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Part 1.

TASMANIAN BERRIES.

By RALEIGH A. BLACK.

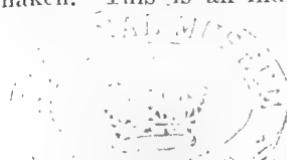
At the last meeting of the Society the President (Mr. W. W. Froggatt) exhibited a parcel of berries sent by Miss Cusbert as having been collected in Tasmania.

At the request of the President, the writer, who is a native of that island-State (often referred to as "The Gem of the Pacific") but now a resident of New South Wales, identified the specimens for the information of the members. At the close of the meeting he was asked to prepare a few notes on these specimens for publication in the *Australian Naturalist*; hence this short article.

Of the parcel of berries exhibited four distinct species were found and they are as follows:—

1. Blue Berry *Billardiera longiflora*, Lab.
2. Coral Berry *Gaultheria hispida*, R.Br.
3. Turquoise Berry *Drymophila cyanocarpa*, R.Br.
4. Heart Berry *Aristotelia peduncularis*, Hook.

Of the four species the blue berry, also occurring in Victoria, is the greatest favourite amongst plant lovers, and possessing a climbing nature it will always be found in its native habitat, entwined about some bush or small shrub; in which state it is able to display its resplendent charms to great advantage. This berry is so popular and being fairly easy of cultivation that it will be found growing up verandah posts of many gardens in Tasmania. Seeds are often collected and forwarded as presents to people living in remote parts of the world. For cultivation purposes the berries should, after having been gathered, be kept in a dry place until they assume a rusty appearance when it will be observed that the seed will rattle when the berry is shaken. This is an indication that the



seed is ripe and being of short longevity it should be planted at once after some hot water has been poured over its seed.

The coral berry also occurs in N.S.W. and Victoria, and is not a berry in the true sense of the word, although superficially it looks like one, but it receives its name from its appearance which it obtains from the thick fleshy calyx that completely surrounds the capsule which contains numerous small seeds. The coral berry is not a climber, but a small shrub, and in undisturbed parts of the forest will attain a height of five feet.

The turquoise berry, also belonging to N.S.W. and Victoria, belongs to the lily family, and owing to its favouring secluded, shady situations it has to be searched for. As the berries arise from the upper axils of a curved branch and are pendulous they are easily overlooked, but the graceful curved branch often "puts them away."

The heart berry, which is peculiar to Tasmania, receives its name from its appearance which is cordate in shape; and in colour the berries will be found in many different shades. This plant likes damp, shady situations and will grow several feet high, but in a straggling manner.

These four different kinds of berries are getting scarcer and scarcer on the slopes of Mount Wellington, under which nestles the beautiful city of Hobart, owing to tourists and others helping themselves so freely to them. Some few years ago bush lovers were so alarmed at the comparative scarcity of them that the Municipal Council was induced to issue an edict warning people not to pick any native plants on any part of Mount Wellington under a penalty.

To enable young botanists to correctly identify these beautiful berries the following descriptions are appended which are taken from "The Tasmanian Flora," by L. Rodway, Government Botanist:—

BILLARDIERA LONGIFLORA, Lab. (Family PITTOSSPORACEAE) a twining climber. Leaves narrowly to broadly elliptical, rarely lobed, about three-quarters to one inch, rarely linear. Flowers solitary, stalked, usually pendulous, dull yellow or blue. Sepals very acute, about two lines long. Petals about one inch, cohering into a tubular corolla. Style as long as corolla. Berry swollen, about three-quarter inch blue, white or red.

ARISTOTELIA PEDUNCULARIS, Hook (Family TILIACEAE). A straggling shrub of a few feet high. Leaves mostly opposite, shortly stalked, oblong to lanceolate, pointed serrated, and two or three inches long. Flowers white, mostly solitary, pendulous on long stalks. Sepals about a quarter inch long pointed.

Petals about half inch broad, and three-lobed. Stamens 10-12, the filaments much bent and hairy at the base. Anthers long, linear and shortly pointed. Berry heart-shaped, about one-third inch long, varying in colour from white to deep brown purple.

GAULTIERIA HISPIDA R.Br. (Family ERICACEAE). An erect spreading shrub up to five feet high, the branches and midribs of the leaves covered with coarse brown hairs. Leaves shortly stalked, lanceolate to oblong, obscurely toothed, mostly one to two inches long. Flowers in small dense, terminal racemes, each flower sub-tended by a short broad bract. Calyx about one line long. Corolla about two lines long. Frinting-ealyx white and succulent completely surrounding a capsule, about four lines in diameter.

DRYMOPHILA CYANOCARPA, R.Br. (Family LILIACEAE). Stems simple and erect from a tuberous rootstock, the upper leafy portion curved and often branched, half to two feet high. Leaves lanceolate, alternate, in two opposite rows, confined to the upper portion of the stem, one to three inches long. Flowers white, few, solitary in the upper axils, pendulous, on slender stalks. Perianth-segments two or three lines long, and lanceolate. Berry globular or oblong, usually turquoise blue, rarely white.

NOTES ON THE LARGE MOUSE-GREY TIMBER MOTH.

(*Zeuzera Boisduvalli.*)

By L. GALLARD.

On December 4th, 1927, while continuing my observations amongst the stunted white gums I collected three pupae of this huge moth and, after keeping them till January 28th, I was rewarded by seeing female adults emerge.

From another pupa that I collected on February 23rd, 1927, I bred a male specimen of the same species. In this case the pupa was only a small one, and the adult which emerged was only a little over half the size of the females referred to above.

The larva of this species closely resembles that of *Zeuzera eucalypti*, the chief differences being that the thoracic segments are a little more humped and the colour a little redder.

In the pupae they are more distinct, having a pronounced horny process or snout projecting from the front of the head enabling the species to be readily identified.

The adults are the heaviest bodied of all our timber moths, and the large females sometimes have a wing expanse of 9½ inches. The fluff on the legs and the ventral plate, which is very long, are almost white in colour. The dorsal surface and the wings are a light mouse-grey. Although the body is of such prodigious size, the eggs of this moth are extremely small and number many thousands.

One female laid over sixteen thousand eggs in four days in captivity. The eggs are dropped in the soil at the butt of the tree and the larvae on emerging crawl up the trunk and bore their way in through the bark. Here they feed on the inner bark and sap wood of the tree circling round and round until a cavity is formed of sufficient size to enable the larvae to move about freely. In some cases a lateral tunnel is made through the inner bark, and the larvae continue to feed within it until they reach a fair size. They then tunnel upwards in the barrel of the tree for about ten inches. After this they continue to feed on the woody tissue of the walls of the tunnels, and also feed in the original cavity the size of which increases accordingly.

During the first year all this work is done without leaving any external evidence, except a swollen blistered appearance of the bark, and a few rejected fragments of tissue which have escaped from a crack in the drying bark over the cavity. During the second year a considerable amount of this rejected food material finds its way out and accumulates on the ground below but it is not till the larvae are almost ready to pupate that they eat away the outer bark just over the mouth of the tunnel, and leave it exposed to view. When this is accomplished the larvae back up the tunnel and after stopping up the hole with a stout wad, constructed of rejected tissue and webbing, resembling a felt gun wad, they pupate head downwards and await their destiny.

Sometimes this is not too certain owing to parasites. Members of the Society may remember that I exhibited last year a cluster of the cocoons of a large Ichneumon wasp taken from pupae of this moth, and from which 83 live wasps were bred. At that time I was not sure of the host species, but I am now certain that they were bred from the species now under discussion.

Lantern slides of all stages of this moth and preserved specimens of the parasites and their cocoons were exhibited at the meeting of the Society on April 5th, 1927.

A VISIT TO JERVIS BAY.

By MARY FULLER.

Jervis Bay, being little frequented by the general public, presents many attractions to the Nature lover. This enormous, sheltered bay, about 40 miles in circumference, occurs in the trough of a syncline or down-fold of the earth's crust. Whilst the resistance of the "Nowra grits" gives bold, perpendicular headlands and a relatively narrow mouth, the syncline allows the bay to be wide and expansive.

The beaches which fringe the shores of the bay are of a dazzling silvery white, quite distinct from the golden sands of Sydney. An examination of the sand shows it to consist largely of quartz and the numerous pebbles of all sizes which wash up with the tides are also of quartz eroded out from the "grits." On a bright day the waters of the bay show a striking royal blue colour, whilst the shallows near the shore are pale, transparent green. This, with the brownish purple of the precipitous cliffs and the silver of the sands makes a most picturesque scene.

Various species of shark abound in the bay—the egg shells found on the beaches being numerous and much larger than the Port Jackson variety. On one occasion, whilst bathing, I received an electric shock from a large ray. Later I speared two of these creatures just off the beach. They measured about two feet from nose to tail and weighed about 25 lb. They retained the power of transmitting shocks for an hour or two after death. On dissection these rays appeared very similar to the common sting-ray.

One windy day a fleet of remarkably beautiful little Medusae floated in to shore. Their floats and sails were of the brightest blue, threaded with silver, and their dense short tentacles of rich blue and purple spread out on the surface, gave them the appearance of animated pansies.

In the bush round the shores animal life was abundant. Many black snakes were seen, and at night bats, bandicoots and rabbits were plentiful. Flowering plants were naturally not at their best, but the thousands of Christmas bells *Blandfordia nobilis* and delicate fringed violets *Thysan otus* made up for the lack of others. One wondered if the bells had ever been so common close to Sydney, and if they will continue to be so plentiful at Jervis Bay, when it is made more accessible to holiday-makers. Although habitation is lacking round here, the hand of man is evident in the work of the "gum-gatherers."

Everywhere the stem butts of *Xanthorrhoea* are piled up. A fire made of these proved very aromatic; the volatile hydrocarbons being given off in dense yellow fumes.

THE ATTRACTION OF THE FLOWERS OF THE
ORCHID, *CRYPTOSTYLIS LEPTOCHILA* FOR
ICHNEUMON WASPS (*LISSOPIMPLA
SEMIPUNCTATA*).

By W. W. FROGGATT.

The following notes are made from observations sent by a Victorian field naturalist, Mrs. Edith Coleman, of Walsham, Blackburn, Victoria, who wrote to me regarding the habits of wasps.

She says: "A month ago my daughter was carrying a few flowers of *Cryptostylis leptochila*, when I noticed a number of wasps on them. The wasps backed in under the labella instead of entering in the orthodox way. It seemed rather incredible to me, for it suggested that they were depositing their eggs in the stigma of the orchid, and we could find no trace of larvae in the flowers, which they might have been parasitising.

"Some time later I happened to read in Miss Sulman's 'N.S.W. Wildflowers,' that an observer had noted wasps backing in under the labella of *Cryptostylis longifolia*. Interested in the matter I visited Upwey, the locality where this orchid grows. I gathered some of the flowers and the wasps came as before. I watched them back into the flower, extract themselves with a jerk and carry off the pollen on their tails.

"The pollen was always in exactly the same position, about the anal segment. We distinctly saw the ovipositor exserted, and to our eyes it appeared to penetrate the rostellum. Examination showed that the rostellum had been carried off with the pollen masses, leaving a deep viscid pit, in which I expected to find eggs or larvae or the larva of some other insect.

"When I pinched the wasp out of the flower it offered some resistance, suggesting that the ovipositor was either hooked or went in sideways under the rostellum.

"I cut sections of the flowers and examined them to see if I could find any eggs or larvae in the flowers with negative results.

"At Upwey the wasps brought pollen to the flowers, but here at Blackburn (where the orchid does not grow wild) they only carry it from the flowers. I am posting to you the wasp with the pollen as it is withdrawn from the flower, and one

wasp in the act. The flower was snipped off with the wasp attached."

This is an interesting observation on the fertilisation of an orchid by Ichneumon wasps and is worth recording. Mrs. Coleman was under the impression that the wasps were looking for a place to deposit their eggs or larvae, but this ichneumon *Lissopimpla semipunctata* lays her eggs in the larvae of various Lepidoptera. There is probably some scent which attracts them and causes them to act in this manner.

ORCHIDS OF THE PATERSON DISTRICT.

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

The *Australian Naturalist* has already published some notes on the greenhood orchids found by the writer in this district (see the February number, 1927). Some further remarks on these and other orchids collected in the same neighbourhood may perhaps be of interest to members of the Society. For the purpose of this article, the term "Paterson district" is restricted to a radius of about eight miles from Paterson township. Within this limited area, the greater part of which is occupied by farms or stock holdings, the number of orchids found is rather surprising. Since October, 1924, I have recorded 65 species, and I have no doubt that others remain to be discovered.

These 65 species are divided among the following genera:—
BULBOHYLLUM, 2; *DENDROBIUM*, 7; *SARRCOCHILUS*, 4; *CLEISTOSTOMA*, 2; *CYMBIDIUM*, 3; *CALANTHE*, 1; *GALEOLA*, 1; *DIPODIUM*, 1; *CALOCHILUS*, 1; *THELYMITRA*, 4; *DIURIS*, 6; *PRASOPHYLLUM*, 3; *CORYSANTHES*, 3; *MICROTIS*, 3; *PTEROSTYLIS*, 13; *CYRTOSTYLIS*, 1; *ACIANTHUS*, 2; *ERIOCHILUS*, 1; *LYPERANTHUS*, 1; *CALADENIA*, 3; *CHILOGLOTTIS*, 1; *GLOSSODIA*, 2.

Eighteen of these are epiphytes, the remainder are terrestrial plants. The epiphytes, with the exception of the three *CYMBIDIUMS*, are mainly confined to brush-forest country, of which there is not much left in the area under consideration.

The two species of *Bulbophyllum* (*B. shepherdii* and *B. elisae*) are comparatively rare, though doubtless they were formerly more abundant, as they are still further up the Paterson and Allyn valleys.

The *DENDROBIUMS* are fairly plentiful, with one exception. This plant has been determined by Dr. R. S. Rogers as identical in all essentials with *D. gracilicaule* F.v.M. var. *Howeanum*, Maiden—hitherto supposed to be restricted to Lord Howe

Island. I have not seen a Lord Howe Island plant; but I must confess that I find it increasingly difficult to regard the Paterson orchid as a mere variety of *D. gracilicaule*; and I believe that it will yet be given specific rank. It is a beautiful flower, the size of the plant and the long racemes of unspotted creamy blooms making it far more conspicuous than *D. gracilicaule*.

Of *D. speciosum*—the rock lily—I have seen two varieties here besides the type, and these I take to be var. *Hillii* and var. *nitidum*. As the description of these forms known to me do not agree, it is difficult to be sure. It would be a good thing if one of our leading botanists could take this species in hand and clear up some of the doubts about its varying forms.

D. aemulum and *D. linguiforme* are very common about Paterson, and are by no means entirely restricted to the brushes. *D. teretifolium* may be looked for wherever *Casuarina glauca* grows, and its near relative *D. Fairfaxii* is more confined to the brushes. In some former notes I ventured the opinion that the specific rank of the latter should be retained. In N.S.W. the two appear to be very distinct, but I have since seen Queensland forms which apparently link them up and justify the inclusion of *D. Fairfaxii* under *D. teretifolium*. The fluted pencil orchid, *D. Beckleri*, is not common in the Paterson district, though in great abundance further up the river.

Of *SARCOCHILUS* there are four distinct species, somewhat remarkably distributed. *S. divitiflorus*, the “wonder-plant” of the genus, is found in fair quantities in some of the brushes to the west of Paterson: on the eastern side of the valley I have seen but one small plant. The beautiful *S. falcatus* also favours the western brushes, and is rare in the eastern. On the other hand, *S. olivaceus* and the dainty *S. Hillii* are very common among the eastern hills, but are seldom seen on the western side. In the Bullahdelah district and elsewhere, *S. Hillii* is white: in the Paterson and Allyn valleys it appears to be consistently pale pink.

Cleisostoma tridentatum is abundant in many brushes: the tiny *C. Beckleri* I have only found towards the head of Dunn's Creek, where it is fairly plentiful.

The three *CYMBIDIUMS*—*canaliculatum*, *suave*, and *albuciflorum*, are somewhat sparsely distributed throughout the district. There are two fine clumps of the first on ironbark eucalypts at the junction of the Dungog and Cresford roads.

The beautiful scrub lily (*Calanthe*) is now very rare—perhaps confined to one locality on Dunn's Creek. *Gateola cassythoides*, the weird climber, is not uncommon on some of the

hills east of the river: and *Dipodium*, the Hyacinth orchid, is plentiful there also. I have only noticed one species of CALOCYBES (C. campestris): it is quite common. Of the THELYMITRAS, *T. ixiooides* I have only seen once. *T. canaliculata*, which seems to me doubtfully distinct from *T. ixiooides*, is plentiful in *Melaleuca* scrubs, where *T. carneae* also occurs. *T. pauciflora* is very abundant in patches along the railway line. It sometimes belies its name, carrying numerous flowers. It is one of the shyest of the sun-orchids, only expanding during the hotter hours of bright spring days.

The genus DIURIS is well represented. I am not sure whether I should give the palm for beauty among the local species to *D. punctata* (elongata) or *D. aurea*. Both are very fine here. Along the railway line near Mindaribba there are large colonies of the former forming wonderful patches of lavender—or is it lilac?—in the foreground of the landscape. *D. aurea* is also very attractive. The name does not seem wholly appropriate: the yellow is almost pure lemon, not the deeper hue of gold. *D. sulphurea* is common, but it never attains here the dimensions seen in the southern States. *D. palachila*, of which I found a healthy specimen in September, 1926, has not, I believe, previously been recorded for this State. Since it occurs so far north, it should be looked for in our southern areas, as it is chiefly a Victorian and South Australian species. *D. pallens*, a wee thing closely allied to *D. pedunculata*, occurs on the grassy hills. In 1926, Mr. D. W. Hooë, of the Paterson Post Office, brought me a perfect specimen of a *Diuris* which has not been identified. It has some resemblance to *D. maculata*, but does not agree structurally.

The larger species of PRASOPHYLLUM seem to be absent from the district. Three of the dainty forms of the section GENOPLESIUM occur in a scrub towards Martin's Creek. One of these appears to be an undescribed species, and is now awaiting a final verdict from Dr. Rogers. When one examines these little PRASOPHYLLS under the magnifier, they switch one's mind off the prosy tracks of technical observations into the fields of that "Wonderland" beloved by children; one feels that such exquisite fairy flowers demand fairy folks to appreciate and enjoy them. The new species (if new it be) is one of the most attractive I have seen—the flowers are gems of deep reddish-purple, with ciliated labellum and segments. Of the two remaining, one is *P. nigricans*; the other puzzled me. It is well known that in PRASOPHYLLS the flowers come out "upside down": but in this form they are so much curved over at maturity as to actually reverse this process; they are then facing the stem,

with dorsal sepals uppermost. Dr. Rogers is of opinion that this plant is *P. eriochilum*. While it does not exactly agree with Fitzgerald's figure, the differences are not greater than might be expected between highland and lowland forms of the same species.

Considerable confusion seems to exist between various species of *CORYSANTHES*. [Are we to retain Robert Brown's name, or must we adopt Salisbury's *CORYBAS*, in view of the fact that it appears doubtful if he had the right to bestow it?]. In the *Victorian Naturalist* for April, 1926, the present writer discussed the relations between *C. fimbriata*, *C. pruinosa*, and *C. diemenica*, and suggested that the first and last might possibly be only variants from the second. A recent discovery of *C. fimbriata* near Paterson has given me a further opportunity to examine this form, which I had not seen growing for some years. I cannot say that this examination has done much to confirm the above suggestion. I think that *C. pruinosa* is certainly a most variable species, in some forms approaching *C. fimbriata*, and in others very close to *C. diemenica*: but in the case of *C. fimbriata* there are differences which seem to fully justify specific rank. In this connection Fitzgerald's tabulated points of distinction should be carefully studied by those who are interested.

C. pruinosa is common in the Paterson district, and the third species is *C. aconitiflores*, abundant in a scrub of *Melaleuca* and *Callistemon*, a mile across the river from the township. The three species of *MICROTIS* are *M. porrifolio*, *M. parviflora*, and *M. oblonga*, the second being the most abundant. The Greenhoods (*Pterostylis*) have already been dealt with in the notes referred to above. Since they were published I have found *P. truncata* in another locality, and have heard reliable reports of what I can only conclude must be *P. Baptistii*, in a forest which I hope to explore this year. The species alluded to at the close of the former notes appears to be, as suggested, *P. rufa*.

Only a few of the remaining orchids call for comment. *Cyrtostylis reniformis* is fairly plentiful along gullies. *Acanthus fornicatus* is perhaps the commonest orchid of the district, in favourable situations attaining a foot in height. It varies considerably in the length of the sepals, and the green-flowering form occurs. Of *A. exsertus* I had seen but a single withered plant until this season, but have recently found it in abundance in a moist gully two miles from Paterson. *Eriochilus autumnalis* may be seen in myriads on some of the grass-lands, and less abundantly along the gullies. *Hyperanthus suaveolens* I



have only found in the scrub which shelters *Corysanthes aconitiflores*. It is abundant there, both red and green forms being present. The three CALADENIAS—*C. carneae*, *C. alba*, and *C. coerulea*—are all very plentiful, and there is a form which may be a hybrid between the first and last of these. The only CHILOGLOTTIS I have found was a surprise. I brought home a few plants discovered in the autumn of 1926, supposing them to be the common *C. reflexa*: but in September they flowered and proved to be *C. trapeziformis*, which I had not seen before. *Glossodia major* and *G. minor* are both here—the latter much more abundant than the former, which is unusual.

TABULATED LIST OF ORCHIDS FOUND NEAR
PATERSON, FROM OCTOBER, 1924, TO APRIL, 1927.

<i>Bulbophyllum Elisae</i> , F.v.M.	<i>Thelymitra ixiooides</i> , Lindl.
<i>Shepherdii</i> , F.v.M.	<i>canaliculata</i> , R.Br.
<i>Dendrobium speciosum</i> , Sm.	<i>pauciflora</i> , R.Br.
var. <i>nitidum</i> , Bail.	<i>carnea</i> , R.Br.
var. <i>Hillii</i> , F.v.M.	<i>Diuris punctata</i> , Sm.
<i>gracilicaule</i> , F.v.M.	<i>aurea</i> , Sm.
var. <i>Howeanum</i> , Maiden.	<i>sulphurea</i> , R.Br.
<i>aemulum</i> , R.Br.	<i>palachila</i> , Rogers.
<i>linguiforme</i> , Swz.	<i>pallens</i> , Fitzg.
<i>teretifolium</i> , R.Br.	sp.?
var. <i>Fairfaxii</i> , F.v.M.	<i>Prasophyllum nigricans</i> ,
<i>Beckleri</i> , F.v.M.	R.Br.
<i>Sarcochilus divitiflorus</i> ,	<i>eriochilum</i> , Fitz.
	sp.?
<i>falcatus</i> , R.Br.	<i>Corysanthes fimbriata</i> , R.Br.
<i>olivaceus</i> , Lindl.	<i>pruinosa</i> , R. Cunn.
<i>Hillii</i> , F.v.M.	<i>aconitiflores</i> , Salish.
<i>Cleisostoma tridentatum</i> ,	<i>Microtis porrifolia</i> , R.Br.
	<i>parviflora</i> , R.Br.
<i>Beckleri</i> , F.v.M.	<i>oblonga</i> , Rogers.
<i>Cymbidium canaliculatum</i> ,	<i>Pterostylis ophioglossa</i> , R.Br.
	<i>concinna</i> , R.Br.
<i>albuciflorum</i> , F.v.M.	<i>acuminata</i> , R.Br.
<i>suave</i> , R.Br.	<i>curta</i> , R.Br.
<i>Calanthe veratrifolia</i> , R.Br.	<i>nutans</i> , R.Br.
<i>Galeola cassythoides</i> , Reichb.	<i>pedunculata</i> , R.Br.
<i>Dipodium punctatum</i> , R.Br.	<i>obtusa</i> , R.Br.
<i>Calochilus campestris</i> , R.Br.	<i>reflexa</i> , R.Br.

<i>revoluta</i> , R.Br.	<i>Lyperanthus suaveolens</i> ,
<i>truncata</i> , Fitzg.	R.Br.
<i>mutica</i> , R.Br.	<i>Caladenia carneae</i> , R.Br.
<i>rufa</i> , R.Br.	<i>alba</i> , R.Br.
<i>longifolia</i> , R.Br.	<i>coerulea</i> , R.Br.
<i>Cyrtostylis reniformis</i> , R.Br.	<i>Chiloglottis trapeziformis</i> ,
<i>Acianthus exsertus</i> , R.Br.	Fitzg.
<i>fornicatus</i> , R.Br.	<i>Glossodia major</i> , R.Br.
<i>Eriochilus autumnalis</i> , R.Br.	<i>minor</i> , R.Br.

NATIVE INSECTS AND INTRODUCED TREES.

By WALTER W. FROGGATT, F.L.S.

It is a well known fact in forest plantation work that when foreign trees, botanically related to the surrounding indigenous trees, are included in the plantings, there is always the danger of insect pests in the forest transferring their attention to the intrusive trees.

We have a number of examples in Australia. The Cypress-pine borer (*Diadoxus erythrurus*) which infests the native *Callitris*, does a great deal of damage to the allied *Cupressus lambertiana* when used for hedges at the western homesteads. The handsome little Lace Leaf-Bug (*Froggattia olivina*) was described from specimens defoliating the introduced olive trees at the Hawkesbury College; later on its native food plant was found to be the Australian olive (*Noto-laea longifolia*), a little shrubby tree growing in the Hawkesbury sandstone country.

When citrus orchards were first planted in the Lismore district, they were seriously damaged by the larvae of a large longicorn beetle (*Uracanthus cryptophagus*) which had deserted the indigenous "finger lime" growing in the adjacent scrub for the more succulent introduced citrus trees.

Near Wee Waa, on the edge of the Pilliga scrub some time ago, the Forestry Commissioners formed a small experimental plantation for introduced trees, among which were a number of small Golden Wattles (*Acacia pycnantha*) from South Australia.

It is, therefore, of interest to record a list of the indigenous insects of one of our western scrub-forests, which assisted in destroying these small golden wattles, when moved into un-

suitable surroundings and in competition with the more hardy western wattles.

The Pilliga scrub comprises some 30 different species of hardy western wattles, of which two species have foliage like the golden wattle introduced from the south. Up to the time when I visited this plantation, through the courtesy of Mr. Gordon Burrows, the District Forester (October, 1924) rain had not fallen for many months, and the more delicate trees had suffered from the drought conditions. A number of these introduced wattles were dead and leafless; others, though alive, showed a sickly yellow tint in their foliage. The dead stems, on examination, showed that they had been badly infested by borers; and the unhealthy-looking trees were full of other borer beetles and their larvae, busily excavating their galleries through the bark and wood. From the specimens collected at the time, and others bred since from the infested wood in the Forestry Insectarium, the following list has been compiled:—

(1). THE SILVER BROWN LONGICORN, *Pachydissus sericus* Newm.

A single specimen of this handsome longicorn beetle was bred out of a section of wattle stem, kept under observation through the summer. This beetle is not uncommon in the Sydney district, where it breeds in the stems of the long-leaved wattle (*Acacia longifolia*).

(2). THE BOTANY BAY DIAMOND BEETLE, *Chrysolophus spectabilis* Fabr.

A specimen of this beautiful weevil was bred from the stem of a golden wattle. This typical weevil is found breeding in various wattles in the Sydney district. In the summer months numbers of specimens can be collected on the foliage, or clinging to the twigs.

(3). THE FLAT-BACKED WEEVIL, *Laemosaccus querulus* Pascoe.

When sections of the dead dry stems of the golden wattles were split up, numbers of short galleries packed with wood dust were found turning into the sapwood. At the end of the chambers short, wrinkled, legless grubs were exposed to view. Three months later a number of the adult beetles emerged in the breeding jars. The members of this genus of weevils in the adult state may be often found resting upon the surface of the bark of a fallen tree trunk when the bark is just beginning to wither.

(4). THE SLENDER BUPRESTID, *Agrilus australasiae* Lap. et Gory.

One specimen of this small slender beetle was bred out of dead wattle stems of this wattle wood.

(5). THE AUGER BEETLE, *Bostrychopsis jesuita* Fabr.

A large series of these fine borers were found busy at work in the stems of the sick wattles. Others were just commencing their attack on the bark. Under one golden wattle, not more than six feet high, I gathered 25 specimens which dropped from the branches when I approached the tree.

This beetle was also found tunnelling in a dead branch of a white cedar growing in a garden in the Narrabri district. In the forest others were cut out of a branch of a redwood (*Cadellia peniastylis*).

(6). THE SPINE-TAILED BORER, *Xylobosca bispinosa* Macleay.

These small black Bostrychid borers were busily engaged in burrowing through the stems of the sick wattles. I collected a number of specimens of both sexes, which are so different from each other, that Macleay gave the female specific rank under the name of *Rhizopertha elongatula*. The short male has two stout spines on the end of the wing covers, the elongated female rounded at the apex without any spines. Specimens of this beetle were also bred out of dead redwood, which is evidently its native food plant.

(7). TINY BLACK BORER, *Xylobosca decis* Lisne.

This is one of the smallest of the Bostrychid beetles, black in colour, and having the tip of the wing covers sharply truncated, terminating in a slight turned down tail. They were not as numerous as the pin tail borers, and seemed to prefer the junction of the branchlets and main stem for their burrows.

(8). THE DARK BROWN BOSTRYCHID, *Xyodelcis obispa* Germer.

These beetles were not so plentiful. Four specimens were cut out of the stems in company with the other species. This borer varies very much in size, and is one common on the spotted gum, and other eucalyptus logs all along the coastal districts of New South Wales.

THE SMALLER GREY WOOD MOTH, *Zeuzera eucalypti*.—One specimen of this common wood moth of the black wattles was bred out of a solid section of dry wood. There were a number of the larvae burrowing in the base of the trunk.

NOTES BY MEMBERS.

BLACK THIRIPS.

By L. Gallard.

These peculiar thrips attack the young *Callistemon* (bottle-brush) plants in the nursery and do considerable damage. The adult is shining black in colour and is almost twice the size of the common rose thrips. The leaves are so badly chafed on either side of the mid-rib by the complex mouth parts of these insects that the tissues dry up and cause the outer edges of the leaves to roll, thus forming a nice shelter and winter quarters for the thrips. Inside these rolled leaves in July I found eggs, small larvae, nymphs, and adults of the thrips. All survived the winter. This particular species of thrip was exhibited at one of our meetings to show the extent of the damage caused, as in some of the smaller species the damage is not nearly so conspicuous.

It is very difficult to make accurate observations on the damage caused by these insects, and we are obliged to rely on the best circumstantial evidence available. In this case the damage is so conspicuous that it can be seen within a very short time after the injury is caused.

PALEOLITHIC WEAPONS.

By B. Bertram.

Two diminutive stone axes formed the subject of an exhibit by me at one of our meetings. The first was discovered in the Darling River area, western New South Wales. It measures $2\frac{1}{2}$ inches by $1\frac{1}{2}$ inch by $1\frac{1}{4}$ inch, and has a distinct groove, formed by percussion, for the reception of a primitive handle. The material is of a hard basaltic character.

The second was found at the foot of the historic Majuba Hill, South Africa. The dimensions are almost identical with the above, except that the first measurement, from edge to back, is $3\frac{1}{2}$ inches. It is not grooved and is of a harder formation, fairly well polished.

EXHIBIT by L. GALLARD.

The following insects were exhibited at the March meeting, 1927:—

Hepialid Moths.—A box of specimens grouped to show their habits of feeding and living in the larval form.

Peressectis Australis (Larvae).—Long flimsy white grubs which live free in the soil, sometimes at a depth of 15 inches, and feed on roots. They pupate free in the soil.

Porina, sp.—The larvae feed in roots, work their way to the surface, and emerge in swarms after a heavy rain. The moths fly to the light freely, and can often be collected in numbers in the house on a stormy night.

Charaga, sp.—The larvae feed on sap wood of gum trees. They eat out a cavity under the bark and cover it over with a felted mass of web and rejected food material. Ultimately they make a tunnel down the affected limb, in which they pupate.

Culama, sp.—The larvae eat out a large cavity in the sap wood beneath the bark. In this they live the whole season. Some ultimately make tunnels in the tree in which to pupate, while others make a little cell in the side of the cavity and pupate there. The larvae of this one resembles *Culama caliginosa* in shape and size, but it is a lighter colour, and speckled all over with black dots. This is the first time I have known it to be bred out, and it is therefore an unidentified species.

THE METALLIC GREEN STAG BEETLE.

Miss R. Thurston at the June meeting exhibited some fine specimens of both adults and larvae of the metallic green stag beetle *Lamprima latreillei*. It is one of our commonest stag beetles and varies considerably in size and colour; being found in many shades from coppery green to metallic blue. The larvae are white fleshy grubs, resembling in general form the white curl grubs of the family Scarabaeidae, but differing from them by body tapering somewhat towards the posterior extremity. The larvae feed in decaying logs from which the beetles eventually emerge and crawl up to the twigs of gum saplings to feed on the foliage.



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Part 2.

THE STARLING.

By RALEIGH A. BLACK.

The Starling (*Sturnus vulgaris*) is native to all but the most northern parts of Europe, and occupies the same latitudes in the western two-thirds of Siberia; it now, however, has by introduction an almost world-wide range. Its numbers have increased to such an extent in some countries that action is being taken to bring it within bounds.

This action raised the question of the economic value of the starling, with the result that economists, farmers, and fruit-growers have been waging a wordy war for and against its destruction. The United States, Department of Agriculture, in its usual thoroughness, appointed two biologists to investigate the matter; especially as regards their own country. These biologists, namely: Kalmbach and Gabrielson, in due course prepared their report, which was published as a Bulletin, under the title of "Economic Value of the Starling in the United States."

Kalmbach and Gabrielson set about to acquire a knowledge of the starling's habitat, food, preferences, and the bird's ability to adapt itself to new environment.

The eggs are of a pale-blue colour, and number from three to six to the set. Incubation lasts about 12 days, the young remaining in the nest from two to three weeks. Nestling starlings are fed by the parents largely on insects. For the first week both parents take part in the feeding operations, but in several nests that were under observation the female was left to do all the work during the later part of the nestling period. When three or four days old the young are very noisy, and give the feeding call in lusty chorus in response to almost any sound. Later they learn to distinguish the approach of the parents,

and respond only to their notes or appearance. Other noises or vibrations cause them to crouch silently in the bottom of the nest, and no amount of coaxing will persuade one of them to stir or make a sound. Two broods are usually raised each year, and sometimes there are three.

STATUS IN OTHER COUNTRIES.

The abovementioned investigators say that, while the behaviour of the starling in its native home and in countries to which it has been introduced cannot be interpreted as a certain indication of its conduct under the new conditions it will meet in America, its activities elsewhere will serve to call attention to its capabilities for doing good or harm. Throughout most of its breeding range in Europe, particularly in France, Germany, and Hungary, the bird is held in great esteem and is encouraged, by the erection of nest boxes, to breed about farms and gardens. The chief German authorities, they say, with one exception, have considered the starling more beneficial than injurious. French authors mention damage by the starling to olives and grapes, but are unanimous in declaring the species useful. In Belgium the starling is said to be very useful, and its damage insignificant, as it prefers insect diet. In Hungary, it is said, taking its feeding habits of the whole year into consideration, the starling does a thousand times more good than harm, and richly deserves protection. Switzerland and Tunis are as much against the bird as for it. Great Britain holds that it is more beneficial than injurious, but adds that, while the bird is valuable now, its habits are undergoing a change for the worse.

Summing up, the investigators say, it may be said that in Europe the verdict on the starling question is distinctly favourable.

In most countries where the bird has been introduced, however, the case is different. In Australia and Tasmania, testimony concerning starlings is generally unfavourable. Their great faults are driving away native birds and preying upon fruits.

Their numbers have become so great, however, that after the breeding season enormous flocks band together and at times descend upon orchards, vineyards or gardens, where they make great havoc with the crops.

FOOD HABITS IN U.S.A.

Examination of 2,157 stomachs of adult starlings by Kalmbach and Gabrielson showed that 57 per cent. of the annual

food was animal and 43 per cent. vegetable.

In summing up, Kalmbach and Gabrielson state that it has been the purpose of this investigation to determine what should be the attitude toward the starling, in order that a correct judgment might be reflected by legislation governing the protection of the bird. Most of the starling's food habits have been demonstrated to be either beneficial to man or of a neutral character. Furthermore, it has been found that the time the bird spends in destroying crops or in molesting other birds is extremely short compared with the endless hours it spends searching for insects or feeding on wild fruits. Nevertheless, no policy would be sound which would give the bird absolute protection and afford no relief to the farmer whose crops are threatened by a local overabundance of the species. Consequently, the enactment of laws that afford protection to the starling, except when it is actually doing or threatening to inflict damage, appears to be the wisest procedure. With its ready ability to adapt itself to new environments, the starling possesses almost unlimited capacity for good, but it is potentially harmful in that its gregarious habits may abnormally emphasise some minor food habit which would be indulged in at the expense of growing crops. The individual farmer will be well rewarded by allowing a reasonable number of starlings to conduct their nesting operations on the farm. Later in the season a little vigilance will prevent these easily frightened birds from exacting an unfair toll for services rendered.

LORD HOWE ISLAND BIRDS.

By THE EDITOR.

Nearly 500 miles from Sydney, almost midway between Australia and New Zealand, though a little to the north of the steamship routes, lies Lord Howe Island, a dependency of New South Wales, which in the last year or two has come into favour as a holiday resort because of its salubrious climate and remarkable scenery. Seven miles in length and about a mile wide, a crescent-shaped residual of an ancient mountain top, it is a spot in which all the beauties of nature would appear to be concentrated. There are inaccessible mountains holding waterfalls and fern gullies, and coral-fringed lagoons and unapproachable palm groves filled with flowers and wonderful butterflies. The rock pools hold fish of dazzling colour, seaweeds of extravagant hue, and curious shells; the gullies sup-

port banyan, pandanus, and other sub-tropical trees and shrubs, and the cliffs and adjacent islets hold millions of sea birds which almost turn the sky and waters black by their numbers. The island has an ideal climate, with no excess of heat or cold, and a rich volcanic soil fertilised by decaying palm fronds and leaves of banyans which for centuries have been falling annually.

Mount Lidgbird and Mount Gower, 2,504 and 2,840 feet respectively, dominate the whole island, and, when visibility is good, may be seen for nearly 40 miles out at sea. So impressive in their razor-backed shape and their beauty, so elusive—hidden one day by mists, reflecting all their wonderful colours unobscured the next—they rise almost perpendicularly from the ocean, presenting impregnable grey-faced cliffs on every side. They support a luxuriant growth of vegetation, the home of the rare wood-hen (a flightless land rail), the hill mutton bird, and countless sea birds. Adjoining Lord Howe Island are the Admiralty Islets, a collection of large rocks, holding terns and gannets by the thousand, while a few miles away to the south Ball's Pyramid rises in the form of a spire nearly 2,000 feet above the sea.

There are about 130 people living on Lord Howe Island, including children. To all appearances they are happy and contented with their lot. They are fairly prosperous, but are inclined to take life easily. Their cottages are not only attractively designed and self-made, but brightly furnished and located among entranceing avenues of palms, banyan and lemon trees, either fringing the coral lagoon on the lowland or among the forests on the hills overlooking the coast and beaches. Cricket, bowls, and tennis are a few of their forms of recreation. The islanders gain their living principally by the sale of palm seeds which are in demand in several countries for ornamental purposes. The Howei palm is confined to the island, and provides a bountiful harvest of seeds, which each year are stripped, sorted, and shipped, either direct to Sydney, or to the United Kingdom, where they find a ready market.

As the result of the s.s. Makambo running ashore after striking a rock a few years ago, rats have overrun Lord Howe Island, with the result that irreparable damage has been suffered. With no natural enemies to check them, the rats from the ship multiplied with amazing rapidity, and are now a scourge that must perpetually be fought. Not only have they caused great damage to the industry by eating the seeds and killing the trees, but have destroyed the birds—the insectivorous varieties have almost disappeared—and insects are free to commit

their ravages on the seeds, which all affects the returns. Efforts are made to keep the rats in check, but it is well nigh a hopeless task. The rough parts of the island, at any rate, have been conceded them.

Sooty terns, masked gannets, noddy terns, prions, wedge-tail mutton birds, and tropic birds nest in many thousands on the cliffs and bare headlands of both Lord Howe Island and its satellites, the Admiralties, as well as, though to a lesser extent, on Ball's Pyramid. They find plenty of cover—though some merely lay their eggs side by side on the bare rocks—and a bountiful harvest of fish in the surrounding seas. Gannets nest alongside the smaller terns, placing their eggs on any exposed surface of rock; mutton birds, of course, select a hole amongst the rocks or dig a burrow in what loose earth they can find, though some are content to lay beneath a tussock or a few dead branches on the ground; while the noddies, the only birds on the island that build a nest, take up their quarters amongst the scraggy and stunted bushes that line the tops and sides of the cliffs.

A prodigious amount of fish life must be required to feed these creatures each day. Not only do the adult birds have to satisfy their own appetites, but they also have to meet the never-ceasing demands of their insatiable young. Flying-fish and squid, as well as jelly-fish are often found amongst the litter surrounding a nest; and trepang is not despised. It is an amazing experience to see so many birds packed on to so small an island as the largest of the Admiralty group, half a mile long, an experience it is almost impossible to describe without laying oneself open to the charge of gross exaggeration. To say that at every step one has to be careful to avoid treading on eggs or young, and to brush the adult birds away from one's head where they hover like flies, might convey something so far as their numbers are concerned, but nothing can adequately picture the remarkable sight of the soaring, fluttering creatures, the grand scenery of the island, and the bird-dotted waters for miles around. It is the kind of experience always to be remembered.

BIRDS OF MY GARDEN.

By MRS. S. A. HOWELL.

I am afraid too many of us have a garden only in front of the house, and, because of various noises the birds, apart from

sparrows, do not come; but my back yard is also my garden. In it are trees—gums, wattle (five kinds), camphor-laurel, fruit trees and native shrubs. By my kitchen window is a fuschia and salvia bush; in these the Honeyeaters spend much of their time. The bell-bird call of the Spinebill is most pleasing. Last week I noticed two new visitors—Indian Bulbuls; they also have a sweet call and, though very timid, they came quite close to me when I imitated their call. I noticed they were feeding on the half-dead wattle blossom. I also have the Silver-eyes who come and bathe in the pools of water in large shells by the bush-house door; their songs are sweet and low, and I have found they keep the roses clear of aphids this time of the year. Last year they built a nest in the wisteria from threads of my mop. The Pee-wits (magpie larks) are our constant visitors. They have built in a large gum tree nearby for the last 15 years, bringing out as many as four broods one year. The Blue Wren is a constant visitor, building in a shrub. One year they brought four young ones, and it was very interesting to watch them at feeding time. The little mother was a great worker, often returning with food three times to the father's once. One year the wrens brought me a solitary child in the shape of a bronze Cuckoo, which they never seemed able to satisfy.

The Thrush is a sweet bird; I can never understand why it is always alone. Jacky Winter is another visitor; also Willy-Wag-Tail, the Coach-Whip, and the Doves. The starling and sparrow are ever with us; the former has a sweet voice; the latter I find is inclined to hunt off the bush birds. One year they simply tore down the nest of the Blue Wren. They are most inquisitive, I find, as they watch the other birds and try to eat as they do, especially the Honeyeaters and Silver-eyes. When the cosmos are in seed we have the Gold-finch and Red-heads, Kookaburras and a solitary Butcher bird also pay visits to my garden: so who could be lonesome with such a number of good friends as I have?

SOME BIRDS OF THE WEST.

By Miss E. McANENE.

Come-by-Chance lies over the Range about midway between Walgett and Coonamble. While visiting friends there about this time last year I was very interested in the bird life of the district. Emus in flocks of 10, 15 and 20 were frequently seen. Against wilga foliage and greyish green vegetation they

were not at first easily observed. They seemed to fade into the surroundings when but a short distance away. They were curious enough to come quite close to the car if the squeaking call like that of the young was given. Generally an old warrior seemed the bravest in matters of this kind. Several nests were found at the foot of tree-trunks. A slight depression, strewn with a little dry grass, was the best attempt at nest-making. These nests contained from nine to twelve eggs. Once, a bird with neck out-stretched along the ground was seen on the nest. In this way one might easily pass quite close without being aware of the nest. The young are hardly distinguishable among the dead logs and dry grass. There is no doubt about their being able to run, even when they are babies. The birds here were not regarded as a menace to sheep.

A feature of the West was the neutral colouring of numerous ground-feeding birds. The large eyes with the definite line of darker feathers above gave to them a very wise appearance. This was specially remarkable in the Curlews, Plovers, Brown Hawk, Little Falcon, Thrush and Grey-crowned Babblers. Brougas were there, too, dancing by the house. On rising from the ground and for a short time after, their flight is rather heavy and awkward, almost a succession of jumps, but later it becomes strong and graceful, as they make wide circles above the trees. Good friend Ibis with his retinue made wonderful figures against the evening sky.

There were many birds of prey, such as Brown Hawks, Little Falcon, Black-checked Falcon, and, I think, the Collard Sparrowhawk and the Wedge-tailed Eagle. Crows, of course, were in evidence. I thought there might be two varieties. The popular Willie-Wagtail and graceful Magpie Lark were never long absent from the scene. One "Waggie" kept himself in good training chasing a "Scissors Grinder" whenever he dared "speak" in a special wilga near the house.

As against the quiet colours of the ground birds was the vivid red of the red-capped Robin. When eight or ten of these birds rested on a fence, the red stood out like the glowing coals of a log fire. The rose and grey of the Galahs, as they alighted on the plains, or made their wonderful, orderly flight, presented a very fine sight. The Babblers (called here "Barkers" or "Baldy Joes") are certainly noisy, but wonderfully active, and of very practical help. Their clever little bills dip into the holes and crevices in trees, turn over bits of bark or wood on the ground, and pick out undeveloped forms of beetles, grasshoppers and crickets. Apostle birds were much in evidence. Crested, Wonga, and bronze-wing pigeons came quite near the

house. Tree-creepers were said to be plentiful. The residents tell of Brush Turkeys having been very plentiful on the plains once, but now they are rare. "Screech-owls" also were spoken of. Waterfowls and wild ducks frequented the Baradine Creek at Come-by-Chance.

Pride of place as regards plumage of the birds of the West must be given the Parrot tribe. Galahs, Blue-bonnets, Mallee Parrots, Lorrikeets, Budgerigars, Quarrion, are but a few of those seen within a couple of hundred yards of the homestead. White-backed Magpies, and the cruel-looking Black-faced Butcher bird, with the glorious song, were often heard. A pair of Spotted Bower birds frequented a wilga tree, on which had been placed kidney fat. Later we found the bower, beneath the low-lying branches of a wilga tree. The floor of this bower was decorated with the fruit of the cypress pine, arranged in a sort of mosaic pattern. Bleached sheep bones were scattered about: it seemed as a sort of guide or land mark. Tiny blue seeds of the wilga also ornamented the bower. The most surprising items were screws and leaden supports for roof-guttering, which had been collected and placed above the bower. No building was within a mile of this bower.

Though I thought I caught sight of the Crimson-fronted Chat, I was unable to secure local help in the matter of identification. The cat one day brought in a tree-creeper. The description given in Leach's book, of No. 330, Brown Tree Creeper, seemed to just fit the specimen.

ARE BIRD SONGS MUSICAL?

A DEFINITE REPLY.

Members of the American Nature Association are rallying to the defence of the songs of birds in answer to a New York critic, who declared that bird songs were entirely devoid of music. This critic (Mr. Nathan, an alleged musical man) dropped a bombshell among bird-lovers when he made the following statement through one of the American newspapers:—

"Perhaps the most persistent of legends is the theory that the noises of birds, commonly called singing, are musical. The notion has been born solely out of the sentimentality of lovesmitten and befuddled numskulls. In such instances as a few first-rate musicians, e.g., Beethoven, have employed bird sounds in their compositions, they have done so only in humorous, aye, in semi-derisory terms. The best way to detect the utter ab-

sence of anything genuinely musical in a bird's chirpings is, curiously enough, since the method seems to have escaped persons almost entirely, to listen closely to them. If what issues from a bird's throat is melodious, then what issues from a nannygoat's is a song by Schubert. The so-called singing of a bird, appraised by a man with a practical musical air, is precisely of a piece with the sounds produced by an ungreased wheelbarrow axle. There is five times more genuine loveliness of tone in a river barge whistle, and ten times more in a soup spoon struck against a china spittoon."

The response to the request of the American Nature Association for replies in defence was tremendous. This attack upon the musical prowess of birds was challenged from every part of the United States. There was not one that did not deplore such unwarranted criticism, though it was suggested that Mr. Nathan had heard nothing but the chirpings of sooty sparrows about a city's dirty eaves. One person pointed out that "sentimental numskulls" might be right, but better far to be thus attuned to the sheer beauty of such silvery-toned harmonies created by the Master Musician than to be so starved as to recognise music only in the artificial devices of man's fashioning.

GOULD LEAGUE OF BIRD LOVERS.

By DAVID G. STEAD.

The Gould League of Bird Lovers continues to do a great work among the children of the State. Many thousands of child members sign the League's certificate every year, and indicate by their enthusiasm for the bird songs and birds talks—and best of all, by their daily solicitude for their local birds—the far-reaching effect that the great movement is having. More than 400,000 children have joined the League in New South Wales since its inception, and this year alone the indefatigable honorary secretary (Mr. H. W. Hamilton, B.Sc.) has already issued over 50,000 new certificates! Teachers everywhere are throwing themselves heartily into the scheme, as they find that every bird-lover gained adds to the intelligence and "humaneness" of their pupils—at least so I have been assured by many teachers all over the country.

The Naturalists' Society sends its greetings to the budding naturalist members of this useful organisation, which will go far towards saving what has been well termed "the Soul of Australia".

THE PURPLE-STRIPED GUDGEON.

By E. L. HAYES.

MOGURNDA MOGURNDA ADSPERSUS.—Commonly called the purple-striped or purple-spotted gudgeon, is one of the most interesting and beautiful of our freshwater fishes. These fishes are carnivorous and, owing to the wide gape of their jaws, it is not advisable to have small and large fish in the same tank, as all flesh is just meat to them. I have had them eat their smaller brethren, even when the victim was quite a third the bulk of the aggressor.

Attaining a length of about five inches and being extremely hardy and tenacious of life, it is quite easy to keep them in comparatively small fish tanks. Both sexes are similarly marked, but the males are lighter in colour than the females. The body is mottled and spotted with blue and brown, the spots extending on to the yellowish fins; the gill covers are marked with four purple stripes from which their vernacular name is derived.

Their breeding habits are extremely interesting, the season extending from October to about March, which includes ten or more batches, each containing about 200 eggs. The eggs are joined by a fine thread and attached horizontally, covering a space of about two inches square. They are fastened by a gelatinous base, which within two days elongates into a stalk. Immediately after spawning the male takes up his position over the egg mass. On the third day, by rapid movements of the pectoral and caudal fins, he agitates the water surrounding the nest, which action is continued until hatching is completed on the ninth day. He does this to prevent the accumulation of sediments or parasites on the eggs.

A large female spawned in January, 1927, but she chased the male away and assumed the task of tending the nest, but lost interest on the fourth day and swam off; the male did not return, and all the eggs ceased developing. I removed the small male and on February 5, at 6.45 a.m., put in a large one. The following morning they were in full swing spawning and had finished by 8.45 a.m., when the male drove the female away. At 1 p.m. I inspected the ova through a hand lens. The dorsal side of ovum appeared opaque and granular, the remainder being transparent. On the 9th the embryos were well formed, and all head down in the egg capsules; 10th, observed that eyes were forming; 11th, eyes well developed; 13th, a few hatched

out, but the majority did not emerge till the 15th, nine days being the usual period of incubation.

My specimens were caught near Brisbane, but the fish is most abundant in the western rivers of N.S.W.

A BEAUTIFUL GARDEN.

MEMBERS OF SOCIETY ENTERTAINED.

Some 40 members of the Society, on October 29, accepted the invitation of Dr. A. E. and Mrs. Finckh, of Mosman, to inspect their shrubberies; consisting, apart from exotics, of over 200 native plants. Dr. Finckh's garden, as regards locality, harbour views, climate, and its north-easterly aspect, is ideally situated. The garden is of a rocky nature, not ordinary rocks, but large boulders with great hollows between filled with centuries of leaf mould and all that is good for plants. This explains the fact that in this locality a greater variety of plants are found in a smaller area than almost anywhere else. The main feature of the virgin bush here is the presence of Hakeas, Banksias, Casuarinas, Grevilleas, etc., all making an almost impenetrable scrub, and beneath it all one finds innumerable small plants, which love mouldy soil, shadow, and plenty of moisture.

The leader of the party (Mr. Raleigh A. Black) in addressing the members on the lawn, said a study of Dr. Finckh's garden was their objective that afternoon, and if they did not do this in a proper scientific way, especially as members of the Naturalists' Society should do, they would not only fail in their mission, but keenly disappoint Dr. Finckh. The garden was not only artistically and attractively laid out, but was scientifically laid out; that was to say, the laws of plant ecology had been carefully followed. To those who had not made a study of botany, he would explain that the term "Plant Ecology" simply meant "the study of plants in their homes."

"Various plants grow together in a sort of society or community in certain localities, and this is a kind of adaptation to environment," Mr. Black added. "The factors which make up environment are climatic, including temperature, rainfall, light, edaphic factors, including the physical and chemical characters of the substratum, i.e., in most cases the soil. The environment includes not only the non-living, but also the living surroundings. Dr. Finckh's garden is both a natural and artificial adaptation to environment. All plants will certainly not grow in the same localities or situations and there are some, like human

beings, will not live a happy life with other plants. Vigorous and delicate plants cannot thrive together. Plants thriving in damp shady spots could not live in hot dry exposed situations, and so on. There are four main ecological plant types, namely:—

- Hydrophytes, or water-loving.
- Hygrophytes, or moisture-loving.
- Xerophytes, or drought-loving, and
- Mesophytes, intermediate forms between Hygrophytes and Eerophytes.

"The majority of plants in Dr. Finckh's garden belong to the Mesophytes."

After the members had very thoroughly inspected the large variety of plants they were entertained to afternoon tea by Dr. and Mrs. Finckh.

In proposing a vote of thanks to Dr. and Mrs. Finckh for their hospitality to members of the Society, the president (Mr. David G. Stead) stressed the wonderful results that had been achieved by Dr. Finckh by simply coaxing "wild Nature" back again to a spot which in his own memory had been very profusely covered with highly diverse flora. Those parts of the Hawkesbury sandstone formations, which, like this, had received much detritus from a previously existent "overburden" of Wianamatta shales, had at one time supported a really luxuriant growth of native flowers. In the spread of population about Sydney, most of these beauty spots had been cut out; but, with naturalists like Dr. Finckh at work, it might be possible in a large measure to re-construct the vanished beauties.

Mr. Stead referred to the many interesting points and the main physiographical features to be seen from the windows of the residence. Looking toward the north-east was Grotto Beach—of interest to the marine biologist and fisheries investigator, as being one of the principal spawning places for the Sea Garfish (*Hemiramphus intermedius*). The Garfish came in from the sea from about November to February and deposited their eggs on the blades of the "sea-grass," *Zostera*. From this point, too, it was easy to visualise the old valley filled with the foliage of "Malayan" type, which existed prior to the subsidence which allowed the flooding of the valley by the sea—later to be filled with the sand and other sediments from creek and sea.

NATURALISTS' SOCIETY OF N.S.W.

RECORD OF MEETING.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Education Department, Sydney, on Tuesday evening, November 1. Mr. David G. Stead, president, occupied the chair, and about 50 members were present. The hon. secretary (Mr. R. A. Black) was in attendance.

Correspondence.—The Under-Secretary to the Department of Local Government advised of the appointment of the under-mentioned members as Hon. Rangers under the "Wild Flowers and Native Plants Protection Act, 1927," namely:—

- Barnett, P. E. B., "Bescot," The Crescent, Chatswood.
Bertram, Bert, 16 Marshall Avenue, Greenwich.
Black, Raleigh A., Arthur Street, Five Dock.
Cheel, Edwin, Queen Street, Ashfield.
Duckworth, A. C., Trentham, Chester Street, Woollahra.
McAnene (Miss) H., Euston, Hurlstone Park.
Powell, John, Elgarth, Rangers Road, Cremorne.
Steinbeck (Miss) C. A., 86 Mill Hill Road, Waverley.
Houston (Miss), R. E., 42 Somerset Street, Mosman.
Watson, A. E., 19 Planthurst Road, Kogarah.

The Workers' Educational Association advised of their holding a biological excursion to Edward's Beach on November 19th.

Dr. C. W. Reid, who was one of the victims in the Grey-cliffe disaster, forwarded a permit under his hand as chief Quarantine officer (general) for the members of the Society to visit the attractive grounds of the Quarantine Station on November 26th.

Election of members.—The following were unanimously elected as ordinary members:—

- Miss V. Anderson, B.A., "Ortonville," Petersham.
Mr. A. R. Samut, 44 Boronia Street, Kensington.
Mr. J. H. Jenner, 38 Beaumont Street, Rose Bay.
Mr. S. D. McPhee, 82 Myrtle Street, Chippendale.
Master Pat Mullaney, Stoney Creek, Taralga, N.S.W.

Mr. A. E. Watson exhibited several specimens of *Callistemon lanceolatus*, var. *lilacina*, showing marked variation in the colour. He reported that of seven shrubs produced from

the seeds taken from one spike collected at Lane Cove and sown in the spring of 1922, five had produced flower spikes of a more or less cardinal tint, one had borne flowers vieux-rose in colour, and one had not yet flowered. Several of the plants flowered in the fourth year from sowing the seed. In the fifth year as many as 418 fully developed flower spikes were counted on one shrub four feet in height. This species usually carried the seed for years before the three-celled seed case opened. As many as five successive annual growths were to be seen carrying seeds in various stages of development.

Miss H. McAnene showed a beautiful vase fashioned out of a piece of *Acacia aneura*, F.v.M., which is found growing from the Darling to the western frontier, and extends to South Australia, where in the desert interior it forms the chief ingredient of the mulga scrub. The president (Mr. David G. Stead) in referring to this exhibit said that the leaves (phyllodia) formed excellent food for stock and described its growth in the desert areas of South Australia.

The late Mr. J. H. Maiden, Government Botanist and Director of the Botanic Gardens, Sydney, drew special attention to this scrub which some people called the "king of fodders," and which had been so much appreciated that it was now scarce in many districts where it was once plentiful.

The Mulga is the most characteristic tree of the arid parts of Australia, varying in height from five to six feet in areas of the lowest rainfall to as much as 20 feet or more on the 12-14 in. isohyet. "Mulga" is an aboriginal name. It was given to the long, narrow shield of wood made by the aborigines out of *Acacia* wood.

A large Longicorn beetle larva was exhibited by Mr. L. Gallard. This was the larva of one of the large flat winged Longicorns of the Genus Prioninae, the larvae of which take a long time to develop, and sometimes attain a far greater size than the one on exhibition which was just a little under two inches in length.

It was brought to Mr. Gallard as a moth larva, and he used it to demonstrate to members how they might tell readily to which these large timber eating grubs belonged—Coleoptera, or Lepidoptera.

"The first thing to look for," he said, "is the shape of the body and the shape of the hole left in the tree. If the body is flattened on both the dorsal and ventral surfaces, and void of legs, prolegs, and anal claspers, and the hole left in the wood is oval in shape it denotes that it is a beetle larva. If on the

other hand the body is round, and the hole in the tree round also, it may reasonably be expected to be a moth. There is, however, one exception to this rule, in the leopard moth, 'Culama caliginosa,' which has a flat shaped larva greatly resembling that of a beetle. To be absolutely sure, it may be necessary to examine the specimen more closely. The moth larvae will be found to have six well developed legs, one pair on each thorasic segment, four pairs of sucker-like processes, called prolegs, and a pair of anal claspers on the anal segment. If these are not present and the larva moves itself along by a series of contractions and expansions of the segments, it may be safely classed as a beetle. This, of course, only applies to the wood boring forms of beetles and weevils."

Mr. Gallard went on to describe how these creatures obtained their supply of air, when they were working in very confined spaces, where it would be almost impossible to breathe through the mouth. The oxygen was taken in through these spiracles on the sides of the body, and carried by small air tubes (tracheae) into longer and larger ones, which with their accessories ramified the whole of the body.

A very interesting exhibit was shown by Mr. H. Wood, of Strathfield. This was a small brass-framed aquarium, about 9 in. x 5 in. x 5 in., made by himself, and containing four species of Australian fish, namely:—Blue Eye (*Pseudomugil signifer*), Fire-tailed Gudgeon (*Carassius galii*), Sydney Minnow (*Galaxias attenuatus*), and Flat-headed Gudgeon (*Philypnodon grandiceps*). Also three kinds of weeds, combining utility with beauty—*Nitella flexilis*, which grows floating or rooted, and flourishes in a strong, light and clear water; *Vallisneria spiralis* Linn., or Eel grass, which is the best known type of submerged water plant for oxygenating purposes, and *Ceratophyllum demersum* Linn., or Hornwort which grows best under the same conditions as *Nitella flexilis*, Agr. Pond snails and shrimps (*Xiphocaris*) are made use of as scavengers, to guard against water pollution in the shape of decaying vegetable matter. Two kinds of these fish mentioned (blue eyes and fire-tails) have been kept by Mr. Wood for two years in a tank in his aquarium away from all sunlight and show all symptoms of spawning, and are quite healthy and vigorous.

Mr. R. A. Black, on behalf of the members, thanked Miss Steinbeck and Miss McAnene for making and presenting to the Society a prettily designed and useful table cover.

Royal Commission.—On the motion of the president, the following resolution was unanimously passed:—

That the proposal to appoint a Royal Commission of experts to inquire into the status, general condition, and future administration of the aborigines of Australia be and is hereby strongly supported by the Society.

FRESHWATER FISHES.

The President (Mr. David G. Stead) delivered an address on the Freshwater Fishes of New South Wales, illustrating his remarks by lantern slides, and, to some extent, by living fish specimens contributed by members of the Aquarium Society of N.S.W. Mr. Stead stated that there were at least 45 species of freshwater fishes (or fishes living in freshwater) in the coastal and inland rivers of the State. There were even more than that number that might be kept alive indefinitely in freshwater; but some of these needed to go to the sea—or, at least, the estuary—to deposit their spawn.

[The President promises some notes on these fishes for a subsequent issue of *The Journal*].

Following upon the President's lecture, a number of highly interesting exhibits were made of aquatic organisms. Among these should be specially mentioned an exhibit by Mr. E. L. Hayes, of the Purple-striped Gudgeon—with an important note relating to its spawning habits—and a tiny “balanced” aquarium, by Mr. H. Wood, illustrating the degree of perfection in aquarium keeping, which might be attained to even in a small quantity of water. Particulars of these are given elsewhere.

NATURAL GRAFTS.

An interesting exhibit by Mr. A. A. Brewster, at a recent meeting of the Naturalists' Society, consisted of mistletoe loranthus (a semi-parasite) settling on the branches of a Melaleuca and developing into a neatly-formed natural graft. There were dozens of branches, about half an inch in thickness, with a few straggling stems of its own, while bunches of mistletoe branches formed the green clusters at the top.

Another exhibit by Mr. Brewster was a cross-section view of the stem of Melaleuca with the mistletoe stem also in section, showing the sucker or haustorium of the parasite in contact with the phloem and the xylem or wood, thus tapping the nutrition current of the bark, and the upward raw sap current of the wood.

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THE GREAT BARRIER REEF.

By H. R. HARRINGTON.

Novel experiences among sea birds, turtles and sharks were the lot of members of a party comprising 32 persons from New South Wales, Queensland, Victoria and South Australia, which recently spent several weeks on the Great Barrier Reef. The parts of this great coral formation visited were the Capricorn and Bunker Island groups, which form the southernmost part of the reef.

The Great Barrier Reef extends along the coast of Queensland for about 1,200 miles and has for its foundation the edge of the eastern Australian "Continental Shelf." It varies from about two miles to about 20 miles in width and, following the edge of the shelf, is from about 10 to 100 miles distant from the mainland. Nowhere on this shelf does the water exceed 100 fathoms in depth and for the great part is very much less, and it is in this shallow water beyond the region affected by the mud and silt carried out to sea by the coastal rivers that the coral polyps thrive.

The Barrier Reef proper consists of a succession of broad linear reefs, several miles in length, and perhaps half a mile wide, awash at high water and separated by channels under a mile in width. At intervals are small islands which show all stages in the life-history of the coral, from the original submerged reef, through mere banks of sand of varying size, to islands densely clothed with vegetation. In the Capricorn and Bunker groups all these stages are to be found, and Heron Island, in the Capricorn group, where the first camp was established, is typical of the islands of the group. It is about $1\frac{1}{2}$ miles in circumference, surrounded by a reef up to half a mile

wide which is partially exposed at low water, and covered with dense forest. Heron Island is about 55 miles from the mainland and about 105 from the mouth of the Burnett River, at Bundaberg.

From Heron Island excursions were made to the surrounding islands of the group, including Masthead Island, North-west Island and Wilson Island, which are similar to Heron Island, Bloomfield Reef, a mere bank of sand in the exposed parts, Wistari Reef (submerged), and North-west Reef, on which is a lighthouse and the remains of the wrecked steamer "Cooma."

The flora of these islands is characterised by the buoyant nature of the seeds of most of the types, being thus adapted for dispersal by ocean currents. The principal tree of any size is *Pisonia brunoniana*, which is abundant on most of the islands. Its height is about 40 feet with a girth of up to about five feet. The wood is so exceedingly brittle that climbing for the purpose of examining the nests and eggs of birds nesting in the trees is rendered somewhat risky, as branches several inches thick will snap short off unless one's weight is applied quite close to the trunk. The seeds have a glutinous covering and, sticking to the feathers of the birds, are thus widely dispersed.

Next in order of abundance are the Pandanus trees. They are easily recognised by their tall, stilt-like aerial roots and sword-like leaves. On the shore line they are frequently found associated with the Coast Oak (*Casuarina equisetifolia*). Other common plants are *Tournefortia argentea*, a very striking bush on account of the silvery sheen on its leaves, and whose seeds have been found perfectly sound after twelve months' immersion in the salt water; the "Cotton Bush," a species of Hibiscus having yellow flowers; a species of Convolvulus, and a sand binding grass, probably a species of Thuaria; besides several other plants of a herbaceous nature which were not identified.

The birds noted particularly were Wedge-tailed Mutton-birds (Shearwaters) which breed in millions on most of these islands. Their burrows in the soft soil make walking through the bush a rather unhappy process, such a walk being mostly a matter of sinking up to the knees into one hole after another. The White-capped Noddies are easily recognised by their white crowns, and as being the only birds in any numbers which build nests, and which breed in such numbers that "closer settlement" is imperative (the limit to the closeness with which nests are built is "pecking distance"). Then there are Crested Terns, of which a very fine rookery was seen on Masthead Island. The Terns lay a single egg on the bare ground, and the rookery in

this case covered an area of about an acre, with the "nests" spaced about $1\frac{1}{2}$ feet apart. A number of Sea Eagles were seen and several nests discovered in the topmost branches of several of the tallest Pisonia trees.

During our stay on the islands, scores of Turtles came ashore each night to lay their eggs. During the period from November to February, the female Turtles come ashore on the sandy beaches and with their flippers dig a hole in the sand above high water line, about four feet across and $1\frac{1}{2}$ feet deep. They then dig, very carefully, with the rear flippers, a hole about a foot deeper and about a foot across, in which the eggs are deposited. The sand is then thrown back into the hole and the eggs left to hatch in the hot sand. The eggs are about the size of billiard balls; about 150 is the average number laid, and there are three batches in a season. They have the peculiarity that they will not boil hard. Despite the great numbers of eggs laid only a very small number hatch out, and very few of these ever develop into adult Turtles on account of the great mortality among the young. Countless numbers of the young Turtles are taken by the gulls, and of those which reach the water comparatively few survive the sharks. The principal species seen was the Green Turtle, exploited to a small extent for making soup. A small factory was in operation on Northwest Island for the purpose of converting these animals into this very much esteemed article of diet—green turtle soup.

The second camp was made on Lady Musgrave Island of the Bunker group, lying about half-way between Heron Island and Burnett Heads. This island is in complete contrast to the others visited, in that the whole of the central portion is covered entirely with a species of Ficus very similar in appearance to the Port Jackson Fig, the Pisonia being confined to a narrow belt around the margin. There is no other vegetation of any kind except a few Pandanus and Casuarina trees, all the under-growth to a height of about five or six feet having been removed by goats. The existing flock of goats, numbering about 200, sprang from a few placed on the island some years ago to provide food in case of possible shipwreck. The only sustenance apparently available for these animals now consists of the bark and fallen leaves of the trees.

Trips were made from Lady Musgrave Island to the neighbouring Fairfax and Hoskin Islands, on which are very fine rookeries of Gannets. Expeditions were made to the reefs whenever the tide was low enough to permit of wading, and

type collections of the corals were obtained by several of the members, besides shells of various kinds.

The lighter side of life was not neglected. Much sport was obtained from turtle riding, especially good performances being given by several of the ladies riding into deep water. There was fishing from both the boat and edge of the reef, and shark fishing from the beaches. Shark fishing, particularly, provided excellent sport on the final day, seven sharks being caught within a few hours. Three of these were over 12 feet in length, and put up a great fight, the largest being 12 feet 10 inches in length and six feet two inches girth. All these big sharks were of the Tiger variety. Altogether, members of the party were unanimous that they had spent a most interesting, profitable and enjoyable holiday on the Reef.

NATIVE BEARS AND MISTLETOE.

By RALEIGH A. BLACK.

Mr. David G. Stead, President of the N.S.W. Naturalists' Society, at a recent meeting, brought under the notice of the members the matter of the wholesale destruction of the Native Bear. The meeting carried a resolution appealing to the Prime Minister to enforce the Federal proclamation of 1923 prohibiting the export of skins without a State permit.

Mr. Stead, in referring to the open season in Queensland, said that 23,000 Native Bear skins were sold within a few days of the opening of the season, showing that in some cases the skins had been collected for years prior to the open season, which had only served as an opportunity for the disposal of them. He added that 40,000 skins had left Sydney by the "Aorangi," and that before the end of the season at least 300,000 Native Bears would have been killed.

By the persistent work on the part of the Wild Life Preservation Society, Linnean Society of New South Wales, the Naturalists' Society of New South Wales and other interested bodies the Federal Government decided that on and after November 10 last no more permits for the export of Native Bear were to be issued.

At the meeting of this Society already referred to, Mr. C. J. White said that it was believed by some people that the undue destruction of the Native Bear was the cause of the rapid increase in the mistletoe plant. In order to determine whether



THE NATIVE BEAR, OR KOALA.

there was anything reliable in this belief the writer communicated with the Department of Local Government requesting its co-operation in ascertaining whether the various Shire councillors in the State could furnish anything authentic relating to the question. The Department courteously entered into the spirit of the proposed inquiry and sent a circular-letter to all Shire Councils, with the result that many interesting replies came to hand. As these replies have a certain amount of scientific value, they are given hereunder. Although some appear contradictory, nevertheless after careful sifting and analyses, which it is proposed to do later, the apparently conflicting statements may be reconciled.

The following is a copy of the circular-letter which was despatched to the various Shire Councils:—

NATIVE BEARS.

The Naturalists' Society of N.S.W. is desirous of obtaining authentic information as to whether or not the Native Bear feeds on mistletoe, and would esteem it a favour if any members of the Council who have any knowledge on the point would communicate with the Hon. Secretary (Mr. R.

A. Black), Box 2178 L.L., G.P.O., Sydney. It is stated that the point has been raised that the past undue destruction of the Native Bear has been the cause of the increase and spread of mistletoe; and particulars as to whether the Native Bear has been actually seen feeding on the mistletoe or any verified facts bearing upon the question would be greatly appreciated.

The bulk of the replies were of a negative character, but the following were of interest and value:—

Nymboida Shire Council.—“The Council do not consider that the destruction of the Native Bear has been the cause of the increase and spread of the mistletoe. Never to their knowledge has the Native Bear fed on mistletoe. Cr. W. J. Mulligan, of Camgar, who has had considerable experience of bush life, gives it as his opinion that the Flying Fox is responsible for the increase in the growth of mistletoe.”

Orara Shire Council.—“The Council is of opinion that the destruction of the Native Bear has nothing to do with the increased growth of mistletoe. Cr. Collett, who when a young man, shot hundreds and hundreds of Native Bears, says he never saw them feed but upon the gum and iron bark leaves. On the coast he has seen them feed, a little, on tallow-wood.”

Municipality of East Maitland.—The Town Clerk states that Alderman A. S. Foster, of Messrs. Pender & Foster, of East Maitland, has often seen Native Bears feeding on mistletoe.

Stroud Shire Council.—“Councillors are not able to supply any information as to whether the Native Bear feeds on mistletoe, but the Council views with alarm the fact that the Native Bear is getting more scarce and hopes that the efforts of your Society will be entirely successful in securing the continued protection of this animal.”

Shire of Harwood.—“There are practically no Native Bears in this district, but there is a fair growth of mistletoe.”

Municipality of Ulladulla.—The Town Clerk (Mr. Ernest H. Scott) in sending the following remarks of Mr. R. H. Yates said that in his opinion they were reliable and authentic:—“I am of opinion that the Native Bear does not feed on mistletoe, but on gum and other leaves. It has been my experience to know of a Native Bear up in one tree for five weeks and he was never down to the ground during that time; needless to say there was no mistletoe growing on the tree.”

Woodburn Shire Council.—“Two of the Shire councillors, both septuagenarians and experienced bushmen have never from their observation known Native Bears to feed on the

mistletoe. At present there are very few Native Bears in this district."

Bland Shire Council.—"Cr. Wilson advises that the growth of mistletoe had greatly increased at Lake Cowal in recent years where Native Bears had not been known to exist. This would be one instance where there appears to be no relationship between the decrease of bears and the increase of mistletoe."

Hastings Shire Council.—"Members of my Council cannot state that they have authentic information of the bears in their wild state eating mistletoe, but one councillor stated that he had fed a tame Native Bear on mistletoe."

Apsley Shire Council.—Mr. S. Hargrave (Shire Clerk) writes that the councillors had desired him to answer the query personally. Mr. Hargrave said that he had never seen an instance of the Native Bear feeding upon mistletoe. "As a general rule, at least in this district, the mistletoe is a pendulous growth from a horizontal bough which formed a suitable perch for the bird which lodged the seed. The Native Bear did not possess the activity of the Opossum to reach the growth from the branch, and the twigs of the plant would not sustain the weight of the bear, nor would they offer sufficient grip for its claws. There is not a very noticeable increase in the mistletoe here since the Native Bear disappeared, thirty years ago, though the timber growth has decreased during that time by a very large percentage; this decrease of the host should, I think, increase the parasite. In this district I am inclined to think that *Strepera graculina* is the chief agent for the growth of the mistletoe, also *Philemon corniculatus*. The knob formed by the mistletoe is a favourite nesting place for the Currawong."

Mandowra Shire Council.—"In the opinion of the councillors, many of whom have resided in this district from childhood, the Native Bear may be responsible for the destruction of the mistletoe. It is many years since Native Bears have been seen in this locality, and the spread of mistletoe has greatly been on the increase since the Native Bears here disappeared. About 20 years ago, it was reported that Native Bears were in this locality in great numbers, and very little mistletoe was growing at that time. The Council also protests against the undue destruction of these quaint and harmless animals, and would like to see them carefully protected by legislation."

Abercrombie Shire Council.—"The opinion of this Council is that since the Native Bears have been exterminated the mistletoe is increasing."

THE LEOPARD SEAL OR "SEA LEOPARD."

(*Ogmorhinus leptonyx*).

By DAVID G. STEAD.

The Australian Leopard Seal, or "Sea Leopard," is widely distributed in the waters of the southern half of the continent. Though sometimes recorded as of rare occurrence on the New South Wales coastline, such is not the case. Indeed, it may truly be said to be quite common, but, not being seen in herds out of the water as in the case of the Sea Bear (*Arctocephalus*), it does not come so much under notice. Generally in newspaper records of the Seal's occurrence on our coastal beaches it figures as some sort of "sea monster," and there have been several such during the last two years.



LEOPARD SEAL AT WRECK BAY, NEAR TUGGERAH, N.S.W.

Owing to the long fusiform body and the fact that the hinder limbs are produced into two tail-like fins, projecting in line with the body, the Leopard Seal is not able to make its way over a land surface like the common Sea Bear (the ordinary Seal of Seal Rocks and Montague Island). It is just able to wriggle out on to a sloping beach, or perhaps some smooth rock surface which slopes down into the sea. The twin "tails" drive this Seal through the water with great strength and speed. While most of the Seals depend upon fish for their food, this kind also consumes the diving birds like the Gannet, watching for the bird to dive after Pilchards, Mackerel, and so on, and then catching them before they are able to make the surface again.

The specimen illustrated was seen and photographed by a party of boys from the Sydney Technical High School, while

on vacation in the Tuggerah district, in 1924, when they were walking along the beach at Wreck Bay, near Tuggerah. To my personal knowledge almost every beach along the coast within 40 miles north and south of Sydney, has had at least one visit from this species during the last few years—some of them several times. On two occasions they have been captured in the trawler's nets at sea, and have been many times observed swimming past.

THE GENUS EUCALYPTUS.

By LUCY A. HEYNER.

The vegetation of Australia differs in striking respects from that of the rest of the world. It is unique. The outstanding facies is the remarkable genus *Eucalyptus*, which presents a uniformity that makes it easy of general recognition wherever seen, and yet the diversity is multitudinous. In eastern Australia the Eucalypts attain their maximum development, both in height and specific characters, but in size of flower and brilliance of colour they cannot compare with the endemic trees of Western Australia.

The genus was founded by L'Heritier on material from Tasmania, namely, *E. obliqua*. The French botanist named the genus in 1777, the word eucalypt being derived from two Greek words, eu—well, and kalypto—I cover, in allusion to the little calycine lid or operculum, usually more or less conical, which covers the unexpanded flower, and is thrown off as the flower opens. It was Banks who first called them "Gumtrees," now adopted universally in Australia. The trees are evergreen. They vary in bark, leaf, flower and fruit, and also in the chemical constituent of oil, yet their specific characters are comparatively constant, however great the range of distribution.

The genus *Eucalyptus* is extremely adaptable. The species are found under all sorts of climatic and physical conditions; they mingle with the Malayan rain-forest, they flourish on the top of ranges, they grow in deep and shady gullies, on marshy land, in barren soil, on sandstone plateaux, and thrive xerophytically. There are few plant communities that are not favourable to one or more species of *Eucalyptus*.

The *Eucalyptus* is a very persistent type of vegetation. It can resist drought, thrive in waterless areas, and defy the bushfire. In its passage through the endemic flora a fire releases the seed-babies from the hard-wooded cradles of many shrubs

and trees, and in the case of the Eucalyptus, although disfigured and defoliated, the tree seems to pass unscathed through the furnace. Many of the charred bodies quickly send forth new shoots, and in a season are entirely clothed, and the forest rapidly recovers.

Among the particular characteristics that distinguish the Eucalypts from other native flora are the simple, pendulous leaves, which vary in length, thickness and shape, being long or short, broad or narrow, falcate, lanceolate, acuminate, thin or coriaceous, petiolate, and clothe the tree in "an unvaried mantle of olive green." Then the flowers, devoid of their corolla, whose dominant feature is the stamens, are distinctive. Their creamy, pink, or red feathery heads vary from inconspicuous axillary umbels of twos and threes to wondrous flaming clusters.

In differentiating particular species of Eucalyptus, such vernacular names as: "Blue," "red," "brown," "white," "grey," "slaty," "scribbly," "peppermint," "spotted" and "river" gums are often very misleading. The timbers are not easy to define. *E. melliodora* is the yellow box, named after the yellowish appearance of the inner surface of the bark; *E. capitellata* is the brown stringybark, and *E. pilularis* is the blackbutt, and all are noted for excellent timber. The distribution of the genus is wide. Many species of Eucalyptus abound in the County of Cumberland, and trees and forests occur over the greater part of New South Wales and throughout the Commonwealth. As a rule the trees growing near the coast, especially along the Northern Rivers, attain a greater height and girth, and yield better timber than those of the tablelands and plains. Some species, namely, *E. saligna*, the Sydney blue gum, and *E. pilularis*, prefer a rich alluvial flat; others flourish in rocky places. Some attain their maximum height on swampy ground, notably *E. camphora*. "Swamp gum" is essentially a wet-ground species. The river red gums (*E. rostrata*) spread their light airy crowns above the waterways of many of the southwestern and western rivers and give a striking note to otherwise monotonous country. Many arid regions are brightened by the mallee scrub which grows in clumps on the western plains.

A striking feature of the genus Eucalyptus is the high percentage of xerophily—the power of thriving on a limited supply of water. Besides the leaves being vertically hung, they are dotted all over with rounded glands, full of ethereal oils,

which reduces transpiration, and gives them a more or less aromatic odour. The leaves also twist on the petiole, probably for the purpose of protecting the oil glands which are present in the leaves of almost every species and are attached to the under surface of the upper cuticle of the leaf. The "trees that cast no shadows" are not valued as shade trees for stock, because of the fact that the leaves are fixed vertically and not horizontally.

Of Eucalypts of importance, economically, there are the ironbarks and the stringybarks, renowned for their timber. The ironbark is the chief source of hardwoods, which are used for bridges and wharf deckings. The timber of the stringybark is also hard and durable, and gives excellent wood for bridges, wood blocks, posts and rails. The Sydney blue gum is a useful timber, being thicker in trunk than most gums. The spotted gum is used in ship-building. The bloodwood gives wood suitable for fencing and railway sleepers, and the softer tallow-wood provides flooring boards.

The gum which gives the genus their vernacular name is not true gum. The exudation is used medicinally as an astrin-gent, and in tanning and dyeing.

The genus *Eucalyptus* is "Australia's greatest gift to forestry." The trees are being planted in many parts of the world, especially in marshy districts where malaria exists. They drain the soil and purify the air by means of their rapid growth and transpiration. The grandeur of the mighty genus is not confined to Australia. The Eucalypts are planted in Africa, South America, New Zealand, Southern India and regions bordering on the Mediterranean. Capetown has avenues of magnificent blue gums, an Indian hill station has them planted on its breezy slopes, San Francisco has an avenue of *Eucalyptus* trees, one and a quarter miles long, so beautifully grown as to arch overhead, and Kew nurtures them and gives them shelter in the warm temperate house. The *Eucalyptus* form the most prominent features of the scenic beauty of New South Wales. Behold the tree vista from any of the vantage points or "look-outs" of the Blue Mountains! The eye is fascinated, the pulse is quickened and the mind uplifted by that vast sea of olivegreen. Look where one will and the silhouette of a *Eucalypt* stands out against the changing colours of the sky; and beyond, the tall gums against the horizon seem to have captured all the lights of dusk and dawn.

TAME "WILD" BIRDS OF WELLINGROVE.

By MRS. DAVID MILLER.

(Presented by the President.)

To enable you to visualise my story it is necessary for me to shortly describe my home. It is a bungalow, with a wide verandah approached by steps. On one side of the steps is a large brick pier rising some four feet above the verandah floor; opposite across the drive is a pergola covered with climbing roses. Some hundred yards from the homestead runs a beautiful stream, fringed with willows.

My introduction to the "Tame Wild Birds" was made through a lame Magpie, which, though at first somewhat shy, later became very tame. I started by placing a few small pieces of meat on the verandah rail, and in a short time the Magpie, after singing a delightful song, would fly on to the rail and eat its meal quite close to me. After a while the bird disappeared and was away for two or three months; but you can imagine my surprise and joy, when, one morning, I heard the Magpie calling for her meal and resting on the exact spot where previously I had fed her. She had brought her young one with her. After a time, more Magpies came, and now, very early in the morning, they perch on the pier at the steps and sing their morning hymn. They have some babies with them which require a lot of the mothers' attention.

Then there are the dear, quaint, wise-looking old Kookaburras—nine of them; they are beginning to bring their young ones, too. I love them and the way they sit and gurgle when waiting to be fed. If they are not already there they will come to the call of "Johnnie." One day I was saying good-bye to a number of friends and one of the Kookaburras flew on to the bricks near me and kept pulling my handkerchief which I held out to him, not in the least troubled by the strangers. I was interested reading in a paper a few days ago about the Kookaburras eating fish. I saw one kill a gold fish at Mosman in a garden by darting swiftly down and striking it; and one day here one of them flew on to the brick pier, with a small Tortoise in its bill and set to work with great vigour to kill it by hitting it on the bricks, but was not able to swallow it, and left it there.

The "Soldier Birds" have become very friendly. I picked

one up in my hand from the brick pier one day and carried it into the house, where it ate some jam from a spoon, which I held to it. It was not in the least afraid and flew quietly away to rejoin its mates when I took it outside. Then there are "Gill birds" and Cuckoos, which come to the birds' feeding place, and later the beautiful honey-eating birds will return; and the "Currawangs," and other birds too numerous to mention.

The perky little Blue Wrens and many other small birds are always busy hopping about the garden, evidently picking insects from the leaves and flowers of the plants. Many Blue Wrens come on to the verandah picking up tiny crumbs which I scatter for them; and lately some very small grey Doves have made their appearance. I love to watch them. The Parrots visit us, too, and are very beautiful; Lowries, Rosellas, and Grass Parrots. During the recent heavy rain, several young Grass Parrots took refuge for two or three days on the verandah piers, they looked very miserable and wet, but would not eat the crumbs I placed for them. On the creek near the homestead amongst the willows, are "Red-bill," Duck, Blue Cranes, and other birds. We do not allow them to be interfered with; the result is one may go quite close and watch them swimming and playing about. In the paddocks are to be seen numbers of Ibis, amongst them one almost white. They look so quaint and pretty stalking about the grass and pushing their long bills into the ground for worms. In flight they are very graceful and beautiful. We also have one large white Heron or "Osprey" which frequents the creek and one or more of another kind of White Crane.

So this is my story of the tame wild birds of Wellingrove. Naturally, I am very fond of them all, although the Parrots have been very unruly in eating quite a lot of grain from one of the crops of oats. We are very fond, too, of the Plovers, which are here in great numbers and sound so truly Australian at night, with their wild cry when disturbed.

You will be interested to hear of two Wallabies which my son and his wife have reared; they were caught when a few days old. One of them is very much attached to my son, with whom he dearly loves to play and box. My son made a cement bath about six feet in diameter and a foot deep for this Wallaby, who revels in it, and is constantly sitting in it splashing himself. He delights, too, to sit out in heavy rain, sitting straight up, with his little front paws folded on his chest and the rain pouring into his face.

SOME TAME WILD BIRDS.

By J. H. JENNER.

Much information may be gleaned of the habits and manners of birds if one has the good fortune to make friends with them in their wild state. The first friends of this kind that I made were four large White Swans that lived on one of the lakes in Richmond Park, London. It took but a short time to overcome any shyness that these proud birds possessed, and they soon learned to come out of the water, and search my hands and pockets for the food I brought them. Still, two only became tame enough to take what was offering without snatching; and snatching frequently resulted in bleeding fingers. The tamer birds however would push up under my arm and so to my pocket, and did not mind being held quite tight by the neck.

The Peacocks of Richmond Park roam at will over its broad acres, and these became my friends and would come to me. It was a pleasure on one occasion, when sitting on a seat in one of the wooded enclosures, to find that one of these fine birds had found me out, and placed himself on the back of the seat by my shoulder.

Wild birds in England as a rule are less friendly than the Australian birds, because I think they are harassed to a greater extent. If one looks for friendly birds in England, they are to be found in London, where they are appreciated and unmolested. The Golden-crested Grebe builds each year in the lakes, in Richmond Park. It is interesting to watch the Seagulls being fed from the London bridges. Forming themselves in a great wheel, revolving in one direction, the lower part close above the water, the upper part higher than the bridge, each bird takes the food thrown to his or her part of the wheel, and catches it without destroying the wheel formation.

On coming to Tasmania, I was very struck with the friendly interest that birds in the bush showed towards humans, and it was not long before I was adopted by a pair of Dusky Robins. These would fly from the branch of a tree to my hand or arm, but it came as a surprise to my unsophisticated mind, when standing one day with a dainty meal of grass grubs in my open hand, I was met with a feathered avalanche—the parent birds and five fresh young ones which must have been enjoying my free meals for quite some little time.

Talking of birds' manners, these small brown birds had the most charming ways and none of the impudence of a Green Parrot that sat on my head, tweaked my ear, and fought me for the seeds I gave it in later days.

Tasmania suffers from grass grubs, and these the Dusky Robins could pick up from my hand, four or even five at a time and take away home. But slugs—no! these were outside the pale. One of my small friends after several offers of a slug, picked the object up with great care, let it fall on the ground, and looked at me in an offended way, so no more slugs were offered!

These little friendships remain as a very sweet memory; a momentary bridging of the gulf between man and Nature.

BOTANY OF HEATHCOTE, N.S.W.

By R. A. BLACK.

Trees and flowering shrubs noted during a recent excursion by members of the Naturalists' Society to Heathcote, near National Park, comprised a most interesting variety.

The creamy-white flowers of Wild Parsley (*Lomatia silaifolia*) were very attractive and a close relative of the Waratah (*Telopea speciosissima*) was in evidence. Although the structure of the flowers and fruits are very similar, that of the leaves is not and well illustrates the Protean character of the family (*Proteaceae*) which owes its name to *Protea*, a South African genus, which is represented in several private gardens. Several species of Hakea were noticed, and they were peculiar for their needle-like leaves and woody fruits. In some parts of Australia, especially Tasmania, the Hakea is known as the Native Pear—a greater misnomer could not be imagined.

If one were to travel through certain parts of central Tasmania, one would gather from the stockmen that the prickly pear was a great pest there. One would naturally think of the Queensland prickly pear (*Opuntia* spp.) which is causing so much concern in the northern State; but upon seeing the plant one would at once distinguish it as *Hakea microcarpa* which also grows in this State, as well as in Victoria. The common or vernacular names, generally speaking, are very misleading.

The "blackfellows' marbles" or drumsticks were noticed scattered about the heath-like country. There was both *Isopogon anemonifolius* and *Petrophila pedunculata* whose inflorescences

are superficially alike, but the former plant may be distinguished by its deciduous bracts and the small nuts covered with silky hairs. The Red Honeysuckle (*Banksia serrata*) revealing its huge cones, proved an item of interest for two reasons; first on account of the flowers being of such regular aggregate clusters and, secondly, its botanical name being associated with that of Sir Joseph Banks who has been called the father of Australia, which is an affectionate title. The late Mr. J. H. Maiden, Government Botanist of New South Wales, in his splendid work, taking the form of a contribution to the Bank's Memorial Fund, showed that Banks justly deserved this title.

One observing member of the party seeing a Bottle Brush (*Callistemon* sp.) in flower, considered, as the inflorescences were in his opinion formed on a similar principle, that it and the honeysuckle must be closely related. As others have thought the same, I take this opportunity of pointing out that they not only belong to different families, but structurally are greatly removed from one another. The genus *Banksia* is a very interesting one, and has been the subject of inquiry by several outstanding botanical authorities, including George Bentham, who was assisted by Dr. Ferdinand Mueller in the publication of the "Flora Australiensis." The flowers, hundreds in number, are gathered into a dense spike or cone, and consist of four sepals,—petals being absent,—at the tips of which, in coneave recesses, four stalkless stamens are found. Often one will notice a honeysuckle tree laden with cones or spikes, and a few of them bearing fruits, consisting of embedded compressed capsules, on a thickened rachis, usually containing two broad seeds, whilst some of the others are shrivelled with no vestige of fruits, suggesting that the flowers were unisexual. The reason for this is the remarkable ineffective fecundation of the flowers; that is to say, the pollen in an enormous number of cases fails to germinate on the stigma. As regards the Bottle Brush or *Callistemon* sp., it is true that the flowers are in dense spikes or cone-like aggregations, but the florets or individual flowers have both a calyx and corolla and a large number of long showy stamens, usually in several bundles or series; the fruits consist of hard, woody circular capsules, containing innumerable linear or linear-cuneate-shaped seeds. These capsules are uniformly grouped on the branch in a cylindrical manner. Owing to the elongation of the flowering stem after the formation of the flowers, the fruit clusters of several successive seasons will be found on the same stem.

The next plants to be examined were the Angophoras, commonly known as "apple trees." They are exclusively Australian trees, but confined to the eastern portion of the continent. They do not extend to Tasmania, although one will hear some settlers in the midlands of that State calling a true Eucalypt (*E. aggregata*, of Deane and Maiden), "Apple-scented Gum." The confusion arose through this Eucalypt being identified* with *E. Stuartiana*, of Mueller, which is found in New South Wales and north-eastern Victoria, where it is reported to be called "apple."

It is gathered that the Angophoras received the name of apple trees from the supposed likeness one or another species had to the apple trees of the English orchards. Angophoras may very easily be mistaken for Eucalypts, but an examination of the flowers and fruits of both will soon reveal a marked distinction between the two. The fruit of some of the Angophoras is of a papery texture, accompanied by short petals or petal-like calyx-lobes; not so the Eucalypts. The Eucalypts have a conical cap, called the operculum, which covers the immature flowers, and which is ultimately forced off and falls to the ground upon the development of the flowers. Angophoras have no such cap and their fruits have five teeth, set at equal distances round the top edge, while at the same time they bear small ridges. The conspicuous parts of the flower of the Angophoras are the expanded stamens, and the flowers usually appear in greater numbers than do those of the Eucalypts, at which time they present a pretty sight, forming a great attraction to insects.

The pendulous growth of a mistletoe growing on the branches of a Eucalypt attracted our attention upon examination of it,—it proved to be *Loranthus celastroides*, according to Bentham and Mueller, in the "Flora Australiensis," and *Phrygilanthus eucalyptifolius*, according to Mr. Blakeney, of the N.S.W. Herbarium. The mistletoes comprise a very large group of plants, and are embraced by the order *Loranthaceae*. In this order there are recorded for the world 21 genera, embracing 520 species, almost wholly tropical or sub-tropical. There are 15 Australian species and one is common in Asia; another extends into Timor, and it is believed over several of

*P. & P., Royal Society of Tas., 1917, pg. 20. "Tasmanian Eucalypts," by L. Rodway, C.M.G.

the islands of the Indian Archipelago, while 13 are, as far as is at present known, endemic.*

The mistletoe of the English Oak is *Loranthus europaeus*, and not *Viscum album*, as formerly recorded. *V. album* has not been found parasitical on the Oak,[†] but on the Silver Fir and other trees. If this be so, *L. europaeus* must have once existed in the United Kingdom. It has been suggested that all vestiges of the plant were extirpated with the Druids, which, it is held, will account for the *Loranthus* having disappeared wherever that religion formerly held its sway.

TREES AND BIRDS.

Another account of this excursion to Heathcote is supplied by Miss McAnene, who writes of the Angophoras and the birds.

"Some fine Angophoras had recently shed their bark, and the delicate colouring of their trunks impressed one with the faithfulness of Hans Heysen's paintings of the out-doors," she writes.

"In one patch of stunted growths the young leaves formed a beautiful coverlet in tones of brown and gold. On the fringe of this plot the twigs of the *Hakea dactylis* send up their beautiful bronze and green leaves. Mosses also were there. The species locally known as "Mountain Moss" and made use of in war-time for medicinal purposes grew well in damp situations.

"There were many signs of bird life. Several species of honeyeaters were noted, as well as a pair of Wagtails, and Robins, Tree-runners, Martins, Finches (Red Heads), Wrens, and a Rufous-breasted Whistler. A larger bird, which appeared similar to a ground bird, disappeared behind some rocks.

"The youngest member of the party (Master Thorby Black) collected two fine Buprestid Beetles (*Stigmodera*).

"In several places, between the railway lines and the fence, Christmas Bells, among the grass, made a regular riot of crimson and gold, their little faces all the brighter for the light showers. The masses of them, quite close to the train, spoke well for the operation of the Wild Flowers' Protection Act.

"On leaving the train, the exquisite colourings of a summer sunset, after rain had fallen, made an entrancing ending to the excursion."

* "Flora Australiensis," Bentham & Mueller. Vol. iii., pg. 388.

[†] London's Encyclopaedia of Plants, 1855, pg. 1071.

NATURALISTS' SOCIETY OF N.S.W.

PROCEEDINGS.

DECEMBER, 1927.

The ordinary meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, December 6, 1927. There was a good attendance of members.

Correspondence.—Mr. James Nangle (Superintendent of Technical Education) wrote agreeing to give a lecture on the "Spectroscope" at a date suitable to members. The Secretary to the Prime Minister wrote saying that the views of the Society, relative to the proposal to appoint a Royal Commission of experts to inquire into the status, general conditions and future administration of the aborigines, had been noted. The Hon. Secretary of the Australian Forest League (N.S.W. branch) wrote forwarding copies of the League's annual report. These were distributed amongst the members.

Election of members.—The following were elected as ordinary members of the Society:—

Rev. A. Hay-Holden, Presbyterian Church, Palmer Street.

Robt. A. Dallen, F.I.I.A., Accountant, B.M.A. Building, 82 Elizabeth Street.

S. W. Crane, 71 Belmont Road, Mosman.

Keith Norman, LL.B., Solicitor, Pitt Street.

Albert Booth, "Boronia," O'hara Street, Marrickville.

A short address, based on a paper entitled, "The Illawarra Scarp at Stanwell Park," by Miss H. Brewster, B.Sc., and Miss A. Caldwell, B.Sc., appearing shortly in the first number of the *Journal of the Geographical Society of N.S.W.* was given. This address was followed by a lecture on "Malaita," by Miss H. R. Drummond, B.Sc., who illustrated her remarks by a large number of lantern slides, and native articles obtained from the islands at the time of her visit.

FEBRUARY, 1928.

Mr. H. R. Harrington gave an instructive address regarding his visit, in company with a party of 32 ladies and gentlemen, to the Great Barrier Reef. The whole of the movements and activities of the party were shown by a cinema.

Mr. P. E. B. Barnett showed a number of lantern slides, covering a considerable range of subjects and secured in widely separated districts, including Lake Moodamere (Victoria),

Chatswood, Burrowa, Corowa, Narrabri and Wellington, N.S.W.

A visit to the Mudgee district.—Mrs. L. A. Heyner gave an interesting account of her visit to the Mudgee district. She accurately described the trees and animals of the district, and her remarks were made on specimens exhibited, namely, Mountain Oaks (*Casuarina*), White Box (*E. albens*), and Yellow Box (*E. melliodora*), Applewoods (*Angophora lanceolatus*), the Kurrajong (*Brachychiton diversifolia*), *B. Gregori* (gouty trunk and scarlet flowers), Ironbark (red flowering), *E. sideroscyon*, several *Acacias*, a black pine (not exceeding 30 feet) growing in groups in gully, and green pepper trees.

Mr. A. E. Watson exhibited a specimen of *Passiflora herbertiana* (passionfruit). Found in a bit of jungle at Newport. The fruit, Mr. Watson said, was not unpleasant to taste, but one would put it aside for the more palatable cultivated species. Jelly was made out of the fruits by Mrs. Watson by straining out the numerous seeds, but when made into jam seeds and all (except skin) it had a very bitter taste. As the fruiting is so prolific, there may be possibilities ahead for its commercial use if the bitterness were eliminated.

Mr. Geo. R. Park exhibited three water colour paintings of Bottle Brushes. There were four blooms on spray of the well known *Callistemon lanceolatus* or "Red Bottle-brush" obtained by him from the swamp opposite the Long Bay Penitentiary, close to the tram line, where a splendid display of this lovely plant may be seen in spring. There was also a beautiful bloom of *Callistemon linearis* bearing crimson flowers and found growing in the dry sandy soil opposite the Long Bay Penitentiary.

Three clusters of Brachyseelis Galls on ironbark limbs were exhibited by L. Gallard. One of these numbered ten so closely packed that each touched the other. These belong to the genus *Apionomorpha*, and the specific name is *Apionomorpha strombylosa*. The Gall itself very much resembles a Quondong. The female insect which develops inside it is a large fleshy creature somewhat resembling an Egyptian mummy. Towards the end of her life she develops into a sack of eggs. These eventually hatch and crawl out in hundreds through a small hole in the end of the gall, leaving the skin behind. Thus ends her life without ever coming out of her woody home.

Welcome.—The President extended a hearty welcome to Mr. W. W. Froggatt, who had just returned from a trip to the Old Country with his wife and daughter.



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Part 4.

A NATURALIST'S NOTES IN ENGLAND.

By WALTER W. FROGGATT, F.E.S., F.L.S.

After the vivid lush green grass, so different from the Australian herbage, one is struck with the beauty of the English trees. All through London, not only in the parks and gardens, but in angles of the streets, open squares, in the Law Courts and along the Thames embankments you find trees. The commonest and the one which thrives best in the smoke-laden air of London is the Plane tree, and the reason is that it not only sheds its leaves every year, but all the bark flakes off so that it starts the spring with a clean body, as well as fresh foliage. One of the finest forest parks near London is Bushy Park, which you drive through on the road to Hampton Court. Its glorious massed chestnuts were in full foliage when we visited it in June.

Every nature lover who comes to London makes a pilgrimage to Peter Pan's statue, near Long Walk, in Kensington Gardens. The base is built up of bronze, with figures of fairies, rabbits, mice, birds, frogs, snails, and Wendy. There are always children about, and the red squirrels are so tame that the children feed them. All the embossed figures as far as their fingers can reach are worn smooth through the children stroking them. Two small children told my daughter: "We don't know Peter Pan very well because we have not been very long in London, but he is a great friend of ours."

Stopping a week-end at Uxbridge, early on the Sunday morning we drove through Burnham Beeches. An ancient forest of gnarled pollarded beech trees, quite a show place on holidays. It is in Buckinghamshire. According to Stutt, this country takes its name (Buchen-Heim), the home of beeches, from its extensive beech woods.

As you know there is a very large area of level land in England, and in ancient times the whole of the midlands were covered with forest, a few of these remain, but their beauty is rapidly vanishing, the leafy lanes are changed to motor roads, and the village inns supplanted with huge modern hotels. The New Forest is intersected with motor roads, Brockelhurst is no longer a quiet little woodland village, and the wild ponies are often run down by cars. There is still Sherwood Forest, in Nottinghamshire, but the Dukeries encroach upon it, and now coal has been found in several places.

On all the landed estates, the homes are built well back from the road, hidden by a forest of oaks, elms, chestnuts, and copper beeches. Wollaton Hall, which has been acquired by the Nottingham Council and turned into a Natural History Museum, is a fine example of the stately homes of England. The hall was built by Sir Francis Willoughby, in Queen Elizabeth's reign, and was surrounded with 5,000 acres of park and forest, enclosed with a high brick wall eleven miles round. Among the collections in the Nottingham Museum is part of the Earl of Derby's collection of Australian animals, made about 1845. Others of them are in the Torquay Museum.

Another extensive area of trees is the Forest Park, at Windsor, which contains 18,000 acres.

The Forestry Commission, in its seventh annual report, in their census of Woodlands, 1924, give the area of forest lands in Great Britain as 2,958,630 acres, but more than half of this is only coppice, scrub, and felled, or devastated land. During and immediately after the war, it is estimated that nearly 5,000,000 acres, nearly all conifers, were felled.

All through the summer months the country is bright with flowers. In many places the hay fields are red with poppies: in others they are golden yellow with charlock, both of which are weeds, though picturesque. In the north the broom and gorse cover the hills with bright yellow blooms, reminding one of our wattles. There are many wild flowers along the roadside, and the edge of the forest, of which, in the north, the fox-glove is one of the most conspicuous, forming a mass of colour against the shelter of the stone walls.

On the Yorkshire moors and Derbyshire dales, the country is clothed with heath and heather. There are five species of indigenous heaths, and the nurserymen cultivate a number of varieties. The heather in both Yorkshire and Scotland is frequently burnt off to destroy the old growth, and promote a fresh growth upon which both the sheep and grouse feed.

In London I called upon Miss Gardener, secretary of the

Royal Society for the Protection of Birds, with whom I have corresponded for some years. She wanted to know all about our Gould League of Bird Lovers, and said that they had no school organisation like it in England. In fact, she said they encouraged the school boys to make collections of bird's eggs, as it taught them natural history.

Among my younger cousins and their school boy friends, I found a number had natural history collections, and in the suburbs a number kept caterpillars, and bred out moths. The most popular pets are toads, hedgehogs, and box-shaped tortoises. There is quite a trade in the latter, which I was told came from Spain. In a street off the Strand I saw a window full of them in a bird dealer's shop, having a breakfast of lettuce leaves.

Last year, on account of the cold, wet weather, insects were scarce in the gardens, and there were very few butterflies until September.

The greatest pest in the orchards and gardens is the common wasp. They eat holes in the ripening fruit growing against the walls. In many gardens they hang wide-mouthed bottles half full of sweetened water in the fruit trees. At my cousin's garden, near Loughborough, such hanging jars were nearly full of drowned wasps. They are often attracted into the pastry-cook's shops, and at Exeter I saw over fifty wasps inside a shop window feeding upon the sugared cakes.

Birds are plentiful all over England, and many householders in the suburbs of London having gardens put up a few nesting boxes for the "tits," and put out food and water for the semi-domestic garden birds. After the nesting season is over very few of these small birds sing, and even their plumage is more dingy. The robin red-breast has a much duller tinted waistcoat than our bush robins. All round the coast sea birds are numerous and very tame; in the stormy weather numbers of seagulls come up the Thames, and people feed them along the embankment. At Torquay large gulls were common and their favourite roosting places were the rigging and decks of the anchored boats. On the mud-flats were many small grey terns with black-capped heads. Inland there are many flocks of the Lapwing or Pee-wit (*Tringa vanellus*) which, except that it has a crested head, looks very like our brown plover. In spite of the fact that immense numbers of their eggs are collected and used for the table under the name of "allspiced plover eggs," they are very plentiful. Yarell in his "British Birds" records that 200 dozen lapwing eggs were collected in the 1839 season, and sent to London from Romany Marsh.

The Magpie (*Pica caudata*) is another common bird in the open country, sometimes in pairs or small parties up to a dozen in number. Our magpie only resembles them in its black and white colouration, as they are much more slender in form and have a long tail, which seems to be out of proportion to their size.

We often read about the Jackdaw (*Corvus monedula*), a dull coloured bird; the only place I saw them was flying round the tower of Wells Cathedral and uttering their harsh notes. The Raven (*Corvus corax*) is common I was told in Scotland, but the only one I saw in England was on the hills behind Conway Castle.

It is the Rook (*Corvus frugileus*) which takes the place of our common crow. In most parts of England they gather together at night in the pine trees in regular flocks, chattering while selecting their camping place. They fly out in the early morning uttering their characteristic caw, caw, as they settle down in the meadows. At times they do some damage to the crops and orchards. They nest in rookeries, where, after breeding many young, rooks are shot and converted into rook pie.

The Blackbird (*Turdus merula*) and the Thrush (*T. musicus*) are common visitors in the gardens, often in company. Though they police the lawns and eat the earth worms and grass-eating insects, they are both very unpopular with the gardener, who has to net all his fruit trees in the summer when the fruit is ripening, or loose a large percentage of his crop. At Windermere, one of the most common birds in the lanes was the Chaffinch (*Fringilla cuelebs*). The male is more brightly coloured than his mate, and they nest in crevices in the stone walls.

The swan is found on most rivers and lakes, and even the wild swans are semi-domestic. At Abbotsbury, every year, about 1,000 gather together and nest on the marshy land. The rushes are cut and placed in heaps for them to form their nests, and food provided in bad seasons. The swans on the Thames are rounded up every year by the Civic authorities, and the young swans marked on the beak as a sign of ownership.

At Wells Cathedral there is a moat full of water, surrounding the Bishop's Palace. Here there are a number of wild ducks, grebes, waterhens and swans. At the gateway there is a bell chain hanging down over the water. Years ago one of the swans learnt to reach up and pull the bell, when he thought dinner was late. I saw this swan in a glass case in the Museum; but before he died, the Curator told me several of the other swans learnt that the ringing of the bell brought their dinner.

Of course one does not see many wild animals on the roadside,

with the exception of the red deer in the parks. In some parts of the country rabbits have become so plentiful that they are becoming a pest, and last year there was a Rabbit and Rook Act brought up in Parliament to treat them as outside the Game Acts. Driving along through the sheltered lanes, we saw a weasel on several occasions run across the road.

The Mole (*Talpa europaea*) is very common in many parts of England; the mole catcher as a professional man is a thing of the past. The gardener catches them by sinking a wide-mouthed bottle or jar below their runs, into which they fall, when working along their burrows. He kills all he can catch, for though they eat worms and insects they cut up and spoil the lawns in pursuit of them.

The little Red Squirrel (*Sciurus vulgaris*) is common on the woodlands, but one has to wander into the woods and keep very quiet to see them. It is, however, threatened with extermination in the vicinity of London, through the spread of the American grey squirrel, some of which have escaped from the Regent Park Zoological Gardens, and taken up their quarters in the parks and gardens. I saw several loose in the Zoo, and another, early one morning, in Russell Square.

I paid a visit to a friend, with a home in the Surrey pine wood, at Camberley. He showed me holes dug in the ground by some semi-domestic badgers (*Meles taxus*) in a forest area behind his garden.

While stopping in the midlands, near Loughborough, the Hunt Club had a day along one of the small rivers, and with their otter hounds succeeded in turning out and killing a fine otter (*Lutra vulgaris*). This was quite an event in this district.

Notice to Members: The Hon. Librarian would be pleased to receive any back numbers of the "Australian Naturalist" not now required by them.

The Council desires to publish in the next issue of this Journal a list of members, together with their addresses, scientific or other titles. The Hon. Secretary would be glad if members would furnish these as soon as convenient.

ECONOMIC USES OF SEAWEEDS.

By EDWIN CHEEL.

(Curator of the National Herbarium.)

The uses of the seaweeds, or marine Algae, compare favourably with those of the Lichenes or fungi. Several species are employed by man for food. One or two, including the well known so-called "Irish Moss" (*Chondrus crispus* Lyng) are articles of the *Materia Medica*. Iodine is obtained from seaweeds, and finds an extensive application in the arts and in medicine. In the Malay Peninsula an edible seaweed is used which somewhat resembles a species of *Thamnolia*, which belongs to the Lichenes. Japanese Isinglass is prepared from a seaweed botanically known as *Gelidium spinosum*, and is used as food in Japan.

The following interesting article from a daily newspaper, entitled "Money from Seaweeds," also conveys an important account of what is being done as regards the marine flora of Japan:—

"Japan, which wastes nothing in its domestic economy, realises £400,000 annually from its seaweed products. According to the report of C. J. Davidson, an attache of the British Embassy at Tokio, more than 50 varieties of the seaweed found along the Japanese coast are utilised either for food or as manufactured products. The traveller sees bundles of dried seaweed, white with the crystallised salt of the sea-water, hung from the front of every food stall. The coarser varieties are stewed and served with fish. Some of the delicate sprigs of sea-grass are boiled with fish soups and remain a vivid green, floating against the red lacquer of the soup bowls." *Laminaria digitata* and *L. saccharina*, under the name of Tangle, are eaten in the north of Europe. The people of Rhode Island use the Irish (or Carrageen) moss as blanc-mange.

Other species of seaweed are used in the manufacture of glue, or plaster and of starch. Whole villages are given over to fishing and the drying and packing of the product for shipment to the manufacturing plants in the large cities. In the country along the seashore the farmers use the coarse and ropy kelp for fertilising their vegetable fields.

In Japan seaweeds have been used as a manure. On the Isle of Thanet, in the south of England, for instance, seaweeds have for many years been employed as a manure, especially for green crops. I have also seen it gathered from the beach at Whitstable, in Kent, and carted a distance of eight or nine miles

in order to manure the land for certain crops. In several other counties in Great Britain seaweed is extensively collected and employed as a manure for clayey and light sandy soils.

Messrs. H. J. Wheeler and B. L. Hartwell have published an interesting account on "The Agricultural Value and the Chemical Composition of Certain Species of Seaweeds" in connection with the Agricultural Experiment Station of the Rhode Island College of Agriculture and Mechanic Arts. In the "Annual Report of the Hawaii Agricultural Experiment Station" for 1906, p. 61, an interesting account is also given of "The Economic Seaweeds of Hawaii and their Food Values," by Minnie Reed, M.S. Numerous other instances could be given of the economic uses of seaweeds, all of which should be an incentive to the people of New South Wales to study their marine flora, which extends along a coastline of upwards of six hundred miles. During the Great War a company was established in Scotland under the name of the "Highland Kelp Industry and Potash Supply." Upwards of twelve hundred tons of ash is prepared annually, which is estimated at £4,300 to £5,000 for the output.

GALAXIAS AS A FLY-CATCHER.

By GILBERT P. WHITLEY.

In a pond near Long Bay (N.S.W.) lay a dead rat, its inflated body half in and half out of the water, forming a kind of islet. A splash in the water near this sordid object attracted my attention, and I noticed several fishes (*Galaxias attenuatus*) which had been disturbed at my approach. Wondering whether they might sometimes feed on carrion, I waited until one returned to the rat, upon which, in the meanwhile, a few green-bottle flies had settled. A fish swam up to the rat, but did not even nibble at it. Instead, it seemed to judge its distance from one of the greenbottles and leapt forward quickly to catch the fly. It then fell back with a splash into the pond, but, its appetite apparently not so easily appeased, kept cruising around as if to await the return of the other flies.

Amazed at this performance, I also waited until the green-bottles reassembled on the rat. Another *Galaxias* approached and espied the fly nearest the water. A gleam of sunlight shone for a second 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.

Lazily wagging its tail as its long body glided smoothly through the water, the fish returned before long to resume its tactics, and another unwary fly, which rested for a moment upon a floating stick, paid the supreme penalty for its folly.

THE MOUNTAIN GRASSHOPPER.
(*Acridopeza reticulata* Guer.)

By MARY FULLER.

Specimens collected at Koseiusko during February showed the typical sexual dimorphism of this species. The males appeared as normal *Tettigoniids*, but the females were deformed-looking creatures, hardly recognisable, at first, as "long-horned grasshoppers."

The females of this species have a hunched-up appearance, instead of the long leaf-like form; their forewings are shortened and crumpled, whilst their hindwings are absent. They are incapable of flight.

The male, however, possesses well developed wings, capable of flight from tree to tree, and has also well developed stridulatory organs, situated upon the bases of each forewing, by means of which it is able to produce a shrill chirping sound, which is usually given at short intervals. The female does not possess these sound producing organs.

Living examples of these insects have the abdomen banded with bright red, white and blue stripes, which after death decompose and disappear. Both the males and females have ears on the fore tibiae, visible to the unaided eye, but very distinct when viewed with a lens.

Excursion to Turramurra: Mr. L. Gallard (leader) reported that a small raised "termite track" was observed, which extended across the path, from an old stump on one side to a "blood-wood" tree on the other. Portions of this track were broken away, disclosing the covered passage in which the "white ants" or termites pass unnoticed from one place to another. Beneath the bark of the tree both "soldier" and "worker" forms were seen in hundreds.

Many ants (*Iridomyrmex detectus*) were noticed swarming over the branches of a "bloodwood" sapling and acting in a characteristic manner, which denoted that Homopterous insects were present, from which they obtained secretions known as "honey dew." Numbers of sucking insects were also observed amongst which were members of the following families: *Jassidae*, *Psyllidae*, *Cercopidae*, *Mémbriacidae* and *Pentatomidae*.

Amongst other insects collected were mealy bugs, gall insects, "eup moth," and "saw-fly" larvae, and the egg-mass of *Archimantis latistylus*. A nest of the non-stinging native bee (*Trigona carbonaria*) was seen in a high stump. One member of the party discovered the empty pupal shell of *Zeuzera boisduvalli* projecting from a hole in a "white gum" tree. A tree, containing a larva of this moth was opened by the leader with an implement, carried by him when on excursions. With this same implement members were also shown how to collect certain fly larvae from the soil, some fine examples of the family *Therevidae* being captured.

BOTANICAL NOTES ON AN EXCURSION TO BALL'S HEAD.

By L. A. HEYNER.

To the casual observer, the headland at Ball's Head would appear less interesting for botanical study than a more thickly wooded area. The vegetation, although mostly dwarf and stubby, was found to be extremely interesting. The botanical leader (Mr. E. Cheel) stated that some thirty species of such small Australian plants were to be found growing at the Tweed, England, and amongst these were *Bidens tridentata* and *B. pilosa*, which had probably been carried there, attached to shorn wool, by means of prongs upon their achenes.

These achenes (seeds) were evidently liberated and disseminated during the process of scouring and cleaning the fleeces.

Amongst other specimens examined were "Kangaroo grass" (*Themeda*), "everlasting flowers" (*Helichrysum*), asters (*Aster subulata*), *Lobelia purpurascens*, Blue Bells, *Wahlenbergia gracilis*. (The blue bells of the Mudgee district are larger than those of the County of Cumberland, but are excelled by those of the New England district. The blue bells at Kew Gardens are *Hyacinthus nonscriptus*, and belong to a different family).

Scattered sparsely over the headland were a few familiar trees, *Banksia integrifolia*, *Casuarina distyla* or *rigida*, *Pittosporum*, *Ficus rubiginosus*, the true Port Jackson fig, with small yellow fruits, and *Elaeocarpus*, the "Blue berry Ash."

The dioecious *Dodonaea* "native hon" had pistillate and staminate flowering plants, growing side by side.

Very prominent were such weeds as "Stinkweed" (a pest to pasturage), "Native Dock," Flaxleaf fleabane," "Canadian fleabane," and the pest "inkweed," *Phytolacca octandra*.



THE NATIVE BEAR, OR KOALA. (*Phascolarctus cinereus*.)

NATIVE BEARS AND MISTLETOE.

By RALEIGH A. BLACK.

Reference was made some months ago in this journal* to a questionnaire having been forwarded to the various Shire Councils within the State and of the replies received relative to the ecological relationship (if any) of the native bear or koala to the mistletoe. In this connection the following interesting letter has been received from the Rev. E. Norman McKie, of Guyra, N.S.W.:—

*The Aust. Nat., Vol. 7, Part 3, March, 1928, p. 36.

"Some few months ago I noticed a questionnaire in the papers from your Society relative to the spread of the mistletoe consequent upon the disappearance of the native bear. I intended writing at the time, but was delayed. I am afraid I cannot add much to the information sought for. The native bear has completely disappeared from this part of New England. I have only seen one in fifteen years; it was captured near Ben Lomond. From old hands I cannot get definite information as to whether the *Loranthus* or other types of mistletoe formed either the staple diet of the *Phascolarctus* or a sideline or change. Most of those to whom I have spoken do not think the bear preferred the mistletoe to eucalyptus leaves. I

believe the bear was discriminative in his selection of young leaves, neglecting some and relishing others.

"The mistletoe is doing great damage to the forest trees here, many of the best timbers are affected the worst. Along the Armidale road the yellow box (*Eucalyptus melliodora* A. Cunn.) and the red gum (*E. blakelyi* Maiden, in affinity with *E. tereticornis* Sm.) are literally laden with the parasite and the trees are rapidly dying.

"I consider the mistletoe a national problem and something should be done, otherwise the forests will disappear."

Many observers are of opinion that the increase of the mistletoe is not due to the destruction of the native bear, but to the conversion of forest and bush land into pastures, orchards, crops, etc. At first glance the connection may not be apparent, but when the reader is reminded of the comparatively few trees now remaining in the several selected districts, he would at once see that the agencies responsible for the spread of the mistletoe would have fewer places to visit and thus the infestation would become intensified.

A NOTE UPON HYBRID PARROTS.

Family *Cacatuidae*. Order *Psittaciformes*.

By ALBERT JEWELL.

(Communicated by David G. Stead.)

A cross between a male "galah" or "rose-breasted cockatoo" (*Cacatua roseicapilla*) an inland form, plentiful almost throughout Australia, and a female "sulphur crested" or "white cockatoo" (*C. galerita*) common in eastern Australia.

Both the above birds have been in the possession of H. A. Veen, Esq., Day Street, South Kensington; the galah for 26 years and the white cockatoo for 18 years.

During 1924 they developed their first young one and have since developed two each year. In colour the young birds are slate-grey upon their backs, with pink and yellow upon their breasts, whilst under their wings they are a bright canary yellow.

In size they are larger than the galah, but not quite so large as the cockatoo.

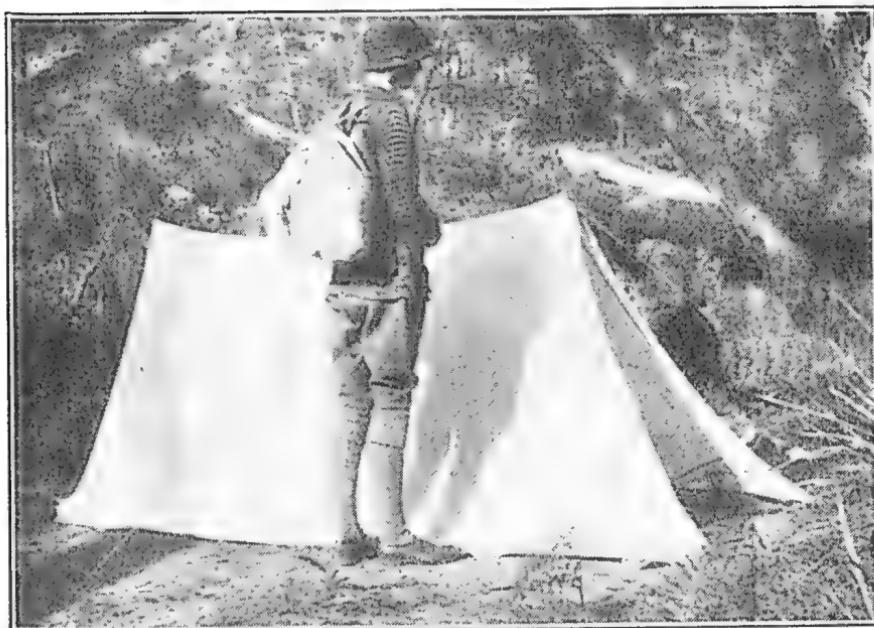
A LIGHTWEIGHT CAMPING EQUIPMENT.

By DOROTHEA TAYLOR.

Many women are deterred from bush walking by the thought of the heavy weight which it seems necessary to carry, or from fear of a wetting if not provided with a tent. A draughty eave is not a very pleasant home, whereas a tent can be most comfortable. It may be of interest to tell of a tent for two which weighs only 3 lb., including pegs and ground sheet. This light-weight shelter keeps out all rain, except a slight mist during a very heavy downpour. The tent has been used with great success in the Tropics. It is 4 ft. high, 4 ft. wide, 8 ft. 6 in. long, and can be erected in five minutes. One is protected from the wind, and therefore many degrees warmer than if sleeping outside. This tent, for two, can be bought in England for about £3, including Customs postage, etc., or may be made up here. We have tried *japoea* and *fuji*, but neither gives as good results as *kampette*. Pegs can be made at home, of stiff, thin wire, or metal skewers.

For lightness of weight and greatest warmth an eiderdown is unquestionably the most satisfactory sleeping bag. It must be of the best quality down and covered with some lightweight, closely woven material. The coverings bought in shops here are much too heavy. It is convenient not to have down all round the bag, as it is overpowering on a warm night. One side is of a thin woollen material which is put towards the ground in cold weather, warmth and softness being obtained by a layer of bracken or gum twigs and leaves. In warm weather the thin side is placed uppermost. It is a good arrangement to have the sleeping bag to hold two people for mutual warmth and distribution of weight—one's partner carrying the tent. As a down quilt it will be useful at home, so need not be counted as a luxury.

A waterproof ground sheet is necessary and can be made at home quite easily. Also a waterproof cape. We greatly prefer a cape to a coat, as in the latter case the rue sac straps rub on the shoulders and soon work water in through any but the best and newest of coats. One's knees get wet in heavy rain unless leggings of the motor cycle variety are adopted; they come well up the thighs. They are, of course, very hot if worn all day, but for showery weather are excellent. The material for leggings, cape and ground sheet is made waterproof by applying two coats of a mixture of equal parts of waterproof oil dressing and boiled oil, rubbed over with a candle when dry.



A *rue sac* is the easiest method of carrying the weight. We make a *rue sac* which weighs 8 oz. yet has pockets and adjustable leather shoulder straps. It is 21 in. deep by 23 in. wide, a good average size. A larger *rue sac* holds too much and so is too heavy. Anything extra is better slung in front from the shoulder strap.

It is assumed that breeches are worn by the women and these, with an extra woollen sweater and scarf, will keep the campers warm on any but the very coldest of winter nights. One is allowed a change of underclothing, but all one's outer clothes must be worn in the sleeping bag on an average winter night.

Toilet necessities: mug, plate, cutlery, billies, maps, and so on, all add to the weight, but with care two can be absolutely independent for a week's walk, each carrying 22 lb. which diminishes as the days go by and the food disappears. Food can be reckoned at 2 lb. per person per day.

A table of materials, weights, and pieces may be useful.

Article and Material.	Weight.	Price.
	lb. oz.	£ s. d.
Tent, kampette	2 0	3 0 0 ready-made.
Tent, 11 yd., kampette . . .	2 0	1 5 0 material only

Article and Material.	Weight.	Price.
Sleeping bag, 6 yd. kampette, 1½ lb. down, 27 yd. woollen material	2 12	2 0 0
Ground sheet, 2½ yd. green lawn waterproofing	12	3 6
Cape, 3 yd. green lawn water- proofing	14	3 9
Ruc sac, 1½ yd. green, rot proof treated linenette ..		1 10
Straps	8	8
Buckles		4

I shall be pleased to answer any questions regarding this kit, etc.

A BRIEF HISTORY OF THE WORD WATTLE AND ITS APPLICATION TO AUSTRALIAN PLANTS.

By RALEIGH A. BLACK.

In several States of the Australian Commonwealth the writer has often heard the remark that the word "wattle" is of Australian origin and that it was a name given to a tree which produced bark for tanning purposes. Since his advent in New South Wales, several people, including some of the members of the Naturalists' Society, have expressed themselves similarly, but without going very deeply into the etymology, it is my aim, in this short note, to throw some light upon this interesting and widely adopted word, and show how it came to be associated with some Australian trees.

In the first place wattle is not of Australian origin; in point of fact it was in use in Europe long before this country was discovered. A reference to this word will be found in a very old manuscript of Galway, dating as far back as 1485 A.D., about which John T. Gilbert made some commentaries. He said: The oldest body of municipal records of Galway, now extant, is in a volume known as the "Statute Book" of that town, or Liber "A," the contents of which consist of lists of Mayors, officials and councillors, copies of statutes, or enactments, grants, petitions and memoranda, commencing in 1485, and terminating in 1709-10. The original plan for the book seems to have been that the pages should be headed in chronological order, with the names of the Mayors and officials for the respective years, and that under them should appear the records of the transactions during their administrations.



The Original Wattle of N.S.W.
(*Callicoma serratifolia*, Andr.)

In connection with the use of the word wattle, we find that a by-law was made in Anno Domini, 1510, under the authority of Jhamys Lynch Fitzstern, Mayor, and Will(i)am Kyrvan and Vallintin Ffrench, Baylewis (baillies) namely:—

2.—Item: If the porters do suffer or admitte anny man to bring in wode (wood), trosse (turf), or vattill (wattle), but

onely with the owners thereof on Payne to forfaite, iiiid. (4d.) (1).

This by-law correctly shows that the word wattle (2) was in use prior to the discovery of Australia, but it does not indicate to what it appertained: therefore we draw attention to the undermentioned quotations, which serve to show that the word had generic force and not specific similarly as does the word timber, which defines no individual tree.

Burns mentions wattle in his "Farmer's Salutation to his Auld Mare," and it will be seen that a switch or the flexible terminal growth of any tree or shrub is meant and it is to take the place of a whip.

"The sma', droop-rumpl't hunter cattle,
Might aiblins waur't thee for a brattle,
But sac Scotch mile, thou try't their mettle an' gar't them
whaizle:

Nae whip nor spur, but just a *wattle o' saugh or hazle.*"

"Saugh," according to Prior in his work on the "Popular Names of British Plants," is the Sallow (*Salix caprea L.*) and the Hazel (*Corylus Avellana L.*).

A reference to a good dictionary will show that "wattle" (the noun) is defined as "a framework of interwoven rods or twigs," and that "wattle" (the verb) means "to bind, wall, fence, or otherwise fit with wattles."

As far as the writer can ascertain, it has not been traced back to its root, and from the very nature of the word it is full of philological interest, and hence there is an attractive field for research.

"Wattle" evidently belongs to the great Indo-European or Aryan family of tongues, and I suggest originated (of course not in its existing form) with the use of the whip-like rods of the pliable willow (*Salix*, which is said to be derived from two Celtic words: sal, near, and lis, water).

The willows constitute so extensive a family that a perfect Salicetum or willow-plantation, in which every known species was represented, would assume the dimensions of a small wood, and they are so difficult of discrimination, that not even the experienced botanist ventures to assign individuals to their several

(1). 1510, Galway, Archives in 10th Rep. Hist. MSS. Com'n. Appx. V. 394.

(2). A good etymological dictionary will show that *wattle* has had various spellings, namely: *waddle*, *watel*, *watue*, *vattill*, etc.

species unless he has an opportunity of examining them in their various stages of growth (1).

The willows are natives of the temperate regions of the Northern Hemisphere, and are much more numerous in the Old World than in the New. The majority grow by the sides of waterecourses, but a few high up in the mountains, and one is found nearer to the North Pole than any other shrubby plant (2). The twigs of the willow have from the earliest antiquity been employed in basket-work and in Pliny's time (as they are indeed at present in the northern countries of Europe) were twisted into ropes (3).

(1). Treasury of Botany, p. 1008.

(2). Ibid, p. 1008.

(3). Ibid, p. 1009.

In the Old Country there is a grass called the "Windle-straw" (*Agrostis spica venti* L.) whose calms were used for plattting. This operation is described in the Anglo-Saxon word, *windan*, to twist, from which "windle" or "windel" is derived (1).

The English Osier (*Salix viminalis* L.) was in the early days better known as "withy" (2) which is also an Anglo-Saxon word, and has a sense of twisting and twining. In these three words, namely, "wattle," "windle" and "withy" we see a great similarity of meaning, and it is quite within the realms of reason to deduce that they have come down from the same root, but this remains to be proved.

According to Prior (loc. cit.) "withy" is Anglo-Saxon, and is derived from *withige*, *withie* or *withthe*, Ger. *wiede*, and etymologically identical with Du. *winde*, standing to it in the same relation as "*lithy*" to "*linde*." Words closely related to "withy" occur in other languages, as the Lat. *vitis* and *vimen*, Gr. *itea* or *gitea*, and Pers. *bid*, all derived from a root *vi*, the Skr. *we*, and, having the sense of twisting and twining, the especial use of the osier in all countries. Prior (loc. cit.) draws attention to the close connection with the word vine, Fr. *vigne*, Lat. *vinea*, Adj. of *vinum*, wine, as being the wine-shrub, G. *wein-rebe*, Gr. *oinos*. Turner and some other old writers, he says, spell it *vynde*, from confusion with A. S. *winde*. The first syllable of *vinum* and *vitis* is probably a radical *wi*, or *vi*, whence Lat. *viere*, twist, *with*, *withy*, etc., and given to the vine in reference to its twining habit.

(1). Prior: Pop. Names of Brit., pl., 1879.

(2). The word "withy" is still in use in Sweden, according to a Swedish friend of the writer, and is pronounced with a long i.

To better see the application of the word "wattle" in English literature, a few additional quotations are given below:—

"The walls are *wattles* and the covering leaves."—Scott, the Poacher.

"They are gallant hares, and the scent lies thick right across another meadow and then over a good *wattle* [hurdle] with a ditch on the other side."—Hughes: Tom Brown at Rugby.

As the etymology of the word "wattle" means to bind, etc., how did it become to be applied to some species of *Acacia* in Australia?

We see its application in the "Contemporary Review" (L. 111: 8), which *intera alia* says: "Melbourne in those days was a straggling village, where the fathers of the settlement were content with slab shanties or *wattle-and-daub* huts."

"Ross's Hobart Town Almanack and Van Diemen's Land Annual for 1836" describes the building of these structures, namely:—

"As some of my foreign readers, as well as my more modern colonial ones, may not fully comprehend what is meant by the term "wattle and daub," I feel it incumbent on me to digress from the thread of my narrative (The Settler in Van Diemen's Land) a moment in order to explain this primeval order of architecture which the march of events is now transferring so rapidly from the antiquities of Van Diemen's Land to Port Phillip and other parts of New South Wales, and I do trust that Colonel Torrens, Messrs. Mackinnon, Hutt, Monte-fiore, Lefevre and the other M.'sP. and Commissioners of the New South Australian Colony, *quos longum describere nunc est*, will not only read my description with attention, but in gratitude for what must prove so highly useful to them in their new estate, transmit to me some small token of remembrance which I may keep as an heirloom and hand down to future ages."

"The four corner posts of your intended building being your corresponding wall plates, you complete the frame by adding other uprights at convenient distances, leaving proper orifices for the door and windows. You then bring home from the bush as many rods of the black and green wattle (*Acacia decurrens* or *affinis*) as you think will suffice."

"These are platted or intertwined with the upright posts in the manner of hurdles, and afterwards daubed with mortar made of sand or loam and clay mixed up with a due proportion of the strong wiry grass of the bush, chopped into convenient lengths, and well beaten up with it as a substitute for hair." "This mud or mortar is taken up in handfuls and dashed against

the wattles with due force, and afterwards smoothed with a trowel, the rafters are then put on, the roof is covered in with either flag grass or shingles, the chimney is built, the door and windows put in, and, with the help of a little whitewash applied inside and out, a very neat looking hut or cottage is completed."

The word "wattle" was taken across to America by the early settlers from the Old Country, for we find that the long branches of *Laetia Thamnia* Swz., commonly called Wattle Wood, was used in the construction of huts (1). It also was introduced into Africa where buildings were made of daub-and-wattle (2).

In Sweden, similar structures are made, even now, and the material used is called "wortl" (3).

Near Sydney Cove, during its early history, there grew in abundance, overhanging the watercourses, a small tree, with thin flexible stems, which was frequently used by the early settlers to construct the framework of their dwellings and other buildings. The settlers used the twigs and split saplings thereof and the operation was called "wattling," and the material used "wattle." This tree is known to botanists as *Callicoma serratifolia* Andr., and bears cream-coloured flowers, in globular heads. Subsequently other plants, which we now call *Acacias*, were used for the purpose, and these are recognised as "wattles" in most parts of this Continent, whether their stems are used for wattling or not, while the name, as applied to *Callicoma serratifolia*, has almost fallen into disuse, except amongst a few old-fashioned people. The term "wattle" is, however, by no means universally applied to plants of the genus *Acacia*, particularly in the far-western parts of the State. Myall, Boree, Mulga, Brigalow, Cooba, Dead-finish, Gidgee, Hickory, Miljee, Umbrella-bush, Wait-a-while and Yarran, amongst others, are all members of the great wattle family (1).

The figure above shown is a reproduction of *Callicoma serratifolia*.

In Tasmania the word "wattle" has become particularly associated with *Acacia decurrens* Willd., which is known as the Black Wattle, the bark of which, being very valuable for tan-

(1). Flora of Jamaica, by Fawcett and Rendle, Vol. V., p. 221.

(2). Olive Schreiner, Afr. Farm. II., i.i.i.

(3). The writer was so informed by a Swede, who is resident in New South Wales.

ning purposes, and also with *Acacia dealbata* A. Cunn., which is known as the Silver or White Wattle.

In Victoria the word "wattle" has been extended to *Acacia decurrens*, which is called the Black Wattle, and it was known by this name as early as 1840 (2).

(1). The Forest Flora of N.S.W., by J. H. Maiden, Vol. II., p. 104.

(2). Bunce's "Aust. Reminiscences Exped. in Viet.," p. 71.

In South Australia, *A. decurrens* Willd. var. *mollis* Lindl. is called the Black Wattle and Silver Wattle (1).

Emily H. Pelloe, in her "Wildflowers of Western Australia," says:—

"*Acacias* are called 'wattles' because wattles or hurdles, made of the long pliable branches or of the split stems of the slender species, were used by early Australian settlers in building their houses, the hurdles being daubed with mud. This style of construction was known as 'wattle and daub.' Wattle is an old English word of Anglo-Saxon origin, meaning a hurdle twisted, interleaved or bound with twigs."

Mrs. Pelloe gives the following quotations:—

"The folded flocks, penned in their *wattled* cotes."—Milton.

(1). Black: Flora of Sth. Aust., Part II., p. 291.

"And there he built with *wattles* from the marsh

A little lonely church in days of yore."—Tennyson.

Bailey, in his "Comprehensive Catalogue of Queensland Plants," mentions that *Acacia podalyriæfolia* A. Cunn. is known as the Silver Wattle of Queensland, which tree or shrub will be found growing in many of the gardens of our suburbs, and that *A. decurrens* Willd. is known as the Green Wattle.

Acknowledgements.

The writer confesses that the information forming the subject matter of this short note was widely scattered, and for which it required much searching, and in this connection he desires to express his grateful thanks to Miss Mander Jones, B.A., assistant at the Public Library of this State for her help, and also to Mr. J. W. Audas, F.L.S., of the National Herbarium, Victoria.

THE VEGETATION OF THE "FIVE ISLANDS."

By F. A. RODWAY.

On February 25th a party from Nowra, New South Wales, visited the Five Islands, a group of rocky islets, off the coast, between Wollongong and Port Kembla.

Of the Islands, the two most southerly (Nos. 1 and 2) are joined by a sandy beach, so forming really one island, much the largest of the group, of about 20 acres in extent.

Id., No. 3, separated from No. 2, by a narrow strait, is rugged and almost barren.

No. 4. Also barren and rocky, is the farthest from the coast.

No. 5. Is the island nearest to Wollongong. It consists of a level plateau, raised about 25 feet, on a lower portion just about sea-level.

Islands 3 and 4 can only be landed on in perfectly calm weather,, and, as there was a strong north-east wind, with rather rough sea, it was impossible to land on them.

Of Id., No. 1, the western slope, i.e., the part facing the mainland, is covered with a luxuriant growth of buffalo grass (*Stenotaphrum Americanum*), clumps of which are up to 3 feet high. In it are some prickly pear plants, and a luxuriant growth of *Commelina cyanea*, the bright blue flowers of which made a pretty sight; there were also a few plants of *Wahlenbergia gracilis* in flower, and a small area of reeds (*Phragmites communis*) which, however, were not in flower.

Over the rest of the Island, prickly pear was the dominant plant, in clumps up to 6 feet in height in places. Elsewhere, where the ground was rocky, the plants were small and scattered, growing in crevices in the rocks.

Scirpus nodosus covered small areas where the soil was sandy, and there were a few plants of *Xerotes longifolia*.

Here and there a thin growth of grass (*Sporobolus virginicus*) and odd plants of *Cyperus globosus* occurred.

The other vegetation consisted of—

Oxalis corniculata, a robust hairy form.

Correa alba, a few shrubs in flower.

Samolus repens, one small starved patch.

Phytolacca octandra, fairly plentiful in the buffalo grass area.

Rhagodia hastata.

Salsola kali, a few plants close to the shore.

Tetragonia expansa.

Mesembryanthemum aequilaterale, fairly plentiful.

Senecio scandens (not in flower), climbing over the buffalo grass in a few places.

A large pumpkin vine in flower near the site of an old camp, and a few tall dead thistles (probably *Onopordon acanthium*).

The centre of the Id., which is about 100 feet in elevation, was very bare and wind-swept.

Id., No. 2, was dotted all over with small plants of prickly pear. Other vegetation was scanty, viz.:—

Kennedya rubicunda, one or two plants in leaf only.

Samolus repens, a few small patches.

Correa alba, fairly luxuriant on northern side.

Erythroea australis.

Plectranthus parviflorus.

Westringia rosmariniformis, associated with the *Correa*.

Rhagodia hastata.

Sporobolus virginicus, a few patches.

Id., No. 3, appeared quite barren, except for a few patches of prickly pear.

Id., No. 4, could not be landed on, but we could see a little tussocky grass.

Id., No. 5, though only a couple of acres in extent, had the most varied flora of the lot.

The plateau was covered with a carpet of *Mesembryanthemum aequilaterale*, forming a soft green lawn of most striking appearance.

It was the dominant vegetation. Other plants were:—

Stephania hernandifolia, in leaf only.

Lepidium hypsopifolium.

Spergularia rubra.

Correa alba, a few shrubs near the edge of the plateau cliff.

Lillosa verticillaris.

Senecio scandens, in leaf only.

Erechthites arguta.

Cotula coronopifolia.

Myoporum tenuifolium, a small thicket, in leaf only.

Lobelia anceps, in moist place at foot of cliff.

Plantago varia.

Plectranthus parviflorus.

Westringia rosmariniformis, a few small bushes.

Solanum nigrum.

Atriplex cinereum.

Euchyloena tomentosa, covered with its bright red fruit

Prickly pear, only a few plants on the cliffs.

Commelina cyanea.

Scirpus riparius, in a moist place at foot of cliff.

S. nodosus, scanty.

Panicum sanguinale, associated with *Scirpus riparius*.

Hemarthria compressa, a few plants.

An orange coloured lichen was plentiful on the rocks at the edge of the cliffs.

Of animal life. Penguins were seen on Islands 1 and 5, signs of rabbits on Id. 1, also a few smooth lizards, about 6 inches long; one or two butterflies, a few small beetles, flies and small ants were noted.

On Id. 5 the carpet of *Mesembryanthemum* was infested with case-moth caterpillars.

It is interesting to note the large proportion of introduced plants in the flora. The native species, with the exception of the "ice plant," give the impression that they are being crowded out.

No ferns were found, though several moist areas appeared suitable for their growth.

As these Islands are seldom visited, and their flora seems to be undergoing change, with resultant elimination of many indigenous species. It may be of interest to put on record their present botanical condition.

THE LIBRARY.—The Hon. Librarian (Mr. A. R. Samut) reports that, in addition to the various publications listed in the *Journal*, from time to time, that the Society possesses a great variety of books dealing with Zoology, Botany, Entomology, Geology, Ornithology, Ichthyology, and general subjects.

On account of the lack of space, however, it is extremely difficult to locate any particular publication inquired for.

Numerous works are being kindly held by Messrs. E. Cheel and T. McCarthy until such time as better conditions exist.

“OLD MAN’S BEARD” OR SO-CALLED “FLORIDA MOSS.”

(*Tillandsia usneoides.*)

By EDWIN CHEEL.

(Curator of National Herbarium.)

As the specific name denotes, this plant closely resembles certain species of *Usnea*, which belong to the Lichenes group of the vegetable kingdom.

It grows very luxuriantly on the trees in the southern States of America, and is often mistaken to be a lichen, but it belongs to the Pineapple family (*Bromeliaceae*). It is common in the West Indies, Southern United States, and Central America, hanging in festoons from the trees upon which it is epiphytal. The plant is collected, steeped in water or buried for a short time to remove the outer cellular portion, the fibrous part being dried and used for stuffing cushions, mattresses, etc. Specimens of this species were exhibited at the April meeting of this Society by Mr. E. Cheel, who received them originally from Mr. F. Elliott, of Woodburn.

They require no special treatment, and will thrive by just hanging the plant to a stick or piece of wire in a bush-house—no soil, or water other than the ordinary rainfall is required.

 ENTOMOLOGICAL NOTES ON AN EXCURSION TO
BALL’S HEAD.

By LUKE GALLARD.

A number of specimens of the larvae of the small Lantana fly, *Agromyza lantanae*, were secured within the berries of the *Lantana*.

This fly is allied to the injurious French bean fly, *A. phasaeoli*. The eggs of the Lantana fly are laid beneath the skin of the berry, and the larvae feed upon the fleshy tissue.

Amongst other specimens collected were *Phytomyza*, found developing in thistle leaves, etc., a wingless form of a mantis from beneath a stone, and a butterfly.

Pyralid moth larvae which had drawn together the leaves of their foodplant were noticed to have been parasitised by Chalcid wasps, some six or seven medium-sized wasp cocoons being present. Numbers of the leaves on several wattles, *Acacia longifolia*, had been damaged by larvae, but a close search failed to reveal either these or their cocoons.

Two fine specimens of *Embiidae* were found in a most un-

usual place. I noticed some silken covering on top of an old rotting stump, and, on removing some of the old decayed wood, the two specimens, one fully grown and the other about one-third, were discovered. They somewhat resembled dark coloured termites divested of their wings.

NOTES ON BOTANICAL SPECIMENS OBSERVED AT NATIONAL PARK.

By L. A. HEYNER.

Amongst the natural orders well represented the *Myrtaceae* appeared to dominate. The conspicuous genera of this order comprised *Eucalyptus*, *Melaleuca*, *Tristania*, *Leptospermum*, *Baeckea* and *Darwinia*.

Of the genus *Eucalyptus*, *E. haemastoma*, *E. luemanniana*, a small and rare species recorded only from National Park and Bulli Mountain; *E. sieberiana* was noted on the adjacent ridges. *Tristania conferta* and *Leptospermum flavescens* were examined, the latter species, the leader (Mr. E. Cheel) stated could be grown easily from seed for the home garden. *Baeckea crenulata* and *B. diffusa* were also noted.

Amongst the *Proteaceae* admirably adapted to the conditions under which they live, the following were seen: *Hakea pugioniformis*, *H. propinqua*, *Grevillea buxifolia*, the "grey spider flower," *Banksia*, spp., in full fruit, and the "honey flower," *Lambertia formosa*.

Epacridaceae: The familiar spikes of *Epacris longiflora* ("native fuchsia"), *Leucopogon microphyllus* and *L. amplexicaulis* ("white beards") and *Astrolobium* with its small scarlet tubular flowers were examined.

The "purple pea," *Mirbelia speciosa*, was found with empty seed pods attached.

The characters of the orders *Compositae* and *Umbelliferae* were clearly explained by the leader. Many fine examples of various forms of Lichens were also seen upon rocks.

NOTES ON INSECTS OBSERVED AT NATIONAL PARK.

By MARY FULLER.

A fully-fed larva of a "cup moth," *Doratifera vulnerans*, was found feeding upon *Angophora* leaves. This larva was stout and slug-like, with the anterior and posterior ends ornamented, with four bunches of stinging hairs. Its body was marked with brown, yellow and green.

When fully-fed and ready to pupate they spin a cup-shaped cocoon characteristic of the family *Limacodidae*, and on emerging as an adult moth a well defined lid is pushed off the top. The empty lidless cocoons or "cups" are common objects upon eucalypts.

A large papery egg-mass of the brown mantis, *Archimantis latistylus*, from which the young had emerged was also seen.

A specimen of the small green mantis, *Orthodera ministralis*, was found upon a gum tree. The egg-mass of this species is smaller, darker, and more elongate than that of the brown mantis.

A small yellow Chrysomelid beetle, *Paropsis*, sp., was taken upon a eucalypt. The larvae of these beetles are caterpillar-like, and feed upon eucalypt and wattle leaves. The adult beetles bear a remarkable resemblance to the lady-bird beetles of the family Coccinellidae.

PROTECTED "WILD FLOWERS."

The Under Secretary, Department of Local Government, Sydney, has furnished us with a copy of the Proclamation of June 22nd. This covers the whole of the State for the period July 1, 1928, to June 30, 1929, and the following flowers are protected: Native rose, *Boronia serrulata*; Pink boronia, *B. floribunda*; Pinnate boronia, *B. pinnata*; Sticky boronia, *B. anemonifolia*; Red boronia, *B. ledifolia*; Small-leaved boronia, *B. microphylla*; Scented boronia, *B. thujona*; Soft boronia, *B. mollis*; Fraser's boronia, *B. Fraseri*; Safron-scented boronia, *B. safrolifera*; Christmas bells, *Blandfordia nobilis*, *flammea*, *grandiflora*; Flannel flower, *Actinotus helianthi*; Waratah, *Telopea speciosissima*; Christmas bush, *Ceratopetalum gummiferum*; Staghorn, *Platycerium grande*; Elk horn, *P. bifurcatum*, Tree ferns, *Dicksonia antarctica*, *Alsophila australis*, *A. cooperi*, *A. Leichhardtiana*, *Todea barbara*; Rock lily, *Dendrobium speciosum*; Bright pink eriostemon, *Eriostemon cuneoi*; Wax plant, *E. lanceolatus*; Blunt-leaf wax plant, *E. trachyphyllus*; Native daphne, *E. myoporoides*; Red bottle brush, *Callistemon lanceolatus*.

"THIS NEW WORLD."

By DAVID G. STEAD.

(Summary of Presidential Address at Annual Meeting,
August 15, 1928.)

When, in the year 1900, we formed our Society (then under the name of New South Wales Naturalists' Club), we looked out upon a very different world to that which now meets our gaze! Our Australian environment itself has, of course, undergone vast changes in these twenty-eight years; but, at this juncture, I am not so concerned with that as with the mighty revolutions of human thought and action which have passed before us—bringing us to an outlook in science and in human affairs which was undreamed of such a short time ago.

This is pre-eminently the day of physical and chemical discovery; yet, keeping pace with the epoch-making strides in those sciences, are the parallel advances in every other department of human investigation. Largely these last mentioned forward movements are directly due to the explorations of the chemist and the physicist; where they are not so they are concomitant thereto. No one, I think, will deny this.

I have in my library an old work, published in the year 1664, which furnishes us with a large series of "The Discourses of the Virtuosi of France." These are the discussions of a more or less learned body of men on every conceivable topic of science and social order. A survey of such a work alone leaves the reader rather appalled at the "world of darkness" that is thereby revealed as existent at that time; yet may not the future investigator look upon this age as equally dark. Such may appear inconceivable to us, but then, I find that many of the "virtuosi" previously mentioned, thought that their world was a relatively enlightened one! And is not the present age in many respects, scientifically at least, just as brilliant as compared with the period of the birth of this Society, when that time is compared with the era shown in the discussions of these learned Frenchmen?

In 1900 scientific investigation was but a child compared to to-day, especially as regards physics and chemistry. Since that time Man has conquered the air (with all that that implies in many directions). Radium, the "philosopher's stone," had not yet been discovered when we were born! Wireless had just been discovered, but Marconi was looked upon more or less as a dreamer. Even the phonograph was little more than a marvellous toy. In general the student dwelt in a comparatively un-

informed world. He was ever groping, for causes—many of which are ascertained to-day.

Let us step aside from the main theme for a moment and discuss the position of the rising naturalist thirty years ago and now, in Australia. There was an almost total lack of reliable published information on almost every branch of natural history, botany, and allied subjects—as far as handbooks were concerned, I mean. If one wanted information regarding our birds, insects, fishes, trees, etc., he had to chiefly dig it out for himself. But to-day we have a wealth of information handily published on almost every branch of our studies, making it easy for the student to at least enter the fields of knowledge, with many a helping hand to see him through. All through the intervening period the role of the Naturalists' Society has been a very important one, and not a few of its members have contributed very largely to bringing about the more desirable state of affairs that we find to-day in Australia.

Looking at the world to-day we find that it is particularly a physicist's and chemist's world. To enumerate even a few of the recent discoveries and their bearing upon all our studies would take many pages. Even in the ordinary domestic field is this so, rustless and seamless metal constructions are a commonplace. Paper, then textiles, and now sugar from wood. Electricity from the air—including the harnessing of storms to tap their prodigious potentialities—is experimentally achieved (3,000,000 volts from one storm in the Alps) and is shortly to be a commonplace too! Buttons and glue from milk. Synthetic foods from coal. Nitrogenous manufactures direct from the air (including the best killing agent for the rabbit in Australia). Marvellous physical instruments of amazing delicacy and accuracy for seeing in the dark, for registering infinitesimal pressures on massive structures, for registering distance (and ocean's depths instantaneously), breath-taking advances in radio and promises of powers to be given to Man surpassing the wildest dreams and hallucinations of humans in what has usually been considered to be "their right senses"—including the ultimate transmission of what we consider to be "solid" bodies by radio.

We see also the secrets of growth and heredity being rapidly unveiled. Best of all we are getting a better understanding of Man and his motives, and of the underlying causes for everything that we do.

A very great factor in the world of to-day is the League of Nations, which, incidental to its supremely vital work of ascertaining and alleviating the causes of war, is correlating and co-

ordinating the work of men in science and health and education. I look confidently for very great results here. Already nearly 400 internationally organised bodies of the best thinking people of the world are registered with the League.

This is a new world, then, a new world for human effort in every direction, essentially a new world for scientific endeavour. I see a still greater and ever-widening scope for the activities of this Society of naturalists, and look forward to a bright and happy future, full of usefulness to ourselves and our fellows in Australia.

NATURALISTS' SOCIETY OF NEW SOUTH WALES.

Proceedings.

MARCHI, 1928.

The ordinary meeting of the Society was held in the Assembly Hall, Department of Education, on Thursday, March 6, 1928.

The President (Mr. David G. Stead), in the chair.

Correspondence.—Miss B. Macauley wrote notifying that the W.E.A. would be holding a marine biological excursion to Obelisk Bay, on Saturday, March 10, 1928, and extended a cordial invitation to members of the Society.

Letters of Condolence—As a mark of respect letters of sympathy were forwarded to the relatives of the late Mrs. Cheel, senior, and the late Professor Harrison.

New Members.—The following were elected ordinary members of the Society: Miss Dolce M. Dobbing, c/o Bank of New South Wales, William Street; Miss Greta Savage, "Nangeela," Point Road, Woolwich, and Miss Margery Tarrant, B.A., 146 Arden Street, Coogee.

Mr. Geo. R. Park exhibited water colour paintings of *Boronia ledifolia*; the first of the boronias to flower in the late winter and early spring.

Boronia pinnata, obtained at Mangrove Mountain; *Boroxia floribunda* and *Leptospermum*.

Mrs. L. A. Heyner exhibited a booklet, comprising selected flowers from the Holy Land, collected at the following localities: Jerusalem, Hills of Zion and Moriah, Jericho, Bethlehem, Liberas, Hebron, the place of grapes, the Mount of Olives, and the Village of Siloam. The eucalyptus was noted to be flourishing in Palestine.

Mr. L. Gallard exhibited the following: Larvae of *Anthe-*

raea eucalypti, found feeding upon "mountain ash," at Rydal-mere. Braconid wasps bred from a Pinara moth pupa.

Mr. John Powell exhibited empty shells of an ascidian, which is closely allied to our sea squirts. These were obtained on Phillip Island, Victoria.

Visitors.—The President, in extending a hearty welcome to visitors, asked Mr. Lockby to speak, who, in accepting the President's invitation, referred to the early working of the Rosella parrots in a tree near his building at Killara.

Mrs. Howell reported having met an English naturalist, referred to her by the Secretary.

Mr. Gallard reported upon the excursion to Turramurra.

"A Naturalist's Calendar."—The President suggested that members keep "A Naturalist's Calendar." Several members discussed this suggestion, including Miss Steinbeck, who, in referring to the Blue Fanny Butterfly (*Papilio sarpedon*) said that it was attracted to blue objects, and instanced a case where one alighted on a baby's blue bonnet. Mr. Gray mentioned that he had seen the "Blue Fanny" as early as the end of last December. Mr. Gallard said, generally speaking, insects did not hatch out at the same time each year, and an adverse temperature would greatly affect their incubation period.

Hyde Park.—On the motion of Mrs. Buchanan, the Secretary was instructed to write to the Town Clerk, Sydney, suggesting mass planting of Christmas bushes, bottle brushes, wattles, etc., in Hyde Park.

Lecture.—Mr. W. W. Froggatt, who had just returned from Europe, gave a very interesting description of his visits to several outstanding museums. On the motion of Mr. L. Gallard, seconded by Miss McAnene, Mr. Froggatt was accorded a hearty vote of thanks.

APRIL, 1928.

Hyde Park.—The Commissioners in charge of Hyde Park replied that there was no money available to plant Australian trees in the new section of the Park.

Election of Members.—Miss H. Hart, 5 Spencer Street, Mosman; Miss T. Slade, "Wondella," Russell Avenue, Lindfield, were unanimously elected ordinary members of the Society.

Mr. M. E. Gray exhibited a specimen of *Orgyia (Teia) anartoides* found feeding upon a weed. He stated that some years ago they stripped quince trees of both leaves and bark, and also nibbled the fruits.

Mr. L. Gallard exhibited specimens of olive scale, *Saissetia (Lecanium) oleae* and three species of parasitic wasps which had hatched from same.

Mr. P. E. B. Barnett exhibited lantern slides of various birds seen by him in the suburb of Chatswood.

The President (Mr. David G. Stead) showed some excellent slides of Malayan scenes, of Mangrove swamps, and its natural life.

Miss Mary Fuller presented notes upon insects observed at National Park.

Mrs. L. A. Heyner presented notes upon the flora observed at National Park.

Mr. E. Cheel exhibited living specimens of "Old Man's Beard," or so-called "Florida Moss," *Tillandsia usneoides*; also a live specimen of *Ranunculus rivularis*, which is suitable for cultivation in a bog garden.

Mr. Adam Forster (since deceased) exhibited paintings, done by him, of the following orchids sent to him by Miss T. Harris and Rev. Rupp, from Barrington Tops, N.S.W. and Mount Barrow, Tasmania: *Pterostylis coccina*, *P. falcata*, *Pterostylis* sp., *Diuris venosa*.

Mrs. S. Howell exhibited a blue wren's nest which had been deserted. Mrs. Howell remarked that up to date she had not observed any young male birds with full colouring. The President said that young male birds are without their full colouring for some time.

Miss McAnene exhibited a fan-shaped sponge from Coalcliff which belonged to the family Gorgonidae. In all the Gorgonidae the organism consists of a composite structure made up of numerous polypes.

MAY, 1928.

Correspondence.—The Killara Community Service Club wrote asking for this Society's co-operation in securing a continuance of the protection of the following proclaimed wild flowers:—

Botanical Name.	Common Name.
<i>Boronia serrulata</i>	Native Rose.
<i>Boronia floribunda</i>	Pink Boronia.
<i>Boronia pinnata</i>	Pinnate Boronia.
<i>Boronia anemonifolia</i>	Sticky Boronia.
<i>Boronia ledifolia</i>	Red Boronia.
<i>Boronia microphylla</i>	Small-leaved Boronia.
<i>Blandfordia nobilis</i>	Christmas Bells.
<i>Blandfordia flammea</i>	Christmas Bells.
<i>Blandfordia grandiflora</i>	Christmas Bells.
<i>Actinotus helianthi</i>	Flannel-flower.
<i>Telopea speciosissima</i>	Waratah.
<i>Ceratopetalum gummiferum</i> ..	Christmas Bush.

which were protected for twelve months on and from June 30, 1927.

On the motion of Mr. R. A. Black, seconded by Mr. P. E. B. Barnett, this request was acceded to.

Visitors.—The Chairman extended a hearty welcome to Professor T. D. A. Cockerell, Mr. Pryde, of the Sydney Bush Walkers, Professor A. J. Abbott, and others.

Election of Members.—The following were unanimously elected members of the Society: Ordinary Members—Mrs. H. G. Hain, Banksmeadow Public School, Brighton Street, Botany; Miss Lydia Stewart, 12 Baldwin Flats, Roscoe Street, Bondi. Country Member—Rev. E. Norman McKie, The Manse, Guyra, N.S.W.

Obituary.—The President mentioned that a wreath had been sent to the relatives of the late Mr. Adam Forster on behalf of the members of the Society. The President, in paying a tribute to the late member, said that the late Mr. Adam Forster had exhibited several beautifully executed and most delicate paintings of orchids, newly discovered in this State, and they now form a part of a vast collection, which the President hoped would be acquired by the nation and held until they could be reproduced in some great work upon the flora of Australia.

Lecture.—Professor T. D. A. Cockerell, of the Colorado University, delivered an address on "A Naturalist's Travels." The lecturer related incidents of travel in central Siberia, referring specially to Lake Baikal, the deepest freshwater sea in the world; in Russian Turkestan, England, India, Egypt, the Red Sea, Rangoon, Penang, Siam, Singapore and Port Darwin. He also mentioned that he was present during the great earthquake in Japan.

Professor Cockerell described Lake Baikal as an extraordinary inland sea, and said that it contained hundreds of specimens of life peculiar to itself. At this lake, nature was reversed, a larger river having its source in it, instead of the river flowing into the lake. He added that contrary to popular belief the great museums and art collections in Russia had been preserved and allowed to remain intact.

On the motion of Mr. W. W. Froggatt, seconded by Mr. T. McCarthy, and supported by Miss McAnene, a hearty vote of thanks was accorded the Professor, and which was carried by acclamation.

Mr. R. A. Black exhibited a specimen of the noxious weed Stinkwort (*Inula graveolens* Deef.) collected by him on Ball's Head. He said the late Government botanist declared that it

was one of the most serious weeds that has ever afflicted Australia. It is recorded that it was first introduced to the Onkaparinga district of South Australia, in 1863, and has now spread to most farms and waste places in South Australia, Western Australia, Victoria and New South Wales. It is a native of Europe, and has been used by the German farmers for smoking hams and bacon. Milk, butter and mutton will become affected in flavour when it is eaten by cows and sheep respectively. Stinkwort has been declared noxious in 12 municipalities and 34 shires in New South Wales, and is included in the official list of the 20 words and weeds of this State.

Hon. Editor: It was mentioned that the Council had received with great regret the resignation of Mr. M. S. R. Sharland as Honorary Editor, owing to Mr. Sharland's removal to Melbourne. Mr. E. H. Zeck was being asked to accept the position.

JUNE, 1928.

Ordinary Meeting.—Tuesday, June 5, the President in the chair.

Correspondence.—The President read a letter from Mr. Albert Jewell regarding some extraordinary hybrid cockatoos which had been bred out at Kensington. The cross is between a male Galah (Rose-breasted Cockatoo) and a female White (Sulphur-crested) Cockatoo. The progeny is of considerable beauty, and partakes fairly evenly of the two parents.

New Members Elected.—T. H. Lambert, D.C., George F. Richardson, and Graham L. Turner.

Exhibits.—Mr. Gray, a female fish-parasite (isopod) from a Leatherjacket (*Pseudomonacanthus*). Miss Fuller, photo of Stick Insect from Lord Howe Island. Mr. R. A. Black, specimen of *Styphelia tubiflora*, collected at Kangaroo Creek during the members' outing there. Mr. Watson, specimen of *Ficus pumila* with fruit.

Lecture.—Mr. M. B. Welch, B.Sc., Economic Botanist in the Technological Museum, gave a highly interesting and informative address on various aspects of Forestry, illustrated by a fine series of lantern slides. On the motion of Messrs. Watson and Froggatt, the members' thanks were conveyed to Mr. Welch.

JULY, 1928.

Ordinary Meeting.—Tuesday, July 3, the President in the chair.

New Members Elected.—Miss F. Chamberlin, I. J. Garling, Lilian Halloran, Mrs. A. E. Watson, and Mr. A. J. Abbott.

Exhibits.—The Honorary Secretary showed some admirably prepared specimens of the foliage and polished timber sections

of the Illon Pine, *Dacydium Franklinii*. Mr. Abbott artistically mounted specimens of some West Australian plants.

Lecture.—Professor T. G. B. Osborn, of the Sydney University, gave a very informative and interesting illustrated address on Australian Saltbush. This proved extremely valuable to members. On the motion of Messrs. Froggatt and Watson, a very hearty vote of thanks was conveyed to the Professor.

AUGUST, 1928.

Annual Meeting.—Wednesday, August 15, the President in the chair.

New Members Elected.—Miss F. Smethurst, Professor T. G. B. Osborn, M. M. Lumsdaine, Thomas Youmar, and N. R. Ayre.

Hon. Secretary's Report.—The Honorary Secretary gave a brief resume of the work of the year, revealing satisfactory progress. The President congratulated, and the members applauded, Mr. Black for his earnest work throughout the year.

Hon. Librarian's Report.—The report received from the Hon. Librarian showed that, though there had been a considerable accession to the library throughout the year, the position was very difficult, because of the lack of accommodation for the books and papers which, literally, are "all over the place." In this connection, if any member is able to come forward with a practical suggestion for the permanent housing of our valuable library, the members generally will be very thankful. As it is the library is of little practical use and can only be stored against future use—and even storage, in one place, is not available.

Hon. Treasurer's Statement.—This showed that the year's expenditure had been £110/1/11, balance to our credit being £112/14/6.

Presidential Address.—Mr. David G. Stead gave an address on science and the new world, entitled "This New World." A summary of this address is printed elsewhere in the *Journal*.

Election of Council.—The following were elected to form the general Council for the ensuing year: President, David G. Stead; Vice-Presidents, W. W. Froggatt, A. E. Watson, Dr. I. M. Mackerras; Hon. Treasurer, J. Powell; Hon. Secretary, R. A. Black; Hon. Assistant Secretary, Miss R. Thurston; Hon. Editor, E. H. Zeck; Hon. Librarian, A. R. Samut; Hon. Lanternist, C. J. White; Members of Council, Miss H. McAnene and Steinbeck, Messrs. A. G. Hamilton, G. Gostelow, A. S. Le Souef, L. Gallard, and P. E. B. Barnett.

Exhibits.—This had been arranged as a special exhibition evening, and a large number of choice exhibits were shown.

Misses Steinbeck and McAnene were responsible for the decoration of the hall, and received the thanks of the meeting. Mr. R. A. Black showed a fine series of mounts, illustrating the life-history of the timber trees of Tasmania—including transverse, longitudinal and radial sections of the woods themselves, polished (without oils or varnishes), and showing the natural colour of the timber. Miss McAnene had an assortment of native flora from western plains. Mr. Gallard showed illustrative examples of the damage done by insects on various plant tissues. Mr. G. Gostelow exhibited a superb collection of his paintings of birds and wild flowers, and artistic cover designs incorporating such. Miss M. Fuller showed pteridophytous plants and insect specimens. The President had a collection of reproductions of fish photographs from specially prepared fishes. Mrs. Howell, native flowers from Lane Cove. Mr. Abbott, collection of flowers from the vicinity of The Spit (about 20 species): also an illustration of a new West Australian orchid. Mr. Eddes, fine photographs of wild flowers. Mr. Gray showed some useful objects made from Silky Oak (*Grevillea*) timber which had been used for tomato cases, and which well illustrated the exquisite cabinet timber that this well known species is. Mr. W. W. Froggatt had a collection of Australian and exotic insects. Miss Steinbeck, specimens of West Australian wax plant and of Sydney flora. Miss D. and Master M. Finekh exhibited 38 species of beautiful native flora grown in their private garden at Mosman.

At this meeting, also, the President drew attention to the great loss which the Society had sustained through the death of Mr. Bertram, whose work in mosquito-control and in noxious insect study had been greatly appreciated.

Mr. Edwin Cheel's unavoidable resignation was also reported, and received with great regret. Mr. Cheel finds that he is not able to continue his work for the Society at present because of pressure of official duties, but we will hope that he may be able to link up with us again later on.

EXTRACTS FROM ANNUAL REPORT.

The following extracts from the Honorary Secretary's annual report are of interest. During the year the following lectures were delivered:—

"Insect Life in Relationship to Their Environment," illustrated by lantern slides, by Dr. I. M. Mackerras.

"An Evening with the Birds," by members, the following taking a prominent part:—

Messrs. A. H. Chisholm, P. E. B. Barnett, D. G. Stead, and R. A. Black, and Mrs. S. A. Howell, Mrs. L. A. Heyner, and Miss H. McAnene. So popular was this subject that several other members were unable to take part owing to the lateness of the hour; therefore it was decided to repeat it at the next meeting, when the following other members took part: Messrs. J. H. Jenner, L. Gallard, and Mrs. P. Buchanan.

"Fresh Water Fishes" (illustrated), by the President, Mr. David G. Stead, and supported by Messrs. Whales, Hayes, and H. Wood, of the Aquarium Society.

"The Physiography of the Illawarra Searp" (Stanwell Park Section), by Miss Hazel Brewster, B.Sc., and Miss A. Caldwell, B.Sc. (illustrated by lantern slides).

"Malaita" (illustrated by native articles obtained from the Islands), by Miss H. R. Drummond, B.Sc.

"Members Night," at which the following took part:—

Mr. H. R. Harrington.—An account of a visit to the Great Barrier Reef, illustrated by moving pictures.

Mr. P. E. B. Barnett.—Some excellent slides of birds and spiders seen under natural conditions.

The Secretary (Mr. R. A. Black), a report of the members' excursion to Heatheote.

Mrs. L. A. Heyner.—An interesting account of her visit to the Mudgee district, illustrated with specimens of plants.

Mr. W. W. Froggatt gave an informative account of his visit to the Old Country.

"A Naturalist's Travels," by Professor Cockerell.

"Forestry," by Mr. M. B. Welch, B.Sc.

During the year, the following places were visited:—

Longueville, Mangrove Mountain, Kuringai Chase, National Park, Ball's Head, Kangaroo Creek, Botanical Gardens, and Dr. A. E. Finekh's private garden at Balmoral.

The membership of the Society is on an increase. During the past year the names of 30 new members were added to the roll.

It is with great regret that we have to record the deaths of the following members and member's relatives:—

Professor L. Harrison.

Mrs. Cheel, senior.

Mrs. A. G. Hamilton.

Mr. Adam Forster (late Hon. Librarian)

Mr. E. Bertram (late member of Council).

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Part 5.

THE IMPORTANCE OF FOREST CONSERVATION.

M. B. WELCH, B.Sc., A.I.C., Technological Museum, Sydney.

Although it is generally accepted that in a comparatively few years the world will be faced with a timber famine, due to the rapid depletion of the forest areas, yet, apart from the value of the trees in yielding wood, they play a far more important part in our national economy than is usually realised. What are now practically deserts in parts of China, Arabia, Egypt, Palestine, Mesopotamia, Spain, Italy and Greece were all at one time fertile wooded areas, with permanent streams, until the forests were destroyed.

Forests have a very definite effect on climate, thus in forested regions the temperatures are lower in summer and higher in winter, whilst it has been shown that the day temperature may be as much as 8° Fahr. lower and 4° Fahr. higher at night, than in denuded areas.

The actual effect of forests on rainfall is rather a controversial matter, and the data available are conflicting, due to the difficulty of preventing the influence of other factors.

Normally, over land, about one-third of the rainfall is due to evaporation from the land itself, the remainder coming from the sea. Moisture from the land comes principally, either from transpiration from the leaves or from the soil or swamps and free water. Although transpiration is naturally largely affected by the class of tree, the total amount of moisture given off from a forest, including soil evaporation, far exceeds that from the same area of still water. The amount given off from an agricultural crop is even greater than that from the forest, but the crop is intermittent and in drought periods non-existent; whereas the forest provides a more or less constant moisture.

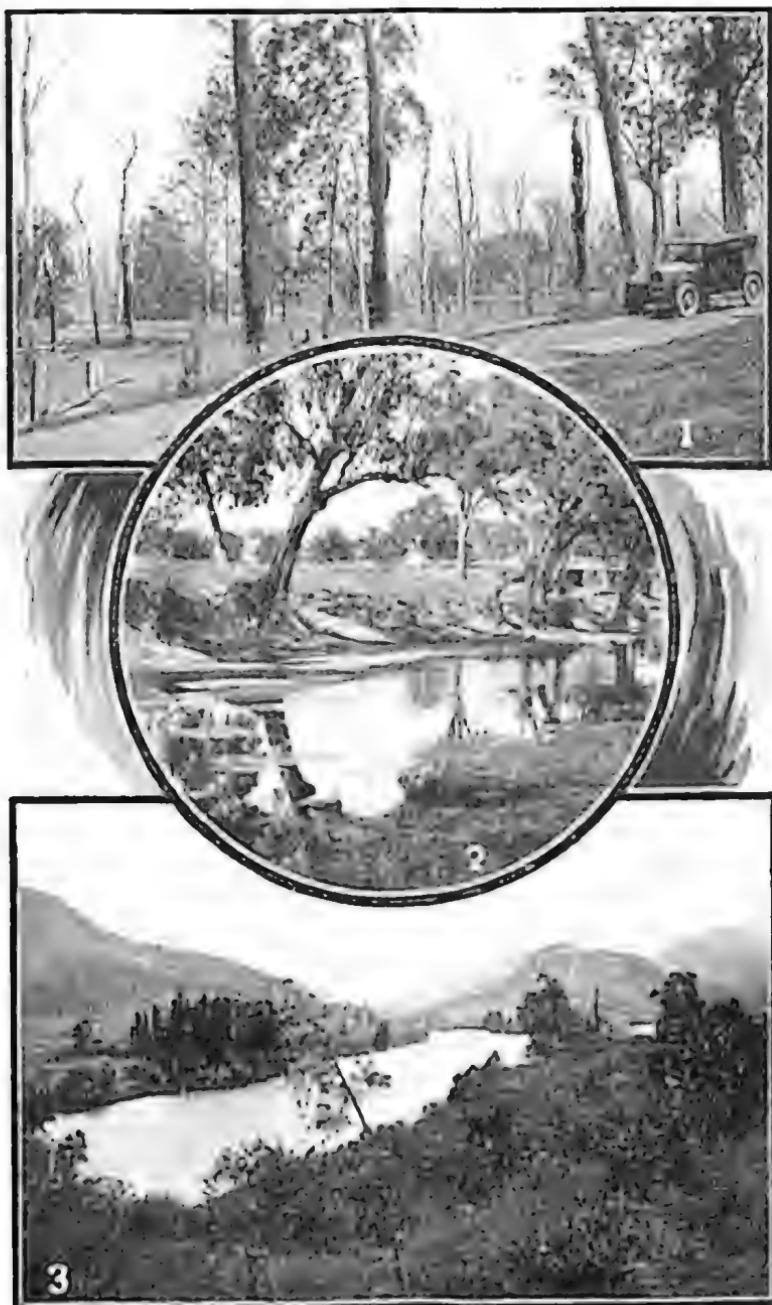


supply. In a country such as Australia, with its huge land mass, transpiration must play an important part in rainfall. It seems probable that, due to the cooling effect of the forest on surrounding air precipitation is increased, especially in mountainous country. Although cases are on record where the rainfall has apparently increased after the establishment of forests, others seem to show no increase, or even a decrease, but other factors may account for these.

One of the most important effects of forests is on the stream flow. Actually forests decrease the run off from land, and for this reason misguided people have from time to time persisted in clearing the trees from catchment areas. After the dams have commenced to silt up or the water has become brackish, as occurred at Mundaring, in Western Australia, there is a marked enthusiasm for tree planting. Rain falling on cleared uplands rushes down the hillsides, the surface soil is denuded, serious erosion occurs, and the stream becomes a torrent and the river a flood. Rain falling on upland forests is held in check, first by the interception of the foliage, next by the absorption of the humus, which can take up to seven times its weight of water, and lastly inequalities in the surface due to roots, logs, etc., forming pockets in which water lodges and soaks into the soil.

Forests do not always prevent floods after exceptionally heavy rains, but they minimise them very considerably. The water which enters the soil is partly lost by root absorption and transpiration, but much of it emerges at lower levels as springs, with the result that perennial streams are ensured, or, in other words, we have a more constant stream flow. Many parts of Australia, in the coastal areas, bear witness to the fact that forest destruction means dry creeks in summer. The disastrous floods which occur in China are attributed to the destruction of forests near their sources.

If more definite evidence is required of what forest destruction can bring about, France provides a classic, or rather a tragic example. Prior to the French Revolution, regulations prevented the clearing of the mountain slopes in the Pyrenees and Alps. Subsequent forest destruction denuded the hillsides and about 800,000 acres of arable land was destroyed by the detritus brought down by raging mountain torrents. It has been estimated that the carrying power of water increases as the sixth power of its velocity, and it is not hard to imagine the tremendous destruction wrought by these torrents which shifted



For Description of Illustrations, see page 94.

boulders many tons in weight. In 1860 the French Government began in earnest to attempt to "harness the torrents." Sodding proved ineffectual and reafforestation has been found to be the only remedy, but it is estimated that to make the streams safe considerably more than £10,000,000 will need to be expended.

Innumerable cases could be cited to show the effect of forests on stream flow, but the following is typical. The River Elbe, from 1787 to 1839, following the cutting of the forests at its sources, diminished in level at Attenbruecke in Hanover by ten feet!

Forests play an important part in mountainous regions by slowing down the rate of melting of snow, and hence minimise floods due to this cause and again produce a more even stream flow. Further, due to retarding wind action slight falls of snow are not so easily lost by evaporation, but melt and are soaked up by the ground.

One of the most serious problems in many countries is the drift of sand, and in dry areas this frequently follows the destruction of the vegetation. In many parts of Australia overstocking and the rabbit are responsible for the fact that large areas are nothing but sandy wastes, the contours of the surface altering with each heavy gale. Deherain has said that "it is not wars which have brought most evil upon the region of the Mediterranean, but aridity brought on and aggravated by the reckless destruction of woods and the excessive abuse of pasturing in the mountains." The warning has apparently been unheeded in many parts of Australia.

In the vicinity of many of our inland rivers, after heavy winds, sand is blown from the bed and encroaches further and further on adjacent land. Forests by acting as wind-breaks, not only prevent this encroachment, but also considerably decrease soil evaporation, due to dry winds.

Experimental work has also shown that there is a definite increase in the yield of crops which are protected by wind-breaks, apart from minimising the risk of their absolute destruction by gales. Similarly the importance of trees as wind-breaks for the protection of stock, less hardy trees, and dwellings, cannot be over-estimated, yet comparatively few are seen in New South Wales, even on the wind-swept southern plateaux.

Forests are a factor in our national health. Trees act as filters, removing dust and bacteria from the air, especially near towns, and for this reason forest air is pure; one count showed the air outside a forest contained twenty-eight times as many

bacteria as the air inside. Forest soils contain little albumenoid matter which would encourage bacterial life, and, moreover, humus inhibits the development of pathogenic bacteria. Numerous records show that towns and villages in Europe, situated in forested areas, are free from cholera. Although the idea that the air of pine forests has a curative effect in diseases such as tuberculosis has been questioned, the fact remains, that on most people, forests have a bracing effect. Many countries provide examples of the effect of tree planting on health. The Campagna, near Rome, is a classic example of where the planting of Eucalypts lowered the water table and dried the malarial swamps. The fever stricken Landes district of France, where disease was rife, and the sole inhabitants were a few poverty stricken peasants, now supports a large population, and is almost a health resort, due to the establishment of vast coniferous plantations.

There remains the effect of forests on bird life. The balance of Nature cannot be upset with impunity, and tree destruction and the driving away of bird life brings serious consequences in insect plagues. The losses due to this cause amounts to many millions of pounds sterling in Australia alone; one wonders how much could have been avoided if a little more care had been exercised in the use of the axe and fire-stick.

In every country there must be a balance between agricultural, pastoral and forest lands, and the ideal condition is one in which the forests are confined to the ridges and upper slopes of the mountainous regions, the pastures to the less precipitous slopes and agriculture to the valleys and lower slopes.

Australia was very poorly endowed naturally with forests, and many of these have been destroyed. It is estimated that we have about 24,500,000 acres of forest, or 1.29% of the total area, whilst to mention only a few, France has 18.4%, Germany 23.8%, Russia 38.7%, Sweden 54.8% of their areas under forest. It should be apparent, therefore, that it is our bounden duty to protect what forests we have left, especially by the careful use of fire in summer, and to encourage reafforestation in suitable areas.

In conclusion, let me repeat the oft quoted translation of the notice found in public parks and forests in Portugal:—

TO THE WAYFARER.

Ye who pass by and would raise your hand against me,
hearken ere you harm me,
I am the heat of your hearth on the cold winter's night; the
friendly shade screening you from the summer sun, and
my fruits are refreshing draughts quenching your thirst
as you journey on.
I am the beam that holds your house, the board of your
table, the bed on which you lie, and the timber that
builds your boat.
I am the handle of your hoe, the door of your homestead,
the wood of your cradle, and the shell of your coffin.
I am the bread of kindness and the flower of beauty;
Ye who pass by, listen to my prayer: harm me not.

DESCRIPTION OF PLATE (see page 91.)

1. Near Benalbo, N.S.W. Although many of the trees have been ringbarked for grazing purposes, numbers have been left. This sensible method provides shelter for the stock.
 2. The Lachlan River, near Condobolin. Murray Red Gum (*Eucalyptus rostrata*); the roots of these trees prevent erosion of the river banks.
 3. Tweed River (South Arm), N.S.W. The mountain slopes still possess their natural cover. Clearing means soil erosion, floods and dry streams in summer.
-

DON YOUR HIKING CLOTHES.

Our lady members would be well advised to equip themselves as far as possible with proper hiking clothes, and to wear them wherever it is convenient, to the bush outings. At a recent outing hosiery and shoes were damaged—as well as not a few nether limbs, to some extent—by the thousands of burnt stumps of scrub, frequently hidden among more recent growth. Our ladies will find the enjoyment and comfort of these outings greatly enhanced by the possession of more suitable walking costumes.

D. G. S.

DENTITION OF FISHES.

By DAVID G. STEAD.

Amongst the most important of the organs of fishes are their teeth, and, perhaps, it is because these are so important that we find that the class of fishes presents to our notice the most striking variety of tooth forms that it is possible to imagine; in fact, in the teeth of this important division of the Animal Kingdom we find a much greater amount of variation than is to be seen in any other class of Vertebrates.

While in some species—or whole groups—they may be totally absent; in others they are developed on all the bones of the mouth, and even on the hyoid bones (the bones to which the branchiostegal rays are attached) and the gill-arches; while again they may be attached only to the membrane lining the cavity of the mouth. In some cases the teeth have been developed in membrane immediately overlying one of the (usually) dentigerous bones, without having actually become ankylosed to the bone. When the tooth is fixed to the bone itself, the attachment has generally been brought about by a simple fusion or ankylosis; but in some fishes a process of the bone projects into the cavity of the tooth. The teeth of the Mackerel are developed in a furrow running round the thin edges of the jaws; and when they are completed and erupted, they become attached to the permanent bony walls of that furrow by a development of little bony trabeculae, which bridge over the interval and so fix it in its place (1). In exceptional instances the teeth are firmly implanted in sockets (alveoli) and in some of these the teeth rest upon processes of bone rising from the bottom of the sockets. The teeth of the Sharks and Rays (*Elasmobranchs*) are simply embedded in the gums, and are only connected with the jaws by fibrous tissue. In some fossil Sharks, however, the fixation of the teeth was brought about by the mutual articulation of the basal plates of the teeth with one another.

Amongst the many kinds of teeth to be met with may be instanced the long, acutely-pointed canines of many of the bathybial or deep-sea fishes, the fine villiform teeth of such familiar forms as our Whitings (*Sillaginidae*) and Perch; the pavement-like molars of the Black Bream and Snapper, the curiously-formed tricuspid incisors of the common Blackfish and

(1) Tomes, C.S., Trans. Roy. Soc., 1816.

Drummer, the smooth chisel-edged incisors of the Leatherjackets, the welded teeth of the Toad-fishes and Porcupine-fishes and of certain Parrot-fishes (forming a turtle-like beak), the broad, flat, triangular teeth of certain sharks, the horrid-looking, tearing, long and pointed, awl-shaped teeth, of the "Grey Nurse" and "Wobbegong," the great barbed fangs of the Pikes and the Silver Eel, the wonderfully constructed dental-plate (with its close-set, pavement-like, rounded teeth) of the Port Jackson Sharks (*Heterodontus*) and the curious palatal plate of the *Dipneusti* or Lung-fishes.

Many other instances present themselves to our notice, but those I have mentioned will be sufficient to show the great extent of variation to be found.

When the teeth are exceedingly fine and flexible they are termed *ciliiform* or *setiform*, and if they are small and conical and arranged in a band they are *villiform*. When they are a little coarser or mixed with coarser ones, as in some of our seaperches like Black Rock-Cod, they are *card-like* or *cardiform*. Molar-like teeth of very small size are termed *granular*. In some cases the teeth may be so insignificant as to appear as inconspicuous asperities of the bone itself. The term *canine* as applied to the teeth of a fish must be given a very wide application.

Structure: The tissues of which the teeth of fishes are composed are: (1) *Dentine*, which is a non-vascular, calcified tissue, traversed by numerous radiating branched, dentinal tubuli, into which extend protoplasmic prolongations from the cells (*scleroblasts*) by which the dentine is secreted. (Dentine forms the greater part of the body of the tooth). *Dentine* presents microscopically a columnar cancellated structure, in which and in its lack of bone cells it differs structurally from true bone. (2) *Vasodentine*, and (3) *Osteodentine*. These are modifications of ordinary dentine; the former containing blood-vessels, ramifying throughout its substance, but no dentinal tubules; and the latter more closely resembling bone. (4) *Enamel*: an exceptionally dense non-vascular, non-tubular tissue, which may or may not exhibit traces of the prismatic structure so characteristic of this tissue in the higher Vertebrates, forms of the outer investment of the teeth.

Nearly all fishes are polyphyodont; that is, the old teeth are constantly replaced by new ones as fast as they become worn out or are dislodged. In the Sharks (in which the teeth are arranged in rows parallel to the axis of each jaw), the

functional teeth along the upper edge of the jaw are usually erect, while those in the rows more internally situated, point inwards towards the oral cavity; and behind these again there are rows of developing teeth in different stages of growth and partially hidden beneath a projecting fold of the oral mucous membrane. As the teeth in use become lost, they are successively replaced by the inner rows; which, with the mucous membrane in which they are embedded, move forward to the edge of the jaw, where they become erect and functional. In some species, such, for instance, as the Lung-fishes, the teeth are not shed; the loss which they sustain through wear and tear being made good by persistent growth at the bases of the old teeth.

In the teleostomes, or ordinary bony fishes, the succession of the teeth is less regular, new ones being formed at the bases or between the old ones. In the case of socketed teeth, new teeth are usually formed at the sides of the old ones; and by the absorption of the bases of the latter, the former come to lie directly below them; eventually occupying the same sockets.

Teeth, in fishes, have long been considered to represent the dermal defences of the mouth rim. The teeth of the Sharks and Rays are identical in essential structure, as well as in the manner of their development, with the ordinary dermal spines of the skin; *and in the embryo the dermal spines form a continuous series with those which invest the jaws and which eventually become teeth.* It is only at a later period of development, when well-defined lips are beginning to make their appearance, that the continuity of the teeth and dermal spines is interrupted and the two structures assume the distinctive characters suiting their different functions. The teeth of Lampreys are developed in the form of conical yellow structures on the inner surface of the buccal funnel and on the extremity of the rasping tongue. Each tooth consists of an axial papilla of the dermis, sometimes enclosing a pulp-cavity; and invested by the epidermis, and also by a stratified horny cone, which forms the projecting hard part of the tooth. The dermal papilla, with its ectodermal investment, bears a superficial resemblance to the germ of a true calcified tooth, but there is no calcie deposit (and no odontoblasts are formed), the laminated horny teeth being formed by the gradual conversion of the successive strata of the epidermic cells into horny cells. The old teeth are vertically replaced by new ones, developed beneath the functional teeth (2).

SOME NOTES UPON THE MAIDEN HAIR TREE.

(Ginkgo biloba, Linnaeus.)

By R. A. BLACK.

The Maiden Hair tree is of great botanical interest and of singular appearance. In Japan and China, where it is largely cultivated as a sacred tree, it is known under the names of "Ginkgo" and "Yin-hing" respectively. The translation of these names is "Silver Apricot" and refers to the fruit which is a pale brown drupe of globular form; it is yellow when ripe, with a fleshy, juicy, white pulp, adhering closely to the drupe which is something like that of the apricot.

When a specimen of this tree came under the notice of the traveller Kaempfer he proposed *Ginkgo* as its generic name, which Linnaeus adopted, adding *biloba* as the specific name. Sir James Smith holding that the aboriginal Japanese name *Ginkgo* was a barbarism, proposed the name *Salisburia adiantifolia* after R. A. Salisbury, an English botanist. Such alteration, however, is not accepted by the modern rules of botanical nomenclature, therefore the name *Ginkgo biloba* of Linnaeus stands. The specific name was suggested by the leaves being something like those of the Maiden Hair fern, *Adiantum*.

This tree, in the East, attains the height of eighty feet. It is the sole representative of its family in the living Flora, and has formed a subject upon which many eminent botanists have written. Geological evidence shows that it is the last survivor of an ancient family, which flourished during secondary times, and can even be traced back to the primary rocks. Scott, in his "Evolution of Plants," records that the race might not have lasted down to our times at all, if it were not that the "Maiden Hair Tree" was regarded as sacred in China and Japan, and grown in the gardens of the Buddhist temples.

The male and female flowers are borne on separate trees. In the form of the leaves and in the structure of the flowers *Ginkgo* presents features which clearly distinguish it from the Conifers, the class in which, until recently, it was included.

In 1896 the Japanese botanist Hirase made the important discovery that the male reproductive cells (pollen) of *Ginkgo* are large motile bodies, provided with a spirally coiled band of minute cilia, delicate hairs, which by their rapid lashing movements propel the cell through water. In all flowering plants and in Conifers the male reproductive cells (pollen) have no

independent means of locomotion, but in the *Pteridophyta* or Ferns there is a similar means of locomotion as in *Ginkgo*. It was, therefore, with no ordinary interest that Hirase's discovery was received, as it broke down a distinction between the two great divisions of the plant-world, which had been generally accepted as fundamental.

Ferns and other plants in which the male cells are motile represent earlier stages in the progress of plant development when the presence of water was essential for the act of fertilization, a relic of earlier days when the whole plant body was fitted for a life in water.

Ginkgo is a type which, though similar in most respects to the Conifers, possesses in its motile reproductive cells a persistent inheritance from the past. The recognition of this special feature affords a sound reason, according to professor Seward, in his "Links with the Past in the Plant World," especially when other peculiarities are considered, for removing *Ginkgo* from the Conifers and instituting a new class name, *Ginkgoales*.

ENTOMOLOGICAL NOTES.

By LUKE GALLARD.

During the excursion to Cadell's Creek, on September 29, I endeavoured to show members where and how to collect the larvae of insects that spend the early stages of their life cycle in the ground.

Amongst the species secured were some rather rare ones, such as *Ithona fusca*, the moth Lacewing; *Heterojapyx gallardi*, a long soft-bodied insect resembling a large earwig.

The soft-bodied larva of a moth *Perisectis australastiae*, which spends its larval period in the soil. Numbers of fly larvae, including the following groups were observed, *Mydidae*, *Asilidae*, *Tabanidae*, and an unknown form, which has been taken on several occasions by the writer, who has been unable, so far, to develop them to the adult stage.

A few *Cryptophasa* moth larvae were collected and a number of small, oval-shaped galls, caused by *Buprestid* beetles, were keenly examined. Upon being opened the cavities within these galls were found to contain the pupae of the beetles, and in one instance two small parasitic wasps were seen.

EXHIBITION OF SPECIMENS.

The following interesting small insects which damage leaves, either by causing swellings or deformities, or by eating out the tissues between the cuticular layers, were exhibited by Mr. L. Gallard at the August meeting of the Society, as follows:—

The leaves of the "sow thistle," *Sonchus* sp., showing a rather elaborate pattern of pale markings, eaten out by the larvae of small flies, *Phytomyza* sp. These leaves, when held up to the light, showed the positions of the larvae and pupae as dark patches between the cuticular layers.

Numbers of *Eucalyptus* leaves were also shown having similar markings (1).

Terminal shoots of *Eugenia* sp., damaged by a *Psylla* sp., which in its larval stage causes the leaves and young shoots to swell. Within the soft tissue thus formed are oval-shaped pits in which may be found the larvae of these insects. Some were seen to have entered their pupal stage, and a few had even reached the adult form. The adults lay a number of oval-shaped eggs over the tips of the shoots.

Young "Christmas bush" showing the edges of the leaves swollen and rolled by a small black *Thrips* having thickened tibiae. A small *Psylla* affects them in much the same manner. In these swollen and rolled edges they shelter and are able to develop almost in the middle of winter.

Pittosporum tips curled and deformed by the rather large, thin-headed, black *Thrips* which resembles the large *Idolothrips* usually found amongst dead *Eucalyptus* leaves. Some of the curled leaves were thickly covered with patches of eggs, which to the unaided eye resembled "rust." Some of the older leaves showed large dried up blisters, supposed to be the after effects of *Thrips*, but so far Mr. Gallard has not been able to associate it with these insects.

Numbers of "Blue Gum" tips badly infested by small Hymenopterous insects known as *Cynips* were also exhibited. In this case the limbs were not only swollen, but were also twisted into various shapes. In one inch of swollen tissue eight or nine white larvae could be found within small rounded cells. It is not at all uncommon to find two species in the one limb and in addition several parasitic forms.

(1). *Eucalyptus* leaves are frequently mined by the "saw fly" or Tenthredinid, *Phylacteophaga eucalypti*, in this manner.
—Editor.

Besides the abovementioned specimens, the following were also exhibited by Mr. Gallard:—

The flat oval-shaped larvae and pupae of a species of Syrphid fly of the genus *Microdon*, which were taken from the nest of small black ants, and a specimen of "Crown Gall" *Bacterium* sp. from the butt of a young peach tree, and a somewhat similar gall from the limbs of the "wild cherry."

The "crown gall" is sometimes a rather serious pest of stone fruit trees, the corky swellings of which may attain the size of an emu's egg.

NOTE UPON MOTH LARVAE.

By LUKE GALLARD.

A moth caught at Lane Cove by Mrs. S. A. Howell laid a number of round, bead-shaped eggs during the first week in April (1928).

The moth was variously identified, both as a *Chelepteryx* sp. and a *Darala* sp.; it was agreed, however, that the larvae would feed upon "Gum leaves" *Eucalyptus*.

After about ten weeks the larvae emerged and Mrs. Howell endeavoured to feed them upon *Eucalyptus* leaves, but these they rejected. Some larvae were then given to me to endeavour to rear and, after trying some seven or eight different kinds of leaves, the only ones they would feed upon were *Melaleuca* or ti-tree.

They ate very sparingly of these, but did not make any progress, and finally died. In the meantime, Mrs. Howell's specimens were accepting clover leaves as food, and at a recent meeting some of these specimens were handed to me and have continued to feed upon clover. They have now increased considerably in size, and two have moulted. One of these was left in the box overnight, but in the morning it had been eaten up. The other was secured and placed in a tube for preservation.

EDITOR'S NOTE.—It is understood that these larvae are still being developed, both by Mrs. Howell and Mr. Gallard, and it is hoped that the full life cycle will be successfully obtained and reported upon later.

GEOLOGICAL NOTES.

By G. D. OSBORNE, B.Sc.

On the excursion to the north-east of Epping, on Saturday, September 29, 1928, a number of interesting geological features was observed, although the area examined, like most of the Sydney district, is characterised by a fairly monotonous type of geology.

At Epping station we were on the Wianamatta shale, the topmost division of the Triassic rocks in this State. This shale is the equivalent of the shale worked for brick-making at St. Peters and elsewhere. It overlies the Hawkesbury sandstone, so as we went down towards Cadell's Creek, the sandstone was soon encountered. This rock showed the presence of current bedding and iron-oxide concretionary markings. At one place, near a small overbridge, a number of potholes, in various stages of development, were seen in the bed of a stream. The mode of formation of these structures was clearly indicated by the existence of some small resistant pebbles lying in the base of each pothole.

In the gully of Cadell's Creek, it was noticed that a good deal of yellow sandy loam had been built up and subsequently eroded by the stream, pointing to aggradation and later entrenchment.

At the close of the "ramble" the volcanic dyke was seen. All now visible is a great fissure about two feet wide, partly filled with clay, more or less stained with iron-oxide, and some dumps of clay which has been excavated from the dyke. It was explained that the clay represented the decomposition product brought about by the weathering of the hard basalt (blue metal), which, originally, had been forced in from underneath into the fissure in a molten condition, and had cooled to form a hard rock. This rock was then attacked by ground waters.

Time did not permit of an examination of the altered sandstone near to the dyke locality, but some specimens of micaceous sandstone and iron-oxide were collected from the northern end of the dyke, and some excellent examples of earth-pillars were seen in the dumps of rubble and clay.

EXCURSION TO HEATHCOTE.

Since June is not the best time of the year and the afternoon was dull, insects were not conspicuous on this excursion. In fact, the only insects noted were a few aquatic types collected from the creek and pool in Kangaroo Gully.

The attention of members was drawn to the numbers of black "whirligig" beetles swimming rapidly about on the surface of the water. These beetles belong to the family *Gyrinidae* and show remarkable adaptations to their aquatic habitat. The eyes are divided into dorsal and ventral halves, so that the insect appears to have four eyes, and is thus able to see above and below the surface of the water at the same time. Although helpless on land, it is very efficient in the water, the second and third pair of legs being modified into short paddles, covered with swimming hairs.

A bug belonging to the *Notonectidae* was also netted in the pool. This insect exhibits no less striking adaptations to the aquatic environment. The body is convex above, shaped like the keel of a boat and the bug swims on its back. The hind legs are long, bearing special swimming hairs, so that the insect appears like a tiny boat with two paddles. There are hairs on the abdomen to hold bubbles of air for breathing whilst under water. The larvae of these bugs feed on mosquito wrigglers in the ponds and creeks.

One must mention also the shrimps which were so numerous at the bottom of the pool. When placed in a bottle of water the tiny crustaceans were perfectly transparent, and very active. They belong to the great Phylum Arthropoda in which the class Insecta is also placed. Thus the shrimps are "cousins" of the insects.

MARY FULLER.

EXCURSION NOTES.

By R. A. BLACK.

At the request of the social committee of the Workers' Educational Association, a conjoint excursion was made in the direction of De Burgh Bridge (upper reaches of the Lane Cove River), on Saturday afternoon, November 24, 1928.

Under ordinary circumstances the excursion would have been held on December 1, but, as the W.E.A. social committee

expressed a wish that it be held on the 24th ulto, this request was acceeded to.

The party, consisting of thirty members, met at the Killara railway station. The objective was De Burgh Bridge, but although this destination was not reached, the outing proved to be a very enjoyable one. Another group of members, however, including Messrs. L. Gallard and H. R. Harrington reached the bridge by another route, where they waited in vain for the main party to arrive.

The country over which we passed was very similar to that of Galston, and carried almost the same kind of vegetation.

Whilst examining some of the ornamental trees and shrubs near the Killara railway station, Mr. Hawley drew my attention to the "Maiden Hair tree" (*Ginkgo*), notes upon which appear elsewhere in this issue.

Later, when descending a boulder strewn slope, we came into a beautifully fresh area of flowering scrub, Christmas bells (*Blandfordia nobilis*) and the Honey flower (*Lambertia formosa*), were seen in their gay colours.

The grey "Spider flowers" (*Grevillea buxifolia*), crimson "Bottle-brushes" (*Callistemon lanceolatus*), and here and there, growing almost out of the rocks, were the "Red Honeysuckles" (*Banksia serrata*) bearing huge cones, the flowers of which grow in pairs and are arranged spirally on a thickened axis.

The dagger-fruited Hakea (*Hakea pugioniformis*) was fairly plentiful along with the broad leaved "Geebung" (*Personia salicina*). A member of the wild pansy group (*Goodenia stelligera*) with yellow flowers and leaves up to six inches long was seen.

The heath-like Comesperma (*C. ericifolia*) with its lilac-pink flowers produced at the ends of the branches and superficially resembling those of the pea family, was also observed. On close examination it will be seen that each flower has three small green sepals and two large petaloid wings; the two petals are unattached to the united filaments and the keel encloses the stamens and pistil.

In many places the "Christmas bush" (*Ceratopetalum gummiferum*) was seen growing in profusion.

Numerous other plants were also observed.

NOTE UPON A FERN GROWING WITHIN A BOTTLE.

By H. SUNDSTROM.

About four years ago the occupier of a house at Balmain made use of empty bottles as a garden border. They were placed neck downwards into the ground, leaving about two or three inches of their bases protruding.

Some little while ago a child happened to break one of the bottles, so to prevent any accidents the occupier decided to remove all the bottles.

To his surprise a fern was found growing within one of them, and although it has not been placed in the ground for days at a time it continues growing well.

Notes on a Stick insect or Phasmid (*Karabidion (Eurycantha) australe Montr.*), a photo of which was exhibited at a recent meeting.

This is the large wingless phasma peculiar to Lord Howe Island, where the inhabitants give it the popular name of the "Land Lobster." It shelters in the cavities in the stems of the fig trees, and a few years ago was fairly common. Since the invasion of rats, I believe it is now very hard to find, as they found them good eating. It was originally described by the French naturalist, Montrouzier, in 1855, under the name of *Eurycantha australis*. It is figured in Westwood's Catalogue of the Phasmidae (published in 1859), upon the first plate under the same name. Sharp described and figured it in the Cambridge Natural History, 1895.

In Kirby's Catalogue of the Orthoptera, Vol. 1, Phasmidae, it is placed under the Sub-family, *Euryanthinae*, but placed in the Genus *Karabidion* of which it is the sole representative.

WALTER W. FROGGATT.

A CORRECTION.

On page 74 of our last issue, line 13 from bottom of page for "*Lilloea verticillaris*" read "*Tiloea verticillaris*"; line 2 from bottom of page for "*Euchyloena tomentosa*" read "*Enchylaena tomentosa*".

NATURALISTS' SOCIETY OF NEW SOUTH WALES.

Proceedings.

SEPTEMBER, 1928.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on September 4, 1928.

The President (Mr. David G. Stead), in the chair.

Correspondence: The Rev. H. M. R. Rupp, of the Rectory, Paterson, wrote suggesting the formation of a branch of the Society in the Newcastle-Maitland district.

After discussion, the Secretary was instructed to circularise the Technical Colleges with this object in view.

The Naturalists' Society of Queensland wrote asking for a collection of native flowers for their Wild Flower Exhibition, to be held on the 29th instant. Miss L. Steinbeck agreed to gather and forward a collection.

Nomination of members: The following have been nominated:—

Mr. R. L. Masters, 8 Middle Street, Marrickville.

Miss Muriel Boyce, 639 New-South Head Road, Rose Bay.

To Increase Membership: A discussion, to increase membership by means of a competition, was initiated by Mr. R. A. Black, and, although Mr. Black was supported by some members, an amendment moved by Mr. W. W. Frogatt, "That each member endeavour to bring along a new member during the year without any competition" was carried.

Exhibition of Specimens: The President showed a number of lantern slides, illustrating various matters of interest relating to some freshwater and sea fishes. He also mentioned the occurrence of immense numbers of Sprats in the waters of Port Jackson during the preceding day or two. Mr. Stead also raised the question of feeding habits of the Native Bear. Following upon a discussion, the Society had recently made some inquiries through the Local Government Department, and these had been dealt with in the Society's Journal. It had been suggested that the Native Bears had in their time of abundance helped considerably to keep the Mistletoe (*Loranthus*, etc.) in check, and some corroboration was now forthcoming from the report of a District Forester in the Armidale district, who, in

1904, asked the Chief Secretary to have the Native Bears protected "as they feed on the mistletoe."

Mr. H. R. Harrington: Lantern slides of bird life and vegetation in the locality of the Island of Capricorn and the Great Barrier Reef; also slides in colours of stems of several monocotyledonous plants and geological specimens.

Mr. L. Gallard: Specimens of moth larvae.

Mr. A. E. Watson: A collection of native flowers; also a number of shells.

Mrs. Howell: A Waratah bloom, with six heads grown at Lane Cove. The tree was ten years old and had been well manured with bone-dust.

Miss Steinbeck: Exquisite specimens of *Tetratheca* from Mangrove Mountain.

Mrs. Jenkins: Cottony cushion scale (*Icerya purchasi*), which Mr. Froggatt said had caused immense damage to citrus orchards in California, where it had been accidentally introduced from Australia, until it was controlled by the introduction of the Australian ladybird beetle, *Novius cardinalis*.

Mr. M. M. Lumsdaine: Specimens of *Acacia*, *Eucalyptus* and *Casuarina*.

Excursion: About 40 members attended the excursion, held at the Quarantine Station, North Head, where large numbers of native flowers were in bloom. These were named and discussed by several of the leaders, including Miss H. C. Butler, who, together with the President (Mr. D. G. Stead), also explained the geological formations met with.

OCTOBER, 1928.

The ordinary meeting of the Society was held in the Assembly Hall, Department of Education, on October 2, 1928.

The President (Mr. David G. Stead), in the chair.

New Members:—

Mr. R. L. Masters, 8 Middle Street, Marrickville.

Miss Muriel Boyce, 639 New-South Head Road, Rose Bay.

Dr. Arthur S. Crane, "Harley," 143 Macquarie Street, Sydney.

Mrs. E. B. Baird, "Fairlie," 15 Norfolk Road, Longueville.

Mr. G. D. Osborne, B.Sc., Department of Geology, University, Sydney.

Honorary Lanternist: The President mentioned that Mr. C. J. White had met with an accident, and therefore would not be able to operate the lantern that evening, but his son had very kindly come along to assist in the unfortunate absence of his father. The President referred to Mr. White's splendid help in the past, and that he could always be relied upon. It was unanimously resolved that the Secretary write to Mr. White conveying to him the members' sympathy in his misfortune, and trusted that he would make a speedy recovery.

Native Bear: Mr. M. E. Gray spoke of the Native Bear and strongly advocated its permanent protection, and said that Bundaberg and other southern Shires had promised their support in this direction.

Lecture on Captain Cook: The President gave a most entertaining and profitable account, illustrated by lantern slides, of Captain Cook, whose bicentenary would be celebrated at Kurnell on Saturday, October 27.

The President, who had the good fortune to visit Captain Cook's birthplace, as well as the scene of his murder, over which he flew in an United States military aeroplane, traced the life of Captain Cook from his birth to his historic discovery of the east coast of Australia.

On the motion of Mr. R. A. Black, seconded by Professor A. J. Abbott, a hearty vote of thanks was accorded the President.

Excursion to Epping: The Hon. Seeretary reported that a very pleasant, as well as instructive Saturday afternoon was spent at Epping, under the leadership of Mr. L. Gallard (Entomology), Mr. G. D. Osborne, B.Sc. (Geology), and Mr. R. A. Black (Botany). There was a fairly good attendance of members, who met at the Epping railway station, and by arrangement were conveyed to Cadell's Bridge by a motor 'bus. Members, under the guidance of Mr. Gallard, skirted the creek to the end of the dairy paddock, where a crossing was made to a volcanic dyke, which was described by Mr. Osborne. Mr. Black explained the botany of the locality.

Exhibition of Specimens: Mr. Luke Gallard:—Earwig-like insects known as *Heterojapyx gallardi*, Tillyard (in honour of Mr. Gallard); also *Ithona fusca*, a member of the Neuroptera.

Mr. E. Gray: Specimens of *Sericea spectans* Guerin; thirty-six of these moths were observed resting in the cellarettes, at Vaucluse House, on September 17, fifteen of which were clustered together, the remainder being scattered.

Professor A. J. Abbott: A monstrosity of *Strelitzia* from Wahroonga, which bore an unusual extra flower spathe; also a specimen of *Styphelia triflora* and *Astrotriche floccosa*.

NOVEMBER, 1928.

Ordinary Meeting: Tuesday, November 6, 1928, the President in the chair.

Correspondence: Letter from the Science Museum, South Kensington, London, asking for all publications of the Society. Resolved that the request be granted. Letter from the Social Committee of the Workers' Educational Association, suggesting that this Society co-operate with them on a botanical excursion.

Resolved that the request be acceded to and that the Secretary arrange to hold the next excursion to De Burgh Bridge.

Letter from the Queensland Naturalists' Club thanking the Society for box of wild flowers.

Letter from the Horticultural Society of N.S.W. inviting members to their monthly meetings.

Letter from the Australian League of Nations' Union relative to citizens meeting, Town Hall, on Armistice Day.

The President urged members to attend if possible.

Letter from Mr. C. A. Ferguson inquiring if the "J. H. Maiden Fund" were still open.

Resolved that a reply be sent in the affirmative.

Obituary: The President made known the unexpected death of Mr. C. J. White, the Hon. Lanternist. He said that the late Mr. White's much valued services would be a great loss to the Society. At the request of the President, members stood as a mark of respect to their late member and the Secretary was asked to convey to his relatives the Society's deep sympathy in their great loss.

Resignations: Miss H. Butler and Mr. J. H. Jenner. These were accepted with regret.

Life Members: Miss Florence Sulman's application for election as a Life Member of the Society was placed before the

members, and, as she had complied with all requirements of the Society's rules, she was unanimously elected a Life Member.

Lecture: Professor O. V. Vonwiller, President of the Royal Society and Professor of Physics in the Sydney University, gave a most informative and interesting lecture on "Modern Advances in Physics."

On the motion of Mr. R. A. Black, seconded by Professor A. J. Abbott, a hearty vote of thanks was carried by acclamation.

Exhibition of Specimens:—

Mr. L. Gallard: Larvae of moths.

Miss McAnene: Specimens of *Elaeocarpus cyaneus*.

Professor A. J. Abbott: Specimens of *Persoonia lucida*, *Angophora cordifolia*, *Kunzea corifolia*, *Callitris rhomboidea*, collected in the vicinity of the Spit.

DECEMBER, 1928.

Ordinary Meeting: Tuesday, December 4, 1928, at 8 p.m.

Correspondence:—

Letter from Mrs. S. A. Howell, which was received and approved, suggesting that greater scope be given to the exhibition of specimens.

Letter from the Horticultural Society of N.S.W. sending syllabus of their meetings and shows.

New Members:—

Mr. John E. Yates, "Loch Lomond," Flora Street, Lakemba.

Mr. M. Morrissey, c/o Pathological Department, University, Sydney.

Mr. H. Clay, Vaucluse Park, Vaucluse.

Mr. F. W. Crane, c/o E. F. Wilkes, Ltd., Princes Highway, Rockdale.

Obituary: It was unanimously resolved that members place on record their deep sorrow and sense of personal bereavement, as well as the great public loss, sustained by the death of that great naturalist and botanist, Mr. R. H. Cambage.

Exhibition of Specimens:—

Mrs. E. Foster: Specimens of beetle (*Batocera boisduvali*) from Gympie, Queensland.

Mr. Froggatt, who spoke upon this insect, said that its larvae were to be found in trunks of fig trees.

Excursion: Mr. R. A. Black reported upon the excursion made to De Burgh Bridge on Saturday, November 24 last. (This report will be found in another column).

Lecture: Mr. W. W. Froggatt, F.E.S., F.L.S., gave a most informative lecture on "Fight between Man and the Insects."

NOTE ON EUCALYPTUS (LEUHMANNIANA) VIRGATA.

Amongst the botanical specimens recorded in our last issue, by Mrs. L. A. Heyner (Vol. 7, p. 77), was *Eucalyptus leuhmanniana*.

The following interesting note has since been received from Mr. D. W. C. Shiress regarding this species.

"Reference to the Critical Revision of the Eucalyptus, Part 39, will show that this name, erroneously given to the Species by Mueller, had to give way to that given many years before by Sieber, viz.: *virgata*, a most appropriate name. The talented author of the Critical Revision of the Eucalyptus, the late J. H. Maiden, mentions that the type specimen of *E. leuhmanniana* was originally labelled by Mueller himself as "*E. virgata*."

"As to its range, I have myself collected it right through from near Manly to the Hawkesbury, and across the Hawkesbury at Mounts Sugar Loaf and Kariong towards Gosford.

"It is a catholic species, being mostly found on the south-east side of the coastal hills, just under the cap of the hill, where it finds moisture and is readily seen with its glaucous foliage and yellow tips."

ADDITIONS TO LIBRARY.

(Report of Mr. A. R. Samut, Hon. Librarian.)

The Moisture Content of Some Eucalyptus Woods.—M. B. Welch, B.Sc., A.I.C.

The Wood Structure of Some Species of Kauri (*Agathis*, spp.).—M. B. Welch, B.Sc., A.I.C.

Notes on Wattle Barks, Part II.—F. A. Coombs, A.A.C.I., W. McGlynn, and M. B. Welch, B.Sc., A.I.C.

An Examination of Defective New Zealand Kauri.—M. B. Welch, B.Sc., A.I.C.

Some Mechanical Properties of Australian Grown *Pinus Insignis* (*P. radiata*) with Notes on the Wood Structure.—M. B. Welch, B.Sc., A.I.C.

The Occurrence of a Number of Varieties of Eucalyptus Dives as determined by Chemical Analyses of the Essential Oils.—A. R. Penfold, F.A.G.I., F.C.S., and F. R. Morrison, A.A.C.I., F.C.S.

A Recently Found Iron Meteorite from Oakley, Idaho.—Geo. P. Merrill.

The Rodents of the Genus *Plagiodontia*.—Gerrit S. Miller, junior.

Rossite and Metarossite, Two New Vanadates from Colorado.—William F. Foshag and Frank L. Hess.

On Newly discovered Meteoric Irons from the Wallapai (Hualapai) Indian reservation, Arizona.—Geo. P. Merrill.

Dedescription of Types of American Muscoid Flies in the Collection of Vienna Natural History Museum with Incidental Notes.—J. M. Aldrich.

The Essential Oils of *Eucalyptus Bakeri* (Maiden).—A. R. Penfold, F.A.C.I., F.C.S.

The Victorian Naturalist, Vol. xlv., Pt. 7.

Records of the Australian Museum, Vol. xvi., No. 7.

A Forest products Laboratory for Australia, by A. J. Gibson, F.C.H., F.L.S., F.Z.S.

Publications Puget Sound Biological Station of the University of Washington.

The Australian Museum Magazine.

The Australian Naturalist

Vol. VII.

MARCH, 1929.

Part 6.

NATURE INTERESTS ABOUT A WESTERN MUDGEES STATIONETTE.

By M. S. LEWIS.

The western Mudgee district presents much of general interest, and affords to the city dweller and lover of nature a never-ending source of delight.

Within five or ten minutes' walk from our camp, there are hills, still untouched by the hand of man, the valley between which with its rugged, fern-banked gully winds its way to the flat country below.

I have often noticed these mountain gullies, with their pools formed by the miniature waterfalls, and wondered where all the life they contain eventually goes: where, as so often happens, their life cycles not completed before the water has dried up.

In my mind's eye, I particularly see a pond at the foot of our garden, part of the mountain stream, at its best, with water bank high and with gentle inflow and outflow it was very beautiful. No human-made aquarium could equal it. Its various pond grasses with golden sand and mounds beneath were all there.

It pleased me to sit on the thick green water couch which formed a perfect natural lawn around and watch the many wonderful creatures beneath the clear water.

Not being an entomologist, I go to my bookshelf to seek information, and I am then able to watch their habits with added interest. I behold the water scorpion usually seen hanging head downwards with just the tip of what appears to be its tail above the surface.

With the drying of the water I see struggling tadpoles and

other creatures in distress, but with good rain I know that all life, the "whirligigs," "diver" and other water beetles, water scorpions, snails, etc., will re-appear.

Red and black wasps light for a moment with outspread legs, then take flight again, and mud hornets come to gather their little pellets of mud. There are gaudy dragon flies, bright scarlet, blue, mottled and dull brown. The female places her eggs on water plants beneath the surface, without fear, for the male hovers just far enough off to support her while so engaged. The dainty damsel flies are also there.

Quite a mile distant the creek flows on, beyond the spring till it reaches the Cudgegong River, where one finds in the deepest holes, during drought time, various fish, such as Cod, Golden Perch and Jewfish. Shrimps are to be seen there, whilst mussel shells of great size and well lined with "mother of pearl" are frequently found along its banks. I have also seen platypi bobbing up and swimming along for a few feet, then disappearing again.

Along the banks of the Cudgegong are beautiful Red gums of gigantic size, stately Casuarinas or River Oaks from the branches of which, overhanging the water, the Blue Kingfisher and sometimes the Kookaburra may be seen.

Birds are more numerous than in any other district I have visited in Australia; some seventy-four different kinds have been noted, these ranging from small finches to the large wedge-tailed eagles. We contemplate having the whole of the property declared a bird sanctuary.

I have not seen many native animals. The opossum is the most numerous, but Bush rats (some being almost the size of wharf rats) are quite a pest. Porcupines are rather rare, and there are only about nine kangaroos, which hop about our paddocks at will. Possibly snakes are numerous, but we have not seen many; a black snake was killed in our garden, and a light brown one was shot whilst climbing the rafters. Iguanas of great size are numerous, as are also "Jew" and other lizards.

The first insects to attract my attention were the White ants or Termites, but ants, flies, beetles, butterflies, moths, etc., are to be found in great numbers.

From spring to early autumn, if the rainfall has been good, our wild flowers are very beautiful. Some plants, common to the coastal districts, are specially fine here. The Kurrajong trees are numerous and well-grown, although not as large as many I have seen in the New England district. They appear to be free from both disease and the mistletoe; the flowers of 1926-

were of great beauty, both in size and colour. During a drought these trees, together with the "Apple" trees, are invaluable for feeding sheep, as also are the Casuarinas, known as mountain oaks. Among the local native trees, the pine is rather plentiful and of large size. Box, Black Butt, Red and White gums and stringy Bark trees are valuable for timber purposes.

Fern life is very limited. In the shaded gullies I have found *Marchantia* and other Liverworts, together with mosses and lichens.

NOTE ON AN EXHIBIT OF *TEPPERIA STERCULIAE* IN A KURRAJONG POD, BY MR. BLACK.

Kurrajong Weevils.

By W. W. FROGGATT, F.E.S., F.L.S.

There are three handsome weevil beetles found feeding upon the Kurrajong. The first, the "Mimic Bark-weevil" (*Axionicus insignis*), was figured and described by Pascoe in 1869. It is a mottled grey and brown beetle, about $\frac{3}{4}$ of an inch in length and oval in form. It rests in the day-time in the crevices on the stems of the Kurrajong, and its colouration blends so closely with the surrounding bark that they are very hard to detect.

The second is the "Seed-pod Weevil" (*Tepperia sterculiae*), which was described by Lea; its larva feeds upon the seeds of the Kurrajong, and the beetle when full grown eats its way out through the side of the pod. It is a much smaller beetle of a somewhat similar colour, clothed with grey, brown and white scales, with an irregular patch of the latter colour on the hind portion of the wing covers.

The third is the "Rust-gall Weevil" (*Tepperia bicrucicollis*). This pretty little weevil was described by Lea last year, from specimens I sent him some years ago. I bred a number of them out of the large fleshy rust galls on the branchlets of Kurrajong trees growing at Warrah, New South Wales. It is slightly smaller than the Seed-pod Weevil, clothed with dark brown scales, and distinctly marked with white scales, forming a cross on each side of the prothorax, and white markings on the wing covers.

VANILLA.

By E. H. ZECK.

The climbing orchid which produces the vanilla beans grows wild in the hot humid forests of Central and South America, and is cultivated in Brazil, Honduras, Guadeloupe, Reunion, Mauritius, Seychelles, Java, and Tahiti, as well as in Mexico. It has been claimed that the vanilla of Borneo and Java contains a greater quantity of vanillin than the Mexican product, but according to C. Jimenez (Mexican Magazine, Vol. II., No. 3) the aromatic substance of those vanillas is accompanied by a volatile acid of a disagreeable odour, and for this reason the Mexican variety has always been preferred.

Although the exact origin of the Mexican vanilla vine has not been ascertained, it is known to have grown and been gathered by the aborigines in the ancient kingdom of Michoacan, and that the Indians in certain parts of Mexico used to pay tribute to their kings in vanilla beans. When the Spaniards conquered Mexico they found vanilla in use among the Aztecs as a flavouring for their favourite beverage chocolate.

The plant was not under cultivation then, but the exportation of vanilla began immediately after the arrival of the Spaniards, large quantities being shipped, not only to Spain, but also to France and other European countries. It is stated that when the Spaniards accepted chocolate as an article of food, they seemed to prefer cinnamon to vanilla as a flavouring.

The French, however, did not, and to the present time vanilla continues to be their favourite fragrance.

In the beginning, the supplies for exportation were met by the wild plants growing in the States of Veraeruz and Daxaca, and it was not until the wild vines became scarce that cultivation really started.

It still grows wild over extensive areas on the coast of Sotavento, in almost all the forests of the State of Tabasco, and in numerous districts of the State of Chiapas, and many other States. In the State of Oaxaca, it also reaches the Pacific Coast. The fields of greatest production, however, are in the States of Veracruz, Tabasco, Oaxaca, Puebla, Michoacan, and, although vanilla is essentially a tropical plant, it is grown profitably in the more temperate regions of Mexico. It has been noted that a very rich vegetable soil, such as is found in the dense forests of the tropics, is the best for vanilla, and is also stated to thrive best at an altitude of 1,000 feet.

Jimenez states that "it is remarkable that the exploitation of this productive and easily cultivated plant should have remained so long in the hands of the Indians. In fact, the Totonacas of the coast of Barlovento and the Zapotecas and Popolueas of the sierra of Oaxaca are those who benefit most from this source of wealth, which is perhaps the only one left to them of the many their ancestors possessed in the time of the splendour of the Aztec empire."

The plants are readily grown from cuttings, usually four or five feet in length, as these come into bearing more quickly than if of shorter length. The temperature should be moist and warm, and, although sheltered situations are indispensable, too much shelter prevents the fruit ripening. The plants commence to flower in the second year after planting, and full crops may be expected in the fourth year.

It is usually said that pollination is due to insects, but none of the writers give any description or particulars of the insects concerned. Another author regards it as probable that the pollination of flowers growing in his garden in Dominica was effected by humming-birds, which were frequently seen to insert their long beaks into the flowers for the purpose of extracting the nectar. When under cultivation the crops are usually pollinated by hand.

When in Honolulu I visited the home of Dr. Ehrhorn (then Chief Plant Quarantine Officer, U.S. Government), and there saw in his conservatory the vanilla orchid blooming and bearing at the same time. The flowers had been hand pollinated by him.

The Mexican vanilla blossoms, during March, April and May, with yellow flowers of faint but delicate perfume. By the end of June the plants are in full blossom, and from then on the ripening process begins. From the moment the fruit appears it has a green colour, which it retains until almost ripe, in the months of December, January and February. The pods should be gathered only when completely ripe.

After the vanilla beans are gathered they are plunged into water that is almost boiling, then put on mats to dry, and afterwards they are spread out on blankets and exposed to the sun. Every night they are rolled up in the blankets and shut up in tight boxes to ferment. The vanilla bean when ripe is odourless, and its fragrance is due to this fermentation. The sunning-process is continued for a week. The dried beans are sorted according to their length, the long thin ones being the most valuable. In the best qualities or "frosted vanilla," the vanillin ex-

trudes, its needle-like crystals forming a delicate efflorescence on the outside of the bean. Beans of the same length are tied in bundles of 25 or 50, and are then packed in closely fitting tin boxes, which are enclosed in rough wooden cases for shipment.

During my stay in Mexico City I frequently visited the open markets, and there saw offered for sale by the Indians small bundles of vanilla beans for the small sum of ten centavos ($2\frac{1}{2}$ d.) each. I am not aware whether it has been grown in Australia, but possibly in certain portions of our Continent it may be grown profitably.

BIRDS AND THEIR NESTS.

SOME OBSERVATIONS, BY JOYCE HEYNER.

My long holiday in the country gave me a delightful opportunity to study the ways of my little feathered friends.

Amongst the beautiful birds of the Monaro, I was pleased to see the jolly kookaburras, the noisy black and white cockatoos, and the brilliant parrots that dart so quickly from tree to tree. Then all kinds of shy wrens, sweet warblers, mellow magpies, perky robins, gay honeyeaters and soaring skylarks flit between "shadow and shine" in the bushlands of the south.

However, the bird at the nest was my greatest joy.

Now all skylarks seem to build their nests in the peeling bark of a ring-barked tree. I found the nest of the blue skylark in between the loose bark of an old "applewood." It was made of the shrivelled stems of a small yellow-headed flower, and in it was a small greenish egg, with a splash of russet on the broad end. Thinking the nest deserted I took the egg, but on the following day I found another egg in the nest which I left. In about two weeks' time the little fledgling was out in the world, and I watched it grow strong enough to fly away. The brown skylark has a similar nest, loosely woven, of flower stalks and unlined. In it I found two fledglings, but unfortunately the nest was not large enough and one fledgling pushed the weaker one out to the ground. The bark had almost separated from the dried timber of this tree, so to save the nest I tied string around the trunk to strengthen it until the remaining bird was strong enough to fly away, and then I was able to take down the nest.

The ground Lark or Australian Pipit builds its nest on the ground, generally under a small shrub. When I first made its acquaintance the bird would run away from its nesting place,

hoping thus to secure the protection of its nest. I did not follow it, nor did I interfere with its nest, which is very carelessly built, and appears as if the mother had just scratched the strands of grass together before laying her three eggs. I watched the little naked young ones grow their feathers. They would playfully flutter about the ground and return to their nest, until at last a day came when they were able to spread their wings and fly away from their little home on the ground.

The diamond sparrow's (Ground Diamond) nest was built under the ground. One December day, I noticed a small opening near the root of a tree, and found it to be part of a tunnel, so I watched and waited till I saw the pretty, spotted bird emerge. Then I dug and found a neat nest of fine stringy bark, with four little birds about one day old. I covered it over quickly with bushes and sticks so as not to disturb the brood. I left it for a few weeks, and then returned for the deserted nest.

The willie wagtail's nest is a model of neatness and compactness. This "little brother of the leaves" with its tuneful "sweet, pretty creature" call, built its cup-shaped nest in the fork of a gum tree. The nest is lined with wool, which it pluckily pulls from the sheep's back. The young birds were out of the nest when I discovered it, but hovered in the vicinity for a few days before finally leaving.

The yellow-faced honeyeater makes a beautiful nest of lichen, dried grass and sheep's wool all woven neatly together. When I came upon this nest, built in the green wood of a sapling, it was suspended like a swing. There were four eggs in it which soon hatched. The young birds quickly feathered and were soon on the wing. Another honeyeater's nest was built in the bank of the creek, and the dried flowers lying in the nest plainly showed that the mother had brought honey flowers to the young ones.

A very compact and well-shaped nest is that of the flame-breasted robin. The loose, outside strands of bark are woven to the tightly-packed grass pocket of the inside nest. Two eggs were found in this nest. The sweet yellow robin makes a similar nest to that of the red robin, but this nest was empty when I noticed it.

The nest of robin red-breast is a cosy, soft nest, lined with sheep's wool. This is the English robin, and is rather rare in Australia. The robin red-breast has a duller tinted breast than its Australian cousin.

The nest of the silver eye was made of dry grass and black horsehair, and rested in the fork of a fruit tree. In it were laid

three small blue eggs. Another nest found in a fruit tree was also beautifully made and lined with thistle down, and contained five bluish-white eggs, dotted all over with chocolate.

The swallow's nest, built in the eaves of the house, has a foundation of mud and is lined thickly with feathers. The two snow-white eggs soon hatched and the young quickly learnt to fly. They would come to my window and fly through to alight on the foot rail of my bed, and would twitter and sing to me while I fed them with crumbs.

The scrub wren has a large, loosely woven nest, built in a briar bush. It consists of dry grasses, sheep's wool and feathers. The birds were well able to fly when I found the nest. The Blue wren, that little superb singer, builds a very complex nest in the country. It has several enemies and its bright blue coat makes it very conspicuous; so it builds a two-tier nest of twigs and grass, dead leaves and wool all closely strung together. The top nest is really only a camouflage for the hawks who come to steal both eggs and chickens. When the hawks appear they go directly to the top nest, but the chickens are safely tucked away in the lower half of the nest, which is snugly lined with feathers.

The beautiful firetail builds also a camouflaged nest. This one was built high up in a gum tree, and the protective design is seen in the two-tier arrangement of the large nest, which has been compared to a "stocking hung by the toe while the eggs are laid in the heel."

The diamond firetail has a similar nest, but the lower tier or proper nest is very large in comparison to the top or sham nest. This nest is made with loosely woven grass stems, sheep's wool and feathers.

The tomtit's nest was low and broad; feather lined on grass and wool.

The wattle bird builds its clumsy nest with all sorts of odd stems, grasses and seeds. The opening is just a small pocket, and the pugnacious little bird is hidden from view.

One morning I discovered a small swift fluttering on the ground. I picked it up and took it inside to feed it and give it water, and after ten minutes' rest the swift revived. For a while it perched on my finger and I took it outside; then quite suddenly it spread its wings, mounted swiftly into the air and was soon lost to sight.

EDITOR'S NOTE.—This article is a contribution from one of our junior members.

A HOLIDAY AT GRIFFITH.

By H. McANENE.

Griffith, sometimes referred to by the residents as "The Area," holds many problems yet to be solved by the pioneers.

This irrigation area is laid out in small orchard holdings, in which a large variety of fruits is cultivated.

Burrunjuck is the source of the water supply, and the area of the water here impounded covers nineteen square miles. Its outlet is into the bed of the Murrumbidgee River, and from there it flows some 260 miles to the Berembed Weir, where the stream is diverted, some flowing along the old river bed, while the remainder is carried by the main canal to the irrigation area, where it supplies the towns, farms and some 12,000 inhabitants. Water under irrigation after entering a holding is directed through trenches to any section of the orchard requiring it. Officers appointed by the Commission regulate the supply to each orchardist.

The trees mostly grown for shade and breakwinds are the Kurrajong (*Brachychiton*) and sugar gums (*Eucalyptus cladocalyx*).

The latter, however, are now considered by some to be "hungry trees," their roots reaching far into the cultivation areas.

At "Monthaali" the sugar gums are "lopped" to within three feet of the ground to form a fence, and the young growth springing from these "lopped" trees forms a pleasant shade and good breakwind round the house.

A few miles from the township lie the popular picnic grounds known as "Lake View," the lake consisting of a depression into which a fair amount of seepage from the irrigation has collected. Many birds, Black swans, Ibis, ducks, etc., may be seen there.

The main street of the township is ornamented with a line of silky oaks (*Grevillea robusta*) in front of the shops, while down the centre of the street is a row of Kurrajong trees. A rectangular grass plot has been laid down at one side of each of these trees.

From the hills, known locally as McPherson's Range, one obtains a fine view of the vineyards and orchards, which form a great contrast to the adjoining "dry" or wheat districts.

The introduction of water and the increased tree life, to-

gether with the droughty conditions in the outlying districts, have brought many "new" birds to the district.

With the assistance of Leach's, "An Australian Bird Book," I have attempted to make a list of the birds most noticeable on the farm and swamps, and recorded some thirty species.

During my stay at Griffith (December 15th to January 15th) the thermometer readings were mostly from 96 degrees to 100 degrees Fahr.

MIDDLE HARBOUR EXCURSION NOTES.

By L. A. HEYNER.

The field naturalists found the launch trip to the upper reaches of Middle Harbour most delightful.

Despite the droughty conditions that persisted, a rugged green growth covered the almost perpendicular headlands. *Angophora lanceolata*, the "Apple Tree," spread its "gouty" trunk close to the lapping waters of the inlet and gripped the rocky foreshores with a mighty foothold. The Bracken fern (*Pteris aquilina* var. *esculenta*) grew about the feet of the dioecious *Dodonaea triquetra*. *Dianella revoluta*, with its indigo berries was discovered close to *Xerotes thunbergii*, and *Trachymene linearis*, the latter is a very dainty umbell. *Lasiopetalum ferrugininum*, one of the Sterculiaceae, showed well in bud. Several Pultenaeas were noticed, particularly *P. elliptica*, and one of the Compositae, *Cassinia denticulata*, was scattering its seed in the wind. *Eucalyptus corymbosa* was in full bud, and nearby *Acacia longifolia* and *linifolia* were seen. *Persoonia pinifolia* (Pine-leaved Geebung), *P. salicina* (Broad-leaved Geebung), were recognised, while *Epacris longiflora*, *Actinotus helianthi* and *A. minor* were found on the ridges. *Banksia serrata*, *Casuarina distyla*, *Eucalyptus corymbosa*, *Angophora lanceolata* were the conspicuous trees.

In addition to the abovenamed plants, Mr. R. A. Black reports that the following were also seen: Wild Parsley (*Lomatia silaifolia*), Needle Bushes, *Hakea acicularis*, *H. dactyloides*, *Petrophila pulchella*, *Styphelia triflora*, *Crowea saligna*, *Phyllota phylloides*, *Pultenaea daphnoides*, *Xanthosia dissecta*, *Smilax glyciphylla*, *Hibbertia volubilis*, *Acacia suaveolens*. Mr. Edwin Cheel, Curator of the National Herbarium of New South Wales, very kindly confirmed the identifications.

EXCURSION TO DE BURGH'S BRIDGE.

By R. A. BLACK.

On Saturday afternoon, 2nd March, an excursion was made to De Burgh's Bridge, under the leadership of Mr. Luke Gallard. Nearly thirty members formed the party, which met at the Eastwood Railway Station, at 2.15 p.m.

Mr. Gallard intended to lead the party to an attractive green part of the bush not affected by recent bush fires, but, as the weather was inclined to be showery, it was unanimously decided to hire a motor 'bus to convey members to De Burgh's Bridge. If it had not been for the kindness of Mr. H. R. Harrington, Mr. E. B. Nairn and Mrs. E. P. Taylor in placing their motor cars at the disposal of some of the members the 'bus must have been indeed overerowded.

At the invitation of Mr. Gallard we visited his home at "Louvere," where he has, in a separate building, a truly remarkable "Insectarium." Members, one and all, were amazed at the vast numbers of insects and other creatures stored in this building. Apart from the thousands of preserved insects in various stages of development he had a large number of living insects undergoing their various metamorphoses about which Mr. Gallard lucidly explained to the interested members, who were loath to continue their journey, as there was so much more that they would have liked to have seen and heard, but as time was limited it was necessary to continue their journey to the appointed place.

Mr. Gallard's insectarium put the writer very much in mind of a huge illustrated book, compiled on the Life Histories of the Insects of New South Wales, particularly those of economic importance. The opening of his door was similar to the opening of the covers of a big book teeming with illustrations.

The journey to De Burgh's Bridge was made in quick time, as the roads were, on the whole, good. Now and again a few showers of rain would fall, but they did not deter members from collecting botanical specimens.

Growing closely to the ground amongst other plants were seen the light-green leaves of "Wild Parsley" (*Lomatia silifolia*). It was rather late for its flower, which resembles waratah, with a curved and irregular corolla. Here and there were specimens of "Native Pears" (*Xylomelum pyriforme*) which is sometimes confused with the waratah, especially when the leaves are prickly toothed, but the leaves of the waratah are alternate and those of the Native Pear opposite. The "Honey

Flowers" (*Lambertia formosa*) with their sharply pointed leaves were much in evidence, but had passed the flowering stage. The "Needle Bush" (*Hakea acicularis*) with its rough woody fruits, containing two black seeds with terminal wings, was plentiful. The "Honeysuckles" (*Banksia serrata*) (*B. ericifolia*) carrying large cones, studded with woody nut-like fruits, and *B. spinulosa* without flower spikes were also seen. Forty-six species are listed by Bentham in his "Flora Australiensis," and he remarks that the genus is endemic in Australia and the greater number of species are Western, two only of the Eastern species penetrate into the tropics, besides one which is exclusively tropical, if it be really more than a variety of the most widely diffused of the Eastern species.

The most prominent forms of plant life round about De Burgh's Bridge were the "apple trees," chiefly the "She Apple" (*Angophora intermedia*) which, although very similar to a Peppermint Eucalypt in the distance, can, however, always be differentiated by its branching habits which are very distinct and peculiar to this group of plants. The "Apple Tree" (*A. lanceolata*) stood out from all other trees by reason of its smooth reddish-brown trunk and carrying a large leafy head.

This locality, from the point of view of the young botanist, makes an excellent collecting ground by reason of the large variety of plants found there. Specimens of the following plants were also noted amongst others:—

Pine-leaved Geebung (*Persoonia pinifolia*) which is a very graceful shrub, and is most attractive when in bloom. The flowers, which are yellow, grow at the ends of the drooping branches in pretty clusters.

Broad-leaved Geebung (*P. salicina*) is an erect smooth shrub, six to 12 feet high, bearing bright-green shining oblong leaves, four to eight inches long, and very broad in their younger stages.

Small-leaved White Beard (*Leucopogon microphyllus*).

Yellow-flowered (*Pultenaea elliptica*).

Bossiaea scolopendria, an erect, usually leafless shrub, with flattened branches and wings extending from node to node.

Actinotus minor, *Trachymene linearis*, *Hibbertia fasiculata*, *Acacia linifolia*, Christmas Tree (*Ceratopetalum gummiferum*).

Close by the Bridge is a small refreshment room, where we were able to procure hot water for tea, which provided a "break," and was greatly appreciated.

We left the Bridge at about 5.30 for our homeward journey, all agreeing that it was a very pleasant and profitable excursion.

NATURALISTS' SOCIETY OF NEW SOUTH WALES,

Proceedings.

FEBRUARY, 1929.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on 5th February, 1929.

The President (Mr. David G. Stead), in the chair, with 41 members.

Correspondence.—Miss Reita Thurston, Hon. Assistant Secretary, tendered her resignation owing to her transfer, as teacher of the Infants' Public School, to Parkes. The Secretary said that Miss Thurston had forwarded to him all books, papers and balance of petty cash. These had been found in order, and he desired to take this opportunity of expressing his appreciation for Miss Thurston's ready and able assistance, and he moved that he be instructed to write Miss Thurston to this effect. Upon the motion being put, it was carried by acclamation.

Miss Mary Fuller wrote tendering her resignation as an ordinary member, as she had been appointed to study the blow fly problem, under Dr. Tillyard, at Canberra. This was accepted with regret, and the Secretary instructed to congratulate Miss Fuller upon her appointment, and to convey the meeting's best wishes for her future.

The Association for the Advancement of Science wrote informing its members and correspondents of the great loss it has suffered by the sudden death of its President, Mr. Richard Hind Cambage, C.B.E., on 28th November, 1928, at the age of 69. Members stood as a mark of respect to his memory.

The Director of Education wrote approving of the Society's using the Assembly Hall for its meetings on the first Tuesday in each month, at 8 p.m.

Hon. Assistant Secretary.—On the motion of Mr. R. A. Black, seconded by Mr. David G. Stead, Miss Dolce Dobbin was unanimously elected Honorary Assistant Secretary.

Statement.—The Hon. Treasurer (Mr. John Powell) presented his statement of receipts and expenditure, showing that there was a balance in the bank of £101/8/6.

Prevalence of Bush Fires.—The President drew the attention of members to the prevalence of bush fires during the preceding month. Many of these had occurred in the Sydney area, and most appeared to be of a preventable character if our

people were properly organised everywhere for dealing with such in their incipient stages. A great many fires were brought about by careless, and frequently quite callous, campers and holiday makers; who little appreciated ruin that was fast overtaking the bushlands through these repeated fires—altogether apart from the huge losses of property also entailed. The President invited members generally to do their utmost, both to inculcate an understanding of the matter among the people, and to bring about co-operation in dealing with them.

Arrival of Investigating Vessel s.s. "Dana."—The President also spoke of the arrival, on that day, of the Danish investigation vessel *Dana*, in charge and under the direction of Dr. Johannes Schmidt. The *Dana* is carrying out intensive marine biological studies in the Australian and Austro-Malayan regions. Dr. Schmidt is the world authority on the migrations and development of the eels of the genus *Anguilla*—the "freshwater eels."

Nomination of Members.—The following were nominated:—

Country Members.—Mr. C. E. Whiteford, North Street, Albury; Miss Reita Thurston, Infants' Public School, Parkes; Miss Mary Fuller, Hotel Wellington, Canberra.

Ordinary Members.—Mr. M. B. Welch, B.Sc., Technological Museum, Sydney; Mr. H. C. Whibley, 28 Denman Avenue, Haberfield; Miss Clare Tarrant, 146 Arden Street, Coogee.

Exhibition of Specimens.

Mr. M. E. Gray.—Spotted Pipe Fish (*Stigmatophera argus*) secured in a pool at the head of the salt water of Woronora River on 3rd February, 1929.

[This fish was identified by Mr. Stead and its habits explained].

Mr. Luke Gallard.—A fine specimen of a Queen "White Ant" or Termite (*Coptotermes lacteus*). In the Termitidae, "White Ants," as in the bees, the queen is the mother of the colony. The abdomen of the specimen exhibited was distended by the large number of eggs within. The head and thorax were so small, compared with the abdomen, that it was necessary to examine the specimen closely to detect them.

A cocoon of *Mantispa australis* and the egg capsules of a large Tarantula spider from which the larva of the *Mantispa* had emerged after devouring the eggs. The larva, when fully fed, sometimes spins its silken cocoon inside the spider's egg capsule, but it is more usual, however, to find the cocoon attached to the outside or amongst the surrounding debris.

Since the last meeting, one of the supposed *Cheleptryx*

moth larvae, received from Mrs. Howell in August, 1928, had died. These larvae were referred to in the last issue of this journal, page 101.

Mrs. M. Jenkins.—Specimen of fruit of *Araujia albens*, native of South America. In some countries where it is planted it is visited in large numbers by moths whose complete ignorance of the mechanism of the flowers becomes their ruin. Thrusting their probosces in the slits to get at the nectar, they are held fast, and all their struggles to liberate themselves only fix them tighter. (Identified by Hon. Secretary).

Miss M. McAnene.—Cocoons of the ribbed case moth in various stages, on twigs of Sugar Gum. (2) Cocoons of lictor case moth. (3) Foliage of Kurrajong Tree (*Brachychiton* sp.) showing variations in leaves.

Miss Joyce Heyner.—A large collection of birds' nests and eggs.

Excursion.—Mrs. L. A. Heyner reported upon an excursion, made to the upper reaches of Middle Harbour in a motor launch, on Saturday afternoon, 2nd February. Twenty-eight members and friends were present, and the outing proved a most enjoyable one.

Lecture.—Mr. James Nangle, F.R.S., delivered a highly interesting and instructive lecture on Astronomy, illustrated by a splendid series of lantern slides. On the motion of Mr. W. W. Froggatt, seconded by Mr. A. E. Watson, a hearty vote of thanks was carried by acclamation.

MARCH, 1929.

The ordinary meeting was held in the Assembly Hall, Department of Education, on Tuesday, 5th March, 1929.

Mr. W. W. Froggatt, F.E.S., F.L.S. (Vice-President), in the chair, with about 30 members.

Correspondence.—The Council for Scientific and Industrial Research intimated that applications were invited from biologists with entomological training for appointment to the position of Assistant Entomologist at £400 per annum.

Letter of thanks from Miss Lily F. Parkes for wreath sent by the Society on the sad occasion of the death of her late sister.

New Member.—The following nomination was received, on the motion of the Secretary: Mr. A. W. Duncan, "Edale," Rosemont Street, Punchbowl.

Statement.—The Hon. Treasurer (Mr. J. Powell) tabled his

monthly statement of receipts and expenditure, showing that there was a credit balance in the bank of £101/8/6.

Lecture for May.—The Secretary reported that Professor T. T. Flynn, D.Sc., Ralston Professor of Biology, University of Tasmania, promised to deliver a lecture before the members on Tuesday, 7th May next.

Excursion.—The Secretary reported that Mr. M. B. Welch, B.Sc., Economic Botanist of the Technological Museum, promised to act as leader on Saturday afternoon, 30th March, and that the site would be the National Park, where special attention would be given to trees.

Exhibition of Specimens.—Miss H. McAnene—Parasitic wasps which had emerged from a gall taken from a Sugar Gum at Griffith on 1st January last.

Mrs. S. Howell.—Nest of Bul-bul; also nests of the Blue Wren, one built early and the other late in the season. The former was a normally built one, whilst the latter was nearly flat in appearance and had been constructed with human hair.

Mr. J. W. Hawley.—A beautiful specimen of the Fire Wheel Tree *Stenocarpus sinuatus* Endl. The inflorescence is very distinctive, having a wheel-like arrangement of the scarlet flowers. The fruit is narrow and pod-like, from which the genus is named. The seeds are winged, enclosed in a membranous sheath. W. Baeuerlen, as quoted by the late J. H. Maiden, in his Forest Flora of N.S.W., said that a bunch of flowers of this plant put in a vase and placed indoors has been found to kill flies in large numbers.

Miss L. Steinbeck.—Specimens of conglomerate from Lake Margaret, Tasmania, showing effect of glaciation; specimens of gold bearing quartz from Upper Hunter, N.S.W. (Denison Diggings), and a fossil sea-urchin from Victoria.

Excursion.—The Secretary read report of excursion made to De Burgh's Bridge by 30 members on Saturday, 2nd March.

Lecture.—In the unavoidable absence of Mr. G. D. Osborne, B.Sc., Miss H. Drummond, B.Sc., gave a most interesting and instructive lecture (illustrated) on "Scenery from the Geological Standpoint."

Resignations.—The following resignations were received with regret: Miss Constance M. Le Plastrier, Mr. R. C. Clark, Misses W. B. and D. Yarnold.

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Part 7.

THE INSECT FAUNA OF THE MALLEE SCRUB ON THE LOWER MURRAY RIVER.

By W. W. FROGGATT, F.E.S., F.L.S.

The dwarfed eucalypts, popularly known as mallee scrub, cover a large area of Victoria, South Australia and New South Wales. These gum trees grow upon the red sandy soil overlaying the hard, firm limestone and sandstone; sedimentary rocks, which, according to Professor Gregory, were formed in the shallow sea, covering these lands in the early part of the Tertiary Period.

These scrubs are marked off from the river frontages by the alluvial clays forming the river banks, box swamps, and run out into the open plains. In some places, however, the red soil has been cut through by the rivers changing their courses, and the mallee comes up to the edge of the red cliffs, forming the river bank.

Allen Cunningham, who was botanist to Oxley's expedition in 1817, found this scrub out from the Lachlan River; he named the eucalypts *Eucalyptus dumosa*. Oxley says: "Never exceeding 20 feet in height, and generally from 12 to 15 feet, spreading out into a bushy circle from their roots in such a manner that it is impossible to see further than from one bush to another; they are very often united by a species of vine (*Cassyta*), and the intermediate space covered with prickly wire grass, rendering a passage through them equally painful and tedious."

Nearly every one of our explorers in the south-west had something to say about the mallee scrub. Mitchell, in 1836, when making his way across from the Darling River to the Murray was entangled in it, somewhere near Euston, and gave a very gloomy description of the waterless dreary mallee. Though the earlier botanists considered that the mallee scrub

consisted of only one species of eucalyptus, later investigations have demonstrated that, though their habit of growth is similar, there are a number of well-defined species included in the mallee. Besides *Eucalyptus dumosa*, there is *E. transcontinentalis*, a similar small bush; *E. gracilis*, the "whip-stick" mallee; *E. oleosa*, the "red mallee," which in favourable soil sometimes grows into a big tree; *E. incrassata* and *E. uncinta*.

The typical mallee gum is really a dwarf eucalypt, which has no real stem or trunk. The basal portion just above the surface of the soil, representing the stem, and the slender upright shoots (up to a dozen in number), growing up from it, are really erect branches. Besides the top root, there are several lateral roots just beneath the surface of the surrounding soil, and often running out some yards from the butt of the clump of upright stems.

There are large tracts of mallee scrub in the south-eastern portion of South Australia, and about one-fifth of the State of Victoria is clothed with mallee. In the last map issued by the Victorian Lands Department the area is given at 11,354,511 acres. A very large portion of this has been cleared and converted into wheat lands during this last thirty years.

In New South Wales, though there are some patches of mallee on the eastern side, the great area of mallee is on the western side of the Lachlan River, between the Murray and Darling Rivers. Under irrigation, it is proposed to throw open much of this scrub land so that a great deal of it may, within the next decade, become cultivation paddocks.

To the naturalist, the mallee is a very interesting country, and in Victoria a number of field naturalists have studied and collected the flora and fauna, but there is a great deal still to be done. It is a very great pity that the Museum authorities cannot make a biological survey of our mallee and keep a collecting party out for a year, at least, to collect birds, animals and insects before the remarkable dry land flora is destroyed.

The mallee land might be divided into two classes: the level dense mallee growing on the flat poor land, and the sandhill and little park-like areas where there is a much more varied vegetation. At least a dozen species of acacias, two casuarinas, cypress pines, needle bush, hop bush, dogwood, and other shrubby trees all have their peculiar insects, most of which have adapted themselves, like their host plants, to the semi-arid conditions under which they live. Besides this, the collector has the insect fauna of the alluvial land along the banks of the rivers, box flats, swamps and lagoons, most of which are covered with red gum

(*Eucalyptus rostrata*) and red box (*Eucalyptus bicolor*) *Acacia stenophylla* and lignum bush. The list given represents exactly a month's collecting (October) along the Murray, between Euston on the New South Wales side, and Robinvale on the Victorian.

The insect fauna may be classed into two divisions: firstly, those collected on the alluvial flats, box swamps and river banks; secondly, those found on the red soil or mallee land.

There had been three dry seasons previous to October, 1928, and there was very little rain until just before I left Euston, but the collection made gives a good idea of the insects inhabiting these areas.

COLEOPTERA.

1. *Carenum elegans*, Macleay. A single specimen was found under a half-buried pine log in the red sand. I had a specimen from the Pilliga Scrub, identified by Mr. T. Sloane.
2. *Carenum episcopale*, Cast. Found under a buried log.
3. *Philoscaphus tuberculatus*, Macleay. This is the commonest carenum; it is found under logs in the sandhills and mallee.
4. *Philoscaphus*, sp.? A much smaller species; may be a variety of *P. tuberculatus*, MacL.
5. *Geoscaphus laevissimus*, Chaud. One specimen in the mallee.
6. *Clivina planiceps*. Common under logs or on the edge of the swamps and river banks.
7. *Clivina*, sp. A smaller species found in similar situations.
8. *Promecoderus gracilis*, Germ. A common species, found under logs in the red sand.
9. *Chlaenius australis*, Dej. A widely distributed species, common under logs and under dead bark.
10. *Phorticosomus felix*, Schaum. In cracks in the soil under logs.
11. *Hypharpax rotundipennis*, Chaud. Common under logs and stones in the dry red soil.
12. *Catadromus lacordairei*, Boisd. Under logs on the river edge or about swamps. After a heavy fall of rain, often common under bits of woods, etc.
13. *Catadromus australis*, Casteln. Similar localities.

14. *Dicrochile minuta*, Casteln. One specimen under log on sandhill.
15. *Philophloeus australis*, Dej. Hiding under loose dead bark on stems of mallee gums.
16. *Philophloeus fuscipennis*, Germ. Hiding under loose dead bark on stems of mallee gums.
17. *Adelotopus gyrinoides*, Hope. Hiding under loose dead bark on stems of mallee gums.
18. *Adelotopus*, sp. Much smaller sp. Hiding under loose dead bark on stems of mallee gums.

Heteromera.—The first five are found under dead scaling bark on the mallee stems; when alive some have a plum-like bloom on their dorsal surface.

19. *Pterohelaeus guerini*, var. *bullatus*, Pasc.
20. *Pterohelaeus dispersus*, Macl.
21. *Pterohelaeus vicinus*, Pasc.
22. *Pterohelaeus nitidissimus*, Pasc.
23. *Pterohelaeus minimus*, Pasc.
24. *Adelium similatum*, Germ. Under logs on the dry ground.
25. *Adelium brevicorne*, Bless. Under logs on the dry ground.
26. *Chalcopterus polychromus*, Pasc. On the tree trunks hiding in cracks in bark.
27. *Chalcopterus affinis*, Bless. On the tree trunks hiding in cracks in bark.
28. *Chalcopterus affinis*, var. On the tree trunks hiding in cracks in bark.
29. *Chalcopterus purpureus*, Germ. On the tree trunks hiding in cracks in bark.
30. *Chromomaea fastigata*, Germ. On the tree trunks hiding in cracks in bark.
31. *Anaxo cylindricus*, Germ. On the tree trunks hiding in cracks in bark.
32. *Soronia*, sp. A small Nitidulid beetle, very like a shiny *Pterohelaeus*, common under bark on mallee stems. Mr. Carter says it comes near this genus (*Soronia*).
33. *Saprinus laetus*, Erich. This and the following three carrion beetles found under dead sheep and dead rabbits.
34. *Dermestes cadaverinus*, Fab.
35. *Creophilus erythrocephalus*, Fab.
36. *Trox australasiae*, Erich.
37. *Maechedius imitator*, Blkb. Under dead bark at base of red gums.

38. *Semon semanopterus*, Macl. Dug out of soil at base of red gum.
39. *Arthropterus puncticollis*, Macl. Paussid beetles found under dead bark at the base of red gum trees.
40. *Arthropterus westwoodi*, Macl.
41. *Atesta angasi*, Pase. Found under dead bark of mallee gum.
42. *Phoracantha recurva*, Newm. Common under dead bark of mallee gum.
43. *Belus bidentatus*, Don. Upon foliage of Acacias.
44. *Belus anguineus*, Pase. Upon foliage of Acacias.
45. *Laemosaccus electilis*, Pasc. Very common, eating the surface of the leaves of the "dog wood," *Myoporum deserti*.
46. *Cubicorrhynchus morosus*, Boisd. Common under dry logs.
47. *Rhinaria cavirostris*, Pase. Clinging to the foliage of the "Belar," *Casuarina*.
48. *Polyphrades longipennis*, Pase. On young growth of mallee gums.
49. *Bryachus squamicollis*, Pase. On young growth of mallee gums.
50. *Strongylorrhinus ochraccus*, Schr. On young growth of mallee gums.
51. *Zephryne*, sp. On the dead bark of the red gums.
52. *Oxypus scoparia*, Lea. Clinging to tips of mallee gums.
53. *Agriochaeta crinita*, Pase. A hairy weevil on *Acacia oswaldi*.
54. *Haplonyx*, sp. On the foliage of mallee gums.
55. *Xylobosca bispinosa*. A timber borer. One specimen under dead bark.
56. *Phlogistus episcopalensis*. A rich metallic tinted Clerid. Three specimens under bark of mallee gums.
57. *Laius*, sp. On foliage and often found on grass stalks.
58. *Agrypnus mastersi*, Macl. A large click beetle under dead bark.
59. *Paropsis obsoleta*, Oliv. Upon foliage of mallee gums.
60. *Cadmus crucicollis*, Boisd. Upon foliage of mallee gums.
61. *Cryptocephalus scabrosus*, Oliv. Upon foliage of mallee gums.
62. *Edusiella*, sp. Upon foliage of mallee gums.
63. *Coccinella repanda*. Feeding upon scale on mallee gums.
64. *Rhizobius*, sp. Under bark of mallee gums.

ISOPTERA.

The *Termites* were very plentiful all through the mallee scrub, and, like most of the dry western lands, were very much in evidence after a heavy fall of rain. Mr. Gerald F. Hill examined my specimens.

Hamitermes (*Drepanotermes*) near *perniger*. This species appears to be a new one, allied to the West Australian form. *Rhonotermes*, n.sp., *Leucostermes ferox*, Froggt., *Eutermes*, n.sp., and another new sp. of *Eutermes*, near *tumuli*, which comes from Port Darwin.

HYMENOPTERA.

Formicidae. Determined by Mr. J. Clark.

Camponotus aeneopilosus, Mayr. Under dead bark.

Camponotus walkeri, Forel. Forming nests under logs.

Camponotus ephippium, Sm. Forming nests under logs.

Camponotus nigrouenus, Sm. Running over the stems of mallee gums.

Camponotus capito, Mayr. Running over the stems of the mallee gums.

Camponotus nigriceps, Sm. Forming large cone shaped nests in the sand hills.

Podomyrma adelaide, Sm. Upon the tree trunks; nests in tree trunks.

Podomyrma gratiosa, Sm. Upon the tree trunks; nests in tree trunks.

Rhytoponera mayri, Em. Large open nests on the edge of the sand hills and the swamp land.

Iridomyrmex chasei, Forel. Found under bark on mallee gums.

Iridomyrmex discors, Forel. Found under bark on mallee gums.

Iridomyrmex detectus, Sm. Common mound ant, making large mound nests.

Crematogaster frivola. Under dead bark.

Crematogaster pallidiceps. Under dead bark.

Pheidole bos. Making nests under stones, often storing seeds.

Meranoplus, sp. Found upon foliage.

Myrmecia desertorum. This is the common species forming large nests.

Myrmecia sp. Found upon the foliage; no nests discovered.

Aphaenogaster bargigulae. This ant forms large circular pits in the sand hills and is very common there and in the pine scrub.

Anochitus rectangularis. Found under logs in the sand hills.

A very handsome mottled winged Chalcid wasp, forming beautiful galls upon the foliage of the Bull Oak (*Casuarina laimannii*).

Eurytoma brachyscelides. Bred out of coecid galls.

Perga, sp. A handsome steel-blue saw-fly, bred from larvae taken on the foliage of mallee gums.

Mutilla, sp. Three species found under stones.

Odynerus nigrocinctus. On the flowers of mallee gums.

Polistes erythrinus. On the flowers of mallee gums.

Campsomeris radula. On the foliage of Acacia.

Pelopaeus laetus. Found under dry cow dung in the paddocks.

ORTHOPTERA.

These were not plentiful. Four species of undetermined cockroaches were taken under logs. Two earwigs, three grasshoppers and two immature tree crickets and *Labidura truncata*, the lagoon earwig.

Chortoicetes terminifera, Walk. A plague locust. A few found in the grass lands.

Chortoicetes pusilla, Walk. One specimen taken on grass lands.

Tropidoderus, sp. Half-grown specimen came into the house, probably blown out of a red gum.

HEMIPTERA.

Most of the plant and predaceous bugs were found upon the tree trunks hiding under dead bark.

Eumecopus australasiae, Don. Upon the trunks of the red gum.

Amorbus rhombifer, Walk. On the shoots of mallee gum growing up from ringbarked scrub.

Pscalometis histrionicus, Stal. On the stems of the mallee.

Oechalia schellebergi. On the foliage of the Borree, feeding upon Psyllid larvae.

Aradellis cygnalis, Westw. Under the dead bark on the mallee gum stems.

Piestolestes, sp. Under the dead bark on the mallee gum stems.

An undetermined Lygaeid. Very active on the mallee stems.

Naucloris australica, Stal. The common water bug.

HOMOPTERA.

Taken among foliage or upon tree trunks. Four undetermined species.

Eurymela subrivittata. The common froghopper on the young mallee shoots.

Eurymeloides pulchra. On foliage of mallee.

Eurymeloides, sp. ?. On foliage of mallee.

Tartessus lo, Kirby. On foliage of mallee.

Stenocotus, sp. On the stems of the mallee.

Sextius virescens. The common Membracid on wattles.

Cicadidae. One specimen of the widely distributed small cicada, *Melampsalta landsboroughi*, Dist.

Coccidae. About 40 species were collected, a large number of which are new species. They will be dealt with in another paper.

DIPTERA.

Seven species of diptera were collected, but very few species were in the bush, except the common house fly.

Agromyza, sp. This is a gall making fly, which aborts the flower buds of the red box (*Eucalyptus bicolor*) into reddish yellow rounded galls.

NEUROPTERA.

Only two specimens of ant lions.

THIRIPIDAE.

Four species of *Thrips* were found—one in an oval gall on *Hakea*; the others sheltering among galls and foliage.

HYMENOPTEROUS PARASITES BRED FROM A COCCID GALL.

By H. MCANENE.

During last December, whilst making a collection of the various stages of the larvae of the ribbed case-moth, *Thyridopteryx herrichi*, feeding upon the "sugar gums," at Leeton, a coccid gall, *Apiomorpha ovicola*, was found upon the tip of a twig.

Towards the end of January I found my bookcase swarming with small black wasps, which at first were thought to have emerged from the case-moths. Upon examination, however, they were found to have developed from the gall insect. The wasps have been identified as a species belonging to the *Proctotrypoidea*.

NOTES ON APHIDIDAE (HOMOPTERA) I.

By E. H. ZECK.

The *Aphididae* or plant-lice, mostly found living in colonies on plants and trees, will be well known to most members on account of the injury they cause to young buds and tender shoots.

Before recording certain species occurring here, it may not be out of place to give a few particulars regarding these insects. Four distinct forms of individuals are produced, viz.: (1) Wingless, and (2) winged parthenogenetic females, which are viviparous (spring and summer forms); (3) winged or wingless males; (4) wingless egg-laying females (late autumn and winter forms).

The characteristic cornicles borne by aphids upon the abdomen, between the 5th and 6th segments, vary much in size in the different groups, and in some are present only as mere rings, in others they are absent.

The cornicles, although often referred to as "Honey tubes" or "nectaries," do not secrete the so-called "Honey dew." This sugary solution is given off as excreta. Boussingault's analysis of this "Honey dew," given in Buckton's Monograph (1875), is as follows:—

Cane sugar, 48.86 per cent.
Sucre interverti, 28.59 per cent.
Glucose, 22.55 per cent.

It is also recorded (Buckton) that in some countries "Honey dew" is credited with having healing properties.

The family *Aphididae* is now looked upon by prominent workers as separate from the *Phylloxeridae*.

Baker, in his Generic Classification of *Aphididae*, separates the two families as follows:—

1. Summer parthenogenetic oviparous forms produced; stigma formed by the radial sector—*Phylloxeridae*.
2. Only sexual oviparous forms produced; stigma formed by radius I.—*Aphididae*.

The normal life-cycle of a typical aphid is for it to pass the winter in the egg stage. This stage, however, under certain conditions may be extremely short.

The over-wintering eggs hatch in the spring into small larvae which grow into mature wingless females, sometimes known as "stem mothers." These females produce living young which grow and continue to produce further young.

Theobald, in his Monograph, states: "As each may often produce seven or eight young per day, under favourable conditions, and as an individual may go on reproducing for twenty or more days, it can readily be seen that a huge progeny may result."

After some time these wingless forms produce others which passing through a nymphal stage become winged. These fly off to other plants and there produce further wingless generations. This goes on until the approach of winter, when winged forms develop and fly back to the primary host plants, where they then produce wingless egg-laying females. Whilst the egg-laying females have been developing upon the primary host plants, males have been developing upon the secondary host plants, and after reaching their winged stage fly off to seek the wingless egg-laying females upon the primary host plant, where, after fertilisation, the females deposit their eggs.

Usually, with the exception of the sexual wingless egg-laying females and the sexual males produced at the approach of winter conditions, all the other generations throughout the year are winged or wingless parthenogenetic viviparous forms.

The host plants of aphids may be divided into (1) Primary (winter) host plant; that upon which the over-wintering eggs are laid, and (2) secondary (summer) host plants; those to which the aphids migrate (spring migrants) in the spring, develop upon during the summer, and migrate from (autumn migrants) in the late winter.

Of the following *Macrosiphoniella sanborni* and *Anuraphis helichrysi* have not been previously recorded from Australia, as far as I am aware. In giving these and other records, it is not intended to list the many synonyms under which the species have been placed by various authors, but to give the names by which they are at present known.

Macrosiphoniella sanborni, Gillette (1908). A common chrysanthemum aphid, which sometimes becomes a serious pest. The general colour of this species is dark red to almost black. It has been recorded from Africa, America (North and South), Britain, Formosa, India, Jamaica, and Japan. Both wingless and winged viviparous females may be taken about Sydney from March to June upon chrysanthemums. Length: wingless, 1.5—1.8 mm.; winged, 2.8—3 mm.

Anuraphis helichrysi, Kaltenbach (1843). A common aphid upon chrysanthemums, frequently taken in colonies with *M. sanborni*. The general colour varies from bright green to yellow green in the wingless forms; the winged forms somewhat darker. Recorded from America (North and South), Britain,

Egypt, Europe, India, Ireland, and Japan. It occurs about Sydney from March to June. Length: 1.1—2 mm.

I have not seen the sexual forms, but Theobald states it is the commonest aphid found upon plums, Damsons, etc., and is known as the "Leaf-curling plum aphid." The primary hosts upon which the eggs are laid are *Prunus*; from these they migrate in the spring to a large number of secondary herbaceous host plants. Eight varieties, mainly based on antennal differences, are recognised by Theobald.

Aphis nerii, Boyer de Fonscolombe (1841). The Oleander or Milkweed aphid, a bright yellow and black species common upon the young shoots of the oleander. Recorded from Africa, America, Argentine, Bermuda, Formosa, India, Italy, and Porto Rico. Length: 2.2 mm.

At the May meeting, Mr. L. Gallard exhibited specimens of this aphid, feeding upon *Gomphocarpus fruticosus*, taken at Eastwood. I have seen this species, both at Thirroul and Woy Woy upon the same food plant. About Sydney it occurs upon oleander from October to April. During April, 1920, specimens of this aphid infesting *Hoya*, sp., at Ryde, were given me by Miss Mary T. Collingridge.

The sexual forms are unknown to me, but Essig (California, 1915), states that "they migrate to the oleanders, where true sexual forms are born and the over-wintering eggs are laid." Observations, by C. Moreira (1919), on *A. nerii* (Abst. in Rev. Appl. Ent., 1919), during four years in Rio de Janeiro, where it lives on *Asclepias currassavica* and *Nerium oleander* "have demonstrated that the reproduction of this species is always parthenogenetic and less lengthy observations on other aphids have confirmed this. When the number of aphids on *A. currassavica* is sufficient to cover all the branches and leaves, so that the plant dies and the food fails, while at the same time the attacks of insect enemies begin, the winged forms begin to appear and fly, or are blown to another food plant."

Should any member, not requiring, or having a duplicate copy of Vol. 4, pt. 15 of *The Australian Naturalist*, the Hon. Secretary would be pleased to receive same.

NOTES ON THE MOUNTAIN MINNOW,
GALAXIAS COXII, MACLEAY.

By M. E. GRAY.

These small fish occur in Pope's Creek, Blackheath Creek, and Pulpit Hill Creek, Blackheath, and probably in other streams thereabouts, as well as in the Cox River.

The maximum size seems to be between $4\frac{1}{2}$ and 5 inches in length. The smallest fry observed by me were about $\frac{3}{4}$ to 1 inch long.

From my observation of them I am of the opinion that they breed in each of the streams mentioned, as both Pope's Creek and Blackheath Creek pass over falls that would preclude any possibility of the fry leaping or swimming up them, and so isolating them from the rivers in the valleys below. Pope's Creek empties over Horseshoe Falls into the Grose Valley, and Blackheath Creek tumbles some 50 feet into Centennial Glen, and later rushes down a steep series of cascades into the Kanimbla Valley.

I observed a school of some 40 fry, averaging from about 1 inch to $1\frac{1}{2}$ inches in length, in a pool at Centennial Glen, situated between the falls and the cascades, and also a smaller school in Flower Dell above the fall.

These minnows are most plentiful in Pope's Creek, occurring in pools practically on the brink of the falls, but I failed to find any in the stream below the falls. In fact, the only fish I observed in the three streams occurring in Rodriguez Pass were a couple of rainbow trout, in a small pool below Pope's Falls, which are on Greave's Creek, and were probably washed down from Lake Medlow during a flood.

The specimen exhibited was secured in a pool along Pope's Creek, about $\frac{1}{2}$ a mile from its source.

The fry are so transparent when in about 12 or 14 inches of water as to be almost invisible from above, but their shadows betray their presence when the sun shines down on the pool.

We endeavoured to keep them in captivity, but, although we secured mud, sand and weeds from the pool in which they were captured, they succumbed to the heat on the first hot day in Sydney, about a week after their capture, and I think a large tank with running water is essential for their well-being in captivity, as they never seemed to be "at home" in the still water, but became quite frisky and full of pep when water was allowed to drip into their aquarium. They also obviously require a low temperature.

AUSTRALIAN BOTANICAL NOMENCLATURE.

By RALEIGH A. BLACK.

Much interest is being taken by taxonomic and other botanists throughout the world in the forthcoming International Botanical Congress, which is to be held at Cambridge, England, in 1930.

This Congress, amongst other things, will deal with the report of the committee appointed to consider proposals for amending the International Rules of Nomenclature.

The committee referred to was appointed by the International Congress of Plant Sciences, held at Ithaca, New York, during the tenure of its meeting, namely, from August 16th to August 23rd, 1926.

Included in this committee are:—

J. H. Barnhart (New York), G. Bitter (Gottingen) [deceased], J. M. Black (Adelaide, South Australia), J. Briquet (Geneva), A. de Degen (Budapest), E. de Wildeman (Brussels), L. Diels (Berlin), K. Domin (Prague), B. Fedtschenko (Leningrad), H. Harms (Berlin), A. S. Hitchcock (Washington), A. Jaczewski (Moscow), J. Janchen (Vienna), H. Lecomte (Paris), H. Lindberg (Helsingfors), R. Maire (Algiers), L. Mangin (Paris), C. E. Moss (Johannesburg, South Africa), S. Nurbeck (Lund), T. Nakai (Tokyo), C. Ostenfeld (Copenhagen), J. Ramsbottom (London), A. B. Rendle (London), B. L. Robinson (Cambridge, Mass.), H. Schinz (Zurich), C. L. Shear (Washington), T. A. Sprague (Kew), A. Trotter (Florence), and A. Valeton (Leyde).

The committee is under the chairmanship of Dr. John Briquet, who is known to all taxonomical botanists, especially by his publication entitled, "Règles Internationales de la Nomenclature Botanique."

To enable this committee to function properly it was necessary to provide funds. In 1927 the Botanical Society of America asked the National Research Council to appoint a committee to obtain funds for the use of the International Committee on Nomenclature. The Council acceded to this request by appointing the following committee:—

Dr. William Crocker, representing the Boyce Thompson Institute for Plant Research; Dr. J. M. Greenman, representing the Missouri Botanical Garden; Dr. Alfred Gundersen, representing the Brooklyn Botanic Garden; Dr. A. S. Hitchcock, representing the Smithsonian Institution; Dr. Elmer G. Merrill,

representing the University of California; and Dr. B. L. Robinson, representing the Gray Herbarium of Harvard University.

This committee is fortunate in having Dr. A. S. Hitchcock as its chairman, who, en passant, is one of the world's outstanding personalities in systematic agrostology. Dr. Hitchcock, as chairman of this committee, will, at an early date, communicate direct with Australian botanists, urging them to bring before the International Committee on Nomenclature suggestions or amendments that may improve or clarify the rules.

The writer of this article, when he was associated with the Agricultural Department of Tasmania, as botanical officer, was appointed, with Mr. Leonard Rodway, C.M.G. (Government Botanist), a member of the Australian committee, which was formed at a meeting of the officers of the botanical section of the Australasian Association for the Advancement of Science, held in Adelaide, in August, 1924, for the purpose of making representations to the Federal Government with regard to the importance of Australia having definite official representation on the International Botanical Congress, to be held at Ithaca, in August, 1926, and to draw up recommendations with regard to the nomenclature of our national plants for submission to the International Botanical Congress. The personnel of the Australian committee included the senior botanical officer of each University, the senior botanical officer of each Government botanical department, and Mr. J. M. Black, of Adelaide, as secretary.

The Australian committee, under the secretaryship of Mr. J. M. Black, discussed what generic names they desired to see placed on the lists of conservation or rejection.

As an Australian botanist was unable to attend the Ithaca Congress, Mr. T. A. Sprague, of the Royal Botanic Gardens, at Kew, and convener of the sub-committee on Nomenclature of the Imperial Botanical Conference, held in London, in 1924, very kindly took charge of the lists of the Australian committee of *nomina conservanda* and *nomina rejicienda*, but the Congress decided to postpone legislation on questions of nomenclature for the consideration of the more cosmopolitan gathering, to be held at Cambridge, England, in 1930.

Since penning the foregoing "notes," word has been received that there is every probability of Mr. J. M. Black personally representing the Australian committee at the Cambridge Congress, and it is to be sincerely hoped that nothing will pre-

vent his attendance. Mr. Black (no relation of the writer), has the full confidence of all Australian botanists in putting their case to the Congress.

THE RESURRECTION PLANT, *SELAGINELLA*
LEPIDOPHYLLA, SPRENG.
PTERIDOPHYTA, ORDER LYCOPODIALES.

By LUCY A. HEYNER.

The brownish, shrunken ball of dried-up leaves and roots was a species of *Selaginella*, a clubmoss, included in one of the three existing groups of the *Pteridophyta*. The ferns, horse-tails and clubmosses have been traced back in the fossil state to very early periods of the earth's history, and are now only represented by a few distinct genera. *Selaginella lepidophylla* is a native of South America, and has the property of drying-up "root and all" into a compact light ball, which in the dry season is blown miles across the sandy plains by the variable winds. When it finds sufficient moisture, such as creeks or small pools of water, it revives quickly, and opens out into a complex plant, three times its rolled-up size. The remarkable resurrection is complete. The green colour reappears, the leaves unfold and expand, and the roots absorb water. The thick thallus-like leaves of the xerophyte evidently have thick-walled cells, with a wide layer of mucilage forming the inner part of the wall. "Prolonged desiccation and extremes of temperature leave thick-walled plants unharmed." Such mucilaginous walls possess a wonderful power of absorbing and holding water, and consequently occur in plants characteristic of dry situations. This mucilage investment enables the *Selaginella* to store water for the long dry seasons. The change in bulk is particularly noticeable, for from a hard, horny and compressed ball in the dry condition it blossoms into a magic garden in the presence of water, and thus the South American *Selaginella* becomes the Resurrection Plant.

Notice to Members.—In order to facilitate the handling of notes and papers submitted for publication in the *Journal*, these should be forwarded direct to the Hon. Editor.

NATURALISTS' SOCIETY OF NEW SOUTH WALES.

Proceedings.

APRIL, 1929.

The ordinary monthly meeting was held in the Assembly Hall, Department of Education, on 2nd April.

The President (Mr. David G. Stead), in the chair.

Professor of Zoology.—On the motion of the President, the Secretary was instructed to write to Professor W. J. Dakin, extending to him a very cordial welcome and the best wishes of the Society for the successful prosecution of his work at the University. A hope was expressed that the Society's work and that of the Department of Zoology might be as far as possible contributory one to the other.

Hon. Librarian.—On the resignation of Mr. A. R. Samut, Mr. G. G. Park and Miss Margery Tarrant, B.A., were appointed Hon. Librarian and Hon. Assistant Librarian respectively.

Financial Statement.—Mr. J. Powell (Hon. Treasurer), presented his monthly financial statement, which showed a credit balance in the bank of £86/16/5.

Exhibition of Specimens.—Mr. G. G. Park, sponges from Coogee Beach, collected after the last storm.

Mr. L. Gallard.—Larva of cicada; two small cicadas and specimen of "Wild Cotton Bush," *Gomphocarpus fruticosus*, showing presence of yellow aphid and small wasps attacking same.

Mr. A. E. Watson.—Larva of one of the Passalidae, and seedling of Morton Bay Fig Tree, several years old, growing in a pot.

Lecture.—"Plant Diseases," illustrated by Dr. R. J. Noble, Biologist to the Department of Agriculture.

The Jungle.—Mrs. Howell asked if the Society were interested in the area known as the Jungle. The President said that the Wild Life and Preservation Society had a financial interest in it to the extent of a £10 share, and added that he would bring the matter up at the next Council' meeting.

MAY, 1929.

The ordinary meeting of the Society was held in the Assembly Hall, Department of Education, on 7th May.

The President (Mr. David G. Stead), in the chair.

Nominations.—Mr. R. I. E. Gormley, "Carlisle," 32 Bobbin Head Road, Pymble; Miss E. B. Button, "Carlisle," 32 Bobbin Head Road, Pymble; and Mr. A. J. McGow, 112 Castlereagh Street, Sydney.

Resignation.—The resignation of Mrs. E. Foster, owing to her no longer being a resident of Sydney, was accepted with regret.

Treasurer's Monthly Statement.—The Hon. Treasurer presented his statement of receipts and expenditure, showing a credit balance in the bank of £86/16/5.

Exhibition of Specimens.—Mrs. L. A. Heyner, a specimen of the "Resurrection Plant" (*Selaginella lepidophylla*, Spreng.). Note given in this issue.

Professor A. J. Abbott.—Specimen of New Zealand Flax (*Phormium tenax*), which he described and explained the uses of its fibre and how it was extracted. Professor Abbott considered that as a boy in New Zealand at his father's nursery he was practically the first to tease the fibre from the leaf to use it for binding grafts on fruit trees, etc.

Mr. L. Gallard.—A Queensland fruit-fly, *Chaetodacus ferrugineus* (*Dacus tryoni*), heavily infested with mites. When captured, about eighteen years ago, in the Gosford district, the fly was covered with some two hundred and fifty mites.

Two dried skins of the large mealy bug, *Callipappus australis*, from which over four hundred small red larvae had been produced. Mr. Gallard stated that the male, sometimes known as the Bird of Paradise fly, was winged and fly-like, and possessed a long tuft of white filaments which projected from the end of the abdomen.

Excursion.—About 30 members, under the leadership of Mr. M. B. Welch, B.Sc., visited the National Park, via Waterfall, on Saturday, 4th instant. The outing was chiefly for the study of trees. Amongst the trees examined were the following: Apple Tree (*Angophora lanceolata*); Bloodwood (*Eucalyptus corymbosa*); Blackbutt (*E. pilularis*, Smith); Scribbly Gum (*E. micrantha*, Benth.); Peppermint (*E. piperita*, Sm.); Mountain Ash (*E. sieberiana*, F.v.M.).

Lecture.—"A Naturalist in Tasmania," illustrated by Professor T. Thomson Flynn, D.Sc., Ralston Professor of the Tasmanian University.

JUNE, 1929.

Members' Evening.—Mr. Walter W. Froggatt (Vice-President), in the chair, with about 30 members present.

The President (Mr. David G. Stead), wrote saying that he was leaving unexpectedly to go to Point Cloates, 160 miles north of Carnarvon, in north-west Australia, and would be away for about a month.

Correspondence.—Letter of thanks from Mrs. A. A. Hamilton. Letter from Hon. Secretaries of the "Professor Launcelet Harrison Memorial Fund" asking for a donation. The Council, whilst sympathising with the desirable movement, found that they were not empowered to appropriate the Society's funds for that purpose. The Secretary was instructed to reply to that effect. Letter from Mr. Noel Burnet requesting the Society to lodge a protest with the Queensland Premier requesting him to take steps to prevent the issuing of a proclamation declaring an open season for the hunting and trapping of the opossum. This was agreed to, and the Secretary was requested to take action accordingly. Letter from Mr. A. C. Duckworth tendering his resignation. This was accepted with regret.

The Hon. Treasurer (Mr. John Powell) submitted his monthly statement of receipts and expenditure, showing a credit balance in the bank of £86/16/5.

Candidates.—On the motion of Miss Agnes A. Brewster, the following were nominated as candidates for admission as members:—

Miss D. Marchant, B.A., B.Sc., 11 King Street, Ashfield.

Miss D. Jones, B.Sc., 95 Villiers Street, Rockdale.

Miss Edna Houison, B.Sc., "Ningedo," Elizabeth Street, Ashfield.

Miss Janet Logan, B.Sc., Helensburgh, South Coast.

The Hon. Secretary (Mr. R. A. Black), read a report upon the excursion made to the Zoo at Taronga Park, on Saturday afternoon, 1st June, under the leadership of Mr. A. S. Le Souef, the Director.

It was unanimously agreed, on the motion of Mr. G. G. Park, to send Mr. Le Souef a special letter of thanks.

The Vice-President, Mr. Walter W. Froggatt, F.E.S., F.L.S., read the following papers: "The Insect Fauna of the Mallee Scrub on the Lower Murray River," illustrated by a fine collection of insects, and "John Williamson Lewin, the First Naturalist in Australia, 1800 to 1819."

Mr. Hawley exhibited specimens of the following plants: *Banksia marginata*, *Caustis flexuosa*, *Grevellia punicea*, *G. buxifolia*, *Acacia suaveoleus*, *Lomatia silaifolia*, *Angophora*, sp., *Bauhinia*, sp.

Mrs. Howell.—Two ornate and dainty table mats on which orchids and ferns had been artistically painted.

Mr. M. E. Gray.—Specimen of *Galaxias coxii* and the cauliflower fungus, *Clavaria*, sp.

Mrs. Fitzjohn.—Specimen of the Black Apple (*Sideroxylon australe*).

Mr. P. E. B. Barnett.—Specimen of spider whose bite is poisonous and beautiful slides of scenes in Switzerland, recently visited by him.

Mr. L. Gallard.—Slides of moths and stick insects.

Mr. G. G. Park.—Specimen of *Eucalyptus citriodora*.

Mr. Denny, of Lilydale, Tasmania, gave a very interesting description of his lavender farm, illustrated by beautifully coloured slides. Mr. Denny described the several species of commercial lavenders, giving particulars of their essential oil content. Members were much struck in seeing the evolution of Mr. Denny's lavender farm, per medium of the slides, from the virgin bush-land to the wonderfully neat and well-kept property as it stands to-day.

Mr. White, assisted by Mr. Booth, very kindly operated the lantern.

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Part 8.

MARINE RESOURCES AND THE NATURALIST.

By DAVID G. STEAD,

(Substance of Presidential Address at Annual Meeting, 6/8/'29.)

The role of the naturalist in the development of our fisheries—and, in fact, of general marine development—is but little understood by the people at large. There is, indeed, quite a good deal of misunderstanding on the part of many people of scientific bent or training. It is the object of this address, therefore, to point out the essential parts played by the naturalist in both fisheries administration and fisheries development.

I use the term “naturalist” in its widest sense, and as implying one who makes a detailed study of all or any of the natural factors controlling the life-history, distribution, etc., of animal and plant life, as well as of oceanography, climatology and allied subjects in applied geography.

As is known to many, your President can claim a life experience of fisheries administration and development which, in many respects, is quite unique. This experience includes the first continuous series of fisheries investigations ever carried out in Australia and the application of such to a period of development of marine fisheries which stands out as an epoch in our economic history. In addition to this, for many years your President has been called upon to advise various Australian Governments, as well as a number of foreign administrations and British Colonial and Protectorate Governments in a multitude of matters covering practically the whole gamut of marine

development, and the handling of aquatic resources. Supplementary to this has been the valuable experience of studying on the spot in many countries of the world the various plans followed in fisheries investigation and in the study of marine biology, acclimatisation of aquatic animals, etc., and the application of such studies directly to administration, conservation and development.

FISHERIES ADMINISTRATION.

Fisheries administration is so closely bound up with conservation and the continuity and development of fisheries as to be inseparable therefrom in the mind of the expert. While this is not always the official view there is no doubt that such is the controlling idea behind the erection of such an administration, and not, as some officials think, the mere collection of license fees or other dues or taxes.

In practical fisheries administration the many and varied questions coming up for decision can only be properly and impartially dealt with by the expert, armed with the evidence which he has obtained personally from a close acquaintance with the biological and economic conditions prevailing. Perhaps it is designed to make closures (as in Australia) in inland or coastal waters, either against all forms of fishing—because of alleged depletion—or to protect one or more species during their spawning periods or early stages of life. In the first case, unless one is possessed of expert knowledge (the result of personal investigation or research, or both) he cannot possibly tell whether the evidence tendered for or against the closure is biased or is founded upon sound reason. In the second instance, the question can only be decided after careful investigation into the period and locality of spawning of each species or a close study of the haunts, rate of growth and general conditions of life in the early stages. Practical experience here has shown us, as David Starr Jordan tells us, in regard to efforts for regulating the catch of fish, or for the protection of the latter, that "each species of fish, like each plant in a garden, has its own nature and must be met on its own ground."

Again, perhaps it is intended to protect some particular species of fish below a certain size. As a rule the actual size may only be determined after the age of sexual maturity has been fixed. In other cases, the points to be decided upon may be (a) relative abundance of young and adults, (b) amount of destruction likely by existing or future means of capture.

Perhaps it is a matter of oyster cultivation. A person has applied, say, for an area under reduced rental, because of its alleged comparative unsuitability or inferiority. The latter point should obviously not be decided by the applicant, who is an interested party and in any case may be quite unfitted to determine the factors surrounding the development in commercial quantities of the edible oyster. In short, the question may only be truly decided by the biologist-administrator who is fully acquainted with the various agencies making for the development or the retardation of the species of animal life which is under discussion. Some of what are apparently the most unsuitable areas may be potentially the best, but there may be some natural agency for the moment interfering with full development. I can call to mind several such cases in this country and elsewhere.

Questions regarding, say, pollution of waters, lawful mesh and length of nets and lines, the smallest amount of oysters which a person may leave upon his leases for reproductive (that is re-stocking) purposes, allowing of lessees to surrender areas because of alleged barrenness (when perhaps it is through the lessee's prodigality in stripping the lease) what area should be leased for oyster culture and what retained for other purposes, which fishes should be protected from capture, size limit of oysters, what exotic species of fishes are suitable—or the reverse—for acclimatisation in specific waters. All these and a thousand other fisheries questions are, or should be, the subject of inquiry and consideration of the man who makes a practical study of all the natural conditions of environment and life surrounding the particular animal whose capture or cultivation forms the object of the fishery.

I know that in theory at least, most of what is said here is conceded; but in practice (certainly in Australia) it is frequently not considered at all. This is one of the most cogent reasons why the expert scientific investigator should have control of fisheries administration which can only be safe as long as each question coming under review is properly investigated by competent and experienced authority and judged carefully upon the results of such an investigation, and not upon the personal opinions and probably private interests of every Tom, Dick and Harry. Unless the expert officer has at least an important say in the control there is no guarantee that the result of his inquiries would be the guide in deciding the various matters under consideration, so there would be the ever-recurrent

danger that the question will be decided, according to the expediency of the moment, or because those in control at the time might not be appealed to by arguments which, though absolutely sound, did not recommend themselves to the lay mind. Many such cases may be called to memory in one's own experience or in literature.

Even where the intentions are of the very best it is surprising how "at sea" authorities have frequently been through not possessing themselves of practical scientific knowledge of the fisheries under their control. One such case is of special interest to Australians here: For many years it was the custom to absolutely prohibit netting at certain times in the upper parts of Port Jackson, "so as not to disturb the eggs of the sea mullet," which, it was stated by many fishermen and alleged authorities, were deposited on the bottom of the mud flats. In 1903, however, during the course of some general investigations, I discovered that the eggs of the sea mullet were pelagic or floating, and were deposited at sea. What availed then this misguided carefulness? Many other cases could be cited, showing the great and pressing need for founding all regulations upon the most searching investigation and of giving the investigator the administrative means for putting such regulations into execution for the common good.

In short, therefore, the fisheries administrator, wherever he is situated, should be one who has become familiarised in a general way with the best methods of scientific fisheries investigation, for, as Jordan has said: "All fisheries control must be based on scientific investigation." Further, he must be able to apply such knowledge to the immediate benefit of the commercial community without causing permanent harm to the fisheries.

FISHERIES DEVELOPMENT.

Fisheries development may proceed in various ways, but, in any new fishery—and even in some of the older fisheries—experimental work should be carried out by the overhead authority, the State, with a view to ascertaining both the possibilities for commercial development and the steps that might be necessary for ensuring the fullest development and permanence of the industry. Such experimental work, to be of lasting value, should be in the hands of the fisheries economist, who will co-ordinate and correlate the information obtained.

Parallel with the regular fisheries investigation work—such as the testing of the various bottom and surface fishing grounds

with all forms of commercial fishing gear, the elucidation of seasonal, bathymetrical and geographical distribution, the rate of growth, food, etc., of economically valuable fishes, their food organisms—should be investigations relating to sea currents and temperatures, nature of bottom deposits, chemical constituents of the sea water, nature and volume of the plankton and other associated marine life, as well as a number of other related subjects of inquiry which properly appertain to a wide application of marine biology.

In all new grounds such as those of Australia, the prime need is the testing of the grounds with nets and lines as used in the fishing industry in other parts of the world. This needs strong emphasis, because there is a widespread impression among naturalists in this country that the kind of work that would be done at a marine biological station is of primary importance. This is not so, however, and all such work should be essentially contributory to the main field investigations carried out from vessels designed on commercial lines. We have already seen the revolutionary effect of the introduction of three commercial trawlers by the New South Wales Government in the year 1915. Notwithstanding that their work was initiated in the most chaotic period of the world's history—during the great war—the great outstanding fact which led to the planting of a permanent new industry, was that they were able to keep up a continuous supply of a valuable and necessary food commodity from an entirely new province. Thus was established a fishery industry which to-day employs no less than eighteen large steam vessels.

A similar development undoubtedly awaits fisheries tests in other avenues, provided that these are carried out on proper commercial lines. I particularly refer to the development of the surface fisheries—with fishes like pilchards, sprats, anchovies, marays, mackerel, Spanish mackerel, bonito, tunnies, etc.—and with the use of nets such as the purse-seine, the drift-net and surface meshing nets of various forms. So much may we expect from scientific development with commercial gear in this direction that I confidently expect that ultimately it will even outshine the trawling work itself: I mean by that, as I stated eighteen years ago in a paper entitled "The Future of Commercial Marine Fishing in New South Wales," that notwithstanding the brilliant future for bottom fishing in these waters, it is probable that the vast fisheries to be developed from the pursuit of our pelagic fishes will be far greater. But to ensure that this

shall come about within a reasonable period, it is necessary that the State should initiate the work at the earliest possible moment by experimental work carried out with suitable vessels and gear. That developmental work should be carried out at several points on the Australian coast line at the one time. This means that to ensure full success we must have the fullest co-operation between the various States of Australia and the Government of the Commonwealth.

This is a matter in which the Commonwealth Government should itself take the lead, both in regard to field and laboratory investigations, but the contributory work of each State should be on a well co-ordinated plan, and under the expert supervision of the scientific fisheries man.

The place of the public aquarium in advancing the marine biological phases of fisheries education is worthy of mention here. Undoubtedly in many parts of the world the public marine and fresh water aquaria are of the greatest utility where they are adapted for marine biological work. Naturalists in Sydney had hoped that the public aquarium at Taronga Park Zoological Gardens would have been of this order. In fact they were promised on many occasions that when the erection of this establishment was undertaken full provision would be made for its use by the fisheries investigator and marine biologist. One naturally took such assurances seriously as they were made publicly. Founding my remarks upon such public statements, as well as official assurances by letter from the late chairman of the Taronga Park Trust (a Government body), I mentioned the matter in my "General Report upon the Fisheries of British Malaya" (p. 152), where, after describing the intention to erect a "modern public aquarium" at Taronga, I said that "arrangements will be made for the carrying out of biological work at this aquarium."

But, alas, for such hopes! One could hardly have realised that when Sydney's public aquarium did at last materialise it would turn out to be the "world's worst example" of what a modern public aquarium should not be—for, unfortunately that is to be said with truth of this establishment, which is not only ill-designed and altogether "impossible" from the modern aquarium constructor's point of view, but has no provision for the carrying out of any fisheries or marine biological work. Nor can any alteration or modification of this structure—short of entire demolition and reconstruction—ever bring it up into the front rank of large public aquaria in the world. Yet it is

true, as has often been stated, that Sydney has unparalleled natural advantages for the establishment of a modern aquarium which might also be a useful adjunct in fisheries investigation and education.

I would like to conclude this short address by reiterating some remarks in an article on Australian Fisheries, contributed by myself to the Commonwealth *Year Book* for 1924.

The results already obtained show the necessity for a further pushing forward of fisheries investigation. Matters such as the occurrence and distribution of food fishes and other sea food organisms, the most effective and economic utilisation of both sea foods, and of those sea organisms or their products and by-products, which may be of use in the industries; schemes for conservation; the harmonisation of regulations (in the various States) surrounding identical or allied fisheries; the amassing and dissemination of general technical and biological knowledge of the fisheries; the exploration of new or little known fishing grounds; the testing of all kinds of fishery appliances; the co-ordination of oversight and of conservation work in the inland fisheries; and the carrying out of propaganda work in regard to fish and sea food consumption generally, are all worthy of attention by the State separately and conjointly working in concert with the Commonwealth.

But the work at every stage must be carried out under the guidance of experienced fisheries investigators whose primary aim will be to bring to the people of this country the fullest possible utilisation of their vast fisheries resources while safeguarding them for all time.

Extract from report of Hon. Librarian (Mr. G. G. Park).—
“The library is gradually being put in order. Another press has been bought to hold the Society’s journals, and these are more accessible than formerly. As soon as possible a catalogue of works, etc., in the library will be written.”

Members are respectfully reminded to take notice of Rule 4 of this Society, which reads: “All subscriptions shall become due on the first day of August, and shall be payable in advance.”

Indices to Vols. V. and VI. will be published shortly.

Owing to lack of space, several papers are being held for the next issue.—Editor.

AN EXCURSION TO BARRINGTON TOPS, AUGUST, 1928.

By MARY FULLER, B.Sc.

The plateau known as Barrington Tops is an extensive, isolated portion of the Mount Royal Ranges, a spur of the Great Dividing Range, running between Scone and Gloucester. The level plain surface of the Tops has an elevation of over 4,000 ft., many points reaching 5,000. This great flat area is dissected on all sides, making access difficult, with the result that the area is little known. Although it is possible to reach the Tops from Scone, climbing gradually from the north-west, the shortest route is from the Allyn and Williams Rivers. This necessitates a very steep climb for ten miles, through virgin country along a narrow bridle track.

Topography and Geology of the Area.

The topography of the Tops is peculiar in Australia—the characteristic ruggedness of the Blue Mountains is absent here, having rather the gently undulating, rounded aspect of the Kosciusko plateau. Evidence of slight glacial action is apparent in the wide U-shaped valleys, containing peaty sphagnum marshes, traversed by meandering streams; small moraines, alternating "gaps" and "basins," and abundance of granite, boulders and erratics. Swamps were observed at three distinct levels. The highest one approaching 5,000 ft., was circular in outline, with streams draining inwards from the slopes surrounding it. This bog had no outlet, the stream not yet having succeeded in cutting a gap through the wall of the basin. The lowest swamp, about 4,000 ft., was very extensive and crescent-shaped, due to the presence of a moraine in the valley. The Barrington River has captured this swamp, and is reclaiming the swampy area. Following the Barrington River downstream towards east-north-east, it is found to flow through a series of basins, containing marshes, and a series of narrow gaps between them, very similar to Spencer's Creek and the Snowy at Kosciusko. Numbers of smaller streams run from the hillocks down into the swamps. The grade of the river increases, about five miles from the first swamp, as the basins are left behind, and it approaches the edge of the plateau through a continuous gorge, flowing with a strong current over rapids and small falls. Granite appears to be the chief rock composing the Tops, but extensive flows and sills of basalt make the geology complicated.

In regard to the dissected country to the west of the plateau, the parallel valleys of the Allyn, Williams, Paterson, etc., point to the fact that this area has been block-faulted. Nothing short of block-faulting can explain the alternation of flat ridges and steep talus slopes as one proceeds up the spur between the Allyn and Williams.

The Allyn Valley and the lower country towards Eecleston consists of carboniferous tuffs, intermingled with basalt flows. The very steep grade of the rivers has made erosion rapid, bringing great quantities of material down into the valleys.

The Flora of the "Tops."

The climate of Barrington Tops is reflected in the flora. It is typically sub-alpine. From about 3,500 ft. above the Corker, snow-grass appears, and makes a uniform ground stratum all over the Tops. This plant, *Poa caespitosa*, is the most characteristic feature of the Tops vegetation, particularly on the valley slopes and treeless moraines. The Tops were visited in August, and late in July the area was covered with snow—in places over two feet deep. Although on the slopes the *Poa* was still bent down after the weight of snow, and the ends of the leaves were “scorched” and white, the bases of the plants were green and flourishing.

At the time, when it was recently seen, the vegetation between the clumps and tufts of *Poa* was scanty—chiefly mosses, a tiny *Leucopogon* and *Persoonia prostrata*—level with or lower than the *Poa* tufts. The cold westerlies, bringing snow and blizzards, do not allow of the persistence of many low shrubs or herbs all the year. There is a heavy summer rainfall on the Tops, and their appearance this August contrasted strikingly with that of last January. The greyish tones of the snow-grass were enlivened by the bright colours of numerous flowering annuals. *Stylidium graminifolium* attains a luxuriance which makes the Sydney form look poor and stunted. In the summer, the moors have a pink tinge in the distance, owing to the profuseness of this flower. Many dead spikes and fruits were noticed among the *Poa*. Another plant which reaches a surprising size and richness of colour in the summer is *Wahlenbergia gracilis*, which is almost as abundant as *Stylidium*. Yellow and white helichrysums and other composites, *Ranunculus* and *Scaevola*, make a mass of colour. Ground orchids are extremely abundant. The beautiful heliotrope *Diurus venosa* is most common. Several *Pterostylis* species, *Gastrodia sessamoides* and *Prasophyllum*

ruppii, grow among the grass. None of these were seen on the present excursion, being summer annuals.

The rounded hillocks on the plateau were covered with Eucalyptus forest. *Eucalyptus correacea*, *E. haemastoma* and *E. stellulata* were observed in these situations. The vast quantity of fallen timber and broken boughs testified to the severity of the recent blizzard. The Eucalyptus forest is very open, with a scanty shrub stratum of an undetermined *Acacia* and *Hakea*, and a broad coriaceous leaved *Lomatia*. The trees stopped at a line well above the swamp level, and the lower hill-



Top—Looking W.N.W. from the Allyn-Williams Divide.
Bottom—A Typical Swamp on Barrington Tops.

sides were covered with an *Epacris* (probably *Bawbawensis*), *Hakea*, *Olearia nunistri* and *Oxylobium ellipticum*, making a stratum above the *Poa*. *Acacia mollissima* grew in more sheltered parts of the forest. A small *Hovea* was already in flower

amongst the grass, and a very coriaceous and spiny *Smilax* was common.

Along the streams the flora was somewhat different. As they ran down the hillsides in small gorges these were more sheltered from the cold winds and bore a luxuriant semi-brush vegetation. *Athaerosperma moschatum* was the chief element here. Mosses and liverworts covered the stones and fallen leaves in this forest, and there was a dense ground flora of *Aspidium aculeatum* replacing the snow-grass. As the streams emerged on to the more open treeless tracts their bank vegetation altered. *Drimys aromatica* was the dominant, *Leptospermum stellatum*, *Callistemon palladeus* and a large *Prostanthera* occurring here also. Along the edge of the swamps *Lotus australis*, *Juncus* and *Gahnia* flourished. The rest of the swamp was covered with a clumpy grass, with deep holes between and reeds in the wetter places. Great deep patches and mounds of *Sphagnum* were also common. Peat is evidently being formed in these marshes, as in places where it is possible to stand on the grass the accumulation of vegetation beneath can be felt shaking and a hollow sound is produced by distant footfalls.

After the Barrington River leaves the swamps it passes through alternating patches of *Eucalyptus* and *Fagus* forest. *Fagus moorei* makes a dense, dark forest, difficult to penetrate. *Dicksonia antarctica* occurs in the valley here. There is no difference in the flora of the granite and basalt on the plateau—the nature of the plant associations in this upland area seems to depend entirely on aspect and exposure.

It is interesting to compare the flora of Barrington Tops with that of other elevated regions on the east coast of Australia. There is a similarity to Kosciusko in the snow-grass—*Eucalyptus correacea* association. But the snow-gum is taller and more luxuriant. This may be due, both to the higher latitude and the presence of basalt soil. The presence of *Drimys aromatica* and *Leptospermum stellatum* along the streams, and the ground flora of composites, epacrids, *Pimelia alpina*, *Veronica arenarius* and *Lotus australis*, is common to both regions.

Again the *Fagus* forest, the occurrence of *Callistemon palladeus* and *Epacris Bawbawensis* is a feature recalling the Tasmanian flora, and that of certain high country in Victoria. The occurrence of pure societies of *Dicksonia antarctica* (more stunted than usual) is also Tasmanian. An interesting point is found in the fact that the insect fauna is also reminiscent of Tasmania, and wombats are numerous.

Whilst resembling Kosciusko on the one hand and Tasmania on the other, the flora possesses an endemic element also. Many new insects have also been found on the Tops. The higher latitude and the basalt soil help to account for the Tasmanian element in contrast to the Kosciusko one. The climate, with its low temperatures and heavy rainfall and mists in summer, is said to be very like that of Tasmania. The long isolation probably accounts for the endemic element in the flora and fauna.

The Flora of the Allyn-Williams Divide.

Leaving the level country of the Tops and coming down the spur between the Allyn and Williams in a general south-east direction, one traverses a very well marked series of steep slopes and level flats like a giant stair-case. An examination of the flora along this route is instructive.

For some distance a *Poa-Eucalyptus* association is traversed, being fairly flat country. On the first steep slope this gives place to a dense shady *Fagus* forest. Not only is the soil of this vast talus slope, containing as it does much volcanic clay, more fertile, but the slope is protected from the westerly winds which sweep freely across the flats. Emerging on to another flat tongue above the Corker, the *Fagus* and ferns peter out suddenly, and an open *Eucalyptus*, snow-grass flora clothes the area. The snow-grass comes no lower than this (about 3,000 ft.), but is replaced by *Xerotes* and xerophytic shrubs on the lower flats. The upper part of the Corker bears also large patches of *Oxylobium ellipticum*, *Senecio* species and *Leucopogon lanceolatus*. As it slopes down to the next flat it is covered in a brush forest, rich in ferns. Tall Eugenias and giant Eucalypts with smooth pink boles are the chief trees. *Pteris umbrosa* covers the floor. The stunted Dicksonias of the Tops are replaced by numerous Alsophilas. A noticeable feature of the ground flora of this forest was the giant moss, *Dawsonia excelsa*. A curious little *Asplenium* with the habit of *Polypodium australis* was also noticed. Then below the Corker came another flat with *Eucalyptus haemastoma* and *E. pillularia*, and the accompanying xerophytic shrubs and grasses. *Caladenia carneae* and two *Pterostylis* sp. were found here also. A little lower, before the next steep slope with its dense brush, the *Eucalyptus* gave way to just an open forest of *Casuarina torulosa* and *Acacia floribunda*. This was between about 2,600 ft. and 2,300 ft. The next brush began with extensive patches of native raspberry. Here the beautiful corkwood, *Ackama Muelleri*, was in evidence,

and the native tamarind, *Diploglottis Cunninghamii*, appeared. It was noticeable that, as the patches of brush were lower on the spur, they became denser and richer in species. The next flat again bore *Eucalyptus*, but tree ferns were plentiful. On all these flats, on emerging from the shelter of the brush, the strong winds could be felt sweeping across.

The Allyn Valley Brush Forest.

From the ridge the turn down into the Allyn Valley was made, and then for the next five miles the track passed through dense luxuriant brush forest. This is true rain-forest jungle, with giant trees towering upwards to the light, abundance of epiphytes and lians. Great Eucalypts and Syncarpas are in evidence, but the tree which distinguishes this Allyn brush is that beautiful and priceless timber tree the Rosewood—*Diospyros*. Another member of the same family which flourishes here is *Synoum glandulosum*. It is not uncommon to see rosewoods being strangled by great figs, which have sent their roots down from the higher branches. The climbing *Ficus aspera* is one of the commonest lians. The family *Saxifragaceae* is represented by *Polyosma Cunninghamii*, and the more modern *Cunoniaceae* has many representatives, viz.: *Schizomera ovata*, *Wienmannia rubifolia*, *Ceratopetalum apetalum*, and the cork-wood, *Ackama Muellieri*. All these large trees are covered with tiers of *Asplenium nidus*, which is extremely abundant; *Platycerium bifurcatum*, *Asplenium falcatum*, the fronds of which reach several feet in length; *Polypodium scandens*, and masses of *Dendrobium* and other epiphytic orchids. A species of *Peperomia* flourished also in the forks of trees, and many branches were festooned in streamers of moss. The dense shade from the tree stratum did not allow of a very thick under-growth. The stinging tree, *Laportea gigas*, with great drooping soft leaves did not fail to attract attention, whilst the Cunjevoi, *Colocasia macrorhiza*, was always conveniently nearby. The related *Elatostemma reticulatum* was profuse, and *Urtica incisa* flourished on the outskirts of the brush. Of the trees not already mentioned, *Litsea dealbata*, two large Eugenias, *Tristana* and *Brachychiton*, were conspicuous. The smaller trees and shrubs forming a stratum below the tall timbers included: *Duboisia myaporoides*, *Backhousia myrtifolia*, *Rhodamnia trinervia*, *Eupomatia*, *Hedycearya*, *Palmeria scandens*, *Psychotria loniceroidea* and *Drimys dipetala*. The creeper, *Dioscorea transversa*, with its curious fruits was universal, and the great

llian, *Vitis hypoglaea*, grew from tree to tree. *Trochocarpa laurina* was another common shrub. On dead logs mosses and fungi were in abundance. Even the shrubs and larger creepers had their vesture of epiphytes, *Polypodium confluens* being abundant. Of the filmy ferns a large *Hymenophyllum* was noted. Along the creeks liverworts and mosses abounded, and the creeks themselves contained the red alga, *Batrachospermum*, in large quantities.

It is interesting to compare the floras of the Allyn Valley and Barrington Tops. The rainfall is uniformly high and the soil is practically the same, yet what a vast difference is found in the vegetation of these two regions, only a few miles apart. The rise of four thousand feet from the valley to the plateau is equal to bringing the latitude much farther south, and we get the flora of Tasmania. The drop from the Tops into the Allyn with its rich basalt soil, heavy rainfall, shelter and humidity gives one the flora of Malay. There could be no more striking contrast than that found in the cold moorlands, with their snow and blizzards, covered with sub-alpine heath, and the humid Allyn brush with its giant rain forest trees and thin, broad leaved shrubs.

The Lichen Flora.

The lichen flora of Barrington Tops is of intense interest, not only because it offers a new (not having been previously examined), but also because it furnishes further evidence to that of the Phanaerogamic flora and the fauna of a distinct Tasmanian element.

Large foliaceous lichens were not expected at this high elevation, but they were found in great abundance in the Athaerosperma and Fagus forests along the Barrington River, and even in the Eucalyptus forest on the hills.

Sticta Billardiera was the most abundant foliaceous lichen on the Tops. It grew in the shady forest along the Barrington River, on the branches and twigs of shrubs and small trees. It did not extend into the brush below the Corker—that is, it was not found below 3,500 ft., being replaced in the brush at low altitudes by the very similar *Lobaria pulmonaria*. *Sticta Billardiera* has a restricted distribution in New South Wales, only having been found at the head of the Bellinger River previously. It occurs all over Tasmania.

In association with this *Sticta* there occur two members of the *Peltigeraceae*, *Nephroma antarctica* and *Nephromium cellu-*

losum. The distribution of these is curious—they have not been recorded from New South Wales before, but all the specimens so far obtained have been from Tasmania. It is interesting to note that *Nephromium* with its blue-green algae and *Nephroma* with its bright-green, grow closely intermingled. All of these lichens possess a thick, plectenchymatous upper cortex—no doubt a response to the conditions at this altitude.

Sticta Freycinetti is fairly common on trees in slightly more exposed situations and has a distribution—Barrington, Mount Wilson and Tasmania. Of the *Parmeliaceae*, *Parmelia placaradioides* is found on dead twigs along the river in more open forest. This lichen is common at Kosciusko, on the Snowy. Another *Sticta* which is found on the hillsides is *mougeotiana*, which also occurs at Mount Wilson in the exposed Eucalyptus forest. This *Sticta* has a denser, more compact growth than those in the *Fagus* brush.

The granite buns and boulders on the Tops were covered with crustaceous and small foliaceous forms, and the dead wood was a mass of tiny corticolous lichens.

Coming down into the brush on the Divide, the lichen flora altered just as appreciably as the Phanaerogamic vegetation. The last patch of *Sticta Billardiera* was seen at 3,500 ft. on a large tree in the *Fagus* forest. In the brush below the Corker, *Lobaria pulmonaria* appeared. This is strikingly similar to the abovementioned *Sticta*, so much so that from the upper surface one could not distinguish them. They are both bright green, containing *Protococcus gonidia*, and are deeply indented. The *Sticta*, however, bears no isidia, whilst *Lobaria* is markedly isidiose.

On mossy rocks and trees *Sticta fossulata* and the large bluish *Sticta suborbicularis* were fairly common. The last-named lichen is found also in the Mount Wilson brush. In the Allyn brush, *Lobaria pulmonaria* var. *papillaris* is extremely abundant. Every large tree has a clump of this lichen, sending out horizontal fronds covered with isidia. It is growing in dense shade, and the isidia are doubtless a response to feeble light conditions. This lichen has well developed powers of absorbing moisture from the air. On a hot afternoon, after a dry day, the thallus is stiff, brittle and grey. In the morning after the temperature has fallen during the night, the thallus is soft, flexible and brilliant green. Crustaceous lichens are absent in the brush forest, since rocks are not exposed, any boulders being densely covered with moss and fern.

LAVENDER.

(Abstract from Lecture given by C. Keith Denny.)

There are different species of lavender, but only one, *Lavandula officinalis*, produces the oil suitable for the finest perfumery. The principal ingredient of the odour of lavender is Linalyl acetate.

Spike lavender, *L. spica*, may be distinguished from *L. officinalis* by its strong camphoraceous odour, by its flower stems which have flower spikes at right angles to the main stem, and by its bracts, which are linear in shape, and practically narrow triangles.

In *L. officinalis* the flower stems differ, in that side shoots, if any, run parallel to the main stem; its bracts are broad and rhomboidal in shape, and its perfume is sweet and fresh. *L. officinalis* grows naturally in some twenty districts of France, extending from an altitude of 3,000 feet up to 12,000 feet. *L. spica*, on the other hand, begins at sea level, and reaches an altitude of 3,000 feet. Here the two species mingle, and hybrid



Lavender Growing at Bridestowe, Lilydale, Tasmania.

plants begin to spread up and down the slopes. Lavender plants were carried to England by refugees, when the edict of Nantes was revoked in 1685.

In order to ensure, as far as possible, the introduction to Australia of *L. officinalis*, three months were spent in the French Mountains, in finding a place where this species was growing by itself, with a minimum risk of its seed being crossed by the "spike" variety, *L. spica*. It was then necessary to grow it for three years before it yielded sufficient flowers to permit experimental distillations.

An analysis of these distillations, made from plants grown at Bridestowe, Lilydale, Tasmania, has since been carried out, proving conclusively that the oil was from pure *L. officinalis* plants, and contained 44.1 per cent. esters as Linalyl acetate.

Forty per cent. esters is sufficient to place an oil in the front rank of the world's leading lavenders.

A COMMENT.

Some interesting comments have been received from Mr. A. H. Chisholm, with reference to the article, "Birds and Their Nests," by Miss Joyce Heyner, in Vol. 7, Part 6, page 118, of this Journal, as follows: Re skylarks (page 118, line 20 from bottom), Mr. Chisholm states.—"No lark, whether introduced or native, nests elsewhere than in grass. The birds referred to were probably wood-swallows (*Artamus*)."

Re "The diamond sparrow's (Ground diamond) nest" (page 119, line 9 from top).—"This reference is to one of the pardalotes (diamond-birds). The term 'diamond sparrow' is usually applied to a finch."

Re "the English robin" (page 119, line 5 from bottom).—"There is no English robin in Australia. Our robins are much more varied and radiant than those of Britain."

Re "The Blue Wren" (page 120, line 12 from top).—"Here the wren is apparently confused with the yellow-tailed tit, which is renowned as the builder of a 'double-decker' nest. It is very doubtful if any Australian hawk ever ravages a small bird's nest."

Re "The Wattle Bird?" (page 120, line 11 from bottom).—Mr. Chisholm mentions that "The wattle birds are not little, their nests have no 'pockets,' and the sitting bird is never hidden."

EXCURSION TO THE BOTANIC GARDENS.

Under the leadership of Mr. J. Stovold, foreman of the Botanic Gardens, a small party of enthusiasts spent a most interesting and instructive afternoon in June amongst the plants. Owing to the inclemency of the weather most of the time was spent in the glass-houses, but in the little while outside, however, numerous indigenous trees and shrubs, together with many exotic species, were noted and examined.

The first glass-house visited contained mostly varieties of palms and *Dracaena*, to which a very effective touch of colour was given by the introduction amongst the foliage plants of a dwarf red-flowered *Plumbago*. Some fine *Croton*, *Bilbergia*, and in hanging baskets, *Nephrolepis* spp., were seen. The next house visited contained mostly crotons, with beautiful leaf colourings, together with other plants noted for remarkable shape, colour and veinings of their leaves. In hanging baskets *Davallia* sp. were seen.

In the orchid house, although not at its best, were beautiful specimens and varieties of *Cypripedium*, *Cymbidium* and *Dendrobium*. In another house were seen *Anthurium*, *Dracaena*, *Cordyline*, *Alpinia*, *Pandanus*, and in hanging baskets *Polypodium* species. A most interesting insectivorous plant, *Nepenthes*, was also seen in flower.

Various stages in the propagation of ferns from spores, Begonias from leaves, cuttings of *Hibiscus*, *Bougainvillea*, *Ficus*, etc., were also observed. At the conclusion of the inspection, Mr. Stovold was cordially thanked for his interest on our behalf.

ANT LIONS.—At the July meeting, Mr. Luke Gallard exhibited a large adult Neuropteron, belonging to the genus *Acanthaclisis*, which differed from any he had previously seen. A pupal cocoon, about the size of a large marble, of *Acanthaclisis fundata* was also exhibited.

Mr. Gallard stated "that the interesting larvae of these large 'ant lions' do not make pits in the sand as do most of the commoner species, but move about freely under the loose sand around the butts of old trees, etc., where they are likely to obtain other smaller insects for food. When collecting, one has to be very quick to grasp them on sight, as only a few seconds are necessary to enable them to completely bury themselves in the sand again."

NATURALISTS' SOCIETY OF NEW SOUTH WALES.

Proceedings.

JULY, 1929.

The ordinary monthly meeting was held in the Assembly Hall, Department of Education, on July 2, 1929.

Mr. A. E. Watson (vice-president) in the chair.

Rent of Room.—By arrangement with the Royal Zoological Society, the Council will meet in its room, Bull's Chambers, Martin Place, at a nominal rent.

Correspondence.—The Premier of Queensland replied, saying that in view of the widespread unemployment existing in his State, the Government had decided to proclaim an open season for opossums for one month from July 8, 1929.

The Under-Secretary, Department of Local Government, wrote, forwarding copy of the Proclamation of June 5, 1929: "Wild Flowers and Native Plants Protection Act." This covers the whole of the State of New South Wales for the period July 1, 1929, to June 30, 1930, inclusive. The following flowers and plants are protected:—

Boronia serrulata, Native Rose; *B. floribunda*, Pink Boronia; *B. pinnata*, Pinnate Boronia; *B. anemonifolia*, Sticky Boronia; *B. ledifolia*, Red Boronia; *B. microphylla*, Small-leaved Boronia; *B. thujona*, Scented Boronia; *B. mollis*, Soft Boronia; *B. Fraseri*, Fraser's Boronia; *B. safrolifera*, Safrol-scented Boronia; *Blandfordia nobilis*, Christmas Bells; *B. flammea*, Christmas Bells; *B. grandiflora*, Christmas Bells; *Actinotus Helianthi*, Flannel Flower; *Telopea speciosissima*, Waratah; *Ceratopetalum gummiferum*, Christmas Bush; *Platycerium grande*, Stag Horn; *P. bifurcatum*, Elk Horn; *Dicksonia antarctica*, Tree Fern; *Alsophila australis*, Tree Fern; *A. Cooperi*, Tree Fern; *Alsophila Leichhardtiana*, Tree Fern; *Todea barbara*, Tree Fern; *Dendrobium speciosum*, Rock Lily; *Eriostemon Crowei*, Bright-pink Eriostemon; *E. lanceolatus*, Wax Plant; *E. trachyphyllus*, Blunt-leaf Wax Plant; *E. myoporoides*, Native Daphne; *Callistemon lanceolatus*, Red Bottlebrush.

Candidate.—Miss E. E. Gray, "Norwood," Kirribilli Avenue, Kirribilli.

Excursion.—Mr. Clay read a very interesting report on the outing made to the Botanic Gardens on Saturday, June 29.

Press Reports.—A discussion took place upon the desir-

ability of forwarding to the press reports of the proceedings of the Society's meetings.

Welcome.—A welcome was extended to Professor Dakin, of the Department of Zoology at the Sydney University.

Exhibition of Specimens.—Mrs. S. A. Howell, specimen of mistletoe (*Loranthus* sp.). Bentham mentions that this large genus is almost wholly tropical or subtropical in America, Africa and Asia, with one species as far north as the south of Europe. Of the 15 Australian species, one is common in Asia; another extends into Timor, and perhaps over several of the islands of the Indian Archipelago; the remaining 13, as far as hitherto ascertained, are endemic.

Mrs. Fitzjohn.—Specimen of Irish strawberry (*Arbutus*, sp.).

London mentions that *Arbutus* is derived from an ancient name, said to be traceable to the Celtic *ar boise*, meaning austere bush, in allusion to the roughness of the fruit. This genus includes one of the most elegant of hardy shrubs, namely, *A. unedo*, W. This evergreen is peculiarly beautiful during the late autumn, being covered with blossoms and ripe fruit.

Mr. Luke Gallard.—Specimens of an Ant Lion and its cocoon.

Lecture.—Mr. W. B. Gurney, B.Sc. (Government Entomologist) gave a very interesting, illustrated lecture, entitled: "Some Remarks, chiefly Entomological, on his Trip to Hawaii, United States and England," and for which he received a hearty vote of thanks, which was passed by acclamation. Messrs. White and Booth very kindly officiated at the lantern.

Treasurer's Statement.—Mr. John Powell tabled his statement of receipts and expenditure, which showed a credit balance in the bank of £86/16/5.

AUGUST, 1929.

The annual meeting was held in the Assembly Hall, Department of Education, on Tuesday evening, August 6, 1929.

The President (Mr. David G. Stead) presided.

The Hon. Secretary (Mr. R. A. Black) read his report, which referred to the activities of the Society during the past year. (It is printed on page 170).

The Hon. Treasurer (Mr. John Powell) read his financial statement, which showed a credit balance of £82/10/8. (It appears on cover III.).

The Hon. Librarian (Mr. George G. Park) read his report, giving particulars of the general state of the library.

The President delivered a very interesting and informative address, entitled: "Marine Resources and the Naturalist."

Office-bearers for 1929-30:—

President: Mr. David G. Stead.

Vice-Presidents: Messrs. W. W. Froggatt, F.E.S., A. E. Watson, and E. Gostelow.

Hon. Treasurer: Mr. John Powell.

Hon. Secretary: Mr. Raleigh A. Black.

Hon. Assistant Secretary: Miss Dolce Dobbin.

Hon. Librarian: Mr. G. G. Park.

Hon. Editor: Mr. E. H. Zeck.

Hon. Lanternists: Messrs. G. White and A. Booth.

Council: Misses H. McAnene, L. Steinbeck, and Mrs. S. A. Howell, and Messrs. Luke Gallard, A. G. Hamilton, P. E. B. Barnett, M. E. Gray, and R. H. Anderson, B.Sc.

New Member.—Miss E. E. Gray.

Candidates.—Mr. Colin R. Chapman, c/o Tasmanian Tourist Bureau, Martin Place; Miss E. Warren, and Miss H. Leving, c/o Women's College, Newtown.

Geological Excursion.—Mr. H. R. Harrington reported upon the excursion made to Bondi, under the leadership of Miss Heather Drummond, B.Sc., on July 27 last, and showed some interesting slides of Hawkesbury sandstone and quartzite under his microscope.

Exhibition of Specimens.—Mr. M. E. Gray, a collection of native ornaments and weapons obtained from "boys" employed on Bali plantation, Witu Island, New Guinea, including Muruk and Obsidian daggers, grass arm bands, hair combs, pig's tusks, and wheel or hoop money.

Mr. Luke Gallard.—Collection of different coloured Emperor moths and Jewel beetles.

Professor A. J. Abbott.—Box of butterflies from subtropical climate, and specimen of Resurrection Plant.

Mrs. S. A. Howell.—Specimens, showing life-history of *Darala*.

Mr. G. G. Park.—A walking stick, and specimen of Honey-flower, showing fasciation.

REPORT OF HON. SECRETARY.

For the Year ended July 31, 1929.

It is with much pleasure that I submit my annual report for the past year, and to record that highly interesting and profitable meetings have been held, as well as enjoyable excursions, which were made to several parts of the State, easily visited in an afternoon.

Altogether ten ordinary meetings and ten Council meetings were held, at which there were always satisfactory attendances.

The following lectures and lecturettes were given:—

Mr. H. R. Harrington, on "Bird-life and Vegetable-life in and about the Islands of the Capricorn Group and the Great Barrier Reef." Illustrated.

The President, Mr. David G. Stead, on "The Birth, Life and Discoveries of Captain Cook." Illustrated.

Professor O. U. Vonwiller, President of the Royal Society and Professor of Physics at the Sydney University, on "Modern Advances in Physics."

Mr. Walter W. Froggatt, F.E.S., F.L.S., on "The Fight Between Men and the Insects."

Mr. James Nangle, F.R.S., on "Astronomy." Illustrated.

Miss H. Drummond, B.Sc., on "Scenery from the Geological Standpoint." Illustrated.

Dr. R. J. Noble, Biologist to the Department of Agriculture, on "Plant Diseases." Illustrated.

Professor T. Thomson Flynn, D.Sc., Ralston Professor of the Tasmanian University, on "A Naturalist in Tasmania." Illustrated.

Mr. Walter W. Froggatt, F.E.S., F.L.S., on "The Insect Fauna of the Mallee Scrub on the Lower Murray River," illustrated by a fine collection of insects, and on "John William Lewin, the First Naturalist in Australia, 1800 to 1819."

Mr. C. Keith Denny, of "Bridestowe," Lilydale, Tasmania, on "The New Lavender Industry in Tasmania." Illustrated.

Mr. W. B. Gurney, B.Sc. (Government Entomologist), on "Some Remarks, chiefly Entomological, on his Trip to Hawaii."

Excursions were made to the undermentioned places:—

To the Quarantine Station Grounds (Botanical and Geological), under the leadership of the President, Secretary and Miss Hilda C. Butler.

Epping (Entomological, Geological and Botanical); under

the leadership of Mr. Luke Gallard, Mr. G. D. Osborn, B.Sc. (now Doctor), and R. A. Black.

De Burgh's Bridge (Botanical), in conjunction with the Social Committee of the Workers' Educational Association, under the leadership of the Secretary.

Upper Reaches of Middle Harbour, per motor launch, under the leadership of the Secretary, assisted by Mrs. Heyner.

National Park (Forestry), under the leadership of Mr. M. B. Welch, B.Sc., Economic Botanist of the Technological Museum.

The Zoological Gardens, Taronga Park, under the leadership of Mr. A. S. Le Souef, the Director.

Bondi (Geological), under the leadership of Miss Heather Drummond, B.Sc.

Botanic Gardens, under the leadership of Mr. J. Stovold, foreman of the Botanic Gardens.

New Members.—During the past year, 23 ordinary members and 2 country members were elected.

Life Member.—Miss Florence Sulman was unanimously elected a life member, and complied with the rules of the Society.

Deaths.—We have to record with deep regret the death of the following members:—

C. J. White, Hon. Lanternist.

R. H. Cambage, C.B.E., Naturalist.

Miss Parkes, daughter of the late Sir Henry Parkes.

A. A. Hamilton.

Miscellaneous.—Miss Steinbeck very kindly assisted in the compilation of the indices of the "Australian Naturalist." The Council greatly appreciates Miss Steinbeck's services in this direction.

In conjunction with the Workers' Educational Association's Summer Holiday School, held at Newport during the Xmas and New Year holidays, some of the members accepted the Association's invitation, and experienced a very enjoyable and profitable outing.

Mr. P. E. B. Barnett, member of the Council, was granted six months' leave of absence to visit the Old Country and the Continent. Mr. Barnett has since returned and given members interesting particulars of his trip abroad.

Miss Rita Thurston; having been promoted to the Infants' Public School at Parkes, Miss Dolce Dobbin was unanimously

elected Hon. Assistant Secretary in her place, and her excellent help has been greatly appreciated.

Mr. G. G. Park was unanimously appointed Hon. Librarian in place of Mr. Samut, resigned. Miss Clare Tarrant was also elected Hon. Assistant Librarian.

In the past the Society was fortunate in obtaining the free use of Dr. Waterhouse's room, in Bull's Chambers, Martin Place, for its Council meetings, but since the Royal Zoological Society has taken it over it has become necessary for our Society to pay a small fee as rent.

We wish to record our best thanks to Mr. G. White for so generously acting as Hon. Lanternist in place of his late father, who similarly so ably acted for many years.

As an emergency officer, Mr. A. Booth is now working with Mr. White. His services will be of great use to the Society, and for which we record our grateful thanks.

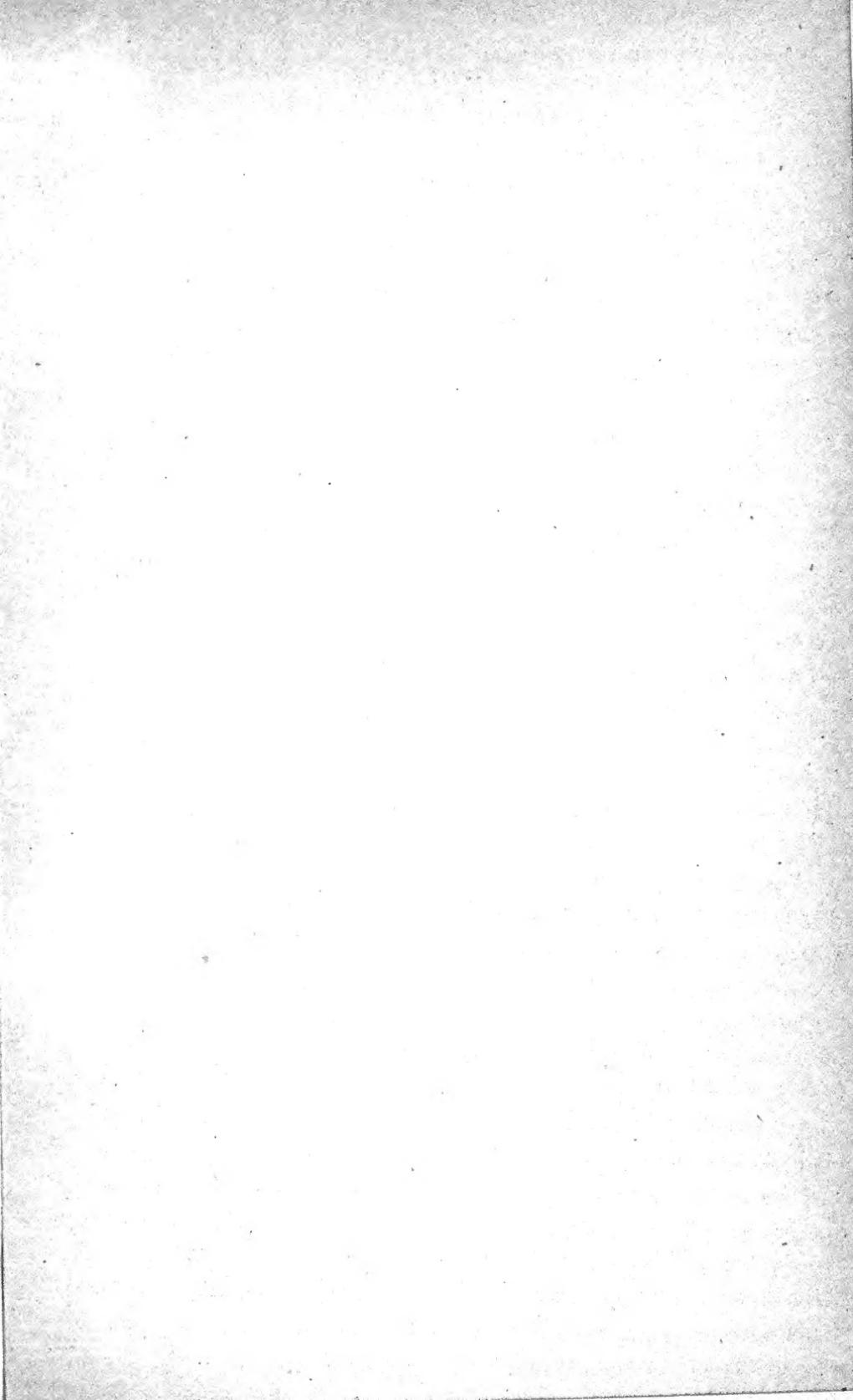
REVIEW.

Another handbook of the "Flora of South Australia" has recently been issued by the British Science Guild (South Australian branch). This constitutes Part IV., Bignoniacae—Compositae (pages 515-745), and is from the pen of Mr. J. M. Black, Hon. Lecturer in Botany, University of Adelaide. The whole work, which contains numerous line illustrations, drawn by the author, is presented in a very lucid manner; the name of each species listed standing out distinctly from the general text.

The complete index of scientific names, to all parts published, is followed by an index of popular names, whilst a list of authors' names and abbreviations is also included. A section of some thirty-three pages has been devoted to additions and corrections, which have become necessary, since the publication of the earlier parts; Part I. being issued in 1922.

The information given will be found of great use to botanists, generally, as numbers of the species dealt with are not confined to South Australia, but occur over the Australian continent and elsewhere. The work is greatly enhanced by the numerous valuable and clear keys to both genera and species. It is indeed a very valuable and welcome addition to the library of any student of botany.—Editor.

END OF VOLUME 7.



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