetic response and practical assistance to the lonely and impecunious collector, for in a letter from Hobart on November 10, Stuart writes, "Received your letter of August 18, also the enclosure, for which I return my best thanks, although it was not less than I expected from your kindness, and, as you refuse a loan, I will try and make it up in the way you mention." Obviously this would be by collecting plants for Dr. Mueller. He writes that there is snow on Mount Wellington. He has obtained a few specimens, especially *Prionotis cerenthoides*, a most beautiful Epacridaceous plant. He will try further excursions. His employer is not interested, and

the work is hard. He has no opportunity of reading or study at night, and no one to speak to on "the subject in which I take greatest pleasure." He has received a box of seeds and plants sent by Mueller, has examined and arranged them. A few are not placed in their natural positions, and he is sending pieces of these for identification.

He thinks that there are still many small plants to be collected around Mt. Wellington. He wishes his friend success on a collecting trip projected in South Australia, and would like to be with him.

The Doctor has evidently repeated an offer of employment in South Australia, for which he thanks him. "I shortly hope to be able to give you a definite answer, but I have something in view here, which, if I succeed in, will place me in a situation where I shall have much liberty to enjoy my favourite pursuit, until which I shall not say more on the subject." He hopes to procure the seeds desired, and writes, "Respecting the habit of *Alyxia buxifolia* here, the habit is very different from the *Alyxia* you send, that, if I remember right, is an upright bush. This is of a more diffuse habit, growing in some instances 5 to 6 feet with the assistance of other shrubs growing near it, the roots lying bare on the sandy bank on the seashore, of the thickness of 6 inches through, and very sweet-scented when cut or burned, quite as agreeable as the *Santalum*, but not in sufficient quantity for any useful purpose. From some cause nearly all the plants I saw were dead or dying." The *Correa* is a variety of *C. viridis* extremely variable. "The *Clematis* you name *C. microphylla* differs extremely from it in robust habit as well as colour of flowers, which are of a pale-yellow. It is only found here in one locality on the extreme top of the seashore, climbing amongst the *Acacia sophoræ*, etc., but is plentiful on the opposite coast at Portland Bay and Port Phillip."

He asks for the natural orders of certain specimens, and regrets his delay in replying to the last letter. He adds, "The fruit and gum of our *Pittosporum bicolor* (Hooker) is not of such an intense bitter as the *P. mimosoides* of South Australia. The gum, which is produced sparingly, is of a pink or rosaceous colour, and of a disagreeable taste, like tallow. The name *Gymno-schœnus adustus* I got from Mr. Gunn, and I believe he obtained it from Hooker, but his (Gunn's) information is very limited. He has, I believe, relinquished botanical pursuits entirely, for he can get no one to collect for him, and as he has hitherto been enjoying credit from the labours of others as well as myself, the loss to science is not great. Your *Diuris debilicaulis* I have known by Gunn's name, *D. menziesii*."

It will be seen that Stuart had in great measure, under the

influence of regular work, and the Doctor's kindly help, recovered from misfortune. The letter quoted was the last from Tasmania. It is evident later that the prospect mentioned of a better situation had not come about, and that once more his fortunes were at a low ebb.

It is certain that he had received word that Mueller was about to leave Adelaide for Victoria, for the last letter of the series, undated, but postmarked April, 1852, is from Melbourne, where Stuart hopes to see Mueller, who with countless others is attracted to Victoria at the news of the gold discovery. This letter tells its own story:

"I hasten to give you a short reply to your two last letters, and to inform you that I am just about two hours since arrived in Melbourne, and as there is a vessel just sailing for Adelaide, I thought I would take the opportunity of letting you know where I am." He had started a letter before leaving Hobart, and continues, "but I have been so unsettled lately that I could give you no account of my address. This place seems to be very flourishing from what I see in the few hours I have been here, but nothing, I think, in my line. I am not able to go to the diggings for want of means, and shall endeavour, therefore, to obtain some employment here for a time, in fact until I see you, which meeting I anticipate with much pleasure, so do please write to me as soon as you receive this. I have a box of specimens for you, but unfortunately I cannot get them from the hold of the vessel in time to send by this conveyance. I just write this in much haste, being determined to put you out of suspense respecting me . . . but long to see you, when I anticipate much pleasure, and I think that I have many specimens which will please you, the result of my late imperfect researches; some I believe new, others rare, from Southport, Recherche Bay, etc. I have just now about 5/- in my pocket, so must look out for something to recruit my finances, being a stranger here. I feel highly flattered and honoured by the eminent distinction you have procured me, and, believe me, that I shall, when circumstances permit, resume our favourite pursuit with fresh ardour. In the meantime I beg you to write to me to say when I may expect you here, and I will not leave. You will perceive by this that I am very unsettled. I must close this short letter as the mail is just closing. I must run to the post office.

And remain as ever,

Yours truly,

The address given is C/o Mr. Thomas Dudley, 89 Great Collins Street, Melbourne (near the market).

The correspondence ceases with this letter, but there is no doubt that the much-desired meeting with Dr. Mueller took place, and

that on his appointment as Government Botanist of Victoria the Doctor employed Stuart in some capacity. There are many plants in the National Herbarium bearing Stuart's name as collector; but there is no information available as to his movements or career in Victoria. Hooker states that he collected *Algæ* in Van Diemen's Land for Harvey,[11] the distinguished Algæologist, who visited Australia in 1855. In later years Stuart was collecting in New South Wales in the New England district, at Timbarra and Tenterfield. At the latter place he spent his declining years as a gardener, and was also in the service of Mr. C. Heath Smith, at Gosford, until his death in 1877 at Parramatta, where he is buried in the Church of England cemetery.

Note.—Through the courtesy of the National Herbarium, the following equivalent names now in use have been furnished:—*Gymnoschœnus sphærocephalus* (Hook) for *G. adustus*, *Melaleuca* for *Calothamnus*, *Oxylobium* for *Podolobius*, *Gunnera* for *Milliganio*, *Statice* for *Taranthema*, *Banksia marginata* for *B. depressa*, *Hakea cucullata* var. *H. Victoria*, *Chanthus Dampieri* (Cunn.) for *Donia formosa*, *Dicksonia antarctica* (Lab.) for *Cibotium billardieri*.

ERRATA

p. 107, Vol. lii, No. 6. Heuzenroder.
p. 134, Vol. lii, No. 7, line 21.—*propinqua*.
31.—*amphibium*
35.—*linearis*.
p. 136, Vol. lii, No. 7, line 38.—*squamata*.

CHAS. DALEY.

11. Harvey, W. H., Professor of Botany, great Algæologist. Visited Australia, 1855. Collected on Victorian coast.

THE LATE FREDERICK PITCHER

One of the most honoured founders of the Field Naturalists' Club of Victoria, Frederick Pitcher, died on November 21, at the age of 79 years. He was born in Collingwood in 1856, when that busy suburb was almost a country adjunct to Melbourne.

In his early days he became a botanical assistant to Baron von Mueller at the Melbourne Botanic Gardens, and there is no doubt that the firm knowledge he subsequently attained, as well as his precise care in detail, were acquired under that great botanist.

Subsequently he transferred to the Lands Department as a clerical officer, working there for quite a long term. He was then transferred back to the Botanic Gardens, where he took charge of the office as clerk and accountant. Here he was associated with the Director, W. R. Guilfoyle. Subsequently, when John Cronin became curator, Mr. Pitcher was appointed assistant curator.

It is more than passing interest that the house he occupied in the Gardens for so many years, and from which he retired, was

the one in which Charles French the first, another of the founders of the Club, had previously lived.

Under Mr. Guilfoyle, he was associated with many of the reforms and improvements in the Gardens, which were carried out by the Director, and which resulted in the beautiful gardens that we have to-day. In many ways Mr. Guilfoyle left much of the detail work to Mr. Pitcher, who had excellent views in regard to planting and to plant associations.

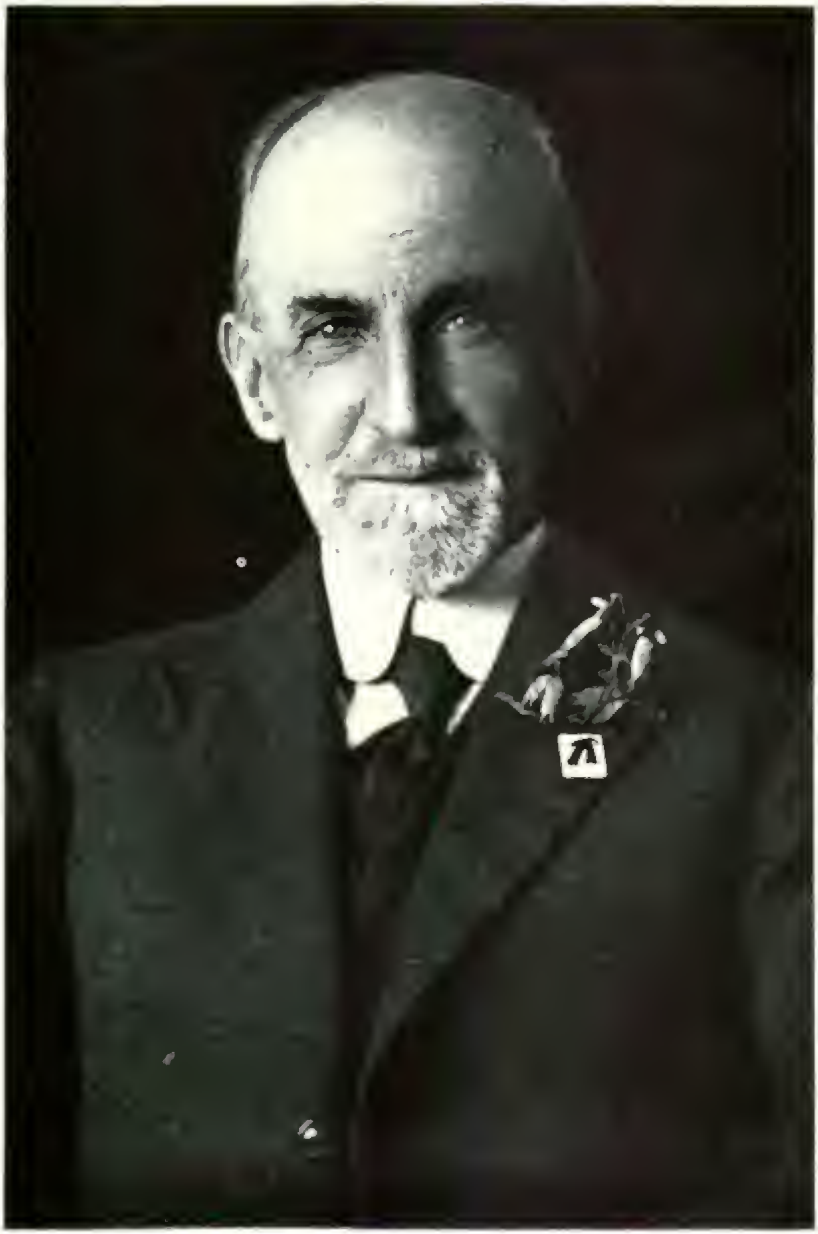
Our late founder was especially interested in Australian flora, and the success of the section of Australian plants in the Melbourne Botanic Gardens, which was such a fine feature of the flora, was largely due to his efforts. He had friends all over the Commonwealth, and from them he drew largely of seeds and plants for planting in the Gardens. The "List of Australian Plants in the Melbourne Botanic Gardens," published by Mr. Pitcher in the *Victorian Naturalist* about twenty-five years ago, shows how extensively he searched the Commonwealth for the plants he so much loved.

He was especially interested in Australian ferns: he studied them extensively, grew them in his own garden, made a very complete herbarium collection of fern specimens, paying especial attention to aberrant, cristate and fasciated forms. He exhibited many hundreds of specimens of ferns at meetings of the Club, specimens of both living and herbarium plants. He published in the *Naturalist* about twenty-five years ago a complete "List of Ferns of Victoria," giving a brief description, with habitat records. This list was revived as a reprint, and was very much in demand. It was, and still is, valued by collectors, and I especially value my own autographed copy.

Our late friend's knowledge of extra-Australian plants was very remarkable: and I have seen him name off-hand very many rare plants, without any reference to books or to the herbarium. The beautiful artificial fern gullies in the Melbourne Botanic Gardens are mainly the result of Mr. Pitcher's interest and activities in the fern world. Originally, the lily ponds in the Gardens near Park Street was a swamp, well grown over with *Melaleuca ericifolia*. The overflow from this swamp ran down a gully into the Yarra, a portion of the old river now forming part of the lake system of the Gardens near Alexandra Avenue. When it was decided to form the upper swamp into a lily pond, the suggestion to preserve the natural features of the gully, interplanting the trees with many tree-ferns and other smaller species, was a foregone conclusion.

Mr. Pitcher worked with Mr. Guilfoyle on this scheme, supervising the placing of the stones to form the rocky creek, and generally arranging all of the details. The fern gully is now a delight to all visitors, especially in summer time, and its green

Plate XVIII



Frederick Pitcher

coolness will long remind us of Mr. Pitcher's love and energy in this work.

As Treasurer of the Club for many years, Mr. Pitcher's work was always a model of neatness and correctness. His balance sheets were always well explained, and his efforts were invariably in the direction of forming a permanent fund, so that the Club would have a good "nest egg" producing interest. But it was in the Flower Shows that Mr. Pitcher displayed very keen interest. As Director of the early shows for many years, he made these functions a very great success. In addition he never missed an excursion prior to the Show in order that he might stage a good exhibit, representing the flora of the district visited.

When the late T. Moore was Director of the Sydney Botanic Gardens, he created a new species of Elk-horn fern, which he named *Platycerium Hillii*, after the late Walter Hill, Director of the Brisbane Botanic Gardens. Subsequently, the late J. H. Maiden, Director of the Sydney Botanic Gardens, reduced the species to a variety of *P. alcicorne*, stating that the variety only differed from the type in that "the fronds are of a thicker texture, and the lobes broader and shorter." Mr. Pitcher very definitely disagreed with this latter determination, urging that *P. Hillii* should be kept as a very clear species. Only a few weeks ago we were talking about ferns, and he remarked to me, "Be sure that you always recognize *P. Hillii* as a separate species." I met him last at our Nature Show, just six weeks ago, and he was as keen as ever to see the few ferns there staged.

Few pioneers of the Club remain among us. Only two of the founders remain, Messrs. Dixon and Bale; while I think that only two others who joined the Club in the first year are now with us, Mr. Geo. Coghill and Mr. Pitcher's brother-in-law, Mr. Stickland.

We shall all miss Frederick Pitcher. To young and old he was always kind and courteous: his able work as Treasurer will long be recognized: and while we regret his passing and sympathize with those who are left, we are honoured that he has left such a valued and useful record behind.

E. E. Pescott.

CLASSIFICATION OF EUCALYPTS

The Editor, *Victorian Naturalist*.

Sir—

I have followed with some interest the articles by Professor Ewart and Mr. Blakely in the *Victorian Naturalist* dealing with the classification of Eucalypts.

I may say that my first feelings on reading Professor Ewart's original article were those of annoyance because I felt that Mr. Blakely was being

made the target at which to aim a general criticism of the present-day laws of botanical nomenclature. We may feel personally that Mr. Blakely has made a mistake in resurrecting a lot of old names for well-known Eucalypts and substituting others in their places and think that a horror such as *Eucalyptus canaldulensis* for the more euphonious and better-known *Eucalyptus rostrata* should not be tolerated.

Mr. Blakely is only obeying the laws laid down by the International Rules of Botanical Nomenclature, however absurd they may seem to many of us. One may not see eye to eye with Mr. Blakely in the multiplication of species but the fact remains that Mr. Blakely stands as the leading authority in the world to-day on the classification of the genus *Eucalyptus*. Personally, when I am in any doubt of species I have always called in his aid and never found him wanting. I recently received a very fine set of *Eucalyptus* specimens from New South Wales collected by one of the Forestry field staff and a graduate in forestry. They were named according to Blakely's system and this forester told me he had very little difficulty in distinguishing the various species in the field.

As regards the classification of Eucalypts it is very easy to criticize, but, though they are a natural group in themselves, any attempt to make a classification into groups based on several natural characters is extremely difficult and if any other system but the one based on anthers alone for the main groups can be utilized I am sure that Mr. Blakely would be the first to welcome it.

Mr. Blakely has done a useful service to Australian botany. He has spent a good deal of his own time and money in presenting his book on the genus *Eucalyptus* and I think the thanks of Australian botanists on the whole are due to him.

I think with Professor Ewart that the present laws are only bringing botany into disrepute among others than purely systematic workers, especially those in the larger European and American Herbaria, but this does not justify an attack on Mr. Blakely's book.

As regards the nomenclature of the Eucalypts from the point of view of commercial and general botanical purposes, the only feasible thing to do would be to draw up a check list of important species for use in Australia irrespective of the International Rules.

That the need for some standardization in the nomenclature of important plants has been recognized, at least by systematic botanists, is evident from the following extract just published in the *Journal of the New York Botanical Garden* in an account of Sixth Assembly of the International Botanical Congress convened at Amsterdam, September 2-7.

"Among the more significant undertakings of the Congress, at least from the viewpoint of applied science, was the appointment of a committee to prepare a standard reference list of binomials for the important economic plants of the world, in accordance with the rules and nomenclature of the International Code. When completed, this will mean an international authority for all commercial and scientific enterprises concerned with the names of plants. This list is to be valid for ten years for economic botanists, foresters, horticulturists, and non-professional botanists who must use plant names, notwithstanding changes in nomenclature that may be made by scientists within that period. This is carrying the effectiveness of the International Code a step farther and, when completed, will constitute an outstanding example of international co-operation in science." —Yours, etc.

C. T. WHITE,

Government Botanist, Queensland.

Botanic Gardens,
Brisbane,
13/11/35.

The Victorian Naturalist

Vol. LII.—No. 9 January 7, 1936 No. 625

THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, December 9, 1935. The President, Mr. G. N. Hyam, presided, and about ninety members and friends attended.

The President referred to the late Mr. F. Pitcher, a foundation member, whose death was a great loss to the Club. Mr. C. Daley and Mr. Geo. Coghill also spoke. Members stood in silence, out of honour to the memory of a man who had no enemies, but a host of friends.

SUBJECT FOR EVENING

The subject for the evening was an illustrated lantern lecture on "The Western Grampians," by the Rev. Clarence L. Lang. The President introduced Mr. Lang, who gave a running commentary on a large number of lantern slides covering all phases of the wild life and scenery of the area. Many were fine bird studies.

At the close of the lecture, Messrs. A. D. Hardy, C. Daley and A. Underwood made appreciative remarks; the President expressed the thanks of the Club to the lecturer.

CORRESPONDENCE

From Mr. Tom Tregellas, thanking the Club for sympathy expressed in his illness.

From Mr. A. H. Mattingley, thanking the Club for a letter of sympathy on the occasion of his mother's death.

From Mr. F. Robbins, re orchids collected and sent for exhibition.

REPORTS OF EXCURSIONS

Reports of excursions were as follow: Toolern Vale—Mr. E. S. Hanks; Montrose—no report; Montmorency—Mr. Ivo Hammett for Mr. A. R. Proudfoot.

ELECTION OF MEMBERS

On a show of hands the following were duly elected; Miss R. Hyne (as Ordinary Member) and Miss Agnes Armstrong and Master Tom Harris (as Associate Members).

NATURE NOTES

Mr. J. Searle sent a microscopical slide of a newly-recorded bivalved crustacean from Australian waters, together with some notes on the animal; the material from which the slide was prepared had been in his possession for some twenty-five years.

This completed the business for the evening and the meeting adjoined for the conversazione.

EXHIBITS

Mrs. Fenton Woodburn.—Fossil Coral from Erromanga, New Hebrides. (From raised beach now two miles inland and 800 ft. elevation.)

Mr. Noel Lothian.—*Diuris longifolia*, var. *concolor*; found at Mt. Cannabil, near Bunyip, November, 1935.

Mr. F. Robbins (per Mr. E. E. Pescott).—Tangle Orchid (*Cleisostoma tridentata*), from Orbost, East Gippsland.

Mr. G. N. Hyam.—Leaf of the Long-leaved Box (*E. eleophora*), 25½ inches in length.

Mr. R. H. Croll.—Leaf of Long-leaved Box (*E. eleophora*), 27 inches in length. It was stated that the late Mr. F. Pitcher had a specimen 30½ inches in length.

THE TANGLE ORCHID.

I owe the discovery of specimens of the Tangle Orchid to Mr. E. E. Pescott, who wrote telling me that thirty years ago he had gathered *Sarcochilus parviflorus* on *Eriostemon trachyphyllus* on the Wilbenduck Creek, a small tributary of the Snowy River, about eight miles from Orbost. I decided to hunt these up, and duly arrived at the most likely-looking creek. The people living in the farmhouse there later told me that it was called Pipeclay Creek, and that no one had ever heard of Orchids there. However, I decided to venture up its dry, stony bed, which was fringed with ferns (including *Pteris umbrosa* and *Cyclophorus serpens*, *Dryopteris decomposita*, etc.), and other plants. After much searching, I found little Orchids growing everywhere, but no flowers. I took it for granted that they were *Sarcochilus parviflorus*.

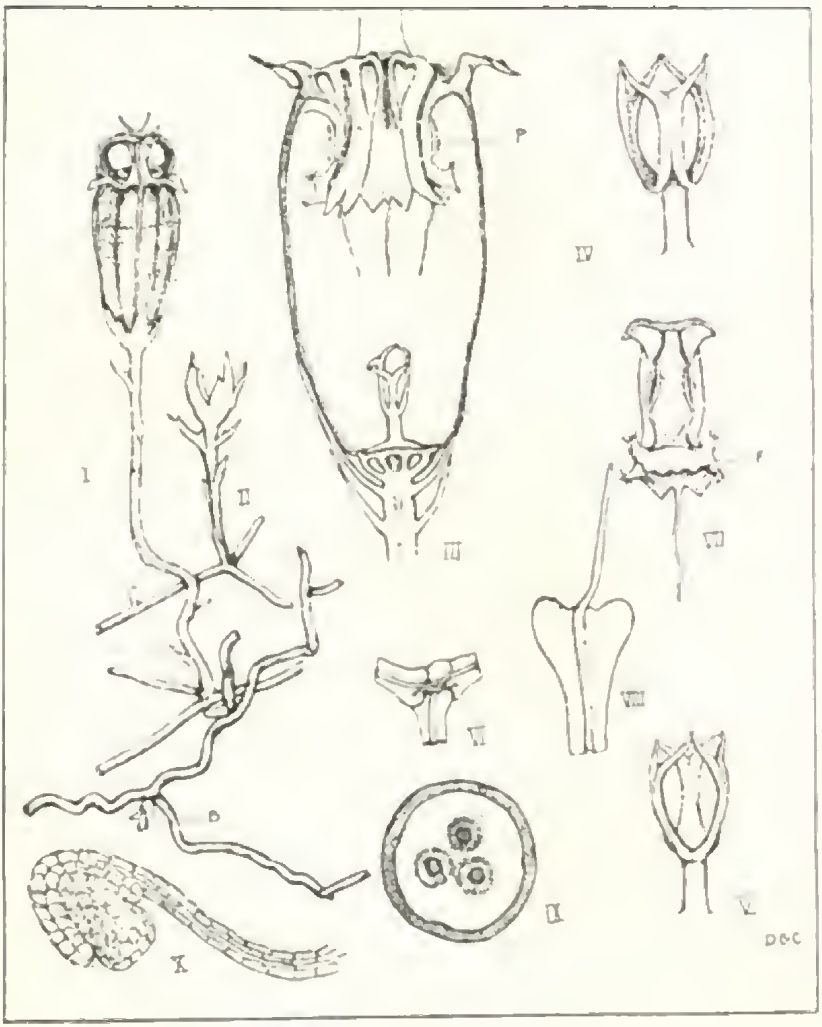
Upon revisiting the creek, I found the Tangle Orchid, in flower, growing in profusion on dead twigs, branches and living branches of Musk and many other trees. A single plant of a different species was found by a member of my party. It was *Sarcochilus parviflorus*, the Orchid I had originally looked for; the other being new to me. From the picture in *Gems of the Bush* I guessed it to be *Cleisostoma tridentatum*, apparently not hitherto found in Victoria. One specimen has a raceme of large "pods" on it. It was on a dead stick lying in the bed of the creek, and suffering from its surroundings. Slugs had eaten its flowers. We hunted in vain for more "pods." Tangle Orchids seem to love the moist air above the creek bed, and are often seen hanging by a single "thread." The air roots are often quite tangled, and sometimes run two feet along a branch.

F. ROBBINS, Orbost.

SARCOSIPHON RODWAYI IN AUSTRALIA

By DOROTHY G. COLEMAN, B.A.

A ramble through Sherbrooke Forest early in November, resulted in the discovery of a remarkable plant, not hitherto recorded in Australia. Only the flowers appeared above the earth, like



Sarcosiphon Rodwayi (F.v.M.) Schltr.

little amber and red lanterns, two-thirds of an inch high. The scapes, each terminating in a flower, bore a few white, scale-like leaves. A section through the root showed a remarkable system of fungal hyphæ forming large coils among the cortical cells.

The plant, belonging to a family of rare, chiefly tropical, saprophytic herbs, the THISMIACEÆ, was identified by Dr. Ethel McLennan (Botany School, University of Melbourne), as *Sarcosiphon Rodwayi* (F.v.M.), Schltr., described by Baron von Mueller as *Thismia Rodwayi* (*Proc. Roy. Soc.*, Tas., 1890, and *Vict. Nat.*, Dec., 1890), from specimens collected by Mr. L. Rodway in Tasmania, near the estuary of the Derwent, and, later, on the slopes of Mt. Wellington.

The Baron records his astonishment at finding a *Thismia*, "not, as might have been looked for, in North Eastern Australia, but in such an extreme extratropical isolation." . . . "That so remarkable, and to some extent, also showy plant, should have evaded hitherto observation, although since almost nearly one hundred years the region about the estuary of the Derwent has been searched for plants, finds perhaps its explanation in the fact that in all likelihood the flower only is peeping above the soil between decaying foliage, and the flower must be very ephemerous and perishable. Now it will likely be found in other places of the island, perhaps, also, in New Zealand and in Continental Australia." (*Proc. Roy. Soc., Tas.*). In the folder containing specimens of the Tasmanian plant, at the Melbourne Herbarium, is a letter from Sir Joseph Hooker to Baron von Mueller, in which he writes: "I have this morning received your account of the Tasmanian Thismia—it is really like a dream: since any preconceived idea of that genus turning up there would have been scouted by every reasoning naturalist who heard it. Had it been fossilized only it would have revolutionized [our idea of? (D.C.)] the former climate of the Southern Hemisphere."

Now that the Tasmanian species has appeared in Continental Australia, the Baron's prediction has been fulfilled, for in 1903 a new species (with rose-pink flowers) was found in New Zealand and described in the *Kew Bulletin* (1908) by Cheeseman as *Bagnisia Hillii*.

The plant bears several synonyms. The genus *Bagnisia* was described in 1878 by Beccari, who separated it from *Thismia* on account of the fusion of the three perianth lobes to form a dome over the mouth of the perianth tube. Baron von Mueller considered that either the genera *Geomitra* and *Bagnisia* should be merged into *Thismia* or that the Tasmanian plant should be generically isolated as *Rodwaya*. He preferred the former course, so the plant became *Thismia Rodwayi* F.v.M. syns. *Bagnisia Rodwayi*. *Rodwaya thismiacea*. F.v.M.

In 1921 Schlecter, who recognized that *Bagnisia* was identical with a genus created by Blume in describing *Sarcosiphon clandestinus* (1849), took up the genus and re-established the earlier name. Thus the Australasian plant is now *Sarcosiphon Rodwayi* (F.v.M.), Schltr.

"Fairy Lanterns" *Sarcosiphon Rodwayi* (*Magnified X2*½)
(*From a color drawing by Dorothy Coleman*)

As Baron von Mueller suggested, these little "Fairy Lanterns" are extremely difficult to discover. Returning to the forest a week after our discovery, we had almost given up hope of finding further specimens, when, scraping away the soil in the vicinity of the first "find," we revealed one more flower—fully open, but completely underground. This plant was removed carefully with portion of the root of a Hazel (*Pomaderris apetala*), upon which

Transverse section through root showing fungal hyphae (H.P.)

it grew. The flower was surrounded in the soil by a remarkable bag-like web composed of fungal hyphæ and fine terminal roots of the Hazel. The latter contained fungal hyphæ between the cortical cells and around the stele. The soil had an unpleasant, putrid odour, not noticeable in the plant when removed. (Blume recorded a smell of decaying fish about the root of *Sarcosiphon clandestinus*, Bl.)

The perianth is very brittle and specimens are easily broken in being removed from the soil. Although too fleshy to press well, the flowers appear to retain their colour when preserved in spirit.

A section through the root, is illustrated on page 165, showing the coils of large fungal hyphæ in the cortex. Fig. VI (page 163) shows the three inner perianth lobes from above. They are fused only where the fleshy ridges meet at the apex of the mitre, the free tips being interlaced or plaited.

Fig. VII of the same illustration shows one of the six stamens which are deflexed to form a tube within the perianth. The filaments are continued beyond the anther cells into a bi-denticulate structure, from which arises a broad membranous frill (F). This bears four groups of firm, fleshy appendages, each group resembling the rowel of a spur. In a freshly-opened flower the arms of the three bifid stigmas touch lightly at the tips, giving an arched effect. This is shown from different angles in figs. IV and V.

All the material collected at Sherbrooke is now at the University, where the mycorhiza will be examined by Dr. Ethel McLennan, to whom I am greatly indebted for identifying the plant, and for literature on the subject.

KEY TO ILLUSTRATIONS ON PAGE 163.

I and II: The plant, bud (B), (x 1½); III: Section of flower, pollen (P), (x 4); IV and V: The style, (x 7); VI: Inner perianth lobes from above; VII: A stamen (x 3½); VIII: Inner perianth lobe (x 4); IX: Section through ovary (x 10); X: Ovule (x 80 approx.).

REFERENCES

Notes on a new Tasmanian plant of the order BURMANNIACEÆ, F. von Mueller—*Roy. Soc., Tas.* (1890-1891), p. 232; *Vict. Nat.* (1890); *Die Thismieae*, Schlecter—*Notizbl. Bot. Gart.* Berl (1921), 8: 31-45; Sarcosiphon, Blume—*Mus Bot. Lugd*—Bat. I (1849); *Families of Flowering Plants*, Hutchinson; *Flora of Tasmania*, Rodway; *Flora of New Zealand*, Cheeseman.

IN PRAISE OF WATTLES.

In a forty-page book entitled *Come Back in Wattle Time* (National Handbook Series, No. 13, published by Robertson & Mullens Ltd., Melbourne), Mrs. Edith Coleman has succeeded in covering a considerable proportion of the Acacias known in Victoria, either in the bush or the garden.

The book is not merely a catalogue and key, but deals with every aspect of many species. The short botanical and morphological descriptions together with a glossary of botanical terms should be an aid to identification even for the general reader. The parasitic galls and other pests of the wattle are described and illustrated. Mrs. Coleman also deals attractively with the wattle in art and literature. She pays tribute to the work of the Wattle League, founded by the late A. J. Campbell. For those interested in Acacias as garden subjects, a list of the species known to do well under cultivation is included. There are hints on the raising of plants from seed. The little book is well illustrated. The photographic illustrations clearly illustrate the inflorescence. Diagrammatic drawings of single flowers, buds and seed formation are given. *Come Back in Wattle Time* can be be recommended to naturalists and general readers alike. Mrs. Coleman has again succeeded in combining botanical description and even ecological and economic data with the attractive popular style which is a feature of her articles in the *Victorian Naturalist*.—G.N.H.

ORCHID NOTES: TWO NEW VARIETIES

By W. H. NICHOLLS

(1) *Caladenia Patersonii*, R.Br., var. *magnifica, N. Var.*—This is a particularly attractive "spider." It was collected at a locality called "Rising Shine," in the Clydesdale District. The soil is alluvial. When first seen it appeared to be a distinct species, but closer inspection proved its affinity with the type.

Unfortunately *Cal. Patersonii* embraces many forms, thus this addition cannot, at present, be separated. It is very striking and deeply marked, and well worthy of a name, in keeping with its regal appearance.

Planta robusta, flos solitarius, magnus, flavococcineus, conspicue ornatus, circiter 20cm. in diametro, labellum oblongo-cuneatum, magnum, crasum, marginibus recurvatis.

A fairly robust plant about 30cm. high. Flower solitary, large; the perianth-segments yellow; generously streaked and speckled with crimson; the gland-beset filiform points purplish-black; sepals and petals about equal in length (up to 10cm.); labellum oblong-cuneate, irritable on a broad crimson claw, almost wholly purplish-black; the lateral lobes densely-veined, marginal fringe long and recurved; calli in 6-8 rows extending to just beyond the bend; mid-lobe thick and fleshy, often circinate, very long; margins undulate-crisped. Column yellow, richly marked with crimson.

Victoria: Clydesdale, Oct.-Nov., 1932, 1933, 1934 (Miss M. Ritter).

(2) *Ptersostylis pusilla*, Rogers, var. *aciculiformis*, n. var.—Since this species was established by Dr. R. S. Rogers, several interesting local forms have been found. The following addition is of interest. The name refers to the needle-like sepal points.

Differt a typo.. Flores compressissimi; sepala aciculiforma.

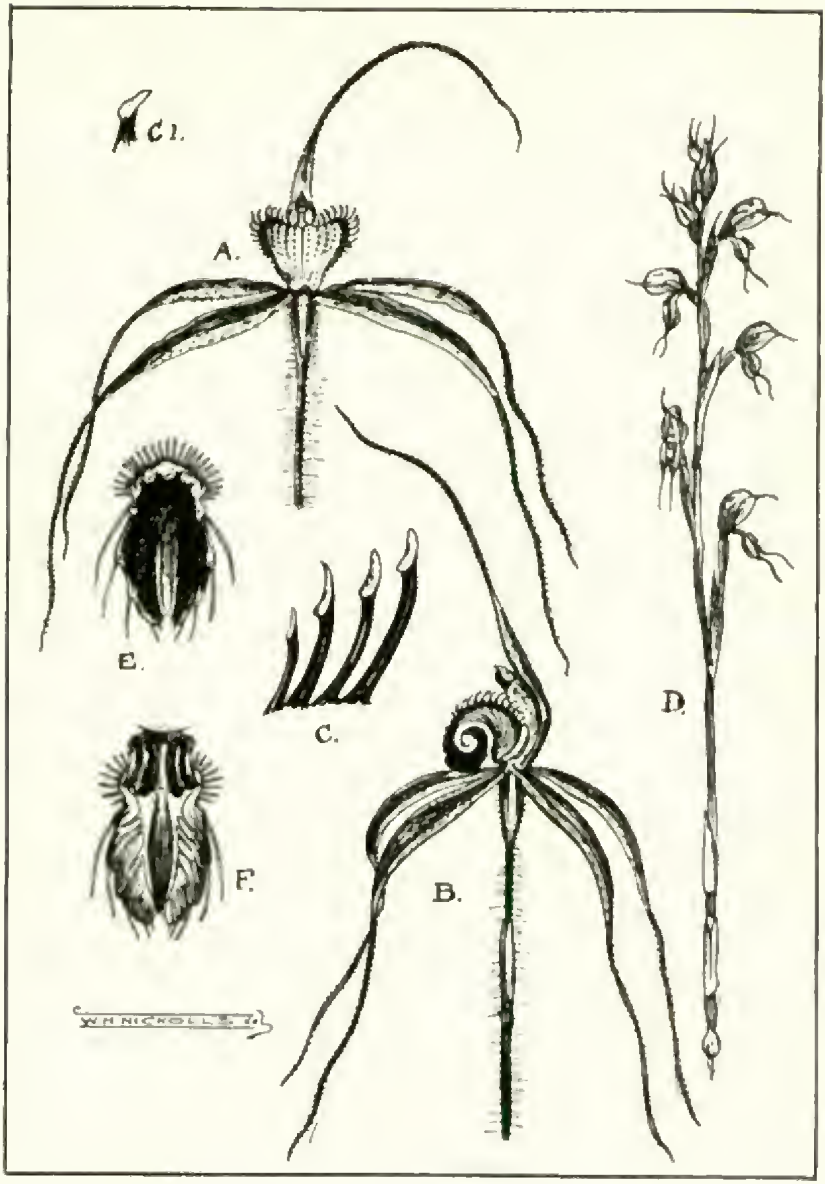
A very slender plant, wholly glaucous-green with pale rusty-brown markings. Flowers up to 10, small. Very much compressed laterally; the apices of sepals produced into caudæ of needle-like appearance.

Victoria: Clydesdale, Sept.-Oct., 1932, to 1935 (Miss M. Ritter).

(3) *Pterostylis rufa*, R.Br.—This comparatively rare species has been discovered by the writer at Coimadai East. Several plants were noticed in an open space. (Oct., 1935).

DETAILS OF ILLUSTRATION, Page 168.

A. *Cal. Patersonii* var. *magnifica*. Flower from front.
B. *Cal. Patersonii* var. *magnifica*. Flower from side, showing long labellum.
C. Call. from the Labellum-margin.
C1. Call. from the Labellum-lamina.
D. *Pterostylis pusilla* var. *aciculiformis*.
E. *Pterostylis pusilla* var. *aciculiformis*. Labellum from above.
F. *Pterostylis pusilla* var. *aciculiformis*. Labellum from below.



Terrestrial Orchids: New Varieties

Plate XX

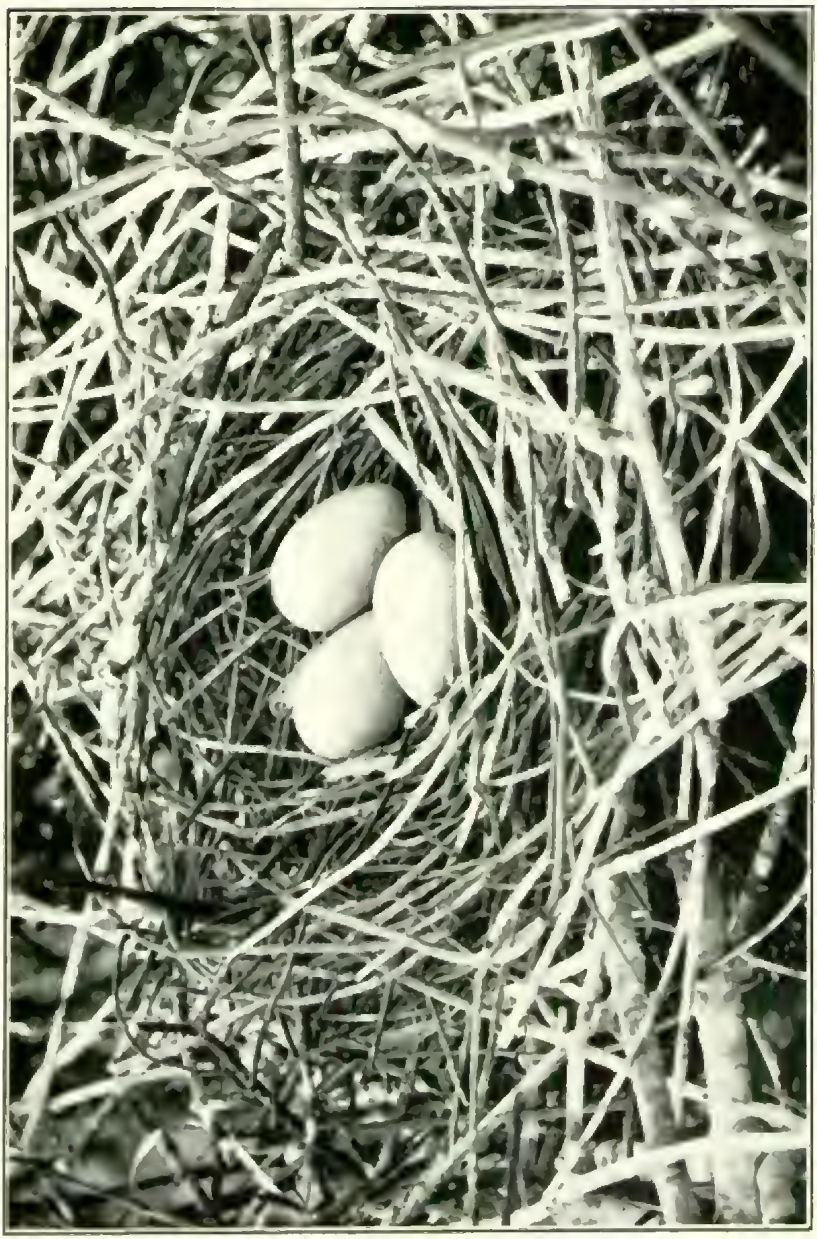


Photo. by Chas. Barrett

Nest and Eggs of Glossy Ibis (*Kerang, Victoria—December*, 1935

GLOSSY IBIS NESTING IN VICTORIA

By CHARLES BARRETT

Though there are several records of its occurrence in Victoria only once has the Glossy Ibis (*Plegadis falcinellus*) been known to nest within the boundaries of this State. In December, 1935, about 50 pairs were found nesting in the great Ibis rookery at Kerang. Mr. Fred Stewart, a local observer and sportsman who possesses a wide knowledge of bird life on the lakes and swamps, guided a small party, including Mr. F. Lewis (Chief Inspector of Fisheries and Game) and myself, to the colony of "Glossies" in a crowded suburb of the Ibis city.

We estimated that 100,000 birds were nesting among the Lignum bushes that form islands, large and small, in the lakes. Straw-necks (*Threskiornis spinicollis*) greatly outnumbered the White Ibises (*T. molucca*), of which there were thousands, however, and it was among the former that the Glossy Ibises were at home. A few pairs were scattered widely through the rookery, but numbers of nests containing blue-green eggs were on one Lignum island, several close together; others between, or surrounded by, nests of the Straw-necked Ibis. A mixed colony of common birds and rare visitors, apparently on good terms. Mr. Ron Monro, who spent hours in a flattie, round about the colony, observed nothing but amity. There was no squabbling and no pecking at neighbours, such as one sees in a Gannet rookery or among nesting Silver Gulls. But young Straw-necks were scrambling everywhere and often a nest of the Glossy Ibis held dusky chicks as well as eggs recently laid. We saw only one Glossy nestling, evidently the visitors had arrived long after the other two species began to nest, for hosts of both White and Straw-necked Ibises already had ranged. Still, many clutches of dull-white eggs were seen, and chicks in all stages.

As we approached in flatties, thousands of birds rose from the trampled bushes, among them the Glossy Ibises, which looked black against the sky. Their smaller forms are more graceful and slender than those of the common Ibises, and their flight is beautiful. We were reminded of Japanese vase designs, and colour prints and paintings of Old Japan, as the Glossies, with their legs dangling and beak and neck outstretched, flew to dead trees, in which they perched for a while. We poled the flatties perhaps a dozen yards from their nests, and the birds were back again, only to rise before we could get within camera range.

Their nests were easily picked out from a distance, the lovely eggs, of a deep bluish-green colour, being conspicuous, resting on grey old sticks, splashed with guano. Clutches of three were most numerous; there were some pairs, and one nest contained five

eggs; often four are laid. There was no difference in general appearance between nests of the Glossy Ibis and those of the Straw-necked species. Using the same materials, and building in the same place, this Kerang colony of the cosmopolitan *Plegadis* followed the architectural style of the rookery. The nests were from a few inches to about two feet above the surface of the water, where the strong, wiry Lignum stems were thickly interlaced, and the upper portions of bushes had been trampled down freely, it was possible to stand long enough to take a photograph before water was over one's feet. Quick work was necessary to prevent submergence of the nests. We secured our pictures without an egg being even wetted; nor were there any desertions, as we learned on a second visit to the colony next day.

It was interesting to see nests practically at water level, for the Glossy Ibis has usually been regarded as a builder in trees. Thus Campbell says: "Unlike the other two kinds, this bird nests in trees" (*Nests and Eggs*, p. 945); and Neville W. Cayley states that the nest is "generally placed in an upright forked branch of a tree" (*What Bird is That?*, p. 234). The late K. H. Bennett was the first naturalist to take eggs of the Glossy Ibis in Australia. In 1889 he found several nests, placed in upright pronged forks of branches of small box-trees, standing in a swamp, on Yandimbah Station, in the Lachlan district, New South Wales. "This species," Sir Charles Belcher writes, "differs considerably in its nesting habits from the other Ibis, for it builds a nest of sticks on a tree in a swamp. The Glossy Ibis breeds in the interior of New South Wales, and never, so far as can be ascertained, in Victoria" (*Birds of the District of Geelong*, p. 106). That was written more than twenty years ago. Now we are able to record the nesting of the Glossy Ibis in this State.

In his paper on "New Nesting Records of Glossy Ibis" (*Emu*, Vol. XXXIII, pp. 279-91), R. F. Bailey, of Moree, New South Wales, could give a list of only six places where nests have been found in New South Wales, and one in south-western Queensland. In 1921, the birds were found by the late F. Morse breeding in thousands in the Moree watercourse, ten miles from Curragundi Station. It was a season of abnormal rainfall, double the average for the district. Here, as at Kerang, the Glossies were at home among Straw-necked and White Ibises, their nests being built in the Lignum. In February, 1922, A. Mawhiney visited the rookery, and he estimated that more than 5,000 Glossy Ibises were nesting there, in Eumo or Water Willow trees.

I have met with the Glossy Ibis in Queensland and New South Wales, as well as Victoria, and had glimpses of it in the Northern Territory. In Egypt it was observed occasionally during rambles in the Valley of the Nile; for *Plegadis falcinellus* is a common

migrant through Egypt. But it is not the bird that was held sacred by the ancient Egyptians, statements by Campbell and others, notwithstanding. The true Sacred Ibis is *Threskiornis æthiopicus*, the *Ibis religiosa* of Cuvier, and *Tantalus æthiopicus* of Latham. Though now extinct in Egypt, there is evidence that the Sacred Ibis was abundant in the country in dynastic times. Consider the great number of mummified Ibises that have been found and the mural paintings of the bird brooding, and with young. In the days of Herodotus, we know from his own writings, the Sacred Ibis was a common bird in Egypt. In 1800 Savigny saw parties of eight or ten, also solitary birds; but not in the neighbourhood of Cairo. Their stronghold was, apparently, about Damietta and Lake Menzaleh, where in 1917 I saw the Glossy Ibis while admiring flocks of Flamingoes. It is more than sixty years since the Sacred Ibis disappeared from the land whose people in ancient times reverenced it as sacred when living, and mummified it when dead. It was a symbol of the god Thoth. (For summary and discussion of the evidence regarding *Threskiornis æthiopicus* as a sacred bird, and its disappearance from Egypt, see Nicholls' *Birds of Egypt*, II, pp. 437-8).

The Papyrus is associated with the Sacred Ibis, and, like the bird, that noble aquatic plant has gone from the land of the Pharaohs, excepting in cultivation, and in wild clumps here and there. The Ibis dwells in vast Papyrus brakes along the course of the Nile, south of Khartoum. You will not see the bird of Thoth anywhere above the Second Cataract, though your dragoman may point to an Egret or a Spoonbill, and declare, "That is a Sacred Ibis, sir." The simple tourist believes, and makes a romantic entry in his diary, while the modern Egyptian smiles and thinks of extra baksheesh for an oft-told untruth.

BOSMINA MARITIMA: FIRST RECORD FOR AUSTRALIA

By J. SEARLE

In 1910, the late E. C. Joshua, a naturalist well known to our older members of the Club, when on holiday in Western Australia, had a dredging excursion to the Abrolhas, or Houtman's Rocks. On his return to Melbourne he gave me a micro. slide containing a number of Entomostraca, from material collected on this excursion. On the slide were specimens of *Penilia*, and on my asking whether he had more of the material Mr. Joshua gave me a small bottle of the plankton collected off the Abrolhos with a tow net. From this I removed the *Penilia* and such of the Copepoda as interested me at the time.

While sorting through some old collections, I came across the bottle, with its label intact, and thought I would work through it again. I had the pleasant surprise of finding that among the debris in the bottom of the bottle, there was a number of the little Cladocera *Bosmina maritima*, a marine species of a common inhabitant of our freshwater ponds. In searching for the comparatively large *Penilia* twenty-five years previously, the small *Bosmina* had escaped my notice.

Bosmina maritima was first recorded by P. E. Müller in the "Cladocera of Denmark" in 1868. Hensen next records it in the plankton of the Baltic Sea, in 1890. Stenross records it in "Acta Soc. pro Fauna et Flora Fennicia XI, 1895." These were the only references to the habitat of *Bosmina* known when Dr. C. Apstein compiled the Cladocera part of *"Nordisches Plankton,"* in 1901. Since then I have not come across any reference to the species, and am pleased to record in the *Victorian Naturalist* that *Bosmina maritima* was collected in tow net off the Abrolhos, 300 miles north of Fremantle, Western Australia, in November, 1910, and the specimens have been in my possession—unknowingly—until now. *They are the first and only record of the species in the Southern Hemisphere.*

The bodies of the tiny animals (0·5 mm.) have shrunk considerably after twenty-five years in formalin solution, but the carapace agrees with the figure and description given by Müller, as do the structure of limbs, etc.

THE BROOMRAPE

I read with great interest Mr. A. J. Tadgell's article on *Orobanche* in our November *Naturalist*, and thought it might be of interest if I gave some observations which I made on November 21. I have found *Orobanche cernua* on the eastern slopes of the "Five Ways" each season for several years, and looked for it again this summer. Besides a few scattered blooms in the usual situation I was surprised to find a patch of more than 100 flower heads (mostly about six inches high) growing among grass and clover right on the main road from Kalorama to Olinda. This large patch of Broomrape is on a green embankment at the right-hand side of the road as one walks from Kalorama towards Olinda and is just beyond the plantation of young pine trees behind the "Five Ways" post office.

J. H. WILLIS.

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

The Victorian Naturalist

Vol. LII.—No. 10 February 5, 1936 No. 626

THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, January 13, 1936. The President, Mr. G. N. Hyam, presided, and about 100 members and friends attended.

CORRESPONDENCE

From the League of Youth, congratulating the Club on its stand in connection with the preservation of National monuments.

From Mrs. E. Coleman, asking assistance in obtaining a half-grown Echidna, to replace Stickles, who had died. Mrs. Coleman has permission to keep the animal.

From Mrs. Graeme Thom, of Kowat, asking the Club's assistance in preventing the stripping of wattle bark in a beauty spot, and also an endeavour to have the area protected.

The President stated that the Committee would deal with the matter. Mr. Miller suggested placing it before the Council for the Protection of Flora and Fauna also.

DARWIN IN AUSTRALIA

The subject for the evening was "The Centenary of Charles Darwin in Australia."

The President gave an outline of Darwin's life, from his boyhood days until his death.

Mr. Hyam mentioned in particular incidents in connection with the great naturalist's visit to Australia.

Mr. F. Chapman spoke on the palæontological work of Darwin, and his theory of Coral Reefs, and the confirmation of the theory, as proved by the bore on Funafuti, the cores of which the speaker had examined.

Mr. F. S. Colliver read a paper on "Darwin as a Geologist," dealing with the influence his works had had on other writers, and listing his more important contributions to geological science. He gave a list of the fossils named after Darwin, closing with a recapitulation of his work, compared with modern knowledge.

Mr. A. D. Hardy read an extract from the first edition of *The Origin of Species*, known as the "Bear Story," which was omitted from subsequent editions.

EXCURSION

Mr. and Mrs. J. J. Freame reported that the excursion to Seaholme was spoiled by the rain.

DONATION

The President reported the gift to the Club by Mr. C. French of two different editions of Darwin's *Voyage Round the World*, and extended to the donor the thanks of the Club.

NATURE NOTES

Mr. Hyam referred to a letter received by him, and reports in the press, in relation to the further vandalism at Painted Rock and other aboriginal "art galleries" in the Grampians, and stated that the Committee would take the matter up immediately with a view of enforcing existing laws, or perfecting those dealing with this type of offence.

Mr. V. H. Miller spoke on vandalism at Mt. Macedon, stating that gardens and ornamental concrete work were badly damaged.

EXHIBITS

Mrs. Mowbray Reiner.—Portrait of Darwin. (Copy made by her of Longstaff's study.)

Miss E. K. Turner.—Eastern Victorian plants collected at Mallacoota, including *Eustrephus Brownii*, Wombat Berry; *Dodonæa triquetra*, Large-leaved Dodonæa; *Oxylobium trilobatum*, Shaggy Pea; *Anisopogon avenaceous*, Oat Spear Grass. Also large winged galls on Eucalypt, sp., collected at Croydon.

Miss Bolton.—*Baeckia virgata*, garden-grown at Canterbury.

Miss D. Coleman.—Spirit specimens and color drawings of "Fairy Lanterns," *Sarcosiphon Rodwayi*.

Mr. W. H. Nicholls.—Growing plants in pots of *Prostanthera Walteri*, Blotchy Mint-bush, propagated from cuttings obtained at Mt. Buffalo.

Mr. A. D. Hardy.—Copy of first edition of Darwin's *Origin of Species*, published in 1857; loaned by Mr. Alfred Hart. Also a honeycomb fungus collected from *Notofagus Cunninghami* in the Upper Acheron Valley. This species is apparently similar to that figured in Darwin's *Voyage Round the World*, and noted by him on the Beech Trees in Tierra del Fuego and New Zealand.

Mr. Noel Lothian.—*Eucalyptus phyphtylla*, a native of Queensland, showing adventitious roots from flowering stem.

Mr. V. H. Davey (Toolern Vale).—Pink form of *Eucalyptus melliodora*, Yellow Box.

Mr. C. J. Gabriel.—Land shells, *Hedleyella atomata*, var. *hershani*, Braz., from near Lake Tyers; also marine shells from Lakes' Entrance, including *Mayena australasia*, Perry; *Ericusa*

papillosa, Swain; *Hipponyx australis*, Lam; *Crepidula unguiformis*, Lam.

Mr. F. S. Colliver.—Photograph of Charles Darwin and figures of fossils found by Darwin. Index of animal species named after him, and photograph of cliff section studied by Darwin.

Mr. H. C. Stewart.—Seventy species of plants from Mount Buffalo, altitude 4,000 feet to 5,500 feet, including:—*Caltha introloba*, Alpine Marsh-marigold; *Eucalyptus stellulata*, var. *alpina*, Willow Gum, confined to Mount Buffalo; *Gnaphalium alpigenum*, Mountain Cud-weed; *Olearia Gunniana*, var., Otway Daisy-bush; alpine form, uncommon to N.E. Victoria; *Olearia stellulata*, var. *Frostii*, Starry Daisy-bush, alpine form; *Oreomyrrhis andicola*, Andean Carraway; *Scaevola Hookeri*, Creeping Fan-flower; *Senecio velleioides*, Forest Groundsel; *Thelymitra venosa*, Veined Sun-orchid, blue and mauve forms; *Veronica nivea*, Mountain Speedwell.

A MUSHROOM NOTE

(By the Rev. H. M. R. RUPP, Woy Woy, N.S.W.)

I have been much intrigued during the past two years by the appearance of various mushrooms in the grounds of my residence. Chief among these is a very large form, which appears to belong to the genus *Lepiota*. I have consulted the invaluable study of Victorian Gilled Fungi in this Journal for April, 1934, by Mr. J. H. Willis, but cannot be sure whether the local giant is included there. The slender stem corresponds fairly with *L. gracilenta*, but the cap is far more in keeping with the description of *L. rhacodes*.

Three mature specimens were found at the back of the house in 1934. One measured 10 in. across. Recently one appeared by itself in the middle of the front lawn, and lasted for eight days before it dried off. It reached a height of 9 in., and notwithstanding the slender proportions of the stem, it stood firm through two days of violent winds. The following progressive measurements of the diameter of the cap during the eight days may be of interest (the figures represent inches): 2, 4, 6¼, 8, 9½, 10½, 11, 9½. After reaching the maximum of 11 in. the cap became concave above and began to dry off quickly.

In the years when specimens were plentiful, we accepted Mr. Willis' assurance that species of *Lepiota* were edible, and had no reason to regret the venture. The flavour was very similar to that of the common pink-gilled mushroom, but milder. In the young stages the cap is extremely convex above, later becoming umbrella-shaped, then perfectly flat, and finally slightly concave.

THE SOUTHERN SCRUB ROBIN

By D. DICKISON

It was in the great tract of Mallee scrub near the Murray River, in South Australia, that John Gould obtained the first specimens of the Scrub Robin (*Drymodes brunneopygia*). Until then the bird was unknown to science and Gould lost no time in describing it in the *Proceedings* of the Zoological Society of London. It was only one of the many interesting discoveries made by Gould during his brief visit to Australia.

(*Photo. by D. Dickison.*)

The Scrub Robin.

The Scrub Robin is a bird of the dry interior, and ranges from the Mallee areas of Victoria and New South Wales across South Australia to Western Australia. Gould found it to be very plentiful near the Murray, and in Victoria, where extensive stretches of Mallee scrub exist, it is still very numerous. In many parts its habitat is being rapidly converted into wheat fields, but fortunately, the amount of scrub that borders the wide roads in the Mallee affords many of these birds cover without much fear of interference.

The Scrub Robin is not placed in the same family as the common red-breasted Robins, but has been allotted to that of the Quail-

Plate XXI

(Photo. by D. Dickison.)

Nest and Egg of Scrub Robin

thrushes, a group of birds whose habits are somewhat similar. It is the largest of all birds bearing the name of robin, being fully 8 inches in length. In coloration it is dark brown above with a light breast. There are some conspicuous dull white markings on the wings. Both the male and female are alike in appearance, but the male is slightly larger than its mate. They are very shy in their habits, and, excepting in nesting time, are not easily approached. During the breeding season, which extends from August until about the end of October, they lose much of their fear, and will at times become quite inquisitive, especially when they find a camera placed a few feet away from their nest.

During several visits to the Mallee scrub in the North-west of Victoria I have found September to be the height of the Scrub Robin's breeding season. The nest is an open structure, built of fairly thick sticks and lined with rootlets and other fibrous materials. It is always placed on the ground, and is generally fairly well concealed among fallen leaves and dead branches. When sitting on the nest the bird harmonises so well with the surroundings that it will escape notice unless it becomes frightened and flies off. It is most unusual to find a small bird whose clutch does not exceed more than one egg, as such minimum clutches are generally found among the larger birds. The Scrub Robin has never been known to lay more than one egg, which has numerous brown markings. In spite of its small rate of increase, this is still one of the common species to be found in the Victorian Mallee. It is probably that more than one brood, and perhaps occasionally three broods, are reared in a season.

In this bird the photographer finds a very suitable subject. Although it may show a little fear when the strange object is placed near the nest, if the egg is approaching the stage of hatching the female will soon return without displaying much objection to the camera. Once settled on the egg she will remain sitting until almost touched before leaving the nest again. When they have young ones just out of the nest both birds will become extremely agitated if danger should appear.

There is another species of Scrub Robin, discovered in 1848, whose range extends from North Queensland across to the Northern Territory.

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

A RARE PUFFBALL FUNGUS FROM THE ALPS.

By A. J. TADGELL.

In my article on Mount Nelson and its surroundings (*Victorian Naturalist*, April, 1930, p. 234) reference is made to Dibbin's Hut, in the Kiewa Gorge, and to the one spur that leads down steeply from Mt. Hotham and up on to the High Plains, while a map of the locality in an earlier issue (*Victorian Naturalist*, June, 1926) marks their positions. It has now been found that this locality is not only famous in being the headwaters of two distinct rivers, under a mile apart, where the water runs in entirely opposite directions, but a rare fungus has recently been discovered there.

Some friends of mine kindly left me about fourteen Alpine botanical specimens which they had collected near Mt. Loch, at about 6,000 feet. I found that the more interesting of them for the height and locality were *Diuris pedunculata*, *Euphrasia antarctica*, *Epacris petraphila*, and a red fleshy Puffball. My friends, on leaving the High Plains, were making from Mt. Loch to Mt. Hotham, where their car was parked, and were attracted by a monstrosity, to them like a small octopus in appearance, a few inches high, which Mr. J. H. Willis also regards as a fantastic growth. The finders lifted it out of the socket formation by which it was held to the earth, and realised that it had a most unpleasant odour. They contemplated its several deltoid tentacle-like segments surrounding a cup-like cavity, holding a viscid substance that gave the impression of its being a carnivorous plant or earth-star, and ready to twine its arms around its prey. This was intensified by the discovery of one or more live beetles within the cavity. It was not an attractive object—bright scarlet in colour, with apparent scabrous and carnulent segments. It reached me in perfect condition in an air-tight container, and my first thoughts were of Mr. Willis, whose masterly article on Fungi, appearing in the *Naturalist* of April, 1934, attracted such wide interest among Club members and others. I forwarded it to him, and he has generously supplied the following very full report:

"Your very interesting enclosure, from the Bogong High Plains, certainly a fantastic growth, is *Aseroe rubra*, a fungus belonging to the Phalloid group of Puffballs. I have never seen a fresh specimen before, and envy your friends their good fortune. The species is rather rare, and to my knowledge has not previously been found in Alpine regions. It has a very interesting history, the first specimen being gathered in Tasmania by the French botanist La Billardiere, early last century; indeed this was the only fungus which he collected during the expedition. Although indigenous to Australia and the East Indies, *Aseroe* has recently appeared in English hot-houses and gardens, the spores having been present in soil taken from Australia. Fungi called Phalloids

are all curious, fleshy growths, beginning as a soft whitish 'egg' from which bursts a strange and often coloured receptacle that may simulate a starfish, flower, latticed basket, or netted veil; the receptacle bears a mucilaginous and evil-smelling mass of spores, which are usually carried away by insects attracted to the smell. Australia is very rich in her Phalloid flora, and much painstaking work needs to be done to elucidate the various forms. About half a dozen kinds (including your red species and the common white 'basket fungus') have been found in Victoria, but doubtless others occur here. What a wealth of botanical treasures our Alps have yielded. I am longing to do some botanising there.".

STUDY OF SEAWEEDS

Collections of Seaweeds have been exhibited at the Club's Wild Nature Shows, but many of the specimens were unnamed. Interested in marine algæ one may be, without knowing even the popular names of the plants which he admires. The study of Seaweeds is difficult, at least for the general naturalist, and there has long been need for a guide to the species occurring in our seas. Professor A. H. S. Lucas has written papers on Seaweeds for the *Naturalist*, and we await the promised book by him. It is one of those to be added to that admirable series, *Handbooks of the Flora and Fauna of South Australia*.

Dr. Josephine E. Tilden, Professor of Botany, University of Minnesota, U.S.A., has travelled all over the world, particularly through countries bordering on the Pacific Ocean, pursuing her study of Seaweeds. She visited Australia, and collected algæ from the Point Lonsdale rock pools, at Portsea, and other places. Much valuable material was obtained at Port Phillip Heads. Professor Tilden, in her notable book, *The Algæ and Their Life Relations*, recently published by the University of Minnesota Press, has many references to Australia, some of our most interesting marine algæ being figured and described. *Nothoia anomala*, first collected by the naturalist of Captain Wilkes' famous expedition, is "one of the most remarkable Seaweeds on the shores of Australia and New Zealand." It grows as a parasite on other marine forms, rising from the base of a conceptacle of the host plant. One of these hosts is "a common and very conspicuous inhabitant of Australian and New Zealand shores." *Harmiosira banksii*, whose yellowish-brown fronds consist only of a chain of swollen bladders, like a string of beads. A brown Seaweed, with long sword-like branches, *Xiphophora billardierii*, belongs to a genus that is confined to the Southern Hemisphere. Dr. Tilden found it at Geelong and Point Lonsdale, and along the shores of Tasmania.

This work by Professor Tilden is an outstanding contribution to the study of phycology, described as "an enormously stimulating field for research." The object in preparing it was to provide teachers and students with materials arranged in an orderly fashion, on the basis of which any desired course might be planned. Admirably has that object been achieved. Besides, the book contains matter of wide general interest, notably a lucid and very informative discussion of the economic importance as food or otherwise of various algal species. There are, Dr. Tilden states, marine forms of algæ that actually extract from sea water and store in their tissues all the chemical elements required as food by man and healthy animals. There surely is need for scientific study of Seaweeds, the only plants "capable of supplying all the necessary food substances which contribute to the health of domestic animals and the well-being of man."

Dr. Tilden's finely-illustrated volume is a model in every respect, and deserves the highest praise. It is an essential work for all who have an interest in a branch of botany on which the author is an internationally recognized authority. She helps the student over a formidable obstacle—confusion in algal literature; has simplified terms, and reduced their number; and includes a series of life cycle diagrams that make clear many things which formerly have seemed to lack meaning.

Dr. Tilden is a native of Iowa. She received the degrees of B.Sc. and M.Sc. from the University of Minnesota in 1895 and 1896 respectively, and for many years has been Professor of Botany at that University. Her published works include *South Pacific Algæ*, 1909; *South Pacific Plants*, 1912; *Bibliography of Pacific Ocean Algæ*, 1920; *Study of Pacific Ocean Algæ*, 1921, and others.

C.B.

In her new book, Professor Josephine Tilden has placed some very interesting and useful matter in the hands of students of algae. The frontispiece is a coloured chart embodying a scheme of evolution from the simplest forms of algae—Cyanophyceae, showing the later parallel, rather than dichotomous or branching, progress of other families. Thus the Archaeozoic and Proterozoic eras embrace a period which saw the beginning and culmination of the development of the marine forms, and in the latter part of the Proterozoic the emergence of the freshwater forms in the Chlorophycean period. This is followed by the development of terrestrial plants up to the higher flowering forms of the early and late Cenozoic era.

The book is profusely illustrated. The 257 figures are drawn to an unusually large scale, or rather, scales, since the author urges the use of three prescribed scales suited to the respective subjects.

In the drawings provided and suggested as of standard size, there seems to be little, if any, loss of detail caused by the use of bold outlines. Apart from figures illustrating specific forms, there are many diagrams of life cycles by which comparisons may be made, and Dr. Tilden's indication of a common essential method of reproduction is worthy of study. Thus the student is shown that, with much variation in detail, there is, in the life cycle of simple algae and that of liverworts, mosses, ferns and flowering plants alike, the essentials of the same syngamy and meiosis, which should appeal to any algological student who has observed the life cycle in, say, an Oedogonium and a lily; one might otherwise be startled to find in a book on algae a full page diagram of the flower of an angiosperm.

Although species of algae, whether marine or freshwater, are for space reasons only incidentally described, there is description of nearly all the families, and in each family at least one characteristic genus, these being mostly cosmopolitan, and therefore of value to students in many countries, including Australia. Algal food, algae as food, symbiosis, and algal control are some of the interesting matters treated. Even forestry is included. The effect on reservoirs of diminution or stoppage of stream flow as a result of deforestation of the catchment areas is to endanger the life of the conserved water. Water supply engineers and algologists are aware that a reduced level in stored water may be followed by activity of objectionable forms of algae and the balance of life may be upset with serious consequences. The effect on fish and humanity is obvious, but denudation of the distant hills as the initial cause is not apparent. This cannot be indicated too often or with too great emphasis, and forest authorities, as well as students of algae, will appreciate the reference.

A.D.H.

THROUGH THE WHIPSTICK SCRUB

By J. W. AUDAS, F.R.S.A., F.L.S. (Senior Botanist, National Herbarium, Melbourne.)

The Whipstick Scrub lies for the most part to the west of Bendigo Valley, extending at first intermittently from about Myer's Flat past Eaglehawk, and then continuously, about sixteen miles in all, to Kamarooka, in the north. The greatest width of the Scrub is from Neilborough eastwards for nearly twelve miles. The area is approximately an auriferous one on the confines of the distinctive saddle formations of Bendigo, so remarkable for their regular character and wealth of productive ore. In contrast the Whipstick country although in the Ordovician belt, is lacking in definite lines of reef; outcrops are broken and scattered. Rich patches have occurred and have been profitably worked, and nuggets of gold occasionally unearthed. Even though lacking in permanent reefs, the Whipstick has always had an attraction for the persistent and hopeful prospector.

The name, "Whipstick," dates from the early digging days, when plant

branches of the Green Mallee (*Eucalyptus viridis*) were readily used as effective substitutes for the whip itself. The surface of the land, undulating in shallow gullies and stony rises, nowhere of any great elevation, is very dry in character, possessing no permanent natural watercourses. Its scrubby vegetation of dwarf Eucalypts, forms a marked contrast to that of the forestal area to the south-east of the Bendigo ranges.

In regard to the flora, Mr. D. J. Paton has made a careful and informative comparison of the Whipstick Scrub with the adjoining area (*Victorian Naturalist*, Vol. XI, No. 10). In its distinct vegetation and general appearance this scrub shows a marked similarity to that of the Mallee district, even though there is a wide diversity in their geological features, the latter in most part being derivative from the Tertiary and limestone of marine and estuarial origin. The close affinity is specially observable in the presence of the dwarf Eucalypts and associated plants, which so definitely distinguish the Mallee of the north-west.

In the Whipstick we have, for instance, the Green Mallee (*Euc. viridis*), the Yellow Mallee (*Euc. incrassata*), the Bull Mallee (*Euc. Behriana*) and the Blue Mallee (*Euc. polybractea*), the Weeping Pittosporum (*P. phillyraeoides*), the Sweet Quandong (*Eucarya acuminata*), and many species of Compositæ with other plants of a Xerophilous nature, in addition to several phyllodinous Acacias of drought-resistant habit. The parasitical plant, *Cassytha melantha*, is also prevalent. These typical Mallee features, among others, distinguish the Whipstick vegetation.

In widely separated places in Victoria there are patches of vegetation allied to, and reminiscent of, that of the Mallee. It would seem that at some remote period the Mallee vegetation in Victoria was more widespread than at present; but in the course of time, under varying conditions, mostly climatic, perhaps also geographical or geophysical, Mallee tracts were gradually contracted in area, being slowly invaded and under favouring conditions in certain areas by a more robust forestal vegetation. In the Whipstick there is evidence of this replacement at work, where Eucalypts such as the Ironbarks, Red Stringybark, Yellow Gum, Black Box, and Gray Box occur in small patches.

To the botanist the Scrub, especially in springtime, is fascinating. In the lesser shrubs there are many dainty flowers such as the Small-leaf Waxflower, Rosy Heath-Myrtle, Fringed Heath-Myrtle, together with Croweas, Anemone Boronia, Platbatium, Prostanthera, Westringia, Calytrix, Grevillea, Goodenia, Dodonaea, Pseudanthus, Showy Legumes and Guinea flowers clothing the stony ridges with floral bloom and beauty. Except in insect life the Scrub fauna is not very abundant—marsupials are now scarce, lizards and snakes not very numerous, but birds are well represented. Several working plants for the distillation of oil from Mallee Eucalypts, are at work in this area.

Having had an invitation from Dr. J. S. Gorman of Rochester (a great tree lover), to visit the northern and less known area of the Whipstick near Kamarooka, in September last, I spent four days in that locality. Travelling by car to the Northern Whipstick—a district situated some twenty odd miles south-west of Rochester, we greatly admired the River Red Gums bordering the Campaspe River. They are well-shaped, have a wealth of foliage, and are a feature in the landscape. Other Eucalypts, noted en route, were Black Box (*Euc. bicolor*) and Yellow Box (*Euc. melliodora*). Occasionally clumps of Murray Cypress Pine (*Callitris robusta*) were seen, and a very unusual sight, a Weeping Pittosporum (*P. phillyraeoides*) growing in the open to a height of about 18 feet, attracted our attention. After passing through the Kamarooka forest reserve, from which large quantities of firewood had been cut and stacked ready for despatch, we reached the northern end of the Whipstick.

The display of bloom was comparable to what I have seen in the

Grampians. The Scarlet Mint-bush (*Prostanthera aspalathoides*) was a blaze of red. Patches of *Loudonia Behrii*, a rigid and slender perennial, were just ready to burst into their golden pennants. *Hibbertia aciculavis* was gay with its guinea-gold flowers; while numerous other plants, such as *Eriostemon gracilis*, *Baeckea ramosissima*, *Olearia lavatifolia*, *Brachyloma ericoides*, *Prostanthera denticulata*, *Westringia rigida* and *Boronia anemonifolia*, made a glorious medley of colour.

The shrubby Eucalypts, which for the most part form the dominant portion of the vegetation, consist of five species, namely: Bull Mallee (*Euc. Behriana*), Blue Mallee (*Euc. polybractea*), Yellow Mallee (*Euc. incrassata*), Green Mallee (*Euc. viridis*) and Scented Box (*Euc. odorata*). These occur in varying proportions in separate parts of the Scrub, but only in a few definite places are all five assembled, and their height varies from 12 feet to 20 feet. Here and there specimens of truly arborescent species occur; Black Box (*Euc. bicolor*), Red Ironbark (*Euc. Sideroxylon*), Yellow Box (*Euc. melliodora*), Red Box (*Euc. polyanthemos*), Gray Box (*Euc. hemiphloia*), and Yellow Gum (*Euc. leucoxylon*).

In places where the Eucalypts grow thickly, very little undergrowth occurs, except a few shrubs in more or less straggling form, such as *Acacia glandulicarpa*, *Pseudanthus ovalifolius*, *Helichrysum obcordatum*, *Olearia lavatifolia*, *O. ramulosa*, *Westringia rigida*, and *Baeckea ramosissima*. In open parts a dense growth, often difficult to penetrate, frequently occurs, comprising chiefly Broom Honey Myrtle (*Melaleuca uncinata*), Shrubby Sheoke (*Casuarina distyla*), Golden Wattle (*Acacia pycnantha*), Hakea Acacia (*A. hakeoides*), Silky Tea Tree (*Leptospermum myrsinoides*), Wrinkled Hakea (*H. rugosa*), Drooping Cassinia (*C. arcuata*), Common Cassinia (*C. aculeata*), Smooth Cassinia (*C. complanata*), Sweet Bursaria (*B. spinosa*), and Crimson Honey Myrtle (*Melaleuca Wilsonii*), the latter a pretty shrub with long spikes of crimson flowers.

A notable feature of the bush is the gregarious nature of many species which are well distributed, such as *Prostanthera denticulata*, *Baeckea ramosissima*, *Micromyrtus australis*, *Leucopogon ericoides*, *Dampiera lanceolata*, *Hybanthus floribundus*, *Eutaxia microphylla*, *Crowea exalata*, *Hibbertia aciculoris*, *Choretrum glomeratum*, *Westringia rigida*, *Phebalium obcordatum*, *Cryptandra amara*, *Dillwynia cricifolia*, *Boronia anemonifolia*, *Grevillea alpina* and *G. alpestris*—the latter a recent addition to the Victorian flora. Many Acacias were seen in full bloom. Those noted were *Acacia acinacea*, *Ac. aspera*, *Ac. brachybotrya*, *Ac. obliqua*, *Ac. pycnantha*, *Ac. retinophylla*, and *Ac. hakeoides*. The last named, which is a common shrub in this locality, occurs in two distinct forms: one has narrow phyllodes, the other broader phyllodes and larger blossoms. The narrow-leaf form covers large areas, and gives a distinctive charm to miles of the Whipstick Scrub.

In less densely wooded areas, the Sweet Quandong (*Eucarya acuminata*) was laden with fruit in the early stages, and looked most attractive. In rich soils this species sometimes attains a height of 30 feet. It has greenish flowers and red fruits, which are edible and the pulp can be made into jam; the seed is very oily and will burn like a candle-nut. Emus relish the fruit. In close proximity *Pittosporum phillyraeoides*, with its drooping foliage and creamy yellow blossoms, made a fine display. This shrub is worthy of cultivation as an ornamental plant, and may be grown readily from seed. Here, also, was noted the Giant Hop-bush (*Dodonaea viscosa*). It is a cosmopilitan shrub, three to six feet in height, and its seed is distributed by the wind and by birds. The leaves are reputed to posses anaesthetic properties.

Orchids were not plentiful in this area, but *Glossodia major*, *Caladenia carnea*, *C. testacea*, *Thelymitra aristata*, *T. antennifera*, *Pterostylis cycnocephala* and *P. nana* were fairly common. Grasses were poorly represented,

but *Poa caespitosa*, *Themeda australis*, *Stipa pubescens*, *S. setacea*, and *Danthonia pallida* were the prevailing species.

A large part of the Whipstick area traversed on this excursion (owing to its very poor soil of shallow depth and stony nature) is likely to be left in its natural state, and to retain its wealth of hardy plants.

The following is an additional list of 59 plants not previously recorded for the "Whipstick":—

GRAMINEAE.
Danthonia geniculata, J. M. Black.
D. semiannularis, R.Br.
Dichelachne crinita, Hook. f.
Stipa scabra, Lindl.
S. semibarbata, R.Br.
S. variabilis, Hughes.

CYPERACEAE.
Schoenus apogon, Roem & Sch.

CENTROLEPIDACEAE.
Brizula gracilis, Hiern.
Centrolepis polygyna, Hiern.

JUNCACEAE.
Juncus bufonius, L.

LILIACEAE.
Bartlingia sessiliflora, Decne.
Dichopogon fimbriatus, J. M. Black.
Stypandra glauca, R.Br.
Thysanotus tuberosus, R.Br.

ORCHIDACEAE.
Caladenia dilatata, R.Br.
C. Patersonii, R.Br.
Prasophyllum odoratum, Rogers.
P. patens, R.Br.
Thelymitra carnea, R.Br.
T. ixioides, Sw.

PROTEACEAE.
Grevillea alpestris Meissn (new of N.W.).
G. alpina, Lindl.

CAROPHYLLACEAE.
Stellaria pungens, Brongn.

LEGUMINOSAE
Acacia glandulicarpa, Reader.
Ac. montana, Bth.
Ac. salicina, Willd.
Daviesia brevifolia, Lindl.
Dillwynia floribunda, Sm.
Platylobium obtusangulum, Hook. f.

GERANIACEAE.
Erodium cygnorum, Nees.

LINACEAE.
Linum marginale, A. Cunn.

TREMANDRACEAE.
Tetratheca ericifolia, Sm.

EUPHORBIACEAE.
Poranthera microphylla, Brongn.

RHAMNACEAE.
Cryptandra tomentosa, Lindl.

DILLENIACEAE.
Hibbertia virgata, R.Br.

GUTTIFERAE.
Hypericum gramineum, Forst.

THYMELACACEAE.
Pimelea curviflora, R.Br.
P. glauca, R.Br.

MYRTACEAE.
Eucalyptus bicolor, A. Cunn.

HALORAGIDACEAE.
Haloragis heterophylla, Brongn.
H. micrantha, R.Br.
H. tetragyna, Hook. f.

UMBELLIFERAE.
Xanthosia dissecta, Hook. f.

EPACRIDACEAE.
Brachyloma ericoides, Sond.

LOGANIACEAE.
Mitrasacme paradoxa, R.Br.

BORAGINACEAE.
Cynoglossum suaveolens, R.Br.
Myosotis australis, R.Br.

LABIATAE.
Brunella vulgaris, D.C.
Prostanthera denticulata, R.Br.

SOLANACEAE.
Solanum nigrum, L.

RUBIACEAE.
Galium parisiense, L.
Opercularia varia, Hook. f.

GOODENIACEAE.
Goodenia heteromera, F.v.M.

COMPOSITAE.
Calotis anthemoides, F.v.M.
Cassinia complanata, J. M. Black.
Gnaphalium japonicum, Thunb.
Leptorhynchus tenuifolius, F.v.M.
L. Waitzia, Sond.
Senecio lautus, Sol.

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, February 10, 1936. The President, Mr. G. N. Hyam, presided, and about 100 members and friends attended.

The President referred to the death of King George, and all stood in silence for one minute as a token of respect.

CORRESPONDENCE

From the Victorian Deaf and Dumb Institute in relation to their Jubilee Flower Show, to be held in the grounds from March 24 to 28 inclusive.

From Mr. Melbourne Ward, "Pasadena," Cross Street, Double Bay, Sydney, asking for live Victorian lizards and frogs, and offering in exchange New South Wales species.

REPORTS OF EXCURSIONS

Reports of excursions were as follows: Buffalo, Mr. H. C. E. Stewart; Lower Yarra River trip, Mr. G. N. Hyam.

SUBJECT FOR EVENING

The subject for the evening was "Common Objects of the Seashore."

Mr. E. E. Pescott spoke on the "Plants of the Seashore," dealing especially with the Tea-tree. He made a plea for the better protection of our unique coastal vegetation.

Mr. C. J. Gabriel dealt with "Shells," and mentioned many good collecting localities, and the types of shells found there.

Mr. Charles Barrett spoke on seaweeds generally.

Mrs. J. J. Freame described her exhibit of Sea Slugs and other marine invertebrates.

Mr. A. J. Swaby gave a short talk on the "Life History of the Tunicates."

Mr. A. R. Varley spoke on collecting and preserving seaweeds.

Mr. F. S. Colliver discussed "Sertularians" and their fossil allies, the Graptolites; and also exhibited and spoke on fossilized or preserved sun-cracks, ripple marks, worm droppings and crustacean tracks, all from the Carboniferous deposits of Mansfield.

Mr. A. H. Mattingley spoke on Sea Urchins and Starfish, and Bêche de Mer.

Mr. Brouce, a visitor, contributed a popular talk on pearls, real and artificial.

ELECTION OF MEMBER

On a show of hands Miss Grace Langley was duly elected as an ordinary member of the Club.

NATURE NOTES

The President read a letter from a country member, Mrs. Graeme Thom, of Kowat, regarding a very tall Clematis.

GENERAL BUSINESS

The President announced that a conference of all interested bodies would be convened shortly to discuss ways and means of checking vandalism.

In relation to the rules covering membership and fees, Mr. L. W. Cooper gave notice of motion to alter the wording so that the Club comply with certain postal regulations. The President announced that a special General Meeting would deal with the matter.

DONATION

The President announced that Mr. W. H. Nicholls had presented to the Club a copy of his Monograph on the Sun Orchids; and that *The Argus* had presented a number of reprints of "The Menace of Water," by Mr. P. Crosbie Morrison, a copy of which would be sent to each member. The donors were thanked. The meeting was then declared closed and the members adjourned for the conversazione.

EXHIBITS

Mrs. Fenton Woodburn.—Sponge, Beach ball, *Ibacus peronii*, and *Lovenia* sp.

Mrs. L. M. Kilvington.—Specimens of the Penal Pine, Leather wood (*Eucryphia*) and Waxberry (*Gaultheria*), from Tasmania.

Mr. E. E. Pescott.—Nodular wood growth in the bark of the Queensland Bunya Bunya. Cultivated specimen of the N.S.W. Christmas Bush (*Ceratopetalum gummiferra*).

Mr. Noel Lothian.—*Ixodia achilleoides*, found at Torquay. Not previously recorded for south Victoria.

Mr. T. S. Hart.—*Acacia armata* hybrid. Parent plant from Croydon and two seedlings, one normal, the other with scarcely any stipules, and suggesting a small-leaved leprosa.

Mr. G. C. Wade.—A collection of beetles, including Buprestidae, Elateridae, Lucanidae and Scarabaeidae. Mostly collected at Warburton.

Mr. A. H. Mattingley.—Glass spear head collected by the late Mr. G. A. Keartland in North-West Australia when with the Horn Expedition.

Mr. C. French.—Plants from Central Australia collected by exhibitor.

Mr. V. H. Miller.—*Grevillia linearis*, garden grown.

Mr. Tom Harris.—Incrustion of lime on root and concretions of carbonate of lime.

Mr. F. S. Colliver.—Sertularian and Graptolites; also fossil sun-cracks, ripple marks, worm droppings (Fucoids) and crustacean tracks. These latter from the Carboniferous deposits of Mansfield.

Mr. H. Stewart.—Specimens of Mount Buffalo flora, altitude 4,000 to 5,600 feet, collected during week-end excursion at Australia Day holiday, including *Spiculaea* (*Drakaea*) *Huntiana* (Elbow Orchid—new locality for this uncommon species), *Prasophyllum Suttonii* (Alpine Leek-orchid), *Pterostylis parviflora* (Tiny Greenhood), *Gentiana diemensis*, var. *pleurandroides*, *Grevillea australis* (Alpine Grevillea), *Hakea vittata* (Striped Hakea), *Haloragis depressa*, *Heleocharis sphacelata*, *Helipterum incanum*, var. *auriceps* (Alpine form of Hoary Sunray), *Scirpus antarcticus*. Also grasses and sedges, including *Agropyrum scabrum*, *Agrostis parviflora*, *A. scabra*, *Calamagrostis frigida* (Alpine Bent-grass—a rare species), *C. quadriseta*, *C. quadriseta*, var. *montana*, *Carex pumila*, *Poa caespitosa*, var. *leioclada*, *Stipa Mueller*i and *S. pubescens*.

Correction.—In the February issue of the *Naturalist*, Exhibit by Mrs. Mowbray Reiner, Portrait of Darwin; For "Longstaff's study," read "Hon. John Collier, R.A."

A NEW FERN FOR VICTORIA

Hymenophyllum dilatatum (Forst.) Swartz, 1806; syn. *Trichomanes dilatatum* (Forst.), 1786, Cumberland Gorge, March 13, 1929. P. R. H. St. John and G. Woodfield.

Geographical distribution: New Zealand, Stewart Is. Chatham Is., Auckland Is., Tropical Australia and Victoria, Polynesia, Malesia, Tonkin, Annam.

Flora of New Zealand says: "Fronds variable in size, usually 9-18 in. long, but luxuriant specimens reach 2 ft. or more, one of the most handsome of the genus." Dobbie, *New Zealand Ferns*: "The broad pellucid fronds look like a superfine seaweed."

Suggested common name: "Handsome Filmy Fern."

Though the discovery was made in 1929, this is the first published record of *Hymenophyllum dilatatum* for Victoria.

P. R. H. St. John

VISCID ORCHIDS AND THE CAUSE.

By W. H. NICHOLLS.

In the spring of 1928, when collecting terrestrial orchids in the vicinity of Nobel Park, Victoria, I found a colony of *Prasophyllum Morrisii*, Nich. (The Hairy Leek-orchid), then incorrectly known as *Pr. Archeri*, Hk.f. The plants were apparently in a badly-diseased condition, viscid to the touch, and marked, very closely, in a more or less regular manner, with dark[1] raised blotches, or scars. As no other vegetation had suffered similarly, I concluded some obscure scourge, peculiar to this ground orchid, had swept the district.

During the two succeeding seasons, the "disease" did not reappear; but in the following year this colony of Leek-orchids was found to be in worse condition than in 1928. It was decidedly uncomfortable to handle the specimens, owing to their strangely-viscid state. No trace of insect-life was visible to the unaided eye; but a powerful lens—and patience—revealed minute, wingless, thrip-like insects. These insects were difficult to discover, their numbers were few, and, the colour invariably harmonized with that portion of the plant where they had secreted themselves. These insects appeared to favour the gynosteminm (column) and its vicinity; and although a few were coloured a deep orange shade—ultimately proved to be the prevailing hue of the wingless insect, or pale yellow (and at least one individual was noticed a rich scarlet colour), the majority seen of these specimens were practically colourless.

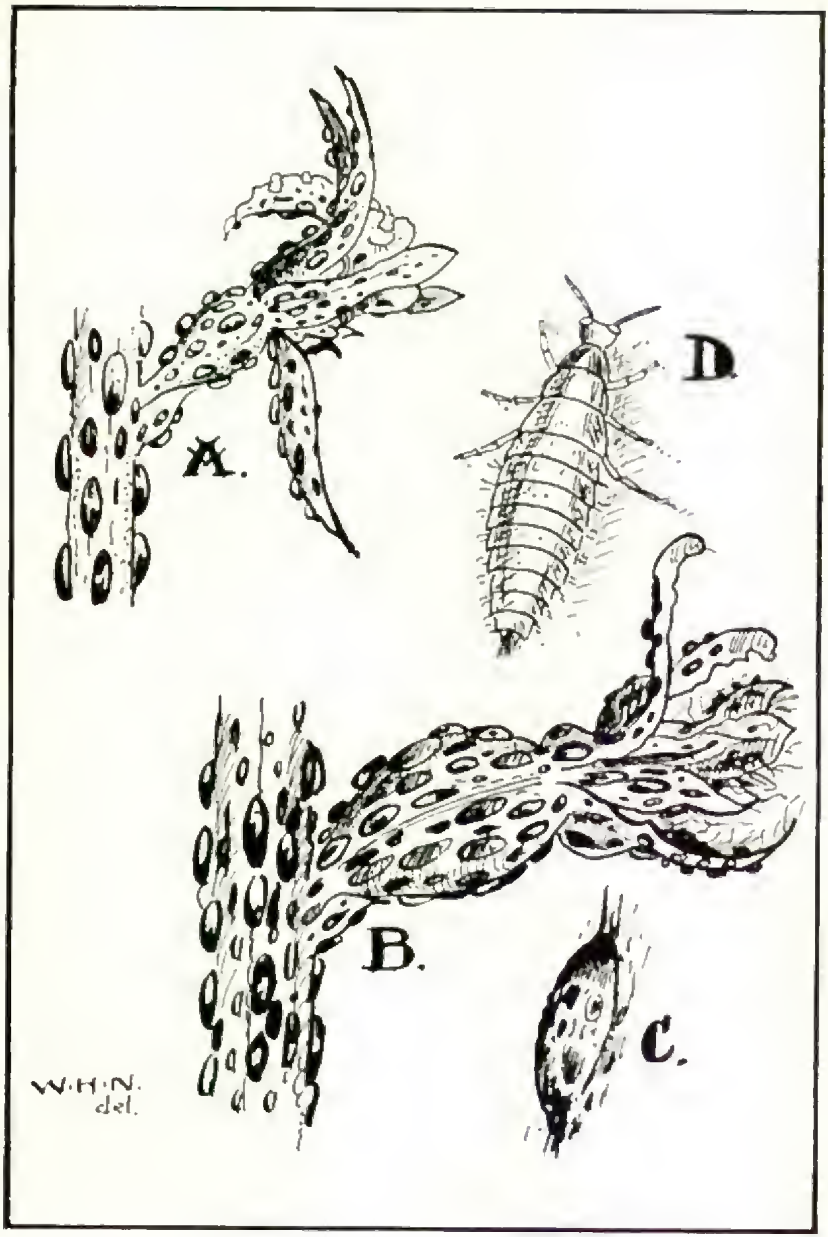
The scarrings on the plants were like so many beautifully-coloured gem-outcrops—usually of regular form—evenly distributed, and, strangely enough, on most of the specimens, in a longitudinal direction along stem, leaf or flower segment; while other specimens were irregularly marked in a most fantastic manner with blotches—all shapes and sizes. Although these markings, to the naked eye, appeared to be wholly dark-purplish, the lens revealed other shadings, as in the opal.

Despite the discovery of these insects, I did not then associate them with the disfigurements on the plants, because their actions were watched for some considerable period; also, on many other occasions, while dissecting the flowers of other species of orchids, I had observed similar creatures within the column environs, and in no instance detected any unusual markings on the plant.

Again, thrips are among the most destructive pests known to horticulturists, and, in my experience at least, they completely destroy the part of the plant attacked; whereas these orchid specimens were disfigured with sticky scars, and even the most delicate parts of the flowers were not otherwise damaged.

1. *Pr. Morrisii* Nich. is a deep prune-coloured species.

Plate XXII



Sweet Leek-Orchid's Viscid Flowers

A: Flower of *Pr. odoratum* Rogers, with viscid blotches.
B: Flowers of *Pr. Morrisii* Nich., with viscid blotches.
C: Individual viscid blotch.
D: Thrips (*Th. imaginis* Bagn.), wingless insect.

(All figures enlarged greatly.)

The mystery was somewhat unexpectedly solved this season (January, 1936). Mr. E. E. Pescott, F.L.S., and Mr. R. T. Pescott, while passing through the Heywood district, in the far south-west of Victoria, hurriedly collected and wrapped up some specimens of *Prasophyllum odoratum* Rogers, which appeared to them somewhat strange in appearance.

These specimens were subsequently handed to me for examination. Some few hours later I unwrapped the parcel, and instantly began coughing and sneezing (as the collectors, too, had done). It was at once apparent the parcel contained not only botanical specimens, but also myriads of minute insects, which were captured and returned to Mr. E. E. Pescott for determination. They were found to be *Thrips imaginis* Bagnall,[2] in its various stages. This is an indigenous species described by Bagnall in 1926.[3] On the plants examined by the writer the immature wingless forms were, as already stated, variously coloured, while the winged (mature) insects ranged from brown shades to black, the latter predominating.

The scars on the plants are caused by thrips imbibing the plant juices: viscidity is due to secretion from the insects themselves.

The Heywood specimens of *Pr. odoratum* were a sticky mass, suggesting treacle or the like had been sprayed over them. Investigation showed them to be as badly-scarred as the plants previously inspected, and separable from each other with difficulty. The insects, in this instance, had overdone the job, for the specimens were covered with their bodies. Thus a seven-year-old mystery was solved.

In the *Proceedings of the Royal Society of South Australia*, Vol. xlvi, 1922, p. 154, Dr. R. S. Rogers describes a viscid form of *Pr. australe* R.Br., as variety *viscidum* (n. var.). Mr. A. J. Tadgell (of Melbourne), who collected the specimens at Alberton, Victoria, writes: "It is scarred like a leper, on flowers and stem." Some months after the 1931 incident, Mr. Tadgell gave me one of the original Alberton specimens for examination and comparison with the specimens already in my possession. The microscope revealed the scars on Mr. Tadgell's material to be identical in all respects with those on the Nobel Park plants; but the cause, naturally, could not then be ascertained. Since 1928, the following viscid specimens have come to hand from Victorian districts: *Pr. odoratum* Rogers, Portland (Mrs. F. Mellblom); Gorae (Murray Holmes); Heywood (Mr. E. E. Pescott and Mr. R. T. Pescott); Cobungra (Mr. Henry Morgan). *Pr. australe* R.Br., Gorae (Murray Holmes). *Pr. gracile* Rogers, Gorae (Murray Holmes). *Diuris sulphurea* R.Br., Cobungra (Mr. H. Morgan).

The above species, with the inclusion of *Pr. Morrisii* Nich., makes a total of five afflicted with the scourge.

2. Determined by Mr. John Clark, Entomologist, Nat. Museum, Melbourne.
3. *Ann. Mag. Nat. Hist.* (9), xviii, p. 111.

ORCHID NOTES AND NEW RECORDS

By W. H. NICHOLLS

The curious Elbow Orchid (*Spiculæa Hunliana* (F.v.M.) Schltr.) long remained a rarity among the orchidaceous plants of Australia. Originally described from New South Wales (three localities), until a few years ago it was known in Victoria, from one district only, Cravensville, in the far north-east (A. B. Braine, 1917). In December, 1929, it was found in the Pyrete Range, near Gisborne (W. H. Nicholls and G. Lyell). Then Mr. D. Matthews, Footscray parks curator and botanist to the Alpine Trails Club, discovered it in several localities in the alpine country (N.E. and E.): near Harrietville, Dec., 1931; Mt. Kent (5,129 ft.), Dec., 1932; Mt. Cobbler (5,349 ft.), Dec., 1933.

Crossing Holmes Plain, near Mt. Howitt (5,718 ft.) in Dec., 1934, Mr. Matthews and the writer saw the Elbow Orchid in several places. Revisiting Mt. Cobbler in Dec., 1935, we found it plentiful on the rocky ramparts of the mountain, close to Cobbler Hut, and also on the heavily-timbered saddles facing Dondangadale Gorge, within sight of Buffalo (5,645 ft.). Messrs. H. Stewart and V. H. Miller, in January last, collected specimens on the plateau itself. Mr. R. Bond, Forest Officer, Neerim South, found it growing on a bush track north of Yarragon and east of Buln Buln in January; the farthest south for this remarkable species.

Prasophyllum Archeri Hk.f. The finest specimens so far seen by the writer were found on Mt. Cobbler's foothills. Among the tufts of grass they grew in clusters, looking very like "Mulberries on sticks," as the cattlemen call them. The colour of the plant—flowers and stem—is wholly very dark purplish. In this locality the flowering pedicel is invariably attended by a slender leaf which arises from the sheath. Some few blooms possessed *fringed margins to the lateral petals*—a remarkable occurrence not previously recorded in this species.

Prasophyllum Morrisii Nich. (one specimen only) was also found at the head of Dondangadale Gorge. On the morass adjacent to "Cobbler's Hut" pale pink forms of *Th. venosa* R.Br. were not uncommon. This form occurs also on Mt. Buffalo (H. Stewart, Jan., 1936).

THE BOOBOOK OWL AND ITS BROOD

Down at Pearcedale, Mr. Ron Monro, last nesting season, took a series of photographs of a Boobook Owl and its young at various stages. Mostly they are flashlight pictures, and two, at least, are unique. Mr. Monro's photograph of a Tawny-shouldered Frogmouth at the nest, delighted Cherry Kearton, who described it as the finest flashlight study of a wild bird that he had ever seen. An exhibition of nature photographs is to be held in the autumn, and several members of our Club will be exhibitors. It is probable that exhibits will be received from other States.

Plate XXIII

Photo. by Ron. Monro.

Boobook Owl (about two months old)

NESTING OF TAWNY FROGMOUTHS

By DAVID FLEAY, B.SC.

The nesting efforts of the quaint Frogmouths in the Australian Section of the Zoological Gardens are of unusual interest, for there appears to be no previous record of these birds breeding successfully under captive conditions. Ten years ago, late in the month of September, in my own collection at Ballarat, a pair of exceptionally tame Frogmouths gathered fine sticks and a few roots and manufactured a flimsy nest on a shelf in their enclosure. The female bird took to her crazy little structure immediately it was completed, but unfortunately she laid no eggs, though she continued to sit on the nest for nearly two months. I was enabled to observe many new calls of the birds during this period and it is surprising what a variety of notes they have. Both birds would spend some time at the nest after nightfall and the female was in the habit of uttering a running continuous call, which is best likened to the noise of a distant motor cycle. With head bent forward and body swaying from side to side she would maintain this series of rapid sounds sometimes for as long as a quarter of an hour. The male bird occasionally answered in similar fashion but his call was even more rapid. The ordinary call of the species so often heard in the country by night was uttered very frequently by these birds at this time. The male bird usually "spoke" from the far end of the enclosure and the quiet but penetrating "oom-oom-oom" was uttered perhaps nineteen times before it ceased as mysteriously as it had begun and a short interval followed before the call began again.

When flying round the aviary at night they sometimes uttered a croaking growl, and during daylight another sound used as a means of communication was a series of notes beginning loudly and rapidly and suddenly dying down again. The birds had a danger signal resembling the sound "oo-oo! oo-oo!" uttered quickly and sharply, and on the overhead appearance of a hawk the first bird to perceive the danger would acquaint its mate in this fashion. Immediately both would "freeze" into the very wonderful "broken limb" attitude. By mimicking this sound it is possible to cause even the quietest and most trusting Frogmouth to adopt its protective attitude.

Cats, possums and other furred visitors in the vicinity of the nest built by the birds were treated with scant ceremony. With fiercely ruffled head, great glaring eyes, extended wings and vigorous claps of their large beaks the birds would attack these unwelcome intruders and drive them away. This brief account of the birds nesting so long ago is given because of the observation of intimate ways, many not possible in the case of the more timid pair at present in the Zoological Gardens.

On September 5, 1935, the female bird in a large aviary in the

Australian section was discovered perched lengthwise on a wooden beam near the ground. Her nest consisted of a small uprooted grass sod and a six-inch nail, and on this precarious support lay a single egg. Next day it rolled off and was broken on the ground below. On September 8, the hen Frogmouth had made another flimsy nest of grass and small twigs on the limb of a pepper tree in the aviary. The site had been previously prepared for her by means of arranging a hollowed platform of bark on the bough. Two eggs were laid on successive days, but again bad luck dogged the bird, for on September 23, both were broken on the ground below the nest. Once again, for the third time, the persevering Frogmouth laid a clutch of eggs and on November 10, two young birds were hatched. Several Nankeen Kestrels inhabiting the upper parts of the aviary were immediately removed in case they should develop a taste for the dainty little birds. However, the hoodoo remained, and when three days old one baby Frogmouth fell to the ground and its fellow suffered a similar fate at the age of eight days.

Rather in despair of success after this extraordinary run of misfortune I surrounded the nesting site with a prominent ridge of bark, but was rather afraid that the structure would not be to the Frogmouth's liking. However, keen interest was revived on November 30, when the bird made her fourth attempt. She laid her first egg on this day and sat immediately. Another egg appeared the following day. For exactly four weeks the bird continued to brood very closely and at no time was she relieved by her mate. On the twenty-eighth day the first young bird hatched, followed two days later by a second. The quaint "chicks" were solemn, tender little mites clothed in white down, and the mother-bird, who had been rather pugnacious and reluctant about leaving the nest even when brooding on eggs, now became quite savage and on more than one occasion she flew at me and knocked my hat flying. Her varying expressions and glaring yellow eyes, together with the unpleasant snaps of her strong beak were well calculated to scare intruders away from the nest.

Naturally the diet of the parent birds had been varied a good deal throughout the nesting season, and now with the advent of fledgelings the block or "feeding table" was spread each evening with a most appetizing array of chopped mice and frogs, finely-minced beef, meal worms, moths, and a shallow tray of earth worms. Not content with this alone the parent birds hunted through the aviary and several times dead spiders which had missed the gaping mouths of the young birds were discovered entangled in the down of their breasts. One chick made little headway and it was missing from the nest a week after the time of hatching. Apparently it had died and one of the parent birds swallowed it. The growth of the remaining fledgeling was slow

Plate XXIV

Frogmouth fledgeling 17 days old

Photos. by D. Fleay.

Female Frogmouth defending her nest

but it proved to be a very healthy bird. At the age of three weeks it was quite a handful; its small eyes were open and it took a drowsy interest in its surroundings. It could plainly be seen projecting from the nest beneath its mother.

When the chick was one month old the mother-bird was forced to perch on the side of the nest, and both she and the baby adopted "broken-branch" attitudes when visitors with brightly-coloured apparel came within the field of vision. The young Frogmouth left the nest for the first time on February 1, 1936, thirty-six days, or roughly five weeks, from the time of emerging from the egg, and its devoted mother sat beside it on a horizontal limb. Some days later it perched back in the nest again, but its powers of flight were now strong and wherever it happened to choose a diurnal resting place there its mother would perch beside it.

Now, however, late in February, the young Frogmouth has become much more independent and it perches alone by day. Gone is the mother's fierce glare and bristling resentment of intruders to her former resting sanctuary, and she simply "freezes" when approached and perches in her old haunts in the upper part of the aviary where her small Kestrel acquaintances are once more at home.

BIRD LIFE AT NELSON

By BLANCHE E. MILLER

It is some years since I first visited Nelson, a small hamlet situated on the historical Glenelg River. On each succeeding visit I have felt thankful to those who, in their wisdom, have preserved untouched a vast area of swamp lands, of sandbanks, and still, shallow waters, through which the river meanders towards Discovery Bay.

To older inhabitants, Nelson is still known as the Punt, although the punt has long since been superseded by a long wooden bridge. On each end of the bridge is a printed notice placed there by order of the Chief Inspector of Fisheries and Game, which proclaims the area to be a "sanctuary for native animals *and* birds." So, hair-splitting miscreants, covetous of the wild game, may not aver that they did not know that birds are classed as animals.

The Royal Australasian Ornithologists' Union chose Nelson as a base for its annual camp-out, in 1934, which is sufficient evidence that the district is of interest to the bird-lover. That the proposed camp-out did not take place was largely because Melbourne's Centenary celebrations, coupled with the presence of a Royal visitor, were counter attractions.

Major Mitchell, who discovered and named the Glenelg River just on one hundred years ago, described it as "the finest body

of fresh water" which he had seen in Australia. He quite expected that the river would prove navigable right to the ocean, and was disappointed to find that the lower reaches were so shallow. However, the "basins" which so disappointed him are a sheer delight to the bird observer.

The bridge always has its quota of Silver Gulls, beautiful emblems of the peace that is assured for the countless numbers of birds in that sanctuary. Perchance a Willy-Wagtail, like a suave little shop-walker with his rusty black coat, will swagger along before you, swinging his tail as he remarks ingratiatingly, if not always appropriately, that you are a "sweet, pretty creature!" Then if you evade the flocks of Spur-winged Plover whose warning cry is heeded by all feathered "winged things" you may steal upon little parties of Chats, or stir Pipits into flight ere you reach across the first headland. Over on the sandbank you may see the Pelicans sunning themselves, or taxi-ing along before rising in graceful spirals. An ungainly bird on land, the ease of its flight is the more surprising. Feeding in the "basin" of shallow water are huge flotillas of Black Swans—"like Spanish galleons," as Mr. Alec. Chisholm wrote when he saw them, similarly, at Mallacoota Inlet, years ago.

All manner of water-loving birds may be seen. Some are merely visitors and make the long journey north, even to the Arctic Circle, to rear their families. Why? we ask. Are they not able to stay always, somewhere, in our vast continent? Ducks of many species include the Musk, but to enumerate all the birds would be to compile a mere catalogue of names. One memorable observation was on the ocean beach, at the turn of the tide, when about fifty Red-capped Dotterels were feeding at the water's edge, in one unbroken line. As fresh waves came in, they turned, as one, almost shoulder to shoulder, to turn yet again as the wave receded. A similar sight has since been reported from Western Port Bay.

Upstream, the aquatic life is negligible. The noise of the motor-launches—necessary means of locomotion when the bream and perch may be biting well, forty miles up—has done much to drive most water-loving birds to the comparative peace and safety of the sanctuary. Even so, while the launches ride at anchor, the visitor may hear a trumpet-like note, and see the white, flickering tail as a surprised water-fowl scuttles back into the reeds that border the river in places. Or he may see the flash of azure blue as the Kingfishers dive into the water for a dainty fish, or dart along the edges of the banks to their nesting-places. Every boat-shed on the river has its quota of Azure Kingfishers, and many a brood has been reared in the rapidly-disintegrating banks of the Isle of Bags.

For miles, the river banks are clothed in native flora, right to the water's edge, affording shelter to numerous birds known to the ornithologist as "small fry." They give colour to the neutral-

tinted background: the yellow of Robins and grey of Fantails; the crimson of Firetails and the enamel-blue of Wrens—with tails erect "like the mast of a little ship." *Acanthizas* murmur a subdued accompaniment to the louder notes of honey-loving birds in the taller trees. The arrogant White-ear, and the raucous Wattle-birds; others yellow of wing like glorified Goldfinches, of which there are many, also. Perchance, one may be charmed with the all-too-rare melody of the Singing Honeyeater as it pauses in its search for nectar in the flowers of the African box-thorn.

One of the outstanding memories of bird-life at Nelson is, surprisingly enough, of an uncommonly vocal Spiny-cheeked Honeyeater. Song, we are told, may be part of the display of a mating bird, but this was no ardent swain; merely an ordinary father-of-a-family who apparently sang because of some inward urge. Audience he had none, of which he was aware, but never did he fail to greet the dawn. Like a devout abbot at matins, for an hour on end he intoned his simple "Chur-r-r, chur-chur-chur," interpolated occasionally with a bar or two of true song, as delightful as it was rare. Nor was the performance repeated again until the next morning.

Of land birds there was a wide range from stately Emus to furtive Emu-Wrens, and Black Cockatoos that swayed precariously on the flowering spikes of grasstrees. Over on the moorlands towards the sand-dunes was the stronghold of the Tawny-crowned Honeyeater, and the more uncommon Rufous Bristle-bird. The charm of bird observing is its very uncertainty. You may visit a locality many times and yet meet something out of the ordinary. During January of this year an immense flock of Tree-Martins, driven from their haunts in the State forest by fire, rested for a day on the telegraph wires. So tame were they that they would fly quite within arm's reach. Next day they had passed on.

Parrots of many species were numerous. Large numbers of Rosellas, regal in crimson and blue, and accompanied by juveniles in various shades of green, fed in the *Casuarinas*, but we, from the eastern part of the State saw, more rarely, the multi-coloured "Joey" of far too many suburban bird-cages; thereby learning a practical lesson in geographical distribution. Even the spontaneous hilarity of the Kookaburra was heard but rarely, for Jack-the-well-beloved is also a bird of the east.

Numbers of *Neophemas* frequented a local stack-yard, and little Red-backed Parrots scarcely troubled to move out of one's path. Of all Parrots none was so rare, or difficult to see as the Ground Parrot (*Pezoporus wallicus*). There is difficulty in making the average resident understand which Parrot is meant seeing that so many of them feed on the ground at times. But the true *Pezoporus* is present there, on the heathy swamplands, without any doubt. Its livery of green with dark bands, whilst such a perfect imitation of sunlight and shadow, is distinctive. Although on the

protected list, there is a price on the head of the bird, certainly on its clutch of eggs. So we are glad to learn that there is something greater than legislation, or even public opinion that deters the commercially-minded marauder, namely, the presence of Tiger Snakes! While we prefer not to encounter a snake of any kind, surely the Tiger Snake has earned our respect by helping to keep safe for posterity one of the rarest of our beautiful Parrots.

DWARF AMONG GIANTS

In a high-rainfall district, such as South Gippsland, one naturally expects to find the giant species of *Eucalyptus*. True it is that giants predominate; but it is somewhat surprising to meet with a pygmy of the genus in *E. Kitsoniana* (Luehmann and Maiden). Certainly, the species cannot be accepted as typical of Gippsland's Eucalypts.

Seldom exceeding a height of 10 feet or 12 feet—more frequently, less—this shrubby gum-tree forms a striking feature of the bushland in the vicinity of Foster, and at places further westward, it is conspicuous along the railway between Meeniyan and Leongatha. About Foster it is found usually in association with other shrubby growth—*Leptospermum scoparium*, *Melaleuca squarrosa*, etc., with an undergrowth of smaller plants, principally of a heath-like character. It is particularly prominent on the flat or, sometimes, undulating country between the township and the coast. The surface-soil here consists of a heavy, gray clay, and the subsoil a yellow clay, sometimes in combination with gravel. Where the country is fairly level the surface soil, owing to the impervious nature of the subsoil, is very sodden in winter and becomes extremely hard with prolonged dry weather in summer. The average annual rainfall for the district is approximately 36 inches.

The Dwarf Gum—or Gippsland Mallee, to use its present-day vernacular—struck me as being quite a suitable type for growing as a garden shrub, particularly as an isolated lawn specimen. Its shrubby habit and rather shapely growth; its large, dark-green foliage with glossy, tinted tips, and its clusters of goodly-sized flowers, are all points which lend an attractiveness to this Eucalypt, and commend it to garden use.

Two years ago I removed a seedling *E. Kitsoniana* from its natural habitat and brought it 120 miles to the Gippsland Lakes. Here the little plant was introduced into an entirely different soil—a light sand—which never becomes unduly saturated with moisture and dries out rapidly in summer; the climate is considerably milder than that of Foster, and the average annual rainfall less by quite 10 inches. Apart from an occasional watering during the first summer, the young Eucalypt was given no special attention or treatment and to-day is a robust, five-branched specimen three feet in height. It seems obvious from this experiment that the restricted distribution of *E. Kitsoniana* in Victoria cannot be due to some particular soil or climatic condition.

It may be of interest to record that this young *E. Kitsoniana* has produced a lignotuber of rather irregular shape and, at present, approximately 1½ inches in diameter; probably it is still in process of development.

The flowering-period of *E. Kitsoniana*, like that of certain other Eucalypts, seems somewhat erratic and influenced by seasonal conditions; usually, flowers are to be seen in late spring and early summer. The blossoms, being rich in nectar, attract a host of insect-life, especially honey-eating beetles; the foliage, too, is favoured by leaf-beetles (*Paropsis* sp.) and sometimes suffers considerable damage in consequence.

FRED. C. W. BARTON.

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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 9, 1936. The President, Mr. G. N. Hyam, presided, and about 100 members and friends were present.

GENERAL BUSINESS

The President stated that the next meeting (April) would be held in the New Herbarium Hall on Monday, April 20. He also announced that a handbook, *The Shells of Port Phillip*, would shortly be published by the Club, the author being Mr. C. J. Gabriel.

Mr. Charles Barrett, in referring to this forthcoming publication, asked for the full support of the members in helping to dispose of copies. The price will be 1/6.

The President invited Mr. Barrett to introduce to the meeting a distinguished visitor, Mr. F. Moorhouse, marine biologist, of Queensland. Mr. Moorhouse spoke briefly about his research work, and gave some very interesting notes on the migration of the Mullet.

SUBJECT FOR EVENING

The "Subject for the Evening" as arranged was an illustrated lecture by Mrs. J. L. F. Woodburn, entitled "Nature in the New Hebrides." Mrs. Woodburn gave an interesting account of her experiences during a recent trip to these islands; a series of lantern slides illustrated the lecture.

REPORTS OF EXCURSIONS

Reports of excursions were given as follow: Anakie Hills, Mr. S. R. Mitchell; Sherbrooke, Mr. G. N. Hyam.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as ordinary members of the Club: Mrs. W. S. Kelly and Miss M. Kelly.

PROTECTION OF ROCK PAINTINGS

Mr. A. S. Kenyon announced that final arrangements had been made for the erection of the cyclone fences around the rock shelter at Langi Jiran, etc.

Mr. L. W. Cooper mentioned that an area at Ararat had recently been proclaimed a sanctuary for the preservation of flora and fauna: a district National Park. The Secretary was instructed to write to the Ararat Field Naturalists' Club congratulating them on their efforts.

The President announced that the Club was in correspondence with the Geelong Town Planning Association with regard to its efforts to have the You Yangs proclaimed a National Park.

DONATIONS

Mr. C. French presented to the Club two volumes for the library, and Mr. V. H. Miller a new book for recording library books on loan. The President, on the Club's behalf, thanked the donors.

The President referred to the retirement from the Forests Department of our fellow-member, Mr. A. D. Hardy, and expressed the hope that he would now do even more scientific work since he had more leisure for research. Mr. Hardy thanked the members for their good wishes.

The meeting was then adjourned for the conversazione.

EXHIBITS

Mrs. J. L. Fenton Woodburn.—Natural history specimens from the New Hebrides, in illustration of her lecture.

Mr. E. E. Pescott.—*Solanum xanthocarpum*, from the Mallee; *Viola hederacea*, garden-grown.

Mr. N. Lothian.—*Olearia teretifolia*, showing ecological differences—(a) growing near the coast; (b) growing in the forest land one and a half miles from the shore. Soil similar in both cases. Found at Torquay, September, 1935. Also a prostrate form of *Acacia verticillata*, var. *ovoidea*, from Torquay, September, 1935.

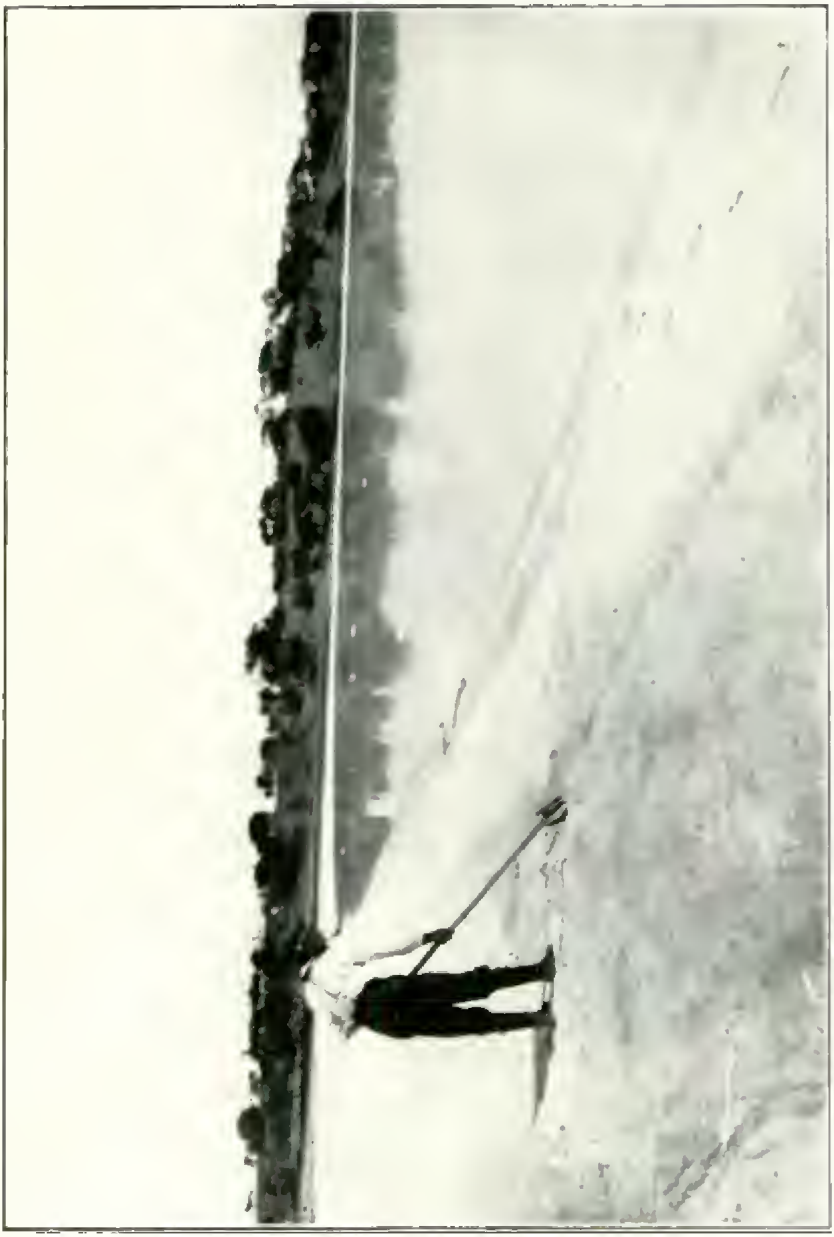
Mr. F. S. Colliver.—A series of "Dendrites," or mineral deposits having the appearance of fossil ferns and mosses; specimens from Lilydale and Glebe Island, Sydney.

SPECIAL MEETING

Prior to the ordinary meeting, a special general meeting was held on March 9, the business being proposed alteration of rules according to notice of motion given by Mr. L. W. Cooper at the last meeting. About 50 members attended. Mr. Cooper formally moved the motion of which notice had been given (printed in the agenda for the ordinary meeting). The motion was seconded by Mr. E. E. Pescott, and duly carried.

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

Plate XXV



On the Shores of Lake Kenyon

Photo. by C. Barrett.

PINK SALT LAKES AND THEIR ALGAE

By A. D. HARDY

In the *Victorian Naturalist*, January, 1914, there appeared an article entitled "The Mallee to Pinnaroo," in which I gave chiefly botanical notes resulting from an exploratory journey with Mr. A. S. Kenyon, M.I.C.E., and Mr. Dave Crosbie. Mr. Kenyon was officially in search of new lands for settlement in the then untrodden wilderness north-west of Ouyen. Excepting the commencement of the earthwork of the Ouyen to Pinnaroo line, the railway was a thing of the future, so our journey was mostly on horseback with very limited equipment and little time for wayside sightseeing. Yet the beautiful scene presented by the pink salt lakes within the encirclement of sparsely forested sandhills held us for a time.

To commemorate the discovery—not of the salt lakes, which were shown as such, though individually unnamed, on old maps, but of their colour—I named the two larger, respectively, Lake Kenyon and Lake Crosbie. A fourth of the group is nearer Underbool and south of Lake Kenyon, also unnamed. The area of Lake Kenyon is 311 acres; that of Lake Crosbie, 394 acres. The smaller north-western lake is 207 acres. These three are included in a public reserve of 4,617 acres (*Government Gazette*, 1925, p. 2,513), the boundary of which is not shown in the accompanying map.

By wading in water, ankle-deep on that occasion, I was enabled to secure a small sample of the coloured salt, which only theoretically added weight to my share of the riding outfit. Later examination showed that the pink colour was not due to the presence of an organism, but to chemical impurity in the salt crust and that algae contributed the green colour to other portions.

Since that date, however, I have so frequently heard that the pink colour is due to a microscopic organism (and the Red Sea colouring quoted in support) that I am presenting further notes on the lakes even though examination of the material recently collected is incomplete. In February, 1936, I was enabled, through the courtesy of the Forests Commission of Victoria, to deviate from the route of a survey and revisit the lakes. The object of the journey with Mr. M. E. Bill, surveyor, and Mr. D. McLean, forester, was the taking of magnetic observations at points on the 142nd meridian, etc., which involved over 1,000 miles of motor car and motor cycle travelling in which weight was severely limited as was also the time spared for diversions, however interesting. The visit to the lakes being thus subordinated, the information respecting the salt and algae is not so satisfactory as it would be as the result of a special mission.

On this occasion the scene was one to interest the economist rather than charm the naturalist. The quiet beauty of the lakes which when last seen lay placid and pink below the surrounding sandhills—part vegetated with *Pittosporum, Callitris, Heterodendron, Fusanus,* dwarf *Eucalyptus,* etc.—had given place to glittering white salt-pans. Stacks of gathered salt, ridges of scraped salt, and the black figures of men with horse-drawn scrapers and carts out on the salt field in process of collecting!

The Salt.—Between the foot of the steeply-sloping bank and the low-water mark there was a strip of beach carpeted with the

Glimpse of Lake Kenyon.

Beaded Glasswort, *Salicornia australis.* Thence one could walk out almost dryshod. Where the salt had been scraped into ridges for shovelling into carts, the drainage resulted in small shallow pools varying in depth but not more than an inch or two, and on these there almost immediately formed a thin (·5 mm.) sheet of salt of colour varying from salmon pink to something more yellowish —approaching apricot. A sample of this (much comminuted), when examined later, was found to be accompanied by many cells which appeared at first sight as empty spherical algal cells, the more so as some of them had taken much colour and resembled the resting phase of *Spherella* or *Haematococcus.* These were distended pollen grains of the Murray Cypress Pine, *Callitris robusta.*

No streams enter to give salinity as in the Dead Sea. The lakes are freshened by direct rain, the salt arriving by capillary attraction from an old sea bed. The offensively smelling black mud below the crust of salt contained five species of algae, and doubtfully a fifth; the two which were most numerous being found in the salt also, i.e., in the lower part of the older salt the upper region of which was at this season coloured pink. The old salt crust is stratified (without distinct lines of demarcation) and exhibits in vertical section alternating green and pink colour bands.

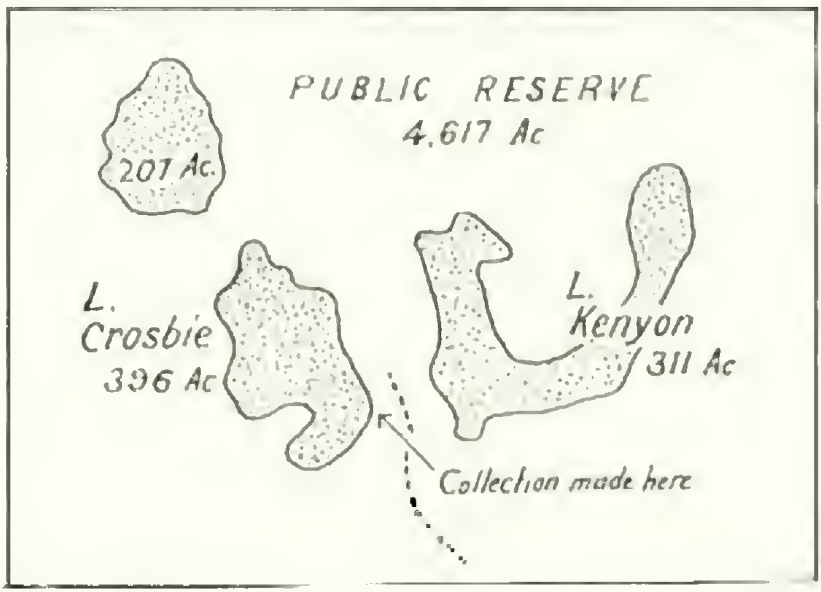
Interesting information was given me by Mr. E. Jones (Union Salt and Gypsum Works, Underbool). His association with Underbool and the district dates back to 1911, and he is now commercially interested in the whole of the eastern lake and the northern half of the other large area to the west of it, under lease from the Lands Department (from whose District Officer, Mr. A. Young, I received information affecting the leaseholds). The only birds visiting, after the rains, are ducks; the lakes being used as resting places during a long flight only, there being no food for them, although feeding may have been the original object. The colour of the salt varies with season and rainfall; the pink appears darker on a dull day than in sunshine.

Usually the surface colour is rosy or shell pink, but sometimes purplish after summer rain. (The bands in the sample (Fig. 7) are purplish pink—A.D.H.) After light rainfall there may be a quarter-inch of salt formed and very slightly coloured, a heavier fall producing more salt and deeper pink. There is usually more colour after rain in the warmest months than in late summer or autumn. In harvesting, the fresh deposit only is collected; the old crust (Fig. 7) is left. The greatest water depth after rainfall above the old salt is rarely more than a foot. The largest crystals form in the mud—the salt being about three-quarters of an inch and gypsum about half an inch. Below the old salt crust there is very little free water—mostly thick mud.

The Algae.—The algae which contribute most of the colour to the salt crust are two colonial forms. One is a myxophyte which seems to be midway between *Microcystis* Kutz. and *Aphanocapsa* Naegeli. West and Fritsch[1] regard the genus *Aphanocapsa* as differing from *Microcystis* in the less dense aggregation of the cells. As some of the colonies seen were less crowded than others I am in doubt, but in the description of the plate, I am giving the benefit to *Microcystis*, and if it is *Microcystis* it is probably *M. flos-aquae* (Wittrock) Kirshner, as figured by Tilden.[2] The other is a chlorophyte which I take to be *Chlorella vulgaris* Beij. (The large cell which I found frequently in the colony (Fig. 1 b) has had 16 to 32 or more small cells, and there were no intermediate sizes seen.)

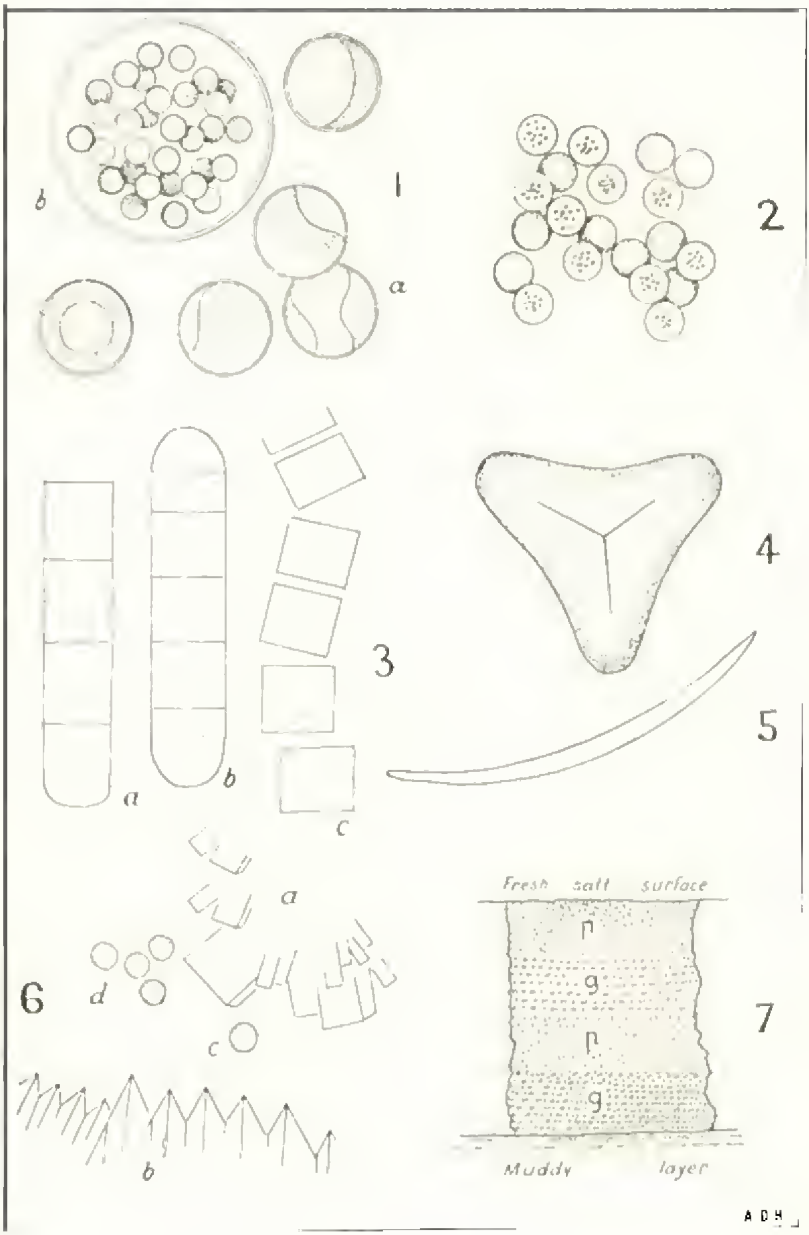
Next in frequency, but comparatively scarce and negligible in the colouring of the salt, is *Oscillatoria tenuis* Ag., a variable form

apparently with cells usually longer than broad but sometimes equal or nearly so, while the apical cell, usually semi-elliptical in long. section, is sometimes semi-circular (Fig. 3 ab). Only solitary filaments were seen, and some of these were much distorted. This distortion, even to the extent of dislocation of the cells, was not noticed in specimens in the mud and in the salt-imprisoned specimens may be due to pressure or adaptation to irregular spacing. A plant which I identified as *Dactylococcopsis acicularis* Lemmermann (Fig. 5), appeared more frequently in the mud and salt than did the Oscillatoria, and of this species also only individual cells were seen, these agreeing fairly well with Professor Tilden's (Fig. 3, p. 61). A plant of which only two individuals were seen,



Plan of the Pink Salt Lakes, 16 miles north-west of Underbool, on the railway west from Ouyen to Pinnaroo (320 miles north-west of Melbourne). (Scale: 1 mile to 1 inch.)

and in the mud only, is shown in Fig. 4, and is a species of *Tetraëdron* Kutz, a genus recorded for New South Wales[3] and Victoria[4] but doubtful in view of West's warning about *Tetraëdron* appearing like states of other members of the Protococcales. On the other hand, there were no forms between this and any other alga found here and the two seen were symmetrical and of equal size. The lines of angles radiating from centre towards the apices were distinct and may be a feature of use in diagnosis. But for these radial lines the plant, in one view, resembles *Staurastrum orbiculare* Ralfs.[5]



Algae and Crystals of Pink Salt Lakes

No diatoms came into view during many hours' examination of salt and mud. Apart from possible local species, there was a chance that windborne frustules might have been blown on to the lakes or have been precipitated from the dust in high altitude air currents in the form of "Red rain." Mr. Jones states that occasionally such red rains have rendered the new salt uncollectable until clean rain and wind had drifted the surface clear of the pollution.

From the foregoing it will be evident that the flora and fauna of the Australian salt lakes is a field for research by an investigator with time and money at disposal. The great distances between the lakes or groups of lakes present one almost unsurmountable difficulty because of the desirability of contemporary examinations, which would mean many investigators, or examinations during corresponding seasons rather than calendar seasons.

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3. Playfair, G. I.: *Proc. Linn. Soc., N.S.W.*, Vol. XXXVII, Pt. 3.
4. West, G. S.: *Jour. Linn. Soc.*, Vol. XXXIX, 1909.
5. Bailey, F. M.: "Contributions to the Queensland Flora," *Bot. Bull.* Vol. XV, 1898.

KEY TO PLATE

1. *Chlorella vulgaris* Beyer, × 1000.
   (a) Cells which (with *Microcystis*) contribute most of the green colour to the salt crust.
   (b) Large cells occasionally with the colony and not found alone. See West and Fritsch, p. 18: "rarely as many as 64 new cells."
2. *Microcystis flos-aquae* (Wittr.) Kirchn., × 1000. The most abundant alga in the green layer of the salt crust and in the mud.
3. *Oscillatoria tenuis* C. A. Agardh. (× 2000 inadvertently).
   (a) Form most frequently seen, but cell contents not discernible.
   (b) Young filament with apical cells semi-circular in section instead of semi-ellipsoid. (Many-celled filaments show variety in the apical cell. Breadth about 6μ.)
   (c) An example of distortion: loss of alignment, and cells a half cell's length apart, and with shortened cells.
4. *Tetraëdron* sp., × 1000. Rare; only three seen, and not satisfactorily observed. (In the mud.)
5. *Dactylococcopsis acicularis* Lemmermann, × 1000. As figured by Tilden, 1935, text figure C, page 61.
6. Crystals of (a) salt and (b) gypsum forming during examination of (c) an algal cell and (d) pollen grains of the Murray Cypress Pine *Callitris robusta*, and threatening to enmesh these (× about 600).
7. Diagram showing a section of old salt crust, natural size, in which two dry seasons appear to be indicated. The letters g, p, g, p, from bottom upwards, indicate the alternate bands of green and pink colour—the green due to imprisonment of algae (chiefly *Microcystis* and *Chlorella*) and the pink a chemical impurity in the salt.

ON TWO ORCHIDS NEW FOR VICTORIA

By EDWARD E. PESCOTT and W. H. NICHOLLS

The discovery of two orchids new for Victoria by Mr. F. Robbins, of Orbost, is a matter of considerable interest. The East Gippsland flora is very different to that of the rest of the State, inasmuch as it represents the southern extent of the rain forest flora which extends from Cape York in the north to Lake Tyers in the south.

When living at Orbost over twenty years ago, E. E. Pescott studied the orchid flora considerably, discovering several species new for the locality. Among the orchids was the Small Sarcochilus, *S. parviflorus* Lindl., which grew in abundance at Wilhenduck Creek.

Last year Mr. Robbins sought for information regarding the district orchids, and his attention was directed to this creek. After a diligent search he failed to find this orchid, but noted the Tangle Orchid, *Cleisostoma tridentatum* Lindl., in abundance. This orchid had been recorded for Orbost a couple of years previously, on the authority of specimens noted by W. H. Nicholls in the herbarium of Dr. C. S. Sutton. They were very fine examples bearing the collectors' names (Dr. Sutton and Mr. Gustav Weindorfer), and the locality of Young's Creek. They were collected about 22 years ago. Dr. Sutton did not remember collecting the orchid, so the local scoutmaster was sent a photograph, with an appeal for further specimens. He replied that Young's Creek was now cleared out, and no trees nor orchids were present. Thus the matter rested until Mr. Robbins forwarded his specimens at the end of last year.

This orchid was described by Lindley in the *Botanical Register* of 1838, and was previously recorded for Queensland and New South Wales. Bailey and Rupp record 10 specimens of *Cleisostoma* for Queensland; and Rupp records 2 for New South Wales, one only (*C. Beckleri* F.v.M.) being confined to that State. Now we record one for Victoria. This species now extends from the southern Queensland coast, southwards to Orbost.

Cleisostoma tridentatum Lindl.; Stems elongated, slender, twisted; roots mostly aerial forming a twisted tangle, very few of which cling to the host plant. Stem leafy, leaves 2 to 3 inches long, linear, oblong or falcate. Racemes several, usually shorter than the leaves; flowers very small, shortly pedicellate, sepals and petals oblong lanceolate, about 2 lines long; labellum middle lobe very short, obtuse, fleshy, concave; spur rather long, deflexed; column very short, with 2 narrow anterior teeth; capsule narrow, rounded, 1 to 1½ inches long.

The flowers are quite insignificant, wholly green, or greenish with dark red on the inside of segments, very fragrant, and the seed capsule is very large in proportion to the flower. Flowering time is irregular, with a central period about the end of the year. The plant grows well in cultivation; but it has no horticultural value.

Plate XXVII

Orchids New for Victoria: *Cleisostoma tridentatum and Cryptostylis erecta*

The second orchid discovered by Mr. Robbins is the "Erect Tongue Orchid," *Cryptostylis erecta* R.Br. This species was described by Robert Brown in 1810, when he described two other species. It was previously recorded for New South Wales and Queensland (near Brisbane). Of the four Australian species, three are now recorded for Victoria, the fourth being a western species, *C. ovata*, which Mrs. Pelloe has named the "Dingy Orchid," a vernacular hardly applicable to a plant that possesses attractive leaves and flowers more delightfully veined than the other Australian representatives of the genus. FitzGerald's[1] plate hardly does it justice. *C. erecta* is very well named, for the prominent labellum is placed in an upward and erect position. Regarding the finding of this orchid, Mr. Robbins writes as follows:—

CRYPTOSTYLIS ERECTA AT ORBOST

While hunting for *Cryptostylis* around Marlo late in 1935, I happened to come across a patch of leaves with only one flower stalk in evidence. I placed the plant in my fernery, but unfortunately, slugs got the flowers while I was away at Christmas. I thought that it was *C. subulata*, but to make sure, I revisited the spot on February 8, 1936, and was surprised to find large numbers of *C. subulata* and also another *Cryptostylis* quite new to me. With the aid of Mr. E. E. Pescott, it proved to be *Cryptostylis erecta*, not previously recorded in Victoria.

The leaves of both orchids occurred thickly over an area of half a dozen yards in diameter near the edge of one of the grass-tree swamps so common on the Marlo plains. The leaves of both are quite similar except that *C. erecta* shows a purplish tint underneath, while *C. subulata* is quite greenish. Not being so tall as their lofty neighbours, the flowers of *C. erecta* would be extremely difficult to pick out among the dense tufts of *Xanthorrhoea* leaves, unless one were looking very carefully. I also noticed that of the dozens of racemes of both these orchids, not a single flower had become fertilized. This suggests complete absence of the pollinating agents (Ichneumon flies) in this locality, yet I found a very nice large specimen of *C. subulata* with 3 spikes, with almost every flower pollinated, on the hills above Bete Bolong, some 16 miles or so farther up the Snowy River.

Cryptostylis erecta R.Br.—Similar in habit and growth to *C. subulata* Reichb. f. (*C. longifolia* R.Br.), but usually shorter in habit, with a less recurved ovary. Height about 18 inches. Sepals and petals very small and very narrow; labellum very large, definitely hood shaped, broad, always erect, membranous, with dark red veins. There is a broad membranous and veined plate along the centre of the labellum and almost along its whole length. The broad bonnet-like labellum, much veined, and standing perfectly erect, points out this species very clearly. There is a reddish-purple tint on the under side of the leaves.

1. *Australian Orchids*, Vol. 2.

KEY TO PLATE

Fig. A. *Cleisostoma tridentatum* Ldl.
Fig. B. *C. tridentatum*. A flower from front.
Fig. C. *C. tridentatum*. Pollinia.
Fig. D. *Cryptostylis erecta* R.Br. Flower spike and leaf.
Fig. E. *C. erecta*. Column.

NOTES ON MICRO-HYDROPHILIDAE.

By C. DEANE.

During his visit to the Upper Williams River and Barrington Tops, New South Wales, with the party of naturalists that explored that region in October, 1926, Mr. Charles Barrett discovered a new species of *Hydrobius*, which is now described herein. The genus, with its allies, is almost world-wide in its distribution.

I have specimens from England, Belgium, U.S.A., Canada, Japan, Philippine Islands, Hawaii, Queensland, New South Wales, Victoria, and South Australia; but comparatively few have been named from Australia; they were described by Lea, Blackburn and Macleay.

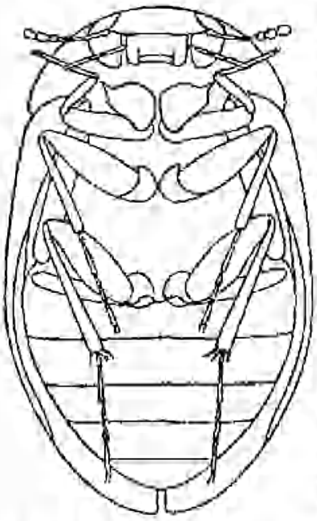


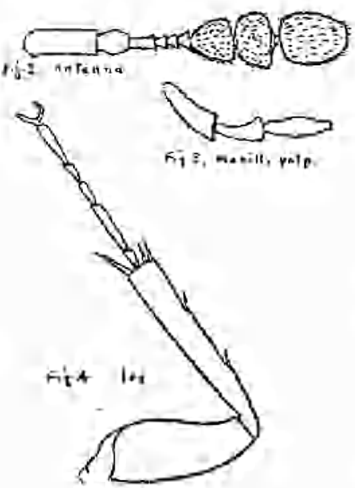
Fig. 1. *Hydrobius barretti*, n. sp.

The features which distinguish *Hydrobius* from its allies are: metasternum not prolonged into a spine, tarsi (feet) not compressed, and last joint of maxillary palpi longer than the third. The beetles of the family Hydrophilidae are mostly water-loving insects, and prefer fresh water. I am not acquainted with any species inhabiting waters of so great a salinity as that of the ocean. Perhaps none exist. Some, however, are content with water having a much greater proportion of dissolved minerals than is ordinarily found in fresh waters of the class that would be suitable for drinking purposes.

Among these waters of slightly increased salinity are the famous "Rock Pools" of Europe, which have yet to be discovered in Australia. They should be found in coastal situations sufficiently removed from tidal influence to prevent contact with the sea, but close enough to permit contamination by the air-borne salts, as carried in by mists and fine spray during high winds. They are thus rainwater pools which have had their salinity increased in the manner suggested. Any discoveries by readers of the *Victorian Naturalist* of pools answering to this description would be welcomed by specialists in freshwater ecology.

The chief town water supplies of the capital cities of the world vary in their solid constituency from three or four grains per gallon up to forty or fifty, while the sea contains something of the order of 2,300 grains per gallon. Waters commonly termed

"brackish" derive their salinity from direct contact with "salt" water; but in the case of "rock pools" there is no contact except through the air. Some members of the genus *Ochthebius* are disposed to adapt themselves to waters of this kind, while *Phylhydrus*, as far as known at present, confines its attention to the true fresh waters.



Figs. 2 to 4.

Hydrobius barretti, n. sp. (Figs. 1 to 4). Oval, highly convex, scarcely nitid, light walnut brown. Head rather broad, only slightly produced, light brown, opaque, finely subrugose. Clypeus broadly rounded in front. Eyes below average size, deeply set, dark brown. Antennae 9-segmented, brown; last 3 segments pubescent. Palpi short, terminal segment just longer than preceding. Pronotum broad, concolorous with elytra. Scutellum small. Elytra finely striate-punctate. Legs medium, brown. Length, 3·56 mm. Width, 2·23 mm.

Habitat: Barrington Tops, New South Wales (C. Barrett).

Type in coll. Wilson, cotype and Canada balsam slides in coll. Deane.

THE HONEY FLORA OF VICTORIA

The Department of Agriculture has recently published the third edition of this handbook which was first compiled in 1922 by the late F. R. Beattie, a Club member. The present edition has been revised and amplified by the officers of the Department in conjunction with the staff of the National Herbarium, and has been enlarged to 136 pages. Whilst it has been produced primarily for the use of apiculturists, field naturalists will find it of considerable value as an aid to the identification of many plants, particularly in connection with the Victorian species of Eucalypts, of which 58 are figured and 77 described. The figures of 45 other plants are included and 80 species are described. The descriptions are not strictly botanical but are written in a popular style with the main points of identification stressed and even the novice should have no difficulty in separating the species or varieties listed. The period of blossoming is given in every case, together with economic details in regard to timber, essential oils and honey flow. The habitats and geographic range is also very comprehensive. Previous editions of this work have been popular amongst naturalists and they will find the present issue of still greater value. Copies may be obtained from the Department of Agriculture or the Government Printer at 1/6 per copy.

G.N.H.

THE NORTON MALLEE

By A. J. SWABY

A few miles west of Horsham, the Norton Creek, from the western Grampians, enters the Wimmera River. In the corner between the two, preserved by mere chance, lies the original southern limit of the Mallee scrubs. When selected by the father and uncle of the present owner, Mr. Egbert Smith (brother of Mr. Harold Smith, whose discovery of *Pultenæa patellifolia* surprised the systematists in 1927), the Mallee covered about a square mile. It was separated from the continuous scrub by several miles of the rich Wimmera plains. Now, but thirty acres remain untouched.

Fortunately, about one hundred acres adjoining this patch, after producing several crops of wheat, were allowed to lie idle. They have thus been enabled to demonstrate the regenerative capacity of this country if given a chance. In these and the roads nearby, 88 species of indigenous plants have been identified and several others have still to be determined.

When the League of Youth of Australia was inaugurated, it was mentioned to Mr. Smith that this area had special interest, and he immediately offered ten acres, to be chosen by the League, for permanent sanctuary. It is now under a rather informal permissive occupancy, dependent upon the sincerity of the people who are charged with the cultivation of a spirit of protection in the community. There is little doubt that the whole area could easily be secured for a natural monument.

Had this lucky remnant been in Japan, it would have been the subject of government proclamation for permanent preservation. They have several reserves, selected by reason of their containing the limits in one direction or another of a single species! The Club is likely to hear more of this shortly.

The Norton Mallee is almost flat. The soil is nearly all heavy red loam with buckshot. Patches of white sand occur. In one corner, heavy clay with "crabholes" is found. The eucalypts known as "mallees" are notoriously difficult of identification, and the correct names of those growing here have still to be determined. It does not appear likely, however, that any of them will prove to be new species.

The scrub consists largely of the Broom Honey-myrtle (*Melaleuca uncinata*). This is a beautiful shrub, always shapely, and at its best in the hottest months of the year. It is strange that it has not found its way into cultivation. I remember well the exclamations of local farmers when I exhibited a fine specimen in my Horsham garden. One had to be forcibly restrained from using the axe upon it. The idea of having it in the house for decorative purposes was ridiculed. They view it differently now.

Associated with it, and strangely similar in vegetative characters,

is the dainty, slender *Baeckia Behrii*. This is another good garden shrub, offering welcome relief from the heavier types of foliage.

Great thickets of *Melaleuca Wilsonii* are found. These make a glorious show in late spring. *M. pubescens* is crowded beside a shallow water-course, and odd plants of *M. acuminata* are seen. Thus we find one-third of Victoria's Honey-myrtles in a few acres. Among all these, masses of smaller shrubs struggle upward for light. The crimson, pink, and white of the *Micromyrtus* mingles with the gold of the *Hibbertias*, the striking blue of *Dampiera*, the blush of *Baeckia crassifolia*, and the lovely waxy stars of *Eriostemon gracile* and *E. obovalis*. All of these show interesting variation, probably due to the inhospitable nature of the soil. *Eriostemon gracile*, in particular, is light and much more dainty than in the Grampians. The flowers appear like stars caught up in a net of green thread.

In the open spaces, *Loudonia Behrii* makes a mass of gold. Amongst it, many plants of the peculiar *Goodenia amplexans* occur.

No fewer than eight species of *Acacia* flourish in the Norton Mallee. These present an interesting study in the variability of the phyllodes. *A. spinescens* is practically leafless. *A. rigens* has grey needles. *A. armata*, *A. acinacea*, and *A. obliqua*, with similar forms, arrange them very differently. *A. brachybotrya* has elliptical silvery-grey phyllodes.

Always close to the bases of other plants, and possibly semi-parasitic, the lovely scarlet of *Prostanthera aspalathoides* enlivens the winter and early spring. *Eutaxia microphylla* also hugs the soil in mats. At the end of September, it is very gay. Here, the species name is justifiable; for the leaves are mere scales. In other parts of the district, the plant is more ascending and has larger leaves. The many forms illustrate well the difficulty of making species in some genera of Australian plants. With extreme forms, separate species seem certain. With all the gradations before one, the only recourse is to lump them.

Perhaps the most striking plant in this area is a variety, I am informed, of *Correa rubra*. If so, it is far from the type in all vegetative characters. A compact shrub with small, fresh, green leaves and always very shapely, it reminds one of neatly trimmed specimens of *Pittosporum eugenioides*. The leaves have a distinct perfume resembling lemon. I have seen it elsewhere only on Mount Arapiles, a few miles away, and then in large bushes, covered with bells from April on through winter. *Daviesia pectinata* is another strange shrub, with something of the appearance of the anchor plant. Should any reader visit the locality, he should not depart until he has viewed the vista of the Darragon road, a ribbon of dark red, bordered with the indescribable greens of the Broom Honey-myrtle. See it on the fiercest summer day and remember it forever!

IN THE NEW HEBRIDES

(Summary of lecture given before the Field Naturalists' Club of Victoria, March 9, 1936.)

The New Hebrides, in which are included the Torres and Banks Groups, are an incomplete double chain of volcanic islands, stretching north-west by south-east for 550 miles. The group lies between 12 and 20 degrees south latitude, and 160 and 170 degrees east longitude, and is reached from Sydney via Lord Howe and Norfolk Islands. The area is about 5,000 sq. miles, and the population 60,000 natives, 1,000 whites, and 1,000 Tonkinese indented labour.

The natives are Melanesian, with a strain of Polynesian blood on some of the easterly lying islands. They have the reputation of savagery and treachery, but since coming into contact with the white race have been dying out rapidly. There are many languages and dialects, and the *lingua franca* is Biche-de-mer, so that communication is established by an extraordinary jumble of French, English, Biche-de-mer, and native dialect. That it succeeds as a vehicle of understanding between the parties concerned speaks well for the linguistic capabilities of both sides.

Pig is the standard of wealth, in the north especially. Tusked boars and the rare hermaphrodite pigs are the most valuable, the younger, smaller and females ranging lower in the scale. Where the influence of civilization has brought about desocialization, pig, as currency, is slowly being replaced by the more easily handled L.S.D.

The Group is classed as unhealthy as a whole; this is true of a great number of spots, but on the higher ground, and especially on the islands to the south, and on their western sides, the climate is both healthy and pleasant. Malaria, blackwater, aemobic dysentery, yaws and hookworm are the most prevalent diseases. Dysentery is losing its terror, thanks to education in public health, and yaws is giving way before neo-salvarsan.

The flora and fauna, while not specifically numerous, are numerically prolific. The natives make use of every tree, bush and vine either for food, clothing, or building material. There is a plentiful ration at hand, and the native gardens supply yet more variety, and provide the main object in life for them since their desocialization. The native "lap-lap" or pudding, is made by grating banana, cocoanut, yam, taro into a banana leaf, placing on this crab, fish, pork or chicken on top and wrapping the whole up in the leaf, and placing it in a hole in the ground with hot stones on top. In three hours or so it is ready to eat.

Of animals there are few. Wild pigs, introduced by Captain Cook, and often called "Captain Cookers," are common. There are rats, some bats, but no marsupials. There are also few birds—spine, swallow, Zosterops, two or three finches, kingfishers and large hawks being the most numerous, but there are no crows.

sparrows, starlings, etc. The silence in the ravines and gullies is one of the most characteristic features of the New Hebridean bush. There are no snakes, frogs, snails or slugs, so that fear of the animal kingdom is absent, though for some obscure reason the natives regard the delightful and tame little blue-tailed lizards as taboo. There are numbers of geckoes everywhere, and gorgeous butterflies and dragonflies give colour if not song to the jungle. Ants are numerous, some very vicious. Lively prawns inhabit the up-land watercourses.

Of ferns there are many, differing from our Australian species, and several orchids may be found. Bamboo, reeds and cane of varying sizes enter into the life of the natives by providing them with houses, weapons, etc. The Banyan abounds, as does the Mango, the groves of large pale-coloured oranges and lemons are met in sheltered spots, these latter obviously introduced by early comers, and spreading rapidly under advantageous conditions.

(Mrs.) J. L. F. Woodburn.

THE GIPPSLAND MALLEE, *EUCALYPTUS KITSONIANA*

By R. W. Bond

Mr. F. Barton's notes on the Gippsland Mallee (*Vic. Nat.*, March, 1936) call attention to a rather little-known species of the genus *Eucalyptus*. In the past, its distribution limits have been uncertain, and it has been allowed to pass under an inappropriate vernacular name. It appears to be closely related to *E. ovata*, the Swamp Gum, and it is suggested that the species originated as a hybrid between this and another gum. When on a favourable site, it makes a small tree with a single trunk and a typical "gum" bark more or less persistent near the base.

Such Mallee-like appearance as it may assume is due not so much to its natural habit as to the poor, and extremely acid soils to which it is usually confined, and to the frequent bush-fires to which this type of country is subjected throughout Victoria. As is the case with many other gums, the bark is ill-adapted to resist fire, and severe heat kills the cambium, resulting usually in adventitious growth from the base instead of along the trunk and branches, as in hardier species such as the stringybarks. This, in turn, causes the formation of a swollen, woody base which resembles a "Mallee-root." It is really only the typical lignotuber formed normally in youth by most Eucalypts capable of coppicing, enlarged by artificial causes. Similar forms are assumed by true forest species under similar conditions, e.g., *E. dives*, *E. Considineana*, *E. capitellata*, *E. ovata*, and others. The various Snow-gums resemble typical Mallee more than does *E. Kitsoniana*, when in exposed, or frequently burnt areas. The name "Dwarf Gum," which Mr. Barton uses, would be much more suitable for this tree.

Regarding its distribution, I have found that, besides being common near Foster, Stony Creek, and Meeniyan, it occurs commonly on all the scrub-lands between Leongatha South, Inverloch and Lower Tarwin. It grows at Wilson's Promontory, on the morass north from Growler's Creek, and a variant form was noted near the mouth of Sealer's Creek. I have received specimens from as far west as Heywood, and believe that it has been collected on Cape Otway, always comparatively near the coast. The National Herbarium possesses specimens labelled "Cape Patterson." I have yet to discover it there, in spite of frequent searching, but, no doubt, in the early

days, this was an indefinite locality, and probably the specimens came from the scrublands south of the upper Powlett River.

In spite of its lowly place in a genus of large trees, *E. Kitsoniana* may have a commercial future if the oil proves to be of suitable quality. Where it occurs, it is often abundant, the leaves would be easy to gather, and it coppices vigorously. The species is easily recognized by its coarse, leathery foliage and its sessile, crowded, more or less hemispherical fruits about a quarter-inch in diameter, and further reports of its occurrence elsewhere would be welcome.

EXCURSION TO ANAKIE HILLS

Eighteen members and friends attended the excursion on February 22. Some very profitable collecting was done. The Anakie Hills are three isolated volcanic scoria cones situated a few miles north-west of the You Yangs, and some 55 miles by road from Melbourne. Although belonging to the newer volvanic series forming the Werribee and Western District lava plains, they differ in many respects to the usual scoria and lava cones of these areas. The eastern hill more particularly consists of an agglomerate of vesicular and scoriaceous basalt, ash, and other fragmentary material. Among these are to be found minerals that are not constituents of normal basalt.

Mr. D. J. Mahony, Director of the National Museum, has investigated these minerals, and describes two of them as a soda anorthoclase and a soda hornblende. The following quotations from Mr. Mahony's paper should prove of interest to members. "The anorthoclase is abundant in loose basalt scoria, and is found as colourless and transparent cleavage fragments, generally small but running up to two inches long, rounded lumps evidently partly absorbed by molten igneous rock and occasionally as crystals more or less rounded." The hornblende consists of black cleavage fragments, small crystals often with rounded edges, and crystalline lumps. Regarding the origin of these minerals, Mr. Mahony quotes Bowen as having "shown experimentally that minerals rich in magnesia are the first to crystallize from a cooling magma containing the elements of diopside and the plagioclases, and that alkaline minerals appear at a late stage of cooling.

The inference is that the original magma during the process of cooling separated by some process of differentiation into two types, one a normal basalt, and the other an alkali-gabbro and that the felspar, augite and hornblende, discussed above, come from the alkali-gabbro differentiate. It would, therefore, appear that the original magma separated into more or less alkaline portions before tertiary volcanic action began. The basaltic portion remained highly mobile, and rose to the surface more easily than the alkaline, partly crystallized, more viscid portion, which in consequence seldom formed lava flows, though some of its constituents together with molten basalt were hurled by explosions from points of eruption.

A very interesting find was made by Mr. H. Stewart, of a rhombic dodecahedral crystal of Garnet which may throw further light on the problem of the origin of these minerals. Olivine as greenish granular segregations in the lava and the glassy form of silica, hyalite (or Mullers glass) were noted. Several blocks of a granitic rock and pieces of indurated shale or slate were also observed.

Reference: *Some Tertiary Volcanic Minerals and their Parent Magma*, by D. J. Mahony, M.Sc., F.G.S., *Proc. Royal Society of Victoria*, 40 (N.S.), Pt. II, 1928.

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