# The South Australian Naturalist

The Journal of the Field Naturalists' Section of the Royal Society of South Australia.

Adelaide


Nov., 1925

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The authors of papers are responsible for the facts recorded and opinions expressed.

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## FORTHCOMING EXCURSIONS

November 14—Millbrook. Eucalypts and Aquatic life. Leader, Mr. Wm. Ham. Charabanc 1.30 p.m. Book at least 5 days before with Mr. Beck.

November 28—Basket Range. Gardens and Trees. Leader. Mr. W. Burdett. Charabanc, 1.30 p.m. Book at least 5 days before with Mr. Beck.

December 12—(Note alteration of date). Dredging. Leaders, Prof. Harvey Johnston and Mr. H. M. Hale. Train to Outer Harbour, 1.35 p.m.

1926.

January 30—Dredging. Leaders, Messrs W. J. Kimber and W. H. Baker Train to Outer Harbour, 1.35 p.m.

## EVENING LECTURES.

November 17—(Note corrected date). Mr. Walter Gill, F.L.S., F.R.H.S., formerly S.A. Conservator of Forests will give a well-illustrated lecture on "Forest Scenes."

The

# South Australian Naturalist

Vol. VII. NOVEMBER, 1925. No. 1.

## FLINDERS CHASE.

The Fauna and Flora Board are to be congratulated on the energy they have put into the work of restoring the Chase and on the success which has attended their efforts. The Chase promises to be not only of immense scientific value but a source of revenue as well. To the pioneer members of this society, especially to Mr. Dixon, Mr. W. Selway, Captain White and others is due a great deal of credit for in the inception, advocacy and foundation of the Chase. It seems a great pity that our section is not represented on the Board. Our Chairman, Mr. Bailey, would make a useful member. It is to be hoped that the Board will be able to do something for forestry, especially in the north-west corner of the island.

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## "FLORA OF SOUTH AUSTRALIA"

Our readers will be pleased to know that Part III is now in the hands of the Government Printer and that the work on the final part is well advanced. Mr. J. M. Black is to be congratulated on the whole work. The new part will include the families from the *Euphorbiaceae* to the *Epacridaceae*.

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Members are reminded that the new year began on October 1st and subscriptions for the current year are now due. The amounts may be sent to the Hon. Treasurer, Mr. F. Trigg, Government Printing Office, Adelaide, or may be paid to Mr. B. Beck at Cole's Book Arcade, Rundle Street, City.

## THE FORTY-SECOND ANNUAL REPORT OF THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF S.A. (Inc.) FOR YEAR ENDING 31st AUGUST 1925.

The Committee has pleasure in presenting the annual report and to congratulate members on another successful year.

EXCURSIONS. The Excursions have been held on an average once a fortnight throughout the year and have been well attended. Places of interest around the metropolis have been visited and several districts further afield have been journeyed to by charabanc and by train.

LECTURES. Our schedule of lectures has been well maintained. Some were given in the Lecture Room illustrated by lantern slides and were of a semi-public nature while others were given in the Royal Society's Room and were illustrated by lantern slides.

SHELL COLLECTORS' COMMITTEE. Through the enthusiasm of Mr. W. J. Kimber this committee has been formed and was successfully inaugurated in July. Mr. Kimber is chairman and Mr. F. Trigg is Secretary. The membership totals 20. Meetings are held on the first and third Monday in each month and excursions are held on alternate Saturdays with the Section.

"THE SOUTH AUSTRALIAN NATURALIST" Our journal completes volume VI this year and continues to be published quarterly under the Editorship of Mr. Wm. Ham.

EXCHANGES. Among the new exchanges are The Academy of Sciences, Philadelphia and The Natural History Museum, Warsaw, Poland.

FLOWER SHOW, 1924. This Show was the best yet held from the point of view of exhibits. Teachers and scholars of many public schools came to our aid and forwarded a fine assortment of flowers and each school's exhibit was kept separate and labelled. Inter-state Nature Clubs forwarded parcels of flowers. Many other branches of natural history were represented and many members worked willingly and made the fixture a success. The net balance was £35/18/-.

HERBARIUM COMMITTEE. The members of this committee have met on numerous occasions at Prof. Cleland's rooms where the herbarium is stored. A number of parcels of specimens were received from various contributors and the work of classifying is steadily progressing and more boxes and labels have been purchased. Apart from the Tepper Herbarium we now have about 1,800 specimens.

MEMBERSHIP. The total number of members at the beginning of the year was 217 and 27 new members have been admitted. Resignations and deaths total 60 so that 184 is the present total of members.

OBITUARY. It is our sad duty to record the loss of Mrs. W. Champion Hackett, who had been a member for many years. Mrs. Hackett always took a special interest in our Wild Flower Shows and her loss will be keenly felt. Another old member in the person of Miss M. L. Benda died just prior to the annual meeting and her loss to the Section will be much felt. Miss Benda was a member for many years and was always an enthusiastic worker. The Committee extend to the relations their deepest sympathy in the loss of two valuable workers.

LIBRARY. The addition of several fresh volumes to our Library would be much appreciated by those members, who, consistently patronising it, have read practically all the books. As it is hoped that the library will be adequately housed in the near future, we appeal for further books to afford a wider scope in reading to the members.

(Signed) E. S. HUGHES, Chairman.
ERNEST H. ISING, Hon. Secretary.

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## FLORA AND FAUNA PROTECTION COMMITTEE.

The thirty-seventh annual report is presented.

A severe blow was dealt by the Government to the water birds when the close season for duck was curtailed by opening it on December 21 instead of February 1. Immediately after the news of this alteration came to hand the committee met and protested strongly by letter to the Premier and asked that action be reconsidered. The committee in conjunction with members of the Section met on May 21 to confer with several citizens interested in nature who were anxious to form a Nature Lovers' League. After discussion the meeting adjourned for the purpose of allowing the proposers of the League to place definite information before the committee.

The committee again met on August 11 to discuss the proposed alterations in the sancturaries on the Coorong. It was considered by some members that by withholding the protection of the foreshore immediately opposite Pelican Island it would be laying open the unique breeding-place of the pelicans to greater molestation. It was resolved that three of the members confer with other scientific bodies on the matter.

In spite of vigorous protests the destruction of our native trees and plants is still going on upon our roadsides and elsewhere. This is greatly to be deplored seeing that with the trees and plants must inevitably disappear so much of our bird, animal and insect life.

(Signed) S. A. WHITE, Chairman.

MARIE L. BENDA, Hon. Secretary.

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## FLINDERS CHASE.

The effects of trade interests on the fauna and flora of Kangaroo Island, are such that one has now to go a long way from settled areas to find virgin conditions. The trapping of animals for pelt and fur has, during the past few years, attained such proportions that a halt has been called with a view to permitting some recuperation. No such legislation however exists in respect to the wonderful grass trees or black boys (*Xanthorrhoea*) and the cutting of the trees, with their incidental destruction, now necessitates a journey of 40 miles or so from Kingscote, all the intervening supplies having been exhausted. When forest trees are cut the planting of new timber becomes the question of the moment, such planting however is not required in the case of the grass trees or yuccas, for seedlings there are in plenty. The disturbing element in their case is the extremely slow growth, for except with the youngest plants, half an inch a year would possibly be a liberal estimate and ten minutes or less will suffice to utterly destroy a tree that has lived for may be 80 or 100 years. With a few strokes of the axe the gummer will strike off the glorious crown of leaves and reduce the quaint looking trunk to an angular stump, a pitiful relic of a once interesting botanical subject. This commercialism must apparently go on until, except in protected areas, the grass tree, as a profitable object of exploitation, is no more. It is refreshing therefore to turn to the conditions on Flinders Chase where for all time the grass tree will grow by millimetres, will raise its marvellous flowering spike to

a height of 16 feet or so and attract thereto the beautiful parrakeets which clamber up and down, their bright scarlet plumage forming the most remarkable contrast to the vivid green foliage of the plant. Here also are the kangaroo, wallaby, opossum and native porcupine, safe from the snare of the trapper; here also is the native bear, the rat Kangaroo and others, introduced from the mainland and given sanctuary.

Not to-day perhaps, but in the distant future the splendid heritage will be appreciated.

E.R.W.

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## A SUGGESTED AQUARIUM FOR HENLEY.

The eighth annual meeting of the South Australian Aquarium Society was held on November 3rd; the annual report showed that members had again spent an active session. An Aquarium had been installed at the All Australian Exhibition, and had attracted many visitors.

Some time ago the Society made an endeavour to stimulate public interest with a view to establishing an Aquarium at Glenelg, a project which was reluctantly abandoned owing to lack of sufficient support. At the meeting Mr. Edgar R. Waite announced that he had had several interviews with Mr. Yeomans, Town Clerk of Henley Beach and Grange Municipal Council, with a view to advancing the expressed desire of the latter to erect a Public Aquarium on the foreshores at Henley Beach. The meeting unanimously decided to wholeheartedly assist the President in supporting Mr. Yeomans.

The following officers were elected for the ensuing year:—President, Mr. Edgar R. Waite; Vice-presidents, Messrs J. W. Goodale and T. Nettlebeck; Committee, Miss Roeger and Messrs B. B. Beck, F. K. Boase, R. Carpenter and J. W. Hosking; Auditor Mr. A. E. Wadey; Secretary and Treasurer, Mr. Herbert M. Hale.

HERBERT M. HALE, Hon. Secretary.

## SHELL COLLECTORS' CLUB.

Bivalves have been further investigated during the quarter, and members are indebted to Sir Joseph Verco for his invaluable assistance in giving the Club access to his revision of South Australian Bivalves. The completion of this work should do much towards clearing up many doubtful points, and place our new shell students in a much more satisfactory position. Among the specimens dealt with were:—

*Laternula creccina,* formerly *Anatina;* and *Cochlodesma Angasi.*

The *Anatina* take their name from a fanciful resemblance to the spoon-shaped duck's bill. They are silvery-white, fragile, toothless-hinged shells, with a prominent gape, which permits the exit of the large siphon. *L. creccina* may be found in the mud flats of the Port Adelaide River. *C. Angasi* is a more rotund shell, with many of the characteristics of the former. Splendid living specimens have been collected by our members on the beaches of Yorke Peninsula.

*Crassatellites Kingicola.* This the largest S.A. bivalve, and specimens were shown weighing up to 9 or 10 ounces. Of very massive construction, it has glistening white, porcellaneous interior tinged with salmon. The shell carries a thick brown, periostracum, usually abraded at the umbo. The animal adds immensely to the thickness of its valves during adult life at the expense of a general contraction of its living space. Many subfossil valves of this species have been collected at the Outer Harbor. It is found alive at Port Lincoln and may also be dredged in a restricted area in other parts.

*Bassina Disjecta* (formerly *Cytheria*) is our most beautiful bivalve, and much sought for cabinet exhibition and foreign exchange. It is obtainable at Kangaroo Island, Port Lincoln and occasionally at the Outer Harbor. Its prominent, symmetrical and delicately ridged valves no doubt play an important part in anchoring it safely in the sand from the effects of tide wash.

*Ephippodonta Lunata.* This small bivalve lives exclusively in the burrow of a certain prawn, with its half-moon valves permanently opened out flat, and, with a living sponge at the door of the burrow, all live in an apparently happy state of commensalism—each dependent on the other. This species collected near Edithburgh and at Port Willunga, was described and named by the late Professor Tate.

November 12th, 1925. F. TRIGG, Hon. Sec. Shell Club.

## NATURE LOVERS' LEAGUE.

First Public Meeting.

After many years of self-denying work in behalf of the fauna and flora of Australia, Mr. T. P. Bellchambers had the satisfaction on Friday of knowing that the foundation he had so carefully and efficiently laid, was at last ready for the "building" of a public organisation. The Lord Mayor's reception room at the Adelaide Town Hall, was well attended on the afternoon of October 16, when the first public meetng was held. As a result the Nature Lovers' League of South Australia was officially formed, and initial steps taken to increase the scope of the work. Mr. N. H. Taylor occupied the chair.

Mr. Taylor said that about £200 had been raised to assist the sanctuary work at Humbug Scrub, but they needed much greater assistance. The Chairman said there was not the slightest antagonism to any association having the same objects; for they realised the great work other associations were doing. The Field Naturalists' Section, for instance, was doing excellent service. But they all felt despite the labour of kindred associations that there was still a great deal to be done in educating children to love Nature and to have love for their own fauna and flora. Australia possessed unique animals, birds, fishes, and flowers; and they wished to keep God's heritage intact. Some of the unique flora and fauna had passed out, many of them interesting types. This was due in part through opening up the country and devastating of forests, thus driving the animals ever farther back to seek for cover. If no strong effort were made soon, it would be too late. These reasons had actuated the formation of a league. (Applause).

Capt. White pointed out that he had been closely connected with the Flora and Fauna Protection Board, which had been in existence for 40 years, and was unobtrusively, doing good work on the same lines. For instance, he was personally working among the school children, and often addressed 5,000 in a week. He was gazetted to go into all the State schools within the year.

Mr. John Davidson, of Mount Gambier spoke in behalf of combining activities with the proposed south-eastern sanctuary.

Mr. Bellchambers gave a thoughtful address upon the plea made by defenceless creatures of the bushland, and touched upon the various phases of his life-work. It was obvious that his impressions had been obtained from long and patient study of the native birds and animals. At the conclusion, he was accorded an ovation, and tributes were paid to his wonderful efforts to try and help save the remnants of a great natural possession.

— Motions Passed. —

The following were passed:—

"That it is desirable to form a Nature Lovers' League of South Australia."

"That all those present become the first members of the league."

The Chairman read the rules which were approved.

— Officers. —

Officials elected:—President, Sir Frank Moulden; Vice-Presidents, Messrs. T. P. Bellchambers and N. H. Taylor; editor, Miss E. S. Abbott; Committee, Mrs. T. O'Halloran Giles, Misses L. Rudkin and Purdie, Messrs, Hugh Hudson, H. E. Wigzell, and John Davidson. The appointment of a secretary was left in abeyance.

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## WILD FLOWER SHOW, OCTOBER 16 and 17.

Our Show this year was a pronounced success. The Lord Mayor with his usual kindness allowed the use of the Town Hall, which was comfortably filled with exhibits. The Lord Mayor opened the Show and made an excellent speech in support of the work of the Society.

Members worked with enthusiasm usually displayed in preparing and carrying on the Show. The following list includes most of the workers, but as no official record is kept it is quite probably incomplete and apologies are hereby offered to any workers whose names have been omitted.

Sales—Mrs. Pearce, Miss Hackett, Miss G. Vohr, Misses Hall (2), Miss Taylor, Miss Legge, Miss Wallace, Miss Penny.

Door sales and Tickets—Mrs. Day, Miss Galley, Messrs. Jolly, Vickery and Worrall.

Shells—Messrs. Kimber, Trigg, Edwards, Stenhouse and Elliott.

Microscopes—Mr. Webb, Dr. Pulleine, Mr. Elston.

General Display—Miss Murray, Miss H. Roberts, Miss I. Roberts, Miss N. Roberts, Mrs. Law, Miss Hurcombe, Miss Ireland, Miss Watson, Miss Rowe, Miss Hocking, Master and Miss Burdett, Mr. Stokes, Mrs. Elliott, Mr. R. Kemp, Mrs. Kelsey, Mrs. H. B. Robson, Mrs. Page, Miss Ireland.

Scientific Classification—Mr. Black, Mr. Bailey, Prof. Osborn, Prof. Cleland, Mr. Ham, Dr. Rogers, Mrs. Osborn, Miss Roeger, Mrs. Black, Mr. Hogan, Mr. Sutton, Mr. F. Bailey, Miss A. Simpson, Miss E. Simpson.

Department of Agriculture—Mr. Pritchard.

Aquaria—Mr. Goodale, Mr. Beck, Mr. Smith.

Museum—Mr. Waite, Mr. Lea, Mr. H. M. Hale.

Seaweeds—Miss Macklin, Mrs. Osborn.

Fungi and Mosses—Miss Featherstone, Miss Macklin, Prof. Cleland.

Flinders Chase exhibits—Prof. Wood Jones, Prof. Osborn, Miss Davies.

Animals—Rat Kangaroo and Black Opossum—Prof. Wood Jones.

Bird Specimens and Lectures—Capt. White.

Wood-working—Mr. Wiley.

Forestry Department—Mr. E. Julius (Conservator of Forests) and Mr. Jenkins.

Schools Arrangements—Mr. Bailey, Mr. Fred Bailey.

Lectures and views—Mr. Morison, Dr. Pulleine.

Paintings of English Wild Fowl—Mr. E. R. Waite.

Zoological Postage-Stamps—Mr. E. R. Waite.

Collection of Butterflies and Moths—Mr. Lea.

Seed pods of W.A. Eucalyptus—Mr. Ising.

Paintings of Sturt Peas—Dr. Moulden.

Special Donors—Mrs. Page (Myponga), Mr. Tilling (Mylor), Lady Stirling (Mt. Lofty), Mr. A. K. Newbery (Mt. Lofty), Mr. Edwin Ashby (Blackwood), Mr. Burdett (Basket Range).

Interstate Exhibits—Mr. Hackett, Miss Hackett.

Photographs etc.—Mr. Thomas, Mr. Duffield, Mr. Lea.

Loan of Material—Messrs. A. Simpson & Son.

Loan of Town Hall—The Lord Mayor.

Musical Items—Mr. Knox (City Organist), Miss C. Godfree, Miss K. Ham, Mr. A. Morison.

Judging Paintings—Mrs. Herbert Barringer.

**Three** Paintings of Scenery at the Sanctuary, Humbug Scrub—Mr. Bellchambers.

Paintings (not for competition)—Mrs. McPherson (Butterflies).

Exhibits of Paintings, etc.—Arranged by Messrs. Hackett and Howie.

Prizes for Paintings: Oil Painting—First prize, Mrs. E. Michelson; Second Prize, Mrs. Tamblyn.

Water-colors—First and second prizes, Miss L. Laughton.

School Prizes: I, Crafers (H.T., Mr. D. D. Smith).
II, Port Lincoln (H.T., Mr. Francis).
III, Stansbury (H.T., Mr. J. S. Welsby).
IV, Myponga (H.T., Mr. F. Jennings).
V, Bordertown (H.T., Mr. Hutley).
VI, Mylor (H.T., Mr. O'Shaughnessy).

Special mention must be made of the flowers collected and forwarded by Mrs. Page of Myponga.

Interstate Exhibition—Flowers were received from the following :

New South Wales (Sydney), Naturalists' Club, Sturt Peas.
Barrier Field Naturalists' Club, Broken Hill, A. Morris, Secretary, also K. Becker, Sturt Peas.
Victoria, Flowers from the Grampians and elsewhere, Field Naturalists' Club of Victoria.
Queensland, Field Naturalists' Club.
Western Australia, Mrs. M. K. Rogers, Wongan Hills.

The Certificates awarded the various schools this year are as usual highly ornamental, and the printing has been enhanced by the Sturt Pea badge of the Society being skilfully hand-coloured by Miss Roeger. In addition the first prize school (Crafers) is the recipient of a presentation cup, neatly-turned from native timber and donated by Mr. Wiley. An engraved silver shield sets off the beauty of the polished wood.

## SOUTH AUSTRALIAN TREES (1)

No. 2. The Stringy bark (*Eucalyptus obliqua*), L'Heritier, 1788

By Wm. Ham and E. H. Ising.

### I. General.

The stringybark is the finest of our South Australian eucalypts. Unlike the Red-gum it grows with a straight stem and the wood is straight grained. In our hills it grows to a height of 80 feet, but in a more favorable environment, as in the rich soil and well-watered, sheltered gullies of Gippsland and Tasmania many specimens overtop 250 feet. But in the hills to the south, as Dr. Cleland has remarked (2), near Encounter Bay it grows in a low shrubby form, so great is the influence of rainfall and soil. At Myponga again in a good rainfall area and deep soil it grows to a fine height.

The Stringybark requires an abundant rainfall and attains its best development in our hills only on the highest ranges where the annual precipitation is at least 30 inches. (At Stirling (1628 ft.) the average rainfall is 46.49 inches with a maximum of 72 inches in 1909).

On poorer and shallower soils it is often replaced by the "Brown Stringybark" (*E. capitellata*), an inferior tree not always to be distinguished from the "white stringybark." Under favorable circumstances, as on the side of Mt. Lofty, *E. obliqua* forms a "pure" forest.

A feature of the stringybark is its wonderful resistance to fire. Its thick fibrous persistent bark protects it in an effective way. Our trees generally show signs of having been burnt at some stage of their growth in the blackened bark and, chiefly in young trees, by the peculiar growth of adventitious buds in the main stem and larger branches, which give a strange outline to the tree. When not subjected to fires the tree makes a shapely crown, not as dense as some eucalypts, but thick enough in the pure forest to prevent any great abundance of bush growth.

Before the advent of the white man the higher ranges were clothed with a dense forest of stringybarks, which held the rainfall, only gradually letting it escape and so preventing floods, erosion of soil and drying up of the streams.

(1) The first of this series appeared in this Journal, Vol. VI. No. 3. (1925), 41.

(2) S.A.N., Vol. VI. No. 3 (1925), 47.

To residents on the Adelaide plains the forests of the Mount Lofty Ranges are of immense importance. We are beginning to see that the greatest function of a highland forest is to protect the land from erosion. Not only does the forest cover lower the temperature but it holds back the floods and prevents them from sweeping down in resistless fury washing away the soil and filling the streams with rocks and sand, choking up the valleys and causing disastrous floods to spread over the lowlying plains. The Adelaide plains in particular are beginning to suffer from the cutting down of the trees in the higher parts of the ranges.

In view of the importance of our limited forest area, it is perhaps not too much to work for a measure similar to that in force in many countries in which certain areas of forests are vested in the government, and no trees are to be cut in such areas without special permission of forest officers. Look at our figures. Australia should have about 20 — 25% in forest, actually we have less than 4% and that rapidly dwindling.

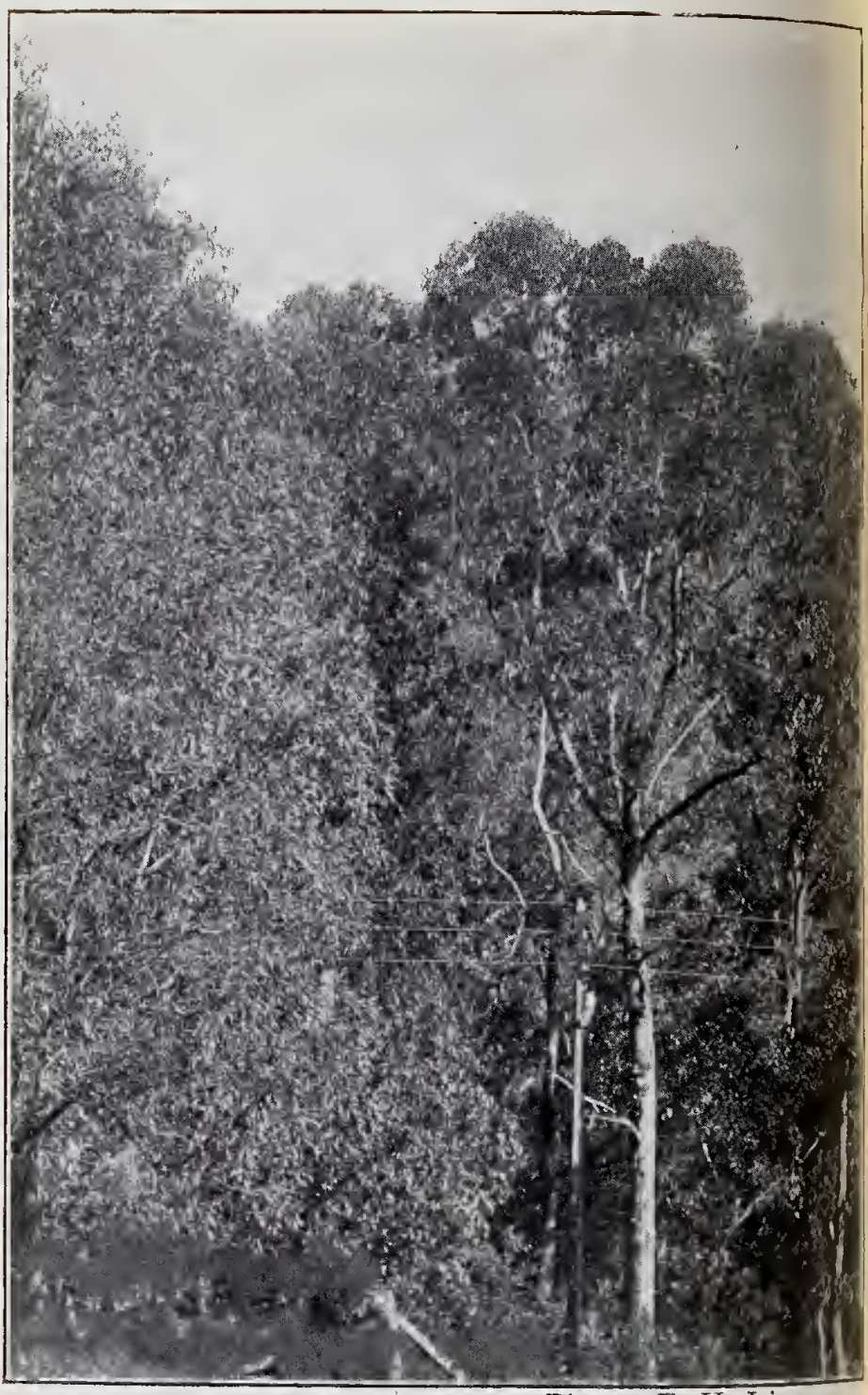
As a timber producer the stringybark takes a high place in our State. Its timber is strong and compares favourably with the timber of most gum trees.

## II. Distribution.

Though the finest and straightest trees have been cut out there still remains a remnant of the forest of stringybarks which once covered the Mount Lofty Ranges above 1300 feet level. Travellers by the south line may notice that the stringybarks come in just before the train climbs out of the National Park about a mile on the Adelaide side of the Long Gully station. The railway at this place is 1307 feet above sealevel. On the Glen Osmond—Mt. Barker road travellers may note the appearance of the stringybarks just beyond the "Eagles on the Hill" at about the same level.

On the Upper Sturt road, it is met with about one mile east of the Upper Sturt Post office. This is at the top of the range there and follows the manna gum (*E. viminalis*).

Its range extends beyond Bridgewater in an easterly direction and beyond Mt. Barker to the south-east but dies out before the eastern slopes of the highlands are reached, not occurring beyond Nairne (27.22 inches of rainfall). We have not seen it in the Torrens Gorge nor around the Millbrook Reservoir (1000 feet) where its place is taken by the Olive-leaved Gum (*E. elaeophora*) which has bark rather scaly than fibrous and is in other respects quite different.



Photo—E. H. Ising.

No. 1. Illustration.—The white stringybark (*E. obliqua,* L.Herit.) occurring at 16 miles on the Hills Railway, one mile west of Long Gully at a height of 1307 feet above sea level. The blackwood (*Acacia melanoxylon* R.Br.) is seen on the left.

Members of the society would do well to note just where these trees come in on the various roads. The planning of the areas occupied by the principal trees in South Australia is an important and useful work. Prof. Osborn in particular has done splendid work in this connection.

This species does not occur in an unbroken forest to the South East but is separated by a large area of mallee and swamps. It disappears as the Mt. Lofty range ends at Encounter Bay. For over 100 miles the stringybark is absent and occurs again where the heavier rainfall of Mt. Gambier is experienced. Altitude does not play an important part in the occurrence of *E. obliqua* in the South East as the country in which it grows, viz., Millicent, Glencoe, Mt. Gambier, near Glenelg River, is under 1000 feet above sea level. But rainfall is an important factor and Mt. Gambier receives an average of 31.66 inches per year.

RANGE—Notes from S.A. Naturalist.

1. Montacute—Vol. I., No. 4, p. 51.
   Also with *E. rostrata, E. viminaliis* and *E. leucoxylon.*
2. Kuitpo Forest—Vol. II, No. 1. p. 8.
   Associated with *E. rostrata, E. viminalis, E. leucoxylon, E. fasciculosa, E. cosmophylla, E. rubida, E. capitellata* and *E. Gunnii* (*E. ovata*). First four are dominant species.
3. Long Gully, at 1307 ft. above sea-level. Vol. II, No. 3, p. 67.
4. Mt. Lofty Summit. Vol. IV, No. 3, p. 43.
5. Myponga. Vol. III, No. 4, p. 58.
   With *E. cosmophylla, E. fasciculosa.*
6. Mt. Lofty. Vol. V, No. 2, p. 105.
   From 1200 to 2300 feet in about 30 inches rainfall and upwards.
7. Waterfall Gully. In higher parts. Vol. V, No. 4, p. 139.
   With *E. cosmophylla.*
8. Long Gully. Vol. VI, No. 1, p. 13.
9. Hindmarsh Tiers and Tunkalilla. Vol. VI, No. 3, p. 47.

Mr. Black has specimens from the following localities:—Mount Lofty Range—Bridgewater, Mt. Lofty, Woodside, and Myponga; South East—Millicent.

## III. Botanical.

The stringybarks belong to the group of eucalypts distinguished by their persistent fibrous bark usually extending to at least the large limbs. The "pattern" of the bark is somewhat lattice-like in *E. obliqua,* quite different in appearance as all our readers must have noticed from the smooth bark of the Gum Group, of which the "River Red Gum" (*E. rostrata*) is the best example. In colour it is greyish on the outside, brownish within, but on most of our trees the bark is black from bush fires. The wood is whitish to a pale creamy colour and from its straightness of grain is most useful for posts and rails, as in the Mt. Lofty ranges, and in Victoria and Tasmania for palings, and building timbers. The Tasmanian stringybark, often known as "Australia Oak," makes excellent furniture.

After the bark, the leaves are a most characteristic means of identification. The young leaves are very broad and somewhat heart-shaped but the mature leaves are sickle-shaped (falcate) and generally decidely unequal, hence the specific term, "obliqua." The leaves are shiny on both sides and fairly thick.

The most certain means of identification is however by a comparison of the buds and fruits. Though the tree is so large, the buds and fruits are small. The clusters (umbels) containing from 3 to 20 flowers, the buds having a half round or slightly pointed top, the whole being somewhat clublike. The mature fruits are cup shape with from 3 to 5 divisions, the valves being deeply sunk below the rim, they are about half an inch long and rather less in width.

As with many other species the buds appear from 9 to 11 months before blossoming, usually in December and January, and the apiarist can tell several months beforehand whether the blossom in any locality will be abundant.

The classification adopted by Mr. Black in his forthcoming Part III of the Flora of S.A. is that used by Bentham in the "Flora Australiensis." Vol. III (1866) 189, viz., of the anthers which are broadly divided into two series, those opening in a long slit or in a small pore at the top. *E. obliqua* belongs to the series having anthers reniform, opening by divergent slits.

## IV. Geological.

The Mount Lofty Ranges are formed of some of the most ancient rocks known, chiefly of Cambrian and Pre-Cambrian age. Howchin (1) has described very fully the geology of the Ranges and Osborn (2) has given four main types of soils in which *E. obliqua* grows. They are (a) quartzite soils, (b) ironstone soils, (c) glacial deposits and (d) gully soils. Except in the soil of the glacial areas our species under review grows to forest dimensions. Forests on quartzite soils attain their maximum development and form the typical tree vegetation of the Ranges in the area defined by the 30 inch isohyet. Teale (3) gives a description of the Geology and chief soils at the Kuitpo Forest where a fair proportion of stringybark grows. The rocks are of Cambrian and Pre-Cambrian age, the former having soils of a gravelly sandy loam and a red gravelly clay loam and growing good stringybark. The latter series of rocks producing a grey gravelly loam support poor stringybark except in the gullies. The Tertiary to recent deposits produce good *E. obliqua* forest in loose deep sands and light yellowish-red sandy clay loam.

## V. Ecological.

The ecology of the stringybark (*E. obliqua*) forest is a very big subject and has been best deal with by Osborn (2) who gives a list of 210 plant species occurring in this formation.

The chief tree species associated with *E. obliqua* are *E. capitellata, E. viminalis, E. rubida, E. fasciculosa, E. cosmophylla, E. rostrata, Acacia melanoxylon, Exocarpus cupressiformis* and *Casuarina stricta.* Of these plants only one (*E. viminalis*) is at all abundant and generally forms a pure stand. The others are only of occasional occurrence leaving *E. obliqua* the dominant tree in all the forest of 1300 feet or over. It is remarkable how this one tree dominates the timber growth on the higher levels of the Mount Lofty Range. The shrubs, undershrubs and smaller plants are exceedingly numerous in the stringybark formation. The chief shrubs are *Pultenaea daphnoides, Acacia myrtifolia, Hakea rostrata, Leptospermum myrsinoides, L. scoparium,* and *Ixodia achilleoides* and these are abundant in certain situations and dominate the undergrowth. Of the smaller shrubs *Epacris impressa, Platylobium obtusangulum, Tetratheca pilosa, Grevillea lavandulacea* and three species of Hibbertia are found in abundance in

(1) Trans. Roy. Soc., S.A. Vol. XXVIII (1904), 253 and Ibid XXX (1906), 227.

(2) Trans. Roy. Soc., S.A. Vol. XLVIII (1924), 99.

(3) Dept. For. Bull. 6. (1918) 8.

definite and mostly widespread areas. Other species such as *Pultenaea involucrata, P. graveolens* and *Acrotriche fasciculiflora* grow in some quantity in restricted areas. Only a few grass species occur in the stringybark forest and nowhere abundant.

A grass-like *Lepidosperma* (*L. semiteres*) grows in close formation in places and seems to take the place of grass and 14 other species of this family occur here. The family *Orchidaceae* is represented by about 18 species while *Liliaceae* has 17 species.

Four parasites occur in *Loranthus*, viz., *L. Miquelii, L. Exocarpi, L. pendulus* and *L. Preisii*, the former being the more abundant chiefly on the yellow gum while the two latter parasitise the blackwood. Composites are represented by 23 species and one of them *Helichrysum Baxteri* makes large white patches where it grows in the ironstone soils on the tops of the ridges.

There is much to be done, and, so far, very little has been accomplished in the ecology of the Mount Lofty Ranges which would well repay close study.

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## A GREAT AUSTRALIAN BOTANIST.

The death of Mr. J. H. Maiden, F.R.S., I.S.O., formerly Government Botanist of New South Wales and Director of the Sydney Botanic Gardens, removes one of the greatest of Australia's scientific workers. His name stands beside that of Baron von Mueller on the roll of those who have done so much for Australia. His life was spent in the study of the plant life of the continent with particular study of its relation to man's life and welfare.

His greatest work was the massive "Critical Review of the Genus Eucalyptus" in seven weighty volumes, still unfortunately incomplete. Other works from his prolific pen include "The Forest Flora of New South Wales," "Sir Joseph Banks" and "Flowering Plants and Ferns."

During a period of 20 years he wrote voluminously on many scientific subjects. As far back as 1907 at the Science Congress in Adelaide he contributed a paper on "The effects of the destruction of the forest flora on the flow of the streams of Australia."

The value of Mr. Maiden's work was recognised by the award of the Linnean medal, 1915, and his election as a Fellow of the Royal Society, He was also the recipient of the Imperial Service Order. Australia loses a keen scientist and a most useful citizen.

## BOTANICAL NOTES.

By Ernest H. Ising.

### *Eucalyptus capitellata* Sm.

I am advised by Mr. J. M. Black that, only a fortnight before his death, Mr. J. H. Maiden decided that this stringybark is a new species and that he and Mr. W. F. Blakely are naming it *E. Baxteri.*

It was first named by Smith in White's "Voyage to New South Wales" in 1790 from specimens collected near Sydney. In 1828 Robert Brown named a specimen *E. Baxteri* collected by Wm. Baxter on the South coast probably Kangaroo Island. This was placed by Maiden (1) under *E. capitellata.* As no description by R. Brown can be found the name *E. Baxteri* under his authorship cannot stand. A second specimen collected by Baxter is referred to *E. santalifolia* F.v.M., as var. *Baxteri* by Bentham but as this plant is now raised to specific rank Bentham's authorship is invalid.

The next name given to this species was *E. Blaxlandi* by Maiden and Cambage (2) in 1918 but it is now considered that this species does not occur in this State. The way is now clear for the use of the name of *E. Baxteri* as Brown's description of it cannot be traced and Bentham's is only a varietal name.

The authors are also naming a new variety, *E. Baxteri,* var. *pedicellata* specimens of which were collected by Messrs. Morison Ham and Ising between Longwood and Mt. Bold in November this year. It is believed that *E. Muelleriana* is also to be dropped in favor of the above variety.

### *Acacia rhigiophylla* F.v.M.

The re-discovery of this spiny wattle is due to the excellent collecting of Prof. J. B. Cleland, who found it at Kinchina in 1924. It was first collected by Mueller in 1848 between Mount Barker and River Murray so that it was lost sight of for 76 years. Kinchina being in the same district possibly it may have been re-discovered in the same piece of scrub situated in a low range about 6 miles west of Murray Bridge. The plant resembles *A. colletioides* very closely and may have been confused with it, however it is very restricted in range this is the only district in this State from which it has been recorded. It was found in West Wyalong in New South Wales in 1902.

(1) Crit. Rev. Gen. Eucal. Part VIII (1907), 213.

(2) Proc. Roy. Soc. N.S.W., LII (1918), 495.

## EXCURSIONS.

### EXCURSION TO SLAPE'S GULLY, AUGUST 15.

Under the guidance of Mr. J. A. Hogan about 20 members traversed Slape's Gully. The going was rough, as in many places the track was ill defined. Slape's Gully is one of the most attractive gorges in our hills, the winding stream, walled in by precipitous hills, being rich in native vegetation. Several species of leptospermum and acacia were observed and the wattle was coming into bloom, but in this secluded ravine it was somewhat early for native flora. The imported wild cotton bush *Gomphocarpus pubescens,* is getting a firm hold in our hills, and is a noxious shrub. It is the resort in the spring of swarms of brown butterflies, the larvae of which came here with the bush. There were also many bushes of *Brachyloma ericoides* just coming into flower An enthusiastic shellman was delighted to find very rare specimens of the two Australian snails *Helix Gawleri* and *H. Bednalli,* which many collectors have hitherto sought in vain. The party reached the waterfall, and scaling the hill, came back by an easy track. From the top of Green Hill a magnificent view of a gorgeous sunset and the shimmering waters of the gulf, with the roofs and spires of the city in clear relief, compensated for the arduous climb.

### EXCURSION, SEMAPHORE BEACH, AUGUST 29.

A party of members under the leadership of Messrs. Kimber and Trigg, explored the beach from the Semaphore southwards, in search of the remains of marine life cast up by the recent storm. Some interesting specimens were found. Certain patches of marine wash were especially rich in molluscan forms. A *Haliotis albicans* (ear shell) was found adhering to a *Pinna* or razor fish. The flesh, though edible, is rather coarse, but is much liked by savage tribes. In a recent lecture, Dr. Pulleine showed photographs of mounds of these shells, many feet in thickness, in spots where the Tasmanian aborigines had camped. As is common with many molluscs the shell was infested with many forms of minute marine organisms. The lustrous nacreous interior is iridescent, as also is the exterior when the foreign accretions are removed by hydrochloric acid. The glittering vari-coloured shells of *Phasianotrochus* may be strung into daintily tinted necklaces. An egg-case of the Port Jackson dog shark, resembling a pine cone, was found. Embryonic sharks are often found in these peculiar receptacles. The mother leaves the tiny creatures to their own devices. This species is quite harmless. The elongated shell of the hammerheaded oyster *Malleus albus* (white hammer), so named from its shape, is provided also with a nacreous

interior. Never two are found alike. It adds laminae in regular layers to the interior coating, and the age of the creature may be judged from the number of these laminae, or plates. It attaches itself to the crevice of a rock or to the sand by means of a "byssus," a beard of very fine cilia, or hairs. From these hairs a fine silk is spun. The organism is very stationary for the rest of its life. By means of a siphon on the lower part, the sea water is drawn in. The organic and mineral matter needed is retained and the waste material, mostly pure water, is ejected by the upper siphon. Thus this lowly organism plays an important part in purifying the waters of the ocean. Oyster culture is largely carried on in the East, and hundreds of thousands of pounds are thereby gained; in other countries it forms one of the chief marine industries. Several specimens of *Fasciolaria* were picked up, including *coronata.* Mr. Kimber described the process of reproduction of mulluscs. The eggs are retained until the embryonic shell is formed, when they are ejected. The cilia help them to move about till a suitable spot is found. It then spins its "byssus," and burrows in the sand, or attaches itself to a crevice in a rock. If the crevice is not large the shell conforms to the shape of the cavity. The *Paphia galactites* lives in the sand, subsisting on the roots of seaweed. The *Chama* is beautiful, as is also the *Pecten* (lady's haircomb), or *Chlamys bifrons* (double- fronted cloak). This species moves in a ziz-zag by opening and closing its valves. A little crab makes itself at home inside the shell, affording another instance of commensalism (common table) so common among the mollusca. The *Phasianella australis was* highly valued when first sent to England, fetching as much as £3 a shell. The *Polinces conica* is a carnivorous gasteropod, boring tiny holes in the shells of other species and sucking the juices. A shell was found with a tiny hole drilled through the upper coat, evidently the work of one of these carnivorous animals. *Polinices* seems to be able to track its prey by scent. The *Cardium tenuicostatum* (common cockle) is abundant in the southern seas, being found in heaps like seaweed, at Port Willunga.

## VISIT TO SIR WILLIAM SOWDEN'S, GLEN OSMOND, SEPTEMBER 5th.

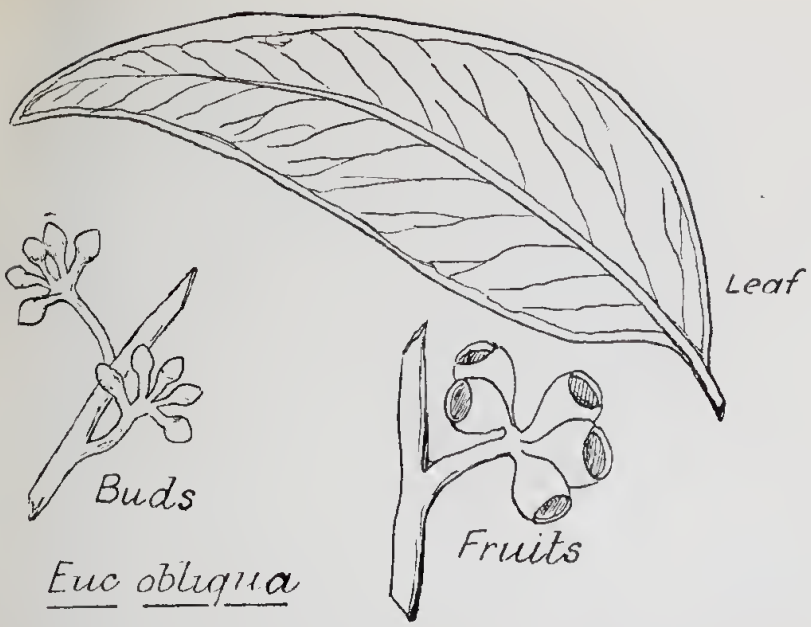
Members were invited to Sir William Sowden's to examine the museum of curios collected by him in all parts of the world. Their bulk is so great that Sir William has been compelled to put up a special building for their accommodation. The visit of the Society was the official opening of the new building. The collection was most interesting and Sir William's informative explanations added greatly to the pleasure of the party.

## VISIT TO MR. E. ASHBY'S AT BLACKWOOD. SEPTEMBER 12.

A large number of members visited Mr. Ashby's residence at Blackwood. Though the afternoon proved stormy the visitors braved the rain and wind in their anxiety to see the many wonderful plants from various parts of the world which Mr. Ashby has succeeded in growing in the various beds. A very large number of plants native to Australia are in thriving condition, as well as desert and Alpine types of plants collected on Mr. Ashby's various journeys to out-of-the-way spots on the earth's surface.

## EXCURSION TO NATIONAL PARK, SEPTEMBER 26.

A pleasant afternoon was spent at the National Park. Mr. A. M. Lea, of the Museum, conducted the party in the quest for the life of the underwood. Spiders of several species were found, their colors harmonizing in a wonderful way with their surroundings. The black variety with a bright red stripe along the centre of the back is capable of inflicting a very painful bite and their brillant colours serve as a warning to unwary observers, whereas the sober coloured species is anxious only to escape notice. Ants, too, were busy: the ferocious warrior, or bulldog, needs to be carefully manipulated with tweezers if one does not wish to suffer in the cause of science. Meat ants were also observed. The great mounds of the termites, the so-called "white ants", were numerous. These mounds in tropical countries attain large dimensions and assume fantastic shapes, as of cathedrals or towers. The city gardener stated that many imported trees were attacked by them. Many of the trees in the park are suffering from the depredations of the tiny gall insects, the larvae of which pierce the leaves, causing the sap to exude, forming characteristic nodules and draining the lifeblood of the tree. Beetles of several types were found, cockroaches, and weevils also. A twisted bunch of the larvae of the sawfly was discovered on a branch. This creature defends itself in much the same way as the skunk or the cuttlefish by ejecting an offensive fluid which effectively puts an end to further pursuit. Moths and grasshoppers were observed, but the weather was too cold for butterflies. "The Devil's coachhorse" (Xantholinus, yellow lined) was a rare find. Several beautifully-coloured fungi, including the "Jew's ear" fungus was generally admired. Native flowers were seen in great variety. Orchids included the dainty *Caladenia,* popularly known as "spiders," the modest *Pterostylis* or greenhood, the quaint *Diuris* (double tailed), and the gorgeous *Thelymitra grandiflora, Tetratheca pilosa, Hibbertia*, and *Pultenaea* were abundant. *Caesia vittata, Scaevola, Bulbine bulbosa* were also noted.




No. 2. White Stringybark (*Eucalyptus obliqua*) L. Heritier 1788. Note the marked obliquity of the leaf, the small clublike buds and the hemispherical fruits with somewhat sunken valves.

No. 3. Fossilized Tree-trunks at Fulham.
The wood (probably she-oak, *Casuarina*), has been replaced by carbonate of lime.

## EXCURSION TO MOUNT LOFTY, OCTOBER 5.

Under the direction of Mr. J. A. Hogan a party explored the scrub in the vicinity of the railway station. The underwood was a blaze of varied colour. The delicate *Tetratheca pilosa* in shades varying from pure white, through exquisite tints of purple, lavender and pink, was a conspicuous feature. *Pultenaea* in many varieties was also much in evidence. *Dillwynia, Daviesia, Hibbertia* (guinea flower), and *Goodenias* also contributed to the dainty colour scheme. *Leucopogon* with its snowy spikes, added a pleasant contrast to the gayer tints. *Grevillea* with its long prominent styles and *Euphrasia* (eyebright), one of the most dainty of white blossoms and *Epacris* provided a feast for the eye. Orchids were represented by the quaint *Caladenias* (spiders), *Diuris* (double-tailed orchid), *Glossodia* (Tongue orchid), *Thelymitra grandiflora* was also observed, but the gorgeous blue flower of the latter had not yet opened.

## EXCURSION TO THE FINNISS, OCTOBER 14.

The excursion to Mt. Compass had to be given up owing to the state of the roads but Prof. Osborn piloted the party through Stirling, Echunga, Meadows and Bull's Creek to a spot on the Port Elliot road 41 miles from Adelaide where the same classes of flora were to be observed. On the white sand recently swept by a bush-fire, the party found a surprising number of the peculiar Red beaked orchid, *Lyperanthus nigricans.* Another find was the very rare Sun-dew, *Drosera binata,* which was also found in immense numbers in the wet swamps.

## LIST OF SPECIMENS RECORDED FROM THIS AREA.

*Lindsaya linearis,* Kuhm., *Cheilanthes tenuifolia,* Swartz., *Selaginella Preissiana,* Spreng., *Themeda triandra,* Forsk., *Danthonia penicillata,* F.v.M., *Pappophorum nigricans,* R.Br., *Cyperus tenellus,* L.f., *Schoenus apogon,* R. and S., *Lepidosperma concavum,* R.Br., *L. carphoides,* F.v.M., *Hypolaena fastigiata,* R.Br., *Centrolepis aristata,* R. and S., *C. strigosa,* R. and S., *Luzula campestris,* D.C., *Dianella revoluta,* R.Br., *Burchardia umbellata,* R.Br., *Anguillaria dioica,* R.Br., *Lomandra dura,* Ewart., *Thysanotus Patersonii,* R.Br., *Caesia vittata,* R.Br., *Chamaescilla corymbosa,* F.v. M., *Bulbine bulbosa,* Haw., *Dichopogon strictus,* J. G. Bak., *Xanthorrhoea semiplana,* F.v.M., *Hypoxis glabella,* R.Br., *Thelymitra grandiflora,* Fitz., *T. antennifera,* Hook. f., *Prasophyllum elatum,* R.Br., *Lyperanthus nigricans,* R.Br., *Caladenia carnea,* R.Br., *C. Menziesii,* R.Br., *C. leptochila,* Fitz., *C. reticulata,* Fitz., *Diuris longifolia,* R.Br., *Microtis atrata,* Lindl., *Casuarina distyla,* Vent., *Isopogon ceratophyllus,* R.Br., *Adenanthos terminalis,* R.

Br., *Conospermum patens*, Schlecht., *Grevillea lavandulacea*, Schlecht., *Hakea rostrata*, F.v.M., *H. ulicina*, R.Br., *Banksia marginata*, Cav., *B. ornata*, F.v.M., *Exocarpus cupressiformis*, Labill., *Calandrinia corrigioloides*, F.v.M., *Ranunculus lappaceus*, Sm., *Cassytha melantha*, R.Br., *Drosera glanduligera*, Lehm., *D. pygmaea*, D.C., *D. Planchonii*, Hook.f., *D. Whittakeri*, Planch., *D. auriculata*, Backh., *D. binata*, Labill., *Crassula Sieberiana*, Ostenf., *Billardiera cymosa*, F.v.M., *Acaena ovina*, A. Cunn., *Acacia spinescens*, Benth., *A. pycnantha*, Benth., *A. myrtifolia*, Willd., *A. verticillata*, Willd., *Daviesia ulicina*, Sm., *D. brevifolia*, Lindl., *Pultenaea pedunculata*, Hook., *P. acerosa*, R.Br., *Dillwynia floribunda*, Sm., *Platylobium obtusangulum*, Hook., *Kennedya prostrata*, R.Br., *Zieria veronicea*, F.v.M., *Boronia caerulescens*, F.v.M., *Boronia filifolia*, F.v.M., *Tetratheca pilosa*, Labill, *Stackhousia linarifolia*, A. Cunn., *Spyridium thymifolium*, Reiss., *Hibbertia acicularis*, F.v.M., *Viola hederacea*, Labill., *Hybanthus floribundus*, F.v.M., *Pimelea phylicoides*, Meissn., *P. octophylla*, R.Br., *Eucalyptus capitellata*, Sm., *E. cosmophylla*, F.v.M., *E. fasciculosa*, F.v.M., *Leptospermum scoparium*, Forst., *L. myrsinoides*, Schlecht., *Callistemon*, *Baeckea diffusa*, Sieb., *Calythrix tetragona*, Labill., *Haloragis tetragyna*, Hook, f., *Hydrocotyle callicarpa*, Bge., *Daucus glochidiatus*, Fisch., *Astroloma humifusum*, R.Br., *A. conostephioides*, F.v.M., *Leucopogon virgatus*, R.Br., *Epacris impressa* Labill., *Villarsia reniformis*, R.Br., *Polypompholyx tenella*, Lehm., *Opercularia scabrida*, Schlecht., *Wahlenbergia gracilis*, D.C., *Goodenia geniculata*, R.Br., *Stylidium despectum*, R.Br., *Stylidium graminifolium*, Swartz., *S. calcaratum* R.Br., *Leewenhoekia dubia*, Sond., *L. pusilla*, R.Br., *Craspedia Richea*, Cass., *Rutidosis pumilo*, Benth., *Helichrysum Baxteri*, A. Cunn., *H. scorpioides*, Labill., *H. obtusifolium*. Son. and F.v.M., *Podotheca angustifolia*, Cass., *Ixodia achilleoides*, R.Br., *Millotia tenuifolia*, Cass., *Microseris scapigera*, Sch. Bip., *Cryptostemma calendulaceum*, R.Br.

## EXCURSION TO MOUNT LOFTY QUARRIES, OCTOBER 24.

Dr. Charles Fenner led the party to the Mount Lofty quarries. The learned doctor pointed out how the strata, originally laid down in a horizontal position, had been slowly tilted up by a gradual but persistent "thrust" from the eastward. This stupendous movement of the earth's crust extended to a depth of some 10 miles and proceeded apparently from the neighbourhood of New Zealand. This movement had thrown the solid land including the ocean bed, into ridges and depressions, which might

be aptly compared with the successive crests and hollows produced by sea waves. In this way the Mount Lofty and Flinders ranges had been uplifted with deep valleys and undulating areas separating the roughly parallel spurs and ridges. Evidences of this resistless earth movement were plainly visible in the strata of the quarries, which had been twisted into anticlines (A-shaped) and synclines (V-shaped), which could be readily traced. Veins of quartz were seen intruding into the layers in irregular directions This mineral fluid through intense heat and pressure penetrates the strata, often carrying metallic ores, such as gold silver and copper. The quartz in the Mount Lofty quarries, however, was of a very "hungry nature." The presence of many quartz veins tends to reduce the value of the stone as building material, and for that reason one large block was left in the middle of the excavations. In her cyclopean masonry Nature employs four principal cements, namely clay, iron, quartz, and silica. The cementing agent in these quarries was mainly clay. Grains of quartz are often forced into softer sandstone or clay, and render them so hard that the hammer rings on the mass as on iron. For that reason this "quartzite" is shunned by quarrymen and stone masons. In the olden days the houses of Adelaide were built mainly of the hard blue clay-slates, which are almost everlasting. Now only the softer freestones and sandstones are acceptable to the builders, as being much easier to work, but the "lives" of the buildings are thereby considerably reduced. As the Mount Lofty and Flinders ranges represent a crest of the great earth waves, so the two gulfs are the hollows or depressions. The building up of the fertile Adelaide plains by the silt and debris, slowly washed from the mountain chain in the long course of untold ages and deposited on what was once a seabed, was grahpically described. A spirited discussion arose as to the aesthetic merit or demerit of the "scars" left on the hill face by quarries. The doctor pointed out that Hilder, among other artists, considered that the brown, red, grey, or white patches harmoniously blended with the vivd green of meadow or vineyard and, by contrast, considerably heightened the effect of the purple distances. Nature, however, seems to take the earliest opportunity of repairing the damage, a fact which appeared from the dense growth of native flora on an abandoned face. This wilderness, was, as the doctor remarked, a botanical museum, and our secretary was able to identify in this natural garden a few rare plants including *Pultenaea involucrata, P. acerosa, Euphrasia Brownii.* The vegetation of these ridges comprises several desert types. Although abundant rain falls, the porous nature of the rock allows the water to rapidly drain away, causing a drought in the midst of copious

moisture. Along the roads wild flowers were in profusion—*Tetratheca pilosa, Platylobium obtusangulum* with its dainty corolla of variegated petals, red, brown, and yellow; *Hakea rostrata, Pimelea* and others.

## EXCURSION TO FULHAM, OCTOBER 31.

A large party accompanied Mr. E. H. Ising to Fulham sand hills and were successful in securing some of the orchid, *Microtis porrifolia* (leek-orchid).

Fulham, as Mr. W. Ham pointed out during the field naturalists' visit, occupies the site of an ancient sea beach, which extended from Brighton Rocks to the neighbourhood of Dry Creek. The ridges of yellow sand that mark the limits of the waterfront are the result of the action the wind and tide, and the Stockade is built on the seaside cliff. The sea has invaded this part on many ocasions, and has relinquished its prey only after a desperate struggle. A gradual uplift of 8 ft. has recently reclaimed these flats from the inroads of the water. Not only the geological formation, but also the prevailing vegetation, bears witness to these vicissitudes. The plants observed are, according to Mr. E. H. Ising, those usually found in tidal swamps, viz., samphire, This characteristic plant, covers an extensive area in these flats. with *Arthrocnemum* sp. and *Threlkeldia diffusa.* A plant observed near the road was the rare native Pittosporum. Many chipped flints were picked up by members of the party, evidently the cutting tools of aborigines. Shells of cockles and other mollusca were also found. Another curious relic of the ancient days was observed—a number of tree stumps of the Casuarina, which had undergone the process of so-called petrifaction. Lime, silica and other mineral matter in solution had entered the interstices in the decaying trunk; the wood had mouldered away, and the solid mineral had formed a perfect cast or mould of the trunk The finding of a sleeping lizard led to a discourse on that peculiar organ, the "pineal gland." The curious little pits of the "ant lion" were noticed and one little brown creature was found. He lies in wait at the bottom of his little pit for ants or other insects that may tumble in: but, when alarmed digs rapidly through the sand, and is accordingly difficult to capture. After an hour or two on the flats an adjournment was made, by invitation, to the residence of Capt. S. A. White, where members and friends were hospitably entertained at afternoon tea. The host's extensive collection of natural history objects were next inspected. Mr. W. J. Kimber discoursed in his usual lucid manner on the numerous land and water shells. Attention was drawn to the subfossil of a species of *Paludina* in a block of limestone in the outer wall

of the house. On a table in one of the rooms was found a great variety of molluscan remains, including two species of nautilus, many varieties of strombs and volutes, the razor shell (*Melo diadema*) frilled cockle, *Murex regius,* the delicate *Pecten pleuronectes* from the seas around Port Darwin; the *Ovulum.* Several beautifully tinted *Achetina* from Central Africa were noted. This is the largest of land molluscs. Another beautiful shell was the reddish-coloured *Cassus rufus* with *Unio* from the River Murray, and some fluviatile shells from the Torrens, a giant clam, an immense *Helix,* (*Harpa ventricosa*) were commented upon. The *Pteroceras* (horny winged) known as the scorpion shell had its place in the collection. Capt. S. A. White also spoke on his favorite theme—the immense value of the native birds to the tiller of the soil and the stockbreeder.

## EXCURSION TO MILLBROOK, NOVEMBER 14.

A large party travelled to the Reservoir via the picturesque Gorge Road. Met by the curator the party divided into two sections. One part under the leadership of Mr. B. Beck went on the lake and secured water weeds and fresh water fish and pond life. Another section led by Mr. Ising and Mr. Ham searched the hillsides for botanical specimens. The visit was rather late for this year as but few orchids were seen. The chief interest was the examination of the characteristic elaeophora forest. The trees bear a superficial resemblance to young stringy-barks but careful examination shows them to be different in many respects. from other eucalypts by its greyish rough (but not fibrous) bark, *Eucalyptus elaeophora* (Olive Barked Box) may be distinguished and by its angular buds, usually arranged in a star shape. Its leaves are long and lance shaped. In Victoria as in our own State it is known under a great variety of popular names. It is usually a stunted tree often with a mallee habit of growth, though a few trees attain a remarkable size. The wood is almost useless, decaying quickly, and of little value even as fuel.

The elaeophora forests occur on poor hard soils with a characteristic undergrowth. Professor Osborn has dealt with this in the "Procedings of the Royal Society" for 1924 (pp. 108-109).

## EXCURSION TO MR. BURDETT'S AT BASKET RANGE, NOVEMBER 28.

A large party motored to Basket Range to visit Mr. Burdett's garden. The trip took the party through some of the most beautiful scenery of the hills. Cherry trees in full fruit lined

the roads for miles: the gullies are largely occupied with fruit and vegetable gardens and the hills crowned with a forest of white stringybark now all too quickly disappearing. The party were received by Mr. and Mrs. Burdett and conducted to the cherry orchard where the pickers were hard at work. At our host's pressing invitation the party engaged in a test of capacity but could not stay the pace for long. Adjournment was then made to the garden of native flowers Mr. Burdett has just established. In this remarkable garden the visitors were able to see a splendid collection of Australia's most wonderful wild flowers, including Kangaroo paws, Leschenaultias, West Australian everlastings, Proteas and many others.

Before leaving afternoon tea was served by Mrs. and Miss Burdett and the party returned via Ashton, Summertown and Belair, the route leading through the well-cultivated gardens of Piccadilly.

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## LECTURES.

### LECTURE BY PROF. SIR DOUGLAS MAWSON, D.Sc. "EXPLORING IN ANTARCTICA." OCTOBER 20th.

He stated that his object was to relate the scientific work attempted, the plant and animal life of the antarctic, and other data collected. Nothing could equal in interest the collection of such information in new lands. The material collected by his expedition in 1914 was still not completely examined. Adelie Land, with which his expedition spent its time, had been regarded as an Ausrtalian sphere, although Fance was claiming it now, on the ground that a party of Frenchmen spent two days there early in the nineteenth cenutry. He explained the movements of the various exploring parties, and stated that the ice-covered area was twice the size of Australia.

When Macquarie Island was reached the temperature was too low to permit the existence of plants larger than shrubs. A great part of the work of an expedition consisted of a study of the sea, its depth, the character of the bottom, and life of every kind in it. Samples of sea water at various depths were obtained in bottles, the contents of which had to be analyzed and tested for temperature. The Mawson expedition had been able to run a line of soundings from Tasmania to the antarctic, and in the process had discovered sunken land, which consisted of hard rock, with no deposit of mud. The life of the surface water was micro-

scopic, and was known as plankton. Investigation had shown that the life of the sea varied in character with depth, and was grouped in zones. Cuttlefish were prolific from 50 to 100 fathoms. As the depth increased the fish became phosphorescent.

Dredging in the deep sea involved many technical problems, and required great skill and experience. Sometimes half a ton of living creatures, many of minute size, would be obtained in one haul. It was found that red predominated in deep-sea colouring, the water quickly filtering out the blue. At the greatest depths there was no colour. Below a depth of 2,500 fathoms magnetic particles were found in the red clay, and it was probable that they were of extra terrestrial origin (particles of meteorites).

Macquarie Island shores were characterised by deposits of seaweed the stems of which were as thick as a man's leg. It has remained unchanged in spite of the many visits paid to it by whalers and sealers. It was too small to have permanent ice, and all snow was thawed within a week or two of its fall. Though the hilltops were bare, tussock grass grew thickly, and there was herbage of various kinds. The smooth outline of the hills gave evidence of former glaciation. All the seal and bird life of the Southern Ocean resorted to that island, so that it was important to reserve it as a sanctuary. The leopard seal was the only predaceous one on the Southern Hemisphere, and would attack and eat other seals. It was unfortunate for the elephant seal that it yielded blubber, the demand for the oil from which had almost led to its extermination. The sealers nowadays boiled down the blubber of whale, seal, and penguin indiscriminately. Lately, the Tasmanian Government had placed an embargo on the oil industry, by forbidding the killing of those creatures.

On the voyage south from Macquarie Island icebergs were numerous, and as they melted plain marks on the sides showed the various sea levels as the dissolution proceeded. The largest berg seen by the Mawson expedition was 210 feet high. In the ice there was an immense amount of bird life, which never seemed to leave that area. Whales also were numerous in the pack-ice zone, where the shrimps were plentiful. It was impossible to reach most of the antarctic coast by ship, because ice extended for some distance out to sea. The snouts of glaciers protruded as much as 186 miles from the land, and the Great Ice Barrier in Ross's Sea was known to stretch 300 miles from the shore. The antarctic continent was without rain, and there was no water except during a thaw. The effect of refracted light was to make everything appear pink for days together. There was no life at any distance from the coast, but the geological formation made the region of great interest to all explorers.

## EVENING LECTURE BY MR. WALTER GILL, F.L.S. NOVEMBER 15.

Mr. Gill delighted a large audience with fine views of forest scenes in the various states. The pictures were not only very informative but of great artistic merit and Mr. Gill's racy comments were much enjoyed. Those present gained some idea of the work that has been done in forestry as well as of the possibilities of the future and the responsibility of the citizens to push on with the work of forestry in Australia.

## ADDITIONS TO OUR LIBRARY.

1. "Last Leaves from Dunk Island" by E. J. Banfield, author of "Confessions of a Beachcomber," "My Tropic Isle," and "Tropic Days." This volume is made up of various papers written by Mr. Banfield and edited after his death in 1923 by Mr. A. H. Chisholm, known to many as the author of "Mateship with Birds." The different chapters are full of interest to the nature student. (Cole's).

2. "Keeping up with Science," Edwin E. Slosson. Deals with a great variety of scientific subjects ranging from "The Psychology of Auto-Drivers" to "Climate in the Coal Age," and from "Why Jellies Jell" to "Friendly Germs." (Cole's)

3. "Golden Wattle, Our National Emblem" by Archibald J. Campbell. Beautifully illustrated with many plates in colour, this book sings the praises of our Australian wattles. Its compilation was a labour of love by the author in his successful endeavour to establish the Wattle as the national flower of Australia. (Cole's)

## OUR EXCHANGES.

1. "The S.A. Ornithologist," October, 1925. Mr. Edwin Ashby contributes "Notes on Tasmanian Bird Life" with map.
2. "The Queensland Naturalist." July, 1925.
3. "The Victorian Naturalist," August, September and October 1925.
   In the August number there is an informative article on "The Victorian Termites" by G. F. Hill.
4. "The Australian Naturalist" (of N.S.W.) July, 1925.
5. "Journal of the Arnold Arboretum" of Harvard, Univ. U.S.A. Notes on Rhododendrons of E. China, etc., July, 1925.
6. Historial Notes of the first Fifty years of the Linnean Society of New South Wales (1874-1924).

A list of members is printed in this number. Any errors or alterations of address, etc. should be notified to the Treasurer.

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# The South Australian Naturalist

**The Journal of the Field Naturalists' Section of the Royal Society of South Australia.**

Adelaide

Feb., 1926

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No. 2.

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## FORTHCOMING EXCURSIONS

February 20—Dredging. Please note alteration of date. Train from Adelaide at 1.35 p.m. to Outer Harbor. Leaders, Messrs. Kimber and Baker.

March 6—Marino, Shore life. Train at 1.45 p.m. Leaders, Messrs. Kimber and Saunders

March 20—Mylor Type Orchard, Charabanc at 2 p.m. from Town Hall. Leader Mr. J. F. Bailey. Estimated Fare 5/-.

April 10—Outer Harbor, Shells. Train at 1.35 p.m. Conducted by members of Shell Club.

APRIL 26—ANZAC DAY—PUBLIC HOLIDAY.

Visit to Mr. T. P. Bellchambers, the Wild Life Sanctuary, Humbug Scrub. Charabanc at 9 a.m. from Town Hall. Leader, Mr. B. B. Beck. *Notice should be given to Mr. Beck, Cole's Book Arcade,* 14 Rundle Street, at least 6 days previously, as additional charabanc may be necessary. Estimated cost, 10s. per head.

May 15—Sir William Sowden's, Glen Osmond. Car 2 p.m.

May 29—Ambleside. Train 1.25 p.m. Botany and Geology, Messrs. W. Ham and E. H. Ising.

June 7—Public Holiday—Barossa Reservoir. Charabanc 9 a.m. Aquatic Life, Messrs. J. W. Hosking and T. W. Nettlebeck.

## EVENING MEETINGS.

March 16—Talks on Books in our Library by Messrs. Ham, Beck, and Ising. Exhibits by members. It is hoped that all members will bring something. *If possible leave word with Mr. Beck, Cole's Book Arcade,* 14 *Rundle Street, a few days before the meeting.*

April 20—"Plant Life in Arid Australia", Prof. T. G. B. Osborn, D.Sc., President of the Royal Society of S.A. Illustrated by lantern slides.

May 18—Microscopic Exhibits. Dr. R. Pulleine, Messrs. Bailey, Harding, Webb, Morison, Elston, Kemp and Prof. Harvey Johnston.

# THE South Australian Naturalist.

VOL. VII. ADELAIDE. FEBRUARY. 1926. No. 2.

## FORESTRY IN SOUTH AUSTRALIA.

It is pleasing to know that the Government has decided upon planting a large area of country in the South East, possibly as much as 100,000 acres, with pine. It is anticipated that the net return will be a handsome one, even after allowing compound interest on the cost. In addition it is expected that the planting of 5000 acres per annum will ultimately give direct employment to from 3000 to 4000 men and thus the poor fern lands of the South-East prove exceedingly profitable. In view of the great importance to the metropolis (representing 54 per cent. of the total population of the State) of the protection of the soil of the Hills and the protection of the watersheds, members who have studied the deforestation question are hopeful that steps will be taken to secure land in the Hills where forests of hardwoods can be produced by natural regeneration.

As emphasised by Sir Douglas Mawson the carriage of timber is such an important item that the proximity of the Hills and their many natural advantages for the production of timber should not be overlooked in any national schemes of forestry.

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## A NOTE ON THE STAMENS OF SOME COMMON NATIVE PLANTS.

Stamens are usually merely yellowish threads with small sacs (anthers) at the top containing pollen grains, by means of which the pistil is fertilized. A small summer-blooming pink flower, *Erythraea australis* or "Austral Centaury" has anthers peculiarly twisted, and the filaments are white and thread-like. The anthers twist down the middle, each half making a secure sac for the pollen grains. In the common "Chocolate Lily," now called *Dichopogon Patersonii,* the stamens are objects of interest. The anthers are long, being twice the length of the filament; they are a light purple in colour with a band of rich dark maroon and end in a deep yellow base, the whole forming a very striking combination of colours when seen under the lens.

In *Tricoryne elatior,* the "Yellow Autumn Lily", the filament has a mass of yellow hairs below the anthers, making a very interesting feature for examination with the glass. These three flowers are all common in the Hills.

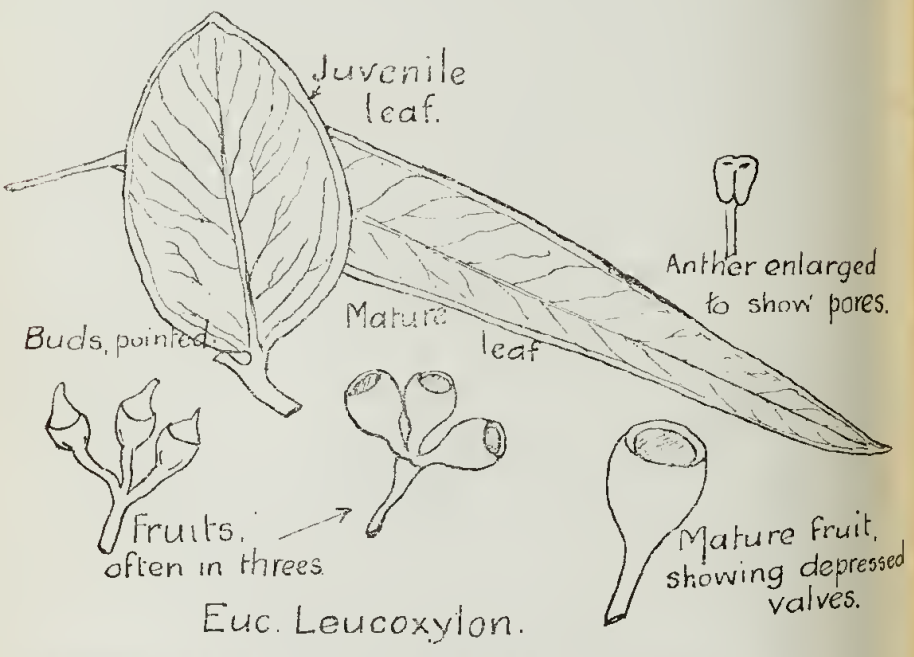
# SOUTH AUSTRALIAN TREES.

No. 3, *Eucalyptus leucoxylon*, F.v.M., Yellow Gum.

By Ernest H. Ising and W. Ham.

## I GENERAL.

This species is one of the best known in South Australia and is put to many and varied uses, from firewood to building timber. On account of its whitish hard bark it has been called in some districts "White Ironbark," other vernaculars have been given it such as "White Gum" but more generally "Blue Gum." It is chiefly known by the latter name in this State, but this is confusing as another Gum (*E. globulus*) has the prior use of this common name. The term "Yellow Gum" (given on account of the yellowish inner bark) has been used in Beuhne's "Honey Flora of Victoria" and by writers in this Journal at various times.




## II DESCRIPTIVE.

This State has the honour of producing the type of this species which was named by Mueller from specimens collected in the Lofty Range by Miquel, in 1855. The specific name "leucoxylon" means "white wood" (Gr. *leucos*, white and *zylon*, wood) and refers to the colour of the timber.

It grows to a good size tree, attaining a height of 50 feet. The trunk is usually straight, but soon sends out branches. The bark is smooth, whitish-cream to a pale brown, a grey colour appears usually in blotches, but the creamy-brown colour is the predominating one. In old trees the base of the trunk is often rough and dark. It is often difficult to distinguish the yellow gum from the red gum (*E. rostrata*) in the field, but if the former is under review the creamy-brown trunk and large dark green leaves will be noticed as compared with the greyish-green bark and light green leaves of the red gum. The leaves are mostly pendent and vary in length and width, being up to 5 inch long by half to one inch wide. They also vary in shape but have a general lanceolate outline. The buds have an elongated lid, being quite half an inch long and almost yellow. The flowers (consisting of numerous stamens), are usually creamy but in the mallee at Kinchina a pink flowering variety is to be obtained. The flowers are about one inch in diameter when full opened and are arranged in umbels in the axils of the leaves. The fruits grow to almost half an inch across when mature and have a stalk quite half an inch long. The fruit forms a little cup with the valves situated well below the rim, and it forms a safe means of identification when compared with the red gum. The latter has small fruits much less than a quarter of an inch in diameter with the valves produced well above the rim.

## III GEOLOGY.

The yellow gum is found in various parts of the Mt. Lofty Ranges, and where it occurs along the Greenhill Road and in the Mt. Pleasant district the underlying rocks are composed of clay-slates and to a less extent quartzites. This species is generally found with the red gum but it does not grow in the gully bottoms where the red gum flourishes. At Kuitpo Forest Teale (1) records the yellow gum in grey to dark-grey sandy loam, clay loam and silt loam derived from tertiary to recent sands, gravels, clays, grits, boulder deposits and alluviums.

In National Park, Belair, the soil given by Osborn (2) is a "cold grey sandy loam formed by decomposition of quartzite rocks of Cambrian age." This is in a lowlying swamp area but we have noticed the yellow gum growing in dry situations along the ridges at 1,000 feet above sea level, in fact, it is unusual for it to be growing in damp situations.

(1) Bull. 6, Dept. of Forestry, Adelaide University, 1918.
(2) Trans. Roy. Soc., S.A., Vol. 42 (1918), p. 8.

For the Mt. Lofty Range in general Osborn(3) records this gum occurring on "soils formed from slates, phyllites, schists and limestones of the Cambrian series which lie within the region of 25-35 inch annual rainfall. The soils vary considerably in composition but are all relatively deep and fine-grained, not sandy." The yellow gum country has quite distinct typographical features, the hills being of a rounded nature and much less steep and rugged than the quartzite formations which border on it. This difference is strikingly illustrated near Slape's Gully, where the quartzite formation is composed of a broken surface of rocks and rubble bearing stunted pink gum and masses of undershrubs while on the rounded hills of clay-slates grow large trees of the yellow and red gum with an undergrowth mainly of grasses.

## IV ASSOCIATIONS.

Some botanical associations have been noted at Belair in the National Park commencing near the Railway Station and proceeding in an easterly direction. The yellow gum appears at a height of 1,000 feet and is associated with the peppermint (*E. odorata*) and the red gum as the main tree growth. The individuals of this species do not grow closely together and in fact they are many yards apart. The tree has a decided spreading habit and gives fairly dense shade. The shrubs growing with this gum are not many in number and there is much open space between the plants. The ground flora is more dense as there is a good proportion of annuals amongst it. This sparseness in vegetation here may be due to the poorness of the soil or to the excessive shading, chiefly by the yellow gum. In strong contrast is the dense vegetation in the stringybark forest, higher in the range, where the white stringybark is surrounded to the base of the tree by numerous shrubs and undershrubs, a great contrast to the complete absence of shrubs around or near the yellow gum trees and the open spaces in this formation.

Other large plants are *Acacia pycnantha, Bursaria spinosa, Dodonaea viscosa, Acacia obliqua, Leptospermum myrsinoides, Calythrix tetragona, Casuarina stricta, Xanthorrhoea semiplana* and *Hakea rostrata.* Although these are large plants they do not dominate any area, but occur only as scattered individuals among the yellow gums. The following smaller plants are also but sparsely distributed:—*Olearia ramulosa, Hibbertia stricta, Pultenaea pedunculata, Helichrysum Baxteri, Thelymitra grandiflora, T. longifolia, Pterostylis barbata, P. nana, P. reflexa, P. longifolia* and *Corysanthes pruinosa.* The "Kangaroo grass" (*Themeda australis*) is fairly abundant in protected areas.

(3) Trans. Roy. Soc., S.A., Vol. 48 1924), p. 110.

*E. leucoxylon* is badly infested with the parasitic *Loranthus Miquelii*, almost every tree seen in National Park being attacked by it.

In considering the full extent of this species over the Mt. Lofty Ranges, Osborn (1) gives a list of 201 species associated with it. He refers (l.c. p. 129) to the blue (yellow) gum forest as a "Savannah Woodland Formation."

## V DISTRIBUTION

As a rule this species does not grow above the 1200 ft. altitude and is seen at its maximum development in the Gumeracha-Mt. Pleasant district. It is abundant on the eastern slopes of Mt. Lofty Range in the Ambleside district and is common from Belair to Eden and at Kuitpo. All these places are about 1100 feet above sea level. At Victor Harbor it is growing close to the town at about 50 feet above sea level. It would appear that J. E. Brown's observation (300 to 1300 ft. altitude) is approximately correct although we record it from a lower level (less than 100 ft. at Victor Harbor) than he shows. We also record it from Cherryville, Torrens Gorge and Greenhill Road.

The range given by Osborn and Adamson (1) is as follows:—"Forests of the blue gum (yellow), *E. leucoxylon,* cover for the most part the lower hills, foothills, and rolling country on either flank of the main (Mt. Lofty) range."

Notes from J. E. Brown's Forest Flora of S.A. Distribution. Most widely distributed of all "Gums." From Rapid Bay (South) to north beyond Clare. Mt. Lofty Ranges 300 to 1300 ft. elevation; Eyre Peninsula, Pt. Lincoln to Marble Range; South East, Lucindale, Naracoorte and Tatiara. Chief habitat from Crystal Brook along Flinders Range to Mt. Remarkable.

Maiden's records in Crit. Rev. Gen. Euc. Part 12 (1910), p. 93 are:—Devil's Country, Lofty Range (Miquel); Adelaide and Mt. Lofty Ranges generally; Kapunda (R. H. Cambage); Kuitpo Forest Reserve (W. Gill); Cape Jervis (J.H.M.); South East (W. Gill); Tintinara (R. H. Cambage).

In investigating the eucalypts of South Australia, Baker and Smith (1) received specimens from Betaloo, Keyneton, Birdwood, Kangaroo Island, Prospect Hill and Middleton.

Records from Annual Reports of Woods and Forest Department, S.A., by Walter Gill, F.L.S.

1. Wirrabara Forest, Report 1911-12, p. 7.
2. Mt. Crawford Forest, 1919/20. t. 12.

(1) Tran. Roy. Soc., S.A., Vol. 48 (1924), p. 110.

Notes from "S.A. Naturalist"—

1. Montacute, 7.6.20. In flower. Vol. 1, No. 4, p. 51.
2. Kuitpo Forest, 13.10.20. Vol. II., No. 1, p. 8.
3. Slapes Gully, 6.11.20. Vol. II, No. 2, p. 27.
4. Eden, Blackwood, Belair, Vol. II, No. 3, p. 64.
5. Ambleside, 24.3.23. Vol. IV, No. 3, p. 118.
6. Eden, in flower, 26.5.23. Vol IV, No. 4, p. 131.
7. Mt. Lofty Range, Vol. V, No. 2, p. 103.
8. Long Gully to Belair, 10.5.24, Vol. V, No. 3, p. 124.
9. Long Gully, 4.10.24, Vol. VI, No. 1, p. 14.
10. Encounter Bay (Waitpinga), Vol. VI, No. 3, p. 47.

Tate's distribution is as follows:—Districts Adelaide and North including the Mt. Lofty Range to Burra; Pt. Lincoln, Kangaroo Island, Tatiara and Mt. Gambier.

Mr. Black records the following locality:—Wirrabara.

## VI FORESTRY AND TIMBER.

The Woods and Forests Department has planted the yellow gum at Parilla, Wanilla, Yarcowie, Second Valley, Mt. Crawford and Kuitpo Forests during the years 1912 to 1923 and the trees have grown well except at Wanilla Forest.

The timber is pale cream to whitish and is one of the best hardwoods in the State. It is used for heavy work being specially good for wheelwrights' purposes. For underground uses, posts, etc. it is known to be very durable.

The tree is a good nectar producing species yielding a first class light colour honey.

## VII RANGE OF VARIETIES.

Var. *macrocarpa*, J. E. Brown.

Monarto South (E.H.I.)

J. E. Brown's notes (1) gives the following distribution:—Coast growing tree, in districts of good annual rainfall. About 1½ miles from Pt. McDonnell. In moist alluvial hollows along the track between Cygnet River and Stunsail Boom Creek, K.I.; and between Pt. Lincoln and Marble Range.

Var. *pauperita*, J. E. Brown.

Mr. Black's localities are:—Bordertown, Hamilton, Kapunda, Nuriootpa, near Gladstone and Beetaloo.

The Distribution given by J. E. Brown (2) is:—Inland and not 20 miles from near Coast. Ranges near Kapunda, Saddleworth, Mintaro, Mt. Bryan and the east; Canowie through Yongala, Mannanarie and Orroroo to the Pekina Range; Spalding and Bundaleer Springs.

(1) Forest Flora of S.A. Vol. II, p. 2, 1882.
(2) l.c., p. 4.

### White Stringybark (*E. obliqua*)

In the previous number of this Journal, p. 12, under the heading of "Distribution" it says "Its range extends beyond Bridgewater in an easterly direction and beyond Mt. Barker to the south-east but dies out before the eastern slopes of the highlands are reached, not occurring beyond Nairne." We now have more complete knowledge of its range in this district. Between Bridgewater and Ambleside the higher quartzite hills give place to lower rounded slaty hills as the River Onkaparinga is approached. Looking back from near the river a distinct change in the country is observed. The higher quartzite hills are rough and steep and densely tree and bush clad while the lower hills falling away to the valley of the river are smooth rounded hills with trees in open formation with few shrubs and undergrowth. The stringybark does not leave the higher quartzite hills and therefore does not extend to Ambleside or even the River Onkaparinga.

E.H.I.

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## THE BLACK CICADA OR RED-EYE.

(*Psaltoda moerens* Germ.)

By Arthur M. Lea, F.E.S.

(Communication from the South Australian Museum)

One of the most familiar insects in South Australia is a large black cicada, commonly known as the black locust or red eye; in the mature state it is only seen in the summer, and, in fact, practically all members of the family are only to be taken in the summer in the southern half of Australia. In Queensland, however, although more common in the rainy season than during other periods, specimens of the family may be taken throughout the year. Altogether we have about one hundred and fifty species, of which the majority occur in Queensland; from South Australia less than twenty species are known.

To most people in Australia, America, and other English speaking countries, these insects are known as locusts, and although naturalists persist in writing of them as cicadas, and point out that true locusts are grasshoppers, it is unreasonable to expect that children and bushmen will think of them other than as locusts, but some of the common species have special names, such as green-locust, yellow-Monday, double-drummer, bladder-locust, floury-baker, tick-tick, &c.

Our common species measures about four inches across the expanded wings, its body being about one and a half inches. It has four glassy-looking wings with black "veins", and the two on each side can be fastened to each other so that when in flight they beat the air together. On the head there is a large red compound eye on each side, and three small simple ones (ocelli) on the forehead. There is a long beak that, when at rest, is carried between the three pairs of legs; the antennae are small and could easily be overlooked. The upper parts are almost entirely black, the under parts are mottled dingy yellowish-brown and black. There is a small amount of whitish or silken hair in places. The male has a fairly large "drum" on each side of the base of the abdomen, pressed close to the side so as to be invisible from above. On many species the drums are much larger and visible from above, this is notably the case with two larger species of the genus *Thopha* that occur in the interior parts of South Australia. One of our interior species, *Macrotristria hillieri*, is covered on the under surface with a white mealy substance, much as the floury-baker of Sydney.

In addition to South Australia our common species occurs in Victoria and New South Wales, and has also been recorded from Queensland and Tasmania. Several smaller species of *Psaltoda* also occur in Queenslnad and New South Wales.

The life history of our Australian species has been fully worked out and published, larvae are often seen during digging operations, and are much the same as those occurring in other parts of the world. In summer the pupae may be seen breaknig the ground in many places, after which they crawl up trees and fences (usually at night). After resting for a short period the outer shell bursts and the mature insect emerges with soft wings; in a few hours the wings harden and the mature colour becomes fixed. Mr. Ham saw a newly emerged specimen of our common species and described it as having mauve, violet, applegreen, and various other shades of colour, but these soon changed to black on the upper surface.

The female is provided with a pair of saw-like organs at the tip of the abdomen, and these she uses to make slits in twigs in which to deposit her eggs. These remain beneath the bark for some time, but the young larvae on hatching out immediately go below ground, to suck up the juices of the roots of plants.

An American species is known to live seventeen years underground, but it is certain that our species live for much shorter periods, probably most of them being annual.

When feeding the long beak of the adult is thrust below the bark into the cambium layer to suck the juices, and on passing under trees where the insects are in large numbers one may often notice a spray or fine shower of honey-dew that they give off, very similar in nature to that given off by scale insects and aphides, although more abundant.

The sound producing or stridulating organs are at the junction of the abdomen and thorax of the males, the drums acting as resonators; each species has a characteristic series of notes. In summer our common species may be frequently heard in the hills, but it was much more abundant years ago, before the sparrow was established, this bird being an inveterate enemy of members of the family and frequently eating such large species as the green cicada and double-drummer. The black cicada has apparently never been regarded as a pest, but the green species of New South Wales and Victoria makes a loud monotonous noise that is irritating to many people; thousands of specimens all tuning up at the same moment, and stopping at the same time. In collecting these insects one may often creep up quietly to the male, who will continue his song until the hand is almost closing on him, when he takes to flight with a whirring noise.

Many of our native birds eat cicadas, swallowing them whole, or leaving only the wings, but in Tasmania and Victoria several species of *Melampsalta* are seized by birds and only the abdomen eaten, the specimens then fly back to trees and remain quite quiet; but when the uninjured ones start singing, they start singing too. A species that occurs on Lord Howe Island now forms an important item in the summer food of gulls, these dash at the insects on the trees, frightening them into flight, when they are seized and the body parts eaten.

## SHELL COLLECTING AT THE OUTER HARBOR.

By F. Trigg.

A short motor-boat trip out through the entrance to the Harbor northward, brings one to shallow water two miles seaward of St. Kilda. Selecting a low-tide day it is possible to wade over several acres of sandy, weed-grown shallows, the home of many varieties of mollusca, crustaceans, starfish and other inhabitants of the salt water. One is immediately attracted by the myriads of Pinnas, commonly known as razor fish, which project their sharp-edged valves above the sand, to which they are firmly anchored by their strong thread-like byssus. To get this shell complete it is necessary to excavate and carefully remove it from its bed. *P. inermis* (Tate) is in great numbers, its smooth sides distinguishing it from a variant, partly covered with closely laid rows of folia-

tions or projections. *P. tasmanica* (Tenison-Wood) is occasionally found. The valves of this species are shorter and broader than the common variety, and carry 8 or 10 rows of prominent hooked spines. These wedge-shaped bivalves measure up to 15 inches in length, all having a thinly-laid pearly interior—the shell itself being composed of minute hexagonal prisms. A rough dissection of the animal discloses a fine double-fringed mantle, and a set of powerful muscles connected to each valve, and to the byssus. The Pinnas are planted firmly erect in the sand, and their razor-like edges are capable of inflicting a severe wound, therefore making strong boots essential before any attempt is made to move among them. Examining one it is noticed that several *Haliotis cyclobates* (Peron) are clinging to it. This shell which measures about $1\frac{3}{4}$ inches across, is of a comparatively globose shape, with several white irradiations running across its dark brown surface, and having a brilliant iridescent interior. It is interesting to notice, if a specimen is turned over on its back out of water, the vigorous attempts made to right itself, the animal swinging its shell round in a half circle from side to side. Further examining the *Haliotis* one may find three or four small conical-shaped shells—*Capulus australis* (Lamarck)—adhering, and superimposed on the Capulus several juveniles of the same family. Another Pinna, in addition to the occupants already mentioned, may carry several beautifully colored *Ischnochiton contractus* (Reeve) or the slug-like *Cryptoplax gunni* (Reeve). The Cryptoplax lives for hours out of water, and, if given the opportunity, crawls laboriously about, anxiously, no doubt, seeking its native element. The little brown *Ischnochiton juliodes* also may be noticed sliding comparatively rapidly along the Pinna's back. *Conus anemone* (Lamarck) is the next shell examined, being found inside the open, half sand filled valves of the dead Pinnas. *C. anemone* is one South Australia's three Cones. While not comparable either in size or decoration with exotic specimens such as *C. literatus*, *C. textile*, or *C. geographus*, when its dull periostracum is removed it is quite a good looking specimen, colored in green, purple, brown and grey. This shell was observed to be living 24 hours after removal from the water, the blood-colored animal extending its foot, seemingly still hoping for a return to the natural order of things. *Murex triformis* (Reeve) is also found in company with the Conus. The prominent longitudinal ridges on this three-cornered shell represent periods of rest and growth. This group gives (1) the univalve, Conus; (2) bivalve, Pinna; (3) multivalve, Chiton. The hammer-headed oyster—*Malleus albus* (Lamarck) is plentiful. It attaches itself by its byssus to a stone or other object, and numbers are found in close

company. The remarkable twisting and turnings of its thin valves render it a difficult subject to open alive without injury. An easy plan is to expose it to the sun for a period, then place it in water, when the muscles relax naturally. Searching among the weeds numbers of smaller shells are to be found living. *Cantharides bellulus*, with its beautiful iridescent sheen; *Bittium lawleyanum*, *Phasianella*, *Thalotia conica*, *Columbella*, *Mitra glabra*, *Gena nigra* (like a miniature *Haliotis*) and possibly a *Lyria mitraeformis* may be secured. This latter shell, which is allied to the Volute family, is beautifully colored when taken alive, very different from the beach-rolled specimens commonly picked up. As the tide commences to rise again over this bank the collector must, perforce, take to the boat, loth to leave such a rich collecting ground.

## DREDGING, St. VINCENT'S GULF, DECEMBER 12, 1925

By F. T.

Members of the F.N. Society were fortunate in having an excellent day for dredging—calm sea, warm sun, and light breezes. Many present were enabled to see, for the first time, specimens of marine life of great interest—fresh from their native haunts—and also to have them described by the leaders, Professor Harvey Johnston and Mr. H. M. Hale.

Drifting slowly, a few miles out, in a few fathoms of water, over a smooth, sandy bottom, the two dredges soon collected a mass of seaweeds, sponges, corals, shells, crustaceans, starfish, ascidians, fish, &c., and those interested in any of these forms had plenty of material to work on.

### The Family *Pecten* or Scallop Shell.

Many specimens of *Chlamys bifrons*, *Chlamys asperrimus*, *Pecten medius*, were noticed. *Chamys bifrons*, the specific name indicates "double face," both valves being similar in shape, general appearance, and coloration. When tightly closed the lower valve slightly overlaps the upper, leaving a narrow, half-circle of reddish-brown, indicative of the ornamental, polished interior. When the valves open, the spaced rows of minute blue eyes (ocelli) on the mantle edges are conspicuous. In some *Pectens* the ocelli number up to 120, and it is authoritatively stated that these molluscan eyes have many characteristics of the vertebrate type. At least they are well able to distinguish light from shade. On dissecting a number of *C. bifrons* it was noticed that a small crustacean lay hidden in the mantle folds, in almost every instance. On being submitted to Mr. Hale, of the Museum staff, he kindly supplied particulars as follows:—

### *Pinnoteres Subglobosa.*

These crabs live as commensals, not parasites, between the mantles of some bivalve shells. Aristotle found specimens in the *Pinna*, hence the generic name of the crab, meaning "one who guards the Pinna." The ancients supposed the Pinna to be a very stupid beast, and that the little crabs lived inside his shell to give him a friendly nip when a fish swam beween the gaping valves, and so warn him that food was in his thaw. The Egyptians used the Pinna and its commensal in their hieroglyphes to symbolize the need man has of friends.

*Chlamys Asperrimus*—the rough-surfaced scallop—came up from the depths evenly clad in a dense mat of scarlet sponge, matching the common color of the shell. The arched, fluted, and finely scalloped edged valves fit evenly at the ventral margin, and, opening spasmodically, one is able to view all the beauty of the animal within, with its double row of ocelli gleaming on the mantle edge. The hinge-line extension gives unequal ears to this scallop, below the larger of which may be seen the byssal notch. The young scallops all use the byssus as an anchor, but abandon the habit later, though from the fact that adult *C. asperrimus* are frequently found attached to floating buoys, jetty piles, &c., it is evident that the byssal organs must always be capable of service. This shell runs through the whole gamut of colors, from the palest lemon to bright scarlet

*Pecten Medius* differs from the preceding two shells in the fact of having a flat upper, or left valve. Resting on the arched right lower valve, fifteen or sixteen prominent ribs give strength with lightness. The ears are almost equal, and the ventral margin of the shell is broadly scalloped. From a gastronomical point of view, this bivalve is something to be considered, and were it not for the conservative taste of Australians in the matter of shellfish, *P. medius* would not have such a peaceful existence. The Pecten family are of world wide distribution, and few sandy shores do not yield some variety of this beautiful and interesting form. From a tiny bivalve, leading a free life, moving swiftly through the water by the rapid opening and closing of its valves, and attaching itself at will to any fixed object, until it reaches adult life, these shells are full of interest.

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## THE PLANTS OF ARID LANDS.

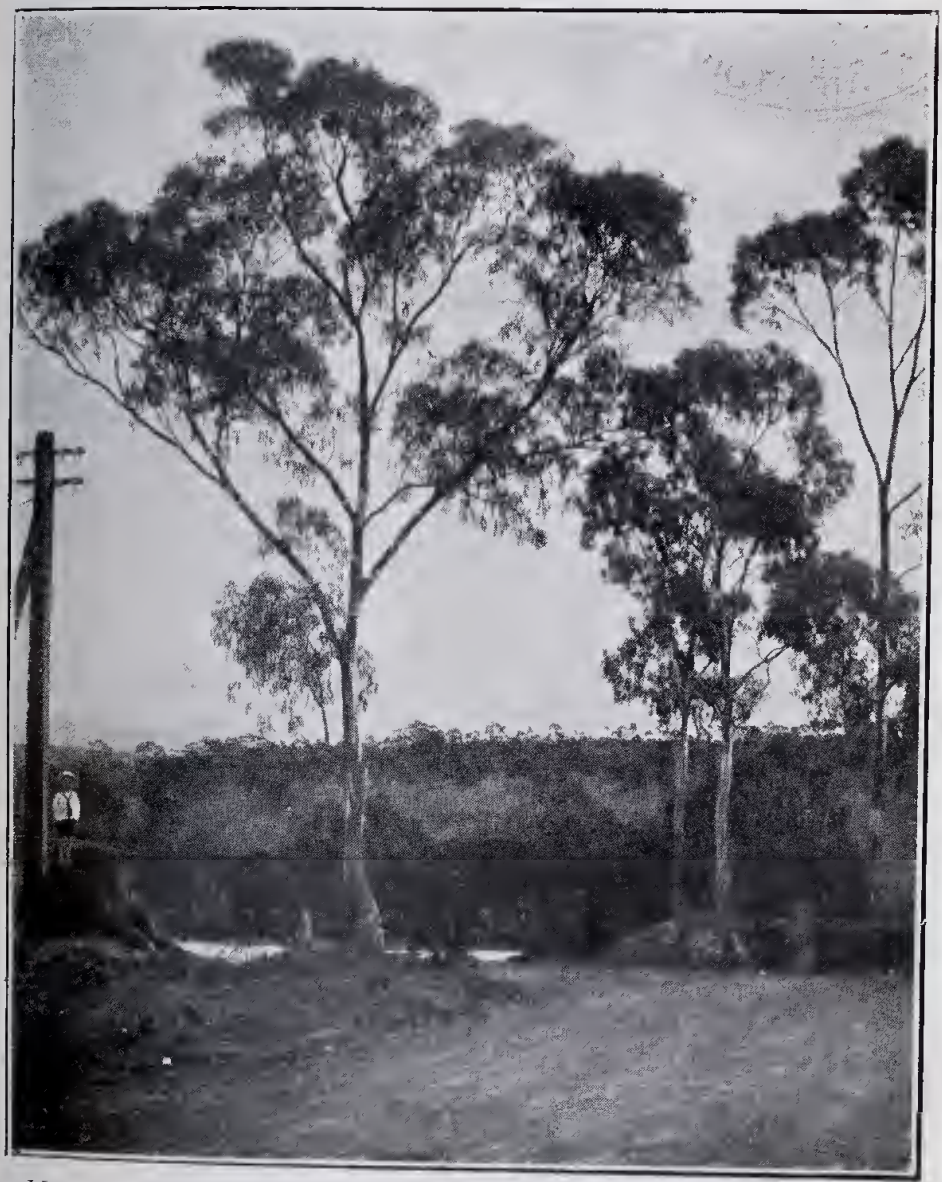
By Tellurian.

Dr. T. G. B. Osborn, Professor of Botany in the University of Adelaide, has undertaken a work of national importance, in a series of special investigations regarding the characters, habits, &c., of the plants, and plant communities of the arid areas of Australia. In this he is being assisted by several other workers, many of them being his own students. His first article is published in the current volume of the "Proceedings of the Royal Society of South Australia," and is entitled the "Ecology of the Vegetation of Arid Australia." Ecology is a special branch of botany; it embraces the study of living plants in their own homes and environments. It is as distinct from the study of systematic botany as is the study of the habits and customs of the aboriginal in his tribal village from the investigation of his anatomy in a museum specimen. Both aspects of scientific inqury are important, but the study of the life and habits of the living plant or animal, in its natural surroundings, is of much wider general interest. In the case under review it is also of mch greater economc importance, particularly as Professor Osborn is investigating our plants in relation to the advent of the rabbit, the grazing of sheep, &c.


*Photo by M. Tindale.*

## EXPLANATION OF PLATE.

Fig. 1 Upper surface of female of Black Cicada.
2 Under surface of male, showing drums and beak.
3 Pupa or chrysalis.
4 Pupa with shell bursting to allow escape of mature insect
5—6 Perfect insects emerging.
7 Empty pupal shell.
8 Mature insects with wings shrivelled.



Yellow Gum (*Eucalyptus leucoxylon*, F.v.M.), Belair.
*Photo by E. H. Ising.*

The existence of "plant communities" has long been recognised. The ordinary observer has noted, for instance, that there is one series of plants to be found in the moist valleys of the Gippsland bush, and quite another plant community on the hill-tops of the same region; so also there is one plant community of the Queensland scrub, a riotous jungle of growth, and quite another group of plants found on the dry Mallee plains. The coastal scrub of the sand dunes embraces a plant community that is quite distinct from the vegetation of the adjoining lagoons and swamps. Even in so characteristic a plant province as the Mallee moreover, we find a number of distinct communities; there is one set of plants on the limestone ridges, another on the gypsum flats, another on the salty swamp lands, and another in the sandy hollows. Broadly speaking, the botanists speak of five great plant groups, as far as ecology is concerned:—

(a) Hydrophytes (Water Plants).—Those that grow in creeks, rivers, and swamps, wholly or partly submerged in water.

(b) Hygrophytes (Moisture-loving Plants).—Those that live on marshes, river sides, and other damp areas.

(c) Xerophytes ("Dry" Plants).—Plants that have accommodated themselves to conditions of droughts. In this class belong most of our characteristic Australian bush plants.

Mesophytes (Intermediate Plants).—Here we find the majority of British plants, those that show no special liking or adaptation either for drought or moist conditions.

Tropophytes (Changing Plants).—Including deciduous plants; that is, those that lose their leaves in winter, and thus take on varying characters, according to their seasonal environment.

We are concerned in this note with the plants of arid Australia, and mainly therefore, with the great group called the Xerophytes, or we may us the adjective to describe them, and say they are "xerophilous" plants, that is, lovers of dryness.

In different countries different meanings are attached to the words "desert" and "arid lands." In the United States of America, for instance, a general definition of arid lands includes all areas with a rainfall of less than 20 inches. This would never do for our sensitive Australian souls, for many of us shrink from the acknowledgement of an Australian desert. As a matter of simple fact, we have in the Commonwealth a bigger proportion of desert and arid lands than any other continent. We should recognise,

(1) Trans. Roy. Soc., S.A., Vol. 48 (1924), p. 110.

too, that deserts are places of extraordinary interest and beauty, and that they may become of great economic importance. Ellsworth Huntington, possibly the greatest comparative geographer living, is a declared lover of deserts—of their scenery, their plants, and their peoples. Professor Osborn tells us that, if we define an arid climate as one with 10 inches of rain per annum, or less, then about 37 per cent. of the whole of Australia is arid; 1,105,452 square miles out of a total area of 2,974,581 square miles. In the State of South Australia five-sixths of the area has 10 inches or less of rain per annum, 317,000 square miles of arid land out of a total of 380,000 square miles. Therefore, he argues, South Australian botanists are well situated for a special study of the flora of arid lands.

Some few years ago on the opening of the Transcontinental line from Port Augusta to Kalgoorlie, it was my pleasure to make that most interesting journey. Naturally, like other travellers, I was desirous of finding out as much as possible of the natural history of the country passed through. As we journeyed through the low, but beautiful and varied vegetation that characterises the country from Tarcoola to Ooldea, I questioned all and sundry as to the exact significance of the term "mulga." The history is too long to tell, but there was much humour in it. I finally came across a gentleman who had lived 50 years in the mulga country. I tried again and again to pin him down to one plant or shrub as being mulga, but he never could get to the window in time to see the plant I was pointing out. When we got to know one another better (and this does happen on the long journey of the east-west line) he became more confidential, and with an embracing sweep of his arm over the visible countryside, he said: "We call the whole lot of it mulga." What my friend really recognised, from the sheepgrazing point of view, was what Professor Osborn would call the "mulga plant community:" this includes all the suite of plants that lives and flourishes under the same conditions as mulga. The real mulga of the botanist is a definite shrublike wattle (*Acacia aneura*).

Some years ago it was my privilege to wander through the bush with Professor Osborn himself; he then told me that when he first came to Australia the plant character that continually forced itself on his notice was the way in which almost all Australian plants have adopted devices, such as leaf shape, leaf arrangement, &c., so as to obtain as little sunlight as possible. The characteristic leaf arrangement in English plants is just the reverse; it is designed to obtain as much sunlight as possible. A couple of years ago, when driving through the Blue Mountains in the

company of several American scientific men, one of them broke a pause in the conversation by remarking, partly to himself: "There's a characteristic Australian flora." It happened that the country we were going through was particularly flinty and dry; the plants, from the eucalypts to the heath, were all of a decidedly xerophytic type. It was not what we call a pretty bush scene, and my national pride demanded that I should call attention to the glories of the Queensland "jungle," to the beauties of the West Australian kauri country, to the semi-tropical forests of Eastern New South Wales, to the fern gullies of Gippsland, and to the wonderful forest tangle of the West Coast of Tasmania. But he brushed them all aside—he had seen most of them—they were beautiful, but not characteristically Australian. Both these little incidents are quoted in illustration of the important fact that we Australians must realise, however reluctantly, that our characteristic Australian bush flora is a xerophytic one—a suite of plants accommodated to dry conditions, enjoying them and thriving in them.

Professor Osborn points out that as we approach the line of 10 inch rainfall from the moister areas, the eucalypts tend to disappear. Over large areas they still remain dominant in the modified form of those graceful trees we call the "mallee." It is clear, says the professor, that the term "mallee" must pass into ecological usage as one descriptive of a definite vegetation type. Further towards the interior the eucalypt occurs only in the fringing of streams. According to conditions there we have also the "mulga scrub association," the eremophila association, or the saltbush community of the wide saltbush plains. Travellers on the east-west line must note the remarkable and sudden break from the scrub vegetation of the eastern sandy areas to the saltbush and bluebush of the more arid limestone plains of the Nullabor. Those who desire to know more of these plant communities of our arid lands should consult Professor Osborn's paper, vol. 49, Transactions of the Royal Society of South Australia.

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## WANTED! AN AQUATIC BOTANIST.

Dear Mr. Editor,

You have asked me to supply some notes on the annual excursion of the S.A. Aquarium Society recently held for the investigation of the Finniss River. As I have already supplied a popular article to the Adelaide "Register" (Feb. 6th.) on the subject of this outing, you will perhaps allow me to substitute a note under the above heading, a note really inspired by difficulties encountered during the excursion in question.

The term "Aquatic Botanist" may be objected to, but it is no worse than "Marine Biologist" and will be as equally well understood. At mention of the word "Aquarium" most people think of fish and generally of goldfish, but the aquarist is concerned with many other aquatic animals and, of necessity, of plants also.

Setting aside one's earlier experience and confining attention to the eight years representing the life of the South Australian Aquarium Society, it may be said that on no occasion, either during excursions or meetings, have satisfactory determinations of aquatic plants been made. We, of course, know *Vallisneria, Myriophyllum, Potamogeton, Nitella* and so on, but specific recognition is a different matter. I have approached botanists in this and other Australian States and while all are prepared to name the flowering land plants not one seems to be interested in the submerged vegetation. Of course there are such workers and the object of this little note is to bring them to light, for I feel certain that much useful work on our aquatic plants still remains to be done. If some young and aspiring botanist would take up the study of the algae and other aquatics, instead of following older workers in identifying sub-species of Eucalypts, for example, I feel sure that a promising field is open to him. He would not lack for material, for members of the Society would willingly supply specimens in return for their names.

It is perhaps consistent with the observed fact—that aliens flourish in our summer clime—that *Vallisneria spiralis*, which in England we knew as a quarter-inch-wide leaved plant, should in the Murray produce leaves quite an inch wider, but it seems a little strange that no varietal name has been proposed for a race that has acquired such remarkable broad and long leaves. It is commonly believed that male flowers are not produced in Australia, propagation being solely by runners. Male flowers were found in the Finniss in abundance, while the stems of the female flowers were so thick that they formed a veritable meshwork of corkscrews, in patches many yards in diameter. However I am wandering. We want a aquatic botanist!

E. R. W.
President S.A. Aquarium Society.

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Notification has appeared in the Press that Mr. N. Tindale, of the Museum, has succeeded in procuring several leg-bones of the Kangaroo Island emu (*Dromaius diamenensis*) of which previously only two specimens were known to science, both taken alive by Captain Baudin in 1802. The museum has since received from Mr. Burgess several part-skeletons from the Kelly Hill caves.

To the Editor—

Humbug Scrub,
4th January, 1926.

A few words to my many friends of the Field Naturalists' Section of the Royal Society.

My life is so crowded that I find a difficulty in keeping in touch with my many friends—a seeming neglect that is unintentional on my part. I have much appreciated the honour done me and my work in that I was elected an Honorary Member of such an association, and my thanks are due for copies regularly received of your interesting journal.

I have much appreciated your kindly reference to the birth of our new organisation, the Nature's Lovers' League (re November issue your journal).

Having similar ideals we shall have much in common and the relationship existing between the two associations should be a most happy one.

As with us, the Field Naturalists have grieved at the swift depletion of Australia's unique and wonderful wild life—Fauna and Flora, and as with us, they recognize the need of action for its preservation. Toward that end we have protective laws that are not recognized in our hinter lands, and educative measures working for future good among the rising generations.

Science is with us in theory, but of practical work the past has been very barren of results.

Years have come and gone and with them have gone some opportunities that we ought not to have missed, and with these passing years more and more destructive agencies have come into play. Also these passing years have proved that for the end in view we cannot rely with safety on Government interest or on scientific interests for action, that action that shall be immediate and speedy as the case demands.

What is left? Is it not that we ourselves take action? We, whose heritage of the ages is so fast being destroyed. When we have risen to our responsibilities then we can demand the support that is our right from the powers that be.

Acts of Parliament will not save our disappearing native life. Motions of censure will not stay its destruction, petty jealousies are a hindrance. What is needed is immediate practical work. And since we cannot turn these creatures adrift on any area and tell them to be saved, the work will have to be specialized on selected areas and the life habits of every creature known. In my long experience of animal psychology I have known animals to starve amid apparent abundance; further study corrected the faulty environment and the same species then prospered. Wide success can only attend specialized effort under the control of efficient and sympathetic Biologists.

The fine flock of breeding duck at the Sanctuary had their genesis in a pair of decoy ducks secured in 1898. There are Mallee fowl here, 15 and 16 years old, still going strong and the parents of many descendants. There are Island Kangaroos and opossums 14 years old, and still breeding. The wallabies are now breeding well.

Thanks to the help of those whose sympathy was with the work, who are interested in Forestry or people's parks throughout our widely varying districts. I am now putting things on a better working basis and am much better equipped to carry out my studies—studies so long negleced yet so important to our success.

The aim of our league is to take up the practical work, to establish sanctuaries and refuges, to train men for the work, to assist in all wise legislation, to combat vandalism in every form, to make every member a vigilant without publishing their names.

We look to acquire areas of land that shall be the property of the League, or to assist others with similar aims, especially district councils. Flinders Chase was a move in the right direction, but will fall far short of what is needed. We recognize that the saving of our Flora is one with that of our Fauna. We are alive to the importance of re-afforestation, and the foundation of all our work must ever be that which is the interpretation and the foundation law of the wide universe—"Love" which no private interest may usurp. This must be the heart and soul of our movement. We cannot afford to be idle while our world is laid waste around us, neither can we afford to wait the fruits of educating the young. Ours is to be up and doing the work that lies to our hand, to take advantage of present opportunities. Our association will have members in all parts of the world, who will start kindred societies to carry on the work. Sure of your sympathy we look to your organisation for such aid as it can give in carrying out ideals that are common to both

Yours in a common cause,

T. P. BELLCHAMBERS.

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# THE PLANTS OF THE ENCOUNTER BAY DISTRICT.

## II—Notes on the Ecology.

By J. B. Cleland.

In "The South Australian Naturalist," Vol. VI, 1925 (No. 2, Feb., p. 22 and No. 3, May, p. 46) we have recorded 603 higher plants for the Encounter Bay District, of which 104 were introduced. Since then, we have made further additions (not yet published) so that the total known flora is now about 650. It is the object of this and following contributions to deal shortly with the ecology of the district and to list the plants found on various formations. Many members of the Field Naturalists' Section yearly visit Victor Harbour or Port Elliot, and such, as well as other botanists, may find it of interest to have lists of plants available so that when they are on the sandhills, or at the Bluff, or in the mallee country behind, or on the ranges, they may have a guide as to the species occurring in such situations.

We must admit that we have been surprised at the number of species that our survey has yielded—and there must be others awaiting discovery, so that the final total will probably be near

700. This is to be explained only in small part by the intensity of the quest. It is chiefly due to the diversity of habit conditions to be found in the district. Grouping these we find the following:—

I. Marine.—Sea-meadows comprising 4 or 5 species of vascular plants.

II. Saltwater Estuaries, at the mouths of creeks and rivers such as the Inman and Hindmarsh. In summer time, the exits are usually blocked by sand. The water varies from salt to brackish or nearly fresh after rains. Small salt-impregnated flats adjoin the banks.

III. Littoral and Coastal Sandhills. The latter are usually low.

IV. Cliffs overlooking the Sea. Westwards from the Bluff, reaching towards Newland's Head probably over 200 ft. high.

V. The Granite Formation. At the Bluff (Rosetta Head), Wright's, West and Granite Islands and Pt. Elliot. The plants so situated are all exposed to strong sea-breezes and mostly also to salt spray.

VI. The Country Behind the Cliffs towards Waitpinga, rocky and gravelly with a sandy clay, the soil too thin and stony to lead to clearing and replacement by grass and so still covered with wealth of Eucalypts of mallee formation, low shrubs, etc.

VII. The now Grassy Hill-slopes, passing into country with scattered trees still remaining amongst the grass.

VIII. Hill-slopes with Gravelly Sandy Loam and Clay Subsoil with widely dispersed *Eucalyptus fasciculosa*, etc.

IX. Gravelly Hills with Undershrubs especially low Casuarinas.

X. Hills, usually High, and Sheltered Valleys of Better and Deeper Soil supporting forests of merchantable *Eucalyptus obliqua.*

XI. Glacial Sands, varying from almost pure white sand to a sandy loam.

XII. River Banks, passing into the vegetation lining creeks, often in rocky valleys and sometimes with waterfalls.

XIII. Small Upland Swamps in or near glacial sands with a flora resembling that of the Mt. Compass area.

XIV. Lowland Swamps, often near the sea.

XV. The Flats Behind the Sandhills at Encounter Bay, at one time covered with bushes and semi-swamps, but now cleared and grass-covered but liable to flooding in very wet weather.

Probably with advantage still other subdivisions could be made. It is proposed, in this series, to supply notes on the plants of these various formations, though not necessarily taking them in the order of sequence just given.

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## "SOME ASPECTS OF FORESTRY IN SOUTH AUSTRALIA."

Under this title Professor Sir Douglas Mawson delivered the Commemoration Address at the Adelaide University in December, 1925. The lecture has now been printed and may be obtained gratis on application at the University.

Commemoration lectures are often abstruse and highly technical in character but there are exceptions, such as this, when the lecturer deals with a national question of vital importance to the future of the country.

The lecturer stresses the importance of forest products as indispensable to human progress. Forests protect the soil of the hills from erosion and Sir Douglas stresses the importance of this in relation to our own hills. The economic position is also of immense importance. To quote from the lecture:—

"Last year, according to the Statistical Register, South Australian imports of lumber and paper pulp products from without the Commonwealth amounted to a wholesale value of approximately £1,000,000. Importations from the other States and home production brings the total figure of South Australia's dependance upon forest products to an amount probably not less than £1,500,000. When by-products, such as firewood, turpentine, resin, honey, etc., are included, the figure is likely to be in the neighbourhood of £2,000,000. Such then is our dependance upon forests, and there is no obvious reason why at least a very large proportion of this requirement should not be produced in the State.

*Supply Forests for the State.*

The *sine qua non* of forest production is a sufficiency of water supply. Here in this State a twenty-inch rainfall is sufficient for certain useful timber growths, but for deliberate supply forests an annual precipitation of twenty-five inches is probably advantageous.

Meteorological statistics show that within the State there the lowest desirable limit, and for pines thirty inches and upwards is an area of about 829,000 acres within the thirty-inch rainfall belt. Of this some 50,000 acres are situated in the Adelaide Hills and the remainder in the south-eastern districts.

The remarkably successful growth of Pinus insignis on sandy lands in the South-East, as demonstrated by areas planted and administered by the Forest Department, indicate beyond doubt the fitness for pine plantation of at least certain areas in that part of the State. The odds are that very large areas of low grade land suitable for pine forests exist thereabouts. Other features favourable to planting in the South-East are the low cost of the land, the small amount of clearing to be done, and the general flatness of the situation. All factors therefore appear to be favourable for planting for supply forests, though, on account of remoteness from Adelaide, it is questionable how much of such timber could be profitably transported to the main centre of population of the State. The railway freight charge between Mount Gambier and Adelaide is much the same as the sea freight ruling for lumber between Canada and Adelaide. It seems probable, therefore, that the products of the forests in the South East, over and above local consumption, will tend to flow towards the fertile south-western district of Victoria.

The other outstanding area for afforestation is the higher rainfall region of the Mount Lofty Ranges, lying at the very door of the metropolis. From every part of this area railway or motor lorry delivery to the centre of consumption can be made at small cost. In the case of pine the saving in cost of delivery to factory in Adelaide from Kuitpo Forest, as against plantation in the neighbourhood of Mount Gambier, ranges from 25s. to 40s. per ton, depending upon special features of location. As the production of sawn, marketable timber from a single acre of mature plantation will not amount to less than 35,000 super feet, or 50 tons, in the bone dry state, a saving of from £62 to £100 per acre is indicated on this score, if the produce is to be marketed in the metropolis. It cannot be too seriously urged that proximity to a large centre of population is supremely advantageous in marketing low value by-products, such as thinnings and firewood.

In the hills a great variety in soil and drainage is available, so that a wide range of timber species may be cultivated, including some yielding higher grade timbers of double the market value of Pinus insignis. In this connection may be mentioned Pinus ponderosa and Pinus laricio, whose suitability, judging by results achieved at the Kuitpo Forest, has been proved beyond all doubt.

"These ranges provide a water catchment supplying the greater portion of the population of the State. As time progresses more and more reservoirs will be needed in the hills. It is a fundamental requirement that the catchment area of water-supply reservoirs for human consumption shall be so far as possible sit-

uated in forest reserves. 'The acid of forest soils kills the germs of cholera, typhus, and bacilli of tetanus. . . . The afforestation of watersheds gives a guarantee of purity.'* Not only is germ contamination thus avoided, but the intake is filtered free from sediment which, under other circumstances, namely, in a deforested locality, would seriously silt up the reservoir.

There can be no gainsaying the fact that permanent forest areas adjacent to the city would be welcomed by the populace, not only for diversion and their inspiration and beauty, but also for the beneficial effects upon the health of the community.

Complaints in the daily press regarding the cutting down of timber in the hills are year by year more strongly worded. But under the present system destruction must progress until naught but quarry-scarred, bare hillsides are left. But what a contrast would it not be to see them clothed in pines or other planted timbers: and why not? Here is beauty combined with profit. To accomplish this the Government would, of course, need to have conferred upon it such powers of control and land resumption as other nations, for instance France, have found necessary. All that would be necessary would be powers of the same order as are exercised by the Mines Department to-day.

It is submitted that the ultimate goal of our Government should be to effect the clothing with artificial or treated forest of the greatest possible area of the poorer and steeper lands of the Mount Lofty Ranges. As the whole community would benefit thereby, it is difficult to see from where opposition to this ideal may arise, unless it be on the score of expense.

Let us therefore enquire into the cost of planting. The figures ruling for the Forest of Kuitpo may be accepted in this connection. The expense in the usual heavily timbered country there about, when clear felled, burnt off, fenced, and close planted by trained employes with Pinus insignis amounts to between £8 and £13 per acre, land purchase included. These figures refer to a first-class job and treatment of the heaviest variety of country likely to be afforested in South Australia."

"Reverting to the Kuitpo Forest, it is of interest to note what profit may accrue. The first acre of pine planted is now just twenty-five years old. This is Pinus insignis, spaced six and a half feet. Out of this thinnings have been cut and marketed, yielding a net return of over £84, and there still remains on the block 38,000 super feet of standing timber, the healthiest and straightest trees of the original growth, and representing a safe nett value of £95. To produce this total yield of £179 the following expenditure (not including administration) was incurred:

* "La Foret," by A. Jacquot.

| | |
|---|---|
| All costs at establishment (1900) .... .... .... | £5 |
| Compound interest for twenty-five years at, say, five per cent. .... .... .... .... .... .... | 12 |
| Pruning (about) .... .... .... .... .... .... | 2 |
| Fire protection and general charges (about) .... | 10 |
| | £29 |

There is therefore in hand and in sight a very substantial clear profit of £150 in twenty-five years.† Since the date of this planting the costs both for land and establishment have increased, but it is also expected that an advance in the selling price will be realized before maturity of pine planted now. As to what this increase may amount to nobody can tell."

A plea for the continuance of forest training at the University of Adelaide, where it has been carried on for 13 years follows. The whole lecture should be studied by every member.

† Based on figures supplied by Mr. H. H Corbin. late superintendent. These figures are purposely taken below the actual yield. for the price obtained for some of the thinnings is probably above that likely to be realized if large quantities are placed on the market.

## SHELL COLLECTORS' CLUB.

The Shell Club concluded its first session on December 7th, 1925. Twelve meetings were held at which both interest and attendance were well maintained throughout. In addition to other bivalves the following specimens were studied:—

— *Mactridae.* —

*M. Pura* (Deshayes). The largest S.A. Mactra. A fine full-bodied shell glistening white, with areas of brown periostracum. Fairly common, low tide, Semaphore.

*M. australis* (Lamarck). Plentiful on Gulf Beaches. Valves tinged with purple.

*M. ovalina* (Lamarck) Common at Largs Bay. Small white shell.

*M. rufescens* (Lamarck). Reddish-shaded valves. Collected at Middleton.

— *Donax.* —

*Donax deltoides* (Lamarck). Wedge-shaped. Immense numbers live in shoals on the edge of surf line, Goolwa beach.

*D. brazieri* (E. A. Smith). Small shell. Corny Point, Y.P.

*Soletellina biradiata* (Wood). Common on Largs Bay beach. Heavy periostracum. All shades of brown, intersected by two prominent white rays.

*Marcia scalarina* (Lamarck). Large numbers at Outer Harbor.

*M. corrugata* (Lamarck). In tidal flats, Port River.

*Antigona gallinula* (Lamarck). At Largs and Outer Harbor, scarce. A beautifully sculptured and colored bivalve, ventral edges crenulated.

*Venerupis galactites* (Lamarck). White shell. Found among the seaweed bases at Outer Harbor.

*Amphidesma augustata* (Reeve). Immense numbers on Gulf Beaches. They plough along just under the surface of wet sand, leaving innumerable semi-circular marks. Just before the tide reaches them they throw themselves out of the sand.

F. Trigg, Hon. Sec.

## OUR EXCHANGES.

1. "Journal of the Arnold Arboretum" of Harvard Univ., U.S.A. Vol. VI.

Notes on the Botany of China and various other countries.

2. "Journal of the Royal Society of Western Australia." Vol. XI, 1924-25.

3. "The Victorian Naturalist" Numbers for November, December, January and February.

4. "The Queensland Naturalist" for November.

5. "The South Australian Ornithologist" for January.

6. Smithsonian Reports from the Smithsonian Institution, U.S.A.:—

1. The Constitution and Evolution of the Stars.
2. The Sun and Sunspots.
3. Joining the Electric Wave and Heat Spectra.
4. The Possibilities of Instrumental Development.
5. The Borderland of Astronomy and Geology.
6. Atmospheric Nitrogen Fixation.
7. The Place of Proteins in the Light of the Newer Knowledge of Nutrition.
9. The Story of the Production and Uses of Ductile Tantalum.
10. The Composition of the Earth's Interior.
11. Diamond-bearing Peridotote n Pike County, Arkansas.
12. Recent Progress and Trends in Vertebrate Paleontology.
13. Animals in the National Zoological Park.
14. The Burrowing Rodents of California as Agents in Soil Formation.
15. The Natural History of China.
16. Life in the Ocean.
17. A Study of the Flight of Seagulls.
18. Insect Musicians their Music and their Instruments.
19. The Gardens of Ancient Mexico.
20. The Hovenweep National Monument.
21. The Origin and Antiquity of the American Indian.
22. The Anthropological Work of Prince Albert I of Monaco.
23. The Utilization of Volcanic Steam in Italy.
24. Proposed Tidal Hydroelectric Power Development.
25. Sir James Dewar, F.R.S., LL.D.
26. J. C. Kapteyn, 1851—1922.
27. Julius von Hann.

# The South Australian Naturalist

**The Journal of the Field Naturalists' Section of the Royal Society of South Australia.**

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## EXCURSIONS.

May 15—Glen Osmond, Sir William Sowden's. Members only. Tram, 2 p.m. Leader, the President, Mr. J. F. Bailey.

May 29—Yantaringa. The railway will put the party down at this siding, near Ambleside and close to the River Onkaparinga, picking up the party in the afternoon. Eucalypts and Scrub Flora. Leaders, Messrs. Ising and Ham. Train for Yantaringa 1.24 p.m. Ticket to Ambleside.

June 7—Sandy Creek Waterfall (via Torrens Gorge, Millbrook, Gumeracha Birdwood and Palmer). The Torrens valley, the Palmer granites, and the Eucalypts of the hills. The action of water and possibly a waterfall in action. Leaders, Miss Murray and Mr. Ham. Charabanc, 8.30 a.m. Book at least 5 days before with Mr. B. Beck.

June 26—The South Australian Museum. Mr. A. M. Lea, F.E.S., the Acting Director will receive the members at the Entrance at 2.30 p.m. and conduct the party over the Museum.

July 10—Henley Beach. Leaders, the Shell Collectors' Club. Shore-life. Tram from Currie Street, 2 p.m.

July 24—Port Noarlunga, via Morphett Vale. Leader, Mr. W. J. Kimber. Fossils and beach-life. Train to Morphett Vale (then charabanc) 1.32 p.m.

August 7—Largs Bay. Leaders, the Shell Collectors' Club. Shore-life. Train 2.5 p.m.

August 21—Highbury (Property of Mr. H. J. Coulls) Leader, Mr. W. J. Kimber. Native Flora, etc. Charabanc, 1.30 p.m. Book with Mr. B. Beck at least 5 days before.

September 4—Horsnell's Gully. Leader, Mr. W. H. Selway. Botany, etc. Magill tram 2 p.m.

## EVENING LECTURES.

May 18—Prof. H. Johnston, Mr. J. F. Bailey, Dr. R. H. Pulleine, Messrs. W. A. Harding, A. J. Morison, W. J. Webb, A. H. Elston, and R. Kemp and other members will show and describe microscopic exhibits.

June 15. Mr. H. M. Hale. "Defensive Devices of Marine Animals."

July 20—Mr. F. G. Holdaway, B.Sc., on "An Australian Plant Bug, its Life and Economic Importance."

**Aug. 17—ANNUAL MEETING.**

The

# South Australian Naturalist.

VOL. VII. ADELAIDE, MAY, 1926. No. 3.

## EXCURSION TO Mr. BELLCHAMBERS' SANCTUARY, HUMBUG SCRUB, ON APRIL 26th, 1926.

A large party of members journeyed by charabanc and motors to Mr. T. P. Bellchambers' sanctuary for native fauna in the rugged fastnesses of Humbug Scrub. Bowling along the bitumen paved North road, smooth as a billiard table, the vehicles turned at the finger post in the direction of Onetree Hill, and entered an undulating park-like country hemmed in by wooded crests. Many stately trees of the yellow gum (*Eucalyptus leucoxylon*) clambered up the tall slopes, while hardy red gums (*Eucalyptus rostrata*) favoured the winding valleys and the occasional moister flats. Through the misty veil that shrouded the hills enchanting glimpses were caught of distant blue ranges bathed in the soft sunlight or anon hidden in fleeting shadow.

### The Home Surroundings.

Mr. Bellchambers' homestead is reached by a rough bush track purposely left in almost its natural condition to discourage the influx of the merely curious. It is situated not far from the abandoned shafts of the Lady Alice gold mine, which has been worked on and off for more than 50 years, and near the Government dam, which holds a considerable store of water throughout the summer, and has proved valuable to Mr. Bellchambers' beneficent work. The wall is, however, crumbling, and the ardent naturalist has devoted much time and labour to maintaining it in a state of repair. The different wild creatures are enclosed in large paddocks wirenetted to prevent their wandering to their destruction at the hands of so-called sportsmen. Otherwise they are allowed to live under conditions approaching as near as possible those of their natural haunts. Near the house a large emu paraded, giving vent occasionally to its booming cry, and baffling the praiseworthy efforts to "snap" her, probably because she had not completed her toilette before the arrival of the inquisitive party. On the other side several innocent looking kangaroos paused in their midday meals to take stock of those strange city folk.

## Mallee Fowl and Ducks.

At the hen house the visitors were arrested by the large pie-shaped mound, its funnel-like hollow filled toa cosiderable depth with dry leaves, in which the mallee hen deposits its eggs. Here the keen observer and staunch friend of the native fauna described in clear and eloquent words, and with a remarkable wealth of detail the nest building and other habits of these unique birds. All the heavy drudgery in the nursery and in other household duties falls to the lot of the patient male, while his bustling mate takes the air, and enjoys the scenery, warning him by a peculiar cry to have everything in apple-pie order when she returns Near the dam were observed thriving flocks of black swans, and of black ducks, and also a white or sacred ibis, the best friend of farmer and flock owner. The ducks are the descendants of a pair brought from the Murray some 20 years ago, and they number several hundreds. There are also a few Galway ducks named after Sir Henry Galway. Talking about ducks, Mr. Bellchambers pointed out the extreme folly, even from the sportsman's and epicure's point of view, of curtailing the close season for these birds—a measure which will inevitably lead to their complete extinction, and so put an end to the so-called sport, and banish the dish from the table of the epicure. Such extermination of rare and beautiful creatures has happened in our own country, and in the United States of America, the Government of which is now offering £40,000 for a single specimen of a pigeon that at one time flew in flocks of millions. Surely "a word to the wise" from a man like Mr. Bellchambers, who has made a life study of these creatures, ought to carry due weight with the powers that be.

## Twenty Years' Work.

The naturalist began his valuable scientific work more than 20 years ago. He noticed that while much was said and written about the preservation of our harmless and unique fauna, little was done to take practical steps in that direction. Accordingly, not asking help from Government, or any one else, he took the task in hand. After a long search for a suitable spot he decided upon the rugged and comparatively inaccessible situation of his present sanctuary. It is secluded and out of the track of the ordinary tourist. Here he has spared neither time nor labour to achieve his purpose, and, although a poor man, has spent considerable sums for little return, except the satisfaction of feeling that his labours will prove of great value to science, and to his adopted country, even from the commercial point of view. All this has been done with little outside aid, and often in the face

of great discouragement, and it does seem that such unselfiish and valuable work deserves substantial recognition. It is understood that many interesting and illuminating articles contributed to The Journal are to be printed in book form, and it is hoped that these books will command a ready sale.

## EASTER CAMP AT FINNISS.

### I. GENERAL.

By Wm. Ham.

At Easter time our members visited the old town of Finniss or, as it was originally named, "Queen's Own Town." The region roundabout is very interesting to the student of Physiography, as it is there that such a great area of country is covered with remains of the Great Ice Age of Permo-Carboniferous times which occurred from 16 to 30 million years ago. It seems strange not to see the familiar limestone, but instead to have a brown sandstone, quite unlike the stone to be seen elsewhere in our State. This in many places forms a free-stone and is easily worked. The Bank of New South Wales in King William Street, Adelaide, is built of this stone, which has a very fine effect. Close inspection of the building will show the way in which the weathering has brought out the grain of the stone. This is held by some to be indicative of the action of either Glaciers or of floating ice on the deposits as they were laid down in the shallow seas at the close of the period. (See Howchin, Proc. Roy. Soc. S.A., Vol. XXXIV., p. 231).

The River originates in springs on the side of Mt. Compass flowing thence in a very winding course first east then north, near Ashbourne turning to the south and flowing south and south east to join the Murray waters, in Lake Alexandrina about 10 miles north of Goolwa.

The river flows in deep gorges through the highest and hardest rocks in the district (the Mount Observation Range) thus showing that the river itself was antecedent to the uplift. It now has all the characteristics of an incised meander.

In the lower part of its course it flows through glacial material and fine sections of glacial beds may be seen. The somewhat porous nature of much of this material enables it to retain a proportion of the rainfall, which is later given out in springs thus maintaining a permanent flow in the river. Indeed some of the party found the flow in the river greater in April, after a dry summer, than it had been on their former visit in January. Evidences of occasional floods were seen in the debris left up to 10 feet above the normal height. The rush of the flood waters is not sufficient, however to destroy the submerged vegetation.

Near Finniss township the river is crossed by a fine railway bridge, the piers, 50 feet in height, being built nearly 60 years ago of the local stone. The bridge is just now being strengthened to carry the new engines and much of the strikingly fine stone-work is being covered with the more utilitarian cement.

We were informed by Mr. Henley that during the re-excavations a further quantity of the green glauconitic clay referred to by Prof. Howchin (Roy. Soc. XXIV, p. 245) under the title of "Older Tertiary Outlier," was found. (See Geol. of S.A., Howchin, p. 462).

Above and below the bridge beds, river gravels were noticed much above the present level of the river. Here also picturesque pools shaded by tea tree and gum and bordered with bul-rushes form ideal places for the growth of aquatic vegetation.

Below the bridge the river branches out forming a delta, the streams meandering through the river-flats, where still pools alternate with sluggish creeks. This part of the river was the happy hunting ground for the aquarist in search of freshwater fish while the flats themselves afforded opportunity for the study of ecological distribution of the plants native to such a low-lying locality, with moisture always not far from the surface and subject to irregular flooding. The botanist of the party found the distribution of the various species of rushes, reeds etc., in such a locality governed by almost imperceptible differences in level, six inches of elevation being sufficient to cause great changes in the species and families represented.

Away from the river rise the hills formed of the older Cambrian rocks which are also known to underlie the glacial deposits of the flats. Originally these hills were very thickly clothed with large gum trees, but sixty years of felling to supply the metropolis with firewood has denuded the ranges and the big gums, mainly peppermint, yellow gum and river red gum, are few and far between and as a result the strong soil once held by the forest has been largely denuded.

The flats with their thin sandy soils, the result of the wearing down of the glacial drift, notwithstanding a rainfall of about 20 ins. annually, supports a typical mallee-scrub formation,—*E. dumosa* (the Common Mallee), *E. leptophylla* (the Hooked Mallee), *E. calycogona*, (the Red Mallee), *E. oleosa* (the Oil Mallee) and *E. gracilis* (the White Mallee) were collected.

Through the kindness of Mr. Henley, of Gilberts, some of the party were motored to the Black Swamp. The contrast between the rank growth along the wet swamps and that of the drier hills is very striking. These fresh water swamps are very pro-

ductive. Everyone with whom we came into contact did all they could for our comfort. In particular our thanks are due to the Station Master, Mr. Hentschke, Mr. and Mrs. Diener, of Finniss and Mr. Henley, of Gilberts.

## II. PLANT ASSOCIATIONS OF THE FLOOD PLAIN OF FINNISS.

By E. H. Ising.

The flood plain is 200 acres in extent. The hills gradually disappear going eastwards from the railway line and from the ford, a mile from the line, the country opens out into a swamp, the lower parts of which are flooded every year. The higher ground is only inundated after big floods and has a number of red gums (*E. rostrata*) growing upon it accompanied by weeds of many kinds.

The junction between this higher ground and the part periodically flooded is very marked. In the lower ground the vegetation occurs in bands or patches and the following associations were noted:—

1. The Samphire Formation.
2. A Rush Formation.
3. A Rush - Mimulus Association.
4. Scirpus - Juncus Association.
5. Crassula - Triglochin Association.
6. Scirpus lacuster formation.

### 1. Samphire Formation.

On the edge of this formation the ground is bare and the first plants occurring are *Spergularia marginata* (No. 2211) and a few specimens of *Mimulus repens* (No. 2212) mixed with the couch grass (*Cynodon dactylon*) and barley grass (*Hordeum sp.*). In the damper ground the barley grass entirely disappears but the *Mimulus* increases and forms a veritable mat over the ground, as it reaches the samphire (*Arthrocnemum halocnemoides*, var. *pergranulatum*) (No. 2213) it is not so plentiful. This leads to the zone of the samphire which is in open formation in the centre of which there are no other species. The ground develops cracks several inches deep becoming very dry in the summer. Thus the soil conditions are very much against plant-life and it seems only such plants as the samphire, with its highly developed water-bearing stems, can grow here. However *Mimulus repens* again enters the formation, and *Triglochin striata* (No. 2214) also comes in here as the samphire disappears. This formation represents a zone of about 20 feet in width.

2. A Rush Formation.

This formation is dominated by a rush, *Heleocharis acuta* (No. 2215) plants of which are growing so densely together as to become a closed formation. The plants are about one foot in height and form a thick mat over the soil. Sparsely distributed are *Cyperus vaginatus* (No. 2216) which is found chiefly on the division of this and the previous formation, the bul-rush (*Typha augustifolia*) (No. 2217) with *Centipeda* (No. 2218), a clover, *Trifolium fragiferum* (No. 2217a) with pink woolly heads and a grass (*Polypogon monspeliensis*, No. 2219). This formation is about 3 inches lower than the samphire zone and is about 30 yards in width.

3. A Rush - Mimulus Association.

This association consists chiefly of the rush, *Heleocharis acuta* and of *Mimulus repens* (No. 2221). The former is in tussocks scattered about and the latter covers almost all the remaining surface. Occasional plants of *Alternanthera triandra* (No. 2222), a dock, *Rumex* (No. 2220), *Typha*, and *Cotula coronopifolia* (No. 2223) are seen. The small *Triglochin striata* is much more plentiful. This is lower ground than the previous formation and shells occur here, as in all the lower ground, in great numbers.

4. Scirpus - Juncus Association.

Going still further toward the main stream island-formations occur with *Scirpus americanus* (No. 2224) in dense patches. This species dominates small areas but has *Triglochin striata* and *Mimulus repens*, etc., occurring with it. *Juncus polyanthemus* (No. 2225) occurs here forming tussocks with the *Scirpus*. Neither of these dominants mix but they occur as small closed formations. Where the ground is a little higher other plants occur such as *Cyperus vaginatus*, *Cynodon dactylon* and *Gnaphalium Japonicum*.

5. Crassula - Triglochin Association.

In the last areas to become dry two small plants combine to dominate the area. *Crassula recurva* (No. 2227) is most abundant and forms a mat over the ground, this plant is moisture loving and its stems and leaves retain their moisture for a long while. The *Triglochin striata* again is plentiful but does not occur as thickly as its associate. *Mimulus repens* also grows well here and a few plants of a large *Triglochin* (*T. procera*) and *Heleocharis acuta*.

6. Scirpus lacuster Formation.

In a very wet situation the tall rush *Scirpus lacuster* (No. 2226) grows very luxuriantly, the plants being from 4 to 6 feet in height. So closely packed are the stems that they make a closed formation. However a few specimens of the bul-rush are seen among it and it is able to survive in this situation because it also is a tall plant.

## III. AQUATIC PLANTS NOTED.

By E. H. Ising.

### 1. *Ottelia ovalifolia* (R.Br.) L. C. Rich.

During two excursions this summer, two days at the end of January and four days April 2 to 5, the aquatic plants growing in the Finniss River were investigated. This is not by any means an exhaustive enquiry into the water plants but a preliminary note on several species which have been identified with certainty. It was not possible in the two short visits to make a thorough survey of these interesting plants but we hope to make further trips to this locality and continue the study of the aquatic as well as the land plants.

This plant was fairly plentiful and was observed in flower on both trips. The plant is secured in the mud and sends up leaves springing from the base of the plant. The leaf stalk grows until it reaches the surface of the water and may be as much as two feet in length the leaf itself then spreading and floating on the surface. The leaves are large, being oval in shape, about 3 inches long and 2 inches across. The top surface is shining green and almost appears oily and water does not remain on it. They make a beautiful sight especially when the flowers are out. The flower stem, like the leaf, grows until the bud is produced above the water level, when it soon develops and opens out. No matter what the depth of water is, the stem accommodates itself to the situation, the plants growing in shallow as well as deep water. The flower rests exactly on the surface and it is remarkable that after fertilisation the old flower-head will finally go below the surface again where it remains to mature its seeds.

### *Vallisneria spiralis* L.

The Finniss River is a favorite haunt for this plant which was abundant in all the pools and level stretches of water. Large patches of the plant grew in the shallow water of the creek, while some plants were in three feet of water. The scour caused by winter rains evidently prevents the plant from getting a hold in the deeper water. All the leaves spring from the base of the plant, they are erect and always entirely submerged. When taken from the water they become flaccid or limp at once, the large and numerous air cells in the leaves and stem buoy them up when in the water. The leaves are from 12 to 24 inches long and even longer and constantly about $\frac{3}{4}$ inch wide. They have no stalk being broad at the base and the apex tapers to a blunt point. The plant increases by means of runners in the mud and this may be its chief means of reproduction. The plants are dioecious (Gr. two houses) i.e., the male and female flowers are on separate plants. It is thought that the male plants have rarely, if ever,

been recorded from this State before this year when two of our members collected specimens which they now have flourishing in an aquarium; the plants have flowered as masses of pollen grains have been observed from this plant floating on the water. The female plant sends up a long thin flower stem which is produced in a spiral. When the solitary flower is about to open the spiral allows it to come to the surface where it blooms. When the flowering period is over and pollinisation has taken place the spiral then contracts bringing the fruit again under water and finally develops its seeds in the mud. The flower is very small and evidently does not depend on insects to carry pollen to it. It seems that the wind disperses the pollen over the surface of the water and some grains eventually reach the flowers. It seems necessary for both flowers to come to maturity at the same time to ensure propagation by seed and how two distinct sets of plants arrange this is a botanical wonder. The fruit is long, slender and cylindrical, up to 5 inches in length by one eighth of an inch in diameter. The seeds are very numerous, threadlike, but not long, being about one sixteenth of an inch in length, and enveloped in a mass of gelatinous substance filling the fruit.

The male plants are similar to the female, the only difference is that the male flowers are produced on short stems at the base of the leaves. When the pollen is ripe the anthers burst and the pollen rises to the surface encased in a protecting coat which opens later.

## IV. FISHES OF THE FINNISS RIVER.

By T. W. Nettelbeck.

My first visit to the Finniss River was on the occasion of the Annual Camping Excursion of the S.A. Aquarium Society, which took place during the sunny week end in January including the public holiday, Anniversary Day. The second, Easter Week, which although considerably cooler was just as enjoyable, and much more to the advantage of the aquarist for the reason of making conditions more suitable for conveying live fishes to Adelaide. As one leaves the camping site equipped for taking specimens of suitable aquarium fishes, and happy in the company of equally happy and enthusiastic camping friends, you can't help but wonder how the surrounding country must have appeared some eighty or more years ago, when the now almost bare lowlands were heavily timbered and the dusky natives made their camps along the still picturesque stream. A few of the old gnarled warriors of the Eucalypt family, still standing like silent links with the past, bear the unmistakable signs of the vanished inhabitants of the lagoons, shores and grassy lowlands of the Finniss. Here and there one sees where the frail bark canoe has been

cut out of the tree trunk. As evening draws on a setting sun makes the surface of the clear winding stream scintillate as it winds rush lined and irregularly through fields. One might very easily picture in imagination the twinkling camp fires and the stealthy forms as they moved to and fro in the shadows of the trees so long ago.

In places where the stream widens out to forty or fifty feet, and stretches so for some hundreds of yards, with an average depth of 12 feet, fine food fish still await the angler. I was told that local anglers with proper bait (and patience) catch small Cod and Callop up to three pounds weight. As we watched amongst the beautiful floating leaves of some aquatic plants, freshwater Butterfish (*Galaxias attenuatus*) seven or eight inches long darted about in shoals. But where the angler would tarry, the aquarist moves on, for the smaller backwaters and swampy lowlands yield him more interesting catches. Altogether the variety of fishes seen was wonderful, many beautiful species were very wary and resorted to deep water when disturbed thus being safe from the strokes of the net. Among the most interesting species obtained was the purple striped gudgeon (*Krefftius adspersus*), this gloriously coloured fish is easily tamed and is sometimes bred in captivity, its breeding habits somewhat resembling the Cichlid group of fishes. The eggs being adhesive are laid in groups on stones or aquarium sides, the male fish spending his time foodless while he fans water over the eggs during their incubation, and later exercising parental care over the young when they are first hatched. Although this fish like many of our gudgeons, has a rather repulsive looking mouth, the pen can hardly do justice in describing its colouration. Specimens of the Congolli (*Pseudaphritis*) were also taken, this fish, mottled black and white is possessed of wonderful powers of protective resemblances. Being a bottom loving fish it is got by deep netting and is hard, if not at times impossible, to see while it lies amongst rocks of an aquarium owing ot its adopted colouration, resembling the surrounding colours. It, however, becomes wonderfully tame, and soon learns to take a worm from one's fingers. The Pigmy Perch (*Nannoperca australis*) was by far the most plentiful, this little fish, neat cut and prettily marked, is also an interesting aquarium inhabitant, its methods of hiding in an aquarium when alarmed are most quaint and amusing. It, like the Congolli, however, soon becomes very tame and displays itself fearlessly in its little glass home. Some small catfish and Gobies were also taken many of which also make interesting and hardy pets. The waterplants were growing in a wild, luxuriant profusion, and the River Finniss is truly an aquarist's paradise.

## FRESH WATER MOLLUSCA COLLECTED AT FINNISS CREEK BY MESSRS. W. HAM AND E. H. ISING ON FEBRUARY 1st AND APRIL 5th.

By F. Trigg.

*Melania ballonensis.* A number of these univalves were taken in the brackish marshes. A turreted shell of seven or eight cancellated whorls, with the apex, as usual, eroded. It has a heavy dark brown periostracum; interior, bluish shade; horny operculum; length, averaging 25 mm.

*Bulinus inflata.* Common in most of our fresh water creeks and rivers, including the Torrens Lake. The last whorl is immensly inflated. It is surprising how quickly these shells proceed to make themselves at home in the smallest aquarium, and numbers soon increase. The *Bulinus* are 'sinistral', viz., when held spire uppermost the aperture appears on the left.

*Glyptophysa Aliciæ.* A prettily-marked little univalve, also 'sinistral.'

*Unio ambiguus.* These large fresh water mussels were plentiful The brown periostracum is generally eroded at the umbo. Interior brilliantly nacreous. The fresh water Pelecypoda are ovoviviparous, i.e., the young being hatched within the gills before being expelled by the parent. Some conchologists connect this shell with the marine bivalve *Trigonia.*

*Corbicula Angasi.* Plentiful on the mud flats, forming a favorite food of the wildfowl, often found in their crops in large numbers. This bivalve may be collected in the Torrens Lake opposite Elder Park. It is a relative of the large mangrove swamp shell *Cyrena* and looks like a small *Mactra.*

April 29th, 1926.

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## Mrs. ROWAN'S PICTURES.

Members will remember the extremely beautiful pictures of native flowers that for some years decorated the walls of our lecture-room, and doubtless many would prefer to see them again on the walls when the war pictures are exhibited in their proper place, the War Museum, which South Australia has been talking about for so many years. Mrs. Rowan painted pictures in almost every state, and the Federal government acquired a collection of 952 paintings at a bargain price of £5000. The admirers of Mrs. Rowan's work in New South Wales, Queensland and Victoria are proposing to have a portrait of Mrs. Rowan painted by an Australian artist to serve as a memorial to her service to science in painting her famous collection of representatives of the native flora of Australia and New Guinea. Many of our members will remember her as the author (and illustrator) of "Bill Bailey."

# HABITS OF THE SMOOTH PEBBLE-CRAB.

(*Philyra laevis* Bell.)

By Herbert M. Hale.

The Pebble-crabs belong to a tribe of the *Brachyura* (the "short tails", or the true crabs) termed the *Oxystomata*. As the name indicates (*oxys*, sharp and *stoma*, a mouth) the members of that tribe agree in one salient feature, namely, the mouth frame is narrowed in front and subtriangular in shape. The sharp-mouthed crabs burrow in sand or mud and the elongated mouth parts are the result of this habit. In the Pebble-crabs the canals conveying water to and from the gill-chambers (both the exhalent and inhalent channels) are prolonged to the front of the head, so that the crabs are able to bury themselves in fine silt with only the extreme front exposed.

The Smooth Pebble-crab occurs plentifully in the Bay of Shoals, Kangaroo Island, and during a visit to this locality the author spent some interesting hours observing its behaviour. The Bay of Shoals is a shallow, extensive and protected bay on the north coast of the island; at low tide a huge area of mud flat is exposed and the water near shore is nowhere more than a few inches in depth. The picture reproduced in fig. 1 gives an indication of the extent of flat uncovered at low tide. In taking this photograph the camera was pointed shorewards; the fringe of vegetation at the base of the hills in the background represents the high tide limit. This tidal flat is the haunt of innumerable forms of life, worms, crustaceans, molluscs and other invertebrates being present in abundance. In the very shallow inshore water, the Pebble-crabs commence their activities as the tide runs out and may remain buried in the mud at high water and during rough weather. The crabs were mating at the time of the visit and their courting behaviour was considerably amusing. A male selects a female and for a time moves around the darling of his heart in a clumsy sort of dance; after a time the female, as if fascinated, folds her legs and remains quiescent. The male then seizes his consort with one or the other of his large chelipeds and bears her off in triumph at arm's length, the female remaining all the time quite motionless. As shown in the illustration (fig. 2) the sexes are readily distinguished, for the males are of larger size than the females and have larger chelipeds. If a couple were disturbed during their elopement they at once commenced to burrow in the mud, the male placing himself immediately behind the female, often with his arms half encircling her. The burrowing occupies only a few seconds. The initial movement is a quick tilting upwards of the front, so that the crab rests in an upright position, supported by the walking legs; then these limbs disappear

beneath the mud and in a trice the hinder part of the body is buried. The chelipeds asssit in "working" the animals further down; the motions of these limbs suggest that the creature is clasping silt towards its chest and then thrusting it outwards. When the crab is buried the only visible parts are the front, the eyes, and the blackish antennules, which dart rapidly in and out and waggle industriously; the last-named appendages, by their constant movement, apparently assist in keeping the inhalent respiratory openings free of sand which washes over the exposed front with each tiny wave.

One of the functions of the long and attenuated hands of this Pebble-crab is apparent when one observes the creature search for its food. The crab runs quickly about in the shallow water and is continually pushing its arms down into the soft mud, or beneath pebbles, and feeling for edible material. In this way it secures pieces of marine worms, pincer-limbs of Snapping-prawns (*Synalpheus*) and fragments of other burrowing invertebrates. Many marine worms break themselves into pieces when disturbed, while the Snapping-prawns, like Dickens' lobsters (1) "part with a claw with as little concern as a man tearing the tail of his coat in a hedge when a mad bull is after him." In parts of the Bay, crowds of the crabs search for food together and in these circumstances the behaviour of a crab which secures a fragment of food is ludicrous; the fortunate seeker tests the edible properties of his capture and immediately commences to consume it, at the same time making off at full speed, with a pack of friends at his heels making earnest endeavours to rob him of his meal. If the pursuers are numerous the diner is very soon robbed and in turn joins the hunters in an effort to recapture the coveted morsel.

It may be well to mention to members of our Section that the observation, for the first time, of the behaviour of certain crustaceans, in particular the crabs, conveys an irresistible impression that at least some of their actions are the result of reasoning. The behaviour of a river crab in dealing with a pebble encountered while excavating is noted in a previous number of this publication (2); this crab appeared to act with intelligence. One has to remember, however, that invertebrates,—even the higher invertebrates, such as insects and crustaceans—do not "think", and cannot claim to be "intelligent" as we understand the term they have a limited capacity for learning and their behaviour is largely governed by ingrained instincts, which leads them to react purely mechanically to various sensations and influences. This

is perhaps a little difficult for us to realize, for our behaviour is largely controlled by learning and reasoning, comparatively few of our actions being due to inherited instinct.

(1) Dickens, Household Words, July 29th., 1854, p. 567.
(2) Hale., S.A. Nat., VI., No. 3, 1925, p. 44.

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The Fresh-water Spider-crab, found at Finniss is named *Hymenosoma lacustris*. This tiny crab was first described in New Zealand, and occurs also on Norfolk Island, and in Victoria and South Australia. It has not been recorded from our fresh-waters, but specimens have been previously taken in the lower Murray. The allies of the species are commonly taken under stones and amongst weeds on our reefs.

H.M.H.

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## OUR EXCHANGES.

1. The Australian Museum Magazine Nos. 7, 8, and 9. Interestingly written, profusely illustrated and compiled by trained observers of Australia life, these volumes are intensely interesting to all nature lovers.
2. Report of the Board of Governors of the Botanic Garden of Adelaide for 1924-5.
3. The Principal Fauna of the Comboyne Plateau (N.S.W.). By E. C. Chisholm, M.B., Ch.M., R.A.O.U.
4. A letter on "The Calls of the Frogmouth and Boobook Owls". By the same author.
5. Report of the Australian Museum (Sydney) for 1924.
6. The Queensland Naturalist for November, 1925 and January 1926.
7. The Victorian Naturalist for March and April, 1926.

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## OUR HERBARIUM.

May we again remind our readers that every one can assist in enhancing the value of this already important collection by collecting themselves, especially during the coming winter and spring, and by asking friends away from the city to collect and forward specimens of all kinds of plants. The specimens from outback places may prove of great scientific interest, and in any case we wish to discover and record the range and distribution of the plants native to our State.

Fig. 1. Shore of the Bay of Shoals, Kangarooo Is., at low tide.

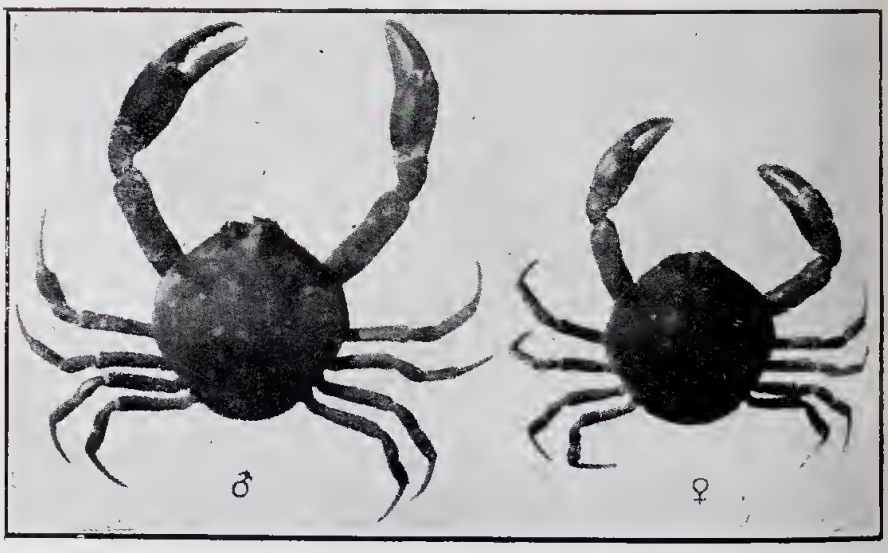
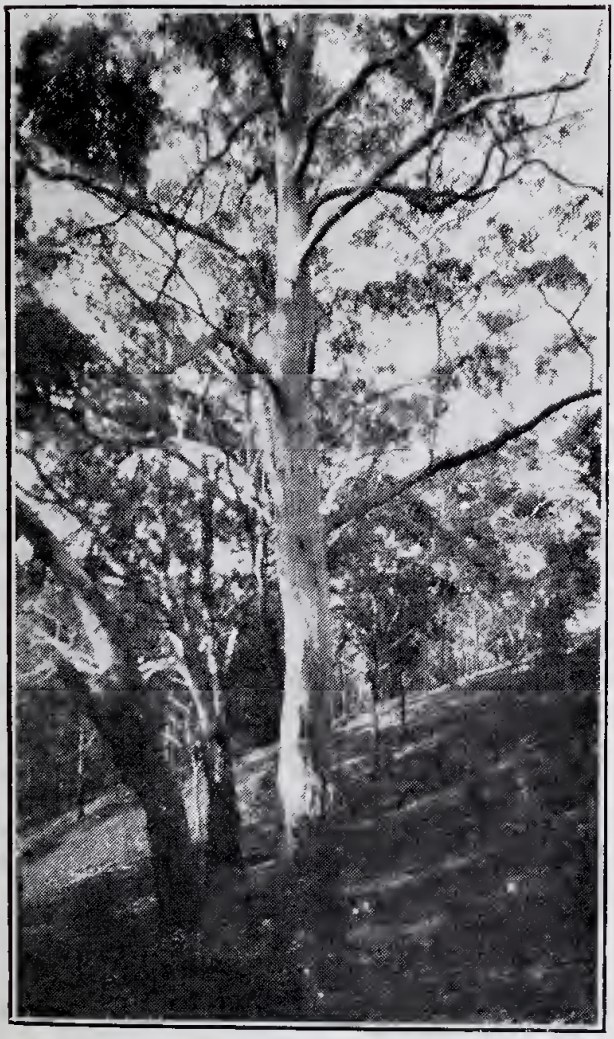



Fig. 2. The Smooth Pebble-crab (*Philyra laevis*) male and female about natural size.

Photos. H. M. Hale.



Photo, E. H. Ising.

Figure 3.

*Eucalyptus viminalis*, Labill.

Growing in National Park, almost on Long Gully flat, on the side of a hill facing north.

## SHELL COLLECTORS' CLUB.

This Club, having concluded its initial review of S.A. Bivalves, commenced a study of the univalves on the evening of February 15th. Among the shells discussed were the family—

### *FAMILY HALIOTIDAE.*

The *Haliotis,* or "sea-ear," commonly known in South Australia as "mutton fish," evidently provided a staple article of diet for the aborigines—judging by the remains that are found in some of the "kitchen middens." A number of species inhabit our seas, the principal ones being—

*H. albicans,* a large, smoothed-backed variety, occasionally found washed up on most of our beaches, probably a deep water form.

*H. cyclobates*, of medium size, with more elevated body whorl. Very common in St. Vincent Gulf, particularly at the Outer Harbor, where it is found attached to the valves of *Pinna.*

*H. naevosa.* Plentiful at Port Willunga on the reef under flat stones.

*H. roei.* Rather a scarce species, with closely laid rows of circular ridges.

*H. emmae.* Also uncommon. Noted for the prominent ridge above the perforation.

The measurement of a set of specimens tabled were as follows:—

| | Length. mm. | | Breadth mm. | | Height. mm. |
|---|---|---|---|---|---|
| *H. albicans* | 196 | x | 157 | x | 60 |
| *H. cyclobates* | 95 | x | 82 | x | 40 |
| *H. roei* | 85 | x | 68 | x | 30 |
| *H. naevosa* | 125 | x | 95 | x | 40 |
| *H. emmae* | 85 | x | 66 | x | 25 |

As a comparison it was noted that the Northern Territory species *H. asinina,* measured 85 x 40 x 23.

The perforations are an interesting feature, being used for the discharge of water from the gills, the outermost for the expulsion of waste matter from the intestines. Young shells have no open holes, these being added as the shell grows, but closed as the animal grows past them. It was noted that the perforations in use on the five species mentioned were—

*albicans,* 8; *cyclobates,* 6; *roei,* 8; *naevosa,* 5; *emmae,* 6; and the N. T. specimen, *asinina,* 7.

The *Haliotis* is called commonly in Europe, "Ormer"; in America, "Abalone"; France, "Sileux", or six eyes.

## *FAMILY TROCHIDAE.*

### *Cantharidus.*

Quite a number of species of this pretty little shell live in our waters.

*C. eximius.* Some beautiful specimens have been collected recently at Middleton and Port Willunga up to 30 mm. in length. The lovely greenish sheen of the interior is always attractive to the collector, and when treated with acid, the exterior rivals the interior.

*C. apicinus,* was recently collected in numbers at Port Willunga. This specimen has a distinctive beauty, and when viewed in certain light, shines like a lovely jewel among the general beach debris.

*C. bellulus, C. conica* and *C. irisodontes* are all common on our Gulf beaches, each having certain handsome features.

*C. fasciatus* is also plentiful. The ocean beaches seem to produce a greater quantity and variety of colors than the comparatively quiet Gulf waters, where the shell is usually smaller and less variable.

### *Monodonta.*

*M. constricta,* the common winkle, is well known on all our rocky shores, exposed at low tide. This plain mollusc has its compensation in providing the finder with a tasty dish.

*M. concamerata* seem to have a preference for the less exposed cracks and crevices in the rocks, unlike the previous specimen, which is not particular in that respect.

*M. adelaidae* (formerly *Diloma*) is very plentiful on certain beaches. This shell is more finely sculptured than *M. concamerata,* and smaller. It has a pretty, greenish interior sheen.

F. Trigg, Hon. Sec., Shell Club.

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## EXCURSION TO MYLOR TYPE ORCHARD, MARCH 20, 1926.

A large party under the guidance of the Director of the Adelaide Botanic Garden (Mr. J. Bailey) who has charge of the orchard visited Mylor. The drive through the hills was delightful. Near the orchard the candlebark (*Eucalyptus rubida*) was greatly admired, its stately white bole showing out well against a background of darker trees.

The summer has been very dry and the fruit trees were not at their best but the members were greatly interested in examining a few of the 1600 varieties of apples under cultivation. 950 varieties of pears are grown and large numbers of other fruits are cultivated, including plums, peaches, apricots, cherries, persimmons and many others. The Remarkable Pine (*P. radiata = P. insignis*) has made splendid growth on a limited area of the orchard. The party were very much interested in the pruning and general treatment of many of the varieties of trees that came under their notice and a profitable afternoon was spent.

## NOTES ON DREDGING TRIP, FEB., 20th, 1926.

By F. Trigg.

Weather conditions were perfect for this excursion—the exceptionally smooth sea prevailing enabled operations to be conducted with comfort. The dredges were lowered in 5 fathoms of water about 6 miles from shore, almost opposite the mouth of the Port Adelaide River.

The spoils recovered were, as usual, varied in character, enabling all to secure a good supply of those forms in which they were particularly interested.

An outstanding incident was the passing of the dredge over a bed of the bivalve *Lima angulata.* These toothless-hinged white shells were in countless numbers of all sizes. The *Lima* weave, with their byssal threads, nests composed of marine fibre and shell fragments, allowing space only for vertical movement. Several juveniles may inhabit the same nest, but adult forms settle down to solitary, sedentary existence, each in their own compartment. When placed in a specimen jar, the full beauty of the shell is revealed. Moving swiftly through the water, sheafs of gaily-colored mantle tentacles trail behind, which have considerable adhesive power. The shell itself has a rough, file-like, surface.

Specimens of *Cardium pulchellum* and *C. racketti* were noticed. The valves of the former, a small shell, are marked with groups of closely-laid pink rays, extending to the ventral edge. Several valves of *Myodora* and *Clausinella tiara* were collected. *Myodora* is peculiar in having one perfectly flat valve and one convex. *Clausinella tiara* is one of the smaller frilled bivalves very shapely when in good order. Both shells are comparatively rare.

The univalves included the rare and interesting *Typhis Yatesii.* Belonging to the great family of *Muricidae,* its tubular spines, rounded aperture, closed-over canal, and long upturned siphonal tube, make it a most remarkable specimen. Two examples of *Dentalium* or tooth shell were collected, one, a young specimen well curved, and the other, an adult much less so. Nine and ten ribs were counted on these shells. *Sigapatella calyptraeformis* was plentiful. This flattened univalve, though covered with a rough, brown, periostracum, was not difficult to discover, adhering to any flat surface among the general debris. Many other small shells were collected, and it was noticed that no specimen was too small to accommodate a still smaller hermit crab.

## SOUTH AUSTRALIAN TREES.

No. 4, Manna Gum, *Eucalyptus viminalis*, Labill, Fig. 3, p. 71.

By Wm. Ham and E. H. Ising.

### I. GENERAL.

This species was named from specimens collected in Tasmania ("habitat in capite Van-Diemen") by Labillardiere, (who was the naturalist on Baudin's Expedition to Australia in 1802,) in his work "Novae Hollandae plantarum specimen" published in Paris in 1806. It is therefore one of the earliest species named. It has received a variety of common names, viz., white, river or weeping gum, blackbutt, blue gum, boxtree, peppermint, in Vic.; Ribbony, weeping, white, grey or drooping gum, mountain ash, blue gum and woolly butt, in N.S.W.; "White Gum" appears to be the name most favoured not excepting "Manna Gum" by which it is now usually known. The former common name is given on account of the whitish trunk of the tree, and the latter on account of the "manna" gum exuded from the leaves at certain times.

### II. BOTANICAL.

*Eucalyptus viminalis*, Labill, 1806. The name "viminalis" means drooping and is an appropriate one as it describes the small branchlets and leaves which are pendulous in habit. This species belongs to the smooth-bark gum group, section Leiophloiae of Maiden (1). There is an exception recorded from Kuitpo, where the trunk has a rough scaly bark extending to the branches. There are no botanical differences between the two and if this variation from the type is characteristic from the early stages of growth close examination and growing the two varieties from seed may enable a distinct separation to be made. Other smooth-barked gums such as the red (*E. rostrata*) and yellow (*E. leucoxylon*) have a similar variation in the bark but not to such an extent, the trunks on some of these trees may be smooth to the ground and others may be rough-barked up to 10 feet from the base. Beuhne records (2) in Victoria that "there is perhaps no other species of Eucalypt which varies so much in general appearance in different surroundings, for while in some districts the manna gum is a tall, straight, stately tree, with upper trunk clean and smooth, in other localities, particularly in dry country, it is sometimes quite stunted, with drooping branches, and covered with a rough bark from the ground to the smaller limbs.". The bark peels annually in long ribbons which often hang for months from the trunk, giving the tree a "ribbony" appearance, hence the common name in some districts. The trunk grows to a good size some large ones measure 2 feet in diameter, they grow straight but often give off branches rather low down.

(1) Crit. Rev. Gen. Euc., Part 51, 1922.
(2) "Honey Flora of Victoria" 1922, p. 41.

The juvenile leaves are lanceolate and they grow longer in the adult stage being about, on the average, 9 inches long, they are usually less than one inch wide. On account of their decided drooping habit the tree was given its name of "viminalis" to describe this feature. The buds are usually in threes, although they have more at times up to 6, and they are in the shape of a cross. Size, about $\frac{1}{4}$ inch long and $\frac{1}{8}$ inch wide. The buds remain on the trees unopened for eighteen months and at times trees are seen with two generations of buds, young ones and others over 12 months old. The cap or operculum is a short blunt cone. The flowers are white, small and are in umbels set in the axils of the leaves. It flowers in February chiefly, but may extend its flowering period several months according to the district. It flowered at Long Gully in February this year.

## III. GEOLOGICAL.

The geological features given for the stringy-bark in a previous paper (1) apply very well to this species as the two are so often associated. The manna gum is found in the Cambrian or Pre-Cambrian series of rocks.

The soils favoured by the manna gum are deep, good soils, chiefly in the gullies. On hill slopes, where the tree is often found, the soil is usually deep and loamy but may have outcrops of soft clay slates. It occurs generally on soils derived from the soft clayey rocks and not from the quartzites.

Teale (2) has taken soil surveys at Kuitpo and he records the manna gum growing in soils derived from Tertiary to recent sands which are loose and deep.

## IV. ASSOCIATIONS.

Approaching Long Gully Station there is a steep ridge which commences about half a mile away. Long Gully proper is south of this ridge while the gully on the north leads to the Station and ends at the tunnel close by. This ridge has been investigated regarding its ecological conditions and the following results are very interesting. In the bottom of the gully *E. viminalis* is the chief tree represented and is in open formation. This species ascends the steep side of the gully to near the top and its tree associates are *Exocarpus cupressiformis* and *Acacia pycnantha* which occur only sparingly. The gully bottom is very moist and gets much shade during the day and although the steep gully-side referred to has a northerly aspect it does not get much

(1) This Journal, Vol. VII, No. 1.
(2) Bull. 6, Dept. For. Adel. University, 1918.

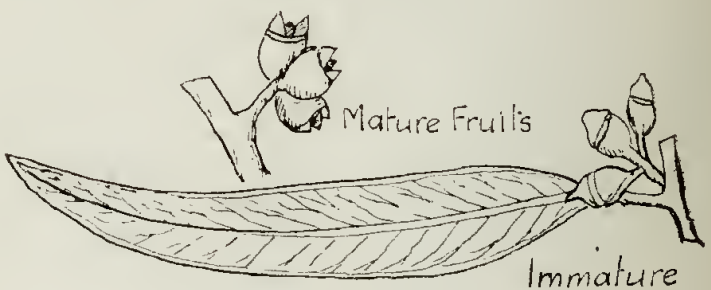
strong sunlight until near the top. It is here, too, that the manna gum ends and the yellow gum (*E. leucoxylon*) and the stringybark (*E. obliqua*) takes its place. The yellow gum is the dominant tree along the top of the ridge where the rocks come to the surface on the higher part. One big tree was was more than four feet in diameter at breast high and no stringybark of bigger size was seen although they also grow along the ridge top and a little way down the side.

These two species are associated along almost the whole of the ridge. There is one place where a pronounced dip occurs in the ridge and it is here that the manna gum is found forming a colony by itself. There are no exposed rocks in this depression, the soil is finer and deeper and must retain more moisture than the higher parts. It is remarkable that this species occurs in this way, but it demonstrates clearly its preference for the deeper retentive soils. Other gullies have been noted where the manna gum comes from the more open, low situations and spreads almost to the head to the exclusion of all other species, the stringybark then takes the place above the manna gum. Going westerly the yellow gum and stringybark form the two main trees, *Acacia pycnantha* is sparsely distributed. There is a remarkable absence of shrubs along the ridge although *Hibbertia stricta* is very plentiful but is less than one foot in height. The ridge falls away very abruptly and it is here that the manna gum again dominates the tree growth. Ascending this ridge from the side with a southerly aspect there are several noticeable differences in the flora. The manna gum again is the tree of the flat (*Long Gully*) and ascends the steep sides of the ridge to near the top. *Exocarpus cupressiformis* again comes in the lower part and ascends half way up the slope. A large shrub, *Acrotriche fasciculiflora,* is also an associate here, it is abundant and occurs over the same range as the latter species. The stringybark is situated lower down the slope than it is on the other side. Not far from the ridge-top the yellow gum again appears and carries itself, with the stringybark to the highest parts.

The association and ecology of this species has been dealt with by Adamson and Osborn (1) and our observations are in general agreement with theirs. As a general rule the manna gum is in association with the stringybark (*E. obliqua*) and is a tree of the higher ranges with a rainfall of 48 inches. The manna gum mixes with *E. obliqua* forests which it penetrates by means of gullies where it occurs alone. It has a marked preference for gullies where the soil is finer deeper and richer than in other situations. Trees growing in these places can be seen on a train

(1) Trans. Roy. Soc. S.A., Vol. 48 (1924), p. 114.

journey between Belair and Bridgewater. It also occurs on open rounded hills where the clay slates take the place of the quartzites in the higher ranges. Such an association as this can be seen at Upper Sturt where the manna gum is mixed with *E. obliqua*. Where it occupies the junction between *E. odorata* and *E. obliqua* it shares the gullies with *E. rostrata*. Proceeding up Workunda Creek in National Park the manna gum appears above the lower falls with *E. rostrata* and *E. obliqua* higher up; on the top of the range *E. fasciculosa* associates with it. At Long Gully this species is growing on gullies sides having both northerly and southerly aspects. Other plants associated with this species are trees of *Casuarina stricta* and *E. leucoxlyon*, the latter where it is found in the lower altitudes; *Acacia melanoxylon*, *Banksia marginata* and *Bursaria spinosa*.




Eucalyptus Viminalis, Lab. WH

## V. DISTRIBUTION.

We have noticed that the manna gum is a tree of the higher ranges and does not occur below the 1,200 feet level and is confined practically to the Mt. Lofty Range. Travelling from Adelaide on the hills railway the first trees are noted as the second range of hills is entered beyond Belair at about 15 miles. This comes in where the peppermint (*E. odorata*) stops and just before the occurrence of the white stringybark (*E. obliqua*). This point is at an altitude of about 1200 feet above sea level. It extends to the higher parts of the range past Long Gully to Ambleside.

J. E. Brown records (1) the distribution as follows:—Eyre Peninsula, Memory Cove; Kangaroo Island, Cygnet River; South East, Mt. Gambier to Rivoli Bay; Mt. Lofty Ranges, Southern part on slates 700 to 1300 feet above sea level, Clarendon, Clare, Auburn, Teatree Gully, Houghton. Mt. Pleasant, Waterfall Gully, Mountain Hut, Noarlunga and Yankalilla.

(1) "Forest Flora of S.A." Part 7.

Mr. J. M. Black's localities are as follows:—
South East—Monbulla Scrub; Mount Lofty Range—Range above Cape Jervis, Willunga, National Park Belair, Bridgewater and Verdun.

Messrs. Baker and Smith when investigating the eucalypts (1) of this State recorded this species from Kalangadoo and Glencoe in the South East. As the authors depended on specimens being sent to them they only received them from one district.

Records taken from this Journal give the range as follows:—Montacute, Vol. 1, No. 4; Kuitpo Forest, Vol. II, No. 1; Between Belair and Mt. Lofty, Vol. II, No. 3; Long Gully, Vol. V, No. 3 and Vol. VI, No. 1; National Park Belair and Waterfall Gully, Vol. V, No. 4; Encounter Bay District, Vol. VI, No. 3, p. 48; Upper Sturt, Vol. VII, No. 1.

Specimens are recorded by Dr. J. B. Cleland in this Section's Herbarium from Mt. Lofty, Lucindale, Ashbourne, Morphett Vale, Myponga, Rocky R., K.I., Encounter Bay and Cape Jervis.

Specimens collected by one of us (E.H.I.) at Mooloolo extends the distribution to the north Flinders Range. The previous farthest north was noted at Clare so that the range is extended 250 miles farther north. This species appears to be a tree of wetter districts chiefly (30 inch rainfall and over) and it is remarkable to find it so far north where the rainfall is only about 10 inches per year.

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Members who are interested in our gums should read the very informative article in "The Register" of Saturday 8th May, by Prof. Wood Jones on the spread of our eucalypts in Mediterranean lands and in California.

## VI. FORESTRY AND TIMBER.

In referring to the timber of this species Baker (2) says "the wood is generally ranked as second-class, owing to a tendency to warp and twist, in some cases, when used before properly seasoned. In part of the State (N.S.W.) where other timber is scarce it is employed largely in house building, being tough and strong and is also regarded as a good carriage timber; makes into fine pick and hoe handles, bars, etc. It is pink coloured, straight and opened grained, dresses and planes easily. Weights, 55 lbs. per cubic foot."

It is a good general timber although not first class quality and can be used for many purposes. It has not been planted by the Forestry Department of this State during the last 17 years perhaps because of its good rainfall requirements. In the 30 inch rainfall area it reaches its maximum development and if planted in such districts it should grow straight tall timber.

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(1) Trans. Roy. Soc. S.A. Vol. 40 (1916) p. 496.
(2) "The Hardwoods of Australia and their Economics" 1919 p. 226.

# THE PLANTS OF THE ENCOUNTER BAY DISTRICT

By J. B. Cleland, M.D.

## NOTES ON THE ECOLOGY. (Continued*)

### I. Marine—Sea Meadows.

Between Victor Harbour and the Bluff low tides expose in places extensive patches of a low limestone rock of recent formation which tends to form cup-shaped depressions a foot or more in diameter with rather jagged crater-like rims. They form algae-covered shelves as the deeper water is approached. Amongst these *Zostera* grows, often exposed and dried by the low tides. In the deeper pools *Cymodocea* of two species is found. The commoner of these, *C. antarctica,* is readily recognised by the distichous leaves being shorter and distinctly twisted or curled. The other species is *C. Griffithsi* which Mr. J. M. Black described in 1915 but which, after submission to Ostenfeld, he suppressed in his Flora. In the field—or rather the sea—there is no doubt of the occurrence of two quite distinct species. They may be found side by side and each is easily recognised. In *C. Griffithsi* the leaves are rather longer and show no evidence of a twist but are quite straight, whilst the sheathing base differs from that of *C. antarctica.* In deeper water still, *Posidonia australis* may be found but not here luxuriating. On a sandy beach, into which a small creek enters and which is directly opposite West Island, fruits of *Posidonia* have been collected in abundance in January of different years. A small reef lies off this beach from which they possibly came. Mixed with the usual broader leaves, so common as banks of 'sea-weed' along our shores, are numbers of others with a diameter much less. Possibly we possess two species of *Posidonia.*

### III Littoral and Coastal Sandhills.

The most advanced plants seen, those approaching the beach and barely beyond an exceptionally high tide, were *Spinifex hirsutus, Sporobolus virginicus, Distichlis spicata, Lagurus ovatus, Salsola kali, Atriplex paludosum, Plantago coronopus* and *Datura stramonium.* Numbers of the last named plant grow amongst the litter of the strand above high-water mark towards the Bluff. In the narrow fringe internal to this, forming the bank overhanging the strand, may be found in addition *Marram Grass, Bromus maximus, Rhagodia baccata, Mesembrianthemum aequilaterale, Melilotus indica,* the two *Oenotheras, Senecio lautus, Helichrysum cinereum* and *Hypochaeris radicata.* The dominant plants of the sand-dunes are *Spinifex hirsutus* (especially on the looser sand), *Lagurus ovatus, Distichlis spicata, Scirpus nodosus* and *Lepidosperma gladiatum.* The *Lagurus* (Hare's Tail Grass) is widely dispersed but the other plants tend to grow in communities. Be-

*Vide. Vol VII, No. 2, Feb. 1926, p. 51.

tween these and abundant though less conspicuous are *Bromus maximus, Festuca rigida, Melilotus indica, Plantago coronopus,* and *Senecio lautus.* Fairly abundant in certain places are the Evening Primroses (*Oenothera odorata* and *O. longiflora*) and the pretty summer-flowering *Brachycome ciliaris*—a plant evidently able to flourish and flower in sandy soil, even in a drought and well worthy of cultivation. Between Victor Harbor and Port Elliot *Pimelea serpyllifolia* is often abundant; bushes of *Myoporum insulare, Helichrysum cinereum, Olearia axillaris* and the smaller *Rhagodia baccata* are common; *Leucopogon Richei* and *Senecio odoratus* var. *obtusifolius* are less frequent; and *Acacia longifolia* var. *Sophorae* and *Scaevola crassifolia* are only occasional. Marram grass is establishing itself here forming communities. Midway between these two towns, a few patches of *Halorrhagis acutangula* and several plants of *Scaevola suaveolens* may be found. *Calocephalus Brownii* is also not uncommon on the sand. Between Victor Harbor and Encounter Bay, *Veronica distans, Silene conica* and *Brachycome ciliaris* occur but were not seen on the Pt. Elliot side. *Plantago coronopus* is more abundant on the Encounter Bay side than towards Pt. Elliot.

The following form communities, sometimes only of small extent, or are widely dispersed:—*Spinifex hirsutus, Ammophila arenaria* (originally planted), *Lagurus ovatus* (very abundant at Encounter B.) *Distichlis spicata, Hordeum murinum, Scirpus nodosus, Lepidosperma gladiatum, Oenothera odorata* and *O. longiflora* (small groups in places), *Solanum sodomaeum, Plantago coronopus* and *Senecio lautus.*

The following are less abundant only occasional or rare:—*Pteridium aquilinum* (on the landward side near the Inman mouth), *Imperata cylindrica, Rottboellia compressa, Themeda triandra, Stipa semibarbata, Sporobolus virginicus, Poa caespitosa, Festuca rigida, Bromus maximus, Cynodon dactylon, Lolium subulatum, Agropyrum scabrum, Lepturus incurvatus, Cyperus vaginatus* (in a place tending to be moist in wet weather), *Cladium junceum* (one or two small communities), *Xanthorrhoea semiplana* (just behind the sandhills near the Inman mouth), *Casuarina* probably *C. stricta* (a stunted plant in the same situation), *Dianella revoluta, Polygonum aviculare* (uncommon), *Muehlenbeckia adpressa, Rhagodia baccata, Chenopodium murale* (uncommon), *Atriplex paludosum* var. *appendiculatum,* (rare, on the strand), *Salsola kali, Enchylaena tomentosa, Threlkeldia diffusa, Mesembrianthemum aequilaterale, Tetragonia implexicoma, Silene conica* (Encounter B.), *Clematis microphylla, Lepidium hyssopifolium, Bursaria spinosa* (rare, on the landward side) *Billardiera cymosa, Acaena ovina, Acacia ligulata, A. longifolia* var. *Sophorae, Trifol-*

*ium procumbens, Melilotus indica* (common), *Medicago sativa* (lucerne), *Lotus australis, Swainsona lessertiifolia, Kennedya prostrata, Glycine clandestina, Geranium pilosum* var. *potentilloides, Pelargonium australe, Adriana Klotzschii, Dodonaea attenuata* approaching *D. viscosa, Pimelea serpyllifolia* (fairly abundant in places), *Kunzea pomifera* (uncommon), *Halorrhagis acutangula* (several patches between Victor Harbour and Pt. Elliot), *Leucopogon Richei, Olea europaea* (seeds deposited by starlings, one or two plants), *Lycium ferocissimum, Convolvulus erubescens, Cynoglossum australe* (fairly common, its burrs a nuisance), *Verbascum virgatum, Veronica distans* (Encounter Bay), *Datura stramonium* (common on the strand above high-water mark at Encounter Bay), *Galium Gaudichaudii, Scabiosa maritima* (a few patches), *Scaevola crassifolia, S. suaveolens, Olearia axillaris, Brachycome ciliaris, Senecio odoratus* var. *obtusifolius, Helichrysum leucopsidium, H. cinereum, Calocephalus Brownii, Inula graveolens, Cirsium lanceolatum, Picris hieracioides* var. *squarrosa, Hypochaeris radicata, Sonchus oleraceus, S. asper* var. *littoralis*. This gives a total of 87 species.

## V. The Granite Formation—The Bluff.

The Bluff is a rounded hill, 333 feet high, sloping steeply to the sea for nearly two-thirds of its circumference and connected with the adjacent country by a lower neck. It is strewn with large granite boulders covering and protecting the softer rock beneath. Sir Douglas Mawson informs me that the granite passes into a soda syenite which is in contact below with a metamorphosed sedimentary rock which has been called a hornstone. The soda content is a feature of the hornstones for some distance beyond the igneous intrusions. Glacial debris to some extent overlies the rock on the shoulder. The granite in weathering has formed a loose soil collecting in substantial pockets between the boulders. A filled-in shaft on the landward slope was worked for copper.

On the exposed aspect facing the sea, subject to the fiercest stress of weather and so steep that it is sometimes difficult to obtain a secure foothold, quite a considerable plant community exists. The dominant plants are *Poa caespitosa, Correa alba, Mesembrianthemum australe* (especially near the sea), *Lepidosperma gladiatum, Goodenia amplexans, Olearia ramulosa, Senecio odoratus* var. *obtusifolius, Cassinia aculeata* and *Calocephalus Brownii*. Less common are the following:—*Calamagrostis filiformis* var. *Billardieri, Aira caryophyllea, Avena, Briza minor, Scirpus nodosus, Dianella revoluta, Lomandra* sp. (rare), *Muehlenbeckia adpressa, Rhagodia baccata, Threlkeldia diffusa* (rare), *Tetragonia implexicoma, Acacia armata* (uncommon), *Trifolium*

*glomeratum, Leucopogon Richei, Anagallis arvensis, Erythraea centaurium, Nicotiana suaveolens, Ixiolaena supina, Helichrysum apiculatum, Inula graveolens, Cryptostemma calendulaceum* and *Hypochaeris radicata.* Several large old wind-tossed shrubs of *Myoporum insulare* withstand the onslaughts of the wind on the side facing Petrel Cove. Strange to say, in this exposed situation they harbour on their trunks a large *Pleurotus*, an agaric new to the State. On the summit and on the more sheltered side are scattered tufts of *Scleranthus pungens.*

On the steep slope on the sheltered aspect we have again *Poa caespitosa, Acacia armata* in more abundance, *Goodenia amplexans*, and *Olearia ramulosa*, and in addition, under sheltered rocks *Cheilanthes tenuifolia, Hakea rugosa, Polycarpon tetraphyllum, Eutaxia microphylla* (much eaten down) and *Pomaderris racemosa* (also much browsed on). This gives a total of 39 species found amongst the granite capping to the Bluff. This list can probably be added to, especially by Spring annuals. A number of clumps of the sweet-scented *Lomandra effusa* grow on the sheltered lower slope below the granite-covered part, rarely encroaching on this, and here alone.

The neck and shoulder of the Bluff have presumably altered much since the advent of the white man. An old resident says that in the early days there were scattered she-oaks (*Casuarina stricta*) and another shrub. Neither of these now occurs there. Most of the Bluff is in the charge of the Survey Department, though it is rented out by the local District Council and the lessee departures sheep. These keep the vegetation eaten down, though rabbits contribute their share. Many introduced grasses, clovers and other exotics have replaced much of the original vegetation. The shoulder and neck are thus covered chiefly by closely-cropped grass and low herbage with small native plants, especially in Spring, interspersed between these. On the neck itself, especially towards Petrel Cove, are small communities of *Lepidosperma viscidum* (*concavum*). This occurs in two forms, the commoner being plants about 8 ins. (20 cm.) high, the other being about 15 ins. (36 cm.) high, the two forms being seen growing side by side. A smaller *Lepidosperma* (*L. viscidum?*) 5 ins. (12.5 cm.) high, also forms communities side by side with the medium form—its flattened stems are only about 1 mm. wide and the panicle 2 ins. (5cm.) long. A community of *L. gladiatum* occurs in sandy soil above Petrel Cove. The soil is a firm one overlying the hornstone, and as this is beyond the granite area the following list of plants is in no way associated with this latter formation, but is characteristc of what is now grass land on the higher country near the sea.

*Themeda triandra, Pennisetum villosum* (several patches near the road), *Aira caryophyllea, Avena fatua, Danthonia, Koeleria, Briza minor, Distichlis spicata, Poa caespitosa, Festuca bromoides, F. rigida, Lepturus incurvatus, Agropyrum scabrum, Hordeum murinum, Schoenus apogon, Scirpus nodosus, Lepidosperma gladiatum, L. concavum* (*viscidum*) (three forms), *Juncus pallidus, J. pauciflorus, Lomandra, Bulbine bulbosa, Moraea xerospatha, Rumex* sp., *R. acetosella, Rhagodia nutans, Atriplex Muelleri* (near the road over the neck), *Bassia uniflora* (one plant found), *Enchylaena villosa* (a little colony of dwarf plants 2 or 3 ins. high on the road up to the neck), *Trichinium alopecuroideum, Calandrinia calyptrata, Silene gallica, Eutaxia microphylla, Ulex europaeus, Trifolium procumbens, T. glomeratum, T. angustifolium, Medicago denticulata, Swainsona oroboides* var. *hirsuta, Glycine clandestina* (in clumps of *Lepidosperma*), *Erodium botrys, E. moschatum, Oxalis corniculata, Euphorbia Drummondii, Pimelea glauca, Erythraea centaurium, Convolvulus erubescens* (in clumps of *Lepidosperma*), *Dichondra repens, Marrubium vulgare, Solanum sodomaeum, Bartsia latifolia, Plantago lanceolatus, P. coronopus, Galium Gaudichaudii* (amongst *Lepidosperma*), *Wahlenbergia gracilis, Velleya paradoxa, Goodenia amplexans, Vittadinia, Craspedia Richei,* small daisy-like composite, done flowering, *Cirsium lanceolatum, Hypochaeris radicata, Sonchus oleraceus*—total 63 species.

This list shows remnants of the original flora before its replacement by grass. This probably presented a heath-like appearance from low undershrubs, though no epacrids probably occurred except perhaps *Brachyloma ericoides* and *Astroloma humifusum. Eutaxia* and *Pimelea glauca* were present and probably *Hakea rugosa, Grevillea lavandulacea* and *Acacia verticillata.*

Beside the road leading to the jetty, which in places has been cut into the rock surface—thus presenting ledges for the growth of some plants and protecting them from being eaten by sheep, the following were more particularly noteworthy, some not being found elsewhere on this area:—*Panicum gracile* (only found along the rock cutting), *Muehlenbeckia adpressa, Rhagodia nutans, Enchylaena tomentosa, Mesembrianthemum australe, Crassula Sieberiana, Nitraria Schoberi, Lavatera plebeja* (in the rock cutting), *Solanum opacum, S.* sp. near *S. pterocaulon,* and *Nicotiana suaveolens.*

This gives a total of 97 species for the area comprising the Bluff itself and its neck and shoulder, seawards from the road running up on to the shoulder. The actual number must exceed 100, as probably all the spring annuals are not included. It is only on the Bluff itself that the type belongs to the granite formation.

# The South Australian Naturalist

**The Journal of the Field Naturalists' Section of the Royal Society of South Australia.**

Adelaide | August, 1926

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The authors of papers are responsible for the facts recorded and opinions expressed.

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## EXCURSIONS.

September 4—Horsnell's Gully. Magill tram at 2 p.m. Leader, Mr. W. H. Selway. Botany, etc.

September 11.—Kinchina. Train at 7.20 a.m. (Fare, about 10/-) Birds and Plant life. Leader, Mr. J. Sutton.

September 18.—Enfield Scrub. Enfield Tram, 2 p.m., to terminus, thence short walk. Native Scrub. Leader (in absence of Mr. Ising) Mr. Ham.

September 25.—Gilles Plains, (Messrs. Pitman Bros.'), Paradise tram 2 p.m. Natural History generally. Leader, Mr. A. G. Edquist.

October 2.—Botanic Garden. Meet at entrance, 2.30 p.m. Australian Plants, etc. Leader, The Director, Mr. J. F. Bailey.

October 9—Long Gully. Train to Long Gully, 2.3 p.m. Bird-life and Gums. Leader, Mr. A. S. Thomas.

October 13.—(Public Holiday). Myponga. Charabanc, 8 a.m. (Book at least 7 days previously at Cole's Book Arcade, Rundle Street) Botany, etc. Professor J. B. Cleland, M.D.

October 15 and 16—FLOWER SHOW, Town Hall. All members assist. Open Friday evening and all day and evening of Saturday.

October 30—Charleston (Mr. Simpson's). Charabanc, 1.30 p.m. (Book at least 7 days previously at Cole's Book Arcade, Rundle Street) Leader, Mr. W. H. Selway.

November 13.—Mt. Bold Road. Charabanc, 1.30 p.m. Native flowers, especially Orchids. Leader, Mr. W. Ham.

November 27—Aldgate Valley (Mr. Hackett's). Train to Aldgate, 2.3 p.m. Botany. Leader, Mr. Hackett.

## EVENING LECTURES.

September 21—Miss E. Macklin, B.Sc., on "Plant Communities at Robe."

October 19—Mr. H. M. Hale on "In Our Northern Ranges."

November 16.—Prof. N. W. Jolly, on "Australian Forestry."

The

# South Australian Naturalist.

Vol. VII. ADELAIDE, AUGUST, 1926. No. 4.

## OUT OF DOORS.

By Agapetus.

*By kind permission of the proprietors of "The Saturday Journal".*

The excursions of the field naturalists provide a most delightful way of spending Saturday afternoons and public holidays. They appeal to so many different sides of human nature. The pure bracing air of the hills or the ozone-laden breezes from the sea serve to reinforce the bodily health, the unaccustomed sights and sounds of the country or the beach insensibly withdraw the mind from the cares and worry of the daily routine. The aesthetic sense, the love of beauty is gratified by the singular charm of the Adelaide hills, their pure clear outlines, their varied curves, the blues and purples of distant ridges, the greens, browns, and greys of the nearer view, the soft golden sunlight lighting up valley and slope with a radiance as of Paradise. Through the rents in the shifting veil of mist and the fleeting shadows of the driving clouds the parklike effects of scattered groups of weird but stately eucalypts, which have happily escaped the woodman's axe, and the orchards and quaint old homesteads in the valleys near some winding brook or miniature lake, provide a rare feast for the eye of the artist or nature lover. The ear, too, is ravished with liquid gurgle of our magpie, the melody of the harmonious thrush, and the thin but sweet pipe of the reed warbler; and even the hoarse "caw" of the crow or the harsh scream of the cockatoo help by contrast to heighten the music of the feathered choir. Then there is that strange exhilarating scent of the Australian woods, which when brought home to the exile by the odour of a gumtree in a strange land or of a spring wattle, thrills with an

emotion too deep for words. It is true, as the physiologists tell us, that the olfactory nerve is closely connected with the grey matter. At any rate, no other sense so vividly recalls past scenes.

To all these exquisite delights is added the charm of congenial and intimate social intercourse; the joyous resilience of youth is tempered by the wisdom and experience of the veteran. The formal conventions of city life give place to the freedom and kindly amenities of life in the country. In the loneliness and calm of the bush the mind expands and readily opens to the claims of the higher nature. Heart-to-heart talks on the deeper things of the spirit are in perfect harmony with the surroundings, and lifelong friendships often sprung from these mutual understandings. The little mite of three gazes open-eyed at the strange creatures of the bush, and listens entranced to the cries and songs of the birds; the tireless small boy scampers through the scrub intent on rare specimens for the leaders of his own collection. The able director of the Botanic Gardens, Mr. Bailey, in his capacity of president, seasons his botanic subtleties with ready jest, merry quip and apt anecdote. The leaders, too, are equally keen and ever ready to place at the service of members their varied stores of bush lore, the fruit of years of observation of native plant and animal. There is the genial doctor, quiet, and retiring, a skilled botanist ,and a leading authority on Australian fungi. The professor of botany at the University has an intimate acquaintance with the rare forms of plants to be found in most diverse regions of our State, and is ever ready with courteous explanations for humble enquirers. On the dredging excursions the mystery and remarkable adaptations of marine life illustrated from living specimens are explained by the professor of biology, and the museum assistants and form the theme of instructive talks by Messrs. Hale, Kimber, Ham, and Trigg. Mr. Ham, indeed, is the most versatile of the leaders and seems equally at home on all natural history subjects. Mr. B. Beck runs a good second and their general conversation is full of interesting detail. Then there is the extremely popular doctor of science, who on occasions far too rare, gives us the benefits of his profound knowledge of Australian geology, and translates for the uninitiated the great epic carved on scarp and quarry face. Nor must the genial secretary be forgotten, an expert botanist and indefatigable in his researches, highly esteemed for his knowledge, his ready help and kindly demeanour, a secretary in a thousand. But the whole time is not taken up with scientific disqusition. Playful talk or serious on many other subjects, light bandinage, and quick exchanges add the salt of humour and heighten the pleasures of these outings. Mr. Kimber is equally ready to describe a mollusc or

perpetrate an atrocious pun. The spice of wit is seldom missing from learned dissertations on life of plant or animal, frequent and perhaps, inane interpretations are not unknown. As an instance of what a lady is capable when driven at bay the writer of these interesting memories was only recently described as "old fashioned, out of date, obsolete and slightly intolerant." But jokes like this are taken in good part, and provoke the hearty laugh, the surest token of good fellowship.

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## A FAMILY OF ISOPOD CRUSTACEA.

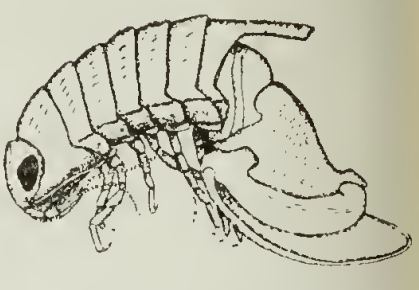
—W. H. BAKER.

The *Sphaeromidae* are a marine family of isopods belonging to the sub order *Ilabellifera* or fantails. They are compact of body, usually in shape approaching the oval, none having elongate form so common in other families of the order. They are so called from the habit which most of the species possess of rolling into a ball more or less spherical, probably as a protection Some merely fold the body from about the middle, others become globular with the outer branches of the posterior fan outstanding, others again tuck away every limb and become a complete sphere capable of rolling about for a considerable time.

So conceive of a creature of the oval shape when not alarmed, with rounded head bearing eyes, seven segments of thorax following, all narrow fore and aft, behind which is an abdomen composed of an anterior portion and a posterior, the anterior being marked with transverse lines, more or less distinct, indicating a few segments which have grown together, and the posterior portion which is complete, although primitively supposed to consist of 2 or 3 segments, this last piece bearing the tail-fan, more or less altered and the only appendages perhaps showing from a back view.

Underneath we shall find on the head, two pairs of antennae—these probably have the same function as in insects—an upper lip above the mouth held in place by a structure called the epistome, a pair of mandibles with biting and crushing projections, a lower lip cleft in the middle, two pairs of maxillae (accessory for feeding) and a pair of maxillipeds more or less covering or applied to these mouth limbs—this pair belongs to the 1st segment or thorax which really numbers eight in all—; then come seven pairs of legs, all ambulatory with the 1st and 2nd for prehensile purpose also. The abdomen carries beside the tail fan, five pairs of pleopods which are leaf-like, their function being to carry and fan the gills, these last with one known exception being attached to the two last pairs. In the adult males, however, the 2nd pleopods carry an apparatus for transferring the sperm bundles to the female.

In this group of the Crustacea there is very often much difference in external structure between the sexes so that until this fact was duly appreciated there was much confusion in classification.



The illustration is that of the male of a common species named *Zuzara venosa*, Stebbing, found on our near beaches at about half tide. This species lives in small colonies. Most of them are small but amongst them will be found larger ones, which are adult males and have, as shown in our illustration, a curious projection on the back arising from the seventh segment of the thorax, the smaller specimens without this process are females or young. It is not known why this hard process exists but similar ones are found in other species arising from the sixth or seventh segment of the thorax or from the anterior division of the abdomen. There is an extreme case known in *Haswellia carnea*, Haswell, in which the process is large and shield shaped and covers the whole of the abdomen. There are other differences among species, one of which is a most extraordinary condition found in some females with brood, where the mouth limbs are degenerate, thus the mandibles have become weakened, lose their brown colour, are deformed and incapable of use; the two pairs of maxillae also lose their colour and spines, and the maxillipeds at their virtal parts are much reduced; their proximal parts, however, have been expanded to broad plates and an accessory fan produced for the better movement of a current of clean water for the use of the developing young as would appear. Another very extraordinary condition found in some females belonging to different species. As is well known in a large number of species of Crustacea, a normal *marsupium* consisting of three part of membranous plates which are outgrowths from the second, third and fourth pairs of legs, form a receptacle to carry the developing young. In the females in the question the full function of the marsupium has been suspended and the growing young are found in pouches or pockets which project into the body of the mother, these have obscure openings to the exterior, but the young apparently first feed on the body of the mother as at the end scarcely any of the viscera and only a mere shell remanis in extreme cases. Another instance of "So careful ofthe type she seems. So careless of the single life."

There is a somewhat similar condition found in the remote family of this same sub-order, viz., *Gnathidae*, See Smith, "Cambridge Natural History", Vol. IV., p. 125, also in the family next following, the *sphaeromids*, the *serolidae*. See Beddard, Challenger Report, *Serolidae*, pages 14 and 15.

Economically speaking these animals are non-parasitic and scavenging habits, but two or three species are guilty of boring in wood and are the cause of a lot of damage to piles and other wood-work.

I must add that nearly all the information here recorded was obtained from the valuable paper by Dr. Hansen, of Copenhagen Quarterly Journal of Microscopic Science, Oct. 1905.

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## OUR EXCHANGES.

1. The Australian Museum Magazine, January—May, 1926, and July—September, 1926.
2. The Victorian Naturalist. June.
3. The Queensland Naturalist. April.
4. The S.A. Ornithologist. April.
5. Annual Report of Town Planning Association of Victoria.
6. Proceedings of the Polish Museum of Natural History of Warsaw.
7. Lists of Books on the History of Science, compiled and forwarded by the John Crerar Library, Chicago, U.S.A.
8. Pamphlets on Scientific Subjects issued by the Smithsonian Institution, Washington, D.C., U.S.A. The series comprises the following subjects:—

*The Drifting of the Continents; Egypt as a Field for Anthropological Research; The Origin of the Solar System; The Vacuum—There's Something in it; John Mix Stanley, Artist-Explorer; Nests and Nesting Habits of the American Eagle; The Breeding Places of the Eel; N. American Indian Dwellings; Shamanism of the Natives of Siberia; Historical Tradition and Oriental Research; Cankerworms; Herluf Winge; Clear Fused Quartz made in the Electric Furnace; The Physicist's Present Conception of the Atom; The Use of Radium in Medicine; A Modern Menagerie; The Nature of Language; The Probable Solution of the Climate Problem in Geology; The Electrical Structure of Matter.*

9. Proceedings of the Academy of Natural Sciences of Philadelphia.

## SHELL COLLECTORS' CLUB.

The Shell Club is continuing its study of South Australian univalves, the bi-weekly meetings being well attended.

### *FAMILY TURBINIDAE.*

*Phasianella Australis.* This well-known shell attains its maximum development in South Australian waters, and may be collected all along the coastline, its habitat being the weedy patches close in shore. Its bright and intricate color pattern, and china-white interior, which is closed with an oval, shelly operculum, makes it a conspicuous and pleasing object in any cabinet. *Phasianella,* being a light-weight shell, suffers considerable damage on its thin growing lip, at times, from sea buffeting, specimens being frequently collected that have been neatly repaired and re-colored.

*Phasianella perdix* is shorter and more ventricose than the preceding specimen, and is common on Encounter Bay and Yorke Peninsula beaches. The coloration is extremely variable.

*Phasianella variegata.* A shell of moderately small and slender dimensions. Collected recently at Port Willunga and Middleton.

*Phasianella rosea.* A minute pink specimen from Port McDonnell, South East.

*Turbo Jourdani.* The largest known specimen of this family. An excellent history and description of this remarkable shell appears in Roy. Soc. Trans. of 1908, Vol. XXXII., page 338, by Sir Jos. Verco. Several large specimens were tabled by Club members, one of which measured on a base line $6\frac{1}{2}$ inches, height $3\frac{3}{4}$ inches, operculum $2\frac{3}{4}$ x $3\frac{1}{4}$ inches. This exceedingly rare shell shows no umbilication, and is covered with a thick reddish-brown periostracum. Habitat: St. Francis Island, West Coast of Eyre Peninsula.

*Turbo stamineus.* A fairly common variety in this State. Two large specimens were recently taken alive off the reef at Port Willunga, one of which, incidentally, weighed $13\frac{1}{2}$ ozs., when stripped of extraneous growths, and without the animal. The umbilicus is wide and deep. *Turbinidae* are vegetarian and crawl around on the rocky sea floor scraping off their food with their abrasive radula.

*Turbo undulatus.* Our commonest *Turbo,* its green and white patterned shell may be detected on almost any rock at low tide. Described by Martyn, 1784.

*Turbo Gruneri.* Occasionally collected on our Gulf beaches. About the same size as preceding specimen. No umbilication color, shaded salmon-pink.

## *FAMILY NERITIDAE.*

*Nerita melanotragus.* Our State has only one representative of this widely distributed family. Its dense, black shell contrasts sharply with its highly colored cousins from tropical waters.

*Neritidae* spend considerable periods out of water, but generally are found on the shady sides, and in deep fissures of rocks exposed at lowtide. The wonderfully constructed toothed operculum, fitting closely the aperture, is a notable feature.

## *FAMILY ACMAEIDAE.*

These limpets now take the name *Patelloidea.* About ten varieties have been described, some being very plentiful on rocks exposed by receding tides.

*Patelloidea septiformis* occurs in great numbers at Port Willunga. The average measurements on their oval base of a large quantity collected being 18 mm. x 13 mm. The exterior generally eroded makes it difficult to see the sculpture. Interior scar purple and brown, edges of shell spaced with brown spots.

*Patelloidea alticostata.* A limpet with 18 or 20 well-defined ribs, shining white within, with a blackish, horse-shoe shaped scar. This handsome shell was invariably found further out on the rocks than *P. septiformis.* Collected at Port Noarlunga and Willunga.

*Patelloidea marmorata.* A more or less rounded limpet found in company with *P. septiformis.* Exterior generally much eroded. Interior scar black, circled with a narrow white line, then clouded sepia to edge of shell.

Other shells of *Acmaeidae* are *P. calamus, P. cantharus, P. conoidea, P. flammea, P. inradiata, P. punctata, P. subundulata.*

## *FAMILY PATELLIDAE.*

These limpets, whose home is on rock faces fully exposed to the rush of the surf are well adapted, in their conical-shaped, smooth, solid sides, and powers of adhesion, to resist dislodgement by wave action.

*Cellana variegata* may be taken off almost any of our rocks. It is stated that they return to their own particular roost, after wanderings in search of food, which is scraped off with their sharp radula. A microscopic view of this organ shows it it to be a wonderful object, coiled up like a watch spring.

Some *C. variegata* exhibited, measured on their oval base, $2\frac{1}{4} \times 2\frac{1}{2}$ inches. A remarkable variety of colors exist: pearly, red margin; yellow, orange rays; pearly black rays; red, black rays; cream, green circle; all pearly. An attractive cabinet mount may be aranged in these varied colors.

*Cellana stellaeformis* is a flattened limpet, with prominent, star-like ribs.

July, 1926. F. TRIGG, Hon. Sec. Shell Collectors' Club

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## THE ANNUAL MEETING, AUGUST 17th, 1926.

The 43rd annual report showed that the membership had increased during the year from 184 to 200. Twenty-three excursions had been made to places of interest, the subjects studied including botany, birds, orchids, marine life, shells and shore life, native fauna, geology, fossils, and fresh-water aquatic life. Several interesting lectures had been delivered by leading men. The flower show in 1925 was a great success. Through the kindness of the Minister and the Education Department a number of schools had been approached, and they had supplied a satisfactory quantitiy of flowers. Inter-State clubs had also been of great assistance. The Herbarium Committee had met on many occasions in Professor Cleland's rooms, Darling Building, University, where the plants were pressed from the collection of various schools sent for the wildflower show, and these, with some the Tepper Herbarium had been sorted into their separate families. Collections had been made at various times in the reserves at Morialta, Waterfall Gully, and National Park, Belair, and it was hoped to publish lists and articles on those reserves early next year. The death of Mrs. S. A. White was referred to with regret. She had been a member of the section for many years, and a valuable helper, especially at wildflower shows.

The report of the South Australian Shell Collectors' Club stated that a preliminary survey had been made of the whole of the South Australian bivalves and about half of the univalves, and it was intended later to review the whole list again and study each shell more fully. During recent years considerable alteration had taken place in the arrangements and classification of shells and a great number of old names had given place to new ones, resulting in some confusion in the minds of those who had become acquainted with the old nomenclature.

The list of officers elected for the ensuing year appears on inside of the cover.

## SOUTH AUSTRALIAN TREES.

No. 5. Candlebark Gum, *Eucalyptus rubida.* Deane and Maiden.

By Ernest H. Ising and Wm. Ham.

### I. GENERAL.

This Eucalypt was named in 1899 by Messrs. Deane and Maiden from specimens collected in southern New South Wales (2). Although it has only been comparatively recently named it had long been confused with the manna gum (*E. viminalis*). It is even now difficult in the field to distinguish from the latter as the general appearance is very often the same in both. However, the pink or reddish patches on the candlebark trunk, its rounded or oval young leaves and its habitat (usually in damp gullies) help to distinguish it from the manna gum. It is known as "White Gum" and "Candlebark Gum" in the Mount Lofy Ranges. In the other States it has various vernacular names, such as:—"Flooded", "Bastard White", "Drooping", "Spotted" and "Yellow Gum."

### II. BOTANICAL.

The specific name "rubida" was given in reference to the reddish patches or blotches which are often seen on the clear white trunk.

The Bark. (See fig. 1.) The bark is usually very white and smooth, the boles standing erect like giant candles, contrasting vividly with the dark rough trunks of the stringybark at Mount Lofty. Sometimes the trunk has definite patches of greenish or reddish bark which spoils the candle-like effect. In late summer the bark peels in long ribbons, which finally fall off. At Mount Lofty one tree has sharp spikes standing out more than half an inch from the trunk and reminiscent of a red gum seen at Gumeracha lately. Often, too, the bark is frosted or chalky.

The Leaves. The juvenile form is circular in its earliest stages and about an inch in diameter developing gradually into an oval shape; they are in pairs, sometimes in three, and have a bloom on them resulting in an attractive pale silvery-grey colour. This class of leaf will be produced for 2 or 3 years and is then succeeded by a broad lance-shaped pointed leaf of about 6 inches in length with a tapering apex and a broad base. The mature leaves are mid-green in colour and have shining surfaces.

The Buds. The buds are short, about $\frac{1}{4}$ inch long, with a blunt cap and are often in threes, although they are found with as many as 7 together in a head. The heads are produced singly in the axils of the leaves.

The Flowers. The flowers are small with white stamens but are not prominent in the flowering period which is midsummer, i.e., January and February. The anthers are ovate—oblong, opening by longitudinal pores.

The Fruits. The fruits are small being about 3/16th of an inch wide and long, they are somewhat top-shaped with 3 or 4 short valve tips protruding. The buds and fruits are very similar to those of *E. viminalis.*

## III. GEOLOGICAL.

The Mt. Lofty Range is of Cambrian and Precambrian age. The candlebark is found in the quartzite hills at Stirling chiefly in the gullies in deep retentive soils, rich in humus. Towards the eastern side of the Mt. Lofty Range the more open country around Yantaringa is formed of clay-slates and the candlebark is also a frequenter of these gullies here. In the silt swamps Adamson and Osborn (4) have noted that when the soil has organic matter diffused through it as humus, trees are present and here *E. rubida* is the chief one.

## IV. ASSOCIATIONS.

The candlebark gum is essentially a tree of the rain forest of the Mount Lofty Ranges, attaining its maximum development in the sheltered gullies of the stringybark (*Euc. obliqua*) formation. This gum practically grows only in the wet gullies and evidently needs an abundance of water, as it is not found far from it. It may not demand so much light as other gums, growing as it does in the shady gullies, although it is noticed that, where there is plenty of shade from other trees the canopy is rather open and sparse.

This species dominates the gullies amongst the stringybark forest and *E. obliqua* is the tree most frequently associated with it, but in lower altitudes where the quartzites give place to the clay-slates, especially in the broad valley bottoms at Balhannah, the red gum (*E. rostrata*), yellow gum (*E. leucoxylon*) and manna gum (E. viminalis) flourish in association with it.

In a piece of natural scrub at Stirling (See fig. 2) the following associations were noted. *E. rubida* was found in two small creekways with a few trees of *E. obliqua.* In or near the creekways were several trees of *Exocarpus cupressiformis*, *Acacia rhetinodes* and *A. melanoxylon.* Tall shrubs of *Leptospermum lanigerum* were found in the water or close to it, this plant is usually found in lower altitudes, e.g.. in the lower part of the Torrens River Gorge at about 600 ft. above sea level, while its altitude at Stirling is about 1700 ft. In the creekway the large rush *Gahnia psittacorum,* another rush *Cladium tetragonum* and *Juncus pauciflorus* were found. In the damp ground were seen *Goodenia ovata, Senecio hypoleucus, Leptospermum scoparium, Pteridium aquilinum* and *Acrotriche fasciculiflora.*

A piece of natural scrub at Stirling, showing the distribution of some native flora.

Photo E. H. Ising.

Candlebark Gums, *Eucalyptus rubida*, Deane and Maiden, growing near Bridgewater.

The land between the creeks is steep and is covered with natural scrub, it is bounded on three sides by these runnels, which are as a rule dry in summer. At the base of the hill near the Stirling creek *E. obliqua* has *Exocarpus cupressiformis* mixed with it and shrubs of *Pultenaea daphnoides* and *Daviesia corymbosa,* about 6 feet in height are sparsely interspersed among the trees. Insufficient light prevents this lower stratum from growing densely and the plants are of spindly habit and sparsely leaved. *Acrotriche fasciculiflora* is found here as a tall shrub of 4 feet with tall bracken fern (*Pteridium aquilinum*). The native pine (*Callitris cupressiformis*) was represented here by a few small trees and a number of young plants, and one male tree of *Casuarina stricta* was growing in the lower part of the scrub. This is an unusual habitat as the sheoak is found as a rule on dry slopes at a lower altitude where the rainfall is much less. Some of the larger shrubs were found from the lowest to the highest parts of the hill and were *Pultenaea daphnoides, Daviesia corymbosa, Actrotriche fasciculiflora, Leptosperma scoparium* (this plant was more abundant in the wetter parts) and smaller shrubs of *Eparis impressa* and bracken fern, *Pteridium aquilinum.* The large rush *Lepidosperma semiteres* extended almost to the top of the hill where a smaller rush *L. sp.* took its place. Several other plants were found only on the higher ground and were small shrubs of *Hibbertia sericea, Hakea ulicina, Acacia myrtifolia.*

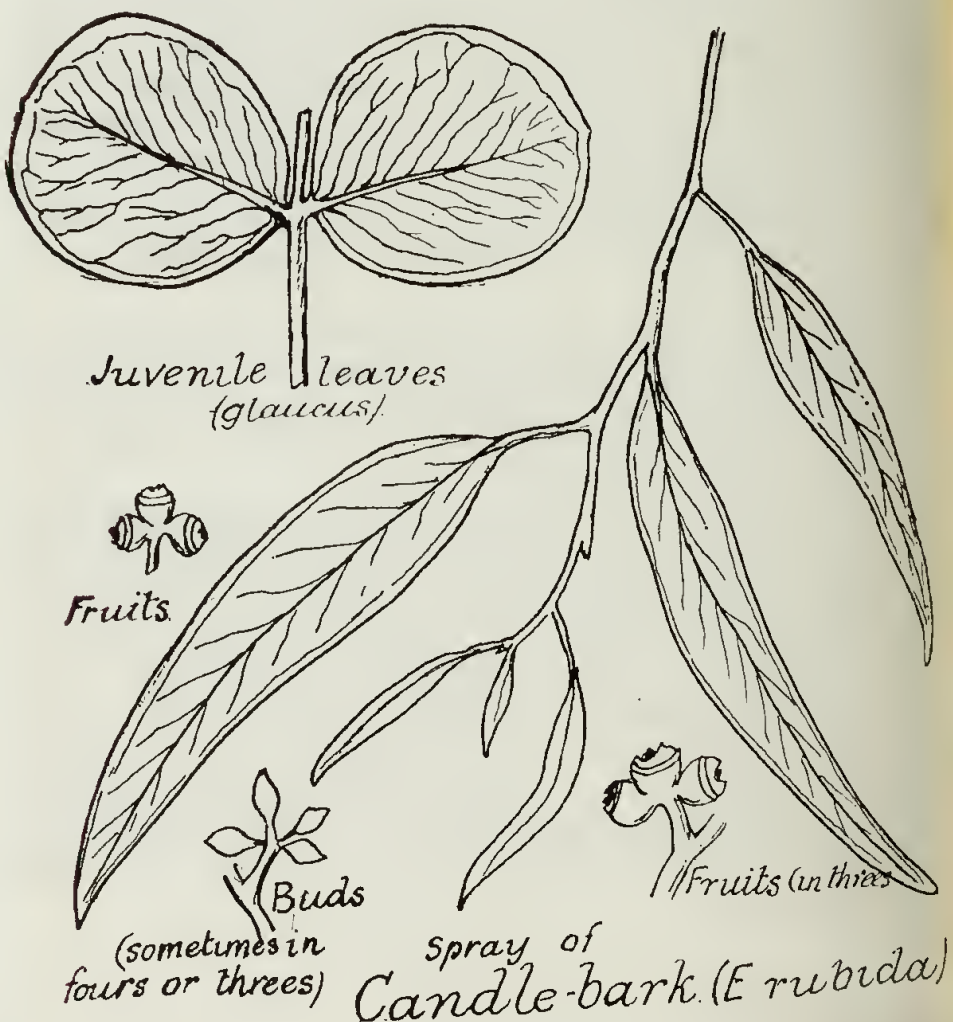
This piece of scrub, which has not been burnt for many years, is a good one for studying plant associations. It exhibits definite habitat preferences which are strikingly contrasted. The wetter ground has its special plants and the higher better drained soil has plants restricted to its situation.

Reference to Fig. 2. will show two small creeks along which the candlebark grows. The sources of these creeks are fairly close together and are only separated by the saddle of the hill between. The candlebark is confined to the waterways except for several isolated specimens situated across the saddle of the hill. It is easy to suppose that the candlebark spread from the higher points of the hills down the creek, keeping to the wetter ground because of its inability to withstand dry conditions. Even in summer the gullies have a good supply of water, mostly below the the surface. The candlebark is thus seen to be a water-loving species which has an abundance of water available all round the year.

In contrast to our observations above, Adamson and Osborn (3) have described the candlebark in association with the yellow gum (*E. leucoxylon*) on valley slopes at Ambleside. They also (4) describe the occurrence of the candlebark in a silt swamp at Mylor.

At Yantaringa, between Ambleside and Bridgewater, where the contour of the hills is rounded and undulating the candlebark was observed in association with three other smooth barked gums, viz., yellow, red and manna.

It is thus seen that the species under review occurs in the highest part of the Mount Lofty Range, which has an average rainfall from 30 to 48 inches and is in a pure stand or associated with several species of eucalypts besides a large number of other plants.



## VI. FORESTRY AND TIMBER.

There is so little of this species growing that it does not form a forest but is merely of local occurrence in the stringybark (*E. obliqua*) and yellow gum (*E. leucoxylon*) forests. It is often in a pure stand but its extent is extremely limited on account of its wet habitat.

The timber is light in colour and of fairly close grain but is not regarded as a first class article. It is a useful timber and and is used in constructional work where it is more abundant.

## V. DISTRIBUTION.

The candlebark is found in the higher parts of the Mt. Lofty Range and besides being observed at Stirling, it is also found at Aldgate, Crafers, Mylor, Yantaringa, Bridgewater, Ambleside and Upper Sturt. It is confined to the altitude between 1300 ft. to 2300 ft above sea level.

The localities given by Maiden (5) from specimens obtained by Mr. Walter Gill are: Kuitpo, near Willunga; near Ambleside Railway station and other places on the Onkaparinga River and Balhannah. St. Vincent's Gulf (a very indefinite locality) and Aldgate are also recorded.

It has a limited range in this State because there are no extensive mountains above 1300 ft. with a rainfall of 40 inches per annum.

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## FLORISTIC COMPOSITION.

Key to signs: a - abundant; fa - fairly abundant; f - few; o - occasional; r - rare.

| | Damp Ground | Dry Ground |
|---|---|---|
| Tree Stratum— | | |
| 1. *Eucalytpus rubida* | a | r |
| 2. *E. obliqua* | o | a |
| 3. *Callitris* | | |
| 4. *Acacia melanoxylon* | f | o |
| 5. *Exocarpus cupressiformis* | r | o |
| 33. *Acacia rhetinodes* | f | - |
| Shrubs Stratum— | | |
| 5. *Daviesia corymbosa* | o | a |
| 6. *Acrotriche fasciculiflora* | o | a |
| 7. *Grevillea lavandulacea* | - | f |
| 9. *Hibbertia stricta* | - | f |
| 10. *Tetratheca pilosa* | - | f |
| 14. *Leptospermum myrsinoides* | o | fa |
| 16. *Banksia marginata* | - | o |
| 18. *Olearia sonderi* | - | o |
| 23. *Pimelea spathulata* | - | o |

| | Damp Ground | Dry Ground |
|---|---|---|
| 25. *Xanthorrhoea semiplana* | r | o |
| 27. *Epacris impressa* | r | fa |
| 28. *Acacia myrtifolia* | - | f |
| 29. *Ixodia achilleoides* | r | f |
| 30. *Leptospermum lanigerum* | o | - |
| 32. *L. scoparium* | a | o |
| 34. *Goodenia ovata* | a | o |
| 35. *Senecio hypolencus* | f | f |
| 38. *Hakea rostrata* | - | f |
| 39. *Hibbertia sericea* | - | fa |
| 41. *Bursaria spinosa* | - | f |
| 43. *Acacia verticillata* | | |
| 47. *Daviesia ulicina* | - | f |
| 48. *Pultenaea daphnoides* | f | a |
| 50. *Platylobium obtusangulum* | - | f |
| 51.....*Persoonia juniperina* | | o |
| 52. *Hakea ulicina* | - | o |
| 58. *Leucopogon* | - | o |
| Ground Stratum— | | |
| 8. *Stylidum graminifolium* | - | f |
| 11. *Lepidosperma semiteres* | - | a |
| 12. *Astroloma humifusa* | r | f |
| 13. *Pteridium aquilinum* | - | fa |
| 17. *Dipodium punctatum* | o | - |
| 19. *Dianella revoluta* | - | o |
| 21. *Acrotriche serrulata* | - | o |
| 22. *Lomandra dura* | - | f |
| 24. *Haloragis tetragyma* | - | o |
| 31. *Gahmia psittacorum* | - | o |
| 36. *Cladium tetragonum* | f | - |
| 37. *Juncus pauciflorus* | f | - |
| 40. *Bossiaea prostrata* | f | - |
| 44. *Craspedia Richea* | - | o |
| 45. *Haloragis* | - | f |
| 46. *Goodenia geniculata* | - | f |
| 35. *Senecio hypoleucus* | - | fa |
| 49. *Lepidosperma* | f | f |
| 53. *Lomandra micrantha* | - | o |
| 54. *Oxalis corniculata* | - | o |
| 55. *Ranunculus lappaceus* | f | f |
| 56. *Geranium* | - | o |
| 57. *Acaena ovina* | - | o |
| 59. *Blechnum sp.* | f | - |
| Parasite— | | |
| 26. *Cassytha glabella* | - | f |
| 42. *Scaevola microcarpa* | - | o |

## NOTES ON SHELL COLLECTING AT PORT WILLUNGA.

The falling tide uncovers for several hours large areas of reef at this port, and then the sun-illuminated rock-pools and shallows show to advantage their population of marine life—Mollusca, crustaceans, echinoderms, chitons, seaweed, fish, &c. On the nearer rocks the littoral shells, *Monodonta* and *Bembicium* are in countless thousands, apparently enjoying fully their brief sunbath between the tide periods. *Nerita* may be noticed roosting placidly in fissures of the rocks that have tumbled from the fossil-studded overhanging cliffs.

*Haliotis naevosa* (mutton-fish) live under the larger stones in shallow water. The writer noticed a lady collect a basket containing about 100 of these shells in an hour or so. Like the *Chitons,* they dislike exposure, and lose no time in crawling back to the undersides of rock. Their elementary powers of vision evidently being sufficient to create a sense of danger in this respect.

*Cypraea angustata,* the little brown caurie, is collected occasionally clinging to the base of flat water-covered stones. The young specimen is noticed to be a cylindrical, thin-lipped, spiral shell, unlike in general shape to the adult. As is well known, the spire is entirely covered, and the toothed and channelled aperture formed, as the shell progresses toward maturity. When taken alive it appears in various shades of orange-brown colors, prettily-marked, the animal corresponding.

*Clanculus* (fam. *Trochidae*) are common at this port. *C. Dunkeri* and *C. limbatus* are found well out off the end of the reef, quantities of dead shells being thrown up on the beach. Several dead specimens of the large *C. undatus* were picked up. This handsome shell measuring about $1\frac{1}{4}$ inches across the base is of a deep, rich, dark-brown color, covered with small black dots.

The finding of a large living shell engenders pleasant feelings in the mind of the collector, as was the case on discovering a pair of large *Turbo stamineus* browsing on the rocky sea floor. These solid, heavy specimens, well camouflaged with a moss like growth, are thereby somewhat immune from predaceous attack, and apparently have a fair chance of long life after reaching maturity. However, dislodgment and eventual stranding by the surf, attacks by sea birds, who collect the *Turbos,* drop them on rocks from a height, enabling them to easily secure the animal from the broken shell, all take toll.

Several specimens of *Cephalopoda* (*Sepia apama*), were captured in the pools. The cuttlebone, so common on our beaches, indicate that a large proportion of these creatures perish before reaching full growth—judging by the preponderance of small to large specimens washed up. Though so well equipped in the possession of superior visual organs; powers of changing color; the device of clouding the water by ejection of sepia; the wonderful set of eight arms and two retractile tentacles provided with disc-like suction processes that hold and carry the food to the parrot-beak mandibles, and powers of propulsion, the *Sepia* often fall victims to the foraging and hungry fish, whose teeth marks may be observed in the cast-up cuttlebone.

F. TRIGG.

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For some years the Museum entomologist (Mr. A. M. Lea) has been engaged in the examinations of birds' stomachs, with a view to obtaining proof positive of the economic value of the varous species. He has identified the insects, while other parts of the stomach contents have been passed on to other specialists, who have co-operated with Mr. Lea in his work. The results of all investigations have been carefully tabulated and got ready for publication. These facts were stated before the last meeting of the S.A. Ornithological Association by Dr. J. B. Cleland, who added that Mr. Lea needed assistance from all those who, in coming across a dead bird, would forward the stomach, or what was better known as the "gizzard," addressed to him at the Adelaide Museum. The speciments should be put in weak spirit for preservation, or, failing this, they should be salted or forwarded as fresh as possible, with the name of the bird and date attached to each. Mr. Lea had also stated that he had examined and tabulated 1,500 stomachs, but there were many gaps yet to be filled up, and many of these were among the larger and more common of Australian birds. It was stated that the Royal Society had promised to publish the tabulated lists about 100 pages per annum, in the annuals of its proceedings, the first list being printed next year.

## EXCURSION TO HENLEY BEACH, JULY 10.

The Section visited Henley Beach on July 10th and although the tide was high some interesting creatures were found and members of the Shell Club spoke of their habits and named the shells taken. A sponge had a fine specimen of *Modiola australis* attached by its byssus of silky threads and the use of this to mussels and other sedentary bivalves was pointed out. A tube making gasteropod *Vermetus siptio* had firmly attached its strange shell to the modiola and the animal must get its food in practically the same way as a bivalve does, by siphons. The sponge was also inhabited by scores of another bivalve, *Vulsella vulsella,* and as it is very frequently found in this way the question arises as to the reason of this strange association. Species of *polyzoa* and *serpulae* were also firmly fixed to the *modiola* and the leader of the party spoke of the food which all the creatures living in apparent harmony required, and the amount of energy exerted in getting that food which consists of microscopical plant and animal organisms. A common *serpula*, a worm which makes a shelly tube, often attaches it to jetty piles in such masses as to prevent the teredo or "ship worm" entering, or if it had already entered it prevents the teredo, which is a bivalve mullusc, from obtaining food by closing the hole through which it must protrude its siphons. A few species of *Echinoderms* were taken, their wonderful structure spoken of and members were asked to make a more scientific study of them as there is much need and the work would be most interesting.

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## EXCURSION TO LARGS BEACH, AUGUST 7, 1926.

On Saturday an investigation was made by a party of field naturalists of the sea life on the beach between Largs and the Outer Harbour. Interesting discoveries rewarded the seachers, but the best find was a perfect specimen of *Fusus Australis* picked up by Mrs. Kelsey. The creature tenanting this shell is red as a red runner, and there are four species found in South Australian waters. Mr. Trigg discoursed on specimens of the *Murex*. It is one of the most numerous of molluscan families. Some 250 species have been identified and the investigation of the group affords ample scope for the energies of young and enterprising members. It takes first place among the mollusca in numbers and variety of decoration. Tryon has divided the family into the *muricidae* and the *purpurinae*. The most striking character of the former is found in the number of varices or seams that diversify the surface of the shell. Besides the more marked, several secondary varices are to be noted. These are highly decorative in color and form, but, contrary to the ordinary case, these ornaments indicate not

wealth but the reverse. When hard up the organism throws up those defences against the attacks of foes and calmly retires to sleep. When it has been sufficiently restored these ridges are dissolved by acid secretions from its body. These seams often assume fantastic forms, such as foliations, spines, and such like. Mr. Kimber then spoke on the *sepia* (commonly known as the cuttlefish) belonging to the important family of cephalopods( head-footed). Their modes of progress are threefold—by lateral fins, by the waving of their long feelers, or by alternately absorbing and ejecting water through their syphons. A beautiful little shell *S. Braggi* not so long as the index finger gave occasion to the remark that the living creature has never yet been taken. A shell of the *Fasciolaria coronata,* with its living inhabitant, might have been 20 years old. Algae growing in profusion on the shell afforded ample protection from marine organisms. A *hipponyx* and several *surpulae* found a comfortable home in this accumulation. The *Haliotis cyclobates* is not found in the northern hemisphere, its habitat being restricted to the cool waters of our southern coasts. *Haliotis* was a favorite food of the aboriginals, and great mounds of the shells are to be seen on the north-west shores of Tasmania. On a lump of brain coral two species of *serpulae* and tubes, the work of annelid worms were noted. A slipper limpet (*crepidula immersa*) rewarded the researches of Mr. Godfree.

— Research Under Difficulties. —

A correspondent writes:—The investigations of the field naturalists have often to be conducted under circumstances of considerable hardship. But neither the inclemency of the weather nor the roughness of the terrain to be explored can quench the ardour of these indomitable votaries of the Muse of Science. On the Largs Beach, on Saturday afternoon, a small party of field naturalists, listening to Mr. Kimber's lucid descriptions of the wonderful life of the shallow seas, and wrapt in admiration of these marvels, temporarily forget, like the philosopher of old, that while their thoughts soared to empyrean heights, not only their feet but their bodies rested on the treacherous sands. The warnings of a more prosaic and practical member passed unheeded until a black and lowering sky suddenly began to pour out a deluge of pelting rain and hail, and a fierce gale flung the sand and spray into the faces of the company. A hasty retreat across shifting banks of sand and sea-weed did not avail to protect their rash conduct from the rage of the elements. Umbrellas were contemptuously whisked about, and in one case turned inside out and smashed. Shelter was sought behind stunted bush or shifting sand dune, but with little mitigation from the fury of

the squall. Men and women were huddled together, the stronger sex endeavouring to act as a shield to the ladies. But a new spirit of good cheer and philosophical submission was maintained that even rose to ready jest and good humoured banter. Variety is the spice of life, and the pleasures of a change to warm clothing and a hot supper near a cosy fire were heightened by the remembrance of the hardships passed through.

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## EXCURSION TO SIR WILLIAM SOWDEN'S, MAY 15, 1926:

At the invitation of Sir William Sowden, a large number of members visited his home—"Castlemaine"—at Glen Osmond. A stroll through the extensive grounds provided occasion for an interesting talk on the many native and acclimatized trees and shrubs which flourish side by side there. The host related many interesting historical facts about Glen Osmond, which was the site of the first mining venture in South Australia, if not in the Commonwealth. The "White Chimney," near one of the shafts, was a haunt familiar to the boys of 50 years ago, as the goal of many of their wanderings in the hills. From the verandah of "the hut" at Castlemaine a magnificent view is obtained of Adelaide and suburbs, framed by the gulf and hills. In "the hut" Sir William has assembled a varied and interesting collection of objects obtained in his travels through Egypt, the Holy Land, India, and Japan. Another rare object was a flower panel, composed of ivory, which was fashioned under boiling water by means of specially adapted implements. Among weapons on view, a vicious-looking "kukri," a double-edged scimitar, was unsheathed. Beautifully chased brassware from the bazaars of Benares was greatly admired, as was also an exquisite model of the Taj Mahal at Agra. After having viewed numerous other curiosities, the visitors inspected photographs and portraits of journalists and legislators of times past. The party were entertained at afternoon tea, and selected music was provided.

## EXCURSION TO YANTARINGA, MAY 29, 1926.

Through the kindnesss of the Railway's Department in providing a special carriage and making a special stop at this new picnic station situated near Ambleside a party were enabled to spend an interesting afternoon among the gums in this vicinity. It was too early for flowers but the secretary enthusiastically described the species of trees and the party were able to see where the stringy bark trees ceased and other gums came in.

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The new President, Mr. W. Champion Hackett, F.R.H.S., has been a useful worker in the Society for many years and his ability and knowledge of botanical subjects have been of great service to the Committee. We feel sure he will prove a capable and popular President of the Section.

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Our old friend, Mr. Bellchambers, the naturalist of Humbug Scrub, has been working very earnestly to secure the approval of his neighbours to having an area surrounding his property officially declared a Sanctuary for native birds and animals. The project should meet with the earnest support of all our members.

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In the removal of Mr. and Mrs. C. Pearce to the Far West Coast (Cape Thevenard) the Society loses the services of two enthusiastic workers. We wish them the best of good fortune in their new sphere.

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A movement is on foot to set apart 88 acres adjacent to Dingley Dell, the poet Adam Lindsay Gordon's old South Australian home, as a national reserve for the preservation of native plants, birds and beasts. The golden wattle, of which Gordon was so fond of singing, grows there luxuriantly. During the 3½ years since Gordon's cottage was acquired by the Government as a national memorial, more than 10,000 names have been registered in the visitors' books.