Vol. 25, No. 1.
JULY 1, 1948.

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STONE AXE HEAD

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NATIVE MATERIAL CULTURE

ABORIGINAL MARKED TREES

The South Australian NATURALIST

JOURNAL OF THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA.

Price: Two Shillings

EXAMPLES OF NATIVE MATERIAL CULTURE FROM SOUTH AUSTRALIA

By H. M. COOPER

Eight examples of ethnological material from this State are briefly outlined in the following paper and relevant localities shown in the accompanying map. As much material used by the natives was exchanged by means of barter, a short account of former native trade routes and their method of functioning is also included. References are cited in order that additional information may be obtained if desired.

Rock Carving on Flaggy Sandstone

CYLINDRO - CONICAL STONE. This specimen, 17½ inches in length and weighing 5 pounds 10 ounces, was found partly buried, in the vicinity of a native grave on Martin's Well Station, to the south-west of Lake Frome. The three drawings show the concave base and the incisings which are mostly in pairs, the remaining two sides being somewhat similar. Many cylindro-conical stones are marked with lines and other patterns, which occasionally include representations of probable bird and emu tracks, whilst others are devoid of incisings and some again have perfectly flat bases. The centre of this extinct culture appears to have been in the region of the Upper River Darling Valley where such stones are found in relatively large numbers. They occur in limited quan-

Map Showing Localities from where the Implements were obtained

THE SOUTH AUSTRALIAN NATURALIST

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JOURNAL OF THE FIELD NATURALISTS' SECTION.
ROYAL SOCIETY ROOMS: KINTORE AVENUE, ADELAIDE.
HON. EDITOR: BERNARD C. COTTON, South Australian Museum, Adelaide.

tity to the east of that area and have also been obtained, rather sparingly, in the Far North of this State around Cooper's Creek, Callanna near Marree, Farina, Arcoona (west of Lake Torrens) and in the area adjoining the northern side of the Peterborough-Cockburn railway line. In addition, isolated specimens have been discovered in Queensland and the Northern Territory. Their use has never been definitely established, but it is generally believed that they are representative of some ceremonial significance and are also phallic in type. There appears to be no substantiated evidence that the aborigines of the European occupation were acquainted with their true meaning, and since many have been unearthed through erosion and excavation, they may be of considerable historical age. Although the material chiefly employed, ranging from extremely fine to very course-grained sandstones, green limestones and shaly slates is widely distributed in the inland districts of the Continent, specimens from South Australia so often closely resemble those found in the River Darling Valley, both in design and texture, that it is possible some at least arrived from New South Wales by way of native trade routes which formerly existed, and were not a local product. Whilst now difficult to determine, it is probable that this portion of South Australia may have been within the influence of the culture, even if slightly and in consequence, the stones would have reached this area for some specific purpose and not adventitiously as objects of casual interest although this is also a possibility. There is definite evidence that cylindro-conical stones have been discovered in this State adjacent to graves, thus suggesting their association with burial, but native objects when brought from distant sources have often been utilised for totally different ceremonial or magical purposes than those for which they were intended by their former owners.

The northern areas of South Australia have by no means been systematically examined for specimens, and their incidence may later prove to be considerable. The largest example in the S.A. Museum is thirty inches in length, has incised markings, a flat base and is from the Broken Hill district.

For a valuable and comprehensive account of cylindro-conical stones see Lindsay Black (1942).

INCISED STONE. This was found on a native camp site near Wirrealpa Station homestead and about 30 miles north of Martin's Well. It is 3½ inches long, ½ inch thick, weighs 2½ ounces, and is one of 120 collected by the writer. In addition to the single deep longitudinal line, the markings, as will be seen, are comprised of long and short transverse, and short longitudinal incisings.

Although the majority was found in the vicinity of Martin's Well, and all inside an area with a diameter of less than 100 miles, it is not yet known whether their present apparently restricted incidence is merely due to intensive search in that district or whether this culture will ultimately prove to be purely local.

Incised stones are derived from local siltstones and slaty shales always of natural shape and never trimmed to size.

Whilst their use is at present unknown, they may have been some form of count or "message stick," but it is more probable that they have ceremonial or totemic significance, and in such respects may have relationship to cylindro-conical stones and churingas, to both of which they bear some resemblance in the character of their markings. Many are incised on one side only and some appear to be markedly phallic in shape.

For a detailed description of incised stones, see Cooper (1947).

AN OBJECT OF UNKNOWN SIGNIFICANCE from Artipena Water, Wilpena Creek, 10 miles south-east of Martin's Well is illustrated here. The material is a micaceous

schist, the weight of the specimen being $\frac{3}{4}$ of an ounce, the length 3 inches and the thickness $\frac{1}{8}$ of an inch. It is incised with a criss-cross pattern of transverse and longitudinal markings, the reverse side being somewhat similar. As will be observed from the drawings, there are perforations at both ends, one of which has broken. It may have been a body ornament, or a churinga, or perhaps an attachment to some ceremonial object.

A NARROW TYPE OF POLISHED STONE AXE HEAD (Cover), from Wirrealpa, the material being a dark green, probably basic, igneous rock. It is $6\frac{1}{4}$ inches long, weighs one pound nine ounces, is symmetrical in shape, and a superior example of native workmanship. The cutting or working edge has been ground and polished to a perfect finish, and the base or head finally shaped by percussion (hammer) dressing, the pecked surface being plainly visible.

The axe is grooved, thus making it more secure for fitting to the handle, which was usually a thin strip of green wood bent around the head, held in place by melted gum, and the two ends forming the handle brought together and fastened by means of human hair string or other form of lashing. A faintly defined second groove may be noticed below the main one. Some types had no mounting, being merely held in the hand when used.

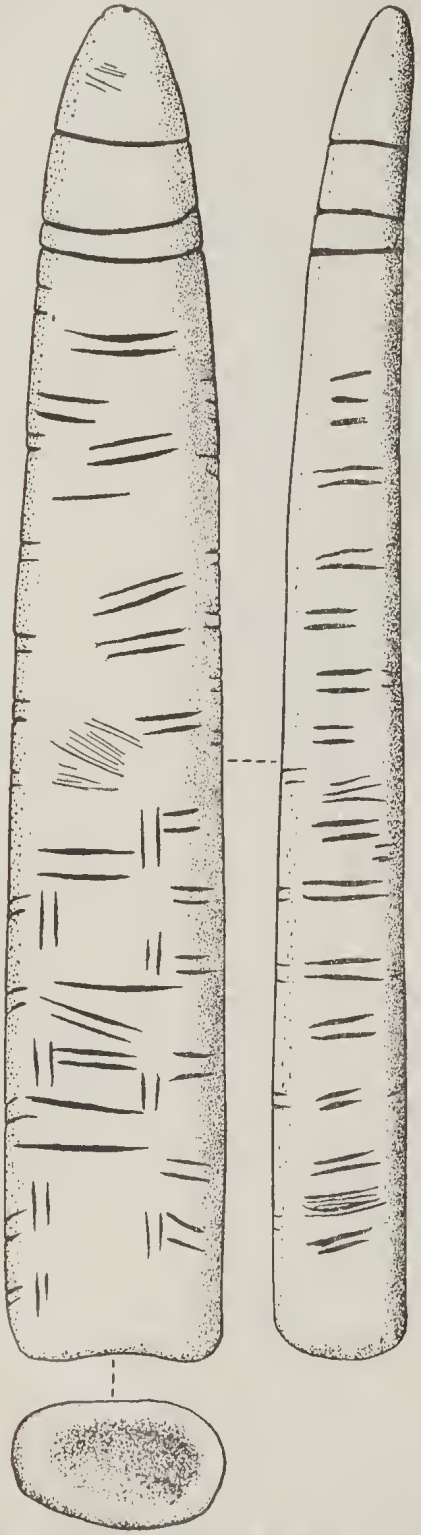
Polished stone axes were employed for various purposes, such as cutting out bark or wood required for food vessels, shields and canoes and making notches to assist in tree climbing. Such axe heads are unevenly distributed over numerous portions of Australia, whilst in some parts they are entirely absent. They were chiefly made from flakes struck off large blocks or derived from suitable water smoothed pebbles. There are many differences in shape, size and weight, whilst the technique of manufacture also varies. It is often practicable to determine with reasonable certainty the district of origin of many axes, remembering however, that this is not necessarily the actual place of finding, since being highly prized in localities where suitable stone was not available, many travelled long distances by trade routes from their starting point. Natives in the Lake Eyre region are known to have buried their traded axes in the sand for safe keeping. Two distinct types may also be occasionally found overlapping in the same district, in which case they apparently arrived from outside by different trade routes. Those in the South-East of this State, where they are comparatively plentiful, are believed to have come from the native quarry at Mount William, in Western Victoria, which it has been recorded, remained under the control of one group or family for generations. The removal of hundreds of tons of stone by quarrying and its occasional pilfering by unauthorised natives testify to the importance of the industry at this locality. Other extensive deposits worked for axe heads, millstone slabs and implements occur in many parts of Australia.

For a detailed account of axe heads see McCarthy (1946).

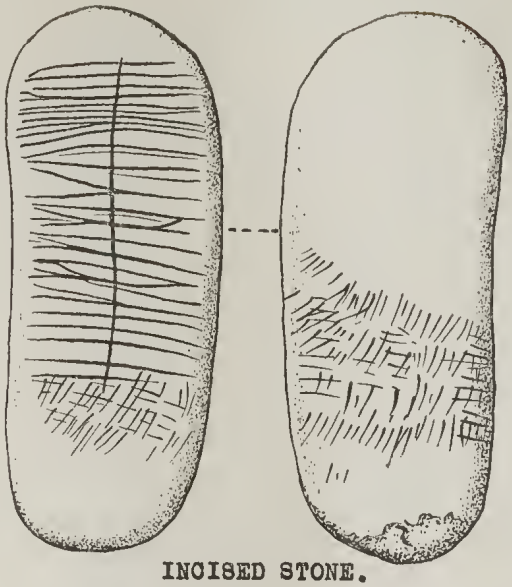
CRUDE STONE AXE. A crude type of axe, roughly trimmed around the entire margins on both faces, all surfaces having since become heavily patinated. It is difficult to determine whether it was originally mounted or employed as a hand axe.

This specimen, which bears a strong resemlance to types which occur in Europe, was found on an eroded sand dune situated upon a hill-side of considerable elevation, overlooking the gorge of the Onkaparinga River, inland from Noarlunga. The site had previously yielded many implements typical of the district, and when re-visited subsequently to deep ploughing operations, undertaken to arrest further drift, the axe was discovered on the surface, together with several others of crude form. Length of figured specimen — 5 inches; weight — $9\frac{1}{2}$ ounces.

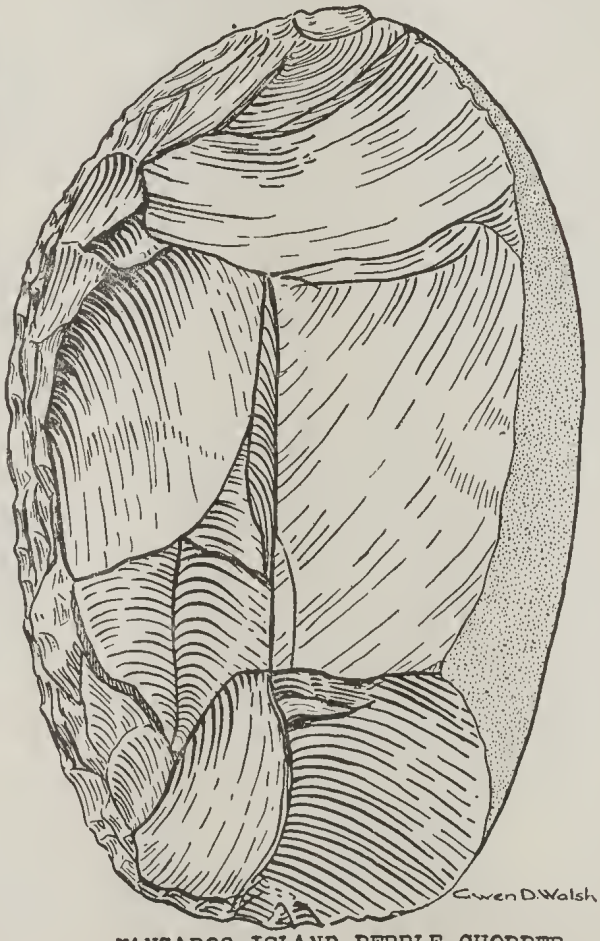
ROCK CARVING. This is a photographic reproduction of a crudely executed rock carving on a slab comprised of flaggy sandstone. The pattern, whilst ill defined and of indeterminate design, is nevertheless of interest since the locality whence it was collected—1 mile north of Second Valley—is much further south than any other occurrence of rock carvings hitherto recorded in this State, amongst the nearest being those at Deep Creek, Burra.



CYLINDRO-CONICAL STONE.



INCISED STONE.



KANGAROO ISLAND PEBBLE CHOPPER.

The eroded surface upon the cliff top where it was discovered was first noticed by chance from a small patrol vessel during the war years, and when later examined from the shore, the carving was found in association with many stone implements.

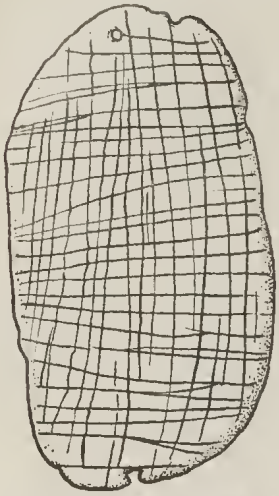
Most rock carvings in South Australia have been executed upon suitable vertical and horizontal rock surfaces in situ, but carved stones have been occasionally reported. A small boulder, from near Parachilna, exhibited at the South Australian Museum is an example.

Weight of carved stone slab figured — 7 pounds fourteen ounces; size—13½ inches x 11½ inches x 1 inch.

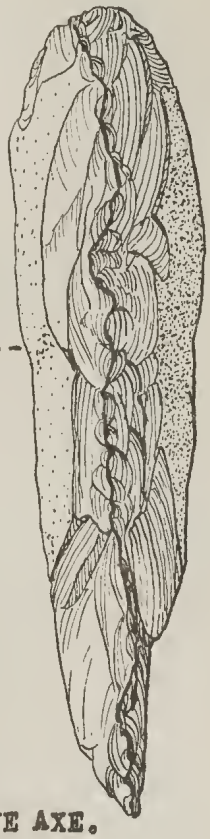
"NOSED" SCRAPER. Shortly after the discovery of Kangaroo Island by Captain Matthew Flinders in 1802—at that time uninhabited—certain runaway sailors, together with other fugitives and adventurous spirits began to arrive and settled on the Island, some bringing Tasmanian native women with them. In 1936 the writer found evidence of human occupation at two localities, one behind the coastal sand dunes at the western end of Antechamber Bay and the other in the vicinity of Cape Hart on the southern or other side of the Island. Flint implements were collected on both sites, associated with fragments of glass and iron, gun flints and other evidence of European occupation. These two camp sites have been attributed by Tindale (1937) to the Europeans and Tasmanian women referred to above, and during several subsequent visits many more implements, all of flint and identical in design with those found in Tasmania were obtained. The three drawings show a well executed, typical scraper of "nosed" design from Cape Hart, where 72 implements in all were found. It is difficult indeed to determine the reason for a settlement at such a bleak and secluded spot as this, upon an open and unhospitable coast, unless it was due to measures taken to ensure the safety of the party. If so it would have been admirable in many respects, being under the lee of a protecting sand dune and thus screened from seaward and also backed by scrub, which at that time was doubtless almost impenetrable and is dense even to this day. In addition, wallabies, birds, fish and crayfish are still abundant, and would have been an assured source of food supply. A small nearby cascade provides water during the winter months which, however, would be scarce in summer, and in the absence of an alternative supply, the camp may have been either a winter or temporary one.

Weight of specimen figured—7½ ounces.
See Tindale (1937) and Alison Harvey (1941).

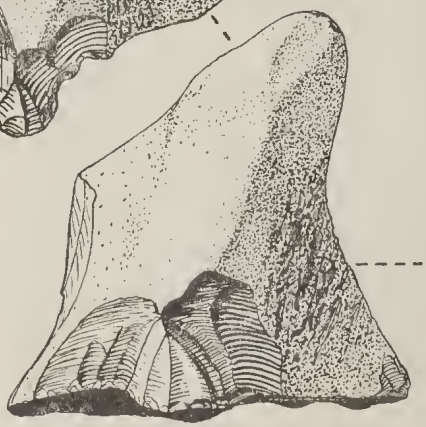
KANGAROO ISLAND PEBBLE CHOPPER. It was observed in a preceding paragraph that Kangaroo Island was uninhabited at the time of Flinders' landing, and not until many years later did the discovery of some hammerstones upon the banks of an inland lagoon denote a former native occupation, hitherto unsuspected. The results of a systematic search during the last sixteen years indicate the former existence of a considerable population or alternatively, of a comparatively smaller one associated with a long period of occupation, the presence of stone implements suggesting at least fifty camp sites of various sizes. A drawing of a typical Kangaroo Island hand chopper made from a water-horn quartzite pebble is reproduced here. Specimens range in weight from 6 oz. to 116 oz., the larger probably requiring both hands for their manipulation. These implements mostly occur buried until exposed by cultivation or erosion, and are therefore probably archaelogical in character. Although extremely simple, both in form and design, they exhibit workmanship and skill in trimming and balance and doubtless provided the natives with an efficient "general purpose" implement. During an experimental test to ascertain their efficiency, a sapling Eucalyptus species, was cut down in four minutes using a pebble chopper three pounds in weight. The apparent non-existence of this elongate oval form of trimmed pebble amongst the stone implements of nearby mainland camp sites, within visible distance of the Island, is puzzling, and probably will be of considerable significance in the ultimate determination of the history of their makers. Meanwhile, nothing is known concerning the former inhabitants of Kangaroo Island, nor the period when they lived, nor the reason for their final disappearance. The figured example is from Red Banks near Point

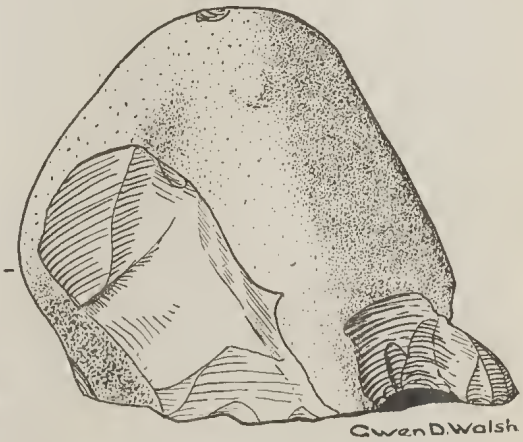


UNKNOWN OBJECT.



CRUDE STONE AXE.





"NOSED" SCRAPER.

Morison and weighs 80 ounces. For detailed accounts see Tindale and Maegraith (1931), Tindale (1937), and Cooper (1943).

TRADE ROUTES. Since the acquisition of much material used by the aborigines was obtained by barter, a brief reference is made, in concluding this paper, to the method adopted. At the commencement of the European occupation, an elaborate and extensive system of native trade routes, often covering long distances, existed in Australia, by means of which finished products and raw material, absent from certain districts and thus prized by the local inhabitants, was traded or bartered with adjoining or distant tribes, either directly or through the medium of an intermediate group.

This system comprised a series of networks, consisting in turn of what could be termed main and subsidiary highways, which in places converged on important points, similarly to present day railway, road and air traffic. Travel, at least in the arid regions of the interior during periods of drought, caused severe privations and often death from hunger and thirst, and at such times, intercommunication thereabouts would have been hazardous. Long distances were traversed, often involving months of travel, to distant places, such as the red ochre mine on the upper slopes of Mount Hayward near Parachilna by parties of natives from as far afield as Queensland and Central Australia, whilst there is also evidence that much prized material from this source reached the Kaurna or Adelaide tribe, although they had local resources of their own. Red ochre derived from this mine was highly valued owing to the mythical traditions surrounding its origin, and according to one account, it represents the blood spilt during a fierce struggle between two legendary creatures, Marindi, a big dog and Adno-artina, a huge lizard. Pearl shell ornaments and other objects have also been found in localities a thousand miles or more from the nearest possible source of supply. Material bartered included almost everything required in the natives' every day lives, such as axeheads, shields, woomeras (spear-throwers), boomerangs, spears, shell body ornaments, red ochre, resin, millstones, dilly bags, human hair, feathers for decorative purposes, fishing nets, digging sticks and pituri (Duboisia hopwoodii). Pituri, a plant with narcotic properties, was chewed with great relish after having been roasted and then mixed with ashes, mainly derived from certain species of Acacia and Eucalyptus. In addition, when thrown into small water holes where emus were accustomed to drink, it produced a stupefying effect, and so made their capture easier. It was, in consequence, highly prized and extensively traded from its main source of supply in Western Queensland. During return journeys from planned expeditions, heavy loads were frequently carried upon the head, such as sandstone slabs for milling and moulded lumps of red ochre weighing as much as 80 lbs. Freedom from molestation when passing along regular trade routes appears to have been generally recognised and the goods, upon arrival, subsequently disposed of, to the accompaniment of preliminary friendly ceremonies, the relative value of material exchanged being at times often either scarcely taken into account or completely ignored. Trade routes however, had a deeper significance than the mere distribution of these articles, for in addition, they provided opportunities, readily availed of, to discuss and interchange, amongst other things both old and new, local traditions, corrobborees, ceremonies, and fresh ideas and methods generally, the distribution of many of which was doubtless brought about to a large degree by such means. Trade routes, in short, provided the necessary channels for social, material and religious interchanges. Avenues of travel in the arid interior would have been restricted by the scarcity of water and in consequence the lack of game, to a few well defined tracks, and it is possible that some at least of these which later may have been identical with the more recent trade routes, played an important part in assisting the diffusion of the native population over portions of the Continent, assuming that somewhat similar climatic conditions were then prevailing. With the advent of European influence and its subsequent encroachment on the innermost corners of Australia, these ancient trade routes gradually ceased to exist, but the whole system, whilst necessarily primitive, was an important, even if a modified counterpart of the highly specialised methods of communication so essential to present-day civilisation.

Appreciation is extended to Sir Douglas Mawson, honorary mineralogist to the South Australian Museum, for the identification of much of the geological material referred to in this paper; Miss G. D. Walsh, Museum artist, for the drawings and Mr. A. Hay, Museum artisan, for the map.

REFERENCES:

Lindsay Black (1942).—Cylcons, the Mystery Stones of the Darling River Valley.

Cooper, H. M. (1947).—Australia: Material Culture. Incised Stones of South Australia. Mankind, Vol. III (No. 1), pp. 292-298.

Alison Harvey (1941).—Flint Implements of Tasmanian Manufacture Found at Cape Hart, Kangaroo Island. Rec. S. Austr. Museum, VI, pp. 363-368.

Tindale, N. B. (1937).—Tasmanian Aborigines on Kangaroo Island, South Australia. Rec. S. Austr. Museum, VI, pp. 29-37.

Tindale, N. B. (1937).—Relationship of the Extinct Kangaroo Island Culture, with Cultures of Australia, Tasmania and Malaya. Rec. S. Austr. Museum, VI, pp. 39-60.

Tindale, N. B., and Maegraith, B. G. (1931).—Traces of An Extinct Aboriginal Population on Kangaroo Island. Rec. S. Austr. Museum, IV, pp. 275-289.

Cooper, H. M. (1943).—Large Stone Implements from South Australia. Rec. S. Austr. Museum VII, pp. 343-369.

McCarthy, F. D. (1946).—The Stone Implements of Australia. The Australian Museum, Sydney. Memoir IX, pp. 45-64.

THE YOUNG RESEARCHERS' COLUMN

No. 3

Answers to problems printed in The S.A. Naturalist, Vol. 24, No. 1, Young Researchers' Column No. 2.

1. The White Cabbage Butterfly Caterpillars prefer cabbages and cauliflowers, but they will eat the foliage of other members of the group of plants known as Crucifers, that is plants that bear flowers having four petals set in the form of a cross.

In addition, they have been found eating the leaves of the Garden Nasturtium or *Tropaeolum majus*, which, by the way, is not a Nasturtium. The true Nasturtium is the Water Cress or *Nasturtium officinale* and belongs to the group Cruciferae.

The Garden Nasturtium belongs to the Order Geraniaceae and not Cruciferae, but having a strong, pungent taste like Watercress, it seems to suit the caterpillar's taste.

Another plant that the caterpillars like is the Horse Radish or *Cochlearia armoracea*, which is a true Crucifer.

NOTE: If you know of any other plants that the caterpillars of the White Cabbage Butterfly feed upon, bring forward the observation at the next meeting of the Society.

2. Clouds appear and disappear as they float across the sky because, heavier than air, they are constantly sinking towards the warm surface of the earth. As they sink they are warmed and turned into invisible water vapor which rises and in time becomes cooled and condensed into a visible cloud. The course of a travelling cloud is undulating in form.

3. Damaged fruit may be turning bad for several reasons, and as one reason is an attack by Fruit Fly. It is best to place the fruit in water and boil it to kill the Fruit Fly maggots.

QUESTIONS

1. In the jewellers' windows one sees beautiful diamonds. What are diamonds made of? Where are they made?
2. How do the pretty markings get on egg shells and shellfish?
3. Why does the wind blow harder some times than at others?

ANNUAL REPORT OF THE COMMITTEE OF THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA, 1946-47.

On behalf of the Committee of this Section, your Chairman presents to members the 63rd Annual Report, for the year ending July 31, 1947. Owing to his resignation, the Secretary could not give this report.

The Committee met twelve times to discuss and arrange the affairs of the Section, and I would like to place on record our appreciation of their work. This has been done under adverse circumstances, and has placed much work on the Auditors, to whom our sincere thanks are due.

There are two hundred and thirteen financial members, one hundred and eighty-nine adults and twenty-four juniors, and nine honorary members.

The death occurred of Mr. A. J. Wiley, an old and valued member. Until old age infirmities prevented him, he took an active part in furthering the aims and endeavors of the Section. He was a keen Naturalist, and we greatly mourn our loss.

Four Clubs, covering the subjects of Conchology, Botany, Geology and Zoology have functioned and flourished during the year. These Clubs enable members of the Field Naturalists to specialise and further their knowledge in any particular branch of Nature. Each Club furnishes the parent body with an annual report, which is read to all present at the general meeting, and later on published in our magazine.

We have had five camps at week-ends and thirty-nine excursions on Saturdays and holidays. Evening lectures, covering many subjects of Natural Science, numbered ten. We tender our thanks to those who so kindly gave to us their time and knowledge in these talks.

The organ of the Section "The South Australian Naturalist," has been issued three times during the year. Many favorable comments on this journal have been received from kindred societies, and libraries in Australia and overseas.

Our annual "Wild Flower and Nature Show" was held at the W.A.N.S. Hall in October, 1946. Our thanks go to all those members who so generously helped. It was one of the most successful we have ever held.

The Conversazione was held in the same hall. Seventy members gathered together for a very enjoyable evening. A Nature Quiz proved both instructive and entertaining. A film, taken and shown by Mr. Elliott of an overland trip to Darwin, was greatly appreciated. Some community singing and friendly gossip, followed by a supper, finished our one social event of the year.

GEO. PATTISON, Chairman.
19/8/1947.

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ANNUAL REPORT OF THE LIBRARIAN FOR YEAR ENDING JULY 31, 1947

There has not been such a great demand for the Library books as there was last year. However, 350 magazines were loaned to members. This shows an increase of 130 over last year. Only 42 books were loaned this year against 100 in the previous one. "Walkabout" magazine was subscribed to, and became very popular and much sought after by members, and "Wild Life" magazine is purchased as usual. Twelve magazines and scientific books have been exchanged for our "South Australian Naturalist."

Eight books on Natural Science have been donated to the Library, six of these were from members and two from outside sources.

No books were purchased during the twelve months just ended. Members have returned their books more promptly this year. Better lighting is needed to enable members to see the title of the books when searching for them. A request for better lighting was made last year, but the matter has not yet received attention. It would be a simple matter to install a plug-in extension lighting.

MRS. GEO. PATTISON, Hon. Librarian.

ANNUAL REPORT OF THE CONCHOLOGY CLUB OF SOUTH AUSTRALIA FOR THE YEAR ENDING JULY 31, 1947.

During the twelve months ending July 31, 1947, there have been eighteen evening meetings held for the study of Conchology and Marine Life. Nine lectures on different families of Mollusca were given by our Patron, Mr. B. C. Cotton, who is the South Australian Government Conchologist. Mr. Moorhouse, the Chief Inspector of Fisheries gave a lecture on the "Fisheries of South Australia," and Mr. R. Sprigg, Assistant Government Geologist, one on "Coral Reefs, Fossil and Living."

Seven meetings were given by different members on the subject of Molluscs of South Australia and other countries. One of these Club meetings was held at the residence of two of its members, who probably have the largest private collection in Australia of World Mollusca. There has been a good average attendance of 16 members from a total membership of 37.

Two Committee meetings were held, and a set of rules drafted, to be passed for adoption at the annual meeting, August, 1947. Each member is to receive a copy of the rules.

Twelve Saturday excursions of the Field Naturalists' to various beaches were led by members of the Club.

A successful display of Mollusca, plus information, given at the Field Naturalists' "Wild Flower and Nature Show," in October, 1946, proved to be of great interest to visitors.

A list of all members of the Club has been published in an overseas American directory. Copies of the Club's publications have been sent to other Australian States and to overseas countries.

During the year, the members of the Club financed an issue of 500 books for £35 on "Australian Turridae," by B. C. Cotton. It is illustrated, showing 55 different Australian species of this Family of Mollusca. This is the fourth publication by the Conchology Club on Conchology and Marine Life. The book is available to members of the Field Naturalists' at the cost price of 1/6 per copy, and copies have been forwarded to many parts of the world.

Correspondence and exchange of South Australian Molluscs, for those of other countries, together with an interchange of scientific data, have been well maintained by members and the Club as a whole. Keen interest is taken by many people of other countries, in Australian Molluscs and Marine Life. The financial status of the Conchology Club is very satisfactory.

It is gratifying to know that members have built up a credit of £8 after paying for "Publication No. 4," the "Australian Turridae."

Thus ends the 53rd year of the Conchology Club's existence. It has had various titles during this period, but has always been a conchology club.

Twelve new members joined during the past year, and a keen interest in Marine Nature Study evinced by all.

Each member will receive a Club programme, giving data of our evening meetings for 1947 to August 1948.

G. BUICK, Chairman.

GEO. PATTISON, Secretary.

———:o:———

ANNUAL REPORT OF THE BOTANY CLUB FOR THE YEAR ENDING JULY 31, 1947

The Club commenced the year under the Chairmanship of Miss Payne, who, to our great regret, resigned in October to return to her home in England. A change of officers then being necessary, Mr. Ferries was installed as Chairman, and Mr. Turnbull in his place on the Committee.

At the Saturday afternoon meetings during the winter, we have had particularly good lecturers, of whom Mr. Peter Trumble of Waite Research was one. His paper on Ecology of South Australia was regarded by members as being well worthy of publication, and Mr. Trumble has courteously lent the paper to the Club for that purpose. The Rev. Gunter supplied a singularly pleasing talk on Western Australian Wildflowers, of which he had tabled many specimens of marvellous beauty.

At an evening meeting, when the subject was "Orchidaceae," Mr. Goldsack honored us

with a visit and added greatly to our interest from his wide knowledge of this botanical family.

During the coming spring, the interest of members will centre round the Sundew or *Drosera* family, as there has been a request from Waite Research for a collection of *Drosera whittakerii* to be sent to U.S.A.

Apart from two successive meetings, when there were flooding rains and only a small number attended, and also the Saturday afternoon meeting, which was cancelled because of the lack of transport, attendance of members has been satisfactory, and interest in and desire for more knowledge of native flora has been noticeably increased. This last factor was mainly due to Mr. Nielsen's patient and lucid instruction in the Study Circle until June of this year, and although his leaving the Club was deplored, we are happy and gratified that an excellent substitute has been found in Mr. Pritchard, who has kindly consented to become instructor for the year.

The purpose of the Botany Club being the study and conservation of our native flora, members have been helpful in the work of mounting and identification of the Tepper collection in the Museum Herbarium, and have shown a keen interest in the Field Naturalists' Reserve at the National Park.

The Botany Club has reason to anticipate greater pleasure and interest in our native flora during the coming year.

JAMES FERRIES, Chairman.

H. M. STOCKHAM, Secretary.

———:o:———

ANNUAL REPORT OF THE GEOLOGY CLUB FOR THE YEAR ENDING JULY 31, 1947.

In the unavoidable absence of the Secretary, Mr. Ken Dunstone, who has gone to Ocean Island, it is my privilege as Acting Secretary, to present the Annual Report of the Geology Club.

Under the able guidance of the Chairman, Mr. W. F. Standen, and in his absence, the supporting Vice-Chairmen—Messrs. Swann and Havard, a very successful year of work was accomplished.

Unfortunately, we lost the services of Miss A. Martin, our Secretary, and later that of Mr. Ken Dunstone, who took over her work. To these officers the members tend their thanks for the services rendered, and hope that both will enjoy their labors in their new sphere of activities.

The programme for the year included five lectures and three study circles. The October meeting was cancelled because of important reasons. Dr. C. Fenner delivered a lecture on Meteorites and Australites; Mr. Don King gave the Society an interesting and educational account of the Nullarbor Plains and the many caves there in the limestones.

Mr. A. G. Edquist dealt with the occurrence of water and gases in crystals. Mr. Kleeman lectured on the occurrence of major faults in the rocks of South Australia and Mr. J. E. Machell gave a splendid demonstration and explanation of the Artesian Basins in Australia.

Club studies were continued, and Mr. F. Swann gave a most interesting account of the Structural Geology of the World, and explained the Theory of the Drifting Continents. Later he delivered an instructive address on Fossils, their preservation and their meaning to geologists. Mr. Havard followed with an instructive address on the Geological Building of Australia. These Club studies are of the greatest value to beginners in the study of Geology, and as set textbooks are used for the purpose, the members who follow up the lectures by reading the chapters explained, get added pleasure from the study.

At the last Wild Flower and Natural History Show, the Geology Club made a fine contribution towards the success of this annual feature.

During the year it was decided to get together a Geological library and also a collection of specimens to be used from time to time as a means of concrete illustration.

W. F. STANDEN, Chairman.

ALFRED G. EDQUIST, Acting Secretary.

ANNUAL REPORT OF THE ZOOLOGY CLUB FOR THE YEAR ENDING JULY 31, 1947

Attendance at the meetings of the Club has been smaller than for the previous year, the average being thirteen, but those who attend are keenly interested in this branch of Natural History, and very instructive meetings have been held.

During the year talks have been given on "Crustaceans," by Mr. H. M. Hale; "Lizards," Mr. J. Mitchell; "The Horse," by Mr. J. H. Alderson, and "The Aquarium," by Mr. J. E. Machell. The alternate months have been taken up with Club Studies on the Insects, led by Mr. Edquist. His talks, illustrated with blackboard, chart and pictures, have been much appreciated by all, as have been the talks by visiting speakers.

At the end of 1946, the Club suffered the loss of its Secretary, Mr. G. King, who left South Australia. A further loss has now been sustained, as our Chairman, Mr. K. W. T. Dunstone, has also left the State. His interest in the Club, and his work on its behalf, has been much appreciated by all members, and we will miss him very much. We wish him well in his new venture.

The younger members of the Club have continued their keen interest, and are now busy preparing for the forthcoming Wild Flower and Natural History Show.

In conclusion, we would like to thank all who have helped the Club in any way, and to give an invitation to all members of the Field Naturalists' Section to come to the meetings of the Club, which are held on the third Friday of each month at 7.30 p.m.

ALFRED E. MERCER, Secretary.
KEN DUNSTONE, Chairman.

THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF S.A., INC.

SPECIAL ACCOUNTS

LIFE MEMBERSHIP FUND

	£	s.	d.		£	s.	d.
Balance at Bank, July 31, 1946	42	0	0	Balance at Bank, 31/7/47	55	10	3
Transfer from General A/c.:							
Subscriptions received prior to 31/7/46	5	5	0				
Subscriptions received during year	7	7	0				
Bank Interest	0	18	3				
	£55	10	3		£55	10	3

COLORED PLATE FUND

	£	s.	d.		£	s.	d.
Balance at Bank, July 31, 1946	7	15	6	Balance at Bank, 31/7/47	8	19	2
Donations	1	0	6				
Bank Interest	0	3	2				
	£8	19	2		£8	19	2

CONSERVATION FUND

	£	s.	d.		£	s.	d.
Balance, 31/7/46, Transferred from General A/c.	37	14	9	Solicitors' Charges	3	3	0
Donations	5	0	9	Gate for Reserve	2	10	0
				Balance at Bank, 31/7/47	37	2	6
	£42	15	6		£42	15	6

Examined and Certified Correct.

FRANK GRAY, A.I.C.A.
C. G. SHUTTLEWORTH.
Honorary Auditors.

THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF S.A., INC.
STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDED JULY 31, 1947.

RECEIPTS.

		£	s.	d.
Bank Balance, July 31, 1946		100	9	5
Subscriptions—				
Ordinary Members		94	5	10
Life Members		7	7	0
Colored Plate Fund Donations		1	0	6
Conservation Fund Donations		5	0	9
Post Office Box Donations		0	15	0
Wild Flower Show		79	10	0
Conversazione		6	15	0
Sales—				
S.A. Naturalist	£7 15 3			
Booklets	0 15 6			
		8	10	9
Excursions		77	14	9
Bank Interest		2	8	8
		£383	17	8

EXPENDITURE.

		£	s.	d.
Transfer to Conservation Fund:				
Balance at 31/7/1946 ..	£37 14 9			
Balance per Contra ..	5 0 9			
		42	15	6
Transfer to Life Membership A/c.:				
Subscription received prior to 30/7/46	£5 5 0			
Subscription per Contra ..	7 7 0			
		12	12	0
Transfer to Colored Plate A/c.		1	0	6
Printing, McAlister & Co.		115	11	2
Stationery, Envelopes ..	£11 1 2			
Cards and Index	1 4 0			
		12	5	2
Postages		15	6	1
Advertising Monthly Programmes ..		9	12	0
Wild Flower Show Expenses		22	3	0
Conversazione		6	15	0
Bus Hire Excursions		73	17	0
Honorarium		15	0	0
Overtime Rent of Room		1	5	0
Kodak Ltd., 2 Wallaby Films		5	11	0
Expenses Junior Club		1	0	0
Subscription—				
"Wild Life"		0	10	6
"Walkabout"		0	12	0
Wreath		0	11	6
Cash in Hand	0 0 3			
Bank Balance, 31/7/1947 .	£47 10 0			
		47	10	3
		£383	17	8

We have examined the books and vouchers setting forth the transactions of the Field Naturalists' Section of the Royal Society of S.A., Inc., for the year ending July 31, 1947, and certify that the above account of Receipts and Expenditure is correct.

FRANK GRAY, A.I.C.A.
C. G. SHUTTLEWORTH.
Honorary Auditors.

THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF S.A., INC.
STATEMENT OF ASSETS AND LIABILITIES, 31/7/1947.

ASSETS.

	£	s.	d.
Balance in Bank	47	10	3
Life Membership Fund	55	10	3
Color Plate Fund	8	19	2
Conservation Fund	37	2	6
Cupboards	5	0	0
Library	47	0	0
South Aust. Naturalist Magazines ..	25	0	0
Film of Toolach Wallaby	15	0	0
Flower Show Equipment	15	0	0
Amplifier	40	0	0
Estimated Subs. to Realise	3	0	0
Sale of Wallaby Film	4	0	0
	£303	2	2

LIABILITIES.

	£	s.	d.
Rent, Royal Society Rooms	8	11	0
McAlister's Printing Stationery	30	14	10
Advertising "Advertiser"	2	2	0
Overtime, Royal Society Rooms	0	15	0
Foster's A/c Conservation, Fencing ..	21	0	0
Excursion Fares to Private Cars ..	2	14	0
Balance of Assets Over Liabilities ..	237	5	4
	£303	2	2

Signed August 19, 1947.

GEO. PATTISON,
Chairman.

SPECIAL MODIFICATIONS OF TEETH

By Dr. T. D. CAMPBELL

Comparative dental anatomy provides striking examples of modifications of tooth form and function which depart considerably from the primary usages of teeth.

In general, the main functions of teeth are for prehension, incision or comminution of food. They are organs belonging to the digestive system. With some of the vertebrates, the function of their teeth may be limited completely, or almost so, to one main purpose. For example, in many fishes and reptiles, the use of teeth is solely for the prehension or seizing of prey. In some herbivorous animals, most of their teeth are for the comminution of the large quantities of vegetable food they consume.

The following are some examples of specialised uses of teeth.

The poison fangs of the highly poisonous snakes are a striking example of extreme specialisation. These teeth are virtually hypodermic syringes. A canal in the body of the tooth conveys the venom to an opening near the tip of the tooth, from which it is injected into the body of the snake's victim during the action of biting. An interesting feature of this particular tooth modification is that various stages of this venom-conveying mechanism are represented according to the degree of venomousness of the snake. In the less poisonous kinds the actual canal is represented by a groove on the tooth surface: and again this groove varies in depth in different snakes according to venomousness.

The tusks of the elephant are an example of teeth (with aid of the trunk) performing a function of transportation. Before the days of intense mechanisation of industry. this usefulness of the elephant was exploited quite considerably. The tusks have little direct function in the business of food handling.

The incisors of the rodents are specialised teeth which function, in the beaver for example, as carpenter's tools. His lower incisors operate against the upper incisors like a double pair of chisels; and with them the beaver is able to cut down trees of quite appreciable size to build its home. Also these teeth are so constructed that in their usage the chisel edges are maintained in shape and sharpness.

The long, downward-pointing, upper jaw tusks of the walrus have little to do directly with the job of handling food. He uses them to assist in hauling himself over the ice, and so might be termed organs of locomotion.

The incisors of many of the carnivores are rather smallish, insignificant teeth which are useless in the main carnivorous business of cutting and slicing flesh food. They are often used for toilet purposes—acting as a fur or hair comb.

In man, besides the primary function of dealing with food—which function has deteriorated considerably in the diet habits of civilised man—teeth also serve important usages in vocal articulation and cosmetic standards.

All of which goes to show that some teeth have evolved along lines which lead a long way from the primary functions.

Also in the specific job of dealing with food, Nature has designed some striking and effective examples in tooth form.

In the highly specialised carnivorous dentition, the cheek-teeth are compressed in shape to blade-like forms, so that the row of lower teeth operates against the upper row just like the blades of a scissors. Excepting that these dental "blades" are irregular, but very sharp along the cutting edge — not straight as in the scissors. Nevertheless the dental blades of the carnivore are exceedingly powerful and effective for slicing through flesh food.

Entirely opposite in form and function to the carnivorous molars and premolars are those of the specialised typical herbivorous dentition in which the posterior teeth have broad, flat grinding surfaces, with transverse ridges of enamel. With these, the lower teeth work against the uppers as a series of grinding mills, crushing and disintegrating the fibrous vegetable food of a herbivorous diet.

One of Solomon's songs poetically describes teeth as being like a flock of sheep that are even shorn; St. Matthew warns of the gnashing of teeth. Observations in dental anatomy also reveal some interesting forms and uses of teeth.

RECORDS OF FISH AND CEPHALOPOD

The following fish and Cephalopod were obtained by me while fishing in one fathom with a seine net at Glenelg during one evening in November, 1947:—

LONG BULLSEYE. *Parapriacanthus elongatus.*

A small fish with large eyes, generally pale in color, greyish above and a length of 132 mm. or 5¼ inches. Approximately 100 specimens were obtained in a seine or hauling net. Although its inclusion among the fishes of South Australia had previously been based upon the official recording of a single example, it may now prove to be relatively plentiful.

Figure 170 in "The Fishes of South Australia," by Waite.

SAND FISH. *Gonorhynchus greyi.* (Named after Governor George Grey). Sandy in color, darker above and lighter below. Length 384 mm. or 15¼ inches.

A primitive type of fish living on a sandy bottom into which it is believed to burrow; does not appear in our markets in any quantity, although its flesh is firm and good in taste. The cross section of its body is almost round. It has a barbel below the snout and an undershot jaw, and in which respect it somewhat resembles a miniature shark or the common mouse. Its appearance on our beaches appears to be somewhat irregular and it is not frequently seen. In New Zealand where it attains a length of 508 mm. or 20 inches, it is called the "Sand Eel": other common names are "Sand Shark," "Beaked Salmon" and "Mouse Whiting." Twenty specimens were obtained upon the same occasion as the Long Bullseyes referred to above. Living members of the family Gonorhynchidae are found in Japan and St. Paul's Island in addition to Australia and New Zealand. Fossil species occur in Europe and America.

Figure 57 in "The Fishes of South Australia," by Waite.

TASMANIAN SQUID. *Euprymna tasmanica.*

This small ten-armed Cephalopod was obtained at the same time, and the Conchologist at the S.A. Museum (Mr. B. C. Cotton) has only one other record from South Australia.

H. M. COOPER.

ORGANIC MATTER CARRIED ASHORE IN FOAM

On Sunday, January 11, 1948, the sea at Encounter Bay presented a yellowish-green appearance as if from suspended matter. This extended out as far as one could see from the land. Next afternoon, on walking to Petrel Cove beyond the Bluff, I found the usually pure white dry sand beyond usual tidal limits presenting a dirty appearance, the tide-swept sand being free from this. There was a strong sea-breeze blowing and an abundance of foam amongst the rocks. Flakes of this were being blown inland in considerable amounts. On catching some, it felt rather slimy and left behind a dirty mark. The rocks were covered with a dirty brownish friable deposit evidently derived from foam which had burst and dried up. This could be scraped up in considerable quantities and felt like a fine powder. Some foam squeezed into big envelopes left large discoloured patches. Foam had also dried on cuttlefish bones and other objects on the shore leaving discolored powdery patches on them. Some of the dried foam in the envelopes and the powder on the rocks examined microscopically showed shreddy fragments apparently of organic matter staining brown with iodine, but showing no vascular bundles or other identifiable material.

Where did this fine and light material, churned up in the foam and carried inland, come from? The fishermen thought it came from the Murray. If so the quantity must have been immense, as the sea was discolored as far out as could be seen. The same discoloration of the dry sand was also seen near Port Elliot on the beach on the Victor Harbor side (where foam was likely to have been blown ashore), but not nearer to Victor Harbour.

J. B. CLELAND.

———:o:———

NOTICE.

If financial members do not receive their copy of "The Naturalist" will they please communicate with the Honorary Magazine Secretary, Mr. A. K. Beasley, Harris Street, Marden, Adelaide.

Telephone: F 1984.

ABORIGINAL-MARKED TREES IN SOUTHERN DISTRICTS

By E. F. BOEHM

In many places in the southern portions of South Australia there may be found trees, especially Red Gums (*Eucalyptus camaldulensis*) along rivers and large creeks, that bear marks on their trunks which were made by Aborigines, in some instances, prior to European settlement. Most of these trees were shelters as can be seen from the shape of the burnt cavity on one side of the base of the thick trunk. The late Dr. H. Basedow ("*Australian Aboriginal*," 102, Adelaide, 1929) implied that the cavities all resulted from bushfires. However, my grandfather, the late C. G. Boehm, who was able to make observations on, and converse with parties of Ngaiawang people passing through Light's Pass, near Nuriootpa, S.A., on their way to Adelaide to receive blankets, during the 1870's, informed me that when camping at night the natives generally made their fires against the trunks of large Red Gums and slept around them. As the result of many such fires, he said, a sheltered cavity was produced in due course, and the natives used these particular trees for shelter on rough or wet nights, and occasionally during the day-time.

Some large Red Gums have an elongate-oval scar on the trunk, commencing a short distance from the ground. The large scars on the bark represent bark-canoes, of which there were two main kinds; the larger one being 15-20 ft. in length, the smaller vessel being 7½-12 ft. long. R. M. Berndt ("*Mankind*," 3 [1]: 17-28; 1941) has described how the Jaralde people made bark-canoes in the vicinity of the present town of Murray Bridge, and he illustrated trees from which sheets of bark were removed prior to European occupation. At Morgan, S.A., the Ngaiawang people removed sheets of bark with the aid of chisel-pointed sticks about 3½ ft. in length. The late Mr. Gus Thamm informed me that he had never known the local natives to use or possess a stone axe-head, and from the paucity of edge-ground axes along the Murray River in this State one may conclude that they were only rarely acquired by trade, and constituted only a minor element of the late Murundian culture.

Scars less than 5 ft. long represent spear-shields, food trays, and fire-trays, such as were employed in connection with flares when spear-fishing on the Murray River at night. There is no record of any kind of carved symbolical, or sacred, tree in the southern districts.

Some large trees bear notches which were made by Aborigines to enable them to climb the thick trunk to secure oppossums or birds.

The clearing of land for agricultural purposes undoubtedly resulted in the destruction of very many aboriginal-marked trees, while bushfires and decay further reduced the number.

———:o:———

REWARD

I HEREBY APPOINT SIR DOUGLAS MAWSON and PROFESSOR J. B. CLELAND as Trustees to hold in trust a fund of One hundred pounds (£100) from which the aforesaid Trustees may pay all or part to any person or persons who discover in South Australia fossil remains of rare or unknown marsupials, reptiles, or birds in Pleiostocene, Pliocene, Miocene, or earlier geological deposits ON CONDITION that the specimen or specimens are presented to the South Australian Museum. The amount of the reward if any to be paid to the discoverer shall be left to the discretion of the aforesaid Trustees PROVIDED THAT the amount of the sum paid be approved by the Director of the South Australian Museum.

If one of the aforesaid Trustees shall decline to act or shall die the remaining Trustee shall have power to nominate a Trustee to fill the vacancy PROVIDED such nomination is approved by the Director of the South Australian Museum.

(SIGNED) W. BURDETT.
26/1/39.

WITNESS:
(SIGNED) HERBERT M. HALE.
26/1/39.

PAPER NAUTILUS

A photograph of the biggest Paper Nautilus *Argonauta nodosa* recorded is reproduced here by kind permission of "The News," Adelaide, where it appeared in the issue of Oct. 15, 1947. The shell is held by Miss B. J. Newman, the Museum Conchologist's Assistant. The specimen is a perfect one, measuring ten and a half inches in maximum diameter, and it was taken at Henley Beach, in Gulf of St. Vincent. These shells were once very rare on the local Adelaide beaches, but during the last five years some specimens have been taken. On August 21, 1943, six were reported washed ashore on different local beaches. Another, with eggs, was taken on August 8 by Dr. Angas Johnson at Port Noarlunga. The next in size to that already mentioned is a specimen in the S.A. Museum from Tasmania, collected by the late W. L. May and measuring ten inches in maximum diameter. No South Australian collector has brought to my notice larger specimens than these. Mr. George Pattison, a well known and experienced collector took in three years more than 500 Paper Nautilus shells on Troubridge Shoal, but none exceeded the size of the two specimens mentioned here. Mrs. W. Klem reports that thirty Paper Nautilus Shells were taken on the beach at Corny Point during the first two weeks in June of this year. The Animal from one of them was forwarded to the S.A. Museum by Mrs. Williams.

B. C. COTTON.

FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA

(Incorp.)

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PROTECTION OF FAUNA AND FLORA IN SOUTH AUSTRALIA

By J. NEIL McGILP

THOUGH in all probability the question of giving protection to our Fauna and Flora had previously been much talked about, the first concrete proposals for Sanctuaries and Reservations appear to have been made in a paper read by the late Mr. A. F. Robin before a gathering of the members of the Field Naturalists' Section of the Royal Society of South Australia on August 21, 1888. These proposals so impressed those present that a Committee, to be named the Fauna and Flora Protection Committee, was appointed. It was charged with the responsibility of promoting a public interest in our native wild life and the need to preserve it, and to make every effort to have suitable land set aside as Sanctuaries for the purpose.

Even at this comparatively early date in the history of Fauna and Flora Protection, it appears that those interested in the subject connected tree planting with wild life preservation, not only to provide shade, shelter and breeding places but as a growing asset from which timber could be sold. The revenue expected was intended to be used to create further Sanctuaries and provide funds for the adequate patrol and supervision of the areas set apart for our wild life.

One of the first steps taken by the Fauna and Flora Protection Committee was towards the establishment of a National Park. There was a Government Farm of some 2,000 acres near Belair which was being used for depasturing Police and other departmental horses. In 1881 the Government proposed to sell the farm, and as the area was within easy distance, approximately 8 miles from Adelaide, it was considered to be admirably suitable for a National Park. Very largely due to the efforts of Sir Edwin Smith, Mr. Walter Gooch and Mr. A. McDonald, Parliament in 1883 passed an Act prohibiting the sale of the property. It was, however, not until 1891 that, reacting to the valiant efforts of Messrs. Samuel Dixon, W. H. Selway, A. F. Robin and other Field Naturalists, widely supported by public opinion, Parliament passed an Act vesting the National Park in a Board of Commissioners, 5 of whom were appointed by the Government and 7 members represented various bodies interested in such a project.

The names of the original Commissioners and those acting in this capacity to-day are as follows:—

ORIGINAL COMMISSIONERS	PRESENT DAY COMMISSIONERS
Appointed by the Government:	
Sir Edwin Smith, Chairman	Professor J. B. Cleland, Chairman
Mr. A. McDonald, M.P.	Mr. F. N. Simpson
Mr. Walter Gooch	Mr. H. M. Hale
Mr. J. C. F. Johnson, M.P.	Mr. H. Womersley
Mr. Samuel Dixon	Mr. A. R. Downer
Commissioner of Crown Lands	
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Mr. F. W. Bullock	Mr. J. McLeay, Lord Mayor
Conservator of Forests	
Mr. Walter Gill	Mr. B. H. Bednall
Director of Botanical Gardens	
Dr. M. W. Holtze	Mr. I. R. N. Lothian
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Mr. R. G. Minchin	Mr. V. D. Haggard
Royal Society	
Rev. T. Blackburn, President	Mr. H. W. Kleeman, President
Agricultural Society	
Hon. J. L. Stirling, President	Mr. H. J. Finniss, Representative

Our National Park is a sanctuary for Fauna and Flora. The bird life there is both numerous and attractive. Between 1919 and 1933 the late Mr. John Sutton identified 81 species of birds in the Park, and quite a number of them nest in the trees and undergrowth. Numbers of them have become so tame and trusting that they may be often seen hopping and running about among picnickers after crumbs and food thrown to them.

Having obtained its objective of a National Park at Belair, the Fauna and Flora Protection Committee did not rest on its laurels, for early in 1906 efforts were commenced to obtain a certain portion of Kangaroo Island as a National Reserve. It was necessary to conduct a rigorous campaign of some 13 years before reward resulted from the ambition and work of such splendid stalwarts as Samuel Dixon, Edwin Ashby, S. A. White, Symonds Clark, J. M. Black, to mention but a few of those assisting. The Kangaroo Island land, now known as Flinders Chase, an area of 163 square miles, became a Reserve when an "Act to Establish a Reserve on Kangaroo Island" was passed in 1919. This Reserve is unique in that it is not infested with rabbits or foxes.

Flinders Chase Reserve was placed under the control of a Board, to be called The Fauna and Flora Board of South Australia, which consisted of six members. Two members, the Hon. John Lewis, M.L.C., Chairman, and George Laffer, M.P., nominated by the Government, two members, Captain S. A. White and Samuel Dixon, nominated by the Royal Society of S.A., and two members, Professor T. G. B. Osborn, M.Sc., and H. H. Corbin, D.Sc., nominated by the University of Adelaide, constituted the original Board to control Flinders Chase.

In the terms of the Act, the Board is charged, subject to the control of the Minister, to "purchase, take, receive, hold, acquire and possess lands, tenements and hereditaments in fee simple or for any less estate or for any term of years or otherwise, and goods and chattels and may grant, sell, convey, transfer, demise, assign or otherwise dispose of the same." Under Section 16 (1) the Flinders Chase was "vested in the Board to be held by the Board in fee simple upon trust for the purpose of a reserve for the protection, preservation and propagation of fauna and flora and as a pleasure and health resort and for other purposes of the Act." Under Section 16 (3) "all the fauna and flora now and hereafter on the said lands are hereby declared to be the property of the Board."

Section 17 (1) of the Act, it is worthy of note, reads that "in addition to the powers conferred under Section 5 of the Crown Lands Act 1915 the Governor may by proclamation dedicate any other Crown Lands for the purposes of this Act," and Section 43 reads "the moneys required by the Board for the purposes of the Act shall be paid out of the revenue of the Board and to the extent that such revenue is insufficient out of moneys provided by Parliament for such purposes."

The Act provides that the revenue of the Board could be derived by the following methods: (1) Selling stone, gravel, earth, sand, trees, bark, dead or live timber. (2) Granting leases and/or licences for grazing or agricultural purposes and for the establishment of sanatoria or biological stations or for such other purposes as the Board determines. (3) Sell or exchange specimens of Fauna and Flora and any other product of the Chase.

The Board among other things may erect dwelling houses and provide other necessary accommodation in the Chase for its officers and servants and such accommodation, as it deems advisable, for persons visiting the Chase. It may be well to remember that the Chase may, under the terms of the Act, be used as a pleasure and health resort.

The main and essential features of the Act have been set out at some length, because, in the writer's opinion, the framers of the Act have set up a splendid administration for the protection and preservation of the Fauna and Flora of Flinders Chase, and further it will be noted that as the Act can apply to other Crown Lands dedicated for the purpose of the Act, it can be fairly clear that when Parliament passed this legislation it was intended that all areas hereafter set apart for the preservation of Fauna and Flora would be placed under the control of the Fauna and Flora Board of S.A.

However, it is understood that a legal opinion on this matter has been obtained and this points out that the preamble and title of the Act definitely restricts its provisions to Kangaroo Island. The Fauna and

Flora Board of S.A. can therefore have no jurisdiction over lands other than on Kangaroo Island and the Act cannot apply to other lands on the mainland or other islands of S.A.

The writer has long advocated that the Act is all that is required or could be desired for the protection and preservation of Fauna and Flora of the State, and that the control of all Sanctuaries and Reserves except possibly those reserves known as National Pleasure Resorts, which are under the control of the State Tourist Bureau, should be placed under the control of or vested in the Fauna and Flora Board of S.A. The personnel of this Board to-day is as follows:—

Sir James Gosse, Chairman, and Mr. Alex Melrose—nominated by Government. Professor J. B. Cleland and Professor A. A. Abbie—nominated by the University. Professor Harvey Johnston and Professor J. G. Wood—nominated by Royal Society of S.A.

In view of the legal opinion above mentioned the Act would need amending or if necessary a new Act passed to empower the Board to control Sanctuaries and Reserves outside of Kangaroo Island, and it is the writer's considered opinion that this should be attended to at an early date. It may be necessary to reconstruct the Board by the appointment of more members, for it can be realised that its jurisdiction would cover a very wide and varied field. It would probably be expedient for the Board to appoint Sub-Committees from its members to deal with particular problems likely to be met with.

Throughout the years quite a number of sanctuaries and reserves have been gazetted for the purposes of the protection and preservation of our Fauna and Flora. A list of these areas, together with the acreage, date of gazettal, and some comments as to why they were selected follows:—

SANCTUARIES DECLARED UNDER THE ANIMALS AND BIRDS PROTECTION ACT

Locality (L.), Area in Acres (A.), Date Gazetted (G.), Object of Closure (O.).

(L.) HD. PORT ADELAIDE (Explosive Magazine Reserve, Dry Creek); (A.) 278 acres; (G.) 1907.

(O.) To keep shooters from entering a dangerous zone.

DANGEROUS REEF (Pt. Lincoln vicinity), PAGES (vicinity of Cape Willoughby, Kangaroo Island), and CASUARINA IS. (south of Cape De Couedie, south coast of Kangaroo Island); 90 acres; 1909.

To protect nesting sea birds—shags, terns, mutton birds, Mother Carey chickens.

BUSBY, BEATRICE AND ADJOINING ISLANDS (near Kingscote, Kangaroo Island); 50 acres; 1909.

To protect nesting sea birds—shags in particular.

ISLANDS OF COFFINS BAY, PT. DOUGLAS, KELLIDIE BAY AND MT. DUTTON BAY (southern Eyre Peninsula); 57 acres; 1909.

To protect the Rock Parrot.

ISLANDS OF LAKE ALBERT PASSAGE (near Narrung); 1½ acres; 1913.

To protect swans, plover and nesting game birds, e.g. ducks and teal.

LAKE CARLET (upstream from Mannum, River Murray); 606 acres; 1916.

To protect nesting birds such as ducks, swans, spoonbills, ibis and plover, and the game birds (ducks and teal). This sanctuary is marked by all-metal road type sign, "Bird Sanctuary No Shooting."

PEARSON'S ISLES, PART OF INVESTIGATOR'S GROUP (in the Australian Bight, 42 miles south-west from Elliston; 4,160 acres; 1916.

COBDOGLA IRRIGATION AREA (near Barmera and includes Lake Bonney, River Murray); 16,000 acres; 1917.

To protect ducks, especially those occurring on Lake Bonney—a favorite tourist resort.

LAKE BONNEY AND ISLAND, SOUTH-EAST (near Millicent); 750 acres; 1920.

To protect freshwater birds and game birds during open season and wombats which otherwise are unprotected in this area.

CAMPBELL PARK RESERVE (shores of Lake Albert); 9,600 acres; 1923.

This is to protect particularly Cape Barren Geese, but other protected and game birds are here cared for. This sanctuary marked by all-metal road type sign "Bird Sanctuary No Shooting."

REEDY POINT, LAKE ALEXANDRINA (near Milang); 1,700 acres; 1923.

This is principally to prevent shooters from encroaching on private lands. Game birds are protected.

COORONG (from the Needles Is. to Stone Jetty) AND ISLANDS (except Cattle Is.); 13,440 acres; 1925.

To protect breeding pelicans, swans and game birds. This sanctuary leased to the Ornithological Association. The sanctuary is marked by all-metal road type sign "Bird Sanctuary No Shooting."

MURRAY BRIDGE AREA (Sections 911, 912, Hd. Mobilong); 30 acres; 1926.

To prevent shooters operating on pleasure resort near Murray Bridge.

GRANGE GOLF LINKS (near Henley Beach): 138; 1928.

To prevent shooters from operating on a much frequented area.

WAIKERIE IRRIGATION AREA (Hart's Lagoon, Hd. Waikerie, River Murray); 600 acres; 1929.

To protect all freshwater birds, including game birds, near a township.

LONG ISLAND, MURRAY BRIDGE (south of Murray Bridge); 200 acres; 1930.

To prevent shooters operating on pleasure resort near Murray Bridge.

TORRENS LAKE (portions of Hd. Adelaide and Hd. Yatala situated in the City of Adelaide); 58 acres; 1931.

To prevent shooters operating near the heart of the city. Freshwater birds are thereby protected.

MARIA CREEK, KINGSTON, SOUTH-EAST 9 portion of Hd. Lacepede); 85 acres; 1934.

Mainly for the protection of breeding game birds. The sanctuary is marked by all-metal road type sign "Bird Sanctuary No Shooting."

MENINGIE (situated on Lake Albert); 675 acres; 1935.

To protect freshwater birds, including game birds, near the township. The sanctuary is marked by all-metal road type sign "Bird Sanctuary No Shooting."

MANNUM (the whole of the reserve for ferry and District Council purposes and the River Reserve adjoining, Hd. Finniss); 85½ acres; 1937.

To protect all freshwater birds, in particular pelicans, and game birds. The sanctuary is marked by all-metal road type sign "Bird Sanctuary No Shooting."

IMPERIAL CHEMICAL INDUSTRIES WORKS (between Pt. Adelaide and Pt. Gawler); 6,645 acres; 1938.

To prevent persons shooting and entering this area.

THE McDONALD RESERVE (near Hartley in the Hd. Freeling); 1,600 acres; 1938.

To protect Mallee Fowl in particular and other native birds in general.

PUNJUM WATER RESERVE (whole of Water Reserve No. 14, Hd. Wirrega); 16 acres; 1938.

To prevent shooting at this popular resort.

RENMARK IRRIGATION AREA (portions of Hds. Paringa and Nurtho); 2,300 acres; 1939.

To prevent shooting near this large township and to ensure plentiful bird life to act as an attraction.

"HAYLANDS STATION" (property of Dr. Michael Schneider, near Blanchetown, in the Hds. Hay and Skurray); 4,395 acres; 1939.

To protect emus, kangaroos, wombats and all native birds. The sanctuary is marked by all-metal road type sign "Bird Sanctuary No Shooting."

HD. NILDOTTIE (property of Mr. J. Gemmell, of Swan Reach); 474 acres; 1940.

To protect native birds and their nests from ravaging by Aboriginals.

LAKES BATTYE, BUTLER AND FELLMONGERY (Hd. Waterhouse, near Robe, South-East); 101 acres; 1940.

To protect all freshwater birds near this popular seaside resort.

LAKE NEWLAND (Hd. Colton, near Elliston, West Coast); 5,280 acres; 1940.

To prevent persons from entering this area and thus give protection to game birds.

HD. GOOLWA (land and water leased by Mr. Napier Birks); ½ acre; 1941.

To keep visitors off the area and thus protect the native birds.

PENOLA STATION (property of Mr. R. R. Rymill, Penola, South-East); 12,000 acres; 1941.

To protect kangaroos, wallabies, opossums, wombats, as well as emus and other native birds).

ALBURY CREEK (property of Mr. F. W. Hannen, Port Augusta); 295½ acres; 1941.

To prevent shooters from destroying native birds and several rare species of parrots.

MT. GAMBIER (Sections 241-242 Hd. Blanche); 548½ acres; 1943.

To protect all animals and birds.

HD. CUMMINS (Section 9—property of Mr. E. Whitlock Jones); 1,783 acres; 12,000 acres; 1943.

To prevent shooters disturbing stock and to give protection to game birds.

HD. NOARLUNGA (Sections 3322 and 3323); 124½ acres; 1944.

To protect birds generally.

HD. MOOROOK (Sections 8a, 8b, 8c, Moorook Irrigation Area); 3,110 acres; 1946.

To protect birds generally.

MOSQUITO POINT (property of Mr. W. P. McAnancy); 2,384 acres; 1948.

To protect birds generally.

PTS. HD. NANGKITA AND GOOLWA (near Goolwa Barrage); 170 acres; 1948.

To protect birds generally.

RENMARK RESERVOIR; 825 acres; 1948.

To protect birds generally.

PORT ELLIOT RESERVE AND PULLEN ISLAND; 50 acres; 1948.

To protect birds generally.

All the above Sanctuaries were gazetted as such under the Animals and Birds Act. They are under the control of the Department of Agriculture. There does not appear to be any protection of Flora on these Sanctuaries.

Land owners interested in protecting and preserving Fauna on their property can have their land proclaimed under the Act, and the occupier will then be empowered to prevent interference with destruction of natural wild life. Many landowners have availed themselves of these provisions of the

LIST OF RESERVES FOR PROTECTION OF FLORA AND FAUNA DECLARED UNDER CROWN LANDS ACT.

HUNDRED OR COUNTY	SECTION	GAZETTED	AREA	PLACED UNDER THE CONTROL OF
Hd. Minnipa (Eyre Pen.)	94	1939	40¼ acres	Minister of Agriculture
† * Hd. Peebinga (Murray Mallee)	21, 22, 30, 31	1940	6088 acres	Not placed under control of anybody
*Hd. Billiatt (Murray Mallee)	15	1940	56000 acs.	Do.
(1) County Jervois (Eyre Pen.)	adjoining Hd. of Verran.			
(2) Nicholls (Eyre Pen.)	north of Sections 3, 4, 5, and 10, exclusive of Licence 4065 and roads.		Total 475½ square miles	
(3) Hd. Murlong (Eyre Pen.)	South-west of Sections 4, 5, 7, 8, and south-east of Section 9, exclusive of roads.	1945		Flora & Fauna Committee
(4) County Jervois (Eyre Pen.)	adjoining Hds. of Boonerdo and Palkagee.			
* (5) Hd. Flinders (Eyre Pen.)	2, 5, 6, 13, exclusive of roads.			
* Hd. Flinders (Eyre Pen.)	3	1945	1540 acres	Flora & Fauna Committee
* Hd. Flinders (Eyre Pen.)	12	1946	21 square miles	Flora & Fauna Committee
* Hd. Flinders (Eyre Pen.)	11	1947	6¼ square miles	Flora & Fauna Committee

† Incidentally this is gazetted a Fauna & Flora, not a Flora & Fauna Reserve.

* Declared Reserves on the recommendation of the State Land Board.

Act. Birds are of an economic value to the man on the land; they help to keep insect pests under control. This is being realised more and more as scrub and trees are being cleared off, and there is a growing desire to provide inducements for these unpaid workers. Admittedly they take some of the produce of the land as fair payment for the work they do. The most important phase in the preservation of bird life is the provision of suitable nesting quarters, and these should be available on every farm and grazing property.

Some years ago the Crown appointed a Flora and Fauna Advisory Committee, so that when any matter connected with Fauna and Flora was brought before the Crown the Advisory Committee could be asked to submit a report on same. The present personnel of the Committee is as follows:—

Chairman: Mr. H. N. Hale, Director of S.A. Museum.

Vice-Chairman: Mr. L. King, Secretary to Hon. Minister of Agriculture.

Sir James Gosse, Chairman Fauna and Flora Board of S.A. (Flinders Chase).

Dr. J. B. Cleland, Chairman Commissioners of National Park.

Lieut.-Col. D. Fulton, representing Fauna and Flora Protection Committee of Field Naturalists' Section of Royal Society of S.A.

Mr. A. L. White, representing Avicultural Society.

Dr. J. G. Wood, Professor of Botany, University.

Mr. F. W. Moorhouse, Chief Inspector of Fisheries and Game.

Mr. B. H. Bednall, Conservator of Forests.

Mr. A. H. Peters, Director of Lands.

Mr. A. J. Baker, Director of Tourist Bureau.

Mr. V. D. Haggard, Director of Zoological Gardens.

Mr. M. H. Womersley, representing Royal Society of S.A.

Mr. J. N. McGilp, representing S.A. Ornithological Association.

This Committee, as its name implies, can only act in an advisory capacity; it has no legal standing or any fund of money to draw upon to carry out any project.

When searching up material for this article it was most surprising to find that in May, 1945, almost all of the reserves declared under the Crown Lands Act were gazetted as Flora and Fauna Reserves and placed under the control of the Flora and Fauna Advisory Committee. In April of the same year Section 3 Hd. Flinders had been proclaimed a Fauna and Flora Reserve and placed under the control of the Fauna and Flora Board of S.A. In view of the legal opinion regarding the Fauna and Flora Board of S.A., and, it was suggested to the writer, the disinclination of the Board to extend its operations outside Kangaroo Island, as this would contravene the Act, the proclamation of April was rescinded in the following month. Section 3 Hd. Flinders (close to Pt. Lincoln) thus became a Flora and Fauna Reserve and was placed under the control of the Flora and Fauna Committee.

Most dictionaries use the word fauna and flora in that order when referring to the native animals and plants of a country. South Australia has a Fauna and Flora Board and a Flora and Fauna Advisory Committee, and has Fauna and Flora Reserves at the same time as Flora and Fauna Reserves. It sounds Gilbertian, creates much confusion and tongue twisting, and should be altered.

In addition to the Reserves and Sanctuaries dedicated for the protection and preservation of Fauna and Flora, all Forest Reserves and Timber Plantations are virtual sanctuaries. In the north of the State we have Mt. Brown 4,814 acres, Willowie 12,797 acres all natural forest land, and Wirrabara 15,757 acres, of which 2,182 acres are planted, Bundaleer 7,470 acres, 744 being planted, and some smaller blocks of some 771 acres, of which 504 acres are planted. In the Central District there is Kersbrook, Mt. Crawford, Belair, Kuitpo, Second Valley, Goolwa and Onkaparinga, with a total of 31,979 acres, of which 15,893 acres are planted. In the South East there are Forest Reserves at Glen Roy, Mt. Gambier, Comaum, Penola, Mt. Burr, Myora, Caroline, and smaller reserves with a total of 89,613 acres original forest and scrub land and 79,294 acres of land planted with pine and timber trees. On the West Coast there is a Forest Reserve at Wanilla of 1,726 acres, of which 833 acres are planted. In the Murray Mallee there are reserves of 4,747 acres at Murtho and Parilla, only 139 acres of which are planted.

In all, covering many localities, there is a total of 248,963 acres of Forest Reserve, and of this area some 149,376 acres remain

in its natural condition. Though plantations generally do not satisfy all the requirements of our fauna in respect to food supply, they together with the unplanted areas are most helpful for the protection of our bird life.

The figures quoted above in respect to acreages of plantations were compiled in 1944, and while they have probably altered somewhat they will suffice to show the extent of forest and planted lands acting as Sanctuaries for our Fauna and Flora.

Under the control of the Tourist Bureau there are National Pleasure Resorts at Morialta 539 acres, Waterfall Gully 103 acres, Mt. Lofty Summit 78 acres, Hazelwood Park 30 acres, Brown Hill Creek 120 acres, Kingston Park 30 acres, Naracoorte Caves 228 acres, Dingley Dell 15 acres, Tantanoola Caves 25 acres, The Knoll Waverley Ridge 4½ acres, Horsnell Gully 282 acres. Obelisk Estate 1,753 acres. Wilpena Pound 19,840 acres, or a total area of approximately 23,036 acres of almost virginal country.

Although primarily tourist and pleasure resorts, well patronised by the public, these Reserves are very valuable for the protection and preservation of Fauna and Flora. Most of them are close to the metropolis, and visitors, both local and overseas, there have the opportunity to see many types of our wild life. These Reserves, moreover, create an interest in our Fauna and Flora, and interest invariably leads to a desire for protection of the animals and plants we learn to love and admire. Though not gazetted as Fauna and Flora Sanctuaries, these pleasure resorts can to all intents and purposes be regarded as such. The By-laws of the National Pleasure Resorts Act of 1914 contain provisions making it illegal to take, molest or destroy any native flower, plant or tree or any animal or bird within the areas without the written consent to do so is first obtained from Mr. A. J. Baker, the Director of the Tourist Bureau. This consent is very rarely given and then only in very special circumstances.

The Animals and Birds Protection Act of 1919 with its many amendments to 1938 contain copious regulations and provisions seeking to protect our Fauna from molestation, injury or death. The Chief Inspector of Fisheries is appointed Chief Inspector under this Act, and he may appoint such inspectors and other officers as he thinks fit to carry out the provisions of the Act. Every member of the Police Force is, by virtue of his office, an inspector under the Act. There are two schedules under the Act; one contains the names of animals and birds which are partly protected, whilst the other lists animals and birds which are unprotected. All animals and birds not included in the schedules are totally protected. The partly protected animals and birds and the period during which they are protected, or "close season" as it is termed under the Act, are as follows:—

Deer, Fallow (*Cerous Dama*).—From July 1 to December 31.

Kangaroo—all species except White Kangaroo.—(a) March 1 to July 31, within that portion of Eyre Pen. south of 33 deg. parallel of latitude.
(b) October 1 to March 31 within the State except the area shown under (a).

Wallaby, except Rock and Toolach (which are fully protected). — October 1 to March 31.

Wombats.—From July 1 to December 31.

Bald Coot.—July 1 to February 13.

Ducks (all species).—July 1 to February 13.

Maned Goose (wood ducks).—July 1 to February 13.

Greenshank (wading bird).—March 1 to September 30.

Snipe (*Gallinago* spp.).—March 1 to September 30.

Pelican, Mutton Bird, Emu.—September 1 to March 31.

Quail (all species).—August 1 to February 13.

Silver Gull (except in Hd. Menzies, Kangaroo Island).—September 1 to March 31.

The animals and birds on the unprotected list are domestic cats run wild, foxes, hares, rabbits, rats, mice, seals (except those found within St. Vincent and Spencer Gulfs from Cape Catastrophe to Cape Borda, along the north shore of Kangaroo Island to the mouth of the River Murray), wild dogs. The unprotected native birds are Black-tailed Native Hen, Blue Mountain Parrot, Chestnut-eared Finch, Sulphur-crested Cockatoo, Corella (long billed), Galah, Cormorants, Crows, Eagle Hawk, Goshawk, King Parrot (*Glossopsitta concinna*), Mistletoe Bird, Red Wattle Bird, Rosella Parrot, Shell Parrot, Silver Eye, Silver Gull (only on coast of Kangaroo

Island in Hd. of Menzies). Incidentally, probably to make doubly sure of it, the list mentions Sulphur-crested Cockatoo, Warbling Grass Parrot, Zebra Finch, Native Hen (black-tailed), and Musk Lorikeet a second time. Practically all species of introduced birds are unprotected.

It will be noted that the Greenshank and the Snipe, usually referred to as the Jack Snipe, are on the Third Schedule and a close season from March 1 to September 30 has been declared. This is somewhat surprising when it is known that both birds migrate from the Northern Hemisphere—to escape the severe winter there—to Australia. They arrive here in September, remain with us until the approach of wintry conditions in April-May, when they start off on their long northern flight. They do not breed in Australia, preferring the tundral regions of Siberia and in Japan respectively.

It is hoped that our efforts to protect the Greenshank and Snipe during the scheduled period will not lead to international complications.

The Jack Snipe is considered a good table bird; its rather erratic zig-zag flight makes it difficult to shoot and consequently it is much sought after by real sportsmen. Rather than continue the farce of giving it legal protection between March—September, it is suggested that the Snipe sould be placed on the Fourth Schedule—unprotected birds—but a "bag limit" should be fixed for a day's shooting. The Greenshank is not generally considered much of a table bird, and true sportsmen do not hunt for it. Almost all of the migratory wading birds, except the Greenshank, are fully protected, and there seems to be no good reason why this very attractive and pleasant-voiced visitor should not be protected during its stay with us.

The schedules under the Act may be altered by proclamation. Severe penalties can be imposed on those found guilty of an infringement of the Act. There is provision for the issue of game licences for any period up to 12 months; for fixing the number of birds to be taken; the sale of animals or birds; skins and eggs of unprotected fauna under licence; preventing the taking an any special permit. Pets may be purchased without a permit from a licensed dealer.

Under Section 19 of the Act any person can be prosecuted for "entering upon privately held land for the purpose of taking any animal, bird or skin and eggs of same without the permission of the owner or occupier of the land. The onus of providing the permission of the owner or occupier shall lie upon the defendant. Proof that any person entering the land having in his possession any dog, gun, net, trap or other instrument capable of being used for the purpose of taking any animal or bird shall be *prima facie* evidence that such person entered upon or was upon such land for the purpose of taking some animal or bird."

The powers under the Act are wide and generally all phases of animal and bird destruction and interference are well covered. The legislation provides for satisfactory protection and preservation of our native animals and birds and for the safeguarding of land owners who may under certain conditions suffer loss and damage through native animals and birds. In short, there appears to be little room for any improvement in the Act as it now reads. As the animals and birds on the unprotected list are known to be destructive when they, as they do at intervals, become numerous, there is little likelihood of them being exterminated and no protection is warranted at present.

The Crown cannot truthfully be blamed if insufficient sanctuaries and reserves have been provided for the welfare of our fauna and flora. It cannot be denied that it has provided the machinery for the purpose, and if it is not used as fully as seems desirable it is the fault of nature lovers not being able to put up acceptable proposals or to rouse public demand for the propositions put forward. When only a few people appear interested, it is not surprising that the Crown is not impressed with a proposal for further sanctuaries or for further protective action regarding our wild life. To be successful all nature lovers must stir up public interest, as indeed was essential before Flinders Chase was gazetted.

It may be of interest to show the representation at a deputation which brought Flinders Chase into being. Those present represented, to quote a report in "The Register" of August 8, 1906, "The Universities of Adelaide, Sydney and Melbourne, the Royal Societies of S.A., Victoria and Tasmania, the Microscopical Society, Field Naturalists, Fauna and Flora Protection Com-

mittee, Ornithological Association, Society of Arts, Botanical Society, Zoologist Society, Royal Geographical Society, British Fauna Guild, Royal Australasian Ornithologists' Union, Young Women's Christian Association, Women's Christian Temperance Union, Australian Natives' Association, Chamber of Commerce, Pastoralists' Association, Stock Exchange, Boy Scouts, Horticultural and Floricultural Societies, Corporations of Adelaide, Brighton, Glenelg, Norwood, Unley, Port Adelaide and St. Peters, and District Councils of Crafers, Payneham, Woodville and Burnside." Truly an excellent cross-section of the public.

It can be stated that, almost without exception, the existing sanctuaries, excluding those over privately owned or leased land, were gazetted through the work of a handful of nature lovers spurred on by such persistent leaders as Edwin Ashby, Samuel A. White, Samuel Dixon, Dr. Morgan, Professor Cleland and one or two others. With the exception of Captain S. A. White and Professor Cleland all those to whom we owe our thanks and admiration for their fine leadership in efforts to secure protection for our Fauna and Flora have left us. Captain White is nearing the evening of a full life and now is unable to undertake any strenuous work or do more for his beloved native wild life—we owe him our gratitude for the splendid work he has accomplished. It must be pleasing to him to reflect on his work and realise that he had "a finger in the pie" in almost every campaign in the interests of our Fauna and Flora. Professor Cleland has in more recent years done splendid work seeking protective sanctuaries, but due to the apathy of native wild life lovers and the public generally to the greater need, widespread support to proposals for more Reserves has been lacking. There seems to be something of a splitting up of effort due apparently to a difference of opinion as to the policy to be adopted for present day protection and preservation methods. Some consider that it should consist solely of sanctuaries, giving little or no encouragement to the public to visit the areas. Others are in favor of, in some measure, exploiting our Fauna and Flora, it being considered that more lasting preservation would follow public interest in wild life, and they point out what is being done in America and England under semi-commercialised control of Fauna and Flora. Others contend that the Crown is not doing enough, and consider the time is ripe for Private Trusts to secure Reserves and the like and to control Fauna and Flora policy. Others, and probably the majority of nature lovers, are of the opinion that the Fauna and Flora of a country belongs to the community and should therefore be under the control of the Crown.

While we argue on policy, opportunities to secure original virginal land for Reserves are being lost, for, through development of our land for agricultural and pastoral pursuits, the natural scrub and forest is rapidly disappearing. It therefore is most essential to get together and act, not talk, before it is too late.

With the help of scientific research, much of our scrub land, once considered useless for other than poor grazing, is now being brought into production. In the course of development the scrub is destroyed. Much reclamation of swamp and swampy areas is taking place, and it will result in the waterbirds, as the ibis, spoonbill, etc., being driven away.

The conservation of our soils is in some measure closely connected with the preservation of Fauna and Flora. It has long been realised that much of the depletion and erosion of our soils has been due to the excessive removal of vegetable cover. On a large percentage of our land, it being of a friable, sandy nature, timber and scrub is essential to protect it from the force of wind and water. In an effort to meet the position and to prevent the wholesale destruction of scrub and forest, the State Land Board, of which the writer was then Chairman, some years ago recommended that an area equal to one-tenth of the area of the block should be reserved in any new lease issued after that date. The Crown approved of this recommendation and it became law. In practice the block is examined, and where possible an area equal to 10% of the acreage of the block, embracing any existing scrub or timber is selected and reserved to the Crown. In some cases, where the block has recently been cleared and there is a danger of soil erosion, 10% of the cleared land is reserved to allow regeneration of the scrub. These small reserves of scrub and/or forest

will prove of great value as nesting quarters and feeding areas for bird life.

In order to make these areas still more valuable for our native bird life and for soil preservation, it has been suggested that where practicable the reserved areas on adjoining blocks should join together. For example, it may be possible to reserve the 10% area of scrub in the adjoining corners of four blocks, thus forming quite a good area of protective scrub.

It must be borne in mind that these reservations are made to prevent erosion of soils and are not gazetted for the purpose of protecting Fauna and Flora. Now that scrub land in the better rainfall areas is being cleared for the growing of more or less artificial pastures, the timber can be removed without so great a danger of erosion, which would to some extent be prevented by the growing of dense pastures. It may be that those in authority may, as they could, relax their policy in regard to the reservations where they are not considered essential to conserve the soils. There is therefore urgent need to secure some Reserves or sanctuaries in any new localities being or likely to be developed for production. It could be stressed that it is important to conserve some areas of virginal land so that the present methods of development may be checked and if found wanting further research could be undertaken on the original soils.

In the list of Flora and Fauna Reserves, there is a large area of virgin country on Flinders Peninsula. This land is of such low value and of little use other than for irregular grazing that the Land Board did not reallot it when the leases expired but asked that it be declared a Reserve. Adjoining this block is a stretch of sea coast and lakeside country of rugged splendour. The gazetted Flora and Fauna Reserves there would form the nucleus of a most attractive tourist and health resort within easy distance of Port Lincoln. Sleeforth Mere is a beautiful permanent water, and its shores could be developed for the accommodation of visitors. If a few areas could be purchased, the whole of the Flinders Peninsula to Sleeforth Mere would make a splendid memorial for Captain Flinders, prove very attractive to visitors, and provide a most useful haven for our native life. There is a movement afoot to create this Memorial, and all those interested in the development of this beauty spot and in protecting our Fauna and Flora should give this all their support.

In inditing this history of Fauna and Flora protection, the writer had perforce to consult other works for much of the material used. "THE FULL STORY OF FLINDERS CHASE," by Samuel Dixon, deals very fully with the long continuous effort to establish Flinders Chase on Kangaroo Island, and "THE NATIONAL PARK," published by the Field Naturalists' Section of the Royal Society contains a wealth of very useful information. These two books are well worth perusal; they give an excellent idea of the amount of work accomplished by a few earnest and far-seeing naturalists for the benefit of the community and our Fauna and Flora. The writer's thanks are due to Mr. A. H. Peters, Director of Lands; Mr. F. W. Moorhouse, Chief Inspector of Game and Fisheries; Mr. A. J. Baker, Director of the Tourist Bureau, and Professor Cleland for a fund of detail, without which this article could not have been written.

EXCURSION REPORTS

SELLICK'S BEACH SCRUB

Leader: Prof. J. B. Cleland.

AN excursion was held to this interesting portion of the original scrub of our coastal area on September 3, 1949. Fortunately, several of the owners of land adjacent to it, especially Drs. A. P. R. Moore, Eric Sims and Jay, are strictly protecting the parts owned by them. It is a great pity that the whole area cannot be reserved. Many interesting plants are to be found here which are rare or whose nearest stations are far away. There are large patches of the handsome deep blue flowered *Dampiera lanceolata* with white tomentose branches, whose other South Australian localities are Murray lands, Kangaroo Island, Minnipa and Ooldea. The party found the prickly Epacrid *Acrotriche affinis*, recorded from Coonalpyn

and Encounter Bay, which had just finished flowering. *Leucopogon rufus* is abundant as a prickly, rather compact shrub up to 5 feet high, without the obvious wiry reddish branches from which it gets its name—it was in fruit, the drupes being unusually large for the genus. An *Hibbertia* (probably *H. stricta*), with the flowers on some plants a washed-out yellow, was noted. *Nicotiana maritima* grew close to Dr. Moore's shack—the species was named in California by Dr. Wheeler from seed obtained at Hallett's Cove; the flowers have a rather unpleasant narcotic somewhat sweet smell and the leaves when chewed by one member were found to be nauseous.

On arrival, the low cliffs above the sea were first inspected. Here the prickly *Acrotriche patala* was still in bloom, though mostly over. The purplish climbing pea *Glycine clandestina* trailed over the low shrubs. Another climbing plant was *Muehlenbeckia adpressa*—its large, swamp relative, *M. cunninghamii*, the lignum of the explorers, grows in some ground wet in winter on the east side of the scrub. *Grevillea lavandulacea*, the upright herbaceous *Stackhousia monogyna* with whitish flowers, and the Euphorbiaceous *Beyeria Leschenaultii* also grow here. A few native yams, *Microseris Forsteri*, were in bloom, as well as *Pimelaea diosmifolia* (previously called *P. flava*) and *Thomasia* with its purplish flowers.

On entering the scrub, some of the minute ephemerals attracted attention such as *Calandrinia pygmaea* and another *Calandrinia*, the composite *Toxanthus Muelleri* (a new record for the coast), *Crassula Sieberiana*, *Triglochin calcitrapa* and others. In the scrub itself Hibbertias were gay with their yellow flowers. *Cryptandra tomentosa*, another record for the district, was in bloom. Other plants in flower were the small *Didiscus pusillus*, with one fruit bristly and the other smooth, *Calythrix*, the sticky *Goodenia amplexans*, Flame Heath and the Pink Gum. Native Peach trees were seen but none in fruit. Two orchids were found in flower—the pink *Caladenia latifolia* (another record) and *Pterostylis nana*.

—J.B.C.

SEPT. 10, 1949.—HORSNELL'S GULLY.

Leader: Mr. K. W. T. Dunstone.

The party travelled by the Kensington Gardens tram to the terminus, then walked up Auldana Hill just behind the vineyards, following the track along the top of the ridge until the stringybark level was reached.

A patch of recently burnt out country was inspected and the extent to which the native flora had regenerated after the fire was noted.

There were many plants of running-postman (or scarlet runner) spreading over the ground, and dozens of young ones coming up. The pretty tetratheca was very common, as was the bachelor's button, with its bright yellow heads on long slender stems, or scapes. Clumps of beard-heath were numerous, and it was a pleasant surprise to find many groups of an orchid popularly called double-tails.

We noticed several specimens of a spider-orchid, and a beautiful little orchid often referred to as blue-fairies, an apt name, surely.

Another orchid, a little greenhood, was seen, but was past its best, as many of the greenhoods flower during the winter.

Several of the parrot-peas were observed. The bush-fires aid the germination of these plants, as with many others of the pea-family, by helping to crack open the seed-covering. For many wattles are seen to spring up abundantly after a burn-off, notably our scrub-wattle *(Acacia myrtifolia)*, which we saw at a little higher elevation.

The rasp-wort flourished, as did one or two kinds of guinea-flower. We discovered a beautiful natural rock-garden on the hill-slope just above our resting-place. Native flowers grew quite thickly in amongst the quartzite rocks, suggesting ways for a garden at home. Blue, pink, white, yellow and brown all blended to form a delightful virgin garden.

Needless to say, we all left this lovely area with great reluctance.

Two of us left the main party, to walk on up to Mt. Lofty. We noticed several interesting plants not seen by the others.

Following is a list, by no means exhaustive, of the plants seen:

Kennedya prostrata (Running postman); *Craspedia uniflora* (Bachelor's button); *Tetratheca pilosa; Leucopogon virgatus* (Beard-heath); *Daviesia corymbosa; Daviesia ulicina; Daviesia brevifolia; Hibbertia sericea* (Silky guinea-flower); *Hibbertia acicularis*. Variety Sessiliflora; *Xanthorrhaea semiplana*

(Grass-tree); *Hybanthus floribundus; Epacris impressa; Astroloma conostephioides; Lomandra juncea; Caladenia deformis; Pterostylis nana; Diuris maculata; Logania recurva; Pultenaea largiflorens; Pultenaea daphnoides; Pultenaea involucrata; Acacia myrtifolia; Acacia pycnantha; Acacia rhetinodes; Acacia armata; Halorrhagis tetragyna* (Rasp-wort); *Cheilanthes tenuifolia* (Carrot fern); *Crassula* species; *Opercularia* species (2); *Sherardia arvensis* (Field madder); *Lepidosperma carphoides* (Sedge); *Bulbine bulbosa* (Bulbine lily); *Dichopogon strictus* (Chocolate lily).

K.W.T.D.

OCT. 1.—NATIONAL PARK, BELAIR

1.15 p.m. train to Belair. Mr. R. L. Specht (Adelaide University), leader. Twenty present.

Before commencing our walk through National Park, our leader discussed the ecology of the area, the relationship between the existing vegetation and the soil, and the fact that plants invariably grow in communities.

The rainfall of the area is approx. 31 inches.

The trees are scattered and consist mainly of Blue Gum *(Euc. leucoxylon)*, Peppermint *(Euc. odorata)*. Underneath these a grassland community exists.

Osteospermum, a daisy-like shrub of South African origin, is becoming all too prevalent and though quite attractive is not welcome, as its luxurious growth is crowding out our natives.

On reaching the first small creek the soil structure could be clearly observed, first a layer of grey soil of variable depth, below that clay, and again below that the parent rock from which our soil is formed.

Continuing our walk a change takes place in the soil, as also in the vegetation—*Pultenaea* and *Daviesia* growing in profusion; Kangaroo and Wallaby grass, *Briza major* and *minor*, lilliaceous plants, oxalis, and introduced plants on the more fertile patches of soil.

Going further in the direction of the Reserve, we find heat-loving plants coming and the grassland changing; trees remain the same.

Further on are communities of Blue Gum.

The soil now changes considerably, the ground covered with laterite pebbles, an ironstone, really a fossil, soil of very low fertility. Our leader explained that a similar soil existed in the W. Aus. Jarrah country and in Central Aus. and in Darwin, where ironstone goes to a depth of 50-60 feet.

We next walked into a virtual wildflower garden, a profusion of color: *Hakea rigosa, Helichrysum Baxteri, Thelimitra Macmillani, Glossea major, Tetrathaca, Chierantha, Dillwinia, Pultenaeas* and *Grevillias*, were only some of the varieties there.

Our leader explained that climatic changes had broken up the flora.

South-Western Aus. still has large areas of extremely beautiful flora. South Aus. has allied species. smaller but very beautiful, nevertheless.

Leptospermum was just commencing to flower; interesting specimens of *Casuarina stricta* with its elongated cones, and *C. Mullerii* were also present, also *Hibbertia scerisca*. In the Reserve proper some beautiful clumps of *Thelimytra antennifera*, the scented yellow orchid, were found, and a very fine specimen of *Thelimitra grandiflora* with 36 buds, about to open. Several varieties of *Diuris* were thriving and multiplying. *Chierathea* and *Stackhousia* were plentiful. We discovered quite a patch of *Caladenia Menzii*, the little bunny orchid, outside of the Reserve, and a few plants of *Eutaxia microphila* with its sprawling branches full of blooms.

The sedges were all very dry, indicating the season.

Members enjoyed an interesting and instructive afternoon, and appreciated Mr. Specht's able leadership.

A.E.B.

OCT. 8, 1949.—OUTER HARBOR.

(Leader: W. G. Buick)

As the low tide was much earlier than the time set for the excursion, those who went to the harbor at the set time did not find very much.

Those who went earlier had the advantage of a very good tide held back by the offshore wind. We made for the mud flat straight out from the Royal Yacht Squadron. Here we found numerous living scallops—*Equichlamys bifrons*, and the razor shell—*Pinna dolabrata*. In colonies we found a few

dozen of the rarer Pinna—*P. virgata.* This is distinguished by the radial scaly ribs. The bubble-shell, *Bullaria tenuissima,* was very common, along with their eggs. These are long vermicilli-like threads wound up into bundles about the size of a hen's egg. A related species with an internal shell and large white slug-like body *(Philine angasi)* was also common. Among the weeds we found living *Fasciolaria coronata. Colus australis* (the spindle shell), and the little keyhole limpet *(Amblychilepas omicron).*

Two octopuses were found, one of them inside a dead Pinna shell with several hundred eggs. These were about the size of a bean, each anchored by a thin thread-like process.

The most interesting species found were two specimens of *Aglaja troubridgensis.* As far as we know, living specimens of this have not previously been recorded. The animal is a dark chocolate-black slug about 3 inches long. The surface is sparsely decorated with irregular white circular patterns. The shell is internal. In the stomach of one were shells of *Philine angasi* and juvenile *Bullaria tenuissima.* This indicates that the creature is carnivorous and in this case almost cannibalistic, as these particular shells are close relatives.

W.G.B.

OCT. 10, 1949.—HINDMARSH TIERS.

(Leader: Miss O. D. Waite.)

Turning from the main Hindmarsh Valley Road, the half-mile strip which leads to the Camping Ground, with its belt of scrub on either side, looks very inviting at any season of the year. In the autumn the melaleucas waved brightly and now, in the springtime, other flowers add to its attractiveness. The green sward of the Camping Ground is bordered by trees. At one side the river flows by under drooping willows, with an apple tree in full bloom adding color to the scene. Along a bush track about a quarter of a mile distant, a good view is obtained of the Hindmarsh Valley Falls. There the river widens and falls in numerous cascades. The water flowers along a ledge of rock, at one side, to spill over a height of about 20 feet. Near the Falls, ferns cover the ground, maiden hair *(Adiantum aethiopicum), Cheilanthes tenuifolia,* with a few plants of *Blechnum capense.*

The pretty little *Lindsaya linearis* decorates the nooks and crannies of the rocks in the vicinity. *Correa calycina* was there, but was not in flower. Out in the scrub *Correa aemula* was noted in flower. On the sloping banks near the Falls were some fine bushes of *Leucopogon australis.* Many other plants were noted in the locality, the most interesting being *Scutellaria humilis* and *Phyllo-glossum drummondii.*

Orchids noted were *Pterostylis nutans, Caladenia dilatata, C. leptochila,* and *C. carnea, Glossodia major* and the scent bottle orchid, *Thelymitra antenniera.*

Returning home along the Pambula Road, a stop was made to view Granite Island through a gap in the Tiers, and another at an interesting patch of scrub, where some fine specimens of white *Tetratheca pilosa* were seen also *Poranthera ericoides.* On the roadside near Mt. Compass, a lovely bush of *Conospermum patens,* our smoke bush, was in full bloom.

O.D.W.

THE ACACIAS OF THE ADELAIDE HILLS

By N. LEWIS

SO far as Australia is concerned, Acacia means wattle, and vice versa. According to A. J. Ewart, the name "wattle" is derived from an old Saxon word, "watel," meaning hurdle. In Europe the small stems of the willow were used for brush hurdles. The use in Australia by early colonists of the stems of Acacias for the same purpose led to the establishment of the vernacular name. Outside of Australia, however, the term does not necessarily, or even usually, refer to a plant of the genus Acacia.

The Acacias are readily separable into two great groups, which we may call—

(1) Feather-leafs,
and (2) Phyllode types.

Feather-leafs comprise those wattles whose bipinnate leaves are most easily, if unscientifically, described that way.

Phyllode types are therefore those whose leaves are not feather-like. They may be thick and nerved, or reduced to spines. In one South Australian species occurring in the area under consideration, they are completely absent.

Most of this group produce feather-like

juvenile leaves. Later these fall off, and the petiole (leaf stalk) flattens and broadens into a phyllode which looks like, and acts just the same as, a true leaf. The intermediate stage, a phyllode half-grown, with a spray of bipinnate leaves at its outer end, is often seen on the Blackwood.

All the phyllodinous Acacias are indigenous (occur only in) to Australia.

According to Black there are in all some 500 species of Acacia, of which about 300 are indigenous to Australia. According to Ewart, the genus numbers 780, of which 410 are native to Australia, the rest being distributed among Africa (130), Arabia, South America, and one or two other countries.

Black lists 80 Acacias for South Australia, of which number the Adelaide Hills area has 17.

The Adelaide Hills area, for the purposes of this discussion, and the included key, means the Mount Lofty Range, from Gawler and Truro in the north to Cape Jervis and Victor Harbour in the south, and from the Adelaide foot-hills to the eastern edge of the range as marked by, say, Strathalbyn, Mt. Barker trig, Palmer and Keyneton. Such a definition is, of course, extremely arbitrary, but may serve in some measure to indicate that the HILLS in contrast to the adjacent PLAINS, constitute the area under consideration.

The key given below is basically that used in Black's Flora of South Australia. An

attempt has been made to modify it for field use in the Adelaide Hills area. In using such a key, involving only macroscopical features, it should be borne in mind that occasional plants, by reason of individual variation with site, etc., will not work in with it. On the grounds that these are few in number, and, from the point of view of the casual naturalist, unimportant, such varietal forms have —with one exception—been ignored. Only *Acacia Victoriae* appears in more than one part of the key. Other variable species, principally *Acacia longifolia*, *A. continua*, and *A. ligulata*, are adequately covered in all their varietal forms, by Black's key. As usual, the common names given may be applied to different species in other States, or even in different parts of this State.

FEATHER-LEAF WATTLES
(*Bipinnatae*)

No species belonging to this group occur naturally in the Adelaide Hills.

PHYLLODINOUS WATTLES
(*Phyllodineae*)

The phyllodinous Acacias, for our purposes, can be split up into two major groups and several distinct sub-groups.

The two major groups are—

(1) Those with their flowers in spikes, and (2) Those with their flowers in globular heads.

A wattle flower, as commonly meant, is really a collection of flowers, each of which is a distinct unit, complete with sepals, petals, stamens and pistil. In most of our Acacias the individual flowers of this collection, or HEAD, are grouped so closely as to appear, in aggregate, the familiar fluffy ball. When the flowers are so grouped, they are said to be GLOBULAR (i.e., globe-shaped) HEADS.

Some, however, bear their flowers at intervals along a common stalk, to which the individual flowers are directly attached without individual stalks. When arranged in this way, the flowers are said to be in SPIKES. These are not to be confused with the racemes borne by some wattles, in which the globular heads (not the individual flowers) are borne on a common stalk.

There are only two Adelaide Hills Acacias which bear their flowers in spikes. These are the "Prickly Moses" (*Acacia verticillata*) and the "Sallow Wattle" or "Sallow Acacia" (*Acacia longifolia*). These are readily distinguished. The leaves of the "Prickly Moses" are fine and awl-shaped, and are set in whorls or rings at intervals around the stem, whereas those of the "Sallow Acacia" are thick and leathery, are prominently nerved, and are alternate on the stem.

There are fifteen Acacias which bear their flowers in globular heads in the Adelaide Hills area. These can be divided up into

(1) Plants with no phyllodes, or with phyllodes reduced to spines.

(2) Plants with phyllodes having three or more longitudinal nerves.

(3) Plants with phyllodes having two longitudinal nerves.

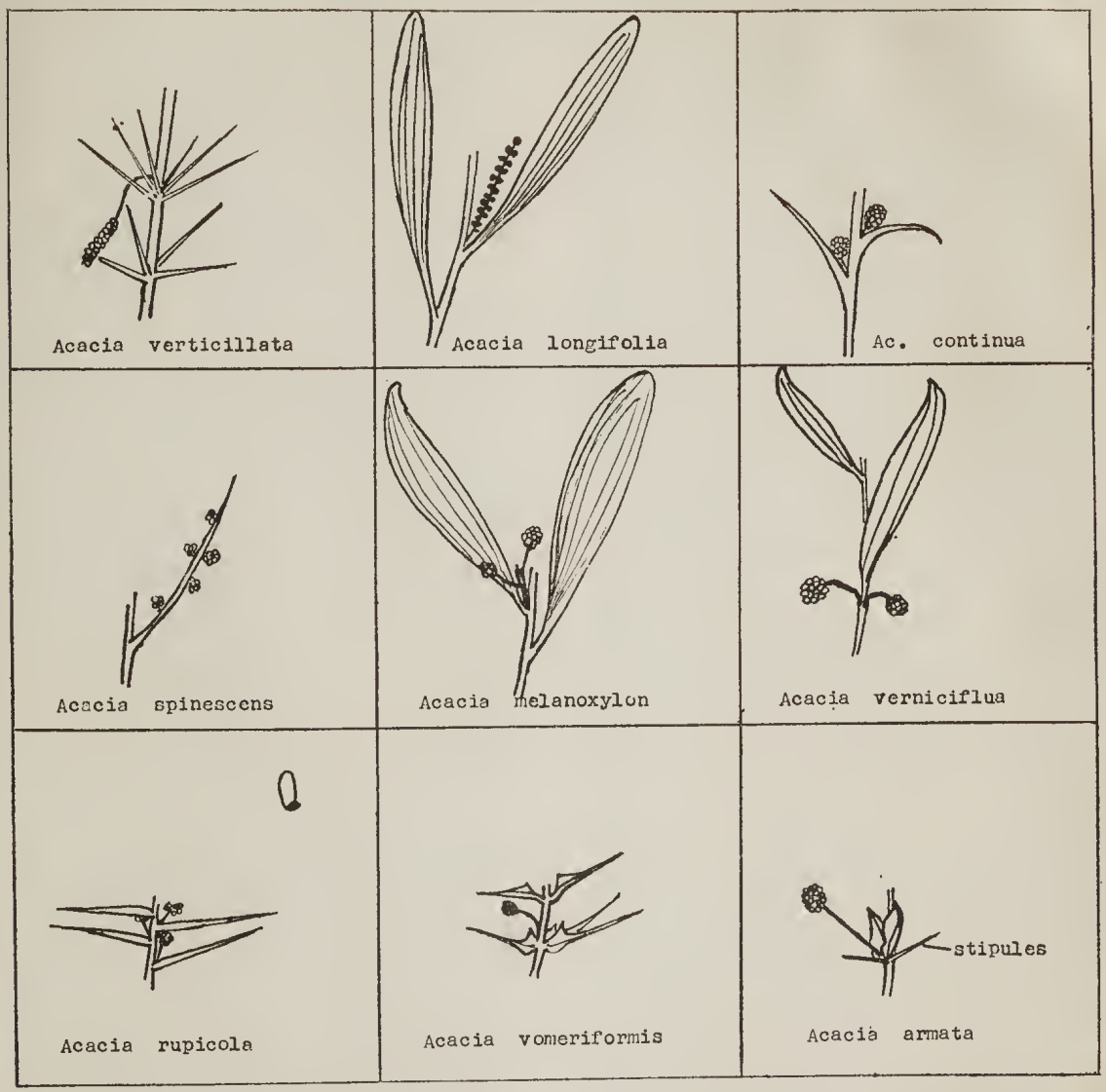
(4) Plants with phyllodes having only one longitudinal nerve.

The Adelaide Hills area has two wattles whose phyllodes are reduced to spines, viz. *Acacia continua* and *Acacia spinescens*. Actually only the spines of *Acacia continua* are reduced phyllodes, those of *Acacia spinescens* being strictly reduced branchlets, phyllodes being entirely absent.

These two species are distinguished by the manner in which the spines are attached to the stem, and by the mode of bearing flowers. In *Acacia continua*, as is suggested by the name, the bases of the spines run into the general stem tissue, i.e. are continuous with it. The spines of *Acacia spinescens*, however, are articulate, i.e. they appear to have been jointed on to the stem. This species sometimes bears pinnate leaves and/or phyllodes on the spines. The other difference is that the flower heads of *Acacia continua*, are borne in the axils between spines and stem, while those of *Acacia spinescens* are borne along the spines themselves.

Of the group PLURINERVES, with three or more nerves to each phyllode, the Adelaide Hills have only one species—the Blackwood (*Acacia melanoxylon*). It has very pale flowers and a thick, furrowed, much cracked bark. The Blackwood seldom exceeds 25 feet in the Adelaide Hills, but is an important timber tree in the eastern States and Tasmania.

Black places the sole South Australian wattle with 2-nerved phyllodes (*Acacia verniciflua*) in the single-nerved group. It sometimes does have single-nerved phyllodes, but I have not yet seen a specimen in the Ade-



laide Hills area which did not have most—if not all—of its phyllodes two-nerved.

Acacia verniciflua is also called Varnish Acacia, because of the glossy, or viscid surface of its phyllodes and young stems.

The UNINERVES, with one-nerved phyllodes, contain most of the Adelaide Hills wattles, and they are best discussed as they occur in the key given below.

Acacia rupicola and *Acacia vomeriformis* form a sub-group by reason of their having rigid and pungent-pointed phyllodes.

Acacia rupicola is a small shrubby wattle which I have seen only in Morialta Gorge. Its phyllodes are linear (i.e. narrow-lance-shaped), and if the pods are ripe you will note that the seeds have a broad aril, i.e. the short stalk (funicle) attaching the seed to the pod has become swollen and flattened.

Acacia vomeriformis is a very low shrub, with a scrambly, almost procumbent, habit. Its phyllodes are more approaching triangular than lance-shaped, and its seeds have no aril.

The remainder of our wattles all have thick, pliable phyllodes, which are neither stiff nor pungent-pointed. They are subdivided according to the manner in which the flowers are borne. In the first group, with four species, each globular head has a stalk of its own, that is, it is pedunculate. Groups of heads, or two (twin) heads, may grow from the axil of the same phyllode, or there may be only one head to each axil. But each

head still has its own stalk or peduncle.

In the second group, with five species, the flower heads are borne in axillary racemes. In this case the flower heads have a common stalk. This grows from the axil of a phyllode, one to each axil, and on it at intervals the flower heads are carried.

The species of the first group—with pedunculate flower heads—include one very variable species which complicates any form of key. The first things to look for here are the stipules, i.e., the two small outgrowths found where the leaf stalk joins the stem. If these are spiny the species may be either *Acacia armata* (Kangaroo Thorn, or Prickly Acacia), or one of the forms of *Acacia Victoriae*. The distinction between these two is not altogether easy unless the pods are present. The seeds of *Acacia armata* are longitudinal, that is, they lie with their greatest length parallel to the length of the pod. Those of *Acacia Victoriae* are transverse, that is, they lie across the pod, perpendicular to its length.

In the absence of the pods the Kangaroo Thorn may be distinguished by its smaller phyllodes, which are never more than about one centimetre long, while those of *Acacia Victoriae* are not less than two cms. in length.

In practice, however, it is a general rule that *Acacia armata* occurs in the ranges, and about and to the south of Adelaide, while *Acacia Victoriae* prefers hilly coastal country and occurs mostly north of Adelaide. *Acacia Victoriae* is also called Prickly Acacia.

If the stipules are not spiny, *Acacia armata* is ruled out. If in addition the phyllodes are round, rather like distorted circles, with a definite pointy tip, and are divided into two obviously uneven parts by the vein, the species is *Acacia obliqua*. *Acacia obliquc* is a small shrub, seldom more than two to three feet high, but it is very striking when in flower.

If, however, in addition to non-spiny stipules, the phyllodes are long and more or less lance-shaped, the species may be *Acacia dodonaeifolia* or another of the forms of *Acacia Victoriae*. The former is readily distinguished by its viscid (sticky) phyllodes.

The second group—with flower heads in racemes—also present some classification difficulty, which is based, a little precariously, on the form of the phyllodes.

Acacia myrtifolia (Bitter Leaf) is readily confused with *Acacia ligulata*, the only other bushy member of this group.

Of the remaining four species, two have narrow phyllodes (narrow-linear) and two have thick, relatively broad, phyllodes.

Those with narrow phyllodes, *Acacia* distinguishable from the others of the group by its obovate phyllodes, and red stems. It is a bushy wattle, and is not likely to be *rhetinodes* (Swamp Wattle or Wirilda) and *Acacia ligulata* (Umbrella Bush) are best distinguished by colour of flowers and length of phyllodes if pods are not present. The Swamp Wattle has rather pale yellow flowers, and long, often pendulous, phyllodes. The Umbrella Bush has bright yellow flowers, and rather shorter, more erect, phyllodes (see key). When podes are available the two are readily distinguishable, firstly because the pod of Umbrella Bush is moniliform, i.e. constricted between the seeds with a consequent wavy edge, while that of Swamp Wattle is straight-edged; and secondly because the seed stalk of Swamp Wattle is folded twice AROUND the seed, while that of Umbrella Bush is folded UNDER, but not around, the seed. Lastly, the Swamp Wattle occurs in the wetter areas of the hills, particularly in swampy places and along creeks and shady valleys, while Umbrella Bush is a denizen of the drier and less fertile parts. The latter is very variable in both form and phyllode.

The two species with large, thick, and relatively wide phyllodes are *Acacia notabilis* and *Acacia pycnantha* (Golden Wattle). I have not seen the former in the Adelaide Hills area, and it is apparently uncommon so far south. It occurs more plentifully in the Flinders Ranges, from Wirrabara northward to at least as far as the Angorichina area. In the Wirrabara area it is very glaucous on both stem and branches.

The Golden Wattle is widespread and well known. As a young tree its enormous phyllodes attract immediate attention, especially after bush fires, when the seedlings spring up very thickly. The mature phyllodes are not so large, less broad, and mostly sickle-shaped. They have a marginal vein, generally in a little from the leaf margin, but it may be along the edge.

The mature phyllodes of *Acacia notabilis*, however, are but little curved, and the mar-

ginal vein almost invariably coincides with the margin, giving it a thick, rolled appearance.

Both species bear very large, bright golden flower heads.

They may be definitely distinguished if pods are available, since the seeds of *Acacia notabilis* are transverse, while those of *Acacia pycnantha* are longitudinal.

In conclusion, a little may be said of the principal Acacias used in our hills and suburban gardens. Of those commonly used, only one is a phyllodinous type. This is *Acacia podalyriaefolia*, Queensland or Mount Morgan Wattle, which has short, obovate phyllodes, and the whole tree is so glaucous as to appear silvery-grey. It bears flowers prolifically in axillary racemes in August and early September.

The remaining cultivated Acacias of importance are all feather leafs, and fall naturally into two groups:

(1) Foliage silvery grey, or greyish:
Cootamundra Wattle *(Acacia Baileyana)*
Silver Wattle *(Acacia dealbata)*

and

(2) Foliage green:
Black Wattle *(Acacia mollissima)*
Green Wattle *(Acacia decurrens)*.

The "leaves" of all these species are really pinnules. These are grouped in pairs along a common stalk, together with which they form pinnae. These in turn are grouped in pairs along a larger common stalk, and the whole thing forms the leaf proper.

In distinguishing between the Cootamundra and Silver Wattles, the length of the pinnules is important. The pinnules at the outer ends of the pinnae of the Cootamundra are shorter than those further down the "stalk," which become progressively longer for about two-thirds of the length of the pinna, and then begin to shorten again, thus giving the pinna —in OUTLINE—a rather oval shape. The outline of a Silver Wattle pinna is oblong, the pinnules all being of practically the same length. Also the pinnules of the Silver Wattle are finer than those of the Cootamundra. The Cootamundra is by far the most widely planted, and is often, though wrongly, called Silver Wattle.

The distinction between the Black and Green Wattles is difficult. Some botanists regard them as varieties of the same species. Generally, however, the number of pairs of pinnae per leaf is greater (10 to 18) in the Black Wattle than in the Green (less than 10). In Victoria and the south-east of South Australia, where it occurs naturally, the Green Wattle flowers from mid winter to mid spring, while the Black Wattle blooms in the summer time, from September to March, and it is possible that the same distinction could be used in the wetter parts of this State, including the Adelaide Hills and Plains.

KEY TO THE ACACIAS (WATTLES) OF THE ADELAIDE HILLS.

A. PHYLLODINOUS WATTLES (Phyllodineae)
- B. Flowers in spikes
  - C. Phyllodia whorled, subulate (awl-shaped) — *Acacia verticillata.*
  - C. Phyllodia thick, with 2-5 prominent nerves. — *Acacia longifolia.*
- B. Flowers in globular heads
  - C. Plants with no phyllodes, or with phyllodes reduced to spines (Aphyllae)
    - D. Spines articulate on the stem, flower heads borne on the spines — *Acacia spinescens.*
    - D. Spines continuous, flower heads borne in the axils between phyllodes and stem. — *Acacia continua.*
  - C. Plants with phyllodes with three or more longitudinal nerves, flowers very pale. — *Acacia melanoxylon.*
  - C. Plants with phyllodes with two nerves. — *Acacia verniciflua.*
  - C. Plants with phyllodes with one nerve.
    - D. Phyllodes rigid and pungent-pointed.
      - E. Phyllodes linear-lanceolate, seeds with a broad aril. — *Acacia rupicola.*

E. Phyllodes triangular, or tending so, seeds without aril, branches downy.
Acacia vomeriformis.

D. Phyllodes pliable, not rigid.

E. Flower heads pedunculate, solitary, twin, or clustered.

F. Stipules spiny.

G. Phyllodes not greater than 1 cm. long, seeds longitudinal.
Acacia armata.

* G. Phyllodes 2 - 5 cms. long, seeds transverse.
Acacia Victoriae.

F. Stipules not spiny

G. Phyllodes definitely lanceolate, 4 - 10 cms. long, viscid.
Acacia dodonaeifolia.

G. Phyllodes broad linear, 2 - 5 cms. long, not viscid.
Acacia Victoriae.

G. Phyllodes orbicular, oblique (not symmetrical about the vein), with short point at tip, less than 1½ cms. long.
Acacia obliqua.

E. Flower heads in axillary racemes.

F. Phyllodes obovate, short and broad, stems red.
Acacia myrtifolia.

F. Phyllodes narrow-linear.

G. Phyllodes long, 8 - 16 cms., often drooping, pod straight-edged, not constricted between the seeds, seed-stalk encircling seed in a double fold, flowers rather pale yellow.
Acacia rhetinodes.

G. Phyllodes short, 4 - 10 cms. long, erect or spreading, edge of pod wavy, constricted between the seeds, seed stalk folded under, but not around the seed, flowers bright yellow.
Acacia ligulata.

F. Phyllodes lanceolate, large, thick, more or less curved.

G. Phyllodes rather oblong, only slightly, or not, curved, very thick. Margin very thick with a rolled, vein-like appearance. Seeds transverse. Not common.
Acacia notabilis.

G. Phyllodes narrower (1 cm. or so), sickle-shaped when mature. Margin not thick or rolled, but may have vein-like appearance. Vein generally in from edge. Seeds longitudinal. Very common.
Acacia pycnantha.

(The younger phyllodes of this species are usually very large and thick.)

* The head of *A. Victoriae* are often borne in racemes, through the abortion of the subtending phyllodes. Such racemes are distinguishable from those of the next group in the Key in that the heads are usually on twin peduncles, especially the lower ones.

THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF S.A. INC. STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDED JULY 31, 1948

RECEIPTS

		£	s.	d.
Bank Balance, 31/7/1947	£47 10 0			
Cash in Hand, 31/7/1947	0 0 3			
		47	10	3
Subscriptions, Ordinary Members		128	13	9
Donations		0	6	0
Rent from Clubs		5	11	0
Wild Flower Show		57	7	5
Excursions		59	13	9
Sales—				
S.A. Naturalist	£8 17 2			
Programmes	0 9 9			
Park Book	0 18 0			
		10	4	11
Sale Toolach Film		4	0	0
Sale Badges		4	18	0
Refund from Junior Club		1	0	0
Bank Interest		1	13	1
		£320	18	2

EXPENDITURE

	£	s.	d.
Printing S.A. Naturalist	66	6	8
Stationery	26	3	0
Rent Royal Society's Rooms	12	2	0
Advertising Monthly Notices	17	4	9
Postages	9	6	8
Wild Flower Show	28	2	6
Excursions	47	1	0
Badges	15	16	3
Post Office Box	1	0	0
Subscription—Wild Life	0	12	0
Subscription—Walkabout	0	18	0
Donation Park Preservation	0	10	6
Flower Day Expenses	0	10	0
Canvas Shelter	2	6	2
Balance at Bank, 31/7/1948	92	18	8
	£320	18	2

We have examined the books and vouchers setting forth the transactions of the Field Naturalists' Section of the Royal Society of S.A. Inc. for the year ending July 31, 1948, and eertify that the above account of Receipts and Expenditure is correct.

(Sgd.) FRANK GRAY, A.I.C.A.

(Sgd.) C. G. SHUTTLEWORTH.

Honorary Auditors.

THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF S.A., INC. STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDED JULY 31, 1949.

RECEIPTS

	£	s.	d.
Bank Balance, 31/7/48	92	18	8
Subscriptions Ordinary Members	105	7	6
Rent from Clubs	2	6	6
Wild Flower Show	75	6	9
Excursions	51	6	9
Sales—			
Naturalist	35	9	4
Wild Life (Old Copies)	0	5	0
Badges	4	14	6
Bank Interest	3	6	0
	£371	1	0

EXPENDITURE

		£	s.	d.
S.A. Naturalist		28	16	0
Stationery		20	8	9
Rent of Room from Royal Society		9	5	0
Wild Flower Show		31	8	5
Excursions		49	9	10
Monthly Notice, "Advertiser"		17	17	6
Postages		13	10	0
G.P.O. Letter Box		1	0	0
Subscription, Wild Life		0	12	0
Subscription, Walkabout		0	18	0
Subscription, Tree Planters' Assn.		1	1	0
Use of Epidiascope		1	1	0
Deposit on Holiday House		1	1	0
Victorian "Naturalists"		0	6	0
Expenses re Incorporation		6	1	1
Balance in Bank, 31/7/49	£188 11 5			
Less Cheque Outstanding	0 6 0			
		188	5	5
		£371	1	0

We have examined the books and vouchers setting forth the transactions of the Field Naturalists' Section of the Royal Society of S.A. Inc. for the year ending July 31, 1949, and certify that the above account of Receipts and Expenditure is correct.

(Sgd.) FRANK GRAY, A.I.C.A.

C. G. SHUTTLEWORTH.

Honorary Auditors.

FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF S.A.

REPORT OF THE CHAIRMAN FOR THE YEAR 1947-48 (ABRIDGED)

It gives pleasure to record that during the past year the number of financial members of the Section has increased to a total of 286, which, as far as can be ascertained from the records, is greater than during any past period of our history.

We have lost through death several esteemed members, including Miss Harwood, Mr. A. J. Morison, Sir Herbert Hudd, and Mr. E. T. Wheare, and two former members, Mr. L. Ralph and Mr. F. Arndt.

Definite steps have been taken to implement the first object of the section, "The Preservation of the Native Flora and Fauna of South Australia." The second object, "Opportunity for Observation and Study," has been fulfilled by the holding of excursions, club meetings, lectures and discussions.

Many new members who joined this year did so in response to a pamphlet distributed at our Wild Flower and Nature Show held last October; this pamphlet emphasised the need of conservation.

I am pleased to report that the retiring Committee has given serious consideration to ideas for practical conservation work.

Our aim must be to secure a properly balanced and scientific conservation plan that will secure preservation of animals and plants with their natural ecological associations, and in addition we must realise that conservation needs to be considered in conjunction with utilisation.

Many and varied problems have to be studied; a great deal of work is entailed, but it is our duty to the naturalists and to the people of Australia generally, and to the naturalists in other parts of the world, to do everything in our power to prevent our native flora and fauna from being further overwhelmed and displaced by importations from other lands.

I ask the Section, and in particular the members of the incoming Committee, to treat conservation as an urgent matter, not to be relegated to a minor place in our activities.

During the year a "Parklands Preservation League" was formed by Adelaide citizens, and I have represented this Section on the Committee of this League. A watch is being kept on parklands throughout the State.

The "Tree Planting League" has been revived by the Lord Mayor of Adelaide and others, and I have represented the Section on the Committee of this League also.

In these Committees, and in other places, I am urging, on your behalf, that in all plantings preference be given to Australian native flora, and I make a special request to all members as follows:—In all your public and private conversations, please do all you can to secure a greater appreciation of Australian native flora, the natural home of our fauna. We have in this land many forms of life that are unique. Let us then preserve these forms for the benefit and enjoyment of ourselves and others who may follow us in this domain.

The Clubs of this Section—the Botany, Conchology, Geology and Zoology Clubs—have carried on, providing facilities for study to those who wish to increase their knowledge of natural science, and it is pleasing to note that we have among us many earnest students representing various age groups.

Our Treasurer, Mr. J. J. Turnbull, who took office last August, has successfully accomplished the two rather difficult tasks of bringing our membership roll up to date and of placing our finances and financial statements in good order.

I wish to express my thanks to all officers and all members of the Committee, all leaders of excursions and lectures, who have cheerfully done their best to further the interests of the Field Naturalists' Section.

F. J. W. SWANN, Chairman.

SECRETARY'S ANNUAL REPORT
For Year Ending August 17, 1948

We have had forty excursions, some of them to the beaches and others to different localities in the hills. We attended the Museum on three occasions, also the Zoo and the Botanical Gardens, and a trip on the Torrens Lake for the study of Waterweeds. Our bus trips were to Myponga, Maslin's Beach, Moana and St. Kilda.

We held our Wildflower and Nature Show in the Liberal Club Hall, North Terrace, on October 17 and 18, 1947, and it proved a great success. Our thanks are due to all

those who so willingly gave us their help and support on that occasion.

The Easter Camp was held at Kapunda in good weather. Most of our time was spent on bus trips, and we made a good inspection of the country for miles around. The Camp proved both educational and entertaining.

We had ten well-attended monthly meetings, when lectures were given on various subjects.

A trip to the Barrier Reef was arranged through Thomas Cook & Sons.

An Arbor Day was held and a tree planted in memory of Mr. Wiley.

We had two issues of our paper, "The S.A. Naturalist," edited by Mr. B. C. Cotton.

Eleven well-attended Committee meetings were held, which attended to the business side of our Society, and I wish to thank those men and women for the time given and for the interest shown in the welfare of this Society. The number of financial members on our books now stands at 286.

In conclusion, I want to pay a tribute for the great work done and interest shown in our Society by our able Chairman, Mr. Swann.

F. J. HAVARD, Honorary Secretary.

ANNUAL REPORT OF THE CONCHOLOGY CLUB OF SOUTH AUSTRALIA (abridged) for Year Ending July 31, 1948.

In the twelve months ending July 31, 1948, eighteen evening meetings of the Club were held. Seven of these were lectures on different families of Gastropoda, given by Mr. Cotton, the Patron of the Club, and South Australian Museum Conchologist. Three evening meetings were held at the private residences of members, i.e., Mr. and Mrs. Elliott, Mr. and Mrs. Pattison, and Mr. Saunders. Their Conchological collections were exhibited and explained. Eight meetings were taken by members, who lectured on species of Molluscs, and exhibited specimens to illustrate the lectures.

Twelve Saturday excursions of the Field Naturalists were led by members of the Club to study Conchology.

A display of Molluscs and Marine Life was staged at the annual Wildflower and Nature Show.

During the year the Club financed the printing of 200 copies of Publication No. 5, "Australian Cone Shells," by B. C. Cotton. Also fifty reprints of "Adelaidean Fossil Molluscs," by B. C. Cotton, were purchased, taken from "Records of the South Australian Museum." Permission was kindly given by Mr. Hale, Director of the Museum, for the use of the "Cone Shell Plates" and for Reprints.

Owing to names and addresses of members being published in a United States of America "Conchology Directory," there has ensued a lot of correspondence, and exchanging of Mollusca specimens with conchologists in many countries overseas.

It is an honor and pleasure to present this report of prosperity, and to record the good fellowship amongst all members.

GEO. PATTISON, Hon. Secretary.

ANNUAL REPORT OF THE LIBRARIAN for the Year Ending July 31, 1948.

The number of books loaned to members during the last year was 42, the same as during the previous year.

Fewer magazines were borrowed, 202 in all, and this is a decrease of 148 over last year. The magazines "Wild Life" and "Walkabout" have been purchased as usual, and proved popular.

Seventeen periodicals and science reports have been received from this State, overseas and interstate. Two handbooks, dealing with fauna and flora, have been donated by Mr. B. C. Cotton to the Library. No books have been purchased for the Library. Two volumes of "The South Australian Naturalist," Volumes 19-24, have been bound, each book comprises 24 issues. One copy is to be placed in the Library for the use of members, and the other one is to be kept as a record of the Section.

DOROTHY M. PATTISON, Hon. Librarian.

ANNUAL REPORT OF THE GEOLOGY CLUB for the Year Ending July 31, 1948.

In presenting the annual report of the Geology Club, we are able to record another successful year, under the guidance of our Chairman, Mr. F. J. Havard; the interest of members has been maintained at the

monthly meetings with an average attendance of fifteen.

Six new members were elected during the twelve months, the year closing with twenty-four financial members.

The Club has now completed four and a half years of its existence.

The October, 1947, and the June, 1948, ings were cancelled on account of falling on holiday nights.

A programme of lectures and study circles was arranged, and we are grateful to those who have rendered us assistance in carrying it out. Our best thanks are due to the undermentioned, who have lectured on our behalf:

Dr. R. S. Burdon, on "Gravitation and Specific Gravity."

Mr. K. Metcalfe, "Industrial Radiography."

Mr. Irvine, "Water as a Solvent."

Mr. A. G. Edquist, "Limestone and Marbles" and "Gem Stones."

Two Study Circles were conducted under the leadership of our members, the University Geology Notes being used as a textbook.

The first lecture was given by Mr. W. F. Standen: this was of an introductory nature, giving useful suggestions to members in the study of Geology. The second was given on "The Atom," by Mr. F. J. W. Swann, who went fully into the subject in a most instructive way.

All the above lectures proved of great interest to our members who had the opportunity of hearing them.

Several excursions of a geological nature were held, and led by members, and a geological exhibit was staged at the Wildflower and Nature Show.

In conclusion, we look forward to making further progress during the coming year.

H. WOODLANDS, Honorary Secretary.

ANNUAL REPORT OF THE ZOOLOGY CLUB for the Year Ending July 31, 1948.

In submitting the annual report of the Zoology Club, it is encouraging to us that the interest of members has been maintained at monthly meetings throughout the year.

The average attendance at monthly meetings was fourteen. Seven new members were elected, the year closing with twenty financial members, which is an improvement on the previous year.

We were privileged in having an interesting series of lectures during the year, and we are much indebted to those who assisted us in this direction.

Our best thanks are due to Mr. J. Mitchell, of the Museum, who spoke on "Snakes"; Major T. C. McKenna, "The Horse"; Mr. A. G. Edquist, "Our Fishes" and "The Frog"; Mr. V. D. Haggard, Director of the Zoological Gardens, "Our Parrots"; and Mr. H. M. Hale, the Director of the Museum, "Shore Life."

In addition, a series of Club Studies was continued under the leadership of Mr. A. G. Edquist.

The Club had an exhibit at the Wildflower and Nature Show, and also took part in the excursions arranged by the Committee of the Field Naturalists' Section.

We trust that in the coming year greater interest may be shown in our branch of natural history—the study of Zoology, and that our Club may make further progress.

H. WOODLANDS, Honorary Secretary.

THE SEVENTH ANNUAL REPORT OF THE BOTANY CLUB—July 31, 1948.

As Secretary I am pleased to present the seventh annual report of the Botany Club.

Our numbers have been enlarged by four members, and the attendance has averaged fifteen.

For the success of the Study Circle, the Club is indebted to Mr. E. W. Pritchard for his instruction on the important botanical families, as set out in Black's Flora. As an aid to this, he has dealt with some cultivated flowers having similar floristic characteristics.

The monthly meetings held in the Museum Herbarium on Saturday afternoons during the winter, have been particularly interesting, a successful innovation being short lectures given by the members themselves on specimens of flora then in bloom. By this means, greater knowledge has been gained of our more familiar wildflowers. The Tepper collection was then used as an aid to recognising a larger number of genera and species.

An afternoon's programme greatly appre-

ciated by members was a lecture by Mr. Gunter, who addressed us on "Broken Hill Flora," when many colorful pressed specimens of the flora of that arid area were exhibited.

At all meetings enthusiastic members have tabled freshly-gathered specimens of flora, which have unfailingly aroused keen interest.

In spring, contacts were made with the W.A. Wildflower Show Society and the Broken Hill Field Naturalists' Society, when as a result of our sending specimens of South Australian native flora, we were rewarded with fine supplies of wildflowers from these societies for our own Wildflower Show. In this way, too, our corresponding member from Meningie, Mr. Williams, added greatly to the orchid display at the Wildflower Show.

The Botany Club appreciates the work being done by our member, Mr. Swann (also Chairman of the Society), in promoting interest in the matter of national reserves and sanctuaries, ultimately creating greater protection of our native flora.

The Botany Club wishes him further success in this project, as the conservation of this State's native flora, apart from the study of it, is the chief aim of the Botany Club.

J. FERRIES, Chairman.

H. M. STOCKHAM, Hon. Secretary.

MEMBERS' PAGE

APHRODITE AUSTRALE

During the Field Naturalists' excursion to the Semaphore beach on May 15, 1948, a member picked up, at high water mark, a marine animal. It was about six inches long, with a cylindrical body seven inches in circumference, and tapering to each end. It is commonly known as a "Sea Mouse," but the scientific name is *Aphrodite australe*. *Aphrodite* was the Goddess of Love and Beauty who sprang from Sea Foam; *australe* means southern. It belongs to the Phylum—Annulata; Family—Aphroditidae, and is a segmented sea worm. It lives on sandy bottoms, preferring a dirty or muddy sand, so the animal is generally coated with dirt. The bristles show a beautiful iridescence when protruding. They can be withdrawn into a sheath. After removing dirt by washing, the animal can be preserved in methylated spirits or formalin. If a dry specimen is wanted, soak the animal in methylated spirits containing about three grains of corrosive sublimate, for four days. (Place the solution in a glass jar, as the corrosive sublimate will destroy metal, and also, remember it is poisonous.) Take out the animal, and put it under pressure to expel fluid and soft parts. It will then be a flat skin. Put a glass tube into its mouth and blow out the skin to its normal shape, helping with your fingers to form it. When shaped it will dry quickly. The corrosive will protect the animal from weevils and insects. The specimen is best kept in a glass case or under cover.

GEO. PATTISON.

THE COURTSHIP OF A MAGPIE

It was about four years ago that it began in the big gum tree at the side of the house. A magpie, probably of the previous year's brood, began some time in June to fly to the top of the tree about an hour before sunrise and pour out his song, without a break, until the first streak of dawn. Then he would fly away and go about his business among the spiders and the grubs. This concert was repeated every morning well on into the spring; but without any result.

Again the next year back he came, and repeated the same persevering routine, but still with no result. But in the third year, when one would expect him to be discouraged, there appeared towards the end of his serenade the mate whom he had been so persistently calling. They promptly made a match, built a nest and reared a brood of young birds in the topmost branches of that very tree. This new routine was gone through in the following year, and now with the two old nests still remaining, they are building a third for still another brood.

But the father bird has taken nothing for granted, for all this springtime he has faithfully carried out his morning carol just as vigorously as when he began in his enthusiastic youth.

Notes—For a general treatment of this fascinating subject of "Bird Territory," see "Essays in Popular Science," by Julian Huxley in the Pelican Books. These observations were made near Tranmere, approximately three miles east of Adelaide.

EDGAR W. PRITCHARD.

At Easter, *Loranthus miraculosus*, var. Boormanii, was found flowering at Cowirra, near Mannum. Its host was *Myoporum platycarpum*. The "Flora of South Australia" gives this plant as occurring in "northern part of Flinders Range and westward to Ooldea; north of Renmark to Cockburn."

Those who know Chaunce's Line may be interested to hear that on August 15 *Pterostylis mutica*, *Pterostylis cycnocephala* and *Caladenia filamentosa*, var. tentaculata, were in bloom there, while on September 4 *Caladenia cardiochila* was in flower.

On September 11, *Acacia Bynoeana*, var. latifolia, given in the "Flora of South Australia" for "Karoonda, Loxton (Murray Lands)," was seen in bloom a few miles from Mannum.

Two of our rarer plants, *Dodonea humilis* and *Microcybe pauciflora*, noted on last year's excursion to Chaunce's Line, were again noticed in September of this year (1949) in flower. It was observed that they were growing in juxtaposition to *Boronia inornata*.

In December of last year three plants of *Billardiera scandens* were noticed at Bridgewater. The "Flora of South Australia" gave the range of this species as "Kangaroo Island"; near Port Lincoln: recorded by Mueller from Mt. Gambier." In the disastrous bushfire that occurred at Bridgewater early this year all three plants were apparently destroyed, but in September one was seen to be growing vigorously again, so there are still hopes that this beautiful *Billardiera* may survive in this locality.

S. E. ROWE.

At Mannum on September 11, the Yellow-billed Spoonbill *(Platalea flavipes)* was noticed wading in the shallows in search of food. Early in the morning of the same day a Brown Bittern *(Botaurus poiciloptilus)* was seen in the swamp.

At Chaunce's Line on August 14, I had the privilege of observing a pair of Shy Ground-Wrens *(Hylacola cauta)* at close quarters. Amongst the birds noted on this occasion were the White-eared Honeyeater *(Meliphaga leucotis)*, the Yellow-plumed Honeyeater *(Meliphaga ornata)*, the Spiny-cheeked Honeyeater *(Acanthagenys rufogularis)*, and the Striped Honeyeater *(Plectorhyncha lanceolata)*. On September 18, a Southern Scrub-robin *(Drymodes brunneopygia)* was seen there, feeding its young.

In a small patch of scrub on the Strathalbyn-Woodchester Road on September 18, four Black-capped Sittela *(Neositta pileata)* were observed. Here, too, were eight of the White-winged Triller *(Lalage tricolor)*, a bird usually seen in pairs.

S. A. ROWE.

ADDITIONS TO THE FLORA OF THE ADELAIDE COAST

(By J. B. CLELAND

Additions to the Coast Flora that have been made since the issue in 1935 of Publication No. 3 of the Field Naturalists' Section entitled "The Geography and Botany of the Adelaide Coast."

(* Introduced. Author's names will be found in Black's Flora.)

GRASSES:—**Sorghum halepense*, Johnson Grass. *Paspalum distichum*, Water Couch Grass, already recorded, also Brighton. **P. dilatatum*. *Digitaria sanguinalis*, Summer Grass. **Setaria verticillata*. **Pennisetum villosum*—this ornamental grass growing in tussocks has now spread to Largs Bay, Brighton and Aldinga. *Enneapogon nigricans*, recorded as *Pappophorum*, also Brighton. **Eragrostis cilianensis*, Semaphore. **Triticum aestivum*, Wheat.

CYPERACEAE (Sedges):—*Cyperus gymnocaulos*, Henley Beach. *Tetraria capillaris*, Sellick's Beach cliffs. *Lepidosperma congestum* replaces *C. concavum*. *L. laterale*, Sellick's scrub. *Chorizandra enodis*, Sellick's scrub. *Carex divisa*, Henley Beach.

CENTROLEPIDACEAE:—*Centrolepis polygyna*, Sellick's scrub.

LILIACEAE:—**Asparagus officinalis*, Edible Asparagus, Fulham. *Anguillaria dioica*, Port Willunga. *Lomandra micrantha* replaces *L. filiformis*. *L. densiflora*, Sellick's Beach. *Caesia vittata*, Port Willunga.

IRIDACEAE:—**Romulea rosea*, Onion-grass.

ORCHIDACEAE:—*Caladenia latifolia*, Sellick's scrub (3/9/49).

LORANTHACEAE (Mistletoes):—*Loranthus Miquelii on Eucalyptus odorata* and *E. fasciculosa*, Sellick's scrub. *L. Exocarpi* also on *Eucarya Murrayana*, Bitter Quandong, Sellick's scrub.

POLYGONACEAE: — *Muehlenbeckia Cun-*

ninghamii, Lignum, also in Sellick's scrub.

CHENOPODIACEAE (Saltbushes):—*Rhagodia parabolica*, Oldman Saltbush, one bush (perhaps planted) in flower beside Dr. Moore's shack, Sellick's scrub, on 14/5/49. **Chenopodium multifidum*, Largs Bay. **Atriplex hastata*, var. *salina*, Port Adelaide, Largs Bay, West Beach—a recent introduction that has already spread widely. **A. patula*, Largs Bay. *A. semibaccata*, Berry Saltbush, Port Adelaide, Largs Bay.

AMARANTHACEAE:—*Hemichroa diandra*, Port Adelaide. **Amaranthus patulus*, Brighton (doubtfully recorded previously).

NYCTAGINACEAE: — *Boerhavia diffusa*. Brighton.

AIZOACEAE:—**Carpobrotus edulis*. Hottentot Fig, Grange Road, Largs Bay.

CRUCIFERAE: — **Sisymbrium officinale*, Hedge Mustard. **Brassica Tournefortii*, Largs Bay, Aldinga—this comparatively recent introduction has spread widely. **Diplotaxis tenuifolia*, Lincoln Weed, Largs Bay. **D. muralis*, Brighton, Aldinga. **Alyssum maritimum*, Sweet Alyssum.

CRASSULACEAE:—*Crassula recurva*. Reedbeds (Sep.),

ROSACEAE: — **Rosa rubiginosa*, Sweet Briar. *Acaena ovina*, Sellick's scrub.

LEGUMINOSAE:—*Acacia spinescens*, recorded, also cliffs at Pedlar's Creek. *A. calamifolia*, Brighton—Herbarium specimen, perhaps wrongly labelled. **Vicia sativa*, Common Vetch, as well as **V. angustifolia*. **V. calcarata*, Aldinga, Ethelton, Semaphore.

GERANIACEAE: — **Erodium moschatum*, Crane's bill.

LINACEAE:—*Linum marginale*, Sellick's scrub.

ZYGOPHYLLACEAE: — *Zygophyllum glaucescens*, also Aldinga Beach. *Tribulus terrestris*, Caltrop, Semaphore, Largs.

SAPINDACEAE:—*Dodonaea hexandra* is correct, also Pedlar's Beach.

RHAMNACEAE: — **Rhamnus Alaternus*, Buckthorn, Brighton. *Cryptandra tomentosa*, Sellick's scrub.

MALVACEAE:—**Lavatera arborea*, Ethelton. **Malva nicaeensis*.

ELATINACEAE:—I have a note of "*Elatine commutata*, Brighton," from what source?

MYRTACEAE:—*Eucalyptus camaldulensis* (=*E. rostrata*), Red Gum. Also in Sellick's scrub.

HALORRHAGIDACEAE:—*Halorrhagis heterophylla* var. *linearis*, Aldinga.

EPACRIDACEAE:—*Acrotriche affinis*, Sellick's scrub.

GENTIANACEAE:—**Erythraea Centaurium*, Common Centaury.

APOCYNACEAE:—**Vinca major*, Greater Periwinkle.

ASCLEPIADACEAE:—**Asclepias fruticosus*, Narrow-leaved Cotton-bush. One seen between Hackham and Port Noarlunga, Oct. 1932.

BORRAGINACEAE:—**Lithospermum apulum*, Black Weed.

VERBENACEAE: — *Avicennia officinalis*, Mangrove, unaccountably overlooked, Port River. An old forest existed south of Glenelg, the stumps recently exposed by sea-erosion.

SOLANACEAE:—*Lycium australe*, Australian Boxthorn, near Hallett's Cove, cliffs at Aldinga Bay. When not in flower, the bushes look very like *Nitraria*, with which it grows. *Nicotiana maritima* replaces *N. suaveolens*. Also Sellick's scrub.

SCROPHULARIACEAE:—*Mimulus repens*, also Hallett's Cove.

CAMPANULACEAE:—*Wahlenbergia gracilenta*, S. of Hallett's Cove, Sellick's scrub. *W. consimilis* replaces *W. gracilis*, Hallett's Cove. *W. bicolor*, sandhills at Henley Beach, Sellick's scrub.

GOODENIACEAE: — *Dampiera lanceolata*, large patches in Sellick's scrub (previously mistakenly entered for this locality as *D. rosmarinifolia*).

COMPOSITAE:—*Brachycome neglecta*. *Olearia ramulosa*, Sellick's scrub. *Vittadinia triloba* var. *lanuginosa*. **Chrysanthemum anethifolium*, Semaphore (identified by J. M. Black). *Erechthites quadridentata*. *Senecio odaratus*, Brighton. **Osteospermum moniliferum*. *Toxanthus Muelleri*. Sellick's scrub. **Centaurea solsitialis*, Yellow Cockspur, Brighton. **Picris echioides*. **Taraxacum officinale*, Dandelion.

The total number of species recorded for the Coast district is now 530, with 3 varieties in addition, of which 190 are introduced species and 340 with the 3 varieties are native.

REPORT ON LIBERATION OF LOWANS ON THISTLE ISLAND

This project was first planned more than two years ago, when three members of Adelaide Bush Walkers, accompanied by Mr. John Mitchell, of the staff of the South Australian Museum, visited Thistle Island on a collecting trip. It was soon obvious that the place would be an ideal sanctuary for Mallee-fowl or lowan *(Leipoa ocellata)*. Upon referring the matter to Mr. C. Wade, the owner of the island, we found that he was most enthusiastic. He had already declared the island a bird sanctuary.

We then found that there were many obstacles to be surmounted, the chief one being that of rapid transport. It was obvious that it was too big a task for Adelaide Bush Walkers to handle, so the collaboration of the Field Naturalists' Section of the Royal Society was sought. This was readily obtained, and Adelaide Bush Walkers hereby place on record their appreciation and their very sincere thanks.

Even so, a year had to be lost owing to the impossibility of making suitable transport arrangements, in spite of the efforts made by your hon. secretary, Mr. R. Praite. This year the matter was again taken up, and through Mr. A. S. Crawford, of Port Lincoln, Mr. George Bird, owner of the cutter "Iris," was engaged to stand by ready for a trip. Mr. Lothian, your chairman, obtained permission to transport the birds.

Mr. Praite picked up the lowans with his car on March 26, and delivered them at the home of the writer. Next morning the writer boarded the plane with them; Mr. Crawford met the plane at Port Lincoln with his car, provided transport to the jetty, and the cutter got under way at once. Unfortunately, a head wind and heavy seas were encountered during the 27-mile trip across to the island, with the result that it was not reached until after dark. The birds, which had stood the trip well, were liberated at the spot previously chosen at dawn next morning.

The writer remained on the island until the Friday, and during that time another survey of its 22 square miles was made. This revealed that it was even better for a lowan sanctuary than had been thought; everything which these birds need is there in abundance. A very pleasant surprise was the discovery that the curlew, nearly exterminated by the fox on big areas of the mainland, is astonishingly plentiful on the island. At night their calls indicated that they must be there in hundreds, if not thousands. Inquiries revealed that they are just as numerous on the nearby Taylor's Island and in Sir Joseph Bank's Group to the northward.

The domestic cats gone wild which used to frequent the island have now been exterminated, save for one or two possible survivors on the northern end, and all the birds are very tame. Wild pigeons come to drink within a few yards of an observer, and scrub wrens enter the kitchen in search of food, hopping fearlessly around the feet of the people in the room.

It is hoped that this collaboration between Adelaide Bush Walkers and the Field Naturalists can be continued with good results in conservation matters, while members of A.B.W. are firmly convinced that by making use of these fox and rabbit-free islands for bird sanctuaries, plus a little self-help, lies our best hope of saving rare and harmless birds from extinction.

Out of pocket expenses were £11/10/-, of which the Adelaide Bush Walkers paid £2/2/- and the Field Naturalists' Section £9/8/-.

The Wade family will keep a constant watch on the area in which the birds were liberated and report if they are seen at any time. Finally, it is placed on record that it is difficult to see how the programme could have been arranged and carried out without the assistance of Mr. A. S. Crawford, of Port Lincoln.

H. A. LINDSAY,

President, Adelaide Bush Walkers.

April 11, 1950.

Note.—The F.N.S. acknowledge with appreciation the time given gratuitously by Mr. Lindsay and other Bush Walkers in securing the lowan chickens, arranging transport and transporting them safely.—*Editor.*

Field Naturalists' Section of the Royal Society of South Australia (Inc.)

FOUNDED 1883

OBJECTS.—The Preservation of the Native Flora and Fauna of South Australia. To afford lovers of Nature the opportunity to observe and discuss the subjects in which they are interested by holding regular excursions to places of interest and frequent meetings for the showing of films, lectures, reading of papers, and the exhibition of specimens.

MEMBERS are requested to invite their friends to these Monthly Meetings.

THE ANNUAL SUBSCRIPTION.—Ordinary Members, 11-18 years, 2/6; 18-21 years, 5/-; over 21, 10/-; Corresponding Members, 5/-:—dates from August 1, and can be sent to the Treasurer, Mr. J. J. Turnbull, 11 Everett Avenue, Dulwich. Membership of Clubs is restricted to Financial Members of the F.N.S.

JUNIOR MEMBERS are invited to attend the Saturday outings and the meetings.

EXCURSIONS.—For meeting places, see particulars at head of programme. Members desirous of attending motor excursions should advise the Hon. Treasurer at least six days before the outing, to enable sufficient accommodation to be provided.

MONTHLY PROGRAMME in detail appears in the Public Notices column of "The Advertiser" on the last Wednesday of each month.

ALL LETTERS must be sent to the Hon. Secretary, Box M 1594, G.P.O.

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