The AUSTRALIAN MUSEUM MAGAZINE

EDITED BY C. ANDERSON, M.A., D.Sc.

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THE AUSTRALIAN MUSEUM

COLLEGE STREET - - - SYDNEY

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Illuminated in honour of the visit to Sydney of
H.R.H. The Prince of Wales in 1920.
Photo - Cecil Bostock

THE AUSTRALIAN MUSEUM
From Hyde Park. *Photo—Henry King*

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VOL. I. NO. 1. APRIL, 1921

THE OBJECTS OF THE AUSTRALIAN MUSEUM MAGAZINE.

By THE EDITOR.

THE publications issued by the Australian Museum in the past have consisted of Reports, Memoirs, Records, and Catalogues, intended principally for scientific readers and specialists in various branches of natural science. Such publications form valuable contributions to knowledge, and are an essential feature in the life of an institution such as ours, but, since the Museum is supported by public funds for the instruction and enjoyment of the whole people, the Trustees have decided to make an increased effort to reach a wider public, so that every man and woman in the State, and even the children of tender years, may feel that the Museum has a message for them. It is with this object in view that the *Australian Museum Magazine* has been established.

As the *Magazine* is intended mainly for those who have no special knowledge of the technical details of natural history, the articles contained in it will be written, so far as possible, in non-technical language, and deal with subjects which are likely to be of interest to the average citizen. The haunts, habits and life-histories of the common animals of our bush, ponds, and seashore will be described; nor will the denizens of the ocean depths be forgotten. We shall endeavour to picture for our readers the everyday life of animals, their inter-relations, their struggles for existence, and their place in the whole scheme of nature. The form and structure of animals is an absorbing study, but animal architecture alone is apt to become dry bones in the figurative, as well as the literal sense, and surely an animal is more interesting when it is presented, not as a mere dead thing, but as a living, breathing creature. Fossils, too, which are merely animals and plants that have been dead a long time, have a fascinating tale to tell, and even the minerals found in our quarries and mines are more than the raw materials of industry and commerce. Like other primitive races, our aborigines are fast disappearing before the inroads of civilization, and we feel sure that every Australian will welcome popular articles on our predecessors in this continent, their quaint customs and ceremonials.

The collections in the Museum consist of animals, fossils, minerals and ethnological objects gathered from all quarters of the globe, though mainly

Australian, and one important function of the *Magazine* will be to make these collections better known to their owners, the public, and not merely to those who are able to visit the Museum in person, but also to those in distant parts of the State, who have not that privilege. From time to time new exhibits of more than usual interest are placed on view in the galleries; these will be described and illustrated in the pages of the *Magazine*.

Every child, and many grown-ups also, find much pleasure in collecting natural objects, and in future numbers we hope to assist them by a series of articles on the best methods of collecting and preserving animals, and recording observations on animal life.

Many of our readers may have opportunities of making interesting and valuable observations on wild life in Australia, and we shall willingly find room in our pages for such observations.

A lively curiosity is one of the best hand-maidens to knowledge, and fortunate is he who preserves in his manhood the enquiring mind of the child; we shall be pleased at all times to answer any queries addressed to us.

We propose, too, to describe for our readers the collecting trips which members of the Museum Staff make to various parts of Australia, and even to distant Pacific isles. If our collectors seldom encounter moving accidents by flood and field, yet their experiences on these expeditions are often interesting and entertaining.

NOTES

The first of the series of popular lectures arranged for this session will be delivered on April 14 by Mr. C. Hedley, F.L.S., his subject being "The Depths of the Sea." Succeeding lectures will be as follows:—May 12, "The Natural History of the Hawkesbury Valley," by C. T. Musson, F.L.S.; June 9, "A Seashore Ramble," F. L. Grutzmacher, F.C.S., F.L.S.; July 14, "Monotremes and Marsupials," L. Harrison, B.Sc., B.A.; August 11, "Lord Howe Island; a South Sea Tragedy," A. R. McCulloch; September 8, "Snakes and Their Venom," J. R. Kinghorn; October 13, "Ants and Ant Communities," A. Musgrave; November 10, "Primitive Man," L. Harrison, B.Sc., B.A.

Mr. Ernest Wunderlich, a member of the Board of Trustees, announces his intention to supply funds to defray the cost of preparing and installing an Australian Aboriginal group in the Museum. The thanks of the community are due to Mr. Wunderlich for his generous and patriotic gift, and it is to be hoped that this example will be followed by other public-spirited citizens.

Messrs. A. R. McCulloch and E. L. Troughton, of the Scientific Staff, have just returned from a holiday trip to Lord Howe Island, and have brought back with them a valuable zoological collection and many interesting notes on the natural history of this outlying dependency of New South Wales. They secured a fine series of photographs, some of which will be used to illustrate a future issue.

Two valuable gifts have recently been made to the Museum. Mr. G. A. Waterhouse, B.Sc., well known as a lepidopterist, has presented his collection of Australian butterflies, which represents the gatherings of many years and is recognized as the finest in the Commonwealth. The standard work, *The Butterflies of Australia*, written by Mr. Waterhouse, in collaboration with Mr. G. Lyell, was largely based on this collection. Professor A. Liversidge, a former Trustee, now resident in London, has presented his collection of crystals, the main part of which formerly belonged to General Cathcart. The collection is specially rich in Indian and Ceylonese minerals.

THE SCOPE AND WORK OF THE AUSTRALIAN MUSEUM.

By THE EDITOR.

A museum may be broadly defined as a repository for objects illustrating the works of man, past and present, the natural history of living things, and the structure and composition of the earth's crust; in short, it is a storehouse for the works of art and of nature. In practice, however, it is found convenient to sub-divide this vast field into various smaller domains, and, in Sydney, for example, we find these collections distributed between the Public and Municipal Libraries, the Art Gallery, and five Museums, each with its appropriate contents.

Omitting the historical and numismatical sections, which are more limited in extent, the collections stored in the Australian Museum fall into four main groups:—

1. Zoological Exhibits, illustrating the animal kingdom as it exists to-day.
2. Palæontological; the animals and plants of bygone ages (fossils).
3. Ethnological; the life and works of prehistoric and primitive races of man.
4. Mineralogical; the naturally occurring inorganic substances.

In each of these groups special prominence is given to Australian representatives.

The question may be asked: Why should we wish to assemble and preserve these objects? The answer is twofold. In the first place, they form the subject matter on which present knowledge is based, and the material by use of which future workers may still further extend the bounds of knowledge. Secondly, when properly displayed, they contribute to the wonder, pleasure, and instruction of the public. These two sentences epitomise the whole aim and object of museums and museum work; it now remains to show how our institution in particular tries to fulfil its mission.

If natural history objects are to be of any scientific service, they must be correctly named and classified. For this purpose the various branches included in the work of the museum are placed in charge of specialists, most of whom have had many years' training and experience in the museum itself. These experts form the scientific staff, on whose ability and industry the success of the museum as a scientific institution largely depends. Then comes the work of preserving the specimens for future reference, and cataloguing and storing them, so that they may be readily accessible for purposes of study. Most natural history specimens are perishable, and special materials and methods must be used if they are not to degenerate into useless rubbish. For it must be remembered that these collections are not for today only, but for posterity also, and that the museum holds them in trust for the whole scientific world.

I would emphasise the importance of museums as places for the acquisition and diffusion of knowledge, for, to the casual visitor, the exhibition galleries are the museum, and the uniformed attendants, performing their useful and necessary tasks as caretakers and cleaners, are the staff. It may surprise many to learn that the collections stored away are, perhaps, as extensive as those on exhibition. The needs of the student are different from those of the ordinary museum visitor, who would but be confused and dismayed by the display of row after row of specimens showing apparently little or no variation. To the student and the specialist, such series are invaluable; without them he would not be able to unravel the many intricate problems of evolution and variation, of geographical distribution, seasonal changes, and the relationship of species. When not employed in routine work, the members of our scientific staff are patiently engaged with microscope, dissecting knife, and test-tube, endeavouring to elucidate the structure, form and composition of the objects under their charge, and the results of their researches are issued in the Museum publications, or in the pages of scientific periodicals. Then, too, one will often find in our workrooms some kindred spirit, who is not a member of the staff, and may have come from some neighbouring State, or from overseas, to consult our collections and our library, which contains a fine assemblage of works and journals on natural history and ethnology, with special reference to Australia. A foreign *savant* journeys to our shores, and expects to find, and does find, the type specimens and records which he wishes to examine in connection with his special researches. The scientific workers in other institutions, such as the University, gladly avail themselves of the treasures stored in College Street, and the Museum authorities as gladly place these treasures at their disposal.

Scarcely a day passes which does not bring several callers, or letters, seeking information. Answering such enquiries is an important and essential branch of museum work, and, although the museum is, in the first instance, a purely scientific institution, many of the subjects on which information is sought touch on matters of economic importance, and may relate to insect pests, the habits and specific distinctions of fishes

* A more extended account of museum work in general, and of the scope and work of the Australian Museum in particular, will be found in an address by the President, Dr. T. Storie Dixson, delivered June 10, 1919 (printed by order of the Trustees, 1919).

and other marine animals, birds destructive to farm or orchard, or the occurrence and uses of minerals.

On suitable days, gallery demonstrations are given by members of the staff, who conduct small parties round the collections and explain the exhibits. This is a new feature, instituted by Mr. C. Hedley, and is much appreciated by our visitors.

Every year a course of free lectures is delivered in the Lecture Hall. These popular addresses, the initiation of which we owe chiefly to the enthusiasm and untiring efforts of two Trustees, Dr. T. Storie Dixson, now President of the Board, and Mr. John Vernon, formerly Auditor-General, are illustrated by museum specimens and lantern slides.

Much work has to be done behind the scenes in preparing specimens for display in the public rooms. An animal must be carefully skinned, the skin tanned or otherwise preserved, and then mounted in a natural posture, so that it may be a true representation of the living creature. This is the work of the taxidermist, who requires to be just as much an artist as does a painter or a sculptor. If the animal is to be shown with accessories of rock or foliage, these must be faithfully portrayed, so that they may look natural and unobtrusive, which demands a high degree of ingenuity and tasteful skill. Many animals are best represented by plaster models, carefully finished and coloured to resemble the originals; this, too, is work requiring no small amount of technical ability. If it is desired to display a skeleton, the bones must be thoroughly cleaned, bleached, and then articulated, so as to preserve their true relations to one another. This is the province of the articulator, who must have a knowledge of osteology. Next comes the work of the artificer, who, besides performing ordinary structural and repair work, has to exercise considerable manual dexterity in fashioning cases and supports for the exhibits. The last requisite is the label. The achievement of a satisfactory label is one of the most difficult tasks, and often the despair of the museum official, and is attained only after much discussion and searching of mind. The labels which accompany the gallery exhibits in the Australian Museum are printed on the premises, and are of two kinds, one, short and pointed, giving merely the name, locality, and a few essential facts concerning the specimen; the other, more lengthy and descriptive, to call attention to features of special interest and importance.

THE MANAGEMENT OF THE AUSTRALIAN MUSEUM

By THE EDITOR.

Until 1853, the affairs of the Museum were adminstered by a committee, but in that year it was incorporated by Act of Parliament under a Board, composed of twelve official Trustees and twelve elective Trustees. The twelve official Trustees consist of a Crown Trustee, nominated by the Governor, and the following public officers, namely, the Chief Justice, the Colonial Secretary, the Attorney-General, the Colonial Treasurer, the Auditor-General, the President of the New South Wales Medical Board, and such five other officers as the Governor names for the purpose. Vacancies which occur among the elective Trustees, by death, resignation, or otherwise, are filled up by the appointment of such other fit and proper persons as the remaining members of the Board may elect.

The Board meets for the transaction of business on the first Friday in each month, except January, when no meeting is held. There are three Standing Committees, namely, the House Committee, consisting of five members, the Scientific and Publication Committee, of five, and the Finance and Publicity Committee, of four. These Committees deal with the matters which fall within their province, and submit their recommendations to the Board, which alone has executive power. The President is Dr. T. Storie Dixson, President of the New South Wales Medical Board.

The Director superintends the staff and the general working of the institution, and is responsible to the Trustees.

The funds necessary for the upkeep and general expenditure of the Museum consist of a permanent endowment of £1,000 per annum, paid out of the general revenues of New South Wales, and an annual appropriation voted by Parliament. The Museum has, up to the present, received no private monetary endowment.

BLACKFELLOWS' PICTURES

By CHARLES HEDLEY.

The stories that we all want to hear are the stories of how things grow; no repetition has ever dulled the interest of those wonderful spring-time stories of the seed, the plant and the flower, or, of the nest, the egg and the chick.

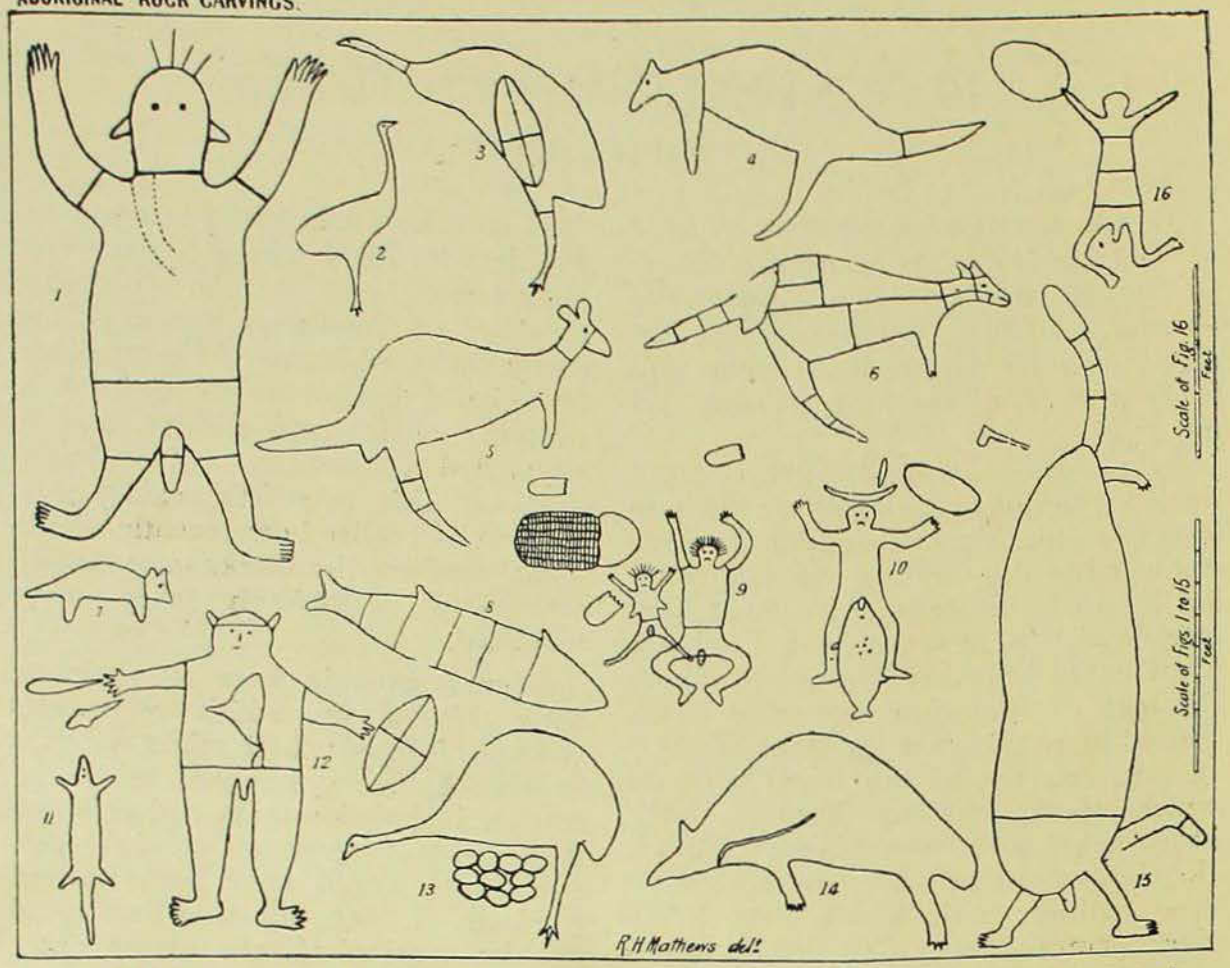
As plants or animals grew from small beginnings, so did Art. Masterpieces of painting and of sculpture are displayed in the modern Art Galleries, but for their beginnings we must look elsewhere. In France and England, many caves have been found in which the men of the stone age once lived. Buried in rubbish on the floor of such caverns are bits of horn and bone on which those ancient hunters have scratched, with surprising vigour, sketches of the animals, some of them now extinct, with which they lived. Such primitive folk had the minds of children in the bodies of grown men and women. Their love for art or music was no less sincere, because it was inarticulate. With hands as sure and eyes as keen as any, their pictures are crude, because the artist lacked perseverance and specialisation. The mind of a savage is simple, passionate and changeable, his brain soon wearies of continuous effort, and so he disappeared because he was pushed out of the world by others who were more purposeful and more persistent in toil.

A couple of hundred years ago the people who lived where Sydney now stands were just like those old cave dwellers of Northern Europe. The many sheltered inlets of Port Jackson provided a bounteous supply of fish, oysters, whelks and cockles, and so supported a numerous native population. In this twentieth century it is difficult to realise how recently and in what numbers the blacks once existed and how completely they have vanished.

Sacred grounds were set apart by these blacks, on which ceremonies were performed; these might not ever be seen by the uninitiated, which, of course, included women and children. Any luckless trespasser on these performances would have been speared to death at once. So that they could not be overlooked, the blacks chose the highest hill tops for their Bora grounds, as they called the spots reserved for their secret rites. Round Sydney on high ground there frequently occur level sheets of bare rock, a fine-grained sandstone. Here the native artist found scope for his talents by carving pictures on slabs of rock. Probably the tree trunks round about were decorated also, but, if so, the stone tablets have long outlasted both the timber and the men who wrought upon them.

The Ancient hunters of Britain and France observed form with a keen eye: This cast which is from the Australian Museum shows that the original piece of bone was deftly carved by a prehistoric French artist who had developed his draughtsmanship to a much more realistic pitch than the Australian aborigines who lived even in modern times.

ABORIGINAL ROCK CARVINGS.

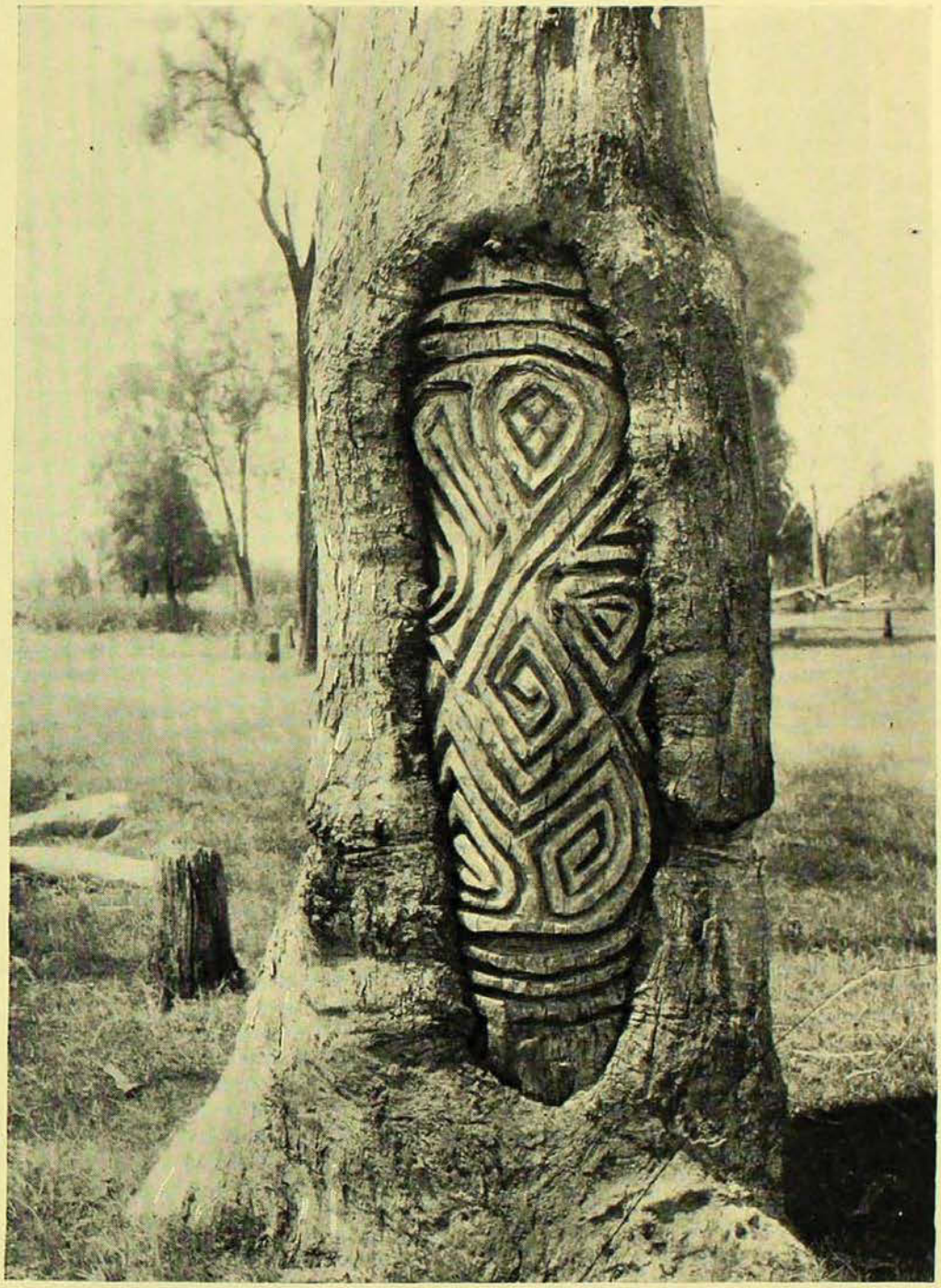


Our blackfellows may have despised realism in art because their efforts to depict a scene serenely ignored details of form. What they did naturally, the cubists, futurists, and dadaists, strove to do unnaturally. The aboriginal makes his picture with a shorthand art of his own and with a quaint humor. This outline drawing was made by Mr. R. H. Mathews from aboriginal rock carvings, and the scale is roughly 8 feet to 1 inch.

These pictures cover a wide range; sometimes an ambitious spirit has tried to present a scene, such as a kangaroo hunt. A favourite subject, and one readily recognised, is a whale. Then, as now, a dead whale chanced at times to drift ashore. When this occurred it would have seemed to the blacks as if some kind providence had opened a butcher's shop gratis on the beach for their especial benefit. As a memento of its size and shape that whale would be drawn on the Bora ground. Such a tale lost nothing in the telling, and the marvellous meat was drawn "heroic size." Sixty feet in length was the testimony of one witness. Another group shows a whale attended by her calf, and alongside is a marine monster which appears to have been a sun fish. The throwing of a boomerang is an incident in some picture stories. What some of the figures stood for we cannot even guess. Some of the unintelligible ones may mean the tracks of game animals, naturally subjects of great importance to a hunter. A green turtle in another group stares at an emu standing beside a clutch of eggs. The turtle seems to be wrestling with the riddle of the egg.

Convention, absurd to say, had overtaken even the palæolithic artist and crushed his initiative with the right way to do things. For instance, their right and only way to draw a man was to spread his fingers and to extend his limbs apart as if crucified. Perhaps this was a dancing attitude of a corroboree.

It is said that the portrait of a man was sometimes made by outlining his shadow in the afternoon sunshine. Probably the sketch was first drawn with a burnt stick. Along the line to be engraved, holes were bored in the rock an inch, or half an inch, apart. Then the spaces between the holes was ground away or chipped out with a



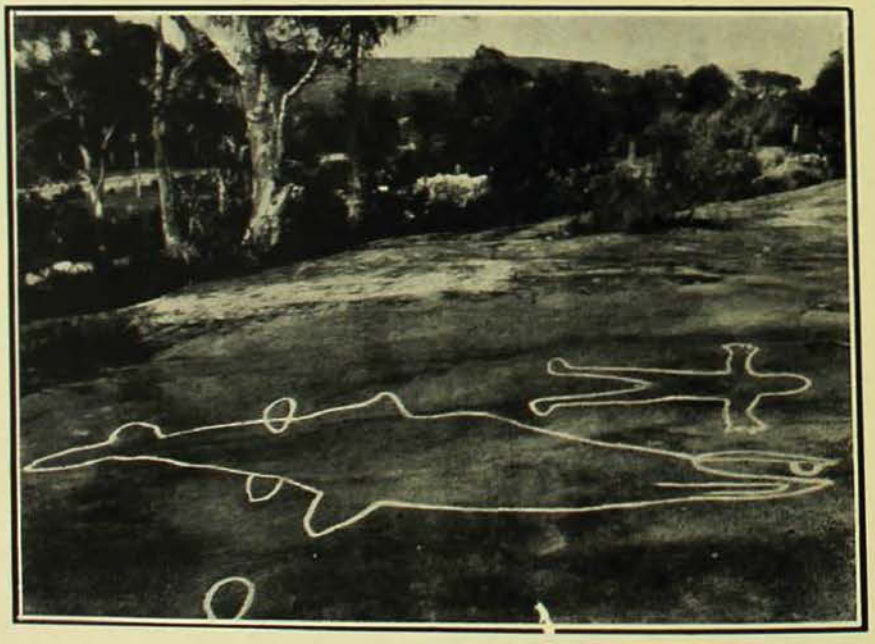
TREE CARVED BY AUSTRALIAN ABORIGINALS, DUBBO. *Photo—Harry Barnes.*

These carvings are generally found near the grave of a dead chieftain in whose memory the carving was made.

The outline of a Dolphin carved at Jibbon, Port Hacking by Aboriginals.

pick or chisel of hard rock. The older figures had broader and deeper furrows than the newer ones, and in some very ancient engravings the natural decay of the surface of the rock has almost obliterated the drawings.

Another style of illustration which the blacks practised was to make red hands in caves. White paint was made from burnt cockle shells mixed with wood ashes from the camp fire, made more durable by mixing it with blood. Red paint was got from iron clays, and black paint from charcoal mixed with fat. Having mixed his paint, the artist took a mouthful of it, then he placed his hand on the rock, the palm to the wall and the fingers outstretched. On this he squirted the paint from his mouth, and when his hand is removed, the print of it on the rock is seen blocked out by white. Finally its outline may be filled in with red paint. Sometimes the rock was first greased to make the paint adhere better.

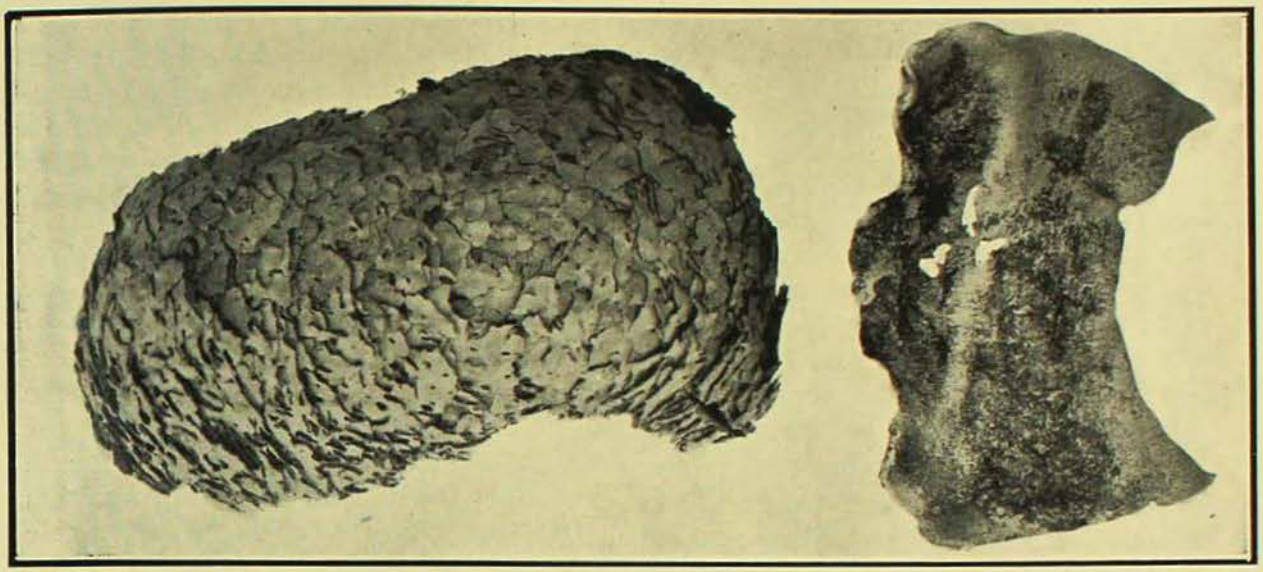


A rock carving at Curl Curl, Manly showing an aboriginal Man, and a Strap-tooth Whale.

AUSTRALIAN INSECTS

By A. MUSGRAVE.

I.—"WHITE ANT" COMMUNITIES



The lead was eaten through by "White Ants" so that they could attack the wood in the roof of the Museum. The nest shown on the left was removed from a beam in 1896.

Australia is very liberally endowed with representatives of the family Termitidae, which includes the termites, or as they are more popularly but wrongly named "white ants." This family is near the order which includes such familiar insects as cockroaches, grasshoppers, mantids, but apart from a very similar social life it has no affinities with the true ants.

"White ants" are chiefly found in tropical and sub-tropical countries, but three species are known to occur in Southern Europe and one in America, as far north as Manitoba, Canada. Australia is rich in species and their nests are common throughout the country. Thousands of pounds are annually spent in combating this insect pest, which is perhaps the worst against which we have to contend. The damage done to the roof of the Museum on the occasion of a visitation in 1896, was so extensive that the entire roof had to be replaced. A remarkable feature of this invasion was the perforation of sheet-lead by the persevering insects in their efforts to reach the wood.

Pyramidal Nest of Eutermes pyriformis at Cape York.

Photo - A. R. McCulloch

The "white ant" responsible for the mischief was the Milk White Termite *Coptotermes lacteus,* as Mr. W. W. Froggatt, the Government Entomologist, calls it. This species is very plentiful around Sydney, where it constructs its nest in logs and stumps. In the South Coast District and northwards to Southern Queensland it makes a dome-shaped nest, which may measure six feet in height. This structure is formed of clay on the outside, and its base is usually embedded about a foot underground. When the outer clay covering is removed, the interior of the nest is seen to be composed of a clay-like material which was originally wood, but has been masticated by the termites and worked into its present form. Through it run the galleries of the colony. A round mass made of sheets of a special material placed one above the other, and riddled with galleries, is found in the centre of the nest. Mr. Froggatt has described it as the "nursery," on account of the numbers of young larvæ found in it.

The Meridional or Magnetic White Ant, *Termes meridionalis,* found in North Queensland and the Northern Territory, has the most interesting nest of all our Australian species. The termitarium resembles a wall in appearance, usually about 8 feet in height, and is so constructed that the ends of the wall point directly north and south, with the broad sides east and west.

The reason for so constructing the termitarium is that it may dry most rapidly. The sun shines on both sides, and each receives an equal amount of heat. This is necessary, as repairs and additions to the nest are made only during the wet season, when the building material is soft.

The nests found around Cooktown are often surmounted by turret and spire-like projections, which remind one of some European cathedral. A variation from the Cooktown form occurs near Port Darwin. In this case the nest has the eastern side convex and the western concave; the turrets, too, have given place to a serrated ridge.

One of the accompanying illustrations shows the Great Mound Nest of *Eutermes pyriformis,* which is common at Cape York and may be 18 feet high. The "nigger head" nests, so common in gum trees in the bush, are the work of members of the genus *Eutermes.* They are usually in communication with the ground by means of closed-in galleries. Other termites do not appear to make these arboreal habitations.

A "white ant" community is made up of a number of castes, each of which has its special duties to perform. The supreme being is the queen, the whole activities of the colony centering around her, since on her falls the duty of the reproduction of its life. She is much larger in size than any of the other termites in the nest owing to an enormous development of the egg tubes in the abdomen, which becomes distended with eggs. Her great rotundity makes her incapable of movement, and she depends on the workers for nourishment. Certain specialised pupæ, known as "supplementary queens," take the place of the queen in the event of her dying or any other such misfortune. The queen, as a rule, belongs to the caste which includes the winged males and females, but after pairing she settles down to a life of egg laying. The king is sometimes seen in the royal cell, but little seems to be known about him. The winged males and females are the only members of the termitarium which are usually seen outside the nest. The "white ant" swarms, which are such a nuisance in the summer months, are composed of myriads of these insects, which are forsaking the nest in order to set up house for themselves. A swarm usually makes its appearance about a quarter of an hour before sunset, after a hot, sultry day. The workers on such an occasion make a breach in the wall of the termitarium and the soldiers allow the winged forms to swarm out. These speedily

take flight and unless they are unfortunate enough to fall foul of some hungry bird, soon come to earth. Like moths, they are very commonly attracted by the glare of a light in an open window, and if one watches them as they settle around a lamp, it will be noticed that they readily cast off their wings without the slightest inconvenience, and crawl rapidly away to some dark corner. At the bases of the wings there is a definite cross line of weakness, and when the insect feels these members to be of no further service, it wriggles and twists its body with no uncertain effort, until a fracture occurs, and the whole four wings are left behind. Late on a hot evening, when we turn down the lamp, a cluster of gauzy iridescent wings on the table around it is often all that remains to remind one of the irritating attention of their owners during the few preceding hours.

To the second caste belong the workers, which are more numerous in individuals than any other. To them is entrusted all the work of the community; building and repairing the nest, feeding the young, and looking after the eggs and the queen. They are literally the "hewers of wood and drawers of water" of this termite kingdom. Like the next caste, the soldier, they are aborted males and females.

The soldier caste is generally easily distinguished by the large sickle-shaped jaws, which are used as weapons against invaders. They stand guard over the tunnels should any holes be made in them, and defend the workers, who quickly repair the damage.

The soldiers of the genus *Eutermes* are remarkable for having a sharp awl-like snout, in which fluid is stored as a means of defence against enemies.

As termites are such a general pest in Australia, a few notes on the methods adopted for their eradication may prove of use.

Arsenic is the poison generally used for their destruction, and as they feed on the bodies of their companions which have died from its effects, the poison is thus passed on. If the arsenic be mixed with treacle or sugar and placed in the wood where they are working, they will soon fall victims to it.

A method suggested by Mr. Froggatt for preventing their ingress into buildings is to paint the floor joists with arsenic mixed with wood preserving oil. A pound of arsenic should be boiled with a pound of washing soda and then mixed with four gallons of the oil.

In North Queensland and Papua many of the houses are built on piles, the tops of which are covered with tin caps to prevent the ants entering the house. The piles are also well coated with tar. All termites' nests in the vicinity of a building must be destroyed, as the insects often tunnel for long distances underground in search of the timber they desire. An established nest may be effectively disposed of by fire, since the internal woody pulp burns readily. A hole should be made on each side of the nest, and a fire lighted in one of them. The air passes freely through the galleries in the structure and so forms a draught, which soon carries the smoke into the innermost recesses and drives the flurried insects before it. A nest several feet in diameter will take several days to burn out, and the smoke from it gives off a peculiar pungent odour, which drives away all the mosquitoes in the vicinity—an item of no inconsiderable value in tropical regions. When the woody material of the nest is completely destroyed, together with the insects inhabiting it, the outer mound may remain intact for some considerable time. The cavity within forms an excellent oven in which bread can be baked, and they are not infrequently used for this purpose by the bushmen of Australia.

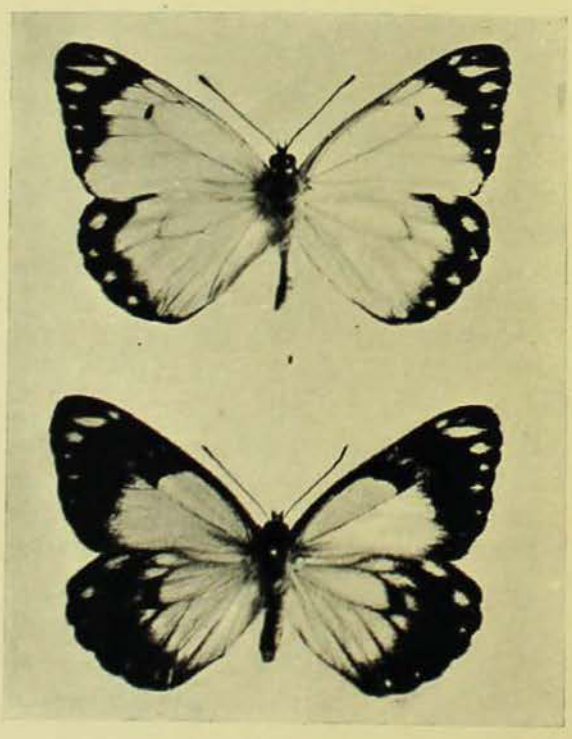
The methods for dealing with these noxious insects have been thoroughly treated by Mr. Froggatt in *Farmer's Bulletin*, No. 60, issued gratis by the Department of Agriculture.

II —THE WHITE BUTTERFLY MIGRATION

The White Caper Butterfly, *Anaphaeis java var. teutonia*, which, during November, 1920, passed over Sydney in swarms, has given rise to much speculation as to its ultimate goal and the reason for its migration. This butterfly is a member of the family Pieridæ, a group which includes those species popularly known as "The Whites." Many species of Pieridæ are noted for their migratory habits, and the great naturalist, Charles Darwin, in his "Naturalist's Voyage Round the World," records a flight of white butterflies which was seen from the deck of the "Beagle" when ten miles out at sea off the South American coast. In view of a theory put forward at a recent meeting of the Linnean Society of New South Wales, that the migration of the "Caper White" was probably due to the westerly winds carrying them from the West, it is of interest to read the conclusion arrived at by Darwin when he encountered the swarm of butterflies so far out at sea. "The day," he says, "had been fine and calm, and the one previous to it equally so with light and variable airs. Hence we cannot suppose that the insects were blown off the land, but we must conclude they voluntarily took flight." Another theory as to the cause of the migration was that the food plant of the butterflies, the Australian Caper Plant, had probably failed through drought conditions and the insects were forced to go further afield No satisfactory conclusion has yet been arrived at as to the motive for the butterflies always travelling in a certain direction. The 1920 swarm is not unique so far as New South Wales is concerned; we have records of swarms in 1894, 1903, 1906 and 1909.

During a migration, the insects often appear at irregular intervals. They may be conspicuous everywhere on certain days, hovering round the flowers of the garden or floating airily over the lantana blossoms, but suddenly they disappear, to be followed perhaps in a day or so by another body, which may linger a little longer before passing away on its unknown quest. Weak fliers, they make little headway against the buffetings of adverse winds, and a white flake on the green waters of the harbour too often bears testimony to an untimely end from the forces of nature.

The "Caper White" has for many years been known to frequent the Native Caper plant, *Capparis nobilis*, growing near the Herbarium in the Botanic Gardens, and the butterfly may be observed there in all stages of its development. During the recent migration, the butterflies descended in hundreds on this plant and were discovered laying their eggs on the leaves to such an alarming extent, that the tree had to be sprayed several times with arsenate of lead in order to destroy them.



Two White Caper Butterflies.
(Male above and Female below).

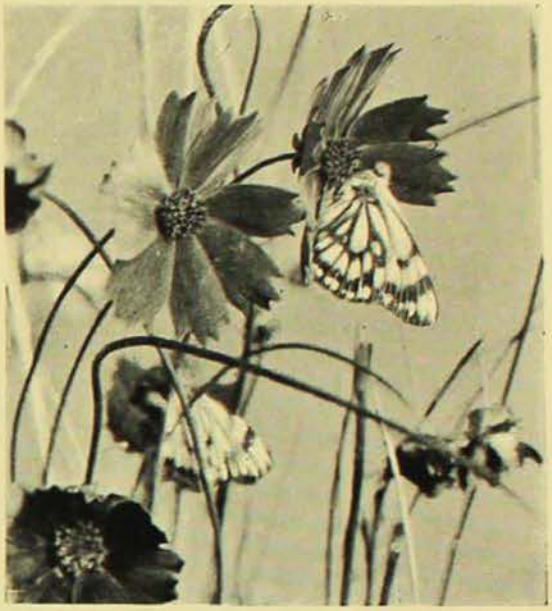
The spindle-shaped eggs of the butterfly are laid on the upper side of a leaf, sometimes as many as fifty being deposited on a single leaf. The

young caterpillar, when it emerges from the egg, is yellow in colour, and covered with long hairs. It is exceedingly voracious, and at once commences to eat the young shoots and leaves of the food-plant. Increasing rapidly in size, it changes its skin several times, until it attains a length of one and a quarter inches, which is its maximum size. At this stage the body is greenish in appearance with yellow tubercles on each segment forming transverse rows. The long hairs which were so conspicuous in the young larva have given place to very fine ones, the long ones having disappeared during a moult.

The caterpillar now develops into the pupa or chrysalis stage, which is attached to a leaf of the *Capparis*. The chrysalis is about an inch in length, and is greyish-white with yellow and black markings. The head bears a pointed process, and the second abdominal segment has two black spine-like structures.

The butterfly, on emerging from its chrysalis, has to wait some time until its wings are dried before it can join its companions in their migrations, or sport around the green leaves of the *Capparis*.

The "Caper White" has a very wide distribution. In addition to being found throughout Australia, it occurs in Malaysia, New Guinea, Friendly Islands, Solomon Islands, New Hebrides, and New Caledonia. So far, it has not extended its range into New Zealand.



The White Caper resting on Flowers.
Photo—A. Musgrave

The poet Swinburne has immortalised white butterflies in the following lines:—

"Fly, white butterflies, out to sea,
Frail, pale wings for the winds to try;
Small white wings that we scarce can see.
Here and there may a chance-caught eye
Note, in a score of you, twain or three,
Brighter or darker of tinge or dye;
Some fly light as a laugh of glee,
Some fly soft as a long, low sigh:
All to the haven where each would be—
Fly."

HOUSEHOLD PESTS.—From time to time the Museum is asked to supply information as to the most effective methods of ridding a house of such common insect pests as the house fly, the bed bug, fleas, and cockroaches.

Of these we shall deal first with the house fly, *Nusca domestica*, also known as the typhoid fly on account of its being a carrier of the germs of this disease. Formalin has proved to be the best poison, and a few drops of five per cent. formalin placed in a saucer of sweetened milk will cause the death of all flies who partake of it. If proper care were taken in the first place to prevent flies breeding, by covering up receptacles for garbage and such places as manure heaps in stables, they would eventually disappear.

Fleas are encouraged through cats and dogs being kept on the premises or else through lack of proper cleanliness. Flea larvae feed upon dust in carpets and in the cracks and crevices of the floor. To dispose of fleas we must therefore get rid of all dust by thoroughly scrubbing out the room with hot water in which a small quantity of carbolic has been poured, and by beating all carpets.

The only effective method for getting rid of bugs is thorough fumigation by a competent person employing such means as hydrocyanic acid gas. This gas is very poisonous and fumigation should not be attempted by a novice.

Cockroaches are best destroyed by placing baits of borax and breadcrumbs, or equal parts of ground-up chocolate and borax, in the places where they lurk. Plaster of Paris sprinkled about will also be greedily consumed by the insects, and on being taken into their digestive system it hardens, and so causes death. Paris green blown into their hiding places has the effect of driving them out.—A. Musgrave.

THE LURE OF THE BIG NUGGET

By THE EDITOR.

Gold occurs in nature chiefly as specks, veins and masses in quartz, when it is called reef gold, or as grains, flakes and irregular lumps in the gravels, sand and débris of stream channels and flood plains, when it gets the name alluvial or detrital gold. Detrital or drift gold deposits result from the denudation of the surface layers of the earth, which were perhaps several thousand feet in thickness, and were traversed by auriferous quartz lodes, the gold, because of its relative insolubility and high specific gravity, becoming naturally concentrated by the action of running water.

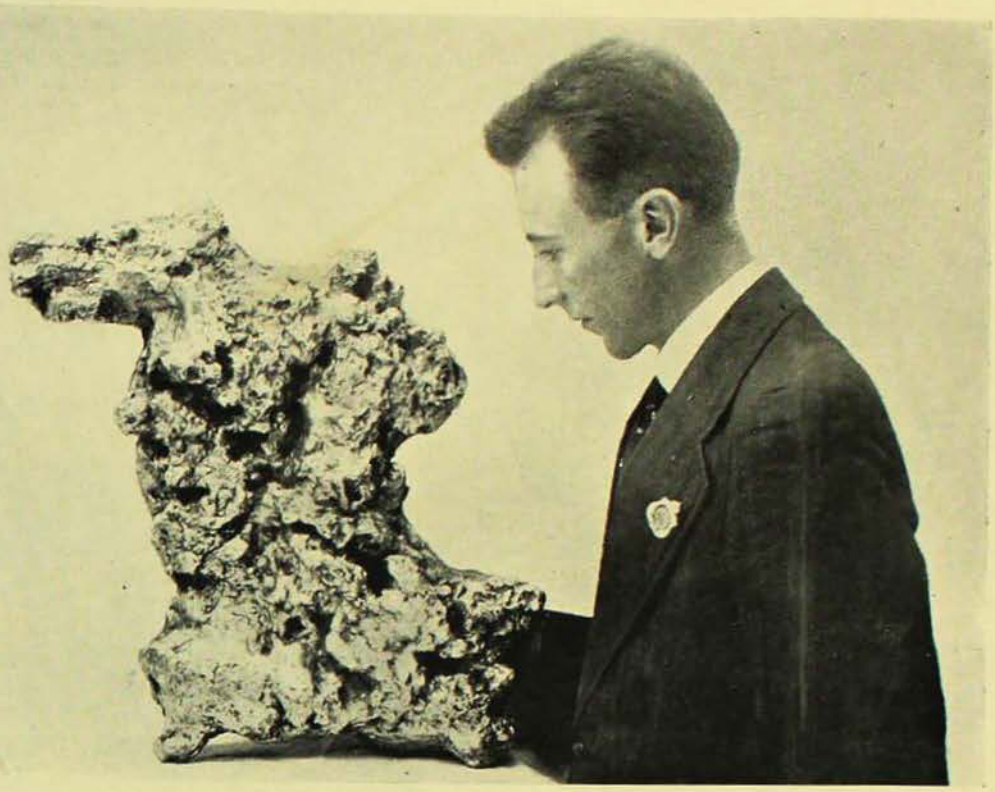
Alluvial gold, especially when near the surface, is much more readily and more cheaply won than the gold which is locked up in the hard quartz of reefs; therefore it will be readily understood that in the early days of Australian gold mining, when small parties of diggers, or even solitary prospectors, were delving for the newly-discovered wealth, it was the drift deposits that received most attention. These were the palmy and adventurous days of mining, so well described in Charles Reade's fine novel, *It is Never Too Late to Mend*. The alluvial gold miner was a gambler, for the precious metal is erratic in its occurrence, and weeks or months of hard work would sometimes be spent in an unavailing search for "pay-dirt," while a more fortunate digger might "strike it rich" in a few days.

Any lump of gold found in the alluvium is called a nugget, whether its weight be a few pennyweights or a hundredweight or so. The word nugget, used in this sense, seems to be of Australian origin, for in the early convict days a lump of tobacco was called a nugget, and amongst farmers the same name was applied to "a small, compact beast or runt." Rolf Boldrewood, in *Robbery Under Arms*, writes: "We branded the little red heifer calf first—a fine fat six-months-old nugget."

The finding of a large nugget of gold was the occasion for great rejoicing on the part of the successful digger, and much excitement among the community. Valuable nuggets are occasionally turned up even now, but in the early days of our history as a gold-producing country, such an event was much commoner. Australia has produced more large masses of gold than any other continent, and this is responsible for the fact that many a "new chum" lands in Australia expecting to find nuggets of gold scattered in his path like pebbles.

The original nuggets have, practically without exception, long since found their way to the melting pot, to be converted into coin of the realm or, mayhap, to adorn some fair lady's finger or stop a hollow tooth to keep the ache away. But, fortunately, we have models of some of the most famous nuggets, which, when skilfully gilded, are to outward appearance almost as good as the originals and not so likely to be a temptation to some poor but dishonest man. In the mineral gallery of the Australian Museum a fine collection of nugget models will be found in a wall case near the entrance, and the stories of the discoveries of the originals are full of interest.

The visitor to the museum will be at once attracted by the huge "Welcome Stranger" and "Welcome" nuggets; the former weighed 2,520 ozs., and the latter 2,217 ozs., the respective values being about £9,534 and £9,323. The "Welcome Stranger" was the largest nugget ever discovered and the circumstances of its finding are somewhat romantic. It was found on Friday, February 3, 1869, in Bulldog Gully, near Dunolly, Victoria. Two miners, Richard Oates and John Deason, had been surfacing in the gully for about two years. They were Cornishmen and had come out to Australia in 1854 in the same ship, arriving at Dunolly in 1862. They were fairly lucky during their first two or three years there, but four very lean years followed, during which they scarcely made a living. At the beginning of 1869 their capital was completely exhausted and on the very morning of their great find, Deason was unable to get a bag of flour on credit at the nearest store. But the two men must have been made of good stuff, for they tightened their belts and worked on. Deason was fossicking round the roots of an old tree, where an obelisk now stands to commemorate the event, when his pick struck something hard. He was a profane man—many miners are—and "Damn it all," he said, "I wish it was a nugget, and had broken the pick." You can imagine the eager delight of the two when they realised that here in very truth was the very grandfather of nuggets, which, as they feverishly applied pick and shovel, revealed itself as being even larger than their fondest hopes had pictured it. Their sensations were much the same, no doubt, as those which thrill the treasure-seeker of romance, when at last he has traced to its hiding place, on some haunted isle of the Spanish main, the long-lost hoard of the old-time buccaneer. So the very welcome stranger was joyfully levered from its long resting place and, with great labour and much helpful language, trundled to the miners' tent. All through that Friday night Deason sat before the fire clean-



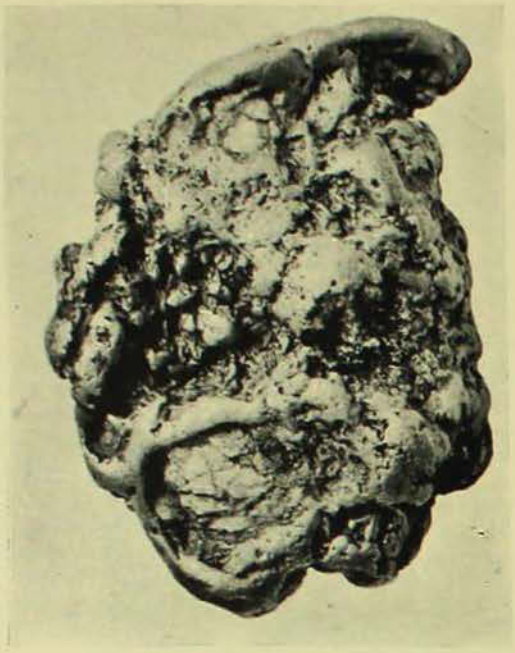
THE "WELCOME STRANGER" NUGGET.
From the Model in the Museum. *Photo C Clutton*

ing the nugget, and on Saturday morning it was loaded on a dray and taken into Dunolly. The finders had intended to cart the nugget to Melbourne and exhibit it there, but Deason did not like the look of the crowd that gathered round the dray in Dunolly. He decided to turn it into cash at once, so it was sold to the bank and melted after it had been solemnly christened in the presence of a large gathering of people, some of whom had travelled miles to assist at the ceremony. A few days later the two men were back at their claim, but no more nuggets rewarded them. They soon gave it up, and separated. Some years later the two mates again met at Dunolly. Meanwhile, Oates had made some fortunate investments and was richer than ever, but Deason's luck had forsaken him again and he was once more poor.

The "Welcome" nugget, but little smaller than its fellow, was found on June 15, 1858, in the Redhill Mining Company's claim, Bakery Hill, Ballarat, at a depth of 180 feet. The claim was being worked by a party of twenty-two Cornish miners, who, it is interesting to know, were the first to introduce steam-driven machinery at the Ballarat diggings. The nugget was first sold at Ballarat for £10,500, was exhibited at Melbourne for some weeks, and was sold there on March 18, 1859, for £9,325. It was melted in London, November, 1859.

These are the two most celebrated gold nuggets, but many others of considerable value have been found in Victoria, New South Wales and, more recently, in Western Australia. In the early days of shallow sinking, both in Victoria and New South Wales, the digger was ever cheered and spurred on by the hope that to-morrow his pick might encounter a lump of gold which would make him rich for life; to the sanguine every new rush was the promised land. Some miners had extraordinarily good fortune. A party of newcomers, just out from England, started to work an abandoned shaft 60 feet deep at Canadian Gully, Ballarat, and had deepened it only about four feet, when the man below drove his pick into a lump, too soft for stone, too hard for clay. Working round the obstacle, he prised it up and, examining it by the light of his candle, he was amazed and delighted to find that he had unearthed a nugget, which was found to weigh 1,117 ozs. Two days later the same party found another nugget of 1,011 ozs., and two of them, after but a few weeks in Australia, returned to England, rich men. What fine immigration agents they would have made!

But the finding of nuggets was not all romance; it had its tragic side. Sometimes the finder's mind became unhinged by the sudden accession of wealth, and he lived out his life babbling witlessly of gold. Then again the work was hard and often



THE "MAITLAND BAR" NUGGET
which is still in existence.

disagreeable, especially to men who had no previous experience of mining or any other kind of manual work. The surface deposits, particularly in Victoria, were exceedingly rich and in the early 'fifties of last century, a stream of goldseekers poured like a tide towards this El Dorado. The *Argus* of October 3, 1851, makes interesting reading:—

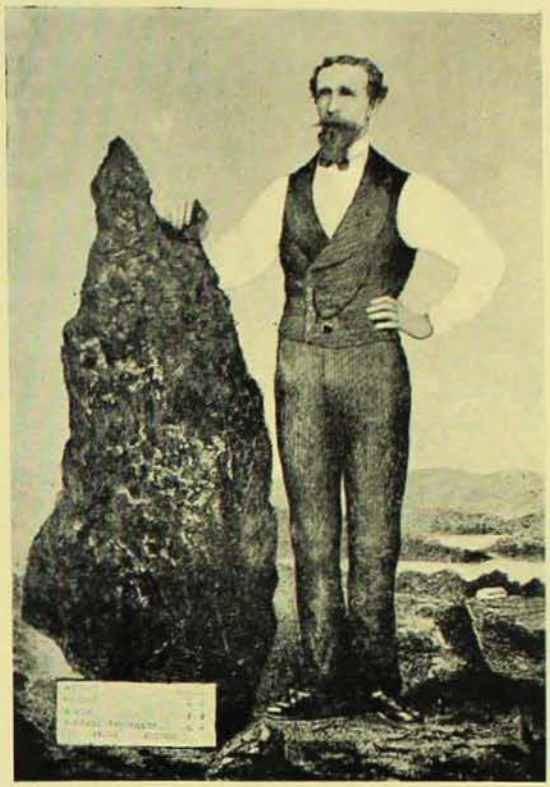
"The police force are handing in resignations daily; even the sergeants are deserting. The custom house hands are off to the diggings; seamen are deserting their vessels; tradesmen and apprentices are gone; the masters are following them; contractors' men have bolted and left large expensive jobs on their hands unfinished. What are the contractors to do? Why, follow their men, and off they go. Patients, on becoming convalescent, forget the attention of their doctor, and his kindness in bringing them round, and depart without even wishing him good-bye; the doctor must, of course, follow; and the lawyer, on the same principle, follows his clients."

The diggers suffered severely for want of provisions, which were both scarce and dear (a bag of flour cost £5), and an even more terrible menace haunted them. Masterless men and adventurers from all the colonies and from abroad hastened to Victoria in search of easy money. Ticket-of-leave men from Tasmania, then a penal colony, crossed the strait, determined to get their share of plunder, and many deeds of violence stain the annals of gold-mining in Australia. The digger who had accumulated a store of gold never went to sleep without the fear that he might be assailed by some savage robber before morning. Men went armed in the daytime and fortified themselves at night. One particularly brutal affair may be mentioned. Two miners were attacked and robbed, one being shot in the leg. As the marauders were tying the wounded man to a tree, one of them felt the bullet, which was embedded in the muscles of his thigh, and callously cut it out with his knife, saying he might want to use it again. Saving men, these bushrangers!

New South Wales has not produced so many large nuggets as Victoria, the largest being that found at Burrandong, near Orange, November 1, 1858. It weighed 1,286 ozs., valued at £4,389. It was melted at the Sydney mint, but no model of it seems to have been made. The "Maitland Bar," a nugget weighing 345 ozs., worth about £1,236, was found at Maitland Bar, in the Mudgee District, in 1887; it is one of the few large nuggets still extant, and is the property of the New South Wales Government.

Much discussion has taken place concerning the origin of gold nuggets. Mr. Evan Hopkins, in a pamphlet published in 1853, advanced the curious hypothesis that the roots of trees have the power of attracting gold from the earth and storing it in masses near the surface. Another view, which has been supported by such well-known Australian geologists as Selwyn, Daintree, Wilkinson, and Newbery, is that nuggets have been formed in the drifts by successive depositions of metallic gold from circulating waters carrying gold in solution. No doubt under favourable circumstances gold may have been deposited from solution by organic matter or metallic sulphides, and some nuggets may have been enlarged in this way, but the theory now generally accepted is that they come from gold-bearing quartz reefs which have been destroyed by denudation, and the gold masses thus set free have been carried perhaps many miles from the parent reef by the agency of running water. In the course of ages the adhering, brittle quartz would be largely removed, and the base metals originally alloyed with the gold would be leached out, which would account for the observed fact that nuggety and alluvial gold generally is purer than reef gold.

It has been argued by the upholders of the growth hypothesis that, if nuggets are derived from lodes, we should find large masses of gold in quartz reefs much more frequently than is the case; but it must be remembered that the reefs exploited by man are probably much smaller in extent, and perhaps poorer in gold content, than the long-vanished reefs from which came our alluvial gold deposits.



MR. HOLTERMANN
AND THE HOLTERMANN NUGGET.

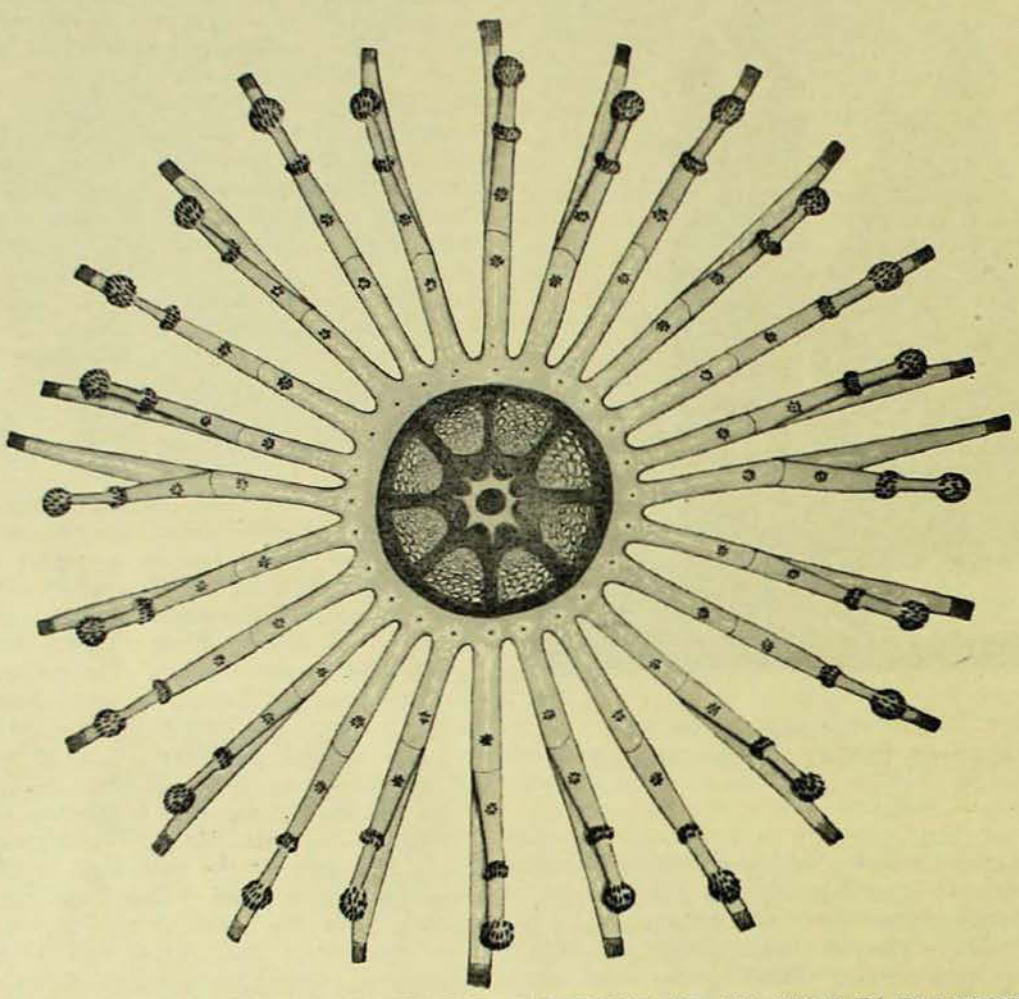
That quartz lodes are sometimes remarkably rich in patches is proved by Kerr's "Hundredweight" and Holtermann's "Nugget." The former was found at Hargraves, New South Wales, in July, 1851, by a Wellington black, a shepherd in the employ of Dr. W. J. Kerr, of Wallawa. He observed some glittering substance on the surface of a block of quartz, broke off a portion with his tomahawk, and found a mass of gold. He hastened home and communicated the glad tidings to his master, to whom he presented whatever gold might be contained in the block. Dr. Kerr lost no time in reaching the spot (is not Kerr a Scotch name?) and the gold, which was in three pieces and weighed 1,272 ozs., was soon lodged in a Bathurst bank. The grateful doctor presented the blackfellow and his brother with two flocks of sheep (about 1,500), two saddle horses, a team of bullocks and a quantity of rations. Regarding this valuable find, Sir C. A. Fitz Roy, in a dispatch to Earl Grey, dated August 15, 1851, naively states: "I am happy to say that although this excitement still continues, and has renewed the migration of adventurers to the goldfield, it has not unsettled the minds of those engaged in industrial pursuits so much as might have been expected; agricultural labours especially have not been suspended, and I believe from information that has reached me from various parts of the colony, and from my own observation, that a larger breadth of wheat has been sown this year than has ever been sown before."

Another huge lump of reef gold, probably the largest mass of the precious metal ever discovered in any part of the world, was found in November, 1872, in Beyers and Holtermann's claim at Hill End, New South Wales. This slab of gold and quartz, which has been called Holtermann's "Nugget," was four feet nine inches high, and over two feet wide. It was valued at £12,000, which, however, is probably an approximation only, as it was crushed along with a quantity of other stone. The late Mr. J. B. Holtermann, who was one of the principal shareholders in the mine, had himself photographed along with the mass of gold shortly after its discovery, and, later, had a woodcut prepared from the photograph, which he used in advertising some patent medicines in which he was interested. Holtermann built a large home at North Sydney, which was later owned by Sir Thomas Dibbs, and is now the North Sydney Grammar School. Both Holtermann and Beyers lost the money that they made from the nugget. Holtermann financed a number of unsuccessful schemes, and Beyers put his money into the Golden Grove Estate, Darlington, but lost most of it, his solicitor absconding with £60,000.

The usefulness of the Museum as a State institution for recreative instruction and research is greatly restricted by the lack of space for exhibition, for storage of specimens, and for extension of the library; more workrooms, too, are needed if the Museum is to pursue a forward policy such as will bring it into line with modern museums. As the President has said in his address of June 10, 1919, "the whole area of ground still available should be covered with suitable buildings"; in fact, the time is not far distant when more land should be acquired to provide for future needs.

A CRAWLING JELLY-FISH FROM PORT JACKSON

By E. A. BRIGGS, B.Sc., Lecturer in Zoology, University of Sydney.



THE NEWLY DISCOVERED JELLY-FISH IS ONE-EIGHT OF AN INCH IN DIAMETER.

To the rich and varied fauna of Port Jackson there has recently been added a new and interesting form belonging to the curious little group of animals known as crawling jelly-fishes.

The creeping or crawling jelly-fish from Port Jackson was first obtained in March, 1917, from a collection of sea-weeds, which had been scraped from the sides of a rock-hewn bathing pool at Point Piper, a sandstone headland on the southern shore of Port Jackson, about two and three-quarter miles from the entrance to the harbour.

Some two years later a further search for the crawling jelly-fish was conducted at Point Piper, from low water mark down to three to five feet below it. The material was obtained by scraping down the face of a weed-covered wall and collecting the dislodged masses of sea-weed and other marine growths in a small hand dredge. At the same time a net of fine silk attached to a wire ring on the end of a light pole was swept backwards and forwards through the water, in order to catch any specimens which might have been set free during the scraping of the wall.

Unfortunately, the animal is rather rare, but subsequent visits to the same locality yielded a number of specimens, thus affording an opportunity of observing its habits, which are little known.

Previous to the discovery of a crawling jelly-fish in Sydney Harbour, these animals were known only from the Falkland Islands, the Cape of Good Hope, Kerguelen Island and Antarctica, while two species had also been recorded from the Northern Hemisphere.

The crawling jelly-fish from Port Jackson is exceedingly small; its body is only the size of a pin's head, and is shaped like a miniature umbrella, with a short, thick handle, and a fringe of tentacles around the edge. Each tentacle consists of a main stem, which is divided at its extremity into an upper and a lower branch. On the upper branch are borne the batteries of stinging-capsules, by means of which the jelly-fish is able to ward off the attacks of

enemies or exert a numbing effect on the animals upon which it preys. The lower branch of the tentacle, which is used for crawling, ends in a sucker-like extremity. By means of these suckers and their secretion the animal is able to adhere so firmly to the smoothest surface that it is very difficult to detach it.

The most striking feature of the animal is its mode of progression. Ordinarily a jelly-fish floats in the sea with the tentacles hanging downwards, or it swims by contractions of the powerful muscles on its under surface, which drive out the water of the umbrella and send the animal forward in the opposite direction. In the case of the creeping or crawling jelly-fishes, the tentacles are modified into ambulatory organs, by means of which the animal moves actively over the surface of a seaweed or other marine growth. When the jelly-fish is lightly touched on one side, the crawling movement can be readily observed; the tentacles on the side opposite the source of irritation are released and applied at a point further from the body, which is then moved in this direction. Progression is also assisted by a reverse movement of the tentacles on the other side.

Another characteristic and almost constant movement is exhibited by the tentacles. This movement consists of a sudden jerking upwards, so that the upper branch of the tentacle, with its batteries of stinging-capsules, is thrown over the body, the lower or sucker-bearing branch at the same time loosening its hold on the substratum and sharing in the upward movement. It has been suggested that this action may have some protective function, since by it the clusters of stinging-capsules are thrown over the upper surface of the body. This movement is maintained almost constantly when the animal is stationary, and differs entirely from the slow and deliberate movement of crawling.

Crawling jelly-fishes are not known to swim, except the Falkland Island species, which is apparently able to do so. The species from Port Jackson was never observed to swim; neither could any swimming motion be induced by dropping the specimens into sea-water. They would fall straight to the bottom of the vessel and then move along the surface of the glass by slow crawling movements.

The small jelly-fishes or medusæ are really special bodies carrying the generative organs. They originate as members of a fixed, usually branched, plant-like animal or "Zoophyte," from which they are set free by breaking away as little umbrella-shaped bodies. These individuals differ widely from the fixed form, being, indeed, so unlike it that their origin would never have been guessed if the separation had not been seen to take place.

The discovery of a crawling jelly-fish in Port Jackson is, therefore, extremely interesting, but up to the present this one has not been traced to its fixed form.

DYING SLOWLY.—A Sea-egg or Heart Urchin, *Breynia*, which buries itself in the sand of the lagoon at Lord Howe Island, can withstand an amazing amount of injury and still live. If its shell or test be broken open, it is seen to be filled with little more than a membranous gut distended with mud, and a few reproductive organs. The removal of these inner works, however roughly, seems to cause the animal but little pain, since it merely waves its many spines around in feeble protest, and if given the opportunity, will dig itself into the sand again as effectively as though its vital organs were all in their proper places.

Several specimens which were being prepared for museum purposes had all of their soft parts removed except the extremely thin membrane which lines the test, yet they waggled their spines around freely for at least half an hour afterwards, the movement becoming quite frantic when they were finally immersed in fresh water. One wandered around a flat board upon the tips of its spines, apparently searching for its well beloved sand beneath the lagoon waters.

Heart Urchins, so lowly in organisation, are evidently but little affected by what we more sensitive beings recognise as pain, and consequently die very slowly from injuries which would instantly destroy more highly organised animals simply through the shock to their nervous systems. But though so lowly, they nevertheless construct amazingly intricate shells for the protection of their soft parts, their apparently simple membranes secreting wonderfully complex and ornate plates which interlock so accurately that an examination of them leaves us lost in admiration.—A. R. McCulloch.

SNAKES

THEIR FANGS AND VENOM APPARATUS. THE ACTION OF VENOM AND THE TREATMENT OF SNAKE-BITE

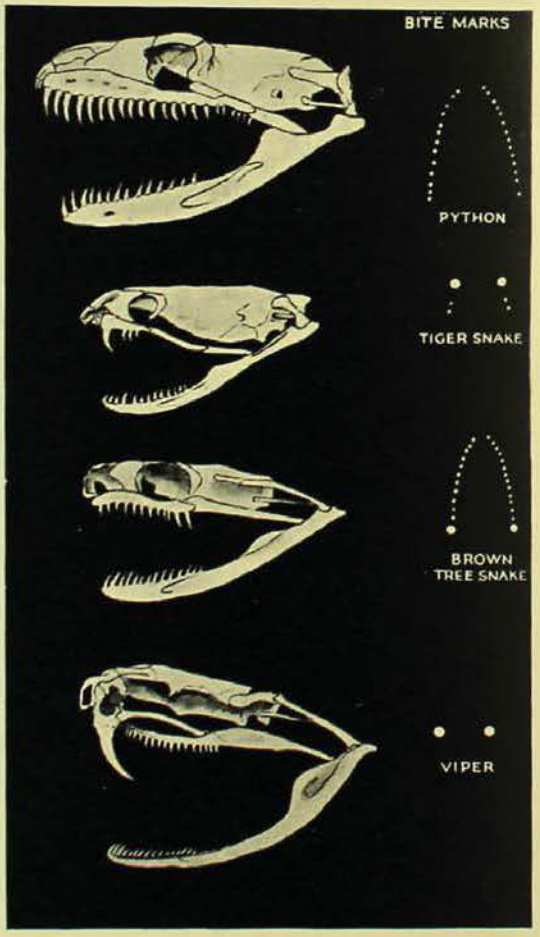
By J. ROY KINGHORN.

Venomous snakes are divided into two large groups: those having fangs situated in the front of the jaw, and others that carry them towards the rear of the jaw. The second group need not concern us very much, but I might say before passing that their fangs are never hollow, but are always grooved. A typical representative in Australia is the Brown Tree Snake, which is absolutely harmless to man or any of the larger animals.

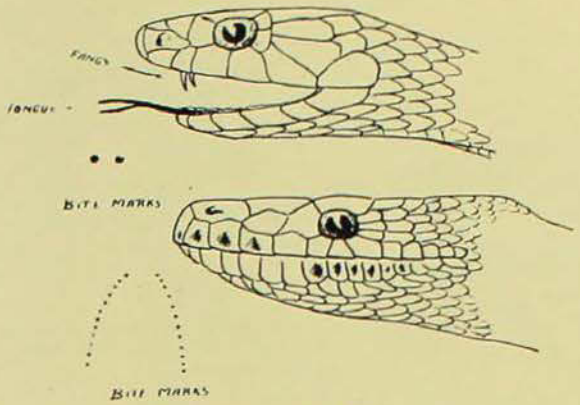
The first group concerns us most as the majority of our Australian venomous snakes belong to it, as do the Cobras and Krait of India, and the Rattle Snakes and Vipers. The poison fang is a pointed, very sharp, recurved tooth, bearing along its length either a groove or a canal, ending a short distance from the point.

Australian venomous snakes have either grooved or hollow fangs which are permanently erect. The Vipers and Rattle Snakes have enormously developed fangs attached to movable bones so that they may be automatically erected and depressed as the jaws open and shut; these fangs are almost perfect in structure, and may be likened to a hypodermic needle, as the edges of the groove are so flattened against each other that there is no trace of the join on the surface. As venomous snakes depend entirely upon their fangs in killing their prey, they would naturally suffer considerable inconvenience if they were without them for any length of time through loss, so Nature has made ample provision in the great majority of cases by arranging reinforcements in the form of series of successively paired fangs which grow in the gums, and are in various stages of development, the most advanced pair being in a socket beside those in use and becoming solidly fixed and attached to the venom apparatus as soon as the old ones are lost.

The venom of snakes, and the apparatus by which it is injected, are subjects which have been extensively investigated by scientists. The venom glands of snakes are situated under the eyes, and each gland is enclosed in a dense fibrous sheath which is surrounded by the main muscles of the jaw. From each gland there is a duct, or tube, which extends forward, terminating over the entrance to the canal or groove in the fang. The harder a snake bites the harder the



SKULLS OF SNAKES SHOWING BITE MARKS
At the top is a Python skull (such as Carpet or Diamond snake which are non-venomous, all the teeth being solid). Next is a Tiger or Black snake, and at the bottom a Viper, all of which are venomous. The Brown Tree Snake with fangs at the rear of the jaw is only slightly venomous.



Venomous snake above and Python (non-venomous) below.

tube is pressed against the canal in the fang, thus preventing any escape of venom other than through the canal or groove.

Venom can be ejected by some of the Cobras in another manner than that of biting, the process being known as spitting. Observation has shown that venom is evidently forced into the mouth and mixed with the saliva, then it is ejected through the lips to a distance of six or eight feet. Several people have been temporarily blinded through it entering their eyes and causing severe inflammation.

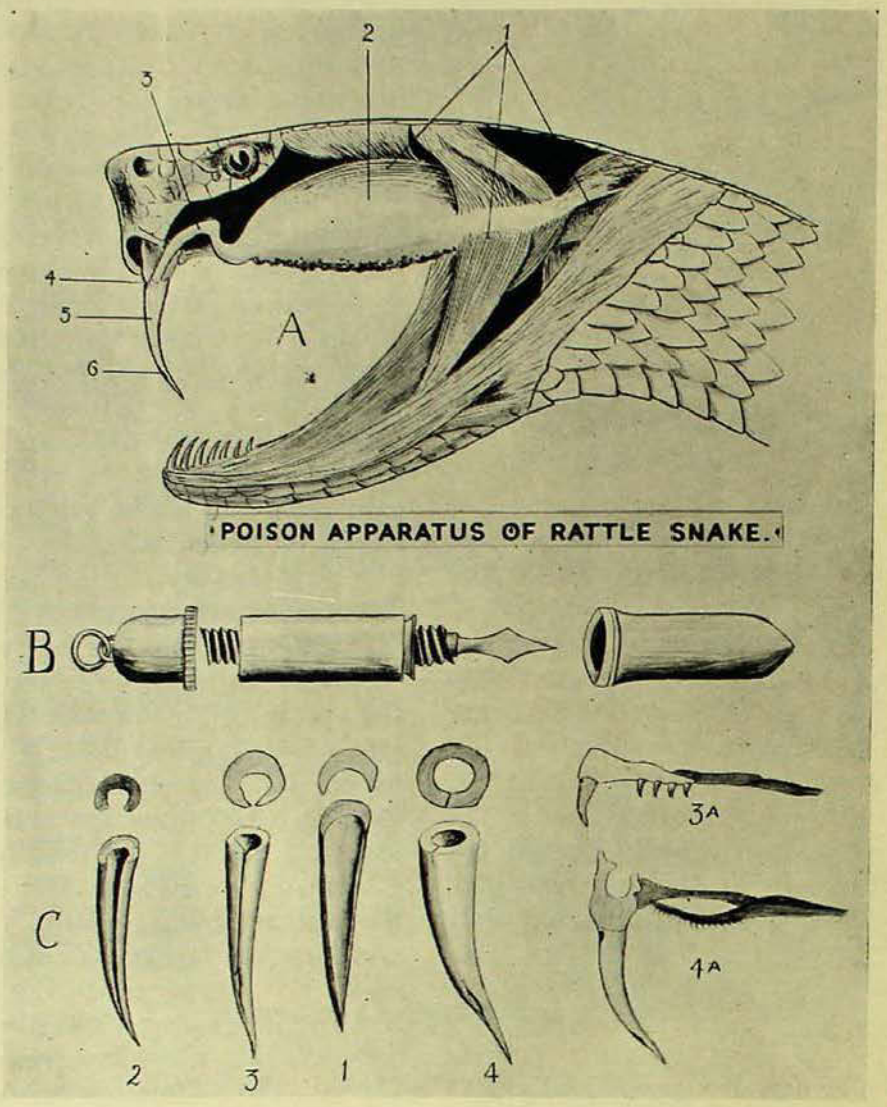
Study and investigation have shown that most snakes possess certain glands which supply their blood with substances antagonistic to venom to render them immune to their own poison and often to that of other snakes. Several animals and birds which are snake killers also have these glands developed, and are therefore immune to the effects of the poison.

Although the actions and symptoms which follow the bites of different snakes appear to be identical, it has been found that a serum which brings about immunity against one species has proved a failure in cases of bites caused by other species. Serum prepared for use against the Cobra poison has proved futile against that of other species, and the same is perhaps the case between any two species of snakes throughout the world. Many instances, of which the following are several, might be given to prove this. A man who was well known around Sydney went to India, taking with him an antidote which he had used successfully against the venoms of Australian snakes. He was of the opinion that this same antidote would secure immunity from the poisons of the Indian species. He was bitten by a Krait, however, the venom of which acted upon his blood and nervous systems in a manner so different to what he had been used to in Australia, that the antidote failed to take effect, and he died. Another man, who had become immune to the poison of the Tiger Snake, was bitten by a Copperhead or Superb Snake, and the bite proved fatal. Others, who have become immune to the venom of Vipers have died when bitten by Cobras.

The immunity of the Indian snake-charmer is brought about by his having submitted himself to a graduated series of injections of the venom of the species of snake with which he intends to play; this process of innoculation takes a considerable time to mature before the man becomes quite immune, and it is not without its risks.

Recent investigation has shown that the venom of the Cobras, Sea Snakes, and our Australian species acts mainly upon the nerve centres which control the heart and respiration, eventually bringing about respiratory paralysis. At the same time, however, there may also be a clotting of the blood, but in the Vipers and Rattlesnakes this effect seems to be reversed, the main action being the clotting of the blood. Doctors Feyrer and Brunton, two famous workers on snake venoms, hold the opinion that no special law can be laid down relating to the effect of venom, as it is dependent upon the species, state, and size of the snake, the quality and quantity of its poison, and the circumstances under which it inflicts the bite; secondly, the species, size and vigour of the victim, and the circumstances under which it is bitten.

In India in 1911 there were over 24,000 lives lost through snake bite, but when the size of the population is taken into account, together with the fact that the majority of the people go about in the bush and jungle barefooted, it is a wonder that there are not many more deaths from bites than the number stated.



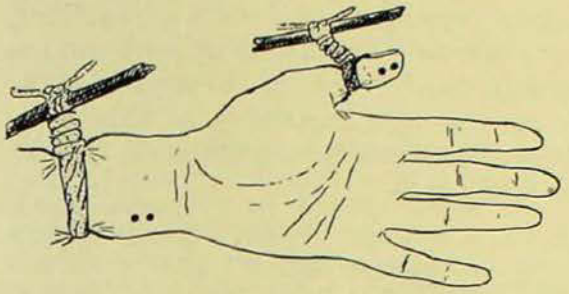
The venom apparatus of a snake consists of a pair of hollow or grooved fangs, situated one each side of the upper jaw, generally at the front of the maxillary bone. To each of the fangs is attached a tube and a venom gland, the latter lying along the upper jaw, just under or behind the eye. When a snake bites, the muscles which surround the gland squeeze out the venom, force it along the tube and into the hollow fang, through which it passes, eventually finding its way out through an opening near the point, which may be buried deep in the flesh of a victim.

On the diagram there will be seen the poison apparatus of a Rattle Snake, and for convenience this may be considered typical of Australian venomous snakes, except that the fangs of our species are very much smaller and are permanently erect. The illustration shows the apparatus of one side of the head only.

A. (1) Muscles which open and close the jaws, surround the venom gland and squeeze out the venom. (2) Venom gland, situated in a dense sheath of fibrous muscle. (3) Duct or tube, along which the venom is forced to the entrance of the canal in the fang. (4) Entrance to the canal in the fang. (5) Hollow fang. (6) Opening through which the venom leaves the fang.

B Brunton's first-aid instrument for snake bite, consisting of a lance, a screw cap cover, and a hollow handle which contains crystals of permanganate of potash.

C. (1) Ordinary grooved tooth possessed by many snakes in addition to the fangs. (2) Grooved fang as in the back-fanged snakes. (3) and (3a) Typical fang of Australian species, or the Cobras, etc., in which the groove is not quite closed; this type of fang is generally followed by one or more small teeth. (4) and (4a) Typical hollow fang possessed by Vipers and Rattle Snakes; the groove is completely closed; there are no other teeth on the maxillary bone, and it is erected or depressed as the jaws open and shut.



Ligatures tied to prevent snake poison spreading through the blood to the heart. The dots represent bite marks.

Throughout the world there are many medical men who are making investigations and experiments with venoms with the object of finding an absolute antidote, one that will act successfully against poisoning and death from snake bite, no matter what species of snake inflicts the bite. A vast amount of valuable information has been supplied during the last few years.

In Australia the most dreaded species of snake is the Death Adder, and rightly too, for over 50 per cent. of persons bitten by this snake succumb to the venom. The Tiger Snake comes next with a ratio of 45 per cent. deaths to bites inflicted; while the Brown Snake is much less deadly, the percentage of deaths from its bites being about eighteen. The Black Snake has very few deaths recorded against it at all, although the majority of bites are from this species.

In this country a fair number of fatalities from "snake bite" occur every year; in many cases, lives which have been lost could have been saved if proper treatment had been given. Some of the improper treatments one hears of, however, such as chopping off a finger or a toe, cutting out lumps of flesh, knocking a patient about to keep him awake, and other equally harsh operations, are absolutely unnecessary, and often dangerous, and my effort here is to save all this as well as a few lives, by giving a safe and sure remedy, one that is within the reach of all, and if carried out quickly and correctly, should never fail in cases of bites from any of our Australian snakes.

Anyone who moves about where he is likely to come in contact with venomous snakes, or any home situated near where these reptiles abound, should have the following essentials: (1) crystals of permanganate of potash, (2) a small, sharp knife or lance, (3) and some string, elastic or rag that can be used as a ligature.

Following upon a bite from a venomous snake, and within a minute, if possible, a ligature must be applied close above the punctures, and on the side nearest the heart. Insert a stick into the loop of the ligature and twist it round until the latter is exceptionally tight; this is painful, but necessary. Then tie the stick higher up to prevent it unwinding. As soon as this is done wipe away any venom or saliva that may be on the surface of the skin, and make several longitudinal cuts over the fang punctures; they should be as deep as, or deeper than, the punctures inflicted by the snake. Into these cuts force some crystals of permanganate, and then squeeze the wound so as to get rid of as much of the poisoned blood as possible. If there are no cuts, cracks or abrasions on the lips or in the mouth, the wound may be safely sucked, either by the patient or by a friend; if any of the venom is accidentally swallowed, no harm will come of it so long as the stomach is healthy and free from ulcers or inflammation. If the bites are on any part of the body where a ligature cannot be applied, as much of the above treatment as possible must be faithfully adhered to. As soon as these operations have been carried out, a doctor should be sent for, but if they have been performed quickly and thoroughly, there need be very little anxiety as to the result, since permanganate of potash has been proved to be an absolute antidote to snake venom once it comes in contact with it. If a ligature be kept tight for more than half an hour there is danger of mortification setting in, so at the end of that time it should be loosened for an instant, and then tightened again. This operation should be repeated every five minutes, and the doctor will

advise as to when the ligature may be finally removed.

Some writers have advised that if the bite is anywhere on the forearm or wrist, the ligature must be placed above the elbow, as there is only one bone there, and more pressure can be brought to bear upon the blood vessels, but, as venom spreads exceptionally quickly, it is advisable to have it tied close to the wound so that the poisoning will be localised, and the venom can be removed more easily than if it were allowed to spread throughout the muscles. A second ligature may be placed above the elbow if desired, but it is not absolutely essential.

Alcohol and ammonia have no curative effect whatever, either taken inwardly or applied to the wound. Venom has been mixed with both these chemicals and has retained all of its poisonous properties.

In some countries, especially where Cobras and Vipers exist, an antivenine serum is procurable. This is injected hypodermically near the site of a bite, and has proved to be most effective. It is prepared by treating an animal (usually a horse) with increasing doses of venom for a considerable time, until it becomes immune to almost any amount of venom that may be injected into it; then the serum is extracted. It is effective in cases of bites from the species of snakes used in its preparation, but not in those in which the victim has been bitten by some other species; for instance, Cobra antivenine is an antidote to Cobra poison only. Some years ago the Public Health Department of New South Wales made a number of experiments by treating a horse with the venom of a Tiger snake; eventually an antivenine serum was prepared and was effective, but only for bites inflicted by Tiger snakes. In 1906 the same Department issued a pamphlet on venoms, compiled by the doctor who made all the experiments, and I have no doubt that any reader who is interested may still be able to procure one on application to the authorities concerned. There are many other splendid papers on snake venoms, antidotes, treatment, etc., but they mostly deal with snakes which are foreign to Australia. The following is a summary of the treatment, in the order in which it is best to apply it:—

1. Ligature: to localise the effect of poisoning.
2. Cut the flesh: to drain away poisoned blood.
3. Apply permanganate crystals: to neutralise and kill the venom.
4. Suck or squeeze out as much blood as possible.
5. Send for a doctor.

I have placed the doctor last on the list for the reason that every second is valuable; and every second that treatment is delayed means that the venom is getting a better hold upon the system. If the patient shows signs of collapse, give stimulants such as small doses of brandy or whisky, etc., or strong tea and coffee; he must also have complete rest.

Unless one has made a close study of snakes, it would be almost impossible for him to determine at a glance a venomous from a non-venomous species, but the bite marks of the two types differ considerably from each other, as illustrated on page 22.

In Australia there are only two well-known non-venomous snakes, and they are the Diamond and Carpet snakes; so, for safety's sake, all other species had better be looked upon as deadly, or at least venomous.

Any Australian snake which is not thicker than your little finger is too small to inflict a fatal bite.

It is as well, however, to treat all bites as dangerous, because in some cases, where the bite is from a non-venomous type, blood poisoning may set in.

In cases where the large number of punctures leaves no doubt as to the bite being that of a non-venomous snake, it is not necessary to apply a ligature or to cut the flesh, but the wound should be washed in a weak solution of permanganate of potash; and hot fomentations would be of great value.

MUSEUM GROUPS.

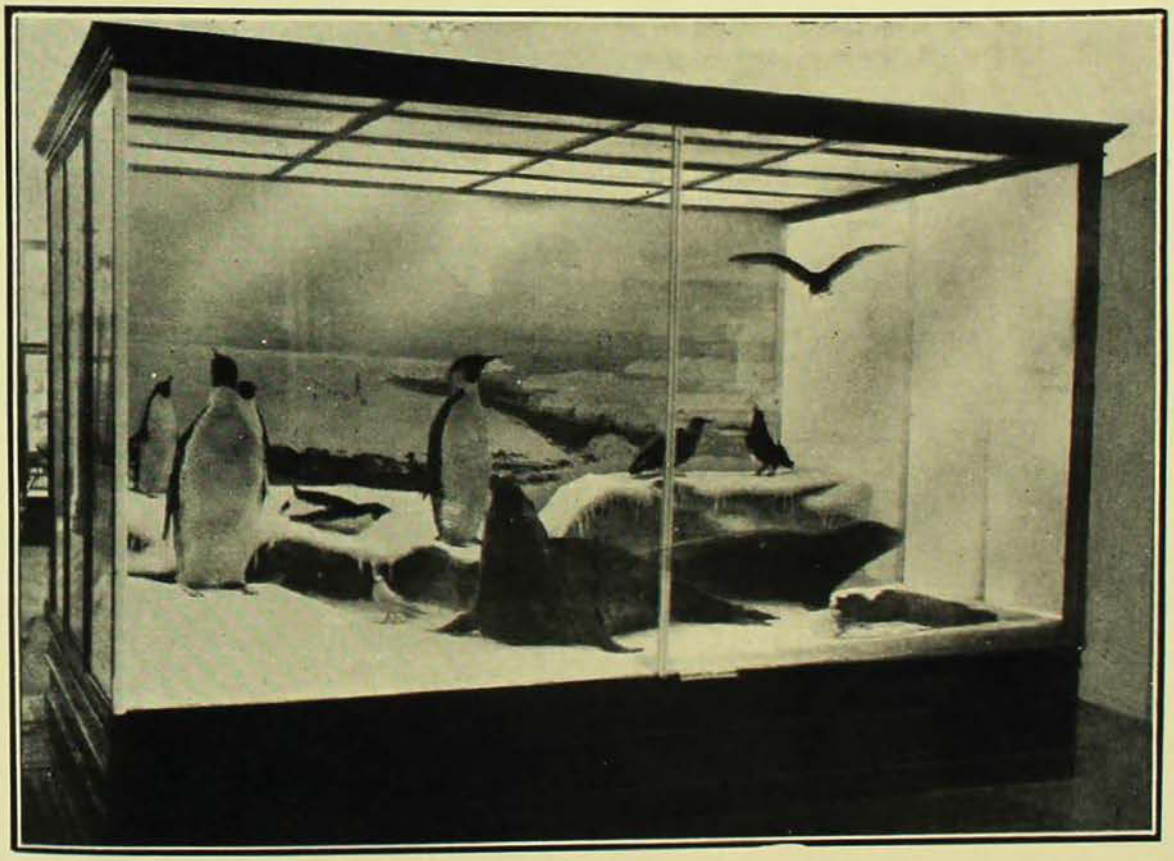
By THE EDITOR.

Until comparatively recent times, the animals shown in museums were mounted in uniform rows, as single exhibits. Some daring innovator might go so far as to display a bird perched on a twig, or a mammal crouching on a bit of rock-work, but groups in the modern sense were scarcely thought of until about fifty years ago. Now museums vie with one another in their efforts to display, not only the animals themselves, but their environment also, in the most realistic manner.

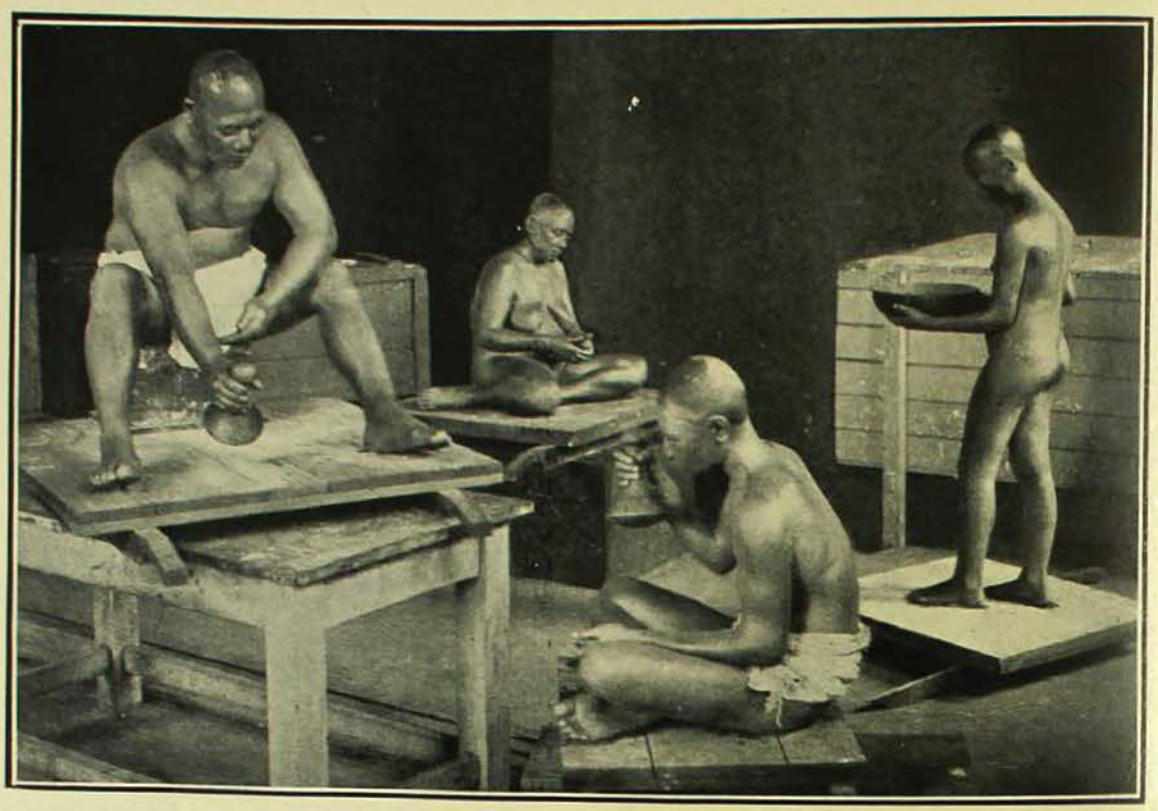
The earliest attempt to realise the habitat group idea was made by Mr. E. T. Booth, of Brighton, England, who made a collection of British birds, and mounted them, with accessories, to reproduce more or less closely the surroundings in which they were obtained. The first bird group was installed in the British Museum through the instrumentality of Dr. R. Bowdler Sharpe, and a number of attractive exhibits of this kind, showing the birds in their native haunts, usually accompanied by their nest and eggs, now adorns the Bird Gallery of that great institution. These groups are comparatively small, but are constructed with great fidelity; the actual soil, stones, grass, shrubs, and even incidental dead animals, were transported bodily to the museum, and there assembled in the exact manner of their occurrence.

This painfully exact "restoration" method has been improved upon by Dr. Frank M. Chapman, of the American Museum of Natural History, New York, where the finest examples of group exhibits are to be

These animals and birds were all brought from the Antarctic by Sir Ernest Shackleton and Sir Douglas Mawson, and presented by those explorers to the museum. The small picture shows the group under construction. In nature the birds would not pose with such unconcern if they discovered a seal emerging from a "blow-hole," but would make hurried undignified departures.



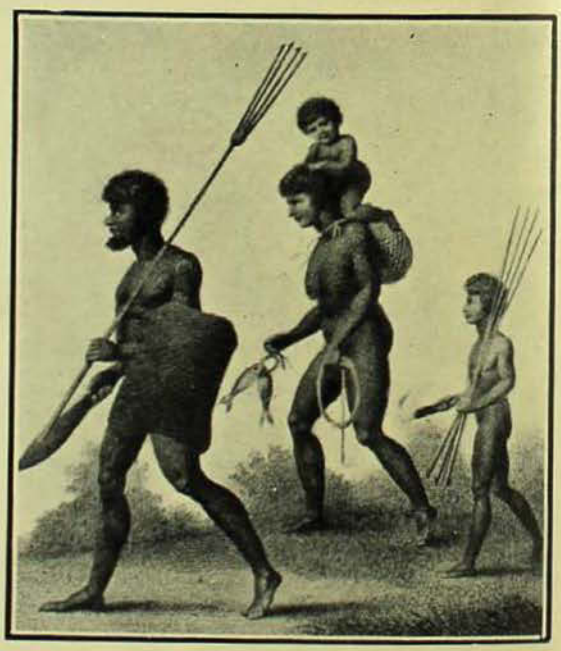
DWELLERS OF THE ANTARCTIC CONTINENT.



THE HAWAIIAN GROUP IN PREPARATION.
The figures are shown without wigs, and the properties which are displayed with the completed group are not yet added.

found. These, and similar up-to-date groups elsewhere, have a foreground which is not an exact copy of any particular spot, but is intended to give a good general idea of the sort of place where the animals live. The plants and shrubs, the rocks and soil, are imitated as closely as possible to harmonise with the actual conditions surrounding the living animal. This foreground merges into a painted, curved background, resembling the drop-scene of a theatre, which, by a clever use of perspective, conveys an illusion of expanse and distance, so that, when viewed from a darkened passage-way in front, the whole scene, which is illuminated from within the case, has an almost startling air of detachment.

In the Australian Museum, groups of nesting birds, and some of the smaller Australian mammals, such as the platypus and the native cat, were installed years ago. These small groups, which are comparable with the habitat bird groups in the British Museum, are skilfully and artistically arranged, and are life-like representations. More recently a large case, containing a group of four lions, each a fine example of the taxidermist's art, has been provided with a scenic background of forest, plain, and hill, with here and there small herds of zebras, antelopes, and giraffes. The foreground and the mounted lions are the work of Ward's Natural Science Establishment, Rochester, New York, "the godfather of all museums," which has played an important part in the development of modern taxidermy and animal groups; the background was painted by Mr. H. R. Gallop. Within the last twelve months an Antarctic group has been added. Here, the foreground represents a low, snow-covered shore, with the seals and birds characteristic of these inhospitable regions; and, extending away to the distance, is an ice-



A quaint old sketch of a family of Sydney Aboriginals made by Governor King when he governed New South Wales. The family are returning from a fishing expedition, the man carrying a curious fishing spear. It is such groups as this that the Museum hopes to erect.

THE HAWAIIAN GROUP COMPLETE.
The family is shown engaged in their ordinary work. The old woman beats out the bark of a tree to make native cloth; the girl assisting by pouring water on the material. Both men are mashing the roots of Taro into "poi" or native porridge.

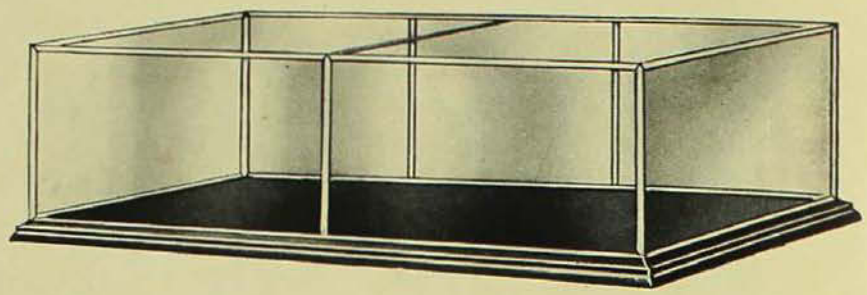
field, broken up by lanes of blue water. In the offing lies a ship, and a landing party is shown on the ice front. This Antarctic group reflects the greatest credit on the taxidermist, Mr. H. S. Grant, and his assistant, Mr. J. H. Wright, who mounted the animals and constructed the foreground, on Mr. Gallop, who painted the background, and on Mr. A. R. McCulloch, who superintended the installation. Any defects in the group are attributable to the fact that, as yet, there is no system of artificial lighting in the museum.

Groups such as these convey much more information to a visitor than serried ranks of single exhibits, and also create a livelier interest in the facts of natural history. With this object in view, the administration has projected additional groups—one representing a coral reef pool, the haunt of sponge and pearl-shell, tenanted by many-coloured fishes, and walled in by masses of gorgeous coral. In the Great Barrier Reef, Australia can boast of the greatest accumulation of living coral in the world; yet comparatively few Australians have any adequate conception of the transcendent beauty and brilliant colours of live coral, so unlike the specimens seen on mantelpieces or museum shelves. Another will show a tide-pool in Port Jackson, peopled with the marine organisms common in our harbour.

The group idea has been extended to include man as well as the lower animals, so that ethnological and historical exhibits are no longer confined to collections of weapons, utensils, and ornaments; for every progressive museum now endeavours, by means of carefully executed models, preferably life-size, and prepared from living subjects, accompanied by appropriate implements and effects, to portray for its visitors the actual appearance, dress, customs, and daily life of various races of men. If it is desired to show a tribal group in a natural, out-of-doors setting, a pictured background is added to harmonise with the foreground. The Hawaiian family group, recently installed in the Ethnological Gallery, is one of the most admired exhibits in the Australian Museum. This depicts a family of four, engaged in the preparation of "poi" from the root of the taro, and the manufacture of tapa cloth from the bark of the paper-mulberry tree. These figures, which were cast from nature by Mr. Allen Hutchinson, and have been skilfully coloured by Miss Phyllis Clarke, from living models, are instinct with life.

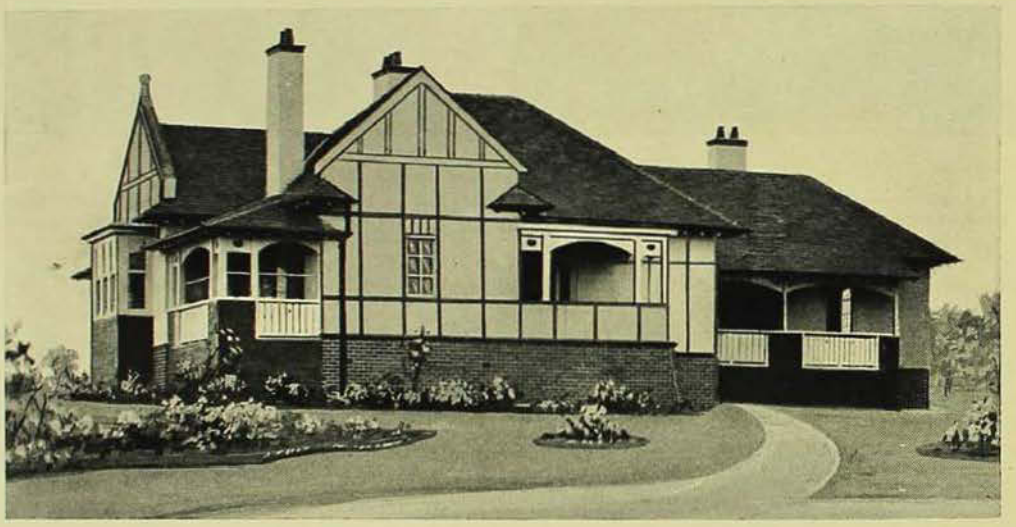
Our aborigines, like all primitive peoples who come into contact with civilisation, are rapidly dwindling in numbers; the Tasmanians are already extinct, and in the near future no full-blooded Australian black will be left. All the more, then, is it necessary for us to secure, while we may, and preserve for our descendants, faithful representations of the people themselves, their tribal customs, and their daily life. The Board of Trustees is fully alive to the importance of taking this work in hand, and a start will shortly be made with the first group of Australian natives.

Metal Showcases



While Wunderlich Metal Show Cases are essentially smart in appearance, yet their simple designs make them uncommonly efficient in displaying goods. Such cases can never distract attention from the objects they contain, and remain at all times solely a handsome accessory.

Asbestos Reinforced Cement—Durabestos



is composed of tough blue grey sheets of mineral asbestos fibre and cement, compressed to fiint-like hardness. Walls and ceilings of Durabestos are insect and fire proof; will not warp or buckle and are easily and quickly erected. By eliminating guesswork in estimating, Durabestos also avoids unexpected expense.

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