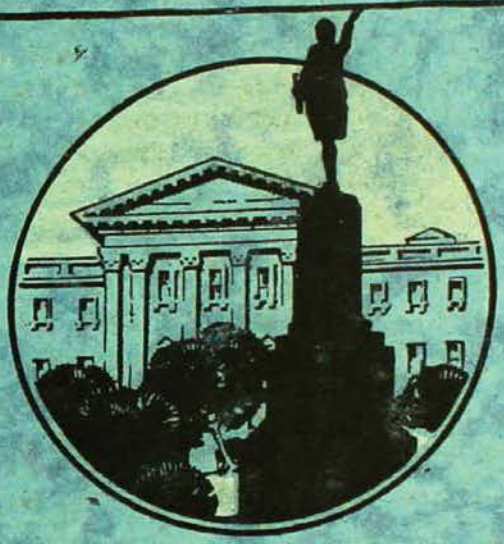
The AUSTRALIAN MUSEUM MAGAZINE

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



PROFUSELY ILLUSTRATED.

Vol. 1. No. 5. JULY, 1922. Price—ONE SHILLING.

THE AUSTRALIAN MUSEUM

College Street, Sydney.

BOARD OF TRUSTEES:

President:

T. Storie Dixson, M.B., Ch.M., Knight of Grace of the Order of St. John.

Crown Trustee:

James McKern.

Official Trustees:

His Honour the Chief Justice.
The Hon. the President of the Legislative Council.
The Hon. the Colonial Secretary.
The Hon. the Attorney-General.
The Hon. the Colonial Treasurer.
The Hon. the Secretary for Public Works and Minister for Railways.
The Hon. the Minister of Public Instruction.
The Auditor-General.
The President of the N.S. Wales Medical Board (T. Storie Dixson, M.B., Ch.M.).
The Surveyor-General and Chief Surveyor.
The Crown Solicitor.

Elective Trustees:

Prof. W. A. Haswell, M.A., D.Sc. F.R.S.
Prof. Sir T. W. E. David, K.B.E., C.M.G., B.A., F.R.S.
W. H. Hargraves.
Eric Sinclair, M.D.
Col. the Hon. Sir Jas. Burns, K.C.M.G., M.L.C.
J. R. M. Robertson, M.D., C.M.
Ernest Wunderlich.
G. H. Abbott, B.A., M.B., Ch.M.
J. Vernon.
The Hon. D. Levy, LL.B., M.L.A.
J. J. Fletcher, M.A., B.Sc.
G. McRae.

Director:

Charles Anderson, M.A., D.Sc.

Principal Keeper of Collections:

Charles Hedley, (*Conchologist*).

Scientific Staff:

Allan R. McCulloch, *Zoologist, in charge of Fishes.*
William W. Thorpe, *Ethnologist.*
Anthony Musgrave, *Entomologist.*
J. Roy Kinghorn, *Zoologist, in charge of Birds, Reptiles, and Amphibians.*
Ellis Le G. Troughton, *Zoologist, in charge of Mammals and Skeletons.*
F. A. McNeill, *Zoologist, in charge of Lower Invertebrates.*
T. Hodge Smith, *Mineralogist and Petrologist.*

Librarian:

W. A. Rainbow.

Accountant:

J. A. Trimble.

$\frac{1}{3}$

BABBLERS

Top Left—Chestnut-crowned Babbler. *Top Right*—White-browed Babbler.
Centre—Red-breasted Babbler. *Lower*—Grey-crowned Babbler.

Table of Contents.

Part of the Montague Island Gullery.

Photo—A. F. Basset Hull.

Silver Gulls on Montague Island.

Photo—A. F. Basset Hull.

THE AUSTRALIAN MUSEUM MAGAZINE

Published by the Australian Museum - - - - College Street, Sydney.
Editor: C. ANDERSON, M.A., D.Sc. Annual Subscription, Post Free, 4/4.

Vol. I. No. 5. JULY, 1922.

Editorial.

THE MAGAZINE.

The Australian Museum Magazine has now passed its first anniversary, and it is possible to make an estimate of the success or otherwise of the publication. It is gratifying to report that, judging from sales and from the enquiries which have reached us from all parts of New South Wales, and even from other States, the Magazine is widely appreciated and is assured of sufficient support to warrant its continuance. We hope for a further increase in circulation as time goes on, and the publication becomes better known to the Australian public.

OUR FRONTISPIECE.

The fine coloured plate by Mr. Neville W. Cayley which forms the frontispiece of this number is the generous gift of Messrs. Angus & Robertson, Ltd., Sydney. It is a reduced reproduction of an illustration which will appear in a forthcoming work, "The Birds of Australia and Tasmania with their Nests and Eggs," to be known as

CAYLEY'S BIRDS OF AUSTRALIA.

This magnificent publication, which will probably remain the standard work on our birds for many years, will shortly be issued by Messrs. Angus & Robertson, who are deserving of the highest praise for their enterprise and patriotic spirit. The letterpress will be the work of Mr. A. S. Le Souef, Director of the Taronga Zoological Park, Sydney, and Mr. Charles Barrett, author of "In Australian Wilds," with special contributions by Mr. A. J. Campbell, author of "Nests and Eggs of Australian Birds," and field observations by leading Australian ornithologists. Every Australian bird will be illustrated in colour by Mr. Cayley, whose name is a guarantee of fine work. A special feature will be the splendid plates illustrating the eggs of all birds which breed in, or visit Australia. In these plates the artist and the engravers, Messrs. Bacon & Co., Ltd., Sydney, have, by some necromancy, succeeded in making the eggs stand out in relief with a quite startling stereoscopic effect. The work will also contain a very fine series of photographs from life, showing the birds in their native haunts, their nests and nesting sites, their young, and something of their daily life. The completed work will contain over two thousand of these photographs, each taken by an accomplished nature photographer.

This and other Australian museums have a special interest in "Cayley's Birds of Australia," for we have been privileged to help in its production, which has entailed continual reference to the various national collections, including our own, and frequent consultations with the officers in charge of the ornithological sections.

LIGHTING OF THE MUSEUM.

It is our misfortune that the oldest portion of the building was erected in the days when museums were considered more from an architectural point of view than as receptacles for the storage and display of natural history objects, consequently this museum, while a fine example of Italian Renaissance style, is very badly lighted in parts. To overcome this defect electric light is being installed, and already the wall cases in the palaeontological room have been illuminated, so that the interesting collection of vertebrate fossils can now be seen to advantage. At the same time electric light has been supplied to the lecture hall, the board room and front offices, and the lion and Antarctic groups, the attractiveness of which has thus been greatly enhanced.

GROUPS.

The Boatswain Bird group, the making of which is described by Mr. A. R. McCulloch in this issue, is almost completed, and will, we feel sure, form a most interesting and attractive exhibit. The preparation of the Admiralty Islets bird group and the coral pool is now proceeding, and, when these three exhibits are on view, Lord Howe Island will have an added interest for our visitors.

Notes and News.

His Excellency the Governor General and Lady Forster, accompanied by Captain C. J. Traill, M.C., A.D.C., paid a visit of inspection to the Museum on 22nd May. Their Excellencies were much interested in the collections, and the activities of the institution.

Two members of the Board of Trustees, Sir James Burns and Dr. J. R. M. Robertson, have recently departed on an extended trip to Europe. We wish them both a prosperous and enjoyable journey.

The Museum possesses a large collection of coins, ancient and modern, but these, through lack of suitable space, have not previously been exhibited. A show case has now been set apart for the display of a portion of the collection, and, by periodically changing its contents, an opportunity will be given for the public to inspect the more interesting coins contained in the Museum.

Among recent visitors were Mr. S. A. Greenland, Department of Native Affairs, and Mr. A. P. Lyons, Resident Magistrate of the Eastern Division, Papua. Two students of anthropology, Mr. F. E. Williams, of Balliol College, Oxford, and Mr. Gullberg, of the Smithsonian Institution, Washington, both on their way to make investigations in New Guinea, called at the Museum and examined our anthropological collections. Another recent visitor was Dr. Herbert Basedow, who is proceeding to the Northern Territory to lead an exploring party on an oil quest.

In our last issue it was mentioned that "some members of our flora and fauna which are not appreciated in Australia are in great demand in other parts of the world," and the case of the Moreton Bay fig was instanced. Since then the fine fig trees bordering the central avenue in Hyde Park, Sydney, have been condemned to death, and most of them are already gone to provide an outlet for passenger traffic by the projected underground railway. There may be good and sufficient reasons why these trees could not be spared, but their passing will be deplored by many. As Henry Ward Beecher said, "Of all man's works of art, a cathedral is greatest. A vast and majestic tree is greater than that."

Notes on the Babblers*.

By Neville W. Cayley.

GREY-CROWNED BABBLER.

(*Pomatostomus temporalis*).

These well-known birds are found over the greater portion of eastern and south-eastern Australia. They frequent open forest country, and are commonly seen playing and hunting for food near habitations and along the roadside; their strange cries and calls have been responsible for a number of their "bush" names, such as Dog-bird, Cat-bird, Barking-bird and Chatterer. They are very interesting to watch, being always on the go and playing all sorts of games from "chasings" to a fine exhibition of "catch-as-catch-can" wrestling. At first sight one would believe them very quarrelsome—but not so; they are friendly, happy creatures, so much so in fact that "Happy Family" is the name they are mostly known by. Another name, which they share with the Grey Jumper (*Struthidea cinerea*), is "Twelve Apostles," because they usually go about in flocks of twelve. They do a huge amount of good, destroying large numbers of noxious insects—especially the larvae of the codlin moth—and should therefore be encouraged in one's orchard and garden. All hands help with the making of the huge dome-shaped nests; these are usually built in small saplings, constructed of sticks, and lined with grass, bark, wool, etc., with a side entrance that is hooded over. Many nests are built—often two or more in the same tree—but only a very few are used for laying, the others being occupied as roosting-places. Four eggs constitute the usual clutch; they are elongate-oval in shape, and the ground colour varies from pale brown to purplish brown or buff, marked or veined all over with hair-like lines of dark brown or black. The strange thing about these markings is that they can be removed by rubbing with a damp cloth. The breeding season is August to December. Outside measurements of nest: 14 inches long by 13 inches wide, 14 inches in depth. Measurement of egg, 27 mm. by 19 mm. This species is known throughout Queensland, N.S. Wales, Victoria, and South Australia.

WHITE-BROWED BABBLER.

(*Pomatostomus superciliosus*).

This bird is smaller than the Grey-crowned Babbler, but has a wider distribution, being found in both eastern and western Australia. Captain S. A. White, of South Australia, says: "This bird is found practically all over the State, and is a most useful bird, destroying large numbers of noxious insects, especially ridding orchards of codlin-moth grubs. Very sociable, even in nesting time they seem to live in families, and at other times more in parties of five to twenty. Like the other species, they build a great many nests and lay in very few of them. It is a common sight to see four or five birds come out of a nest, which they seem to occupy as roosting places."

The nests are similar to those of the Grey-crowned Babbler. Three is the usual clutch of eggs, but they vary in number from one to five; the shape is oval, the ground-colour a pale greyish brown, varying to light or buff-brown, and slightly marked or veined with dark brown hair-like lines or indistinct mottlings of a darker shade of the ground-colour. From the middle of May to the end of the year constitutes the usual breeding season. Outside measurements of nest: 10 inches by 12 inches. Measurements of egg: 23 mm. by 17 mm.

CHESTNUT-CROWNED BABBLER.

(*Pomatostomus ruficeps.*)

This species of Babbler, found mostly in the interiors of N.S. Wales, Victoria and S. Australia, resembles the

* See coloured frontispiece.

The Making of a Museum Group.

By Allan R. McCulloch.

[Owing to the generosity of Messrs. A. E. and O. Phillips, Sir James Burns, Sir Hugh and Mr. William Dixson, the Trustees were able to despatch a party from the Museum to Lord Howe Island to collect material for the construction of three gallery exhibits. Mr. McCulloch was in charge, and was assisted by Mr. E. L. Troughton. The taxidermy and casting, &c., were carried out by Messrs. G. C. Clutton and W. Barnes, while Miss P. F. Clarke accompanied the party as artist. The first exhibit, a nesting group of Boatswain Birds, has been constructed by Messrs. H. S. Grant and J. H. Wright, and is now almost ready for exhibition. The following article gives an account of the field work entailed in its preparation, together with some notes on the habits of the birds themselves.—Editor.]

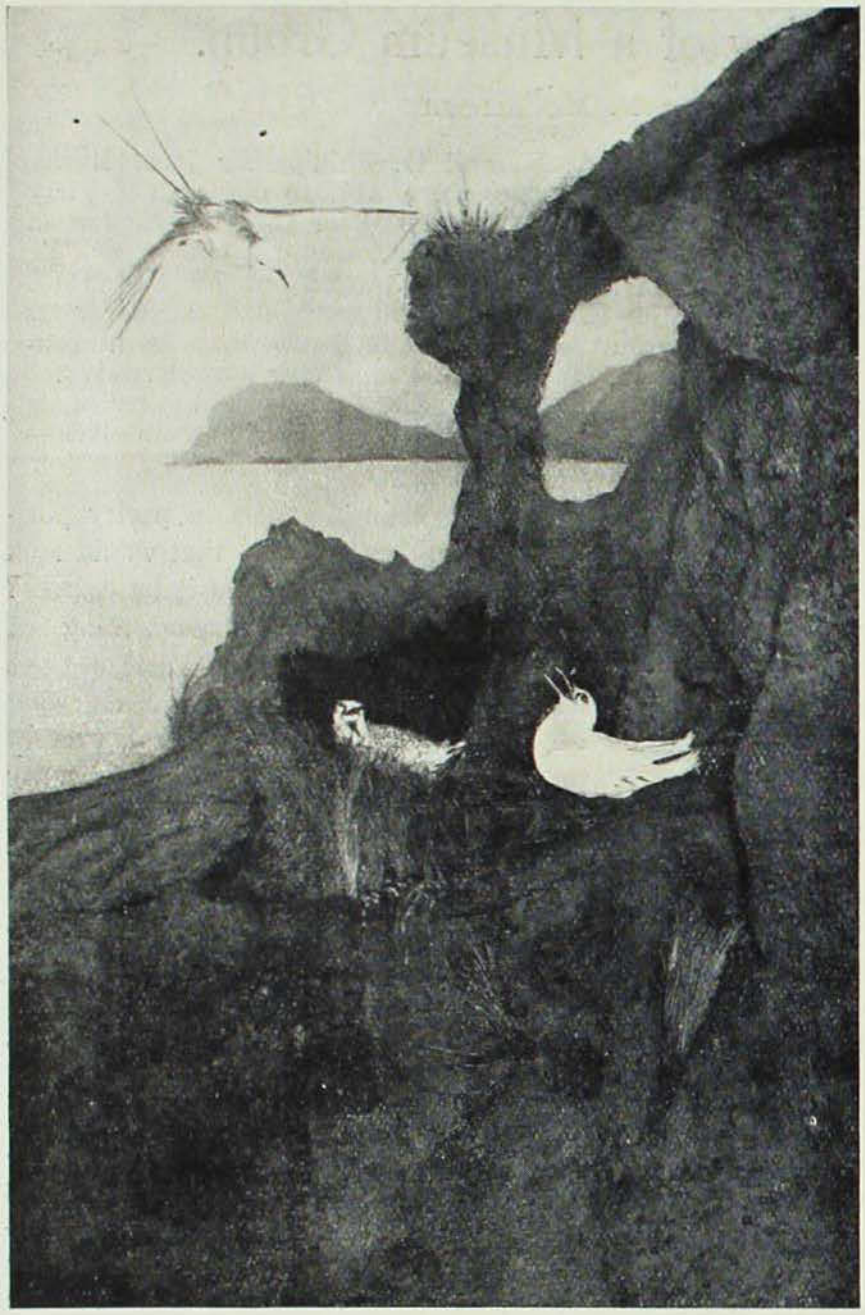
In days gone by, those good old days we so often hear about but which were really so bad in many things, a museum consisted largely of rows upon rows of stuffed animals, and whole shelves of specimens in bottles of spirit. People wandered in and looked them over in a more or less aimless fashion, and most of them went away again carrying nothing with them but a recollection of many dead things. In novels one reads of fusty old gentlemen in frayed coats whose interest in the musty things of museum galleries precluded them from the society of their fellow men. That was the spirit of the museum of days gone by.

But the modern museum must be a place of entertainment and education, the latter presented in such a form that it is unwittingly assimilated by everybody. The vagaries of nature, the relationship of everything around us, changing momentarily and all the time, are what make up the interests of our lives, and, whether we know it or not, we are all deeply concerned with everything nature has to show us. And it is the business of a museum to draw attention to, and so make us appreciate these interests. So we no longer arrange specimens in endless rows, but endeavour to present them as they are in nature, very imperfectly it is true, but far more effectively than has been done in the past.

To bring a Boatswain Bird or two into a museum is quite a simple matter. A gun and a knowledge of taxidermy are all that is required for that. And there would be no difficulty in arranging some artificial rocks, decorating them with ferns and bushes, and after stuffing the birds and mounting them in pretty positions, preparing a group that would look quite effective. But would it be correct? Would it teach people something of nature's ways, or would it mislead them with false ideas, which is precisely what we must not do? In order to represent those same birds with all their vitality and the air around them so as to show people how they are in life, it is necessary that we go into the field. Instead of merely bringing them down with a gun, we must climb up to their nests, to watch their flight from above as well as from below, to make friends with their babies, and to study their ways of living. And we must not only have a taxidermist with us to mount the birds in life-like attitudes, but an artist also who can see and paint the background, and so reproduce the atmosphere in which they live. The nature of the cliffs on which they nest, and the kind of bushes occurring thereon must be carefully noted if the reconstruction is to be really instructive, and just what the birds do or don't do is to be carefully observed so that the specimens may be properly associated in the group.

It was with all these things in mind that we set out early in the year for Lord Howe Island. We selected Boatswain Birds as the subject of our group for several reasons, one of which was that they are of such striking beauty that they could be mounted into an effective group, while they are also characteristic of a large group of sea birds which build their nests upon more or less inaccessible cliffs.

We found the birds in plenty nesting on all the seaward cliffs at anything from fifty to a thousand feet above sea-level.

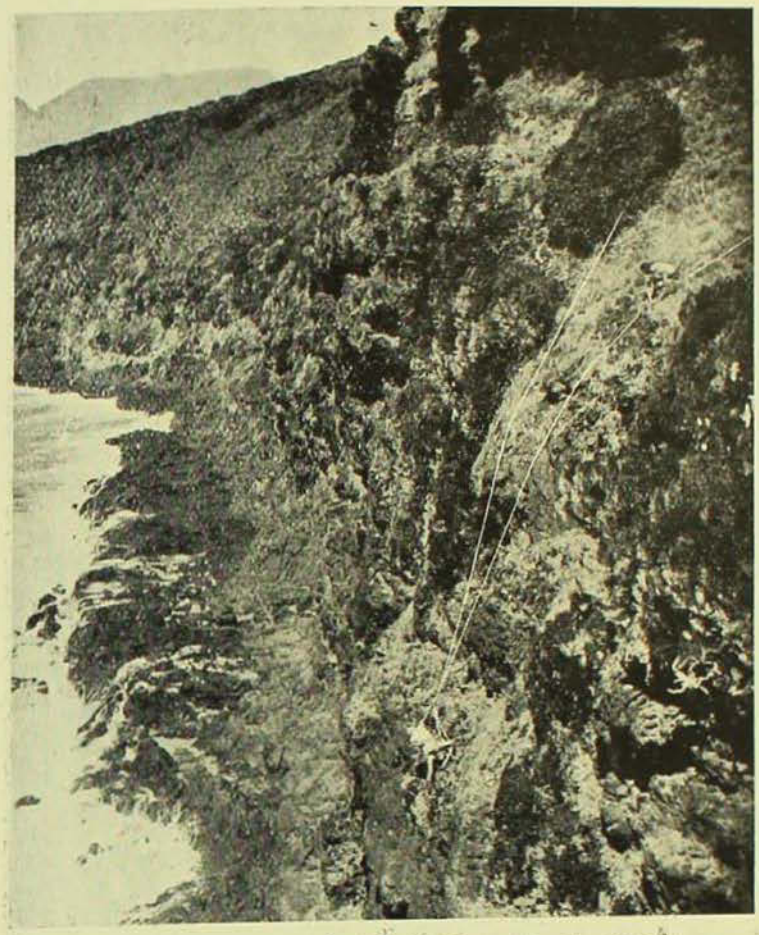


The almost finished group, as it will appear in the Museum. One parent bird has been feeding the speckled chicken in the nest, and resents the intrusion of the other, which is likewise intent upon contributing its quota to the family food supply.

Photo—G. C. Clutton.

Some had eggs, others were feeding white fluffy young, just hatched, while others tended to the wants of fully fledged chickens as large as themselves. These were almost always sheltered securely from the weather in crevices or holes formed by lava bubbles in the basaltic cliffs. The cavities were sometimes almost hidden from view by a luxuriant growth of grass which made them quite cosy, notwithstanding the lack of anything in the way of a nest to keep the chicken or the egg off the hard bare rock. The parent birds were greatly disturbed at our approach, and squawked at us harshly, while ruffling up their beautiful plumage so that their black-tipped feathers showed strikingly amongst their dress of palest pink satin. They did not attempt to leave the nest, however, even when robbed of their single brown or speckled egg, and though provided with sharp pointed bills with serrated edges, they used them so ineffectively that we had no difficulty in grasping and holding them while investigating the nests.

Often as we climbed the cliffs, the noise of our approach to a nest was so smothered in the roar of the surf on the rocks below that we found the parent bird or the young fast asleep. The brooding birds slept with their heads a little tilted backward, not tucked under a wing, as might be supposed, but the young lay sprawled out in any old position. Their necks were generally stretched out upon the ground, doubtless because of the large amount of food contained within the gullet, for the young Boatswain Bird grows apace, and requires much food to build up its rapidly increasing frame. One we disturbed had two half digested squid placed end on end in its throat which were so large that we wondered how it had managed to stow them away so successfully. On one occasion, while watching a young bird in its nest, we saw its mother alight and proceed to feed it, regardless of our presence. She allowed it to insert

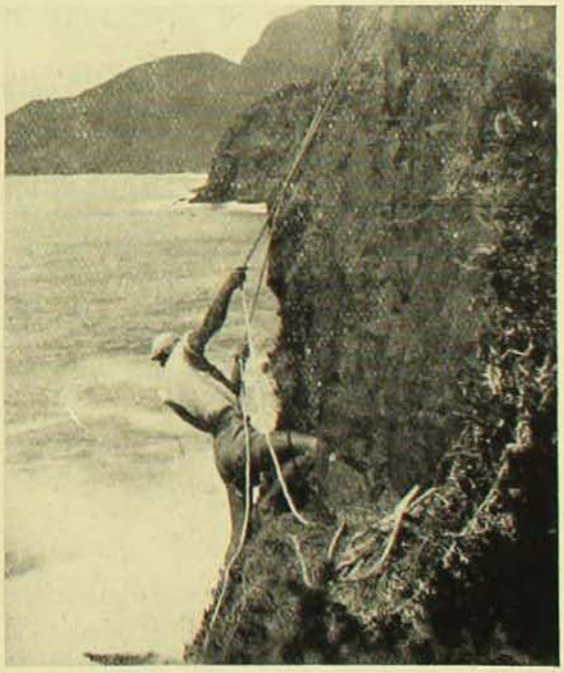


The use of ropes enables the climber to descend vertical faces of rock to positions otherwise inaccessible.
Photo—A. R. McCulloch.

its large bill far down her throat, and then regurgitated the food she had swallowed into its hungry maw, a proceeding which seemed to entail much energy and discomfort for them both. So soon as it had obtained all she had to give it, the large chicken, which is pictured with its mother in an accompanying figure, proceeded to peck at its parent in a most unfilial manner, and drove it out to sea again to search for further dainties to appease its apparently insatiable appetite.

Boatswain Birds wander far and wide over all temperate and tropical parts of the Indian and Pacific Oceans, flying with incredible ease in all weathers. They are apparently assisted by one or two long slender feathers which project from the tail, and are known as "steers." These swing from side to side like the rudder of a ship as the bird turns in the wind, and it is said that individuals which have lost them fly less effectively than those in which they are present. Just how far this is correct is doubtful, but certain it is that the flight of even the steerless Boatswain Bird is a thing to be marvelled at.

We watched them wheeling and circling, either singly or in groups of two to four, and so perfectly at ease in mid air that they could stretch a leg forward to scratch behind the ear or bend the head backward to peck at some irritating parasite among their feathers. Every now and again one would pause in its flight and remain fluttering its wings before its fellows as though showing off its skill. Sometimes we saw one attempt to alight in some crevice in the face of a cliff, fluttering near the rocks with every feather in the wings



Troughton examines a well-secluded nest, while the photographer clings to one of the killmoak bushes shown in the upper picture.
Photo—A. R. McCulloch.

A fully fledged chicken and its mother in a crevice formed by a lava bubble in the basalt cliff. Before leaving the nest, the young reaches a size equal to that of its parent.

Photo—A. R. McCulloch.

and tail outstretched, the latter bent upward, and then sheer off again as though warned off by a sitting mate.

The adult bird is covered with a satin-like plumage which is principally white in colour, but which in the male is suffused with a wonderful delicate pink over the whole body, leaving the head white. A black eyebrow and some black-tipped feathers near the tail, a large scarlet bill and bluish legs add to the beauty of this aerial dandy. The steers are scarlet, and their curious form and rarity cause them to be somewhat sought after for millinery purposes. "Tailing" therefore provides both thrills and profit for some of the better climbers among the island boys who annually scour the more accessible cliffs in search of the nesting birds. As these usually sit with their heads in the dark and their tails projecting from the cavities, the steers can be plucked out almost without disturbing their owners. They are then carried in the climber's hatband until he returns to safer levels.

The young Boatswain Bird, as in many other sea birds, differs considerably in appearance from its parents. Each feather of the upper surfaces is marked with one to three broad bars of black, which offer a striking contrast to the pure white of the rest of the plumage. The bill is slaty-blue, and the long tail feathers are undeveloped. During the earlier part of our stay on the island, we found all the nests tenanted by birds with only eggs or newly hatched young, and as we wanted a young but fully fledged specimen to show the speckled plumage, we had to pay them periodical visits to ensure securing one with just these characters. A violent gale churned up the seas to such a height that several chickens we had hoped to collect were washed out of their nests, but others were found after some little search, which we visited regularly, and watched the de-

Our artist is assisted up a rocky face.
Photo—A. R. McCulloch.

velopment of the black and white feathers among the white down until the latter had almost disappeared. They grew in their nests from the size of chickens of an ordinary fowl to that at which they equalled the bulk of their parents, and, though never friendly, they gradually became more or less accustomed to our periodical intrusions. With a very genuine dislike of destroying any living thing unnecessarily, we found the final task of taking their short-lived lives to be much against the grain, and made sure that their demise was both painless and instantaneous.

Climbing the cliffs to the nests provides many thrills, as the accompanying illustrations show. The volcanic rock is often very rotten, and crumbles away under one's feet, so that every projection affording a hold for either hands or feet must be carefully tested before reliance can be placed upon it. Further, as one can often easily ascend to places from which it is difficult or impossible to descend again, it is advisable that two climbers should work together so that one may help the other if necessary. A rope was usually scorned, but we were occasionally able to reach positions, otherwise wholly inaccessible, by means of long lengths of manilla. By fastening the ends to two bushes some distance apart and allowing them to hang down to the part to which we wished to descend, we were able to climb down even smooth rocky faces, while moving to the right or left as required by using the corresponding rope.

Steady nerves and a sense of balance are all-important in cliff-climbing, and one must be ever on the alert for unsuspected dangers. On one occasion, my climbing mate Troughton, while in a particularly dangerous position, brought his whole weight to bear upon a projecting ledge of rock which broke away from under him, and he slipped several feet on the rope before he could grasp it sufficiently firmly to save himself from a sheer drop of a hundred feet onto the rocks below. Further, the killmoak bushes which cling to the rocky faces, or small projecting rocks, often appear to the most careful climber to afford a secure hold, but tear away when one's full weight falls upon them. At such times, thought and action must be instantaneous, and we more than once found ourselves with nothing but a meagre support for one foot to save us until we could regain our balance. It is upon occasions like these that one glances downward to the white surf, roaring and boiling against the foot of the cliff far below, and regrets that Nature has not seen fit to provide us with wings so that we might leap off into space, as do the birds we disturb in our ascent.

As already stated, we had not only to secure the specimens required for our group, but it was also necessary that our artist should see and make paintings of the view from the nesting site selected for reconstruction, to be used in the final painted background of our case. Likewise, the various positions of the nesting birds had to be studied by the taxidermists of our party. With the ever ready help of our friend Stan Fenton, we selected a suitable nest about fifty feet above sea-level, which was fairly accessible to all of the party, and made a careful study of its form and environment. Photographs were taken from various points of view, colour sketches prepared,

Painting the Background.

Photo—A. Musgrave.

and samples of the rock and grasses preserved for later reference.

On returning to Sydney, this nest was reproduced as accurately as possible for exhibition in the Museum gallery. With the photographs as a guide, a wooden framework was built, over which fine wire gauze was stretched, its folds and angles corresponding with those of the rock surrounding the real nest. This gauze was then covered with a mixture of papier-maché, cinders, and plaster, which produced the texture of the volcanic cliff, and the whole coloured from the rock samples. The flying bird and the chick, which had been mounted on the island, in carefully studied positions, were supplemented by a third, and their faded bills and feet recoloured from sketches made from the fresh specimens. Grasses were added, and the whole completed so far as possible in the workshop, after which the rather massive framework was brought up in sections and finally arranged in the case. Concealed electric lights illuminate the finished group, and so produce the effect of realism as nearly as may be.

There have been two Boatswain Birds in the Museum for a considerable number of years, and they have been exhibited in a very conspicuous place. Yet it is probable that scarcely a dozen of the thousands of visitors who have passed through the galleries each year have remembered them, or perhaps even seen them. But we hope that this new group will attract so much attention that it will be carried away in the memory of many hundreds each year, just as is the lion group or the case of Hawaiians in their life-like poses.

"Check-List of the Fishes and Fish-Like Animals of New South Wales," by Allan R. McCulloch, is a welcome addition to the natural history literature of our State. By the use of a simple "key," one is enabled readily to determine any fish. The list is profusely illustrated, and is complete with a generous index and glossary. Credit is due to the Royal Zoological Society for having issued this handbook, and to its patrons for having made possible its publication at a cost greatly below that of publication.

The Islands of New South Wales and their Birds*.

By A. F. Basset Hull, Honorary Ornithologist.

In the days of my boyhood in Tasmania, a brigantine was making periodical trips to some islands in the Pacific for guano, and the skipper would bring home numbers of handsomely marked eggs of the Sooty Tern and Noddy. From this source our small collections were enriched, and our eager imaginations were stirred by tales of tropical sandbanks littered with eggs; of stretches of sand swept clear of eggs and revisited next morning in order to gather "new-laids" for consumption, and our acquisitive souls grieved at the wanton destruction of the beautiful specimens to gratify the coarse appetites of the greedy sailors! How we longed to visit those distant isles and gather the eggs streaked and blotched with great "gouts" of red, brown, and purple; to tenderly drill them and extract the useless contents so that magnificent series could grace our collections. It has fallen to my lot to realise those youthful dreams, and the reality even transcended my boyish imagination, but I have also found that it is not necessary to travel to the far tropics to see vast numbers of seabirds breeding and brooding their beautiful eggs.

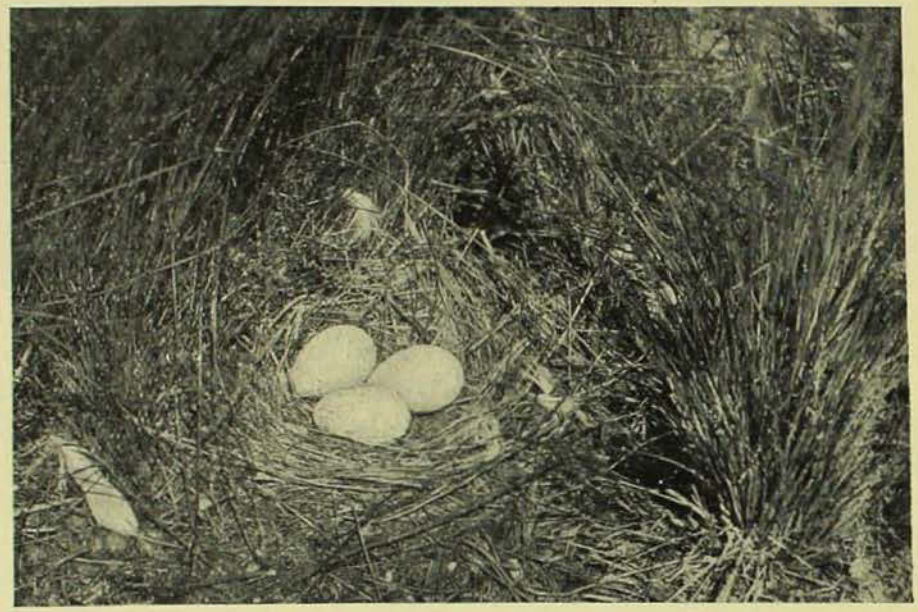
A glance at the map of New South Wales does not reveal any clusters of islands such as occur along the coast of Queensland, but nevertheless there are many islands and islets to be found at intervals from Montague Island in the south to the Solitaries beyond Coff's Harbour. At various times during the past fifteen years I have organised expeditions to the majority of these islands and discovered that they are all inhabited by numerous interesting species of birds, in some cases in vast numbers.

My first visit was to Montague Island, a little to the north of Bermagui. A preliminary correspondence with the lighthouse keeper, Mr. A. P. Bailey, led to my accepting his invitation to inspect the "Gullery." Permission to land having been obtained from the Department of Navigation, my son and I went by the s.s. *Bega* (which subsequently foundered off Tilba Tilba), and after sixteen hours of pleasant steaming along the coast we reached the island about 8 a.m. The Admiralty chart gives the name of this island as Barunguba. It is 110 chains in length and 40 chains in width at its widest part, the superficial area being about 310 acres. It is formed of two islets, connected by a narrow neck, through which the sea breaks in heavy weather. The southern and larger portion is of granite, with huge rounded boulders cropping up above the scanty vegetation, and on top of an immense rock in the centre stands the lighthouse, constructed of the grey granite itself. The northern portion is of black basalt, the cliffs on the seaward side being about 200 feet in height, descending precipitously into the ocean. The landing place is on the southern part, and the track up to the lighthouse passes through low scrub and tussocks of grass, with masses of the creeper *Kennedya rubicunda*. Under this scrub the runs and burrows of the Little Penguin (*Eudyptula minor*) extend in every direction. Numbers of these peculiar birds were sitting on pairs of whitish eggs, more or less nest stained. In the evening those birds which have been out all day obtaining food come home to their expectant families. Standing on the granite rocks near the boat harbour, and looking over towards the mainland five miles distant, I could see numerous patches of broken water, darkened as if by a passing squall or a shoal of fish. These patches moved

*See page 128.

steadily in the direction of the island, and as they came closer I could see the black heads of the Penguins and hear their barking cries. The swimming groups made for several different landing places, but the one immediately below me was the favourite spot. As each group of perhaps twenty to thirty birds reached the rocks they waited, "backpedalling" until the surge ran up a sloping rock, when they shot forward, rolling over and over in the white foam like currants in flour, and as the surge receded they were left clutching the rock or running forward to get clear of the next oncoming wave. Once out of reach of the water, they gravely shook themselves, and chatted in a rippling undertone to each other, huddling together until about a hundred birds had collected on the rock. Then, amidst a chorus of vibratory cries, they started up the slope, following a well-defined track until they reached the rushes and tussocks, where they branched off along smaller tracks to their respective nests. All night long, as I lay on the verandah of the keeper's house, I heard their cries of welcome and endearment, mingled with unmistakable cries of anger and annoyance when some neighbour intruded on the privacy of a nest, resounding from the thick vegetation below the lighthouse quarters.

Interesting as the Penguins were, the northern islet presented a much more animated and brilliant spectacle, for here the Silver Gulls (*Larus novae-hollandiae*) had their great breeding ground. After negotiating the stiff climb up the slippery side of the neck between the two islets we came upon the first group of nesting birds in the "Gullery." There, amongst the tussocks, in the sandy ravines, on the stony ridges, and scattered about the shingle on the slopes of the landward side of the island, were hundreds of nests, from which the birds rose at our approach, filling the air with scolding or plaintive cries. The nests, although sometimes rather close together, were mostly deep, and surrounded with quite a framework of interlaced grass. In fact, some of the nests were quite elaborate structures, although out on the shingly slopes they were merely deep indentations, with a ridge of pebbles and a few straws or fragments of dry seaweed round the eggs. On some of the rocky headlands the eggs were deposited in natural hollows in the rocks, but nowhere did I see any nest so placed that the eggs could roll from one nest to another. The majority of the



Nest of a Silver Gull, containing eggs of the rare red mutation. (Montague Island.)

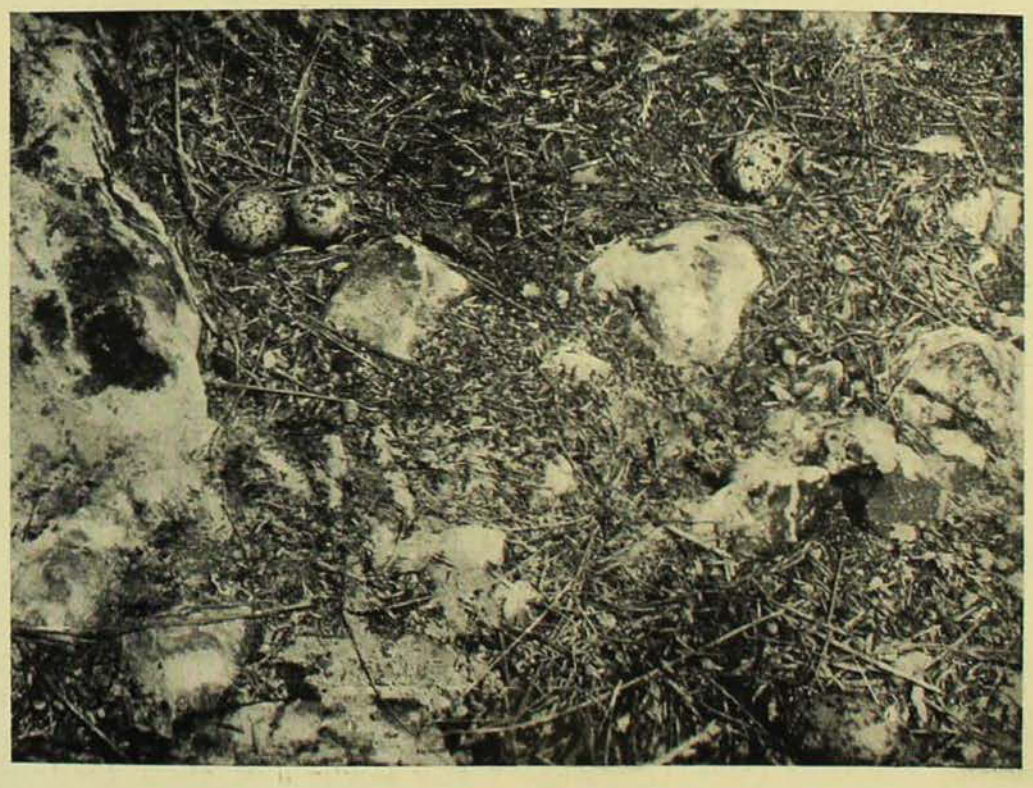
Photo—A. F. Basset Hull.

nests contained three eggs, but quite a large number contained four, a few contained five, and four nests were loaded up with no less than six eggs each. It was indeed a delightful experience, viewing those thousands of eggs with all their wonderful variations in colour, markings, and size. Ordinarily the eggs vary from a pale olive-green ground sparsely to thickly covered with sepia and black markings, blotches, spots or hair-lines, to deep rich brown ground with similar markings, but some remarkable variations were seen; one with very deep green ground, having a broad ring of black round the thick end, and another with umber ground capped with black, gradually merging into the brown, but without other markings. Two distinct "mutations" were found, one being a beautiful pale blue absolutely devoid of markings, and the other having *white* ground, sparsely streaked and spotted with pale *red* and purplish red suffused markings. On the occasion of a second visit a few years later another clutch of this white and red mutation was found and photographed.

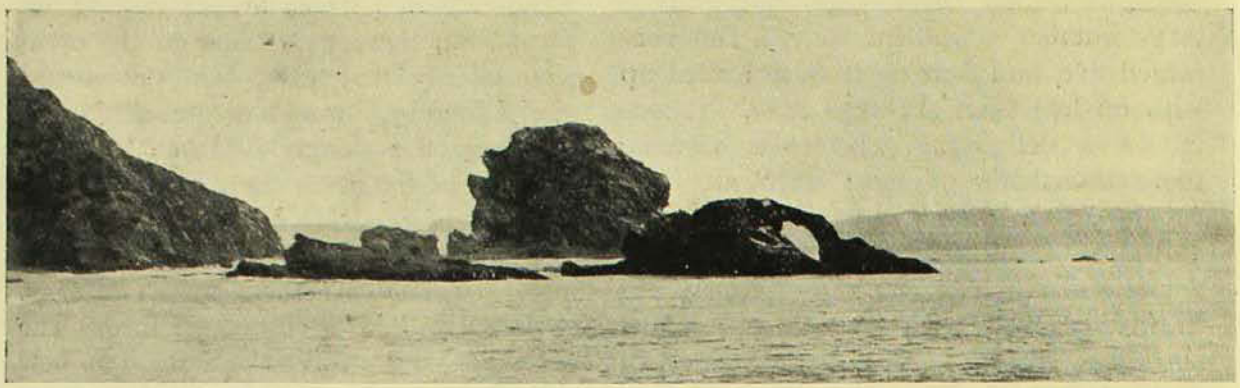
Although Mr. Bailey had noted the Crested Tern (*Sterna bergii*) nesting on the island, there were none on the occasion of my first visit. On the second visit I found a few of these graceful birds breeding on a shingly patch on the eastern side of the north islet, about 30 eggs having been laid amongst the loose stones, without any attempt at making a nest. In one case there were two eggs, apparently laid by the same bird. The accompanying illustration shows how casually the eggs were deposited amongst the stones.

On my second visit to Montague Island I found that the Wedge-tailed Shearwaters (*Puffinus pacificus*) had commenced to construct their burrows preparatory to laying. This species is gradually extending its range southward, while the Penguin is extending its range northward, as will be seen later in this narrative.

The first visit to Montague had a rather unpleasant ending. As we were proceeding to Narooma on the mainland to catch a Sydney-bound steamer, our boat was capsized on the bar, and my camera and pl tes were lost, together with all our personal luggage. We were rescued by



Nests and eggs of the Crested Tern. (Montague Island.)
Photo—A. F. Basset Hull.



The Pierced Rock, South Tollgate Island.
Photo—A. F. Basset Hull.

the Narooma lifeboat after half an hour of perching on the upturned boat in the surf.

About 40 miles north of Montague Island the Tollgate Islands lie off Bateman's Bay. There are two islets, high and steep, separated by a narrow strait. Each islet presents an almost sheer rocky face to the sea, and slopes rather abruptly to the landward side, where the beach renders landing easy in calm weather. On the southern islet there is a pierced rock jutting out from a sandspit. On these two islets I found Little Penguins, Wedge-tailed Shearwaters, and White-faced Storm Petrels (*Pelagodroma marina*) breeding, the last named species in small numbers only. The Penguins had eggs, fresh and heavily incubated, or young birds in varying stages of growth. The Shearwaters had been working on their burrows, but had not started laying. There were large numbers of these burrows in the sandy soil on top of the islets; probably some thousands of birds breed there annually. There were traces of another burrowing bird, the burrows being short and untenanted. There is possibly a colony of Prions breeding late in the year.

Northward again from the Tollgates for a distance of 15 miles brings one to Brush Island. This island I visited by way of Nowra, Milton, and Ulladulla, taking a launch from the latter port for the 15 mile trip south. On the way down I met with the Fluttering Petrel (*Puffinus gavia*) in fairly large numbers. The birds secured were of such a different colour to the illustrations and descriptions of this species that I gave a new name to the Ulladulla bird (*Emu*, vol. xv., p. 206). The bright colour, however, faded somewhat, and intermediate shades from blue to brown having been recorded, my new name sinks into a synonym.

Brush or Murramurang Island lies barely half a mile off Murramurang Head, an old-time camping ground of the aborigines, with one of the most extensive kitchen middens on the coast. It is long and narrow, about 80 acres in extent, slightly elevated in the centre, and thickly covered with sheoaks, honeysuckles, small gums, and scrubby undergrowth. The Penguins occupied many burrows along the shore and in crevices of the rocks almost within reach of the surf. The nests contained either fresh eggs or young birds, incubated eggs or big, pot-bellied chickens, with a mere collar of down left to distinguish them from their parents. Above the line occupied by the Penguins were hundreds of burrows of the Wedge-tailed Shearwater, each containing a bird sitting on a fresh egg of pure white. Both on the beach at Ulladulla and in the water on the way down I had noted numerous dead Short-tailed Shearwaters (*Puffinus tenuirostris*), better known as the "Mutton Birds" of Tasmania and southern Victoria. On Brush Island I found many of these birds, some partly eaten by Hawks or Crows, some which had been dead several days, and others quite recently dead. Just above the thick scrub, on a patch of sand, I found an egg, quite fresh, but perforated by a pebble, as if

it had been dropped from a height of a few inches rather than laid on the ground. This egg measured 71 x 45 mm., and was, I believe, dropped by one of the Mutton Birds. The eggs of the Wedge-tailed Shearwater are much smaller, averaging about 60 x 40 mm. This was only one of many instances which have come under my observation of dead Shearwaters coming ashore in large numbers. The mortality occurs generally in the latter end of October or early November, and many hypotheses have been advanced to account for the phenomenon. Starvation, disease, sudden storms, and conflicts with the Wedge-tailed birds have all been suggested to account for the untimely death of the Mutton birds. Recent reference has been made by a New Zealand writer to similar occurrences on that coast. There is room here for careful observation and investigation.

No trace of the breeding place of the Fluttering Petrel could be found on Brush Island, although a very thorough search was made.

North of Brush Island there are a few islets close to the mainland, and at the entrance to Jervis Bay there is Bowen Island, formerly a haunt of the Wedge-tailed Shearwater. I visited this island, but discovered nothing worth recording.

Off Port Kembla there is a fairly large island, called Rabbit Island. Here I found both the Penguins and Wedge-tailed Shearwaters breeding. A little further north, and about three miles out to sea from Wollongong, there are two islets, one called Pig Island. The group, including Rabbit Island, which is in three divisions, is known as The Five Islands. On Pig Island I found the White-faced Storm Petrel breeding in numbers, their burrows being driven in the shallow sandy soil under the thick growth of mesembrianthemum and convolvulus which covers the higher part of the island. This was the most northern record of the breeding of this species at the date of my first visit, October, 1909. Penguins and Wedge-tailed Shearwaters were also breeding on this island

When Dr. Danysz was experimenting with the rabbits on Broughton Island, one of his staff informed me that a Storm Petrel was breeding on that island. This information, and Gould's description of the White-winged Petrel (*Aestrelata leucoptera*), which he was informed bred on Cabbage Tree Island, at the mouth of Port Stephens, led me to organise an expedition to the Port and adjacent islands. Mr. C. Hedley, Assistant Curator of the Australian Museum, Dr. Hamlyn Harris, and several other friends made up the party. We went by steamer to Nelson's

Young White-winged Petrel in nest. (Cabbage Tree Island.)
Photo—A. F. Basset Hull.

Bay on the 15th October, 1910, and chartered a motor launch to take us to Broughton Island, twelve miles north of the Port, where we arrived about 9 a.m., and landed on a sandy beach. Climbing the steep sandhills and walking a quarter of a mile to the centre of the island, I found a number of small burrows in a sandy hillock with a north-easterly aspect. Investigation proved these to be the burrows of the White-faced Storm Petrel, the birds sitting on their single eggs, most of which were quite fresh. Numerous fragments or skeletons of dead Petrels were lying about, the victims of Hawks and some domestic cats left by the Danysz experiment staff. Thus the northern record of this Petrel was extended by about 150 miles.

Broughton Island is nearly two miles in length, hilly, and with a steep cliff at the eastern end, descending to a nar-

Black-browed Albatross rising from sea outside Sydney Heads.
Photo—F. Degotardi.*

row neck between the main island and Little Broughton Island. The latter is difficult of access, but on a later occasion I managed to effect a landing and carried out an investigation of the numberless burrows, which proved to be those of the Wedge-tailed Shearwater. This bird also breeds on the extreme western end of the main island and on two small outlying islets. A most interesting discovery on Broughton Island was a burrow containing a Sombre Petrel (*Puffinus griseus*), not previously recorded as breeding in Australia, the bird being a New Zealand species. My discovery was evidently preparing its burrow for the egg, and another investigator subsequently found the same species in this "rookery" with an egg, thus rounding off my record.

But the great objective of this first expedition to Port Stephens was the White-winged Petrel. In his "Handbook to the Birds of Australia," published in 1865, John Gould said that his specimen was obtained while breeding on Cabbage Tree Island, at the mouth of Port Stephens, and he was informed that the bird bred there in abundance. He added: "The Australian Seas abound with Petrels, the investigation of the various species of which, their habits and economy, as well as their places of abode, will serve to occupy the attention of ornithologists for years to come." All the years that elapsed from the time Gould wrote those words the White-winged Petrel had remained unsought for, and its nest and egg were undescribed. It may therefore be imagined with what interest I scanned Cabbage Tree Island on the way out from the Port to Broughton Island, and how eagerly I landed on the historic spot after returning from the scene of the Danysz experiments.

Cabbage Tree Island lies barely a mile from the entrance to Port Stephens; it is about half a mile in length, sloping rather steeply up from the western shore to a height of 500ft. The eastern shore faces the ocean, presenting an almost sheer cliff to the rollers. The greater part of the island is densely clothed with trees, principally the native plum (*Sideroxylon australe*) and the beautiful Palm (*Livistona australis*), to which the island owes its name. The first discovery of note on the island was our old friend the Penguin, occupying shallow burrows or ensconsed in crevices under the rocks on the shore. These birds were sitting on fresh or partly incubated eggs, or had one or two young ones in varying stages of growth. This constituted another "farthest north" record of a breeding place of

Black-browed Albatross rising from Sydney Harbour.
Photo—F. Degotardi.*

*Copyrighted by A. F. Basset Hull.

View from Cabbage Tree Island. Yacaaba Head (Port Stephens) in the distance.
Photo—A. F. Basset Hull.

this species. Above, and closely approaching the Penguins' zone, were numerous burrows of the Wedge-tailed Shearwater, some inhabited by birds, although it was still too early in the season to expect eggs. Ascending further and entering a steep gully, evidently forming a watercourse in wet weather, and with numbers of great palms growing amidst loose boulders, I stumbled over the accumulations of dead fronds. Under my feet a shrill cry sounded, and a small bluish-grey bird fluttered from under the fronds, and partly waddling, partly flying, it tried to make its way down the gully towards the shore. The vines retarded its progress and I soon captured it, and realised that I held Gould's White-winged Petrel. Further search revealed several more birds, all of which uttered their shrill cry on being uncovered where they had hidden themselves in crevices of the rocks under the dead fronds. There were no signs of eggs, their laying date being evidently a future one. Ascending the gully to the top I had a magnificent view of Yacaaba Head, the northern headland of Port Stephens, and amongst the boulders discovered another lot of the Wedge-tailed Shearwaters.

On 30th October, I again visited the Island, but the Petrels had not laid. Again on the 4th December I made another attempt to obtain the egg of this bird, and this time was successful. Immediately upon entering the shade of the palm gully I found a White-winged Petrel sitting in full view amongst some vines trailing over the ground, and, on removing her, discovered her egg reposing on a bed of dead cabbage palm fronds, broken into short pieces and piled for a few inches in depth in a hollow amongst the stones. The egg was pure white, chalky in texture, and elongated oval in shape. The gully was evidently the favourite spot, for many more nests were found, each containing a single egg, individual eggs showing considerable variation in shape and size. The average dimensions of a number measured were 1.96 x 1.46 inch.

On this last occasion the Wedge-tailed Shearwaters were all sitting on eggs. This species, like its Tasmanian cousin, has

a fixed date for laying, namely, the 27th November. A few eggs may be found on the 26th, and a late bird may lay on the 28th, but by the 4th of December every burrow contains an egg. By the way, this egg is very palatable, the albumen being rather like that of a duck-egg, and the yolk very pale yellow; there is no trace of a fishy flavour. The Penguins also had more fresh eggs, and from observations taken over the last fifteen years I have come to the conclusion that this bird breeds practically all the year round.

Near Cabbage Tree Island there is a high islet called Boondeldah or Big Island. It required several attempts before I was able to effect a landing on this islet, the cliff being steep all round except at one point where a basalt dyke through the porphyry has weathered away, leaving a narrow gully into which we ran our dinghy, dragging it up out of reach of the surf. The climb up this gully was somewhat strenuous, but on reaching the top we were rewarded by seeing the most densely crowded "rookery" of the Wedge-tailed Shearwaters on the coast. Many of the birds had been unable to secure sufficient soil to burrow in, and had laid their eggs on the bare rock or under the shelter of a little bush. These birds sat quite unmoved as we passed by.

On this memorable December trip I also visited Shark Island, near the Port Stephens lighthouse, and several islands inside the Port. On Schnapper Island I found a huge Nankeen Night Heronry, hundreds of birds having nested in the native plum trees. I was later informed that a party of sportsmen (?) from Nelson's Bay had paid a visit to this island and brought away a boatload of dead birds, which it may be added are useless for food or ornament.

My furthest north trip was to Coff's Harbour, and there the Wedge-tailed Shearwaters were the only seabirds found breeding on Coff's or Mutton Bird Island. As this island is to be joined up to the mainland to form a harbour, the birds will not long remain unmolested.

Full accounts of these trips were published by me in the pages of the "Emu," the organ of the Royal Australasian Ornithologists' Union, to the file of which I would refer any reader desiring a more detailed narrative.

A specimen of the curious Ribbon Fish (*Trachypterus jacksonensis*) was recently caught at Middle Harbour, Port Jackson, and secured for the collection; a fine cast has been prepared for exhibition in the gallery. Its body is a bright silvery colour, the skin studded with numerous bony tubercles, and the fins a pale pink. It is six feet three inches long, thirteen inches deep, and only two inches in thickness, this curious shape suggesting its vernacular name. Only two specimens definitely identified as *Trachypterus jacksonensis* have been previously recorded, one the type, from Manly, the other from Milton, N.S. Wales, which unfortunately was not preserved. Ribbon Fishes undergo remarkable changes with growth, the young being quite unlike the adults. They are probably inhabitants of deep water where their broad fragile bodies and fins are less liable to injury than in the perturbed waters of lesser depths. When first observed this latest specimen was swimming with an undulating motion.

Mr. J. J. Fletcher, M.A., B.Sc., Trustee, has presented a valuable collection of over four hundred specimens of amphibians, including co-types and other specimens described by him some years ago in the *Proceedings of the Linnean Society of New South Wales.*

The June excursion of the Naturalists' Society of New South Wales was held in the Museum. About thirty members attended, and spent an instructive and enjoyable afternoon inspecting the various collections under the guidance of Messrs. W. W. Thorpe and F. A. McNeill.

The Story of the Hookworm.

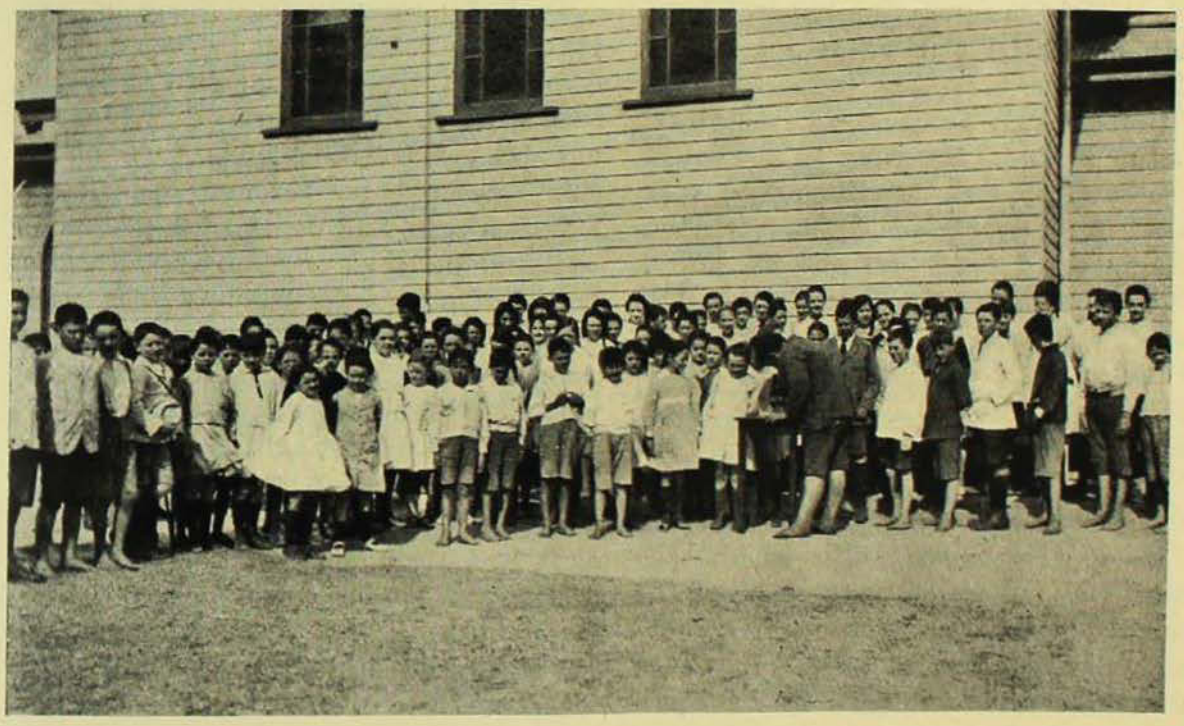
By Dr. Wilbur A. Sawyer,

Senior State Director International Health Board of the Rockefeller Foundation, and Director of the Australian Hookworm Campaign.

[Abstract of a lecture delivered at the Australian Museum, April 13, 1922.]

The hookworm is one of the nematodes, which on account of their shape are commonly called thread worms or round worms. Their early ancestors doubtless lived in earth or water as the more primitive nematodes do to-day, but, with the lapse of time, this class of worms became diversified and adapted to various environments. Some made their home in decaying vegetation, others learned to penetrate living plants, and still others acquired the power to live on the highly nutritious tissues of living animals, or on the partly digested contents of their intestines.

Among the nematodes which are thus parasitic on animals are the hookworms, comprising a number of genera and species. Each species is parasitic in a special host; the dog, the cat, the sheep, the cow, the seal, the elephant, man, and doubtless many other animals, each have their particular species of hookworm parasite. Two species are parasitic in man, *Necator americanus,* the common hookworm of the tropical belt, the Southern Hemisphere, and North America, and *Ancylostoma duodenale,* which predominates in northern Africa, northern India, China, and Europe. In Australia, *Necator americanus* is the commoner form, but there is a small admixture of the other, probably introduced from Europe, and both varieties may be found in the same



Hookworm demonstration at a country public school. Part of the campaign is an effort to interest the children, who in turn become missionaries in the cause, and thus carry the propaganda from home to home. Much good work has been done in this direction.

A Papuan village on piles, over salt water. Settlements like this are practically free from the Hookworm scourge.

individual. Hundreds of hookworms are sometimes found in one person, and from five to eight hundred were removed from each of several children in the Tweed River region.

Unfortunately hookworms damage their human hosts. They cling to the intestinal wall by their mouths, armed with hooklets or cutting plates, and feed on the lining of the bowel and its juices. This causes little ulcers and destroys the body tissue, and the worms also produce a poison, which is probably injected into their hosts through structures in their mouths.

The effects of the hookworms on man are gradual in onset, and so much like those of other chronic diseases that the condition is often not recognised, and the sufferer loses his opportunity of a rapid and early cure through the removal of the worm. The outstanding effect of the presence of the hookworm is pallor, due to a reduction in the amount of red colouring matter in the blood, and with this anaemia we find in children a retardation of growth both physical and mental. Sometimes severely infested persons develop an abnormal appetite for earth or clay, and are known as earth eaters, but this is not common in Australia. The anaemia is apt to be accompanied by lack of ambition, weakness, and increased susceptibility to infectious diseases, and in severe cases death may occur.

To find their way into living animals parasitic nematodes have to overcome the defences of the body against invasion, such as the digestive juices of the alimentary tract and the outside covering of skin. Some enter through being swallowed as eggs, and depend for protection on envelopes that resist digestion. The larvae of others, for example filaria, are injected beneath the skin of their host by mosquitos. Others, including the hookworm larvae, have developed the ability to wriggle through the outside skin and take a devious course to their destination in the intestines.

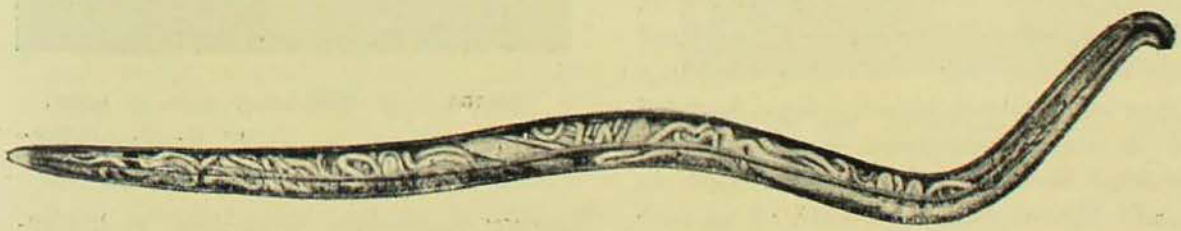
It is a fortunate circumstance that in the case of the hookworm, part of its life cycle must still be spent outside the body of its animal host in the habitat of the early nematodes, moist earth. The eggs cannot hatch in the digestive tract, and infestation can take place only if the eggs hatch in the ground and the developed larva gains access to the body through the skin, the usual way, or through the rare accident of being swallowed at the proper stage of development. Thus if no hookworm eggs reach the ground there will be no hookworms, and *man can protect himself from infection by proper treatment and disposal of sewage.* Discharge of

Native Lecturer. When the Campaign reaches a village, an intelligent native is selected to carry out the work amongst his fellows. This depicts one in his uniform.

sewage into the sea gives complete protection, for the salt in the water absolutely prevents the development of the larvae. In infected areas, parents can largely protect their children from infection by seeing that they never go barefoot on polluted ground.

The hookworm larvae can develop only in warm, moist earth. Except in certain parts of Australia, in the far north and near the eastern seaboard, the soil is too dry for the larvae, or the climate is too cold at the times when there is sufficient moisture. In the regions where surface conditions are unfavorable for the larvae, it is only in a few of the deepest mines that temperature, moisture, soil pollution, and other circumstances, provide a suitable environment and permit hookworm disease to spread, but even there it can be controlled by proper sanitation.

To study and control this disease in Australia, so that it may not interfere with the development of the north and the mines, the Australian Hookworm Campaign is being carried on jointly by the Commonwealth Department of Health, the International Health Board of the Rockefeller Foundation, and the States. Two hundred and ten thousand people have been examined for hookworm eggs, and forty-eight thousand have been found to be infected. Thirty-three thousand sufferers have already been cured by the hookworm campaign. But the most important part of the work is prevention by stopping soil pollution. Thousands of latrines have been rendered safe, and much educational work has been done through the press, through illustrated lectures, and by means of pamphlets. The object of the Campaign is to prevent the spread of the disease, and to establish permanent measures of control. To do this *it must have the help of citizens who understand.*



The common hookworm of Australia and the Pacific Islands, Necator americanus, female. The full-grown hookworm is half to two-thirds of an inch in length. One female may deposit as many as a thousand eggs a day.

A Horse's Hardship.

By E. le-G. Troughton.

An important feature of museum work consists in identifying and supplying information concerning specimens sent from all parts of the State or brought in personally. These specimens are sometimes of great interest, not only to the enquirer but also from a scientific point of view, and there is always a chance that the bringing in of some unusual type of animal may lead to an important discovery.

Occasionally a specimen is abnormal in some way, perhaps a monstrosity like a two-headed calf or, as a specimen does not necessarily represent an entire creature, it may be a single vertebra of an extinct gigantic lizard or the small tooth of some native animal; again it may be a bone deformed owing to an accident, as is the object described in this note.

The accompanying illustration shows the metatarsal or "cannon bone" of the hind-limb of a horse from Graham's Valley, near Glen Innes, New South Wales, brought in recently by Mr. C. E. Watson. Round the bone is looped a piece of ordinary strong fencing wire, the ends of which are twisted firmly together. The movement of this loop has worn a groove in the bone which is accentuated by a high ridge of callus on either side of it. Such an irritation of living bone would excite a prolific flow of constructive matter from the cells, and in this way are deposited new layers, emanating from the bone itself, which would soon cover an immovable body of limited size. Indeed, it has been proved that if the surface of a bone is removed and a close-fitting silver ring placed round it, living bone will surround and cover the ring. In one operation a silver ring, placed round a bone denuded of its outer membrane, had in three months been completely enveloped in newly formed bone an eighth of an inch thick.

In this case the limiting membrane, or periosteum, which controls the growth has been worn through and, as the groove became deeper, the growing shaft of bone has thrown out new layers in an effort to bridge the interspace. The painful movement of the wire, however, has kept the limiting membrane incomplete, and, without its controlling influence, an overflow of growing tissue has banked up on either side of the groove. Unfortunately, though

"Cannon," or Metatarsal bone of horse.
Photo—G. C. Clutton.

these ridges must have served to check any movement up or down, the wire must have rotated freely in the wound, often catching in obstacles and causing the animal intense pain.

How the wire became so firmly fastened around the limb must remain a secret of the animal's painful life story, for the owner tells us that it was wild and unbroken, and was only seen about once a month. Perhaps the unfortunate creature became entangled in a length of wire, and, in frantic efforts to break loose, twisted the ends firmly before doing so and thus it carried the incubus to an early equine grave. Another possibility is that the wire loop was lying on the ground and the young horse stepped through it, whereupon it either worked up with the action of walking or the animal, in trying to rub it off, only succeeded in more firmly establishing the unwelcome leglet.

Bird Notes.

By J. R. Kinghorn.

THE SACRED KINGFISHER AND ITS YOUNG.

About the middle of last December a bird lover at Hunter's Hill wrote to the Museum to the effect that several pairs of kingfishers were nesting in two bird's-nest ferns (a species of staghorn), and stated that last year, when the kingfishers were sitting, a gale, accompanied by torrential rains, flooded the birds out, drowning one of the parents. He had observed that one pair took it in turns to fly to a staghorn (the brown under part) and peck away at the fibre in an endeavour to make a burrow. The writer visited the locality to examine the nest and site and found that the staghorn was growing on an old sawn-off tree stump about twelve feet from the ground, and on the under side, sheltered by over-hanging leaves, was a hole or burrow (the nest) extending inwards for six or eight inches, the far end being slightly enlarged, but there were no eggs. The birds were very shy, sitting 30 or 40 yards away high up in the trees, apparently watching very closely to see that no damage was done.

I again visited the locality on January 14th and found that the new nest had not been occupied. I peered inside with a light and noticed that the floor was very damp as if the rain had flooded it out, and perhaps it was on this account that the birds had decided not to make their home there after all, but had gone to another staghorn which was growing about six feet from the ground

Nest of the sacred kingfisher, Halcyon sanctus, in a staghorn, Hunter's Hill.

Photo.—J. R. Kinghorn.

on the trunk of a very large tree; here they had made their home in an old nest, perhaps their nest of last year. The tunnel is a little over two inches in diameter, and extends inwards for about 8 inches. On flashing an electric torch I was enabled to see three young birds; they were very crowded and one seemed to be living on top of the other two. Their eyes were mere slits, but their mouths were cavernous, and, when I imitated the call of the parent bird, they would open their beaks as if to swallow me and would squeak with all their might in an endeavour to tell the mother that they were very hungry and wanted more. The bluish-green quills were just beginning to show through large patches of bare skin. Again, as on the previous occasion, the parent birds kept a very long way off and watched me from the top of a tree.

The nest of the Sacred Kingfisher is often made in a "nigger's head" white ant's nest in gum trees, or else a hole is drilled in an old decayed stump. The eggs may be four or five in number and are laid in cavities in the side of the tunnel; they are almost round and are pure white.

This bird is a very well known species and its colour is greenish blue on the back and wings and upper part of the tail feathers. The head is greenish on the fore part, but becomes more of a blue colour on the nape. There is a white or cream collar round the neck, bordered by black. The under parts are whitish, the breast feathers being tipped with light brown, while the sides of the abdomen are buff. The under side of the tail feathers are grey.

The food of the kingfisher consists mainly of grubs, small lizards, moths and other insects, and it very seldom does any fishing. I have seen it sitting on the branches of trees overhanging the water, but, when it darted downwards, as I thought in search of a small fish, it almost invariably returned to its vantage point with an insect in its beak. One of the best fisherman of this tribe is the little Azure Kingfisher (*Halcyon azurea*), but, as this species is very blue above and bright buff coloured underneath, with a tiny stump of a tail, it could never be mistaken by anyone for the Sacred Kingfisher.

THE RED-WHISKERED BULBUL.

Otocompsa emeria.

The above name belongs to an Indian bird which was introduced to Australia a few years ago, and which is now firmly established in and around the Sydney district. There have been many enquiries at the Museum during the last few months concerning the name and previous home of this new bird. On several occasions notes have appeared in the *"Emu,"* the official organ of the Royal Australasian Ornithologists' Union, under the heading of *Otocompsa jocosa,* a scientific name synonymous with the oldest and correct one *O. emeria.*

The figure accompanying this article will give readers a very good idea as to what the bird is like. In size it is almost as large as the crested bell bird and the coach-whip bird, and, as all three birds possess a crest, the bulbul, at a casual glance, might easily be mistaken for either of these, but its colour is as follows. Forehead, crown, head, crest, front of cheeks and bill, black. A narrow black line joins the corner of the mouth and extends to just above the shoulder. The hinder parts of the cheeks and the ear coverts are white, and there is a small tuft of crimson feathers immediately behind and joining the lower part of the eye. Sides of neck brownish black, as is also a crescentic band which passes over the shoulders, but does not continue across the chest, which is white; the abdomen is white but washed with brown. Upper parts and wings brown, edge of wing especially near the shoulder, pale pink.

HOW IT CAME TO SYDNEY.

Through making enquiries I understand that a pair of these birds escaped from the Sydney Botanic Gardens about eight years ago, and the great progress the species has made in establishing itself firmly in this country is surprising indeed. Many reports as to its presence have been sent in to the Museum from various localities round

Sydney, but the majority are from the Lane Cove River and the Northern Suburbs. My first acquaintanoe with the Bulbul was early in December, 1921, when I was walking down the Northwood Road; hearing a strange whistle above me, I looked up and saw this unique and very trim looking bird perched on a telephone wire. I have since seen several of them in the same locality. In fact I saw a flock of three pairs on 12th January, 1922, quite close to my home at Northwood.

NEST, EGGS, AND YOUNG.

The Bulbul has been found nesting at Gladesville, and the nest, which is small and cup shaped, but rough, and composed of small twigs and leaves, is generally built in small shrubs rather than in trees. The eggs are usually three in number and are pinkish white, marked with shades of red.

The young do not develop the distinctive red tufts until about three months old.

DISTRIBUTION.

The range of this bird, previous to its coming to Australia was mainly Asiatic, from India, through the Himalayas to Bengal, Assam, and Burma to the extreme southern part of Tenasserim. It extends to China, Siam and the Malay Archipelago, but was introduced to the Nicobars, and Mauritius.

IS IT FRIEND OR FOE?

The question immediately arises as to its habits; so many of our introduced birds have made a nuisance of themselves that it would be both interesting and useful to gather as much information as possible about the habits of the bulbul in this country, and I would ask all who come in contact with it to note carefully any of its peculiarities, and especially what its food consists of. This bird, which is well known in and around Indian gardens and farms, feeds mainly upon insects, but occasionally takes to fruit, thus opening up a field for thought and observation.

The bird seems to be increasing very rapidly in numbers, and now is the time for us to decide whether it is going to be friend or foe. As far as we know, in other countries it seems to be harmless in some localities, but a pest in others, and it has come to us with rather mixed references. If it turns out to be a pest the necessary steps to check its progress can be taken in good time, and, if it proves to be a friend, we can have it placed on the protected list under the *Birds and Animals Protection Act.*

As I stated before, reports have come in from many of the Sydney suburbs as to its presence, but all reports say that it is very shy and nervous, so that observation is thereby rendered very difficult. This seems to be a great point in its favour, because circumstantial evidence, amongst the smaller birds at least,

The redwhiskered bulbul, Otocompsa cineria, an Indian bird accidentally introduced into Australia. It is becoming very numerous in and around Sydney, and should be watched very carefully as to its feeding habits.

Photo.—J. R. Kinghorn.

shows that most if not all of our pests are bold and barefaced in their acts of destruction.

DISQUIETING EVIDENCE.

In the *Avicultural Magazine* there are statements to the effect that, when reared in aviaries, the bulbul feeds mainly on mealworms and other insects such as house flies, varying this occasionally with a little soft food such as banana, and reports such as this seem rather reassuring, but in the *Ibis*, another magazine of ornithology, all reports are very much against it. In 1901 an ornithologist noted that the bulbul discovered that strawberries were very good to eat, and it was not long before it became a great nuisance to gardeners. It was also found to be partial to mulberries.

In 1892 it was introduced into Mauritius and increased its numbers at a terrific rate, rearing several broods in a year, so that by 1911 it was widely distributed through the island and was a scourge and pest to gardeners and fruit growers. It was found to live entirely on insects and fruit, the latter being the main diet. The great decrease in the numbers of *Zosterops* (Silver Eyes) was put down to the bulbul living on the same food, thereby forcing the smaller bird to either get out of the way or perish.

As this subject promises some very interesting observations which should result in valuable information, I can assure readers that the bird will be kept well under observation, and I will be very glad to receive the fullest information possible from those who are interested, so that, as soon as sufficient data are available, they can be published. The most satisfactory way to observe is with the aid of strong field glasses.

Be sure of your bird and do not mistake it for either of the other two mentioned; look for the tell-tale red feathers behind the eye and below the tail feathers. The note of the bulbul is very pleasant, and it seems to be a very proud bird, evidently because of its crest, as it generally perches well in view.

BIRD PROTECTION.

A study of wild life shows that our useful birds are rapidly becoming exterminated, despite the fact that there is a *Birds and Animals Protection Act*, under which all our birds, with the exception of about thirty species, are protected, and the boundaries of declared sanctuaries are laid down. At the present rate of destruction, we may find that in a few years not many useful birds will remain, while the country will be overrun with pests. It would appear that declared pests, with the exception of crows, are the only birds which escape destruction, while useful ones, often, perhaps, because of their attractive colours, are those most sought after either for personal adornment or for aviarine purposes. In view of these facts, some New South Wales members of the Royal Australasian Ornithologists' Union are now engaged upon a special enquiry into the economic value of our birds and the best method of protecting them. The fact that New South Wales has many declared sanctuaries is not to say that the law in respect to protection is being observed. Far from it, often there is more destruction and shooting in sanctuaries than elsewhere, and this is mainly because proper supervision is impossible, due to an insufficiency of rangers. The R.A.O.U. is making an effort to have additional sanctuaries proclaimed, and to have a number of honorary rangers appointed from its ranks to help the already overworked police and special rangers in the enforcing of the *Birds and Animals Protection Act.* They hope that they will have the just sympathy and help of all.

Ocean Island.

THE PHOSPHATE INDUSTRY.

By Thos. J. McMahon, F.R.G.S.

A mere dot on the map, a tiny speck of land, barely five miles in circumference, is Ocean Island, also known by its native name of "Banaba." It lies in the loneliest space of the Central Pacific, 50 miles south of the Equator, and 2800 miles from Sydney.

One of the many thousand pinnacles to be seen in the worked-out phosphate fields.

Photo—T. J. McMahon.

For very many years this island was known to Pacific traders, and American whalers, but none ever guessed its wonderful value. Beachcombers, mostly escaped convicts from Australia, lived upon the island, but none realised the millions of money that lay in the vast, deep deposits of phosphate-of-lime that lay under their feet.

The island was so small, apparently so valueless, that no nation bothered about it. It was subject to long and terrible droughts, when the scanty native population had to fly to adjoining islands for food. After the droughts would come copious downpours of rain, and then the island was a veritable garden. To-day, Ocean Island is a great commercial asset; it is termed the richest island in the world.

The island rises at its highest point about 250 feet above water. Swept by beneficent trade breezes, the island is exceedingly healthy, and always remarkably cool. No malaria exists, nor tropical diseases, discomforts, or pests of any kind. In the bloom of a good rain season it is a picturesque island, the innumerable, ghost-like, phosphate-rock pinnacles, in a wonderful variety of shape and size, of the worked-out phosphate fields, are intensely effective and interesting.

Ocean Island forms the circular top of a submarine mountain. It is plain that at one period this summit must have been submerged, as the framework of the island is composed of coral. According to scientists, the island appears to be slowly rising, as seems by a very curious system of terraces. It is not solid, but is pierced by countless galleries and caves of un-

A native of Ocean Island in festival dress.
Photo—T. J. McMahon.

known extent, and, in places, of great depth. Six hundred feet of line have been lowered into one cavity without touching bottom. The network of subterranean caves has led scientists to declare that the island is built up tier upon tier of coral arches. The caves under the island have wonderful shapes, many have wells plentifully supplied with water, useful in drought periods. The native men refuse under all circumstances to enter the caves, and consequently the women have become the keepers, and they enter fearlessly. In drought times the caves supplied water to the natives, and it is said the women—who are masterful in manner, and not at all subservient to the men —gained their power by doling out the water only as they felt inclined, realising that the men, fearing evil spirits, were afraid to enter the caves. The women take care to feed the fear of the men, and declare the caves are full of evil spirits with a decided objection to men.

Ocean Island is the seat of the British administration of the Gilbert and Ellice Crown Colony. The British took possession of the Island in the year 1901. Prior to that the "Pacific Islands Company" was engaged in collecting the phosphate of the island. In 1902 this company was bought out and a British company formed a remarkable industry for the mining and distribution of the phosphate, now recognised as a magic soil fertiliser. Since the war this company has given way to the British Commission, consisting of England, Australia, and New Zealand, in administering the affairs of the islands of Ocean and Nauru, and managing the phosphate industries of the two islands, 160 miles apart.

The phosphate industry is perhaps one of the most interesting in the world. The bounteousness of Nature is shown in the composition of the magic product. For years—it is impossible to tell how many—countless numbers of sea birds were attracted to Ocean Island, where neither man nor animal disturbed them, and where was found superabundance of fish usual to deep-sea coral islands.

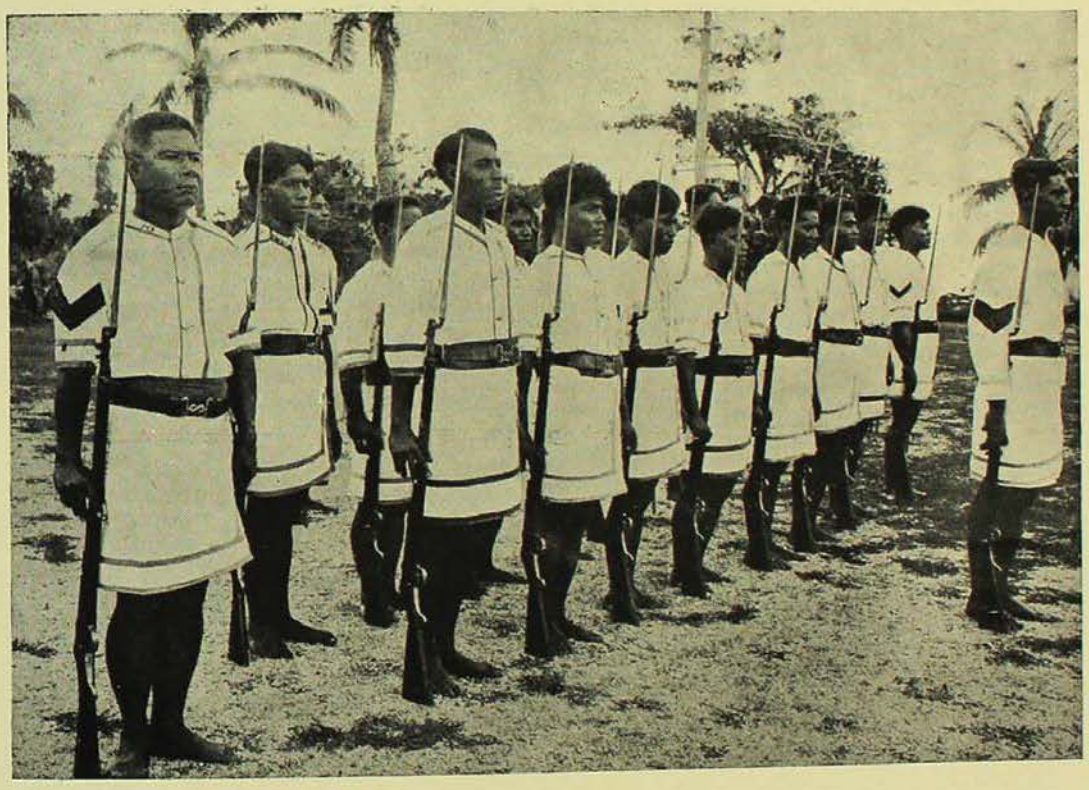
The birds subsisted on fish and created vast deposits of guano, rich in phosphate, which, mingling with the coral rock, rich in lime, by the powerful process of Nature, assisted by periodic and alternate droughts, copious rains and occasional and complete submergings of the island by the sea, were assimilated in one potent, chemical factor, phosphate of lime, a buff-coloured rock containing all the essential qualities of a prime fer-

tiliser. To-day scarcely a bird is to be seen on the island; but a rich treasure has been handed over to the use and ingenuity of men.

The phosphate is of two classes, rock and alluvial. The former is blasted out, while the latter can be removed with pick and shovel. Trucks are loaded with the phosphate rock, and then pushed on to distributing hoppers, great wooden towers dominating the fields. From the hoppers, on trucks down steep decline lines the phosphate rock is sent to huge buildings, where are the dryers and crushers. After all moisture has been evaporated from the crushed phosphate, it is then stored in a great bin holding 50,000 tons. It is then ready for distribution to the ends of the earth. At the present time the bulk of the rock is sent to Australia and New Zealand. In the Commonwealth and the Dominion it is treated and graded and made ready for sale to the farmer.

The native population of Ocean Island is about 600, and is supposed to have come originally from the Gilbert Islands. They are a fine type of people, with many interesting customs, but they are rapidly dying out.

The Pacific is now fast becoming the scene of wonderful commercial activity Foremost amongst the island territories is Ocean Island.



The native constabulary. These men gain promotion and emoluments by their ability to read, write, and speak English. To qualify, they attend night-schools.

Photo—T. J. McMahon.

A Food Hanger with Rat Disc from Fiji.

By Thos. Steel, F.L.S.

That the rat as a pest has been known to primitive man, as well as to his civilised brother, is shown by the food hanger depicted in the accompanying illustration. It is interesting to observe that the device, a disc, employed to frustrate the predatory habits of this rodent, is similar to that used as a guard upon the lines connecting vessels to wharves or lighters which was introduced here only at the beginning of the present century, during the first outbreak of bubonic plague.

Fijian Food Hanger.
Photo—G. C. Clutton.

This interesting object I obtained whilst residing in Fiji in 1885. It consists of a piece of wood roughly carved in human form. On top of the head there projects a peg which is perforated for the suspending cord. Beneath the hole is fitted loosely a disc of wood which projects for some distance all around over the figure. At the feet is another block having four upwardly pointing blunt pegs.

The object of this arrangement is to prevent the access of rats to baskets containing food materials. The baskets holding yams, taro, and other food are hung on the wooden pegs, the whole being suspended from the rafters. Any rats which climb down the suspending cord in their attempts to reach the food are unable to do so, for when they endeavour to get round the edge of the disc they immediately fall to the floor.

An old Fijian, to whom I showed it, by signs indicated its use, adding that when the rats saw the image they were so startled as to cause them to fall off the disc.

I have seen only two hangers carved in this way, they being usually quite plain.