The AUSTRALIAN MUSEUM MAGAZINE

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

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THE AUSTRALIAN MUSEUM

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The Tasmanian Tiger or Wolf, as it is variously called, is the most powerful of the flesh-eating marsupials. It is restricted to Tasmania, though its fossil remains are found on the mainland. It has a dog-like form, and in its evolution it has closely parallelled the European wolf and other carnivores, its teeth in particular being similarly modified for rending flesh (see also figures of skulls in text).

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MAGAZINE

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VOL. 1. No. 3. DECEMBER, 1921.

Editorial.

THE MAGAZINE.

The Australian Museum Magazine, of which this is the third number, has met with a flattering reception; the first number was sold out in a few weeks, and the second (of twice the number of copies) is at the moment of going to press almost exhausted. This shows that there is a considerable demand for a publication of this kind, and is very gratifying to the trustees. No effort will be spared to maintain, and, if possible, to raise the standard of the Magazine, which we hope will continue to obtain the public support which is essential to its continued success.

MUSEUM LECTURES.

These lectures are increasing in popularity, and are now a well established feature in the intellectual life of Sydney. From quite modest beginnings they have grown until the lecture theatre is all too small for our needs. At the regular lectures held this year the accommodation has been taxed to the utmost, and more than once we have had regretfully to close the doors and leave many would-be hearers outside. Mr. A. R. McCulloch's lecture, "Lord Howe Island; A South Sea Tragedy," was so popular that it had to be repeated.

This year we have been able to add some extra lectures to the ordinary course, and to place the Lecture Hall at the disposal of distinguished scientists from other States and countries. Dr. J. V. Danes, Consul-General for Czechoslovakia, lectured on "The Physiography of Czechoslovakia," Dr. W. K. Gregory, of the American Museum of Natural History, on "Australian Mammals and why they are worth protecting," and Captain A. S. White, of South Australia, on "The Economic Value of our Birds." It is hoped that this innovation will become a regular feature.

WILLIAM STREET FRONTAGE.

Plans have been adopted for the improvement of the William Street frontage, which has been an eyesore ever since the City Council resumed part of the Museum premises for the purpose of widening the street, and the work will be proceeded with very shortly. It is proposed to erect a retaining wall along William Street, to level the ground on the northern front, and to terrace the eastern end, where also a roadway will be constructed to give access to the back of the Museum premises. When the work is completed it will enhance the appearance of the building, and also improve the lighting and ventilation of the basement rooms.

ELECTRIC LIGHTING.

The north wing is very badly lighted, particularly on the ground and first floors, where on a dull day the exhibits are seen to very poor advantage. It

is now proposed to instal electric lighting in these rooms, and also in the Lecture Hall, where its introduction will be a great boon. At the same time the lion group and the Antarctic tableau will be electrically lighted, with, it is hoped, a great increase in effectiveness.

Collecting.

Recognising that closer settlement is slowly but surely depleting our native fauna, and that our collections are still sadly deficient in material suitable for modern study, the trustees have wisely decided that the Museum should take a more active interest in field collecting. In furtherance of this policy Messrs. E. Le G. Troughton and J. H. Wright have been sent to South and Western Australia to obtain specimens of some of the rarer Australian mammals and birds, and Messrs. H. S. Grant and J. H. Wright will subsequently proceed to the Recherche Archipelago, south of Esperance, Western Australia, with an expedition led by Mr. A. F. Basset Hull, who is collecting and observing on behalf of Mr. H. L. White, of Belltrees, New South Wales. It is a pleasing duty to express our appreciation of the public-spirited action of Mr. Anthony Hordern, who has kindly made available part of the Hordern and Le Souef Research Fund to help in defraying the expenses of our officers while collecting in Central Australia, and of Mr. White, who generously invited the trustees to send two collectors to accompany the Recherche Expedition.

Nearer home some field work has also been done within the last few months. Mr. A. Musgrave spent some days at Upper Chichester, near Dungog, collecting mammals and insects, and Messrs. C. Hedley and J. R. Kinghorn joined the Royal Australasian Ornithologists' Union in their annual "camp out" at Wallis Lake, near Tuncurry.

By the kindness of Mr. E. B. Harkness, Under-Secretary Chief Secretary's Department, and Mr. A. P. Summergreene, manager of the State Trawling Industry, Messrs. F. McNeill, A. Livingstone, and H. O. Fletcher, have at different times accompanied one of the State trawlers on its cruise, and have thus been able to secure valuable material for our collections.

Museum Groups.

The Museum staff have been busily engaged for some time past in preparing groups for exhibition. A flying fox group is nearing completion; a large number of these bats will be shown clinging in characteristic attitudes to the branches of a tree.

Another interesting exhibit will be a pool showing the celebrated lung fish (*Neoceratodus*) of Central Queensland; a number of casts of this interesting fish have already been prepared by Mr. C. Clutton, and these will be coloured from studies made on living specimens.

Early in January some members of the staff will proceed to Lord Howe Island to obtain the materials and make the necessary sketches for a coral reef group, and a cliff scene with nesting boatswain birds and wide-a-wake terns. Mr. A. E. Phillips has generously promised a donation of £20 towards the expenses of this expedition, if four others will present a like amount; Sir James Burns, trustee, has, with characteristic generosity, agreed to make one of the four.

Need of Funds.

It is with peculiar pleasure that I have referred to the generosity of these various donors, for, though we are indebted to many kind friends for valuable donations of specimens, notably the Hargraves collection of shells presented by Mr. Thomas Walker in 1877, never before have we received any private benefactions for collecting, which is the very life of a museum. In America, where they do these things much better, the expenses of collecting expeditions are almost invariably borne by private benefactors, and at the present time two American museums have experienced collectors in Australia, who are doing remarkably good work. The Australian Museum is embarking on new enterprises, of which this magazine is one, and increased activity in collecting is another; for these purposes funds are required, and we confidently look to Australian citizens of means for help.

Australian Mammals and why they should be protected.

By Dr. W. K. Gregory.

[Dr. Gregory, who is Curator of Comparative Anatomy in the American Museum of Natural History, and Associate Professor of Palaeontology in Columbia University, New York, came to Australia this year, accompanied by Mr. H. C. Raven, in order to obtain by exchange and field collecting a typical series of Australian mammals, to be displayed in the projected Australian Hall of the American Museum. Acting on instructions from President H. F. Osborn, Dr. Gregory lost no opportunity of impressing upon Australians the necessity for protecting their unique and fast disappearing mammalian fauna, and, with this object in view, he delivered a lecture at the Australian Museum, the substance of which is reproduced in this article.]

The preservation of animals may be urged because of their beauty, their scientific interest, or their utility, and there are few indeed which have not some claim to protection on one or other of these counts. I shall not deal with Australian mammals as regards their economic importance, although a plea might well be advanced for their protection on that ground. An enormous number of marsupial skins are marketed every year in Europe and America; at one sale in St. Louis, the great fur mart of the United States, half a million skins of Australian 'possums were offered, and the Queensland Minister for Agriculture has said that in 1919-1920 no fewer than five and a quarter million 'possums and a million native bears were slaughtered in Queensland. If this slaughter continues these poor animals will be exterminated. Of course, there are other factors which are partly responsible for the depletion of the indigenous fauna of Australia, for foxes, bush fires, and poisoned baits are all doing their deadly work. This appalling waste is neither necessary nor inevitable if proper means are taken to prevent it. There is a saying that "You cannot eat your cake and have it too," but, in the case of a timber forest or a country full of fur-bearing animals, you can in a sense do both; you can draw your annual tribute of timber or of furs and yet preserve the trees and animals for future generations. The annual value of the furs procured from the wild animals of Australia is very considerable, but, if the animals are reduced in numbers almost to the vanishing point, no more income can be derived from that source.

But my main object is to show why these animals are worthy of protection from a scientific point of view, and to do this it is necessary to discuss some of the outstanding characteristics of the Australian mammalian fauna.

Mammals, in general, that is the four-footed animals which are covered with hair and suckle their young, are divided into three groups, the Monotremes, the Marsupials and the Placentals; the placentals, such as the dog, horse, and ape, form the largest group of existing mammals, and everyone is familiar with their principal features. They are the characteristic mammals of extra-Australian lands, but, with the exception of stragglers like the dingo, a few bats, rats and mice, no placental mammals are native to Australia.

THE MONOTREMES.

These are entirely confined to Australia and New Guinea, where they are represented by the duck-billed platypus or *Ornithorhynchus* and spiny anteaters or echidnas. These are the only mammals

The Echidna or Native Porcupine is able to burrow rapidly and so hide from its enemies. With the Platypus it forms the most primitive group of mammals extant.

Photo.—G. C. Clutton.

which still lay eggs, a very ancient method of bringing forth young, which was probably at one time characteristic of all back-boned animals. In spite of this old-fashioned custom of theirs the monotremes suckle their young and are therefore true mammals. The fur of the platypus is very valuable, but, as it is an aquatic animal, and very alert, and is, moreover, stringently protected, it is probably in no immediate danger of extinction; nor is the echidna, which is well defended by its sharp spines, and is not useful in any way, although to the blackfellow it is an article of diet. Were these two animals to become extinct the whole scientific world would be filled with keen regret, but, as Grant Allen says in his sprightly verse:—

Although in unanimous chorus
We mourn that, from ages before us,
No single *Enaliosaurus* to day should survive,
Yet joyfully may we bethink us,
With the earliest mammal to link us,
We still have the *Ornithorhynchus*,
Extant and alive.

MARSUPIALS.

These, exemplified by the kangaroo, wombat, bandicoot and many others, form the second great group, and, as their name implies, they are provided in the female with a pouch or *marsupium* in which the young are carried. Marsupials are the distinctive Australian mammals, and, except for the American opossums and the highly interesting *Caenolestes* of South America, they have no surviving relatives. In past geological ages the members of this primitive order were more widely distributed, but, with the rise of a more modern mammalian type, better equipped for the battle of life, they gradually dwindled. They crossed into Australia while that continent was united to, or at any rate less widely separated from, the rest of the world than it is now, and, as the bridge by which they came was submerged before the higher types could follow, they have found sanctuary in Australia and its adjacent islands from the fierce competition which all but exterminated their kind in other countries. Thus Australia became a marsupial preserve.

BIRTH OF THE MARSUPIAL.

One striking difference between marsupials and the higher mammals lies in the fact that the young marsupial is born in a very helpless immature condition. A full-grown kangaroo may be six feet in height, yet its new-born

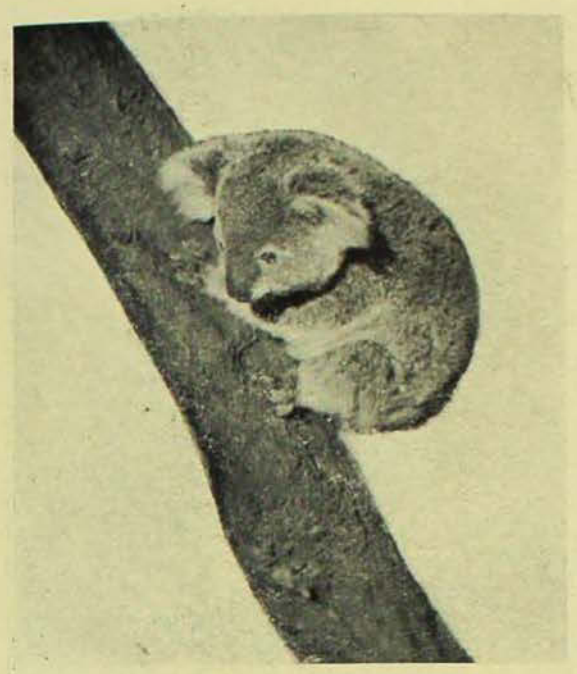
A newly-born Great Grey Kangaroo, attached to a teat in its mother's pouch. Its fore limbs are abnormally long and provided with claws which are wanting on the weaker hind limbs.

Photo.—G. C. Clutton.

young is no larger than one's thumb. As soon as it is born the tiny creature becomes transferred to its mother's pouch, where it becomes firmly attached to a teat and remains there perhaps for months. The manner in which this transference is effected is still under discussion. It has been observed that the young of the Virginian opossum are born with abnormally long fore-legs, armed with sharp claws, by means of which they crawl up their mother's body and enter the pouch. The same thing is probably true of the kangaroo, for its young also has elongated fore-limbs armed with claws which are absent on the toes of the hind feet.

ADAPTIVE RADIATION.

In nature there are a number of niches or particular conditions of life which are suitable for such animals and plants as have become adapted for them. Every



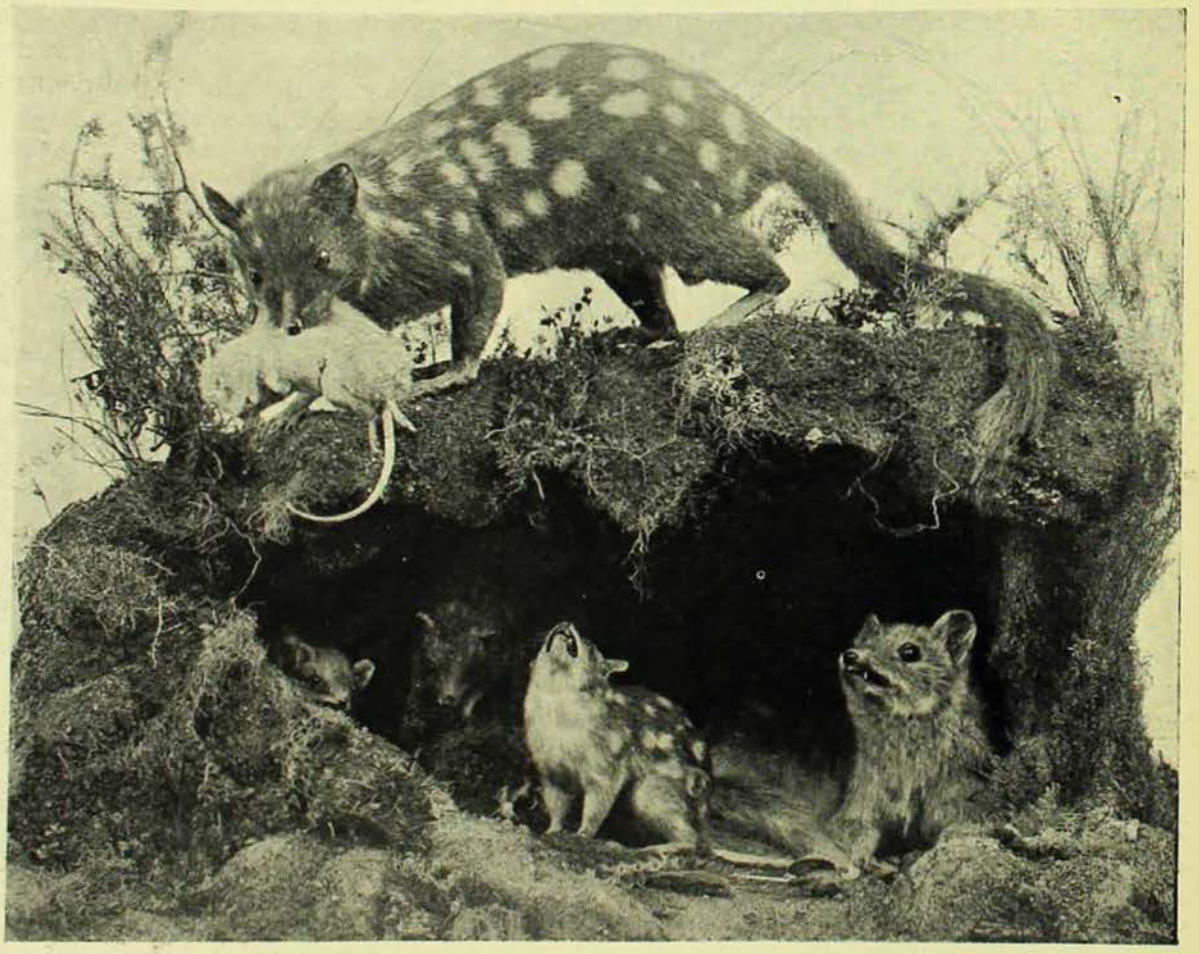
Young Native Bear or Koala; an expert tree climber, though rather slow of movement.
Photo.—G. C. Clutton.

animal class has its modest beginning, mostly in the distant geological past. Thus the earliest mammals were probably insect-eaters, and were provided with sharp needle-like teeth, adapted for piercing the integument of insects and the bodies of worms. But as time went on these primitive mammals branched out in various directions and occupied different "spheres of influence," each group becoming adapted for a specialised mode of life. Thus some took to the water and became modified for an aquatic existence, others got the habit of climbing trees and became arboreal like the squirrels or the native bear, still others became burrowers. Others again acquired long legs and became swift runners, like the northern wolf or the Tasmanian tiger. With these changes in the mode of progression were associated changes in the teeth and the digestive system. Animals which live on grass have the grinding type of teeth with broad crowns, like those of the horse and the cow, while the flesh-eating animals, carnivores like the wolf and the lion, have long, sharp teeth with which to grasp their prey, and cutting teeth to tear the flesh from the bones of their victims. Before mammals had become the dominant race, the reptiles, which were then the lords of creation, had developed in just the same manner, and in just the same directions as the mammals of to-day. There were grass-eating reptiles, which occupied the place of the herbivorous mammals, there were carnivorous reptiles, the lions and tigers of their day, huge reptiles wallowed in primeval rivers like the present-day hippopotamus, and still others roamed the ocean like our whales and dolphins. In this connection one may say with truth that nature abhors a vacuum and fills it with such material as is available. This modification of one class of animals to fit into various environments is what is meant by adaptive radiation, and it is because the marsupials illustrate this great principle in such a wonderful manner that they are so interesting, and important to the zoologist and student of evolution.

Banded Ant-Eaters are primitive animals of great zoological interest, which are rapidly nearing extinction.
Photo—A. Musgrave.

The Tasmanian Devil is a most ferocious animal; it is a flesh-eater and is restricted to Tasmania.

Photo.—G. C. Clutton.

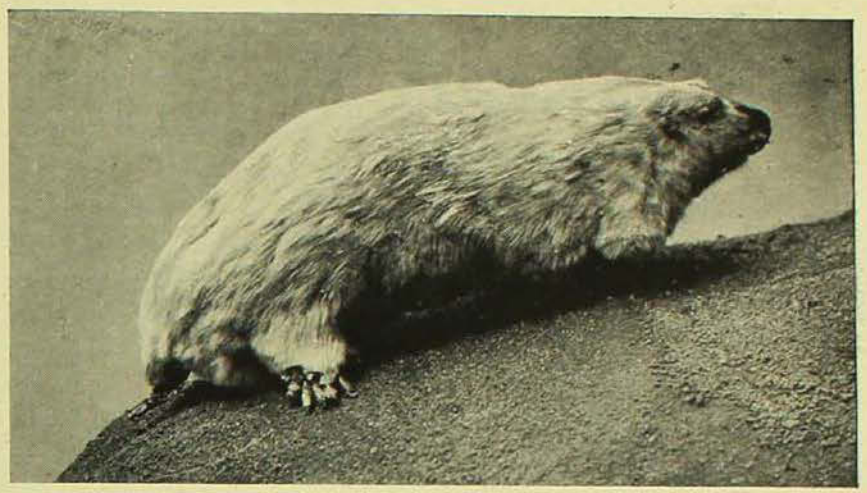


The ravages of Native Cats are well-known to breeders of poultry. This picture shows a mother bringing home a native rat to her half-grown young.

Photo.—G. C. Clutton.

MARSUPIAL TYPES.

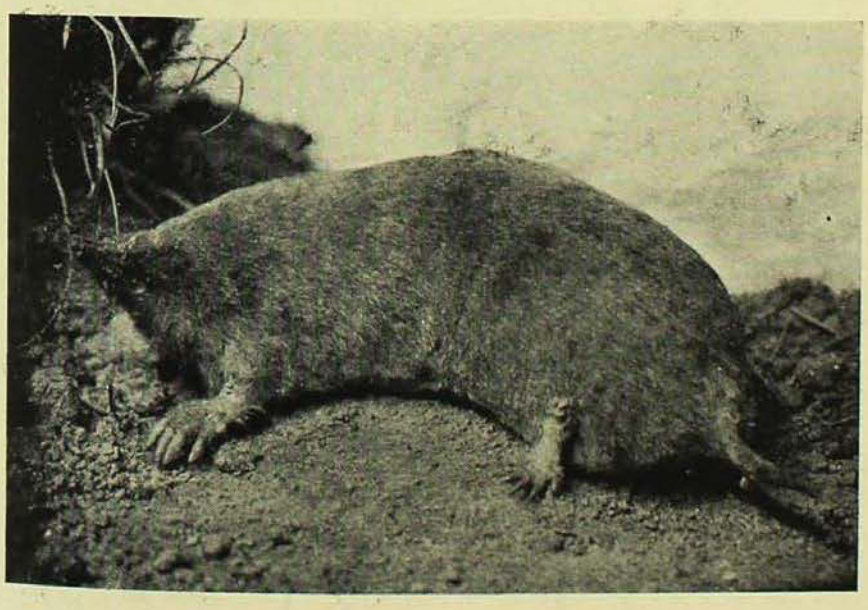
The primitive insectivorous type is represented by the marsupial mole (*Notoryctes*) and the banded anteater (*Myrmecobius*). The native cat, the Tasmanian devil and Tasmanian tiger are carnivorous. If we examine the skull and teeth of the latter we find that they are perfectly adapted for a flesh diet. The teeth at the side of the mouth have a shearing blade and the canines are long and sharp. The 'possum represents another line of development, having molar teeth with conical cusps suited for the mastication of leaves and fruit. The kangaroo again is a typical grass eater, the upper teeth having sharp ridges which alternate with corresponding ridges in the teeth of the lower jaw. Then we have forms like the wombat in which the teeth are adapted for cutting up tough stalks of grass and woody tissues.



The Marsupial Mole closely resembles the European Mole in its general form and in the modification of its limbs, which are adapted for burrowing. It is confined to the desert regions of Central Australia.

Photo.—G. C. Clutton.

In their locomotor apparatus the marsupials exhibit similar adaptive radiation. We have the little running forms such as the marsupial mice, from which we pass upwards to the native cats and the Tasmanian wolf. Then there are the hopping types, like the kangaroo rats and the kangaroo, which presents the extreme example of an animal that progresses by leaps and bounds. Burrowing forms are represented by the bandicoot, the wombat, and, best of all, by the pouched mole found in the desert regions of Central Australia; it has a conical body, a sharp nose, very small eyes, and limbs admirably adapted for progress underground. There are many tree-climbing types like the 'possums and so-called squirrels, culminating in forms which take long leaps from branch to branch, and have developed folds of skin on the sides of the body which enable them to skim through the air like kites.



Being a placental mammal the European Mole is not even a distant relative of the Australian Marsupial Mole.

Photo.—G. C. Clutton.

The 'Possum, slaughtered in millions for its valuable fur, is representative of the tree-climbing types.
Photo from Life—G. C. Clutton.

PARALLELISM IN DEVELOPMENT.

In other lands the various life spheres are occupied by distinct orders of mammals; thus the grass-eating mammals form one order, the flesh-eaters another. But in Australia the single marsupial order has been adapted in the most marvellous manner for the most diverse roles, so that the distinct orders of the old world are parelleled in Australia by various modifications of the one order available. Thus the kangaroos and wallabies may be regarded as the Australian representatives of grass-eaters such as the hoofed mammals, while the native cats, Tasmanian devil, and Tasmanian wolf parallel the cats, dogs, and bears of other countries.

Animals which have similar modes of life develop a similarity in form; no better example of this can be instanced than the striking resemblance in *outward form* between a whale and a fish. Now when we compare marsupials with parallel forms among placental mammals we find some very remarkable resemblances, as is clearly indicated by the names given to the native fauna of Australia by the early settlers, who were so struck by their similarity to the animals with which they had been familiar at home. The marsupial mouse so strongly resembles the common house mouse in outward appearance that it seemed perfectly natural to regard the two as close relatives. Yet the common mouse is a placental, and is more closely related to the giraffe than to the marsupial mouse, which, on the other hand, is a near relative of the kangaroo and the native bear, as is clearly seen from its skeletal and anatomical features. So the Tasmanian wolf presents a strong similarity to the northern wolf, because its mode of life and method of procuring and dealing with food is the same, yet in its internal structure it is closely allied, not to the common wolf, but to the pouched mouse, the marsupial mole and

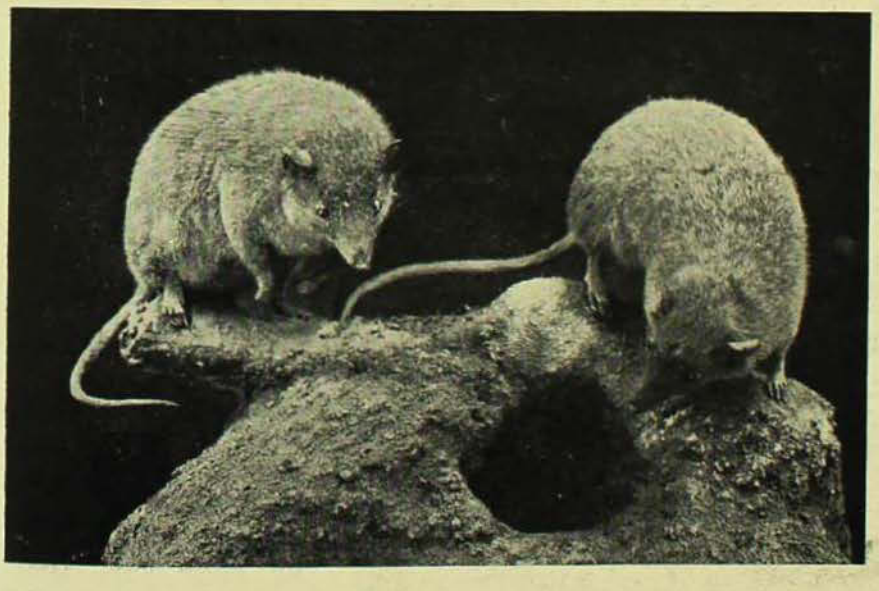
The Ring-tailed 'Possum builds a nest or drey of twigs and ferns.
Photo.—G. C. Clutton.

other marsupials, although externally it may resemble them very little. Again the wombat might on outward appear-

Flying Squirrels, marsupial and placental. Both have membranes between their limbs to enable them to take long flying leaps from tree to tree. But though so similar in appearance the Australian form (left) has no affinity with the American (right).

Photo.—G. C. Clutton.

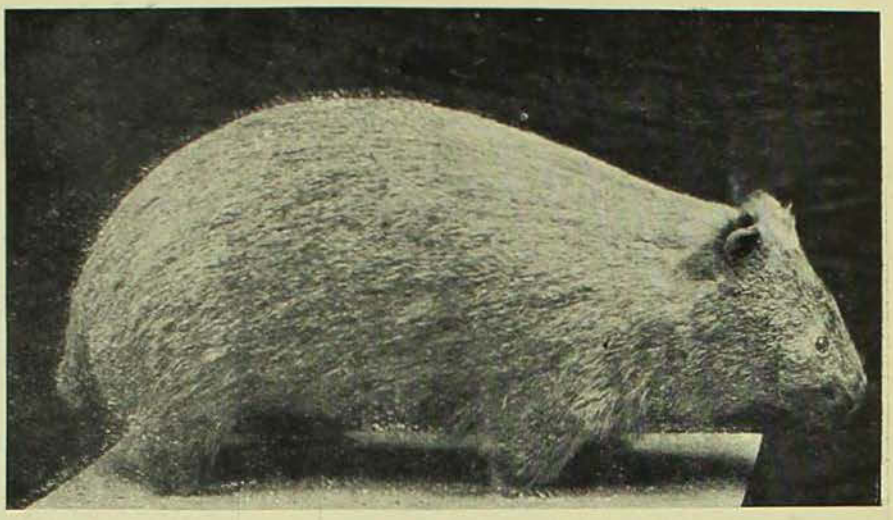
ance be classed with the beaver; it has the same stocky build and both are good gnawers and diggers. Comparing their skulls we find that in both the front teeth are reduced to two in each jaw, one on each side; these teeth are chisel-like, grooved, and placed so that they form an arc with the lower jaw. Moreover, in both these teeth lack roots, so that they grow continuously throughout the life of the animals, and no amount of grinding reduces them. Then in both we find a wide space between the front teeth and the succeeding teeth on each side of the jaws, an arrangement which is probably useful in allowing the animal to manipulate its food, turn it over with its tongue, and pass it back to the cheek teeth. But in spite of these striking similarities in their dental apparatus there is no difficulty in distinguishing the skull of the wombat from the skull of any placental. For example, the roof of the mouth, the hard palate of placen-



Marsupial mice are insect-eaters and do not gnaw as does the house mouse. It is supposed that the earliest marsupials which found their way into Australia were of this type.

Photo.—G. C. Clutton.

tals is entire, but in marsupials it is pierced by two openings. And the lower jaw in practically all marsupials (*Tarsipes* is the only exception) has a pronounced inward bend to the lower border. There are many other anatomical differences which distinguish marsupials from placentals; thus in marsupials the brain is simpler than, and not so wrinkled as that of higher mammals, and there are marked differences in the reproductive systems of the two groups.

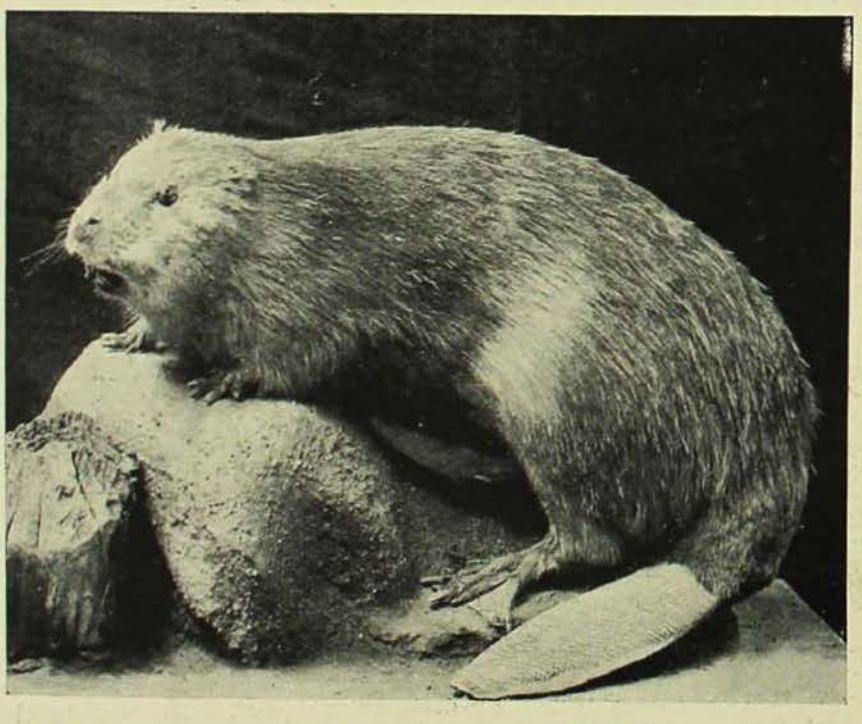


The Wombat has much in common with the Beaver. Both gnaw and dig and have evolved the same general form, but they are nevertheless descended from quite different ancestors. Photo.—G. C. Clutton.

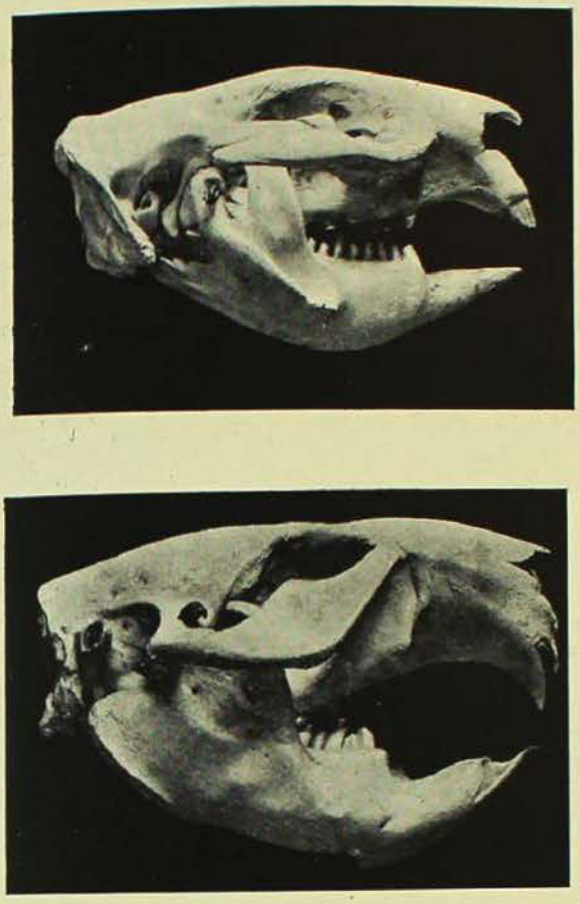
Again, if we examine the spiny anteater of New Guinea, we find that it has a long slender snout, a feeble lower jaw and no teeth; it has a long protusible tongue which it uses to lap up the ants which form its staple diet. In these particulars it strongly resembles the great anteater or ant bear of South America, but in internal structure it is wholly unlike that animal, and reveals its close relationship to the other monotreme, namely the platypus.

HABITUS AND HERITAGE.

When two animals belonging to different groups have acquired a similar appearance because of their adaptation to similar modes of life we say they have the same *habitus*. And when we find that they differ fundamentally in structure, that their class characters are unlike, and that the sum total of their features necessitates their being placed in different groups, we say that they differ in *heritage*. Thus the marsupial heritage is revealed by the presence of a pouch, by the perforated palate, by the other characters common to marsupials and not found in other mammals. These are the features which indicate the true relationships of animals, while the habitus characters tend to obscure the true relationships. Thus when Australian mammals were first made known to the world by Captain Cook's voyages, the naturalists of the time were misled by their superficial resemblance to well-known animals, and the kangaroo, for

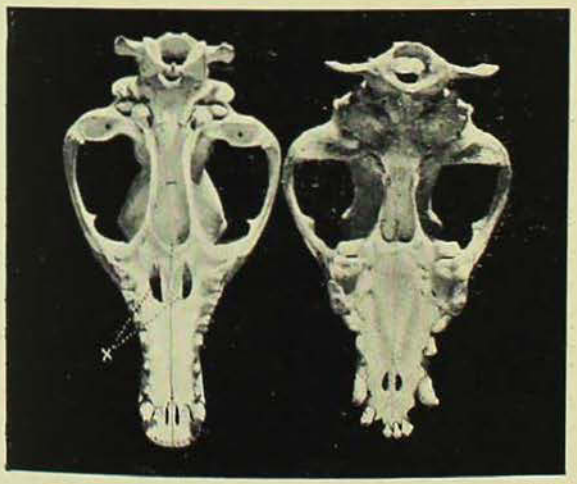


The Beaver, being a water dweller has developed a large paddle-like tail. Photo.—G. C. Clutton.

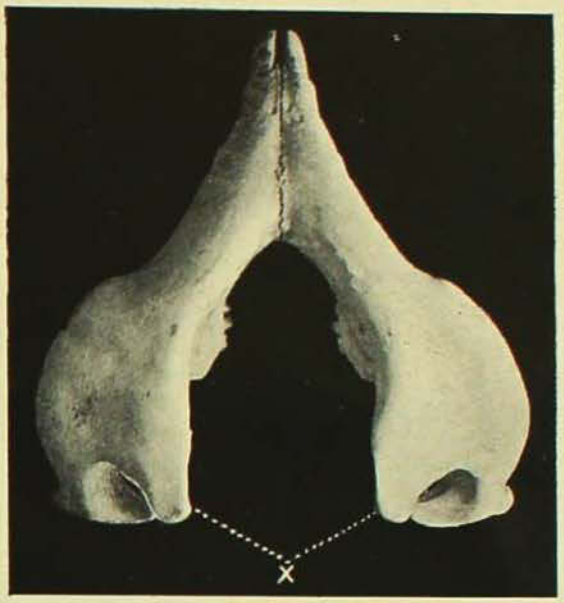


Skull of a Wombat (upper figure) and a Beaver (lower figure) showing similar structure and arrangement of their teeth.
Photo.—G. C. Clutton.

example, was classed with the jerboa, the wombat with the beaver, for that seemed to them to be a natural classification. Closer examination revealed, however, that, in spite of the great diversity displayed by the marsupials, they all belong to a single great group with identi-



Skull of a Tasmanian wolf (left) and a European wolf (right) showing general similarity in their teeth; the former can be recognised as marsupial by the two perforations in the palate.
Photo.—G. C. Clutton.

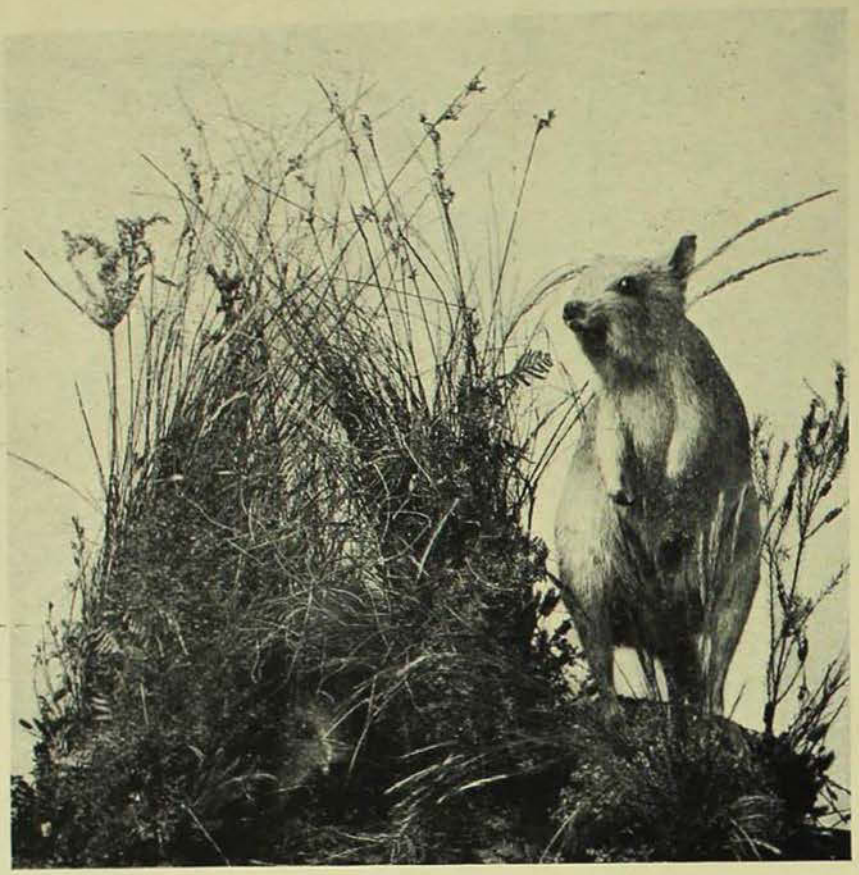


Lower jaw of a Wombat, showing the inward bend (marked with a cross) which is a distinctive mark of marsupial heritage.
Photo.—G. C. Clutton.

cal heritage characters, and that this great group is sharply marked off from the placentals. That is, the Australian marsupials are the diversified descendants of a common ancestral type, which is believed to be represented by the small mouse-like forms.

In conclusion I would impress upon my readers that the mammalian fauna of Australia is the most uncommon, and perhaps the most interesting in the world. It is a link with the past, and shows affinities with the primitive mammals of the remote times when the lordly reptile was monarch of all he surveyed. Because of this, and because of the wonderful manner in which they illustrate the great principles of adaptive radiation and parallelism in development, surely it is our duty to save the

Cape Jumping Hare, a placental hopping mammal resembling the Rat Kangaroo in outward form and limbs.
Photo.—G. C. Clutton.



The Rufous Rat Kangaroo is a representative of the hopping type of marsupial; this species builds a nest of grass.
Photo.—G. C. Clutton.

Australian mammals from extinction and preserve them for the scientific men and students of future generations. Who would not rather see one kangaroo bounding tremendously over the plain than a hundred kangaroo skeletons or skins in a museum?

[The photographs in this article, when not taken from life, are from specimens in the Australian Museum].

NUMISMATIC EXHIBIT.—Two cases containing a comprehensive collection of medals, seals, and medallions, have recently been placed on exhibition in the entrance hall. The contents include war medals and war-time badges, exhibition award and commemorative medals.

VISIT OF AN ARCHAEOLOGIST.—Captain H. W. Murray, F.S.A., of Surrey, England, who was recently on a visit to Sydney, spent some time in the Museum examining the ethnological collections, in which he is keenly interested. He has now left for England, but hopes to return to Australia.

OSTEOLOGICAL STUDENTS.—Dr. A. N. Burkitt, Lecturer in Anatomy at the University of Sydney, has been studying the dentition of man and other animals, and has made extensive use of our osteological collection. Miss H. T. Stephens and Miss E. Thomas, students in Science and Medicine at the University, have also found the Museum collection of skeletons very helpful in their studies.

WAR CANOE.—The Solomon Islands War Canoe presented to the Museum by Mr. Harry Wickham, of Roviana, has now been placed on view in the Melanesian gallery, where, slung from the roof, it forms an imposing exhibit. The canoe, which is a magnificent example of native boat-building skill, is forty-six feet in length, with a beam of three feet seven inches, and is seated for twenty-two rowers. It is inlaid with pearl and nautilus shell, and highly ornamented with shells and feathers. It was necessary to pass the vessel in through a window on the first floor, a task which involved much ingenuity and hard work. Mr. J. H. Wright, assistant Taxidermist, formerly of the Royal Navy, planned and supervised the carrying out of this work with great skill and success.

SOLOMON ISLAND EXHIBIT.—A table case has recently been installed in the Melanesian room to accommodate some of the smaller objects from the Solomon Islands, such as personal ornaments, lime boxes, and examples of shell currency.

Some Famous Diamonds and their Story.

By the Editor.

Probably few of our readers have ever seen a diamond weighing more than a few carats; large diamonds are either the property of monarchs or are jealously guarded among the treasures of the world's millionaires. But all of us may inspect glass models, which, though they lack the fire of the originals, faithfully represent them in size and shape, and, approximately at least, in colour. A collection of such models is exhibited in the Museum, and in this article an attempt is made to sketch the stirring history of some of the more famous diamonds counterfeited in the collection. Truth is stranger than fiction, we say, and even the writers of *fiction,* sadly lacking in a sense of humour, often use this trite phrase in relating the imaginary events of their romances. Certainly the tragic happenings narrated by Wilkie Collins in *The Moonstone,* or by Arthur Morrison in *The Green Eye of Goonah* are not more strange than the real adventures which make up the history of such diamonds as the Kohinoor or the Hope Blue. The beginning of the story is usually shrouded in mystery. We know not where, or when, or by whom, the diamonds were found; they appeared like meteors and flamed across the pages of history leaving a trail of blood and ruin in their wake. Most of them, like the sun, took their rise in the east, for, up to the beginning of the eighteenth century, India was the only known source of diamonds.

THE MOUNTAIN OF LIGHT.

Perhaps the best known of all diamonds is the Kohinoor, which we first hear of in the fourteenth century. It had been held as an heirloom in the family of the Rajahs of Malwa from time immemorial, and when, in 1304, the reigning Rajah was defeated by the Sultan, Alaeddin, it became the spoil of the conqueror. In 1526 it is found in the possession of Sultan Baber, a direct descendant of the warlike Tamerlane, and the founder of the Mogul Empire. It remained the property of the Mogul dynasty until the invasion of India by the Persian conqueror, Nadir Shah, in 1739. The terrible Aurungzeb was the most powerful of the Mogul emperors, and it is related that the Kohinoor, which, however, was not yet known by that name, formed one of the eyes of the peacock in his famous peacock throne at Delhi. which was the capital. Delhi was sacked by the Persian invader during the reign of Mohammed Shah, the last of the Moguls. The conqueror was very anxious to possess himself of the famous gem, but the luckless Mohammed was just as anxious to retain it, and Nadir's efforts to secure it were baffled for a long time, until one of the faithless ladies of the harem revealed its hiding place in the folds of Mohammed's turban. It is said that Nadir, on first seeing the splendid stone, exclaimed, "Koh-i-nur," that is, ("Mountain of light"), and the diamond has been known by this name ever since.

At Nadir's death the Kohinoor became the property of Shah Rokh, to whom it brought nothing but misfortune. However, he clung desperately to his treasure, enduring the most fiendish tortures, even blinding, rather than part with it. In 1751 he concluded a treaty with Ahmed Shah, founder of the Durani Afghan dynasty, and made the fatal gem over to him. Its possession proved disastrous to the Durani line, and it subsequently became the property of Runjit-Singh, the "Lion of the Punjab," who removed it to Lahore. There it remained till the Punjab was annexed by Britain in 1840, when it was confiscated by the East India Company and presented to Queen Victoria the following year, since when it has remained one of the British crown jewels. The story is told that Lord Dalhousie, the then Governor-General of India, who took charge of the diamond for trans-

*A carat is now fixed at 200 milligrams and 1 oz. avoirdupois is equal to 141¾ carats about.

mission to England, was so absent-minded that he carried it in his waistcoat pocket for six weeks, and then discovered it only by accident.

When it came into the possession of Queen Victoria the Kohinoor weighed 186 carats, and was unsymmetrical in shape, with one or two flaws. It was recut, some judges say very injudiciously, and now weighs 106 carats.

THE PITT DIAMOND.

The Regent or Pitt diamond has a story as romantic as that of the Kohinoor. It is believed to have been discovered by a slave in the Parteal mines on the Kistnah River in 1701. According to one account the finder cut a hole in the calf of his leg, concealed the gem in the wound, and so escaped with it to the coast. There he met an English skipper, who bought it from him and promised to carry him to a free country. But the faithless sailor, having secured the diamond, threw the slave into the sea and that was an end of him. The skipper afterwards sold the stone to a diamond merchant named Jamchund for £1000, squandered the money and then hanged himself, a victim of remorse and *delirium tremens*. Jamchund disposed of the diamond, for £20,000 to Thomas Pitt, Governor of Fort St. George, an ancestor of the famous Earl of Chatham. Pitt brought the stone to England and had it cut into a brilliant weighing 136¾ carats, but, while it was in his possession, he was a miserable man. He was openly accused of having obtained it by foul means, and was obsessed by a morbid fear of being murdered and robbed of the diamond. He skulked about, often in disguise, and never slept twice under the same roof. In 1717 he sold it to the Duke of Orleans, Regent of France, for £135,000, and it thus became one of the French Crown jewels. At the revolution the French regalia, including the Pitt diamond, now known as the Regent, were placed in the Garde-meuble, whence they were stolen in 1792. An anonymous letter was afterwards received by the Commune, describing the place where some of the purloined treasures would be found. A search was made at the spot in the Champs-Elysees and there the Regent and other valuables were discovered. Napoleon wore the Regent in the pommel of his sword of state, and, it is asserted, at one time pledged it to the Dutch Government as security for a loan. It was subsequently exhibited in the Louvre, but in 1903 it was offered for sale at an upset price of £480,000.

THE HOPE BLUE.

Perhaps of all diamonds that now known as the Hope Blue has the strangest and most tragic history. Practically all who have owned this gem have suffered; some lost life itself, others reason, fortune, or happiness. Why should the mere possession of this stone bring misfortune? Or is it all coincidence? We know nothing of the early history of the Hope, but it was probably brought from India by Tavernier, a celebrated French traveller and gem collector, who made several journeys to the east and had a keen eye for valuable diamonds. It is said that Tavernier stole the gem from a Burmese temple, where, as usual, it formed one of the eyes of an idol. In 1688 he sold it to Louis XIV., King of France. It was then pear-shaped, and weighed 67½ carats. It was occasionally worn by ladies of the French court, and always brought them ill-luck. Marie Antoinette, who afterwards perished by the guillotine, wore it to a grand ball at the Tuileries. The Princess de Lamballe, who sometimes borrowed it, was killed by a Paris mob. It was stolen along with the Regent and the rest of the regalia in 1792, but, unlike the Regent, it was not recovered. We hear then of a splendid blue diamond, evidently Tavernier's Blue, in the hands of an Amsterdam cutter, Nicholas Fals, from whom it was stolen by his son. Fals was ruined, and his son committed suicide, after giving the stone to Francis Beaulieu. Beaulieu took it to London, and, when in the last stages of destitution, sold it to Daniel Eliason, dying of starvation next day. In 1830 Eliason sold it for £18,000 to Henry Thomas Hope, of Deepdene; it thus became the entailed property of the Hope family, and has since been called the Hope Blue. Its present weight is 44½ carats, and

current opinion regards it as the larger half of Tavernier's Blue, which had been cut, perhaps by Fals. What became of the rest of the original stone is uncertain.

It descended to Lord Francis Hope, who in 1894 married the well-known actress, May Yohe. Their union was not a happy one, for Lady Francis deserted her husband, who divorced her in 1902. In 1901 Lord Francis sold the Hope to Lord Sholto Douglas, a member of the ill-fated Queensberry family, who wanted it for his pretty wife, the dancer, Loretta Mooney, whom he met at a Texan mining camp. But the new owner did not have it long, for, ruined by his wife's extravagance, he was forced to sell the gem. It is not easy to disentangle the threads of this fateful diamond's history during the next few years; it comes to the surface now and then as the temporary property of some unfortunate, only to disappear again in a cloud of rumour. It was owned for a time by Jacques Colot, a Paris broker, who became insane and shot himself. The next owner seems to have been Prince Kanitovsky, who lent it to Lorens Ladne, a beautiful actress of the Folies Bergères—and shot her from a box the first night she wore it. Then it was owned by a Greek, Simon Montharides, and he, we are told, was thrown over a precipice with his wife and children and killed. It then came into the possession of Abdul Hamid, Sultan of Turkey, and continued its baleful career. The Sultan's favourite, Salma Tubayba, was wearing it on her breast when the Young Turks broke into the palace, and she was shot dead by her master, the bullet narrowly missing the diamond. Abdul was deposed in April, 1909, and the diamond apparently passed into the possession of a dealer named Habib. He sold it in Paris for £16,000 in June, 1909, and, in November of the same year, he was drowned in the wreck of the French liner *La Seyne*. The ship's safe was recovered by a diver, as it was wrongly believed that the Hope diamond was still in Habib's possession. In November, 1910, it was in America at the New York branch of the French firm of Cartier, who sold it to Mr. Edward B. Maclean, of Washington, and it is apparently still in his possession. The new owner has not escaped the evil influence of the gem, for, shortly after it came into his possession, his five-year-old child, the "billion dollar baby," was knocked down by a motor car and killed.

THE SANCY.

The history of this diamond is so confused that it is difficult to separate fact from legend. It was probably first brought from the Orient by Nicholas Harlai, Seigneur de Sancy, Ambassador at the Ottoman Court, where he purchased it about 1570. It is described as originally almond shaped, facetted on both sides, and its weight is given as 53½ carats. From de Sancy the diamond was borrowed by Henry IV of France, to enable him to raise money for the hire of a body of Swiss mercenaries. But the messenger carrying the gem to the King disappeared, and, after some time, it was discovered that he had been waylaid and assassinated. De Sancy, who had great confidence in the honesty and resourcefulness of his emissary, proceeded to the scene of the crime, discovered and disinterred the body, and found the diamond in the stomach of his faithful servitor, who had swallowed it to prevent its falling into the hands of the robbers. It was then sold to Queen Elizabeth, somewhere between 1590 and 1600, and thus became for a time one of the English Crown jewels. James II sold it for £25,000 to Louis XIV of France, about the year 1695. Louis XV. wore it as a hat ornament at his coronation. It was stolen in 1792, but turned up again in 1828, when it was sold by a French merchant to Prince Demidoff, of Russia. In 1865 it was purchased from the Demidoff family by a London firm acting for Sir Jamsetjee Jeejeebhoy, of Bombay, and once more returned to the land of its origin. It was again offered for sale in Paris in 1867, and was bought by the Maharaja of Patiala. On his death it resumed its wanderings, and in 1906 it was reported that William Waldorf Astor presented it to Mrs. Langhorne Shaw on the occasion of her marriage to his son, Waldorf.

THE ORLOFF.

The Orloff is first heard of in the beginning of the eighteenth century, when a grenadier, a deserter from the Indian Army of France, stole it from a temple in Mysore. He fled with his spoil to Madras, and there sold it for £2,000 to an English sea captain. The purchaser carried it to London, and disposed of it for £12,000. It was subsequently bought by Prince Orloff, and presented by him to Catherine II of Russia, in the hope that he might be restored to her favour. It remained among the Russian crown jewels until recently. Where is it now? It weighs 193 carats, and has the shape, and is about the size of half a pigeon's egg.

THE GREAT MOGUL.

This stone was described by Tavernier, who saw it at the Court of Aurungzeb, in 1665. He puts its weight at 280 carats, but states that it had been cut from a rough stone weighing 787½ carats. It had the shape of an egg cut in half, thus resembling the smaller Orloff diamond. Its subsequent history is entirely unknown, though attempts have been made to identify it with the Kohinoor and the Orloff. It has either been wholly lost or cut into several smaller stones.

THE LARGEST DIAMOND.

The Cullinan, though its history has, so far, been prosaic enough, has the distinction of being the largest diamond known; in its rough state it weighed 3,025¾ carats, about 20 ounces troy. It was found in January, 1905, in the Premier Mine, Transvaal. The mine manager, Frederick Wells, was, late one evening, descending a jagged slope in an open working when he saw a corner of the huge diamond projecting from the surface. He dug it out with his pocket knife, and, entering the office of the company, he handed the diamond to the general manager, McHardy, who was sitting with the president, Mr. T. M. Cullinan, inspecting the day's yield of diamonds. We can imagine their astonishment. The stone was taken to Pretoria, where it was exhibited to the public for several days, subsequently being sent to the London office. For two years it lay in the London and Westminster Bank, its enormous size making a sale impossible. Finally, at the instance of President Louis Botha, it was purchased by the Transvaal Government for £200,000, and presented to King Edward, as a recognition of his Majesty's grant of a constitution to the Colony. The Cullinan was cut by the Amsterdam firm of Joseph Asscher and Company, the process taking nine months. It was cut into a drop brilliant weighing 516½ carats, another of 92 carats, square brilliants of 309 and 62 carats, and about one hundred smaller stones, all without flaw and of the finest quality. The united weight of the gems cut from this marvellous diamond is 1,050 carats. Experts value them at a million pounds.

In October, 1919, another large diamond weighing 1,500 carats (about half the weight of the Cullinan) was unearthed at the Premier Mine; it is thought that this once formed part of the Cullinan, which was not a complete crystal, one side showing a cleavage surface.

ARTISTS AT THE MUSEUM.—Artists and art classes are frequent and welcome visitors to the Museum. Miss Dora Olfsen, the well-known sculptress, worked for some weeks in our shops, preparing models of typical Australian animals which will be reproduced as statuettes. An art class from the Technical College under the leadership of Miss R. Blakemore makes weekly visits during the session for the purpose of painting Australian birds, and the devotees of commercial art find in our collections material which can be used in their work. The students of the Sydney Art School have made extensive use of the skeletons exhibited in the Osteological Gallery.

A Naturalist on the Great Barrier Reef.

By E. A. Briggs, B.Sc.

Lecturer in Zoology, University of Sydney.

My trip to the Great Barrier Reef of Australia was undertaken for the purpose of studying the marine life of this fascinating area of reefs and shallows, of islands and lagoons. Among these interesting places I spent a considerable time examining and noting the habits of the many curious animals which comprise the heterogeneous life of these reefs.

The Great Barrier Reef is one of the most interesting areas of recent land-growth in the world. The gradual subsidence of the Queensland coast, and the gradual spreading of the coral rock over the sinking continental shelf has led to the formation of a huge deposit of limestone which extends from the neighbourhood of Torres Strait along the north-east coast of Australia for a distance of 1,250 miles. This immense barrier, built up by the activities of countless myriads of coral polyps is not an uninterrupted wall, but is deeply scored in many places by channels and passages, which, in some cases, are wide outlets to the vast expanse of the Pacific.

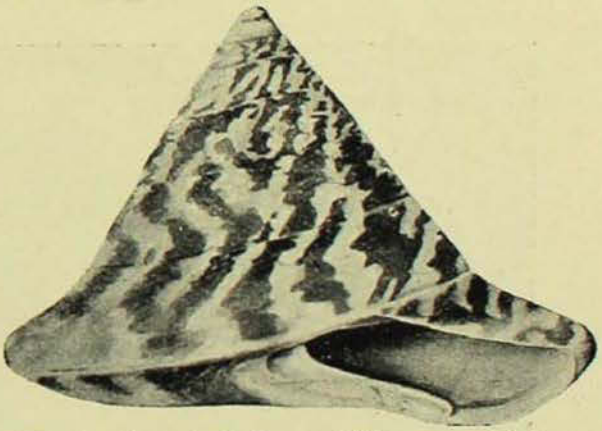
The distance from the mainland to the outer edge of this great chain of reefs varies from ten to thirty miles near its northern extremity. As we follow the reefs to the southward we find the outer edge of the barrier gradually creeps away from the Queensland coast until south of Cairns it is 40 to 60 miles from the mainland. Still further south the barrier extends rapidly to the east, and finally breaks up into a series of isolated reefs and small islands, the outermost of which are some 150 miles distant from the Queensland coast. The area within the barrier is thickly studded with islets, reefs and sand-banks, all of which offer a happy hunting ground to the naturalist.

This great accumulation of coral does not form a high barrier above the surface of the sea, but produces a series of detached reefs, which are perched on the huge bulk of the coral rock, and in many cases appear only at low tide. Here is a shallow, warm-water sea, where many important industries have arisen, such as pearl-shelling, bêche-de-mer gathering, and turtle-fishing, only to languish again owing to the unrestricted conditions under which they were allowed to be carried on. As a result of over-fishing the animal life on the reefs very soon became so depleted that it was impossible for the various industries to be conducted at a profit.

At present the reefs from Torres Strait southward to Port Mackay are being extensively fished over for Trochus shell, and, unless legislation is introduced to prevent the gathering of the smaller shells, we shall soon see the tragedy which befell the pearling industry and the bêche-de-mer fishery enacted all over again.

SHELLS AND BUTTONS.

The trochus shell (*Trochus niloticus*) which is like a gigantic snail's shell, is



The trochus shell, from which rows of buttons are cut, attains a diameter of 5½ inches. It is remarkable for its colouration, flame-like markings standing out against the white ground of the shell.
Miss P. F. Clarke, del.

gathered by hand on the coral reefs between tide marks. The catch is then cleaned by spreading the shells, still containing the animal, on the beach for the blow-flies to dispose of the flesh. The putrid contents are afterwards re-

moved by washing the shells in the sea. The demand by button makers for trochus shell has been created within the last ten years. The catches after being prepared for market, are shipped to Japan where rows of buttons are cut from each shell.

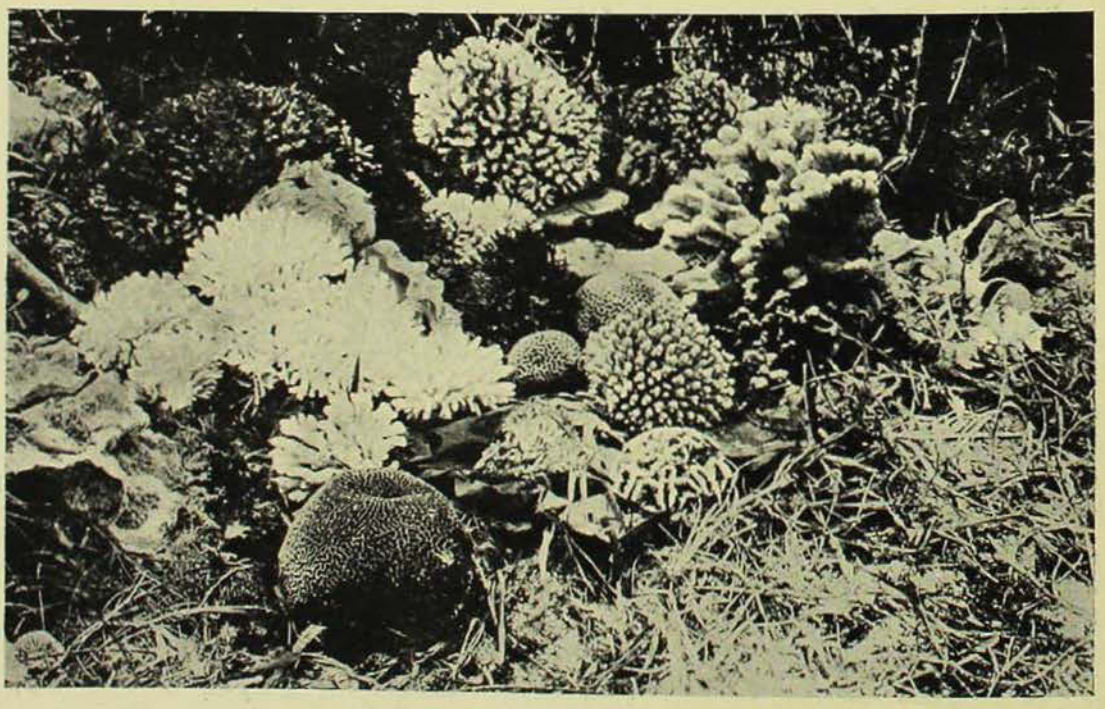
A CORAL REEF.

At first sight a coral reef is very disappointing; the surface is composed of dead and broken coral presenting a long vista of heaps of discoloured fragments which have been piled up by the action of the waves. As the coral grows nearer to the surface of the sea portions become exposed to the direct heat of the sun when the reef is uncovered at low tide and under these circumstances the coral soon dies. The branched forms ("stag-horn coral") die first, and their broken limy skeletons compose the main bulk of the reef. In the deeper pools left by the receding tide, and on the outer edge of the reef flourish the living corals which are of extreme beauty and of the utmost interest. As these continue to grow all around the edges in the deeper water they are continually adding to and thus enlarging the size of the reef. There are many different kinds, from the branching "stag-horn coral" to the great rounded masses of the "brain corals," which may be three feet or more in diameter.

The colours of the living corals are brilliant and diverse, one branching variety being a beautiful light green with the end of each branch terminating in a bright yellow tip. Some are various shades of pink, while others again are a brilliant blue. In and out between the coral branches of these submerged gardens dart many bizarre and highly-coloured flamboyant fishes, which harmonise to an extraordinary degree with their florid surroundings. In the deeper channels between the reefs large spanish mackerel, exceeding five feet in length, were often caught on lines baited with red flannel, and trailed from the stern of our boat as we sailed through the narrow tortuous passages.

Attached to the sides and keel of our boat were the strange sucker fishes, which cling on by means of a large oval sucker on the upper surface of the head. The fish are thus carried from place to place, and only loose their hold when they temporarily leave the ship to go in search of food.

As one wades through the shallow water of the reefs large black cucumber-shaped animals may be seen protruding

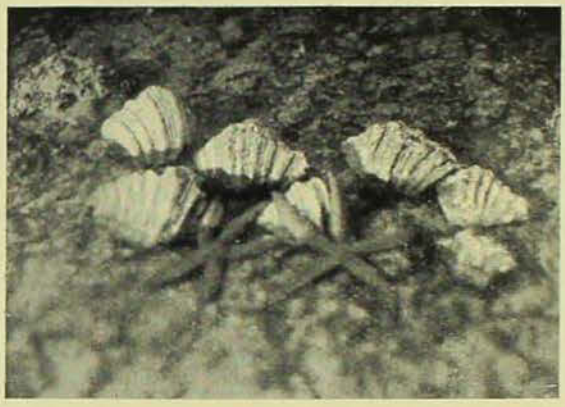


Bleached corals from the Great Barrier Reef.

from the crevices in the rock, or slowly crawling over the fine white sand. These are the bêche-de-mer, and at one time they were extensively collected and largely exported to China. Although called by the fishers "sea slugs" or "teat-fish," they are neither slugs nor fish, but are closely related to the star-fishes.

GIANT SEA ANEMONES.

The familiar crimson-coloured sea anemones from Port Jackson and our adjacent coastal beaches are veritable pygmies compared to some of their tropical allies. The Great Barrier Reef



Clam shells and large blue-coloured Starfishes standing out in bold relief against the glistening white of the coral sand.

produces giant specimens which may measure no less than from 18 inches to 2 feet across their expanded discs. These giant anemones are further interesting on account of the circumstance that they are self-constituted "harbours of refuge" to sundry fishes and crabs. The anemones are themselves bright in colour, but the associated fishes are even more so. In addition a small crab shares the sheltering hospitality of the anemone. Some of these tropical coral-reef-frequenting anemones, which have their tentacles beautifully branched, must be cautiously handled in consequence of their notable stinging properties.

From the side of our boat we were able to look down into the clear depths of the sea and admire the wonders of the ocean bed. Whole stretches of the sea floor are covered over by the so-called soft corals with here and there collections of clam shells and large blue-coloured starfishes, which stand out in bold relief against the glistening white of the coral sand.

EAGLE ISLAND.

At Eagle Island a pair of beautiful sea eagles were seen hovering overhead, and we found their nest, which stood about ten feet in height, on the windward side of the island. The nest contained one egg and a young bird measuring about two feet from tip to tip of the outstretched wings. We removed the bird from the nest for the purpose of obtaining a photograph, but our eaglet proved to be in a pugnacious mood, and it was only after considerable difficulty that I succeeded in making an exposure.

Large mottled eels proved to be very common on the reefs, usually lying with their bodies closely pressed along narrow grooves in the coral rock. When disturbed they would make off through the shallow water to other grooves, into which their bodies fitted so perfectly that they merged with the surrounding rock and were almost immediately lost sight of. A small species of shark with a bulls-eye pattern on the side of the body appeared to haunt the same locality as the reef eels.

Turtles were sometimes met with either in the rock pools or swimming in the open sea, while we frequently passed coiled sea-snakes basking in the warmth of the sun as they floated passively on the surface of the water.

DUGONGS AND THEIR OIL.

The dugongs form a highly characteristic and interesting group of reef-frequenting marine mammals which are the object of a regular fishery chiefly on account of their valuable oil. Dugongs are essentially social in their habits and assemble in herds, the females being always much more numerous than the males. The adult animal reaches a length of eight to ten feet, and has a distinctly rounded muzzle, while the mouth of the male is armed with a pair of large projecting tusk-like teeth. Dugongs are herbivorous, and their food consists almost exclusively of the marine grass, which grows in great abundance over the reef-flats.

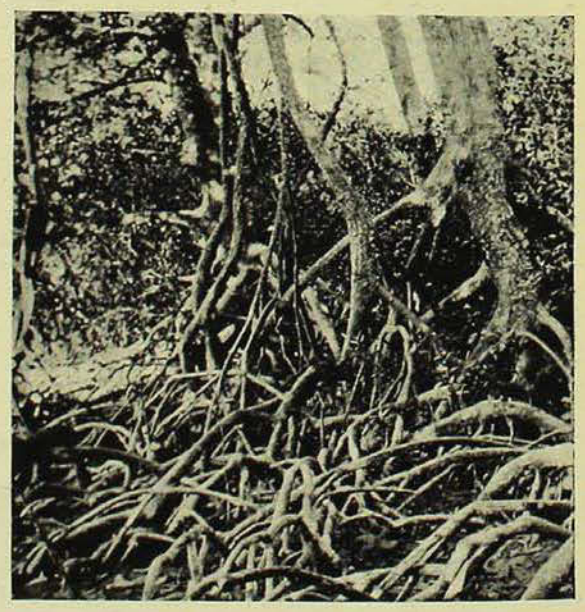
Dugongs on a northern beach.

The chief value of the dugong is the oil yielded by the liver. The quantity varies very considerably, sometimes as much as eight to ten gallons being taken from a single individual captured during the winter months, but on an average only four or five gallons are obtained. The oil is peculiarly clear, limpid, and free from disagreeable smell, and is largely in demand for medicinal purposes.

DENIZENS OF THE MANGROVES.

Although the coral reefs, with their kaleidoscopic array of life, fascinate the observer, nevertheless the mainland can lay claim to some very curious forms such as the goggle-eyed mangrove fish, the calling or fiddler crab, and the ant-house plants. Where the shore is not exposed to strong surf it is usually invaded by certain kinds of trees forming a net-work so dense that it is often very difficult to make a landing. The mangrove is the most important tree of this kind. It grows freely in the shallow sea water on low and muddy shores, and protects the land from the waves. The roots grow in a loop-like fashion, the upper portion being out of the ground at varying distances from a couple of feet downwards, and thus form a network around the tree. The roots of these trees are often heavily encrusted with oysters and barnacles. Muddy sediments accumulate in the quiet water among the trees, and thus the land gains on the sea.

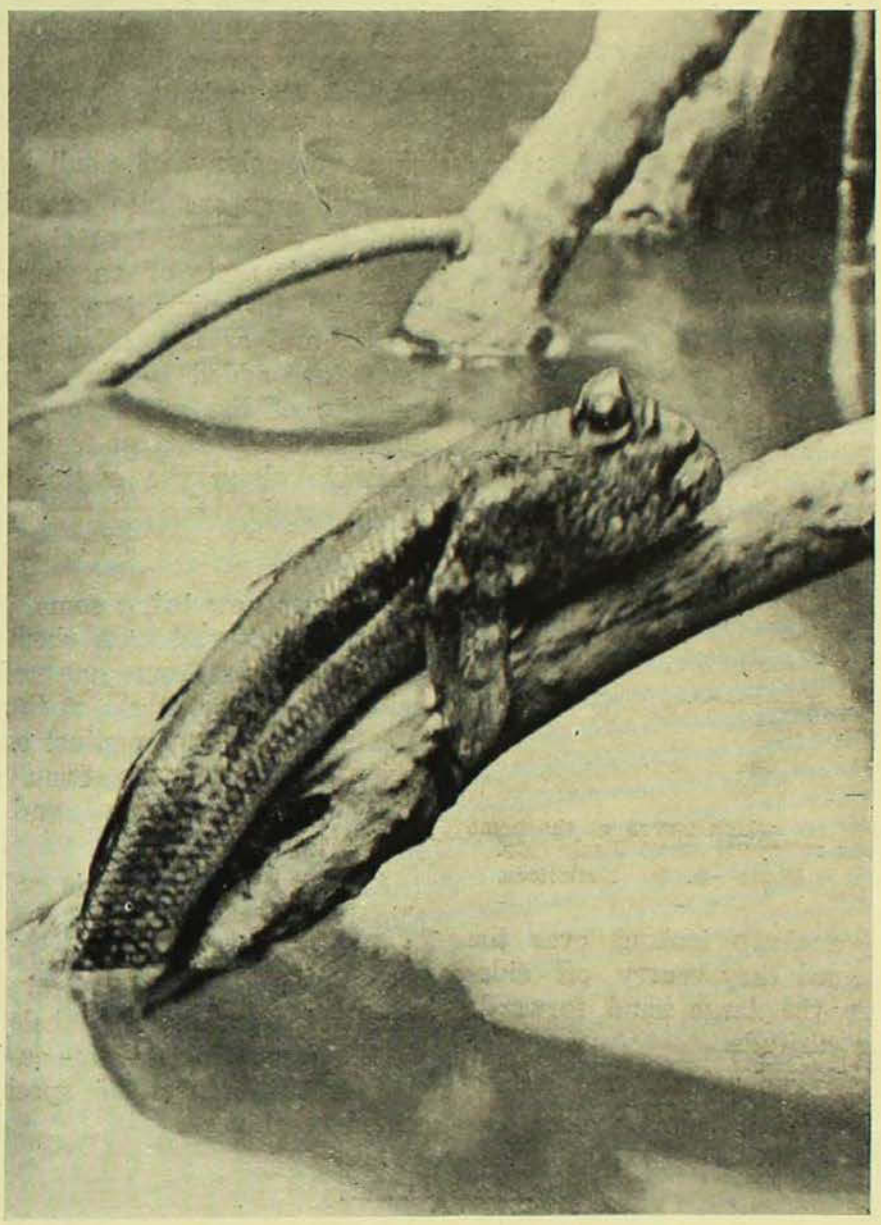
The jumping mangrove fish (*Periopthalmus koelreuteri*) are found in great abundance on the mud flats and among the network of roots of the mangrove trees left bare by the retreating tide. These small fish skip about by means of the muscular, scaly base of



The loop-like roots of the Mangroves where muddy sediments accumulate, and thus the land gains on the sea.
Photo—A. R. McCulloch.

their front fins, with the head raised, bearing a pair of goggle eyes, which seem to protrude from their orbits. The front fins, which are bent at an angle like an elbow-joint, are used for hopping over the mud flats or for climbing about on the roots of the mangroves. Since the fish spends a considerable amount of time out of water, its gills are probably of very little use to it, and the tail then acts as a breathing organ. The mangrove fish rests with its tail in the water with the head and trunk exposed; under these circumstances the fish is able to breathe through its tail, the oxygen dissolved in the sea water passing through the thin skin into the minute blood vessels with which the tail fin is plentifully supplied.

The ground around the roots of the mangrove trees is generally well riddled with crab holes, which serve as retreats for the calling or fiddler crabs. These crabs are remarkable for the enormous size of one of the hands, generally the right, in the male, which may actually exceed in size the rest of the body. It is not known what purpose this organ serves, but it is supposed that the male stops up the mouth of the burrow with it when he and the female are safely inside. It is also used as a weapon in combats with other



The goggle-eyed mangrove fish (Periopthalmus Koelreuteri rests with its tail in the water and the head and trunk exposed.

Photo—A. R. McCulloch.

males. The males probably use it for exciting the admiration of the females in courtship, since they may be seen at the mouths of their burrows with the large hand, which is very brilliantly coloured, in constant motion as though beckoning to attract the attention of the females. When feeding they always hold the hand ready for use, the long-stalked eyes keeping a sharp lookout over the top. If alarmed they scurry off sideways, holding the large hand forwards in a fighting attitude.

The Ant-house plant, which serves as the home of a numerous colony of small black ants.
Photo—A. R. McCulloch.

ANTS AND TERMITES.

In the low-lying country near the coast the ant-house plant is found. Besides the "white ants" (termites), which construct a great mound nest sometimes 18 feet in height, there are true ants which make their home in the curious button orchids. These ant-house plants are usually to be found growing on the paper-bark trees. One part of the orchid is enlarged to form an irregular mass about four inches in diameter. It has one or two entrances, and is honeycombed throughout by a series of tunnels, which serve as the home of a numerous colony of small black ants.

Green ants are also exceedingly plentiful in the dense coastal scrub. They build their nests of varying sizes in the trees by fastening together bunches of leaves, and as the colony grows more leaves are added to the structure. The building of the nest is a most interesting spectacle; a great many of the ants assemble along the edges of two green leaves which are close together, and reaching from one to the other, gradually bring their edges into contact. Other ants now bring some pupae from another nest, and pass them backwards and forwards from one edge of the held leaf to the other, at the same time pressing the pupae against each leaf. A white secretion oozes from the pupae, and this quickly dries, and holds the leaves together.

Almost all the animals referred to in this brief description of the Great Barrier Reef of Australia are exhibited in the museum galleries, and are accompanied by explanatory labels, giving full details concerning their curious habits and other features of special interest, and importance.

The Spider-eating Insects of Australia.

By G. H. Hardy.

Spiders belong to the most abundant class of the invertebrates, other than insects, to be seen in the Australian bush. There are species that hunt their game, some that weave an entangling net to snare their prey, others that sink a shaft in the ground and at the entrance wait for other creatures to come within reach, and still another that seeks its food under water.

Spiders themselves form a staple food for other creatures, such as birds, and hence many secure special cavities to retire into on the least suspicion of

danger. They roll a leaf, find a crack or crevice, or construct a hole to protect themselves from the larger predatory animals. They also fall a prey to various insects, but usually only one species is preyed upon by any spider-eating insect.

A certain large yellow wasp which belongs to the family *Pompilidae* hunts for one of those species that makes a hole in the ground. These wasps can be seen entering hole after hole until a spider is found. The wasp boldly enters, but the spider, by far the more active of the two, slips past, and, with the wasp close behind, an exciting chase begins. As quick as a stroke of lightning will the spider seek and find shelter, behind a stone, under a leaf, or anywhere that affords cover. The wasp is usually left far behind, but, with the persistance that is typical of its kind, it will visit stone, stick, leaf, or hole, along the line the spider took, and, routing the refugee out of its hiding place, will continue the chase.

These lightning darts of the spider, whose usual habit is to sit motionless hour after hour, require such excessive energy that the harassed creature finally becomes exhausted and is overtaken. Should the spider enter a hole wherein another spider is at home, the intruder immediately makes a further lightning dart, perhaps towards its pursuer, in an endeavour to escape falling a victim to cannibalism. It is usual for the wasp to win the chase, but the quarry may escape, if, as sometimes happens, the wasp seeks it in another occupied hole. In this case the wasp will pursue the new spider with the same fervour and insistance, whilst the original one is left to its own devices. The captured spider forms the food of the new generation of wasps, as an egg is destined to be buried with it.

These observations, which differ in several respects from those recorded of other species of the family in various parts of the world, were carried out at Lindisfarne, near Hobart, Tasmania, where these spiders with sapper-ways are very plentiful. Doubtless similar habits will be found under similar circumstances on the mainland of Australia.

There are at least two species of ichneumon flies that prey upon spiders in the form of external parasites. The larvae lie along the upper side of the abdomen of their prey, attached near the base, and with the head lying away from the head of the spider. A larva of the ichneumon has not been found in a stage prior to this, where it remains one or two days; within a night it feeds, becoming more and more bloated, till finally nothing is left of the spider but skin. The larva then spins a cocoon while hanging in the spider's web, and, in a fortnight, there emerges the winged form of the ichneumon. One species occurs in Tasmania, a second in New South Wales, and a third in Queensland, so probably other ichneumons with this habit will be found distributed over Australia.

The author who wrote "'Come into my parlour' said the spider to the fly" could scarcely have been aware that some flies enter the "parlour" of the spider with impunity; sometimes the host and not the guest is the victim. In Western Australia it is not an uncommon sight to see a robber-fly dart at a spider in the centre of a web, and, seizing it in a most dexterous manner, carry it away to feed upon at leisure. The habit is apparently limited to one species of robber-fly, which is rather common in the vicinity of Perth. In this case it is the fly itself and not the larva that feeds upon the spider, and it appears to form the only diet this particular fly partakes of in the matu stage of its existence.

A family of flies that also plays havoc in the spider world contains species of rather sluggish habits. They are known as "bladder-flies" on account of the blown out, bladder-like shape of many of the species. The larvae of these flies are internal parasites on spiders.

The eggs of spiders also contribute to the commissariat of the insect world as witnessed in case of the mantispids (not to be confused with "mantids" to which family they bear a close resemblance in form as well as name). The larvae of these creatures feed upon either the eggs or the newly-emerged spiders before they leave the egg-sac. Recently in Queensland a small moth has been found to feed upon the egg-sac of spiders.

The R.A.O.U. Conference

And Museum v. Private Collections.

By J. R. Kinghorn.

The Museum has lately been the meeting place for the annual conference of the Royal Australasian Ornithologists' Union. Here ornithologists from all parts of the Commonwealth gathered to discuss matters dealing with Australian birds, and the meeting this year was of special importance because of the work done in revising and compiling a complete new check list of names of birds (both scientific and vernacular), together with references to habitat and geographical distribution. This list, when published, should be of the greatest importance and use to ornithologists and laymen throughout the Commonwealth and other parts of the world.

When the question of correctly naming some of our birds came before the meeting, several of the best known species such as the laughing jackass and the lyre bird underwent a severe test and cross examination as to whether their scientific names were wrong or not, the rule in science being to abide by the earliest correct name, unless that name be very misleading. The finding was that the lyre bird, known for a long time past as *Menura superba,* had been living under a false name, while the jackass, *Dacelo gigas,* had been laughing at us for many years because it alone knew that its earliest name was *D. novae-guiniae,* misleading surely, as the bird is not known from New Guinea. The check list committee decided that the lyre bird shall henceforth be known as *Menura novae-hollandiae,* this being its earliest correct name. No doubt the great shyness of this bird in the past was due to its being aware that it lived under an "alias;" however, it stands corrected, and so, in its embarrassment, should most likely continue to be shy and perhaps even more evasive than ever. The name of the jackass is to remain as *Dacelo gigas,* and the bird will continue to laugh at the ways of man, perhaps even more heartily and mockingly, especially if it gets to hear of the heated discussions concerning it that we indulged in, in the Museum lecture hall.

When the R.A.O.U. finished its meetings in Sydney, a ten days' camp was held at the head of Wallis Lake, Tuncurry, N.S.W., where much useful observation work, listing species and photography was carried out.

The evenings were spent in holding meetings either for lantern lectures or discussions on ornithological matters. Important questions relating to official Museum collections and private collections were raised. It was suggested that no unauthorized member of the Union be allowed to form a collection. In my opinion, if this is carried out it will be a very fine move and a step towards checking the indiscriminate killing of birds, likewise the robbing of their nests to satisfy personal vanity.

It was also suggested that certain private collections or small local museums be established throughout the country for the convenience of the people, the plea being that the larger museums, such as the Australian Museum, or any other State museum, being government institutions, may at some time or other be so bound up in red tape, or staffed with such unapproachable officials that a request to examine certain birds in the reference collection may be refused. With the exception of a few very fine, already established, private collections, belonging to well-known and competent ornithologists, all attempts to form collections by other persons should be strongly discouraged. A collection of birds is one of the most difficult to keep free from the ravages of insects and other destroyers, and I know of several small collections in New South Wales country towns which have been allowed to deteriorate beyond all reason. In a museum such as the Australian Museum there are two collections of everything, a gallery or public exhibition collection, and a duplicate or reference collection, which is stored away in specially dust- and insect-proof cabinets, and is avail-

able for the use of students and other workers. The condition of the Museum collections is excellent, this being due to the vigilance of a specially trained staff. In the past the birds were scattered throughout many different cabinets, but they are now undergoing a complete re-arrangement and cataloguing, and the final result will be that any individual specimen of any species can be found within a few seconds. Any species specially asked for is available for inspection, and students and workers will always receive such facilities for study, and as much of our time as can be placed at their disposal.

Primitive Magic and Sorcery.

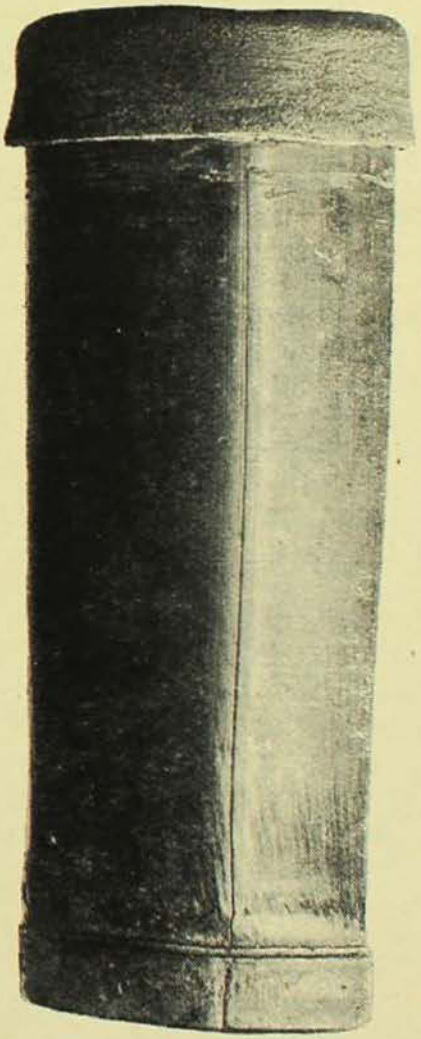
By William W. Thorpe.

Amongst the many curious articles in the Museum ethnographical collections is a small cylindrical bamboo box from the east end District of Papua partly filled with vegetable mould, and capped by a rind lid.

It is used, by a process of make-believe, to obtain certain possessions from another native. The owner of the box dips his finger in cocoanut "milk," then into the box, and smears the mould around his lips, meanwhile asking for what he requires. It is used more especially for obtaining possession of the wife or a pig belonging to another tribesman, and, owing to the belief of the latter in the potency of the box and its contents, he dare not refuse.

Sorcery or magic enters largely into the life and experience of all native peoples. In fact one sees its survival in many of the fears and superstitions current amongst civilised communities. It may be defined as an attempt to produce a result by some extraneous agency, superhuman or occult. As a rule those who practice it claim to have special contact with spirits, but, as in this case, a material agency is commonly used, for the profession has its own properties and implements of trade. These practices are only possible because of the psychological condition of the natives. The well-balanced mind knows there is nothing magical about the box or its contents, but the Papuan thinks otherwise; and this, taken in conjunction with the personality and reputation of the operator, brings about the desired result. A special class of individuals seems to be set apart to practise as sorcerers, who often have to qualify by rigid preparation before setting up in the business.

Unless one is associated with native people it is difficult to realise how inseparable magic or sorcery is from their daily life. If the rain does not fall, it is attributed to sorcery, and the local practitioner is requisitioned to



Papuan Sorcery tube.
Photo.—G. C. Clutton.

counteract it for the benefit of the growing crops. When a man has bodily pains, or is attacked by an illness, the malady is often removed by the native sorcerer, who pretends that he has extracted the offending cause. Magic can only be overcome by counter-magic, and so the time of the savage is largely employed in bringing evil on his enemies, or counter-charming against their machinations.

The mentality of the native does not permit him to put things and events to the test of natural laws or common sense. This is a stage to which he has not attained. He is taught certain things and he adopts them as the articles of his creed, and never dreams of doubting the wisdom of his forbears. Should he show signs of disbelief he would be subject to the ridicule of his tribal companions. Repeated successes of the sorcerer tend also to establish the beliefs inculcated. On the other hand, most of his efforts are brought to a successful conclusion by the readiness of his fellow tribesmen to believe that he can do what he professes. Moreover, the untutored mind generally likes, or is prone to be deceived, and even many civilised people prefer the experience which makes them stare and wonder, rather than to develop the critical faculty which enables them to ascertain the truth and eliminate such things as mysteries from their creed.

Peculiar Agencies of Animal Distribution.

By F. A. McNeill.

Under the striking heading "Shrimps from the Sky," there appeared in the pages of the *Sydney Morning Herald* of August 1st, 1918, a notice from Singleton, N. S. Wales, reporting the fact that large quantities of shrimps fell with rain during a prolonged shower, and continued to descend for some time. As was then suggested, a whirlwind could well be the responsible agency in bringing about such an apparently strange happening. Winds of this nature develop under unstable atmospheric conditions, and, while travelling along, could lift portions of a water surface much in the same way as they carry up dust. Small freshwater fishes still alive have not uncommonly been conveyed in this manner. The shrimp in question afterwards proved to be a common freshwater species (*Paratya australiensis*), and not a marine form, as was thought at the time, blown inland from the sea 40 miles distant. It occurs throughout the greater portion of the interlacing river systems of N.S. Wales, and in other parts of the continent. Apart from this wide distribution, however, the species is found in isolated water holes and lakes, as well as in small water courses. Many of the latter are situated on very high ground, and this leaves one at a loss to explain offhand the manner in which the creature gained access to these disconnected and out of the way places. The record from Singleton provides one definite solution to account for the peculiar distribution of this species of shrimp. In other parts of the world, however, the occasional transportation of small animals by whirlwinds, which has been referred to by Charles Darwin as "what may be called accidental means," probably does not provide the main means of distribution along the peculiar lines exhibited in the case of the Australian *Paratya*. It is probable that this latter has been distributed mainly by the agency of migrating wading birds, which must carry the eggs or young on their legs and feet, entangled with the mud and slime that congregates on those parts, much in the same manner as pond snails adhere to these appendages in the case of ducks. Another instance of peculiar distribution is exemplified in the case of the "Yabbie" (*Parachaeraps bicarinatus*), a freshwater crayfish well known for its depredations in artificially constructed dams in Western N.S. Wales and other parts of the eastern and sou-

thern regions of Australia. It riddles the banks with its burrows, causing them to collapse, and is a source of continual trouble to the man on the land. No sooner is a new dam constructed than the presence of this pest is noticed. Perhaps, as has been suggested by some, the creature traverses wide tracts of land in the night time from one water hole to another, or its distribution may very well have been brought about in the manner outlined for the case of *Paratya*. Mr. Charles Hedley, of the Australian Museum, has satisfied himself that the wide dispersion in the South Pacific of certain small invertebrate animals is due to the agency of wind-blown leaves. He writes as follows:—"Every one who has crossed a woodland track in windy weather has seen handfuls of dead leaves whirled up by eddying gusts. Let such a gust pick up such leaves from a Pacific atoll, during the height of a violent cyclone; they travel softly, without jarring off what has adhered to them, and may easily be dropped on an atoll a hundred miles distant after a few hours. To all collectors it is well known what numbers of small invertebrates attach, either as ova, larva or adult, to fallen leaves. So a shower of a few dead leaves might throw at once a dozen species of insects, spiders and snails on an island where no life was before."

Electric Rays.

By A. R. McCulloch.

Is there any fisherman, professional or amateur, on our coast, who is not acquainted with Electric Rays, or Numbies as they are sometimes called? Their extraordinary powers of giving off electric discharges has brought them under the attention of almost every fisherman —sometimes more forcibly than can be remembered with comfort.

A party of biology students from the University on their annual excursion to Port Stephens, recently discovered a medium-sized example of the common species, *Hypnarce subnigra*, in shallow water. It burrowed beneath the sand with extraordinary rapidity when it observed their presence, doubtless realising the peculiar inquisitiveness of such people. But all to no avail. One member of the party seized a water-logged stick and commenced to dig it out, while another, unaware of the identity of the prey, simultaneously stabbed it with a ferocious looking bowie-knife. Both jumped several feet in the air as they received a violent shock, and very nearly allowed the fish to escape. It was characteristically clumsy in its movements, however, and considered its greatest safety lay in seclusion beneath the sand. But the students were not to be denied the experience of testing its electric properties, so it was soon scooped out onto the beach, where it was prevailed upon to deliver about fifty successive shocks in a space of ten minutes or so. These were quite intense at first, but gradually weakened, and were felt from all parts of the fish, including even the ventral fins and the rim of the snout. An effort to kill the fish by stabbing it suddenly through the brain produced a pronounced discharge which resembled a blow on the biceps of the stabber, due to the sudden contraction of that muscle. Another investigator, with extra good control of his nerves, retained his hold of a knife while inserting it into the electric organ on the sides of the body, and felt the shock completely through his body from his arm to his feet. When one placed a foot upon the fish a shock was felt in the lower muscles of the calf of both legs.

The electric properties of the numbfish would appear to be merely for protective purposes, since the mouth is so small, and the teeth so feeble, that none but small fishes and crabs are devoured. Were a shark or other large enemy to seize a numbie, it would doubtless liberate it after the first shock. One could hardly imagine the predicament

of any animal bold enough to swallow one alive—it would completely outclass that of the foolish monk who swallowed the dried peas. The insulating principles of the fish are evidently very well arranged, since the discharge loses none of its intensity even when the fish is lying on wet sand, and, as was proved, can be transmitted along a wet stick from the water, which is not a little remarkable.

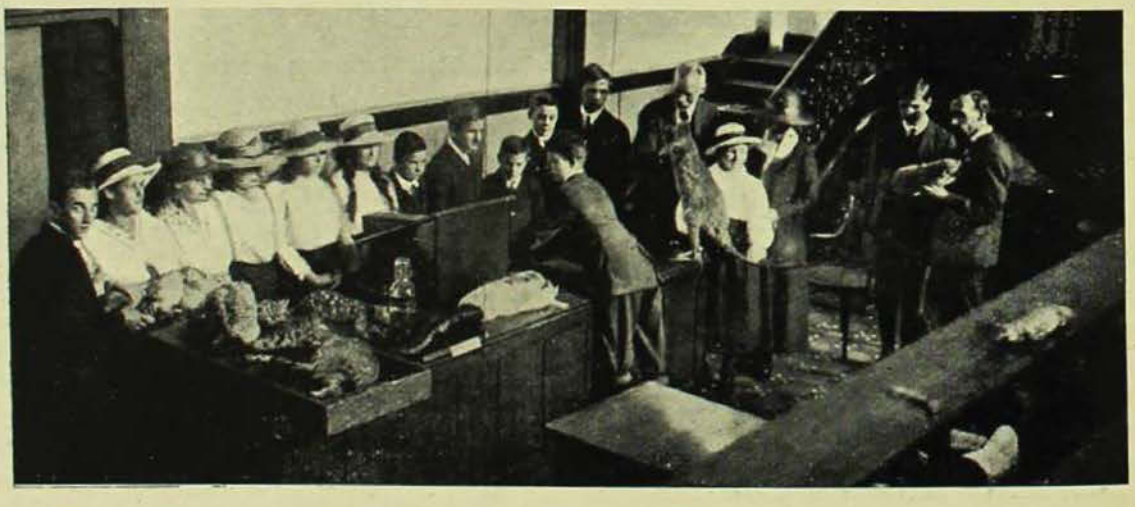
Near the eyes of the specimen referred to above, were three leeches of a kind peculiar to fish, which aroused some comment as to their circumstances during a discharge. Do they too receive a shock or are they insulated, or have they evolved some modification which reduces the shock to a merely pleasant tickling sensation?

The electric organs of European numbfishes have been studied in detail, and most interesting data concerning them have been gathered together. The organ consists of a series of hexagonal cells arranged vertically between the upper and lower surfaces, and filled with a jelly-like substance. The discharge has all the properties of electricity, and will both cause a spark and magnetise the needle.

There are three different kinds of numbfishes so far recorded from the waters of this State, but two of these are restricted to deeper water, and are taken only by the trawlers. A fine example over two feet in length, well worth seeing if one is interested in these things, is on exhibition in the Australian Museum.

Notes and News.

LECTURES TO THE BLIND.—To serve the people is first and last the aim of the Australian Museum. The old-fashioned museums did not trouble about people who could not help themselves, but, while those who are clever and strong need little help, those of our fellow citizens who are weak and helpless require our consideration. A better way in this direction as in many others has been pointed out by the newer of the museums in America. Mr. C. Hedley, a member of our staff, who was studying the improvements in museum administration practised in New York, became interested in their treatment of blind visitors. On his return to Sydney he introduced their method of lecturing to the blind. Some article from the Museum collection, such as a mounted animal or a native weapon, is chosen by the speaker. In simple language he



Blind students from the New South Wales Institution for the Deaf and Dumb, and the Blind, in the Australian Museum Lecture Theatre. After the various animals have been described by the senior demonstrator they are handled by the students who, aided by his assistants, are thus enabled to form some idea of the size, shape and texture of the specimens.

Photo.—G. C. Clutton.

describes the appearance, use, and structure of the article to the blind folk, and finally the article is taken round to be handled by each visitor in turn. By passing his hands over it the student gains by touch a complete knowledge of its texture, weight, and size. Meanwhile he is reminded of the particular points noted by the lecturer. Perhaps three or four such articles will be studied by the party during their visit. In the end the blind boy or girl probably carries away a better knowledge of the things studied than those who have seen them, but seen them with a hasty glance. The blind students, so their teacher says, look forward to their visit to the Museum rather as a treat than as a lesson.

The Young of the Platypus.—Acting-Professor L. Harrison had a novel exhibit at the October meeting of the Linnean Society of New South Wales, in the shape of two young platypuses in their nest. The funny little things were about three weeks old, and looked like pink sausages. In the dark nest they were quiescent, but, when placed on the table, they displayed extraordinary energy, tumbling about incessantly, turning somersaults and twisting themselves into the most comical positions. Mr. Harry Burrell, an enthusiastic student of the monotremes, who has done splendid work in elucidating the life history of the platypus, and who secured these specimens on the Namoi River, says that the young of both the platypus and the echidna may almost be said to afford an instance of perpetual motion.

By the kindness of Acting-Professor Harrison and Mr. Burrell we have been enabled to make colour sketches of these babies, which will be subsequently cast and exhibited with their nest in the Museum.

Travels of a Geologist.—Professor Sir Edgeworth David, trustee, has recently returned from an extended geological tour, during which he visited Victoria, South Australia, and Western Australia, in order to obtain materials and information for his forthcoming work on the geology of Australia. Amongst other places of interest, he visited the curious mound springs of Central Australia, and examined the gypsum deposits and salt lakes of Cape Yorke Peninsula. In Western Australia Professor David travelled as far north as Nullagine, where he inspected the remarkable auriferous and diamond-bearing conglomerates which are found there. He also examined the Collie and Irwin River coal measures of Western Australia, and was able to establish important correlations with the coal beds of Eastern Australia. Sir Edgeworth travelled extensively over the great Nullarbor Plains in the south east corner of Western Australia; these form a nearly level and almost treeless expanse, stretching for 400 miles east and west, and almost as far north and south. The distinguished scientist pays a warm tribute to the many friends who assisted him in his geological and geographical researches, and speaks in the highest terms of the intelligence and fine qualities of many of the aborigines whom he encountered on his journeys.

A Zealous Collector.—Mr. E. H. Rainford, of Bowen, Queensland, has been engaged for some time collecting for the Museum on the Queensland coast. His efforts are quite voluntary, and have already resulted in much valuable material and interesting notes on the habits of the animals which have come under his notice. Writing of the carnivorous habits of the marine worm *Nereis* he says: "One day at low water my attention was drawn by the activity of some green *Nereis* pursuing a pink worm of the same shape and size as themselves—apparently they differed only in colour. As soon as the *Nereis* discovered the pink one it raced after it, endeavouring to head it off; when level with the fugitive it suddenly protruded from its mouth a white bladder [its stomach—Ed.] which fastened on to the head of its prey (sometimes three or four attempts were necessary); through this protuberance the *Nereis* absorbed the whole of its victim fairly quickly. Sometimes two Nereids would attack the same worm, one the head, the other the tail, and continue swallowing until they met in the middle, when each would go its way peacefully."

FIJIAN EXHIBIT.—By removing a number of Buka ceremonial paddles space was found in the wall cases of the Melanesian room for displaying the collection of Fijian ethnography. Among the objects placed on view are some fine examples of glazed pottery, ponderous clubs, tapa cloth, and domestic implements and ornaments. Special attention may be called to the exhibits illustrating the kava-drinking custom and the cannibalistic habits of old Fiji.

FOSSIL WHALE.—Last year Professor T. Thomson Flynn, of the University of Tasmania, had the good fortune to find the skull and part of the skeleton of a squalodont whale in the Miocene beds near Table Cape, Tasmania, where its remains have been embedded for at least two million years. These whales were voracious creatures, with sharp cusped teeth something like those of the shark, and are now quite extinct, nor have they left any direct descendants, for existing whales followed another line of descent. They show distinct evidence that whales have descended from carnivorous animals. The remarkable specimen found by Professor Flynn must have reached a length of about sixteen feet when alive. The difficult task of preparing casts of this valuable skull for distribution to scientific institutions was entrusted by Professor Flynn to this Museum, and Mr. G. C. Clutton and his assistant, Mr. J. Kingsley, have carried out the work very successfully. Professor Flynn writes: "It is a pleasure to be able to express myself in the highest terms of admiration of the fine work which your Mr. Clutton has performed in the execution of these casts. They are, I firmly believe, worthy of any scientific institution in the world."

SNAKES' FANGS.—Mr. R. Fulton, of the Public School, Upper Colo, writes that he has recently examined a black snake which had three fangs in its jaws, two being together on one side, while there was only one on the opposite side. Before and since that enquiry similar letters have reached the Museum, all of which have been answered, but, for the enlightenment of others, it might be as well to give here a brief explanation of the occurrence of such peculiarities. All venomous snakes have a reserve stock of fangs growing in the gums and they are in various stages of development; the smallest is so small that it would take a lens to detect it, while the most advanced pair (one on each side) are well developed and quite ready to take an active part as soon as the fangs in use are lost either through accident or cast aside through the natural shedding of the teeth. The maxillary bone, to which the fangs are attached, has two sockets, one containing the fang in use, and another along side it for the reception of the reserve fang. Very often when the reserve one develops too quickly it takes its place beside the one in use, but it does not become firmly attached to the bone or venom apparatus until the old one is out of the way. Snakes with three fangs are not rare, and there are several in the Museum collection.

VICTORIAN VISITOR.—Mr. A. S. Kenyon, of the Rivers and Water Supply Commission of Victoria, recently paid a visit to the Museum, primarily to arrange exchanges of aboriginal stone implements, by which our collection of Victorian stone axes and flaked material has been considerably increased.

RECORD ATTENDANCE.—On Eight-hour Day, 3rd October of this year, 5,600 people passed in through the Museum turnstile. This is the highest number of visitors ever recorded for one day since the Museum was founded.