

The
AUSTRALIAN
MUSEUM
MAGAZINE

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



Centenary of the Australian Museum

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THE AUSTRALIAN MUSEUM

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A NEW MUSEUM GROUP
Willow Grouse in their winter haunts. While the bird on the left has not changed from its autumn plumage, the two on the right have assumed the complete winter coat. (See page 16).

[Photo.—G. C. Clutton.]

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VOL. III., No. 1.

JANUARY-MARCH, 1927

Editorial.

Centenary of the Australian Museum.

THERE is presumptive evidence that the inception of what is now the Australian Museum dates from 1827, so that in the coming year its first century of history will be completed.

In a despatch from the Colonial Office, Downing Street, dated 30th March, 1827, Earl Bathurst thus addressed Governor-General Darling:—

“It having been represented to me that it would be very desirable were the Government to afford its aid towards the formation of a Publick Museum at New South Wales where it is stated that many rare and curious specimens of Natural History are to be procured, I do myself the honor to acquaint you that, although I feel a difficulty in authorizing the commencement of any Building for that purpose, until an estimate of the expense shall have been first submitted to my consideration, yet I am disposed, in the meantime, to allow a Sum, not exceeding £200 per annum, to be disbursed for the purpose of assisting in the accomplishment of this object; and, as one of the first steps towards ensuring its success seems to be the sending out some proper person to assist in collecting and arranging such specimens, as it may be possible to procure in that quarter, I have been further induced to

consent to the appointment of a young man to that particular duty, who has been recommended to me as peculiarly fitted for it and who will, therefore, be immediately sent out to the Colony in the capacity of Zoologist with the same rate of salary and allowances as appear to have been given to Mr. Frazer, the present intendant of the Botanic Garden at Sydney.”

The “young man” referred to in the despatch was Mr. W. Holmes, who was styled Colonial Zoologist, and who was therefore the first custodian of the infant collections of the “Colonial Museum,” the original designation of the institution.

It is not known with certainty when Holmes arrived in the Colony and assumed the post of Colonial Zoologist, but the following extract from the *Sydney Gazette* of 31st August, 1830, shows that he was in charge of a collection in that year:—

“The public are not generally aware that a beautiful collection of Australian curiosities, the property of Government, is deposited in the old Post Office. This Museum is under the superintendence of Mr. Holmes, who, between the hours of ten and three, politely shows the same to any respectable individuals who may think fit to call. It is well worthy inspection.”

This extract indicates that Holmes was both urbane and discriminating, but apparently he did not long remain in the position of Colonial Zoologist, and there is some evidence that he died in 1830.

It is clear from the records that a Museum was founded between the years 1827 and 1829, but for some time the collections had no permanent home, and were housed successively in various buildings where room happened to be available. Early in 1830 the "Sydney Museum" was lodged in the Judge Advocate's Old Office, which was situated in what is now Loftus Street, at the south-east corner of the existing Lands Office, a building perhaps known also as the Old Post Office, Bent Street. In the same year the Committee of the Australian Subscription Library and Reading Room (now the Public Library of New South Wales) petitioned Governor Darling for the grant of a town allotment:—"and suggested that the Museum, then in an embryo state, should be combined with the Library."

On 10th October, 1831, the Governor gave permission to the Committee to select two allotments of ground in Hyde Park for the erection of a combined Library and Museum. Two allotments were selected in Hyde Park, but nothing came of the project at that time.

For some time prior to 1834 the collections were contained in a room attached to the Legislative Council building, for in Charlton's "Parliamentary Government in New South Wales" (Sydney, Govt. Printer, 1924) pp. 56-57, we read:—

"The next room housed various specimens of native birds in glass cases, which were under the care of the Messenger, William Galvin, who received therefor a small extra allowance. In 1834 the Clerk of the Council reported to the Colonial Secretary that this collection had so grown through the efforts of a prisoner named John Roach, who was an

enthusiastic ornithologist, and Galvin's assistance, that it should be styled "The Australian Museum," and placed under the control of Trustees."

In the Estimates of Expenditure for 1835 (dated 12th June, 1834) is the following item:—

"Australian Museum—Towards the support of the Institution . . . £200." So that the Museum had received its present name in the year 1834.

In 1836 the Museum started once more on its travels, and was removed to Bridge Street, where, with the Library, it occupied the house variously referred to as the residence of the Chief Justice (Sir F. Forbes) and the Office of the Surveyor General. In 1840 the Museum collections and the Subscription Library migrated together to a building in Macquarie Street "well known to the old colonists as the Surveyor General's Office." This building, which had been lately vacated by the Surveyor General (the late Sir T. L. Mitchell), stood on the corner of King and Macquarie Streets, opposite to the present site of the Sydney Mint. Next, the Museum and the Library parted company, and in 1841 the former was removed to the Court House, Woolloomooloo, now the Criminal Court, Darlinghurst, where it was open for public inspection every Wednesday from ten till three.

Here the collections reposed until 1849, when the permanent building, now the Australian Museum, commenced in 1846, was sufficiently advanced to receive them, and on 24th February, 1849, Mr. W. S. Wall, who was then Curator, was "authorized to proceed with the removal of the specimens of Natural History now in the New Court House, and to draw for the amount necessary to cover the expenses of their safe conveyance to the Museum. The sum not to exceed Thirty Pounds."

An important donation of Tongan handiwork has been made by Mrs. Crosbie of Homebush. The collection was gathered by the late Rev. E. E. Crosbie, B.A., who served as a missionary in the Group many years ago, before genuine examples of native work had become scarce.

During the month of October, the Royal Australasian Ornithologists' Union was granted the use of the lecture hall for their annual meeting. Many of the members took the opportunity of inspecting the reserve collection of bird skins, particularly the recently acquired Grant Collection.

Notes and News.

At the meeting held on December 3rd Sir Charles Rosenthal, K.C.B., C.M.G., D.S.O., V.D., was re-elected to the office of President. Sir Charles has taken an active interest in Museum affairs, and is particularly anxious to see a beginning made in extending the existing buildings.

The following standing committees of the Board of Trustees have been elected for 1927 :

House :—Messrs. Jas. McKern and F. A. Coghlan, Dr. J. R. M. Robertson, Dr. G. A. Waterhouse, and Mr. F. E. Mance.

Finance and Publicity :—Messrs. F. A. Coghlan, Jas. McKern, O. C. Beale, R. H. Cambage, and the Hon. Dr. F. E. Wall, M.L.C.

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To fill vacancies on the Board caused by the resignations of Sir William Vicars and Mr. E. Wunderlich, the Hon. F. E. Wall, M.D., M.L.C., and Mr. F. S. Mance, Under Secretary, Department of Mines, were elected in October. At the November meeting the President in welcoming the new trustees referred to the fact that Dr. Wall's grandfather was Curator from 1845 to 1858. During this period he prepared a description of the skeleton of a sperm whale, a work which showed him to be an accomplished osteologist.

Mrs. H. Georgina Hedley has presented to the Museum in memory of her late husband, Charles Hedley, his comprehensive card index to the literature of mollusca and a number of valuable books and papers from his library. At the November meeting a resolution was passed thanking Mrs. Hedley for this very generous donation.

Among recent visitors to the Museum were Mr. Edgar R. Waite, Director of the South Australian Museum, Adelaide, who has just returned from a visit to Britain and America ; Colonel Fredk. J. Hayter of Cambridge, who is associated with Professor A. C. Haddon, and is particularly interested in aboriginal implements and designs ; Mr. Gilbert Rigg of Melbourne and London, with whom an exchange of stone implements has been arranged ; Mr. A. C. Mackay, F.R.G.S., to whom we owe some interesting specimens

collected at Walpole Island and who has recently had some interesting and sometimes thrilling experiences while travelling and exploring in Sumatra, Borneo, Southern China, Manchuria and eastern Russia (we hope he will describe some of these experiences in a later number) ; Mr. W. S. Brooks, representing the Museum of Comparative Zoology, Harvard, Massachusetts, who is in Australia to collect reptiles and batrachia for that institution ; Mr. A. M. Lea, Entomologist of the South Australian Museum ; Mr. Alan Dodd, of the Commonwealth Prickly Pear Board.

We have often had occasion to refer to the yeoman service in the cause of science performed by Surgeon Lieutenant-Commander W. E. J. Paradise, R.A.N., one of our Honorary Correspondents and a most enthusiastic naturalist. Dr. Paradise recently presented to the Museum a large collection of marine animals obtained by him in the Sir Edward Pellew Islands, Port Darwin, and other localities in the Northern Territory. Several reports on this donation have appeared. The reptiles formed the subject of a paper in the *Proceedings of the Zoological Society* of London by Mr. J. R. Kinghorn ; Dr. H. Lyman Clark of Cambridge, Massachusetts, has dealt with the starfishes and their allies, whilst the sea-mats or moss animals (Bryozoa) have received the attention of Mr. Arthur Livingstone.

Nearly three hundred specimens of fishes have now been referred to 127 different species, a few of which are new to science, and a report on them has been written jointly by Dr. Paradise and Mr. G. P. Whitley. Field notes and sketches, made from the living fishes, have been of value in the compilation of this paper.

The large collection of crustacea is being written up by Mr. F. A. McNeill and Dr. Paradise, whilst the remaining groups will be largely dealt with by their collector.

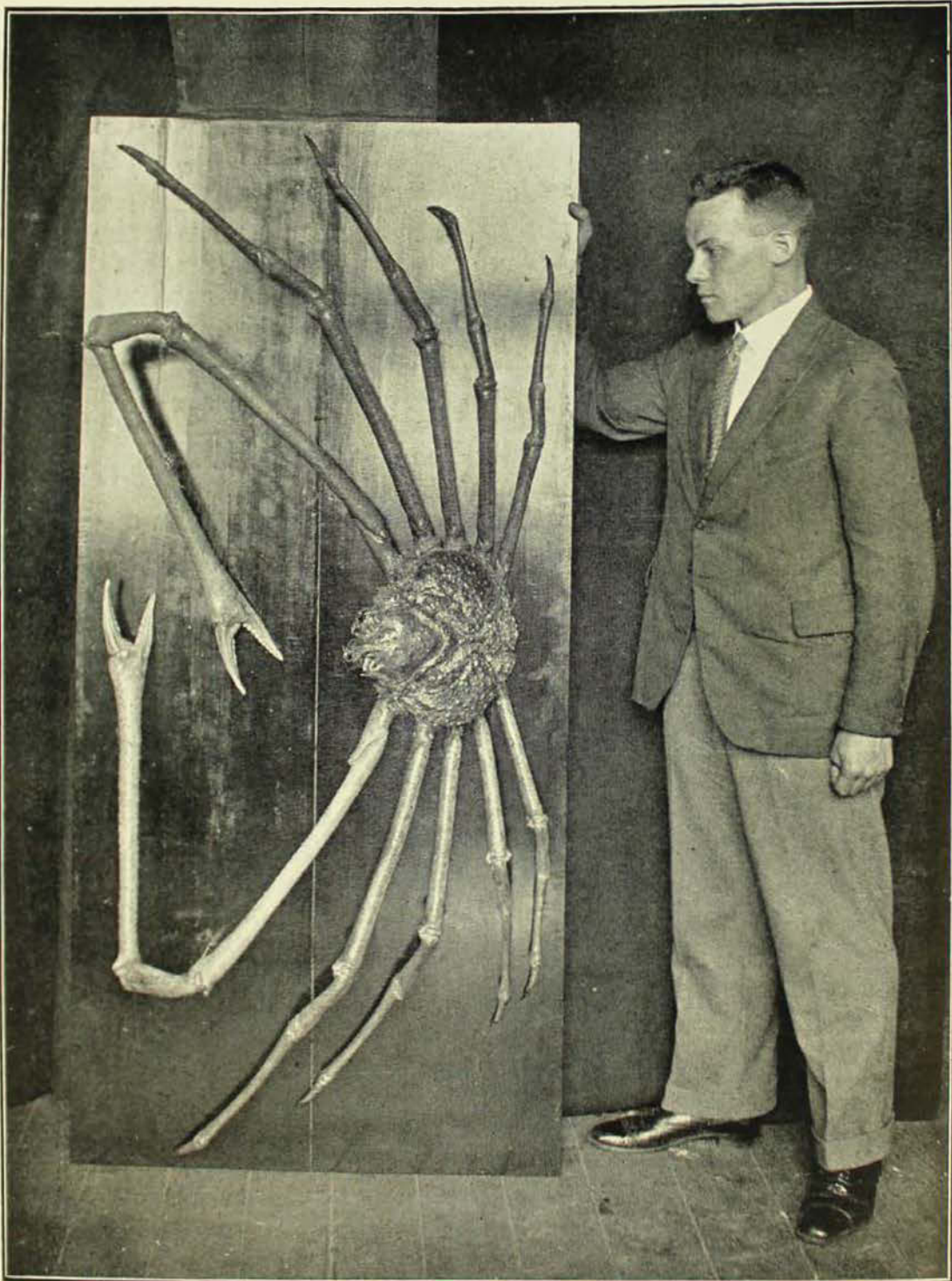
In this way, a large and valuable collection of Australian animals will be made known to the scientific world, and a decided step forward will be taken in the knowledge of the fauna of our waters.

The Largest Crab.

BY FRANK A. MCNEILL.

THE writer once read a most intriguing story which centred around the gruesome activities of a giant crab. This awful creature came periodically from the sea at night and "mauled" lonely wayfarers, leaving an awed populace long unable

to account for its strange presence. Eventually it was decided that this phenomenon was the direct result of the experiments of a mysterious hermit who had recently established a laboratory for the purpose of extracting certain secret elements from the



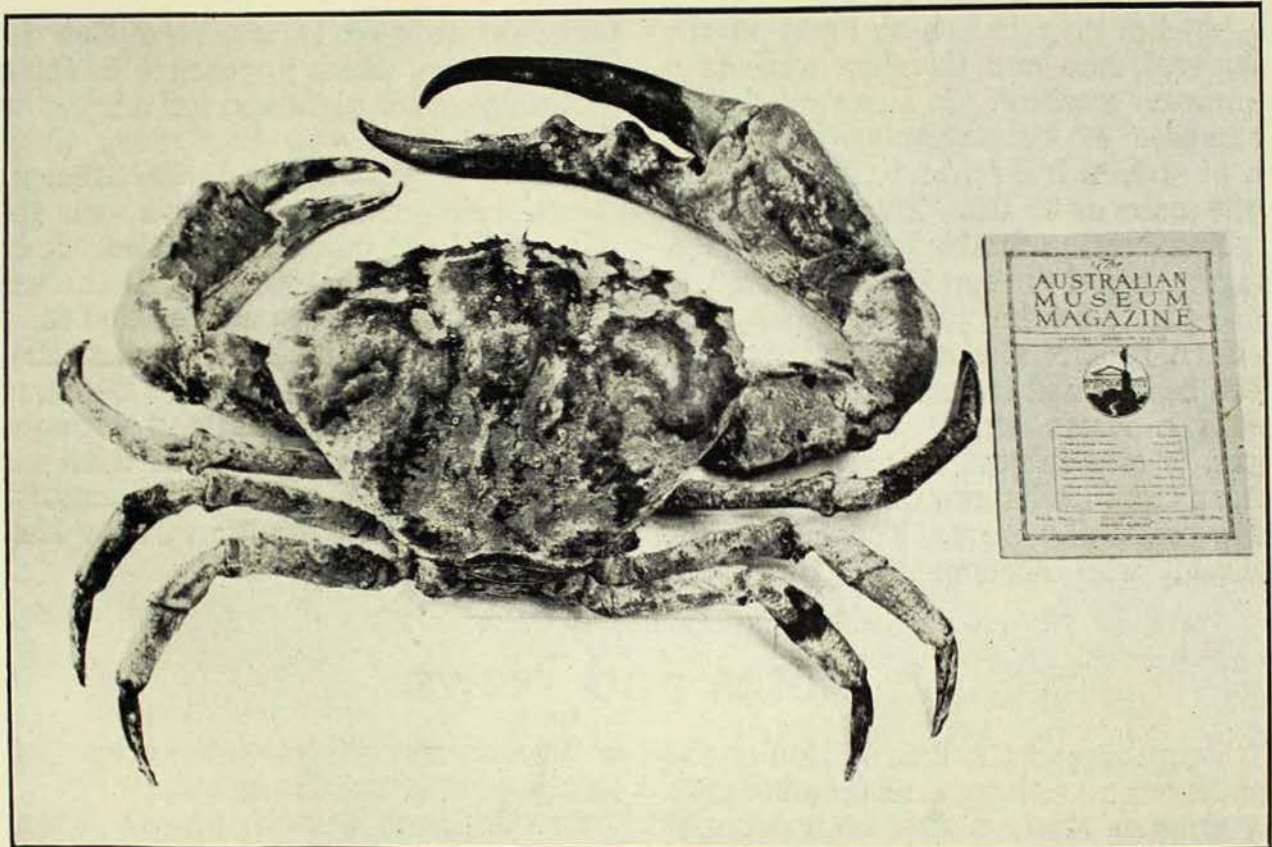
The Giant Japanese Crab (*Kaempferia*) is the largest of living crustacea.

[Photo.—G. C. Clifton.]

adjacent sea water, thus upsetting the balance of nature by causing abnormal growth in an erstwhile inoffensive shore crab.

Now the author of the above was no doubt blissfully ignorant of how close his imagination approached to fact. Like many others, he was not aware that there exists in actual life a huge crustacean capable of inspiring awe were it able to come ashore on raiding excursions. This is the Giant Japanese Crab (*Kaempferia kaempferi*) which frequents the deep coastal waters of Japan. Large

(jointed invertebrate animals), and never fails to create a thrill of interest when viewed in the exhibition halls of a museum. The carapace or shell of this giant often measures over twelve inches in width, and the pincer-bearing limbs may span as much as eleven and twelve feet when fully outstretched. These latter may be five to five and one half feet in length. The four succeeding pairs of walking legs are proportionately long, so that the creature covers a remarkably large area when at rest.



The Giant Edible Tasmanian Crab (*Pseudocarcinus*) is the rival of *Kaempferia* in size. The body of this species is more massive than that of its Japanese rival but its limbs are much shorter. Invariably an inhabitant of deep sea waters it rarely approaches shore. Only one authentic record of the occurrence of this monster among the intertidal rocks comes from South Australia where a specimen twelve and a half inches wide was discovered on the shore at low tide in St. Vincent's Gulf. This locality possibly represents the most westerly extent of the crab's range. [Photo.—G. C. Clutton.]

males of the species would be strong enough to grapple with a child, were it not for the paralysis to which they are subject when drawn suddenly to the surface and so relieved from the great pressure of water under which they are accustomed to live. Under these circumstances the crabs can be handled with impunity.

Kaempferia belongs to the big group of Spider Crabs (*Oxyrhyncha*), and its great spindly legs are characteristic of these forms. It is not only the largest crustacean known, but is the largest of existing Arthropoda

The Australian Museum fortunately possesses a fine example of the Giant Japanese Crab, which is looked upon as a rarity. Our specimen is a little under record size, and was handed to us in desperation by a Sydney resident whose relative had brought it back as a rare souvenir from the Orient. The specimen was found to be in a deplorable condition, and the mass of fragments which eventually arrived at the Australian Museum considerably damped our enthusiasm. This "Chinese puzzle" was handed over to the tender mercies of the taxidermist, Mr. H. S.

Grant. In the finished exhibit now on view the most critical observer will fail to discover any trace of where the missing portions of the crab's form have been cunningly restored by the modeller's art, and later tediously coloured to blend with their surroundings.

There is only one other crab in existence which approaches anywhere near the size of the Japanese giant, and this is Australian. The deep waters of the eastern slope of Bass Strait harbours the great Edible Tasmanian Crab (*Pseudocarcinus gigas*), which can claim a greater bulk of body than its Japanese rival, but has only the short limbs of the conventional crab and therefore appears a less awesome creature. It is recorded that the carapace of *Pseudocarcinus* attains a width of sixteen inches, and the crab may turn the scales at 30 lbs. The larger of the two pincer-bearing limbs (chelipeds) is a striking feature of the species. The hand or terminal pincer-bearing joint of this appendage often reaches the amazing length of eighteen inches, and is sufficiently powerful to crush a man's wrist. *Pseudocarcinus*, however, is also subject to paralysis when drawn up from its haunts on the sea floor, and lies practically inert. The late A. R. McCulloch, who accompanied the Com-

monwealth Fisheries Investigation Vessel *Endeavour* on one of her southern cruises stated that while the ship was trawling eastward of Babel Island, Bass Strait in 60-100 fathoms, each haul of the net brought up one or more of this giant crustacean. Those specimens that could be spared were eagerly sought by the crew as delicate articles for the table, their massive limbs supplying an abundance of white flesh. In life the crabs were mottled or blotched with a rich red colour on a porcelain white ground.

Rare examples of the Giant Tasmanian Crab are trawled in southern New South Wales waters, which appears to be the most northerly extent of the species' range. When these find their way to Sydney they are displayed as great curios in the fishmongers' shops, being transferred from one to the other until the condition of their flesh has deteriorated to the stage when the supplications of the Museum are acceded to. The largest specimen in the Australian Museum measures thirteen inches across the carapace, and the hand is seventeen and three quarter inches long; its weight when fresh was 20 lbs. A slightly smaller representative of the species is on exhibition in the Museum Invertebrate Gallery.

Notes and News

By the opening of the first section of the city underground railway on December 20th the Australian Museum has been brought into closer proximity to the outer suburbs of Sydney. The Museum Station on this section is but a few minutes' walk distant, and it is anticipated that upwards of 100,000 passengers will be discharged daily at this point. In the unavoidable absence of the President of the Board of Trustees of this Museum, Sir Charles Rosenthal, the institution was represented by Mr. W. T. Wells, Secretary, at the official trial.

Dr. W. H. Longley of the Carnegie Institution, Washington, U. S. America, spent several days at the Museum recently consulting the fish collection and ichthyological literature. He was greatly impressed by the work done by the late Allan R. McCulloch. He has now left for Macassar, where he will study fishes in their natural haunts by descending in diving dress. Dr. Longley has

written several papers on the colours of reef fishes and other marine organisms.

Dr. T. Storie Dixson, who for a lengthy period was President of the Board of Trustees, has recently returned from an extended trip to Europe and America. Dr. Dixson has always been zealous for the advancement and improvement of the institution, and during his tour he took the opportunity to visit various museums and collect ideas and data, particularly with reference to methods of exhibition and educational features.

Through the representations of Sir Charles Rosenthal, President of the Board of Trustees of this Museum, Mr. G. M. Sandy, of Messrs. Jas. Sandy and Company, Limited, has presented a quantity of bevelled plate glass shelving. Mr. Sandy's generosity has enabled the Trustees to give effect to a long desired alteration in exhibition arrangements, formerly precluded by lack of funds, and to him thanks are due for his public spirited action.

Rare New Zealand Birds.

BY MRS. PÉRRINE MONCRIEFF.

IN spite of the large number of skins taken in the past and the extensive literature dealing with New Zealand birds, it is surprising how little has been recorded concerning their habits and life history, especially in comparison with what is known of the birds of Australia. To-day it is difficult to obtain data as to the habits of our rarer birds, for many have been driven back and back until they now cling to life in the most inaccessible spots, where to study them one requires much time and an iron constitution, both of which are useless without an element of luck. It is a question whether these rare types will become extinct before their life histories have been elucidated, or whether they are still holding their own. There are signs of a serious desire on the part of the public to give the birds adequate protection, and it is pleasing to note that there has been a slight increase amongst most of our rare birds during the last five years. At the same time, although the importance of forest protection and cultivation is likewise increasingly appreciated, vast tracts of country are still being milled, marshes drained, and increasing areas placed under cultivation, all of which have a serious effect upon bird life. Add to these the steady inroads made by such enemies as the dog, cat, and weasel, not to speak of introduced birds, which compete with the native species for food, and the prospect in front of our birds is not a rosy one. In my opinion the South Island birds, with a few possible exceptions, have a good chance of survival, but in the North Island depletion has probably gone too far. A glance at the small acreage of virgin bush left is sufficient to explain the disappearance of any bird which cannot adapt itself to modern conditions.

THOSE THAT ARE GONE.

The Moa heads this list. These birds have not been extinct so long as ornithologists supposed, for recent investigation proved that the Maori had considerable knowledge of the birds and their habits, so that we are justified in assuming that at least a few

existed until comparatively recent times.

Besides the Moas this list contains one of the smallest species, namely, the Native Quail (*Coturnix novae-zealandiae*). This bird is sometimes reported as being still extant, but invariably the supposed Native Quail turns out to be an introduced bird.

THOSE REPORTED TO BE EXTINCT.

Some surprise may be felt that the *Notornis* is included here rather than in the preceding section. The last recorded Giant Rail was killed by a dog in the vicinity of the Milford Sound track, and was said to have contained eggs. One was reported from near Lake Te Anau in 1913. I have several times received information from surveyors and others of a huge Pukeko or Swamp Hen (*Porphyrio melanotus*) seen by them during the last few years in the densely timbered tracts of Nelson Province. Allowing that one of these reports may be correct, I would like to suggest the possibility that the *Notornis* still roams in areas of unexplored bush in the South Westland, being occasionally driven north in exceptionally severe winters, when it is seen by fortunate individuals. One is said to have been observed near a main road, just where the great chain of mountains running from south to north comes to an end.

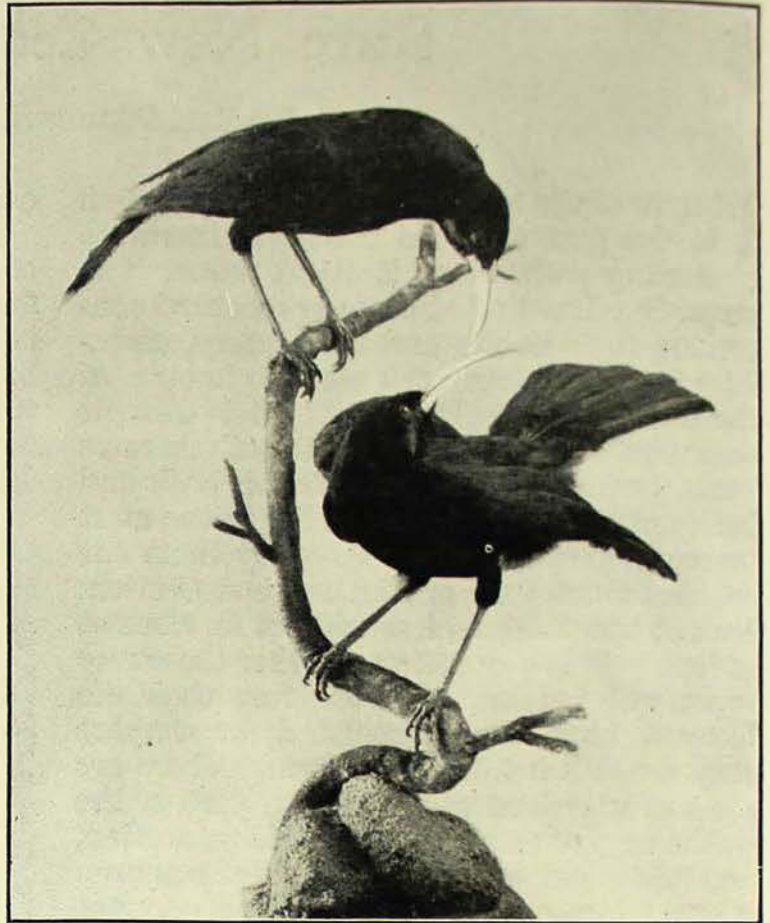
It is more or less certain that the North Island Thrush (*Turnagra tanagra*) has vanished from the North Island, whilst the South Island form has not been seen for so long that it too is probably extinct, though it is now and then reported as still extant. It is fourteen years since the last one was observed in Nelson Province. Whether, then, these birds were allied to the Australian Catbirds, as has been suggested, or were true thrushes, is not now likely to be ascertained. They appear to have been ground birds, frequenting river beds where they hopped about in search of food. The northern form differed from the southern bird in that it had a pure white throat. Both were beautiful vocalists, the northern species being credited with a song of five distinct bars of music.

ON THE VERGE.

Although the Huia (*Heteralocha acutirostris*) is generally placed on the list of extinct birds, it is by no means certain that they do not still linger. Reports continue to come to hand of their having been seen in the rough hinterlands of the Rimutaka and Ruahine ranges. A government expedition sent out in 1913 did not find the Huia, but came across bore holes made in timber which might be ascribed to the bird. That they were there in 1920 is probable, for a companion of some Maoris, who were searching for them at the time of the visit of the Prince of Wales, reported that he had seen them. The plumage is black except at the tips of the tail feathers, which are white, and these are a sign of rank amongst the Maori. The bill of the male is straight and strong, while that of the female is long, curved, and pliant. The male with his strong bill rips the timber and the female then digs out the grubs.

It can safely be said that the Huia was persecuted out of existence by human beings, for it was plentiful in the days of the early settlers, though remarkably little seems to be known of its habits. It has recently been suggested that they were aberrant Birds of Paradise, for in their habits so far as known they seem to have resembled the fascinating family of Paradiseidae. An observer who saw a pair as late as 1906, in bush now milled, described their flight as similar to that of a flycatcher, for they darted up into the air like a fantail, returning to the tree from whence they had flown only to dart upwards again in pursuit of insects. This observer also stated that they flew higher than had been generally supposed, the birds he watched ascending (as far as he remembers) about twenty feet.

The South Island Crow (*Callaeas cinerea*) must be included in the list of fast vanishing birds, in spite of the fact that it may still be found in the south Westlands, and that Mr. W. Oliver reports it as being seen on Stewart Island; it seems to have disappeared from the Nelson Province. Occasionally gold prospectors come across a pair, but very seldom, and it appears to have



The Huia (*Heteralocha acutirostris*). From a group in the Australian Museum.

[Photo.—G. C. Clutton.]

vanished from the Bird Sanctuary at Collinwood. This is a case where some other reason than the encroachment of settlement must be brought forward to account for the extermination of our native birds, for there are vast expanses of forest land in the South Island, where such birds should thrive.

BIRDS THAT APPEAR TO BE STATIONARY.

The Blue Duck (*Hymenolaimus malacorhynchus*) is becoming increasingly difficult to see. Being a tame bird it is easily slain, yet on the South Island, away from the haunts of men, it still exists in considerable numbers.

The same applies to the Kakapo or Owl Parrot (*Stringops habroptilus*), which, though long extinct in the North Island, still exists in numbers in certain localities in the South Island. In the *Emu*, vol. xxiv., 1924, pp. 142-144, Mr. A. F. O'Donoghue has given an interesting account of these quaint and lovable birds, which dwell in colonies under the

roots of beech trees. Being flightless their great enemies are dogs, which delight to chase them. It is the only known bird having large wings which does not use them for flight. It is very owl-like and also resembles the owls in being nocturnal. Its plumage is predominantly pale moss green, but, like most parrots, it exhibits colour variation, a specimen in the Buller collection, Canterbury Museum, Christchurch, being a beautiful canary-yellow, without a single green feather.

There is no obvious reason for the scarcity of the Laughing Owl (*Sceloglaux albifacies*) in the South Island, a recent article having disproved the hypothesis that its disappearance was due to the scarcity of its natural food the native rat, for the writer pointed out that the bird existed in New Zealand long before the advent of the Maori, who introduced the rat. It is apparent that the bird is not quite so scarce as was believed, but like many New Zealand birds, it is nocturnal and so escapes notice, though anyone who hears its eerie shrieks cannot fail to detect its presence.

Though in all probability the Brown Kiwi (*Apteryx australis*) will shortly cease to exist except in Bird Sanctuaries, the more fortunate Great Grey Kiwi (*Apteryx haasti*) is still plentiful in certain localities, where its strident whistle is often heard. In the Nelson Province these birds dwell in districts where they can bore in the soft earth for the large worms which compose their diet. Should their bills become injured they die of starvation, seeing that they can no longer locate their food. A peculiarity of these birds is the manner in which they can shed their feathers without their appearance being in any way affected. In releasing a kiwi from captivity I placed it in a kerosene tin to prevent it doing itself damage. On being liberated the bird walked



The Kakapo, or Owl Parrot (*Stringops habroptilus*). From a group in the Australian Museum.

[Photo.—G. C. Clutton.

calmly away, not in the least bit ruffled, yet the kerosene tin was more than half full of feathers.

The Native Pigeon (*Hemiphaga novae-seelandiae*) is still numerous wherever the bush is plentiful. But it has many enemies and it is often eaten on the west coast of the South Island, though, like the rest of our native birds, it is protected.

Saddlebacks (*Creadion carunculatus*) and Stitch birds (*Notiomystis cincta*) have practically disappeared from the mainland, although until the country has been "combed" no one can say with certainty that a few pairs have not been overlooked, the former being recently reported from the northern mainland, whilst the latter is alleged to be living in the Nelson Province. The Stitch-bird has always been considered to be a purely North Island bird, therefore, unless definitely proved to frequent the wild Karamia district, it must be held to exist only on certain islands off the northern mainland. The Saddleback, though for some mysterious reason (probably to do with food) found on certain outlying islands but not on others, is fairly plentiful in the localities it favours. Fire is its greatest enemy.

BIRDS ON THE INCREASE.

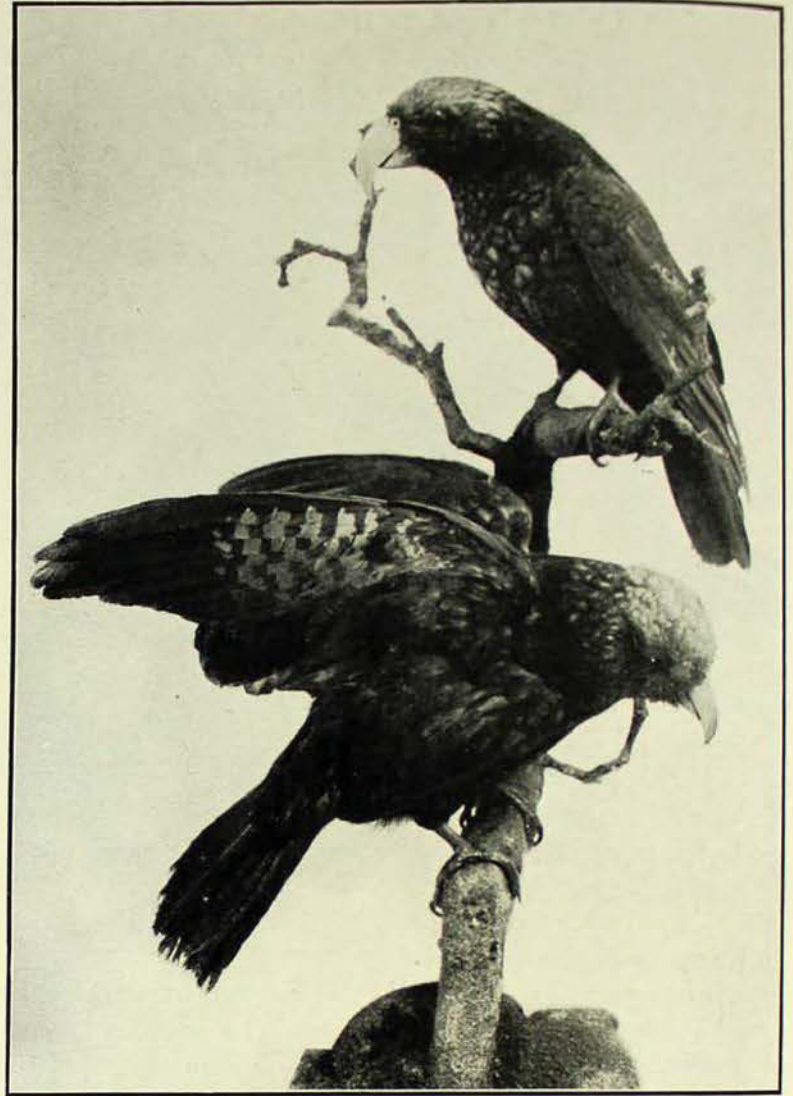
Several birds must be placed in this category, though unfortunately it only means that from being on the verge of extinction the birds have shown definite signs of re-establishing themselves. Conspicuous among them is the North Island Crow (*Callaeas wilsoni*), or Blue Wattled Crow, which is undoubtedly on the increase. Crows appear to prefer the mountain ridges, where they can be heard noisily flopping in the tree tops, uttering their call note, a plaintive sigh; their real song contains rich organ-like notes. Little is known of their habits. In appearance they closely resemble the Australian Apostle Bird (*Struthidea cinerea*).

In certain areas of the South Island there has been a noticeable increase in the Yellow-fronted Parakeet (*Cyanoramphus auriceps*) during the past year or two. An allied species, the Red-fronted Parakeet (*Cyanoramphus novae-zelandiae*), which was also close to extinction, has not recovered with equal ease and is still very scarce in the Nelson Province, where the Yellow-fronted species is quite common in certain areas. The birds, which are much alike on the wing, can be distinguished by the fact that the latter is larger and has a distinctive cry of "pretty dick."

The Kaka (*Nestor meridionalis*) is also on the increase in parts of the South Island. Like the Kakapo these birds have very remarkable plumage, the Buller collection containing a wonderful range of skins from deep crimson to shades of orange.

The Native Robin (*Miro longipes*) of the North Island is scarce, but on the South Island *Miro australis* is again becoming quite plentiful in its old haunts, and it seems as if it has returned to stay.

To state that the Woodhen is increasing in numbers would be a bold assertion, yet in the Nelson Province there has been either a natural increase or a migration from elsewhere. Five years ago one could travel down the coast and be told



The Kaka (*Nestor meridionalis*). From a group in the Australian Museum.

[Photo.—G. C. Clutton.

that Woodhens had quite disappeared. This year the traveller will meet with tales of Woodhens all along the same route. It has been suggested that these birds follow plagues of mice, which is true in this particular case.

There is no doubt that the Bellbird (*Anthornis melanura*) is on the increase, having falsified the gloomy prognostications of its early extinction. With the Tui it is one of the commonest birds on the West Coast of the South Island. This bird, which has a gorgeous blue cap when the fuchsia is in flower, sometimes puzzles newcomers who know it only from books, which often omit to mention that the Make-mako becomes thus decorated from dipping its head into the fuchsia blossoms.

Sharks.

BY G. P. WHITLEY.

THE origin of the term *shark*, like that of many "household" words, is not definitely known. The word seems to have been introduced by the sailors of Captain (afterwards Sir John) Hawkins' expedition, who brought home a specimen which was exhibited in London in 1569¹. Nevertheless, "shark" expresses much in one syllable, and has only to be shouted once or twice to cause large crowds of surf-bathers to leave the waves forthwith, for, even though the percentage of deaths caused by sharks in the population is practically negligible, the shadow of the man-eater crosses the minds of all who swim in Australasian seas.

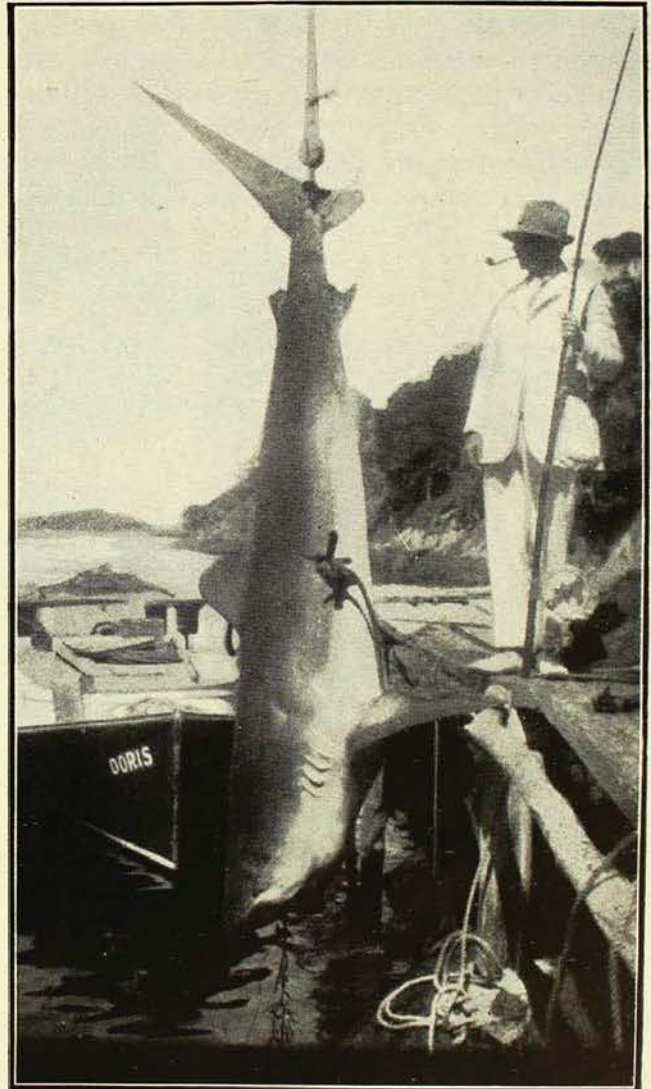
Sharks, and their cousins the rays, are not true fishes, because they have gristly skeletons of cartilage instead of bone, several gill-slits instead of one on each side of the head, and numerous other distinctions. In these respects they are regarded as primitive, not having attained the dignified specialisation of such fishes as the bream and the cod. They have complex structures in their teeth and skins, however, and some species have evolved elaborate methods of nourishing their young, so that they claim respect as an ancient and problematical group.

"MAN-EATERS."

About eighty different species of sharks are known from Australian waters, and of these New South Wales can boast thirty-two, the Ghost Sharks (*Chimaera* and *Callorhynchus*) being excluded. Less than one-third of our sharks are harmful to man, the majority being small creatures which prey on fishes, crustacea, and other marine life.

Superficially, sharks appear very much alike and their specific differences become apparent only when they are studied in detail. So many sharks are loosely referred to as "Nurses," "Wobbegongs," and "Man-eaters" that their identification from the descriptions of casual observers is well-nigh impossible. Neither is it practicable to name a shark as it is seen noiselessly cruising along a beach, occasionally breaking the

surface with its dorsal fin, or shooting like a meteor as it cleaves a wave-crest in pursuit of a leaping school of fish. In such circumstances and at a respectful distance, one may admire its sleek beauty and graceful



A fine shark caught by Commander C. Struben, R.N., near Auckland, New Zealand, a locality famous for big game fishes.

[Photo.— J. M. Gouldsmith.]

motion, though biassed in one's opinions by its evil reputation.

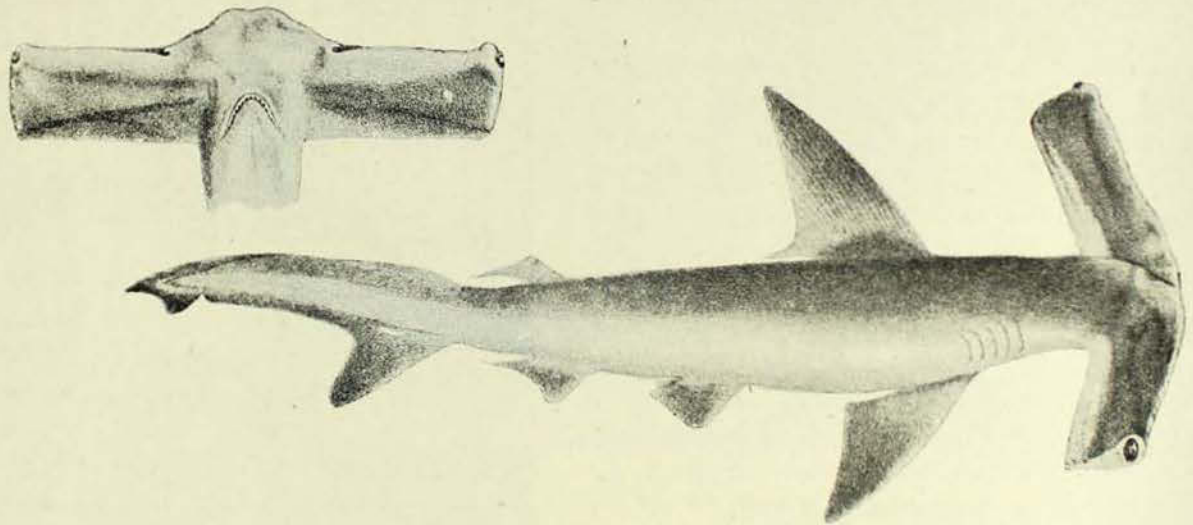
The White Shark or White Pointer (*Carcharodon carcharias*) is the man-eater *par excellence*, the most ferocious monster of the seas, with rows of large triangular teeth, a strong swiftly-moving bulk up to forty feet in length, and an extremely voracious appetite, being capable of swallowing a

¹Murray's Dictionary.

man whole. This species indeed has been credited with the disposal of the prophet Jonah. Apropos of its voracity, Stead² has stated "A White Pointer taken in Port Jackson had in its stomach half a ham, several legs of mutton, the hind quarter of a pig, the head and forelegs of a bull-dog with a rope round its neck (the stone had been chewed off, I suppose), a quantity of horseflesh, a piece of sacking, and a ship's scraper," whilst McCoy³ has written of the White Shark in Victoria, "A specimen between 15 or 16 feet long had been observed for several days swimming round the ladies' baths, looking through the picket fence in such a disagreeable manner that the station master had a strong hook and iron chain

The Tiger Shark, an inveterate scavenger, also displays striking versatility in the selection of its menu. A specimen examined by the late A. R. McCulloch at Bondi, New South Wales, had devoured a full-grown spaniel with a collar on, several sea-birds and a mass of fish; the stomach also contained a porpoise's skull and the spines of a porcupine fish.

Though not dangerous to man, unless by accident a wader's leg or arm come near it, the Wobbegong or Carpet Shark (*Orectolobus maculatus*) has a reputation for snapping up unconsidered trifles. As long ago as 1789, Phillip wrote of this species, in his *Voyage to Botany Bay*, that "This fish was met with in *Sydney Cove, Port Jackson*, by Lieutenant



The Hammerhead Shark (*Sphyrna blochii*) has its eyes situated at the ends of the lobes of its remarkable head. The purpose of this development is not known

[After Francis Day.]

made so as to keep the rope out of reach of his teeth, and this being baited with a large piece of pork, made to look as much like a piece of a lady as possible, was swallowed greedily; and then, with the aid of a crowd of helpers, the monster was got on shore. On opening the stomach, amongst a load of partially digested objects, a large Newfoundland dog was found, with his collar on, identifying him as one lost the day before, no doubt swallowed while enjoying a swim in the comparatively shallow water."

Watts, and is supposed to be full as voracious as any of the genus, in proportion to its size; for having lain on the deck for two hours, seemingly quiet, on Mr. Watts's dog passing by, the shark sprung upon it with all the ferocity imaginable, and seized it by the leg; nor could the dog have disengaged himself had not the people near at hand come to his assistance."

OTHER SPECIES.

Some sharks depart sufficiently from the "man-eater" or "nurse" type to call for notice on account of their remarkable structures. The Hammerhead Shark for instance has its eyes at the ends of two long branches of its head, an anomaly for which

²Stead, *The Lone Hand*, Sydney, (n.s.) i. 1, Dec. 1913, p. 35.

³McCoy, *Prodromus of the Zoology of Victoria*, dec. viii, 1883, p. 20.

no reason is available. The Thresher Shark is another mysterious creature. It has a tail as long as its head and body put together; it uses this to hit the water in order to drive schools of fish closer together so that it may eat its fill of them. Some say that it uses its long tail for dealing heavy blows to whales, and that it allies itself with swordfishes to bring about the destruction of those huge mammals; it would seem however that such tales are based on observations of killer whales, which are well-known attackers of their larger cousins.

In the Port Jackson Sharks we have examples of the "living fossils" for which Australia is so well known. Although sharks like these were evidently common in many seas in past ages, they are only found in limited areas now. Port Jackson Sharks have remarkable teeth which are sharp in front and form scroll-like grinders behind. They feed on crustacea, sea-urchins, and other hard-shelled creatures, and lay brown horny-shelled eggs with spiral flanges, provided also, in one species, with anchoring tendrils which become entangled in seaweeds.

The Ghost Sharks are the most remarkable of all and form a group by themselves, having smooth skins, an operculum over the gill-slits, and many remarkable characters possessed by no other animals. They are not, strictly speaking, sharks and are only mentioned in passing.

SIZE.

The world's biggest shark is the Whale Shark (*Rhincodon typus*) which is authentically recorded as over forty-five feet in length, and is stated on quite reliable authority to grow to well over fifty feet long. It is quite harmless and evidently feeds, like some whales, on the tiny animals which float in millions on the surface of the sea. Only one species of Whale Shark is at present recognised, and no reliable record of its occurrence in Australia is available; references to this species in Australian literature evidently refer to the Basking Shark (*Cetorhinus maximus*), a harmless giant which is sometimes found floating idly in southern Australian seas.

BREEDING.

The arguments held over the methods of reproduction in sharks vie in vehemence

with those on marsupial parturition. Some declare that sharks lay eggs, whilst their opponents dogmatically argue that they always bear "living" young. As a matter of fact, some sharks, such as the Port Jackson Sharks, the Catsharks, and the Swell Shark, lay eggs, horny-shelled objects which are sometimes provided with tendrils, or sticky bunches of threads by which they are anchored to weeds. The majority of Australian Sharks, however, such as the White Shark, Hammerhead, Gummy, and the Wobbegongs are viviparous, bearing well-developed young, often in large numbers, in the summer months. The sharklets are sometimes provided with structures which prevent laceration of the mother at birth. Thus, the fin-spines of the embryo Dog-fish (*Squalus megalops*) are capped by knobs, and the teeth of the foetal Saw-Shark (*Pristiophorus cirratus*) are laid flat against the sides of its snout. Accounts of sharks swallowing their young when danger threatens them appear to have no foundation in fact.

SHARK-FISHING.

Shark-fishing in New South Wales is mostly carried on by line-fishing from the rocks and beaches, and great skill is shown by some who manage to capture monsters on tackle which one would scarcely consider capable of standing the necessary strain.

At Lord Howe Island sharks are caught by line from a whale-boat, played, brought to the vessel's side, hit on the nose with a piece of wood known as a "dolly," hauled aboard, and left to expire on the deck. Hundreds of small sharks and smaller numbers of large ones are netted by trawlers, but they are generally thrown overboard, the large and dangerous ones being killed first.

Captain G. H. Pitt-Rivers wrote an interesting account of shark-fishing in Aua Island, British New Guinea in an earlier number of this MAGAZINE⁴.

COMMERCIAL VALUE.

Sharks are of great commercial value. Their flesh is good to eat and is sometimes served in restaurants under fictitious names. Dogfishes are sold as tinned food in America as "Greyfish," and, notwithstanding the large proportion of urea and ammonia in

⁴*Australian Museum Magazine* ii. 2, 1924, p. 43.

the flesh, are said to taste like halibut. The rough skin or shagreen of sharks was once used in place of the now more popular emery and sandpaper, and for making sword handles. Beneath the shagreen there is a layer of underskin which is used for the production of leather, though even the shagreen, suitably treated, may be utilised for this purpose. The fins and tails are bought by Chinese for soup-making. Oil of excellent quality is procurable in large quantities from sharks' livers, whilst the blood and skeleton are said to yield small quantities of glue. The backbones may be stretched, dried, polished,

and made into walking-sticks, whilst the teeth are in demand as curios and pendants. An American firm which deals with 500 sharks a day, uses sharks' teeth as tags for the laces of shark-leather shoes. What remains of the shark after these products have been gained from it? The flesh, especially if the oil has been first extracted, and the offal make good fertilizer for horticultural purposes. As a local journalist has quoted,

"Methinks that never blooms the rose so red,
As when its roots on ancient shark have fed."

Winter Whiteness.

A NEW MUSEUM GROUP.*

ANIMALS which habitually live in cold regions, where the snow lies deep throughout the whole or the greater part of the year, are not infrequently white in colour. Some northern animals, such as the polar bear, white whale, Iceland falcon, and snowy owl, are more or less white all the year round. Others, such as the Arctic fox, stoat, and Willow Grouse, assume white livery only in the winter time.

It is probable that a white covering, harmonizing with the colour of the surrounding snow, helps to render the animals inconspicuous, enabling the hunters to steal upon their prey, the hunted to escape the notice of their enemies. Apart from the protection and assistance the animals gain by assimilation of colour to surroundings, a white coat is physiologically the most economical for a warm-blooded animal which has to face the cold and the storms of a wintry clime, for it conserves the precious animal heat better than a dark or coloured covering would.

The seasonal change is brought about either by the growth of a new unpigmented suit, or there is a removal of the pigment from individual hairs or feathers. In either case the place of the pigment is taken by air-filled vacuoles, from the surfaces of which the light is perfectly reflected, so

that the hair or feather appears white for the same reason that foam and snow do.

One of the finest examples of this seasonal change of covering is afforded by the Willow Grouse, or Willow Ptarmigan (*Lagopus albus*), which is shown in the illustration forming our frontispiece. This bird, which is closely allied to the Red Grouse of Britain (by some supposed to be merely an insular variety), inhabits the northern parts of Europe, Asia, and America.

In summer, when the bird finds its home on the heathy moorlands, or on barren hilltops among scattered boulders, dwarf Alpine plants and mosses, it has a plumage of a general dark brown colour, finely mottled and barred with grey or rusty, the underparts, as usual, being lighter in colour. This colour harmonizes well with the surroundings and is protective, especially to the female, which is almost invisible when sitting on her eggs. As autumn advances the darker feathers become grey, mottled with black or buff, and, by the time winter has arrived, the complete white plumage is assumed. At the approach of the warmer weather of the following year the change is reversed.

The change from autumn to winter plumage is shown in the group, which was arranged by the taxidermist, Mr. H. S. Grant; the background was painted by Miss E. A. King.

* See Frontispiece.

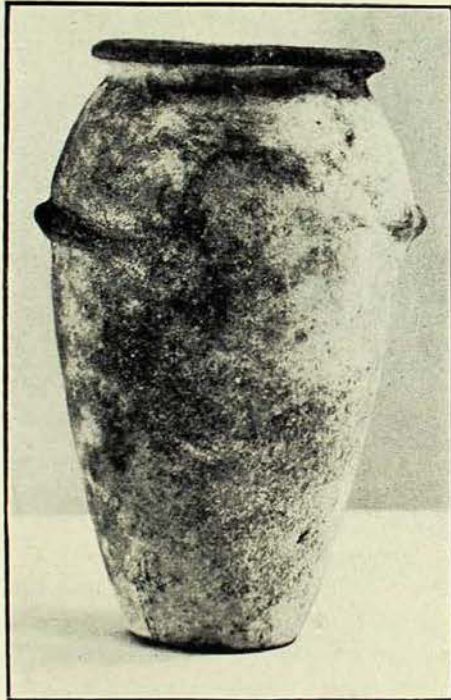
Pottery, an Ancient Art.

BY W. W. THORPE.

For in the Market-place one Dusk of Day,
I watch'd the Potter Thumping his wet Clay :
And with its all obliterated Tongue
It murmur'd—" Gently, Brother, gently, pray "
—*Omar Khayyam.*

ONE of the most useful inventions of early man was pottery. That the art of making pottery is ancient there can be no doubt, for the earliest stages of barbarism saw its introduction. From the earliest times it was made in Egypt, and one can trace the development of this plastic art

Pottery or earthenware, is distinct from porcelain. The former is composed of potter's clay mixed with lime and other properly proportioned ingredients, while porcelain is made up for the most part of a very hard material known as silex, and vessels made of this substance are usually translucent. The question might now be asked how did man arrive at the art of



Earthenware Jar. Dating back to predynastic times, B.C. 3400, this is one of the earliest pieces of pottery known. From Abydos, Egypt.

[Photo.—G. C. Clutton.

through the centuries to the ceramic productions of to-day. Its vogue was world wide and, generally speaking, it is only amongst the most primitive folk that we fail to find pottery manufactured. The Polynesians, however, are an exception, for they cook in open fires or ground ovens, and drink and eat from gourds, coconuts, and wooden vessels. The very nature of pottery precluded its use by nomads, and accordingly it was restricted to those peoples whose life was more or less settled.

Wine bottle, or amphora, of the Ancient Greeks. This vessel stands about three feet high and possesses a pointed base adapted for standing in the sand or soft earth. Late Ptolemaic times, or early Roman (332-30 B.C.) From Hissayeh, Egypt.

[Photo.—G. C. Clutton.



pottery making. It is traceable in many cases, and probably attributable in all, to the practice of covering wooden or plaited receptacles with clay to render them fire-proof. Man did not take long to discover that moulded clay served the same purpose without a lining of other material. At first clay pots were sun-dried, but subsequently they were fire-baked as they are to-day.

The art of glazing, or covering the vessels with some vitreous material, was invented in Egypt about B.C. 1200. It is interesting

to observe that the native Fijians have a form of "glaze" composed of kauri gum, which is smeared over the vessel while hot from the fire-baking. The potter's wheel, although of respectable antiquity, was not used in the earliest times, though prior to the 12th Dynasty in Egypt (*circa* B.C. 2000), the god Khnum is represented in the hieroglyphs as fashioning man upon a potter's wheel. The wheel is also mentioned in Homer's *Iliad*, which was written more than a thousand years later. The potter's wheel is a simple device in the form of a turn-table revolved by hand.



Ewer-like Vessel in black clay, made by the Awemba Tribe, Northern Rhodesia, Africa.

[Photo.—G. C. Clutton.]

In Ancient Egypt men made the pottery, the potter being considered an artisan, and his class was a numerous one. The clay was often kneaded with the feet, and after being rendered sufficiently plastic was placed on the wheel, and as this machine was revolved by one hand the pot was formed with the fingers of the other. Handles, if required, were added afterwards and the vessels carried on trays to the kiln.

It is recorded in Chinese annals that pottery was manufactured as early as 2690 B.C. The invention of porcelain came later.

In other parts of the world to-day, most of the native pottery is made by women. They gather the clay, fashion and bake it and put it to a hundred domestic uses.

In the absence of the wheel the spiral method is the one usually followed. The clay is worked up into long "ropes." One of these is then taken, coiled on itself forming a disc, and when this is broad enough the coiling begins to ascend and form the wall of the pot.

In Fiji, a round stone is held inside the coiled clay, and the outside patted with a spatula which obliterates all traces of the spiral nature of its construction. This mode of building-up a pot is derived from the coiled type of basketware. In New Caledonia the clay spiral is started on a rounded pebble or boulder, which is turned as the process goes on, forming a true but very primitive potter's wheel.



Three Lekythi, used by the ladies of Ancient Greece for holding oil or perfumes. These were presented to the Australian Museum by Mr. Ernest Wunderlich, F.R.A.S. From the Dipylon, Athens, Greece.

[Photo.—G. C. Clutton.]

We have been able to learn a great deal about Egyptian pottery from the custom of burying earthenware vessels with the dead. Ostensibly these and other forms of tomb furniture were for the use of the deceased in an after life. The hieroglyphs have also helped us in identifying the methods followed in pottery making. Pottery had but a short vogue in Babylonia, the Chaldeans preferring vessels made of bronze. The Greeks and Romans made very fine pottery of definite form and utility. The amphora, a tall and capacious vessel with two handles was used for holding wine; others were made to serve as funerary urns for holding the calcined ashes of the dead. Each form had its special function, the crater for holding water, the holcion as a drinking goblet and the cyathus for dipping out the wine. The simpulum was a small cup used when offering a libation to the gods, the lekythos was used

for holding perfumes, and ointments were kept in an unguentarium. There are many other forms which could be enumerated. The Greeks derived inspiration for their pottery from the island of Crete, where the Minoans produced highly decorated ware of chaste designs.



(Left) Quaint Incan Drinking Vessel in the form of a human head. The purpose of these was to hold liquid refreshment for the spirit of the departed. From Cayalti, near Port Eten, Peru.
 (Right) Earthenware Bottle, made by the Mound Builders, who once lived in Poinsett County, Arkansas, United States of America.

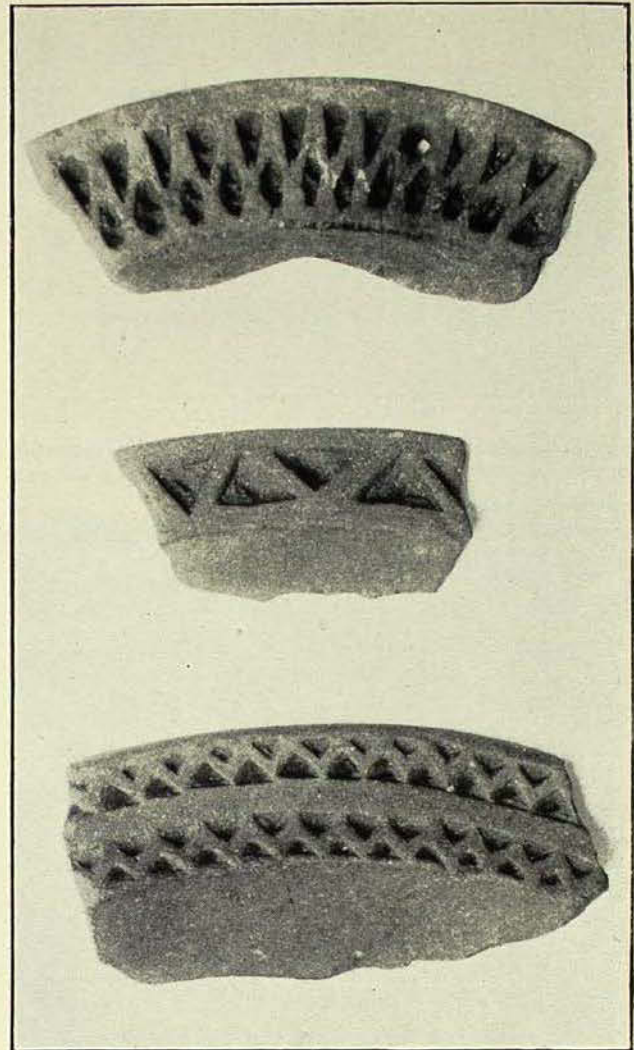
[Photo.—G. C. Clutton.]

Perhaps the quaintest pottery of all were the vessels made by the ancient Incans of Peru. The placing of modelled figures of animals, birds, and caricatures of men on earthenware vessels is not known from any other part of the world. They were humour-



(Left) Conical Cooking Pot, the upper walls decorated with an indented pattern. From Buka, Solomon Group, South Pacific.
 (Right) Cooking Pot in terra cotta clay, with a flaring rim and daubs of lime below, and an indented median cincture. From Espiritu Santa, New Hebrides, South Pacific.

[Photo.—G. C. Clutton.]



Potsherds or fragments of earthenware vessels dug up on the sites of ancient villages. This ware is far superior to that produced to-day. From Collingwood Bay, Papua.

[Photo.—G. C. Clutton.]

ists in their way, and their ware antedates the toby jug by many hundreds of years.

One form of water bottle was so constructed as to emit a musical note when the liquid was poured out.

The cave-dwellers and other Indians of North America engaged in pottery decoration to a remarkable extent, showing to the world that they possessed aesthetic qualities of no mean order. Here again we find conclusive evidence that pottery is derived from basket-ware. Examples have been found with basket structure impressions on the exterior of pots showing that the custom of marking the vessel with textile patterns survived long after the basket was abandoned as a support in the construction of the pot.

Some of the Papuan women are expert pottery makers. At a village near Port Moresby it is quite a local industry, and from



(Left) Cooking Pot of very dark clay, decorated with a series of chevron or zigzag lines. From Wanigera, Collingwood Bay, Papua.

(Right) Globular Pot, decorated in white on dark red background. Astrolabe Bay, Mandated Territory of New Guinea.

[Photo.—G. C. Clutton.

time immemorial this fictile ware has been made and traded westward to the Papuan Gulf where it is bartered for native sago. At Collingwood Bay on the north coast of

Papua, a varied assortment of vessels are made to-day, and on the sites of vanished villages in this area potsherds of superior workmanship have been recently unearthed. In one island only in the New Hebrides pottery is now made, namely Espiritu Santo, but traces of this culture have been found at Malekula, where the art has long been abandoned. A symmetrical pot with a conical base is manufactured in the Admiralty Group, and the northern Solomon Islands. The negro tribes of South Africa also make a variety of earthenware utensils.

Pottery is one of the most brittle works of man, but is also one of the most enduring, and after a race has disappeared the broken potsherds bear mute witness to an industry once practised by hands that are now at rest.

Examples of pottery-ware from all the localities cited in this article may be seen in the Museum galleries.

Review.

The Wild Animals of Australasia. By A. S. LE SOUEF, H. BURRELL and E. LE G. TROUGHTON. George Harrap & Co., London, 1926.

Admirably produced, this book is an important and long delayed step towards the completion of a survey of the mammals of Australia, while the popular appeal to those desirous of becoming fully acquainted with their extraordinary variety and habits, is undeniable.

Hitherto the only works attempting to assemble our mammals in one volume were Ogilby's Catalogue in 1892, which listed 209 species, Lucas and Le Souef's "The Animals of Australia," which included reptiles and amphibians and omitted some species barely mentioned many others, and Lydekker's "Marsupials and Monotremes" which included American Marsupials. These works are now obsolete; the number of species has almost doubled since Ogilby's Catalogue was issued, for this new work described over four hundred.

It is the illustrations, however, which make the strong popular appeal, coupled with the field notes, many of which are original, preceding the various sections of animals. Ogilby's Catalogue contained only six woodcuts of skulls, and Lucas and Le Souef's mammal section was mainly illustrated with photographs of mounted specimens. The new work contains 104 life-study photos, and nine text figures of special features which should commend the book to all. Its usefulness to naturalists, whether in museums, or engaged in field work, is beyond doubt, while informative chapters, including an authenticated account of the birth and development of marsupials, are of very great general interest.

Australian Museum activities are represented by a part dealing with the bats of Australia and New Guinea by E. Le G. Troughton, illustrated with interesting life-study photographs by Anthony Musgrave and drawings by Messrs. J. R. Kinghorn and G. P. Whitley.

The Sawfish.

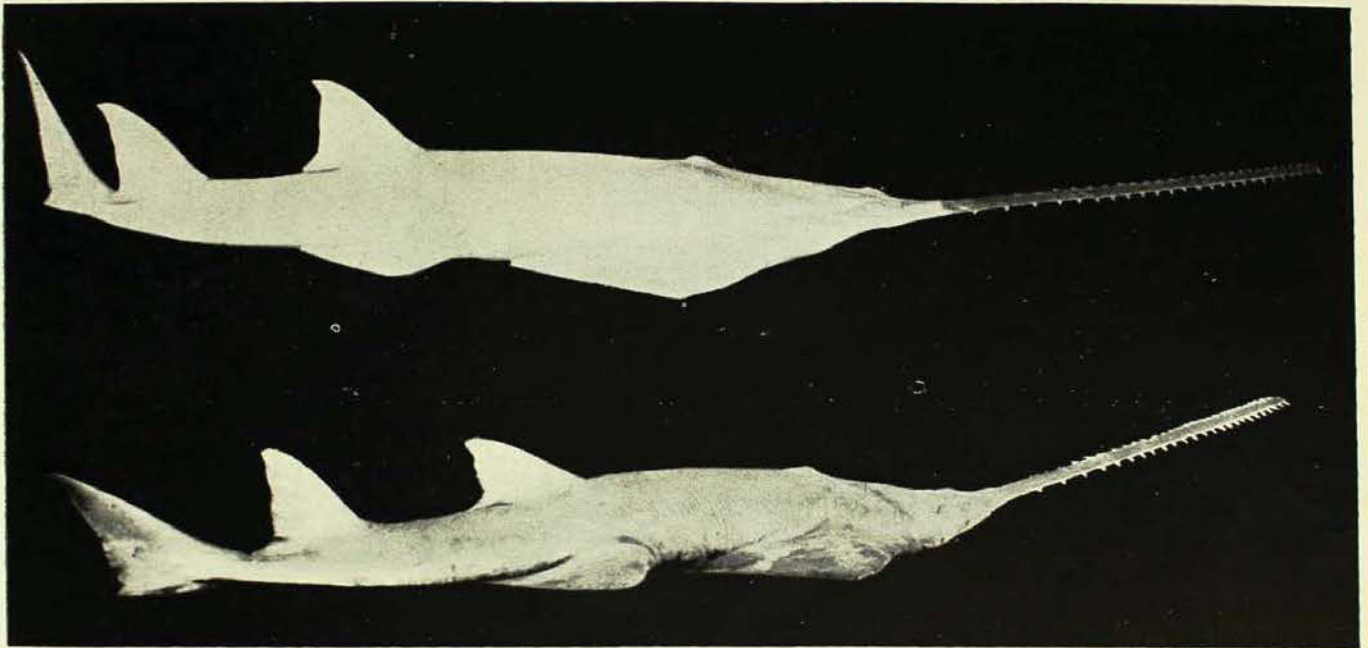
BY G. P. WHITLEY.

SYDNEY folk doubtless recollect the sawfish which alarmed bathers at Manly beach last October. It is therefore at the risk of relating a well-known story, that I pen this account of that creature, though some of the facts here set forth are not generally known.

R. Prendergast, and W. Donald, all of the Manly Life-Saving Club.

THE CAPTURE.

Some manœuvring was necessary to get the old surf-boat close to the monster, but eventually Wunsch struck with the harpoon,



The sawfish from Manly is here shown below the uncoloured cast which is being prepared for exhibition. It was sixteen feet long, including the saw.

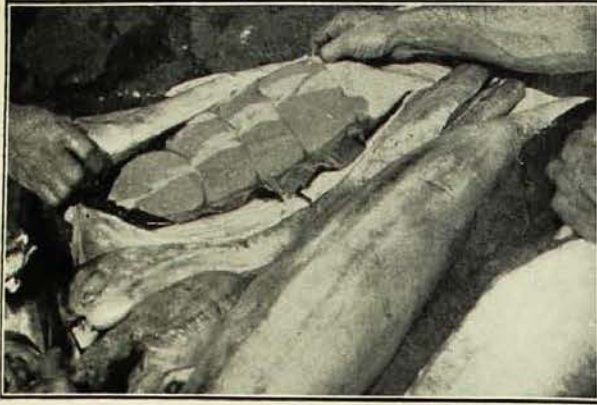
[Photo.--G. C. Clutton.]

Every surfing resort of importance in Australia has its band of life-savers, young men who voluntarily sacrifice much of their time and money to safeguard bathers from treacherous undertows or intruding sharks. The life-savers of Australia work in an entirely honorary capacity and none of their Clubs are in any way subsidised by the Government.

So, when what appeared to be a large shark was seen in the breakers at Manly on the October day in question, an alarm was given by the life-savers and surfers lost no time in leaving the water, whilst the surf-boat crew, armed only with a harpoon, launched their craft to investigate the intrusion. The names of these men are: J. Wunsch, R. Ford, E. E. Bath, S. M. Lane,

sinking it into the creature's back. This caused the sawfish, for such it was then seen to be, to lash with frenzy and even leap into the air, whilst the surf-boat and its crew were pulled right and left and appeared likely to capsize at any minute. Fortunately, however, the sawfish did not attack its aggressors, for, had it done so, they would probably have been cut to pieces. As it was, the monster's struggles subsided after a while and it was eventually towed ashore.

Here was a gift from the gods indeed and the means of a windfall for the deserving but depleted funds of the Manly Life-saving Club. The sawfish was placed in the clubhouse and a small charge for its inspection was made. In less than two days, £84 was collected and was in turn augmented by



The large, yolk, infertile, eggs of the sawfish are exposed when the uterus is laid open. On the right is the other uterus intact; it is in this structure that the young are developed.

[Photo.—G. C. Clutton.]

outside subscriptions so that a new surf-boat, the *Sawfish*, is now an accomplished result.

THE SPECIMEN.

The monster was later presented to the Museum where it arrived in excellent condition and was immediately portrayed in colours. It bore no signs of having been attacked by some marine enemy, as had been suggested to account for its unusual occurrence, neither did it appear diseased.

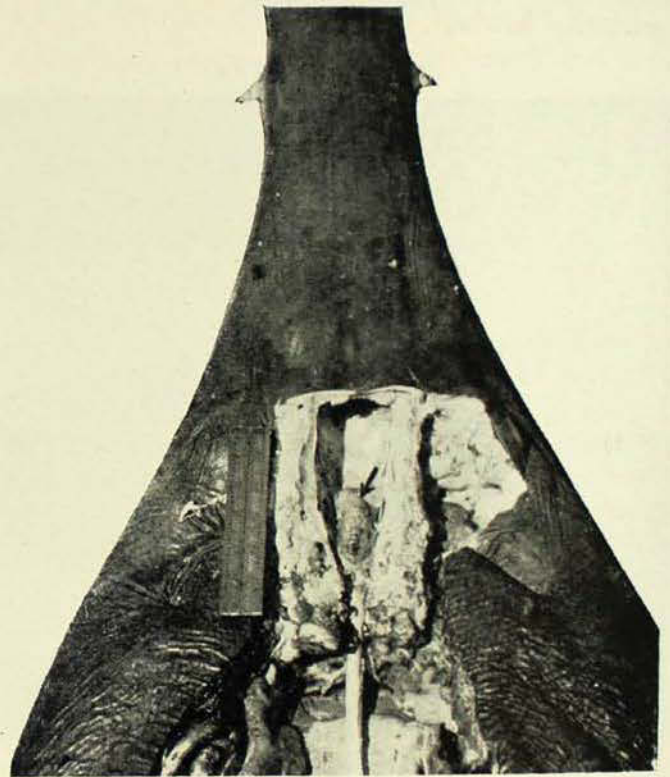
The sawfish was sixteen feet in length, including the saw, which measured four feet ten and a half inches. Its weight was not ascertained.

Four Sucking-fishes (*Echeneis naucrates*) were attached to the sawfish by the suckers on their heads which enable them to enjoy free transport without effort. Sucking-fishes must not be confused with Pilot-fishes (*Naucrates ductor*) which have no suckers on their heads, and are free-swimming, plumper fishes which accompany sharks, following them rather than leading them, for the scraps of refuse which they may obtain.

It was decided that a mounted skin of the sawfish would not look so life-like as a cast made directly from the specimen, with all its curves and folds of skin as in nature. The sawfish was therefore well oiled and ignominiously buried in a lather of moist plaster, and, from the mould thus formed, a cast was made and coloured for exhibition. The monster was then dissected. The stomach contained no food. As may be seen in the accompanying figure, several

large-yolked shell-less eggs, without young, occupied each uterus. The liver was a huge structure nearly four feet long, whilst the heart, situated near the throat, measured four inches in length with arteries an inch and a half thick. Yet all this bulky animal had been controlled by a brain two and a half inches long, resting in a thick-walled skull.

The post-mortem concluded, the carcase was given to an enterprising local firm for the production of oil, leather, and fertiliser.



The roof of the skull has been removed to show the small brain, indicated by an arrow, and the long thick spinal cord leading backward to the body of the saw-fish.

[Photo.—G. C. Clutton.]

NATURAL HISTORY.

Many have asked to what age the Sawfish attains. No answer can be given since nobody knows. Indeed, very few people have even seen a very young sawfish. It is however, known that sawfishes are viviparous, producing several young at a time, and that the saw of the young is invested with a skin to prevent laceration of the mother; as the old naturalist Klein observed, "in the embryo state the sides of the snout are as smooth as the gums of a new-born infant."

The Manly species of Sawfish, scientifically known as *Pristis zijsron* Bleeker, is found in India, Malaysia, and northern Australia,

only occasionally being found as far south as Sydney. This sawfish lives in estuaries and harbours, sometimes even entering fresh water, where, unless feeding, it moves slowly along the bottom. The famous explorer Leichhardt¹ has recorded the finding of one, far from the sea, in the Lynd River, Queensland, and there is a specimen in the Australian Museum from the Parramatta River, New South Wales.

The Manly sawfish was not of record size; a length of at least twenty-four feet is regarded as authentic for an Australian sawfish of the same species. Another kind, caught in American waters, has been recorded as having a length of thirty-one feet and a weight of 5,700 pounds.

The saw is used with deadly effect for hacking at schools of fish, chopping and maiming them ready for the sawfish's meals. Accounts of sawfishes attacking whales are doubtless based on inaccurate observations or confusion with swordfishes. Dr. Francis Day, in his *Fishes of India*, referring to sawfishes, wrote: "Great injuries are inflicted by these fishes, which strike sideways with their formidable snouts; and although not personally a witness to the fact, I have been informed on native authority, that large ones have been known to cut a bather entirely in two. . . . At Gwadur, on the Meckran coast, I found that the fishermen of all religions presented the saws of these fishes at a small temple, where they were hung up inside or piled round the outside. The priest was expected to pray for success in their takes and a safe return to shore. At the Andaman Islands the Aborigines wishing to make a suitable offering to Mr. Homfray,

¹*Tasm. Journ. Nat. Sci.*, vol. iii, 1849, pp. 31 and 105.

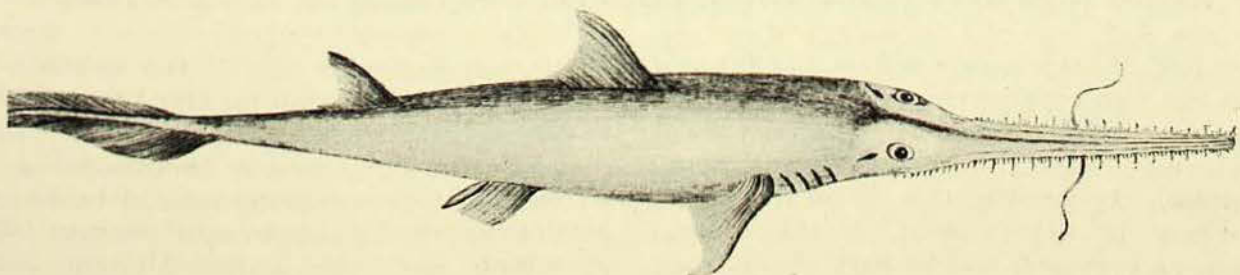
their Superintendent, attacked an enormous sawfish, which they harpooned, and eventually secured at the risk of their lives. They presented him with the rostrum."

As regards economic uses, sawfishes are too seldom caught in our waters at present to merit consideration as a commercial proposition. Like sharks, they may be utilised for the manufacture of oil, leather, and by-products. The flesh is said to be of no use as food, being very dry. The saws are, or were, used as weapons by natives in various parts of the Pacific.

SAWS AND SWORDS.

Sawfishes are, strictly speaking, rays, having gill-slits under the body, teeth arranged in "pavements," and flattened pectoral fins, though the shape of their bodies and vertical fins much resembles that of sharks. They should not be confused with Sawsharks which, though possessing saws, are smaller, have two long feelers on the snout, and, being sharks and not rays, carry their gill-slits on their sides. The first published picture of the Sawshark of Port Jackson (*Pristiophorus cirratus*) is here reproduced on account of its historic interest and for comparison with the Sawfish. This illustration is taken from John Latham's "Essay on the Various Species of Sawfish," which appeared in the Transactions of the Linnean Society of London in 1794. This species is commonly caught by the trawlers, whose decks are sometimes piled high with them, lashing their saws and squirming one over the other.

The Swordfish (*Xiphias gladius*) is another very different fish which is sometimes confused with the Sawfish. It is more closely allied to the mackerels and tunnies, however but has a long toothless sword with which it pierces its victims.



An historical portrait of the Sawshark (*Pristiophorus cirratus*) showing the tendrils on the snout and gill-slits on the sides.

[After John Latham.]

The Story of the Nototheria.

BY H. H. SCOTT, CURATOR OF THE QUEEN VICTORIA MUSEUM, LAUNCESTON.

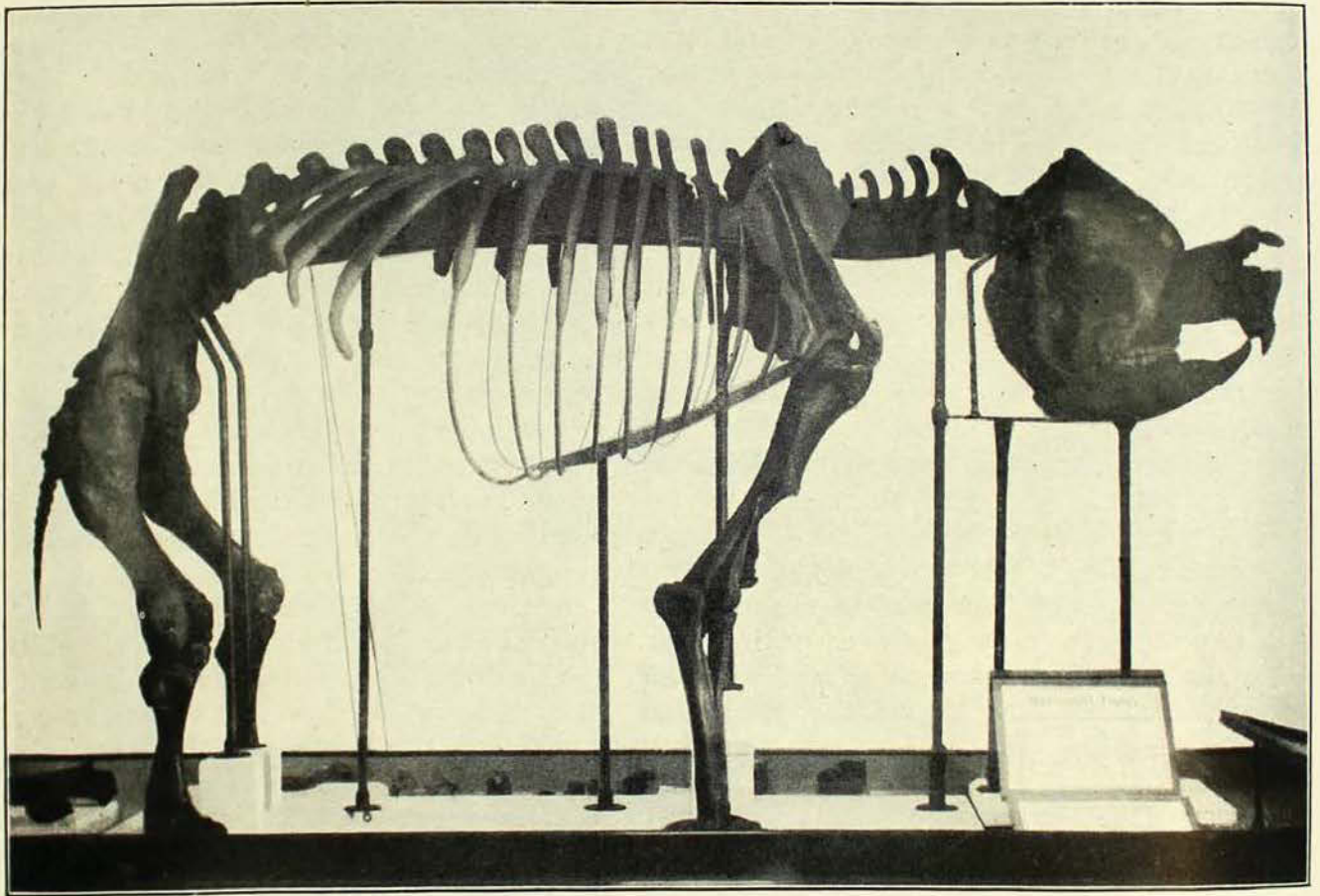
THE Nototheria were very queer marsupial animals that at one time ranged across Australia and even extended as far south as King Island and Tasmania. What these creatures looked like in life no one can say with certainty, for nobody ever saw them alive, except perhaps the aborigines who have left us no records to consult.

They were about as large as a bullock, with elongated faces and heavy lips. The

out, so that it is unsafe to say too much about it, but, as nutrient blood vessels led up to this region of the skull, it is probable that important structures were situated there.

THE FIRST DISCOVERY.

The honour of introducing the Nototheria to the world of science fell to the lot of the great comparative anatomist Sir Richard Owen, who in the year 1844 described some



Skeleton of *Notherium tasmanicum*, Scott, found in the Mowbray Swamp, north-west Tasmania, and exhibited in the Queen Victoria Museum, Launceston. This animal was as large as a bullock.

upper part of their nasal cavities was flat and table-like, and there is good reason for supposing that they had a nasal horn, which may have been used for fighting purposes. Apparently this structure varied in degree of development in the several genera and species, and in part also it may have been a sex character, and therefore more strongly evident in male animals. This part of the story is still being worked

teeth and bones at one of the meetings of the British Association for the Advancement of Science. He it was who coined the name *Nototherium*, which means "Southern beast." From that time onward scraps of bones and teeth kept coming to light until the year 1877, at which date the British Museum catalogues of fossil animals were being compiled by that tireless worker Richard Lydekker, when a revision of all known and surmised

facts was drawn up, and a special study of the resultant data was made.

Briefly the conclusion arrived at was that the Nototheria were creatures that linked up the wombat family with the gigantic extinct diprotodons and many of the bones supposed to be those of *Nototherium* supported this idea. This view of the affinities of the nototheres served as a working hypothesis until the year 1910, when a nearly complete skeleton of a *Nototherium* was found in Tasmania. Now it was possible to check many of the conclusions arrived at

more easily understood, and Longman's *Euryzygoma*, a well marked and bizarre genus of the nototherian group in which the width of the skull is greater than its length, created less surprise than it would otherwise have done. This Queensland animal had evidently adapted itself to special habits and environment, and Longman has suggested that it had cheek pouches for the storage of food.

Let us now return to the Tasmanian Nototheria. In addition to minor discoveries from the Pleistocene lake lands of North West Tasmania a second nearly perfect skeleton was found in 1920 and two lots of nototherian remains were recovered from swamp lands on King Island. These King Island remains served the useful purpose of proving that a species, *Nototherium victoriae*, named long ago by Owen but which Lydekker had thought to be merely a variety of the original species *Nototherium mitchelli*, is really distinct; it has been found on King Island and in all probability in New South Wales and Queensland also.

Such then is some part of the nototherian puzzle, but much remains to be done before we can say with certainty how all fragmentary bones and disassociated elements preserved in various museums exactly fit in, for we must not forget that every species showed male, female, and immature characters and not all of these have yet been discriminated. Were it possible to bring together the collections stored in various museums a comprehensive study and comparison could be made, but failing this our best hope lies in the possibility that more skeletons similar in point of completeness to those found in the Mowbray Swamp at Smithton in 1910 and 1920 may yet be discovered.

Taking a broad view of the nototherian family we can picture them as great lumbering animals combining in their structure characters now found in widely separated groups and inherited by the nototheres from still older and more generalized ancestors. They were still evolving when the race was cut off, and we may say that they were in some respects tapir-like, and that certain branches, which were developing nasal armature, were working on to a more aggressive stage and might ultimately have evolved into a rhinoceros-like type had extinction not overtaken the race in Pleistocene times.



Top view of the skull of *Nototherium mitchelli*, Owen, from the Darling Downs, Queensland. Note the expansion of the front of the nasal bones and the great width of the zygomatic arches, which makes the skull very broad in comparison with its length.

[Photo.—G. C. Clutton.]

by examination of previously discovered specimens, and it became manifest that many of the bones hitherto assigned to *Nototherium* did not really belong to that animal, and that the wombat-like characters which Lydekker had attributed to the *Nototherium* are not so important as he had thought, but are to be explained rather as a survival from more ancient generalized ancestors. Thus the variations exhibited by the nototherian genera and species (which have yet to be fully worked out) are

With the R.A.O.U. to the Barrington Tops District.

BY A. MUSGRAVE AND T. G. CAMPBELL.

SOME thirty miles west of the town of Dungog, lying north of Newcastle, extends a great mountain rampart which forms the southern boundary of the Mount Royal Range. Though dense sub-tropical forests clothe its base, its summit, the Barrington Tops Plateau, is a land of mists, where the snow-grass and the snow-gum flourish. Tumbling down the south and south-eastern sides of the escarpment are the streams of the Paterson, Allyn, Williams, and Chichester, which plunge through dense brushes before finding their way to the more open country and the sea. On the plateau itself rises the Barrington River meandering through marshy meadows before descending the mountains to its junction with the Manning River.

To this delectable land some members of the Royal Australasian Ornithologists' Union recently paid a week's visit, and by good fortune the writers were of the party. Our camp was established on the beautiful Williams River near Cutler's Pass, some twenty-six miles from Dungog and hard by the road which leads to the Tops, and some dozen large tents housed the thirty-six men and women who had foregathered for the purpose of studying the bird and insect life of the district. The work of organisation fell on the shoulders of Mr. Neville Cayley, local Secretary of the R.A.O.U., and he was later elected president of the camp. Mr. Albert Edwards of Salisbury was the local guide and friend to the members and the constructor of the camp.

Ours was not the first scientific party to visit the district, as an article in the AUSTRALIAN



The R.A.O.U. Camp near the Barrington Tops road.

[Photo.—A. Musgrave.]

IAN MUSEUM MAGAZINE¹ has already indicated, but on former occasions, attention had been concentrated on the Barrington Tops and very little time had been devoted to the rich life of the brushes at the foot of the Range. During our stay the ornithologists and entomologists paid but scant attention to the Tops, making only day trips, but they thoroughly explored the scrubs in every direction from the camp.

THE VEGETATION.

The vegetation in the vicinity of the camp consisted of typical eucalyptus forest, but only a short walk was necessary to take us into the scrubs. At the time of our visit it was very hot, the mercury flirting with the centuries and the district was so parched

¹Campbell—*The Australian Museum Magazine*, Vol. II., pt. 6, April-June, 1925, p. 195.



Mr. Erasmus Wilson collecting along the road to Barrington Tops, which leads through the brush.

[Photo.—A. Musgrave.]

and dry that even the brushes showed the want of rain. Notwithstanding the dryness the visitors from southern states were able to gain some conception of a North Coast brush. Perhaps the first feature that strikes the newcomer is the wealth of parasitic plants, with which the limbs and trunks of the trees are laden, few trees being without a Bird's nest, Stag's Horn, or Hare's Foot fern, or even all of these species, while nearly fifteen distinct species of epiphytic orchids were collected by Mrs. A. Messmer, one of the most active lady members of the party. Many of the trunks of the trees growing on the banks of the Williams River were particularly favoured by epiphytes and the climbing fern (*Polypodium brownii* var. *attenuatum*) occurred abundantly, sending down long riband-like leaves. Giant stinging nettles, (*Laportea gigas*) grew plentifully by the road side, wild-raspberry vines occupied large areas in open spaces in the brush, while huge Blue Gums towered over all. For years the district has been the haunt of the timber getter, and the tracks leading through the brush show

where some forest giant's trunk has been hauled out. Along these logging tracks we made many a profitable walk.

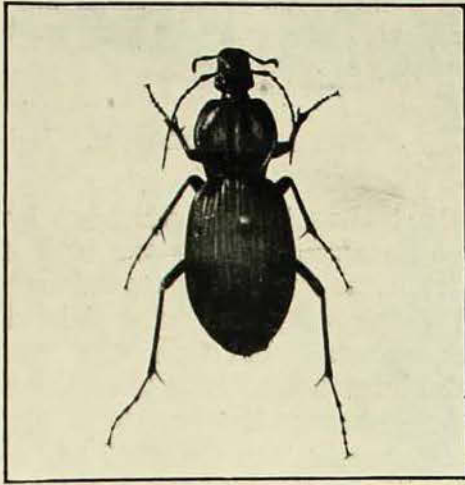
THE ENTOMOLOGISTS.

Though the trip was undertaken by most of the members to study the birds of the district, none the less seven entomologists were of the party, and being afflicted with strong entomological tendencies ourselves it is our intention to devote this article chiefly to the entomological aspect of the trip, leaving matters ornithological to be later dealt with by the birdmen of the party in their journal, *The Emu*. Some of our entomological associates had come from other States to attend the camp. South Australia was represented by its Museum entomologist, Mr. A. M. Lea, well known as a student of beetles. With him was Mr. F. G. C. Tooke, an economic entomologist from South Africa, visiting Australia for the purpose of finding a natural enemy or parasite of a *Goniapterus* weevil, introduced into the Union and defoliating the Australian eucalypts established there.

From Victoria came Mr. Erasmus Wilson, another keen collector of Coleoptera, or beetles. New South Wales was ably represented by Mr. H. J. Carter of Sydney and Mr. John Hopson of the Allyn River, both interested in Coleoptera, and both of whom accompanied the two previous scientific expeditions to the Barrington Tops district. Our two selves completed the magic number.

THE INSECTS OF THE BRUSHES.

The lack of moisture proved a big factor in limiting the extent of our captures. Under logs in the brush, insects such as ants, cockroaches, and earwigs as well as spiders, scorpions, and centipedes usually find refuge, and when a log is over-turned there is a wild scurry for safety by the numerous inhabitants of its undersurface, and unless one is quick they make good their escape. But even log-rolling, usually so profitable in dense scrubs, was attended with poor results, and many were rolled over with nothing to show for one's energies. Despite the dryness several fine carnivorous ground beetles or carabs were secured. One of these



Pamborus morbillosus, a large carnivorous ground beetle occurring under logs in the brushes.

[Photo.—A. Musgrave.]

carabs, *Pamborus morbillosus*, measuring some two inches in length occurred in moist situations in the brush. When held in the hand this insect would make repeated efforts to bury its jaws in one's flesh, and occasionally a sharp nip would bring the collector to the painful realisation that it had succeeded. This beetle occurs in the coastal areas north and south of Sydney, apparently preferring brush country like that of the North Coast and Dorrigo. Carabs are predaceous beetles which prey on the smaller forms of insect life which occur under logs in favourable seasons and localities.

FIRE-FLIES.

One of the prettiest sights witnessed during our evenings in camp was the large number of fire-flies which appeared just after dusk. These insects were to be seen like fairy lamps flitting among the trees on the edge of the open forest country, where it adjoined the belt of brush which occupies the valley along both sides of the Williams River. They were not abundant in the dense brush along the river bank. Light given off from these insects was intermittent and kept appearing and disappearing as the insects moved about. Almost every night some members of the party would go a short distance from the camp to admire these Aladdins of the insect world, while the entomologists sallied forth with nets and killing bottles, to secure specimens.

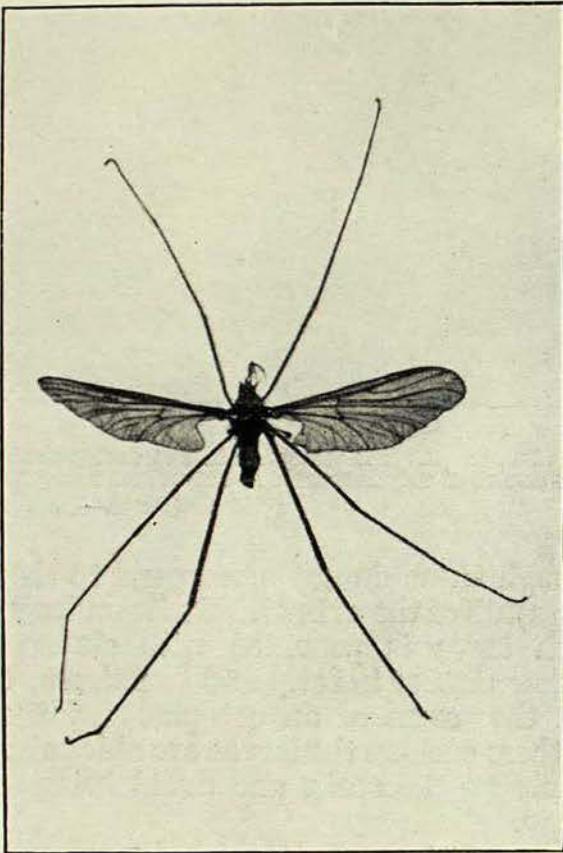
Chasing through the dark aisles of the forest with one's gaze rivetted on the elusive speck of light ahead was not without a certain element of risk, and nasty falls were often narrowly averted. Often, as one struck at a fire-fly the light would disappear, but a hurried examination of the net frequently revealed the captive insect whose tiny spark of light stabbed the darkness like some miniature beacon. Sometimes when a number of the beetles appeared close together there was not always time to remove the first captive from the net until about three or four were secured, after which the contents were transferred to the killing bottle. A close examination of captured specimens showed that the light from the luminous organ kept continually pulsating, causing it to appear and disappear at intervals of about one or two seconds. "Fire-flies" are beetles and not true flies at all; they are included in the family Malacodermidæ, the members of which are comparatively soft bodied beetles, but only a few members of the family are provided with luminous organs.

The luminous organs are situated on the undersurface at the extremity of the abdomen. Light given off from "fire-flies" and other insects is said to be caused by the rapid oxygenation of certain fat cells in the insect's body, the oxygen breaking down the cell material and causing the light to be given off. Experiments have shown that the light given off from these organs contains a very small percentage of heat. About an hour after dusk the fire-flies would begin to disappear, and in a very short time no tiny points of light would be left to stab the sombre darkness of the forest. Apparently, having completed their night's display, the insects reached the ground, where they secreted themselves in the long grass and loose soil until the time was propitious for a further display. The members of the party were indeed fortunate in being able to see such large numbers of these insects in close proximity to the camp.

AQUATIC LIFE—BEETLES.

As the brushes proved rather disappointing one's steps turned naturally to the river, which provided a variety of conditions suit-

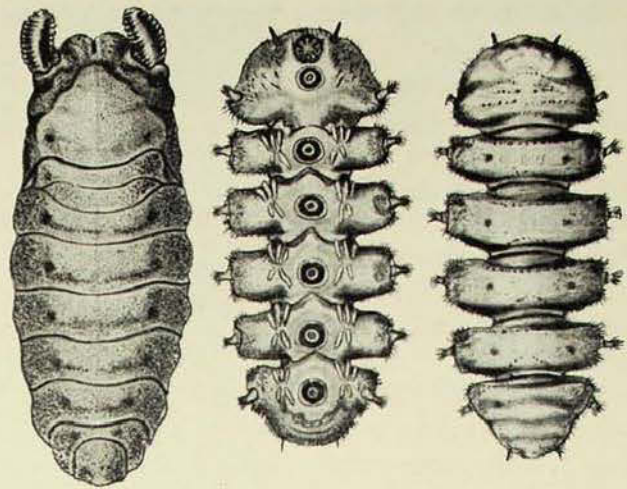
able for insect life. On the water-worn boulders in the sunlight, brilliant blue-bodied dragonflies (*Diphlebia lestooides*), momentarily rested with outspread wings or skimmed swiftly up and down the river. Tranquil pools, mirroring stag-horn-laden branches, afforded ideal retreats for the whirligigs or Gyrid Water-beetles (*Macrogyrus striolatus*)



An adult blepharocerid.

[Photo.—A. Musgrave.

who disported in considerable numbers. When undisturbed they swam rapidly around on the surface of the water, their gyrations fully justifying their name of "whirligigs." In order to secure specimens with the aid of a net, great care had to be exercised in approaching prospective victims, for, at the slightest suggestion of danger, they would immediately dive below the surface and remain on the bottom for some time, or else re-appear on the opposite side of the pool. The whole of their lives is spent in the water and they have become admirably suited to their environment. Their bodies are more or less boat-shaped and pointed at either end, while the convexity of both the upper



The life history of a blepharocerid fly. Pupa (upper surface) showing the two lamellar breathing organs; larva (undersurface) showing suckers for attachment; and larva (upper surface).

[Joyce K. Allan, del.

and lower surfaces is approximately equal. The legs are flattened at their extremities, and moving rapidly backwards and forwards through the water, act as paddles. Perhaps the most interesting feature of these beetles, is the formation of their eyes, each of which is divided into upper and lower portions. As the insects float with the body half-submerged, the lower portion of each eye is directed downwards and used for under-water vision, while the upper portions are for use above water. Whirligigs are thus able to detect the presence of enemies both above and below water with equal facility.

Along the banks of the river, where submerged sticks and leaves occurred in backwaters, we found the interesting aquatic or semi-aquatic beetles of the family Dryopidæ. In order to collect them, the submerged sticks had to be removed from the water and subjected to a close scrutiny, when the tiny black beetles could be seen slowly crawling about. Great care had to be exercised in examining the sticks or bark, for the largest of these beetles did not exceed four millimetres in length, while the majority were considerably smaller. The larvae of these Dryopid beetles, which occur in the same situation, are for the most part broad, slightly convex, and elliptical in outline, being not unlike some of the small loricates or chitons found on the sea-shore. During our stay Mr. H. J. Carter secured many new species in the Williams and Allyn Rivers.

THE FAIRIES OF THE
FALLS.

Even the waterfalls and cascades, in which it would seem that nothing could live, afforded life to the dainty net-veined midges known to naturalists as *Blepharocerids*. These resemble the crane-flies or daddy-long-legs which occur commonly in damp situations, and which look like some gigantic mosquito, but the blephs as we termed them, are at once distinguished by the fact that when at rest, the wings stand out at right angles to the axis of the body, whereas in the crane-flies the wings lie along the sides of the abdomen. At the Rocky Crossing on the Williams River, some four miles from the camp, was a series of cascades and here we secured the little black larvae and pupae and the adults. The two former were taken in the rushing water, clinging firmly to the rocks like other members of the family.

The adults were captured whilst flying in the spray of the falls, apparently seeking favourable situations to lay their eggs, and to catch them, even at a single sweep, meant a wet and dripping net. Some of these falls are only about three or four feet high, but even in normal times a considerable volume of water passes through the narrow rocky channels, so that the situation proves ideal for the insect's life cycle.

Perhaps even more interesting are the quaint-looking larvae which are attached to the rocks in the rush of the falls, where a continual supply of fresh water flows over their bodies to a depth of about half an inch or more. Apparently, in this situation the larvae are ensured of a plentiful food supply in the form of microscopic animalculae, at the same time receiving an abundance of fresh oxygen from the aerated water. Each larva is about six millimetres in length constricted at the sides into six "segments,"



The Rocky Crossing, Williams River. At the waterfall in the foreground were secured larvae, pupae, and adults of blepharocerids—net-veined midges.

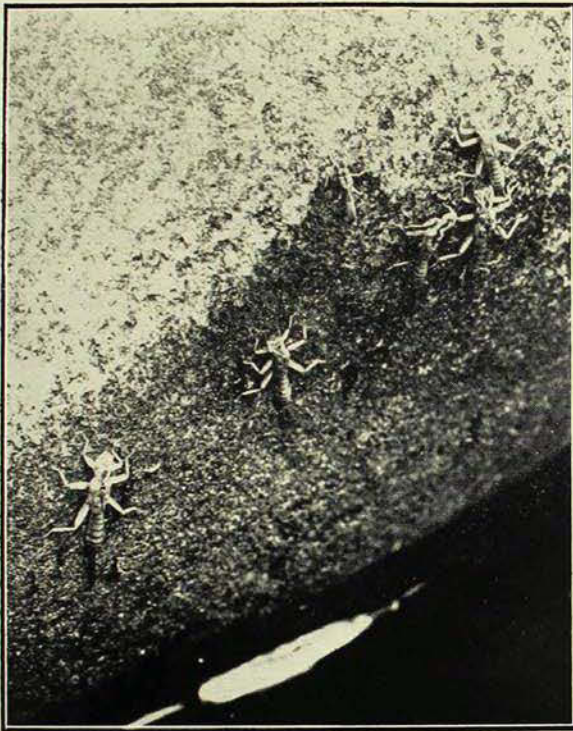
[Photo.—A. Musgrave.]

though these do not correspond to the true segments of the animal. On its undersurface each larva is provided with six suckers, rather similar in form and function to those on the arms of an octopus. By the aid of these suckers the larvae are able to adhere firmly to the rocks and avoid being swept away.

The pupae are blackish in colour, and somewhat oval in outline; the dorsal surface is convex, while the ventral surface is flat and provided with three pairs of adhesive pads, with which the pupae are able to retain their hold in the rushing tumult of spray and water. On the prothorax are situated the conspicuous breathing processes. The adults cling to the surface of rocks, with all six legs spread widely apart, and deposit their eggs separately in places continually drenched by the spray. They are remarkable for possessing a secondary net-veining in addition to the ordinary veins supporting the wings. This consists of a large number of fine creases crossing the wing membranes in all directions, forming more or less of a net-work and representing the creases formed by the folding of the wings in the pupal case.

Blepharocerids occur in favoured situations throughout a large part of the globe, but according to Dr. Tillyard some of the

world's most archaic forms are confined to South America, Tasmania, and Mount Kosciusko, New South Wales. We owe our knowledge of this extraordinary group of insects to the researches of Dr. R. J. Tillyard² and Mr. A. Tonnoir³, who have recorded many interesting facts about these insects in the references cited.



Empty larval shells of stone-flies clinging to the stones, Williams River.

[Photo.—A. Musgrave.]

STONE-FLIES.

The soft delicate-winged stone-flies or perlids occurred commonly in the larval state in the Williams River, and the stones frequently supported numbers of their empty larval cases. The adult insects were not very abundant, and, though not active fliers, were usually able to hover out of reach of a net. Several species were secured, but the commonest form was a greenish-winged insect. This species, like others of the order, has a soft integument which shrivels when dry, four very soft wings, and long flexible an-

tennae. The greenish-coloured larvæ somewhat resemble the adults, but instead of spiracles or breathing apertures, they are equipped with tracheal gills along the first five segments of the abdomen. When ready to emerge into the adult condition they crawl up the sides of the rocks for some few inches, where the outside shell splits and the adult insect emerges. They are preyed on by various aquatic animals, and frogs which we caught at night sometimes had the wings projecting from their mouths.

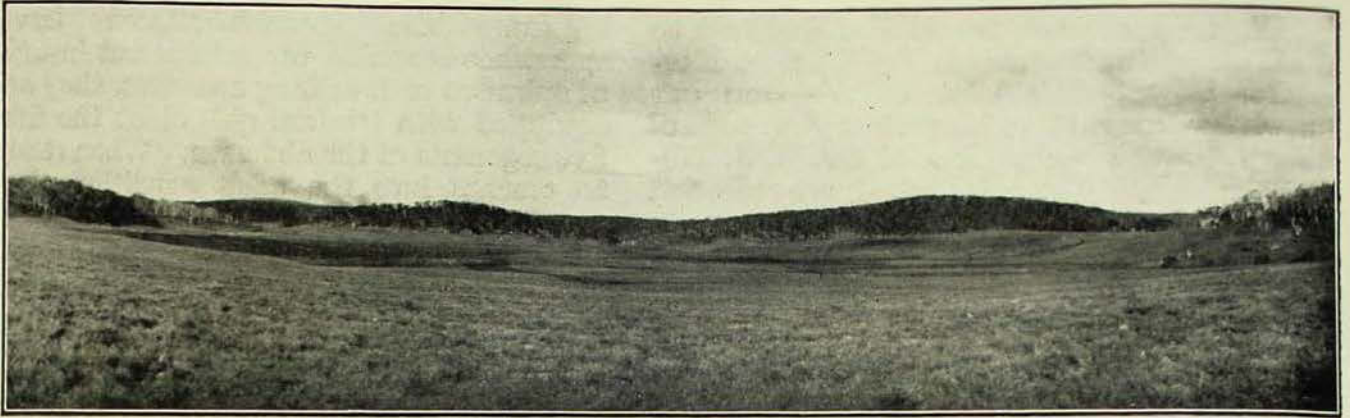
THE BARRINGTON TOPS.

One morning Mr. Edwards, Senior, led a party of which we were members to Edward's Hut on the Barrington Plateau, some 13 miles distant from the camp.

After leaving camp we found the road for the first four miles negotiable for a motor-car and we could ride abreast, but it narrowed to a mere cattle track for the rest of the journey. On emerging from the "brush" the road suddenly ascended a spur between the Williams and the Allyn Rivers, and passed through open forest country. At 2,073 feet the junction of the Salisbury-Dungog Road with the Allyn River Road was reached, a sign-board announcing the fact. Then on and up, the bridle path in places passing through beautiful forests of Box Cedar until "The Corker" was reached at 4,000 feet. This is one of the steep pinches and here the path was narrow, with rocky banks on the right, and a steep descent into the valley on the left. The scenery here was magnificent and compensated for the tiring trip, and as our panting horses paused to take breath, we saw away ahead, Carey's Peak, a bold bluff, 5,100 feet high at the head of the Allyn Valley and past which we had to travel. On the opposite side of the valley, rose the densely wooded hills dividing the Allyn from the Paterson River Valley. Then on to the Spring, 4,388 feet, where we dismounted to rest our horses, for we had ascended nearly 3,000 feet in the last five miles. Above the Spring we came to the first patch of Niggerhead Beech, *Nothofagus moorei*, a beautiful tree occurring only at altitudes above 3,500 feet; it is common on the Barrington Tops. The grade here was slight and we rode on level patches

²Tillyard—Australian Blepharoceridae (Order Diptera) Pt. I. Description of New Species, *Australian Zoologist*, II, 1922, pp. 159-172.

³Tonnoir—Australian Blepharoceridae, Pt. II, Larvae and Pupae, *op. cit.*, III, 1923, pp. 47-59, and pp. 135-142.



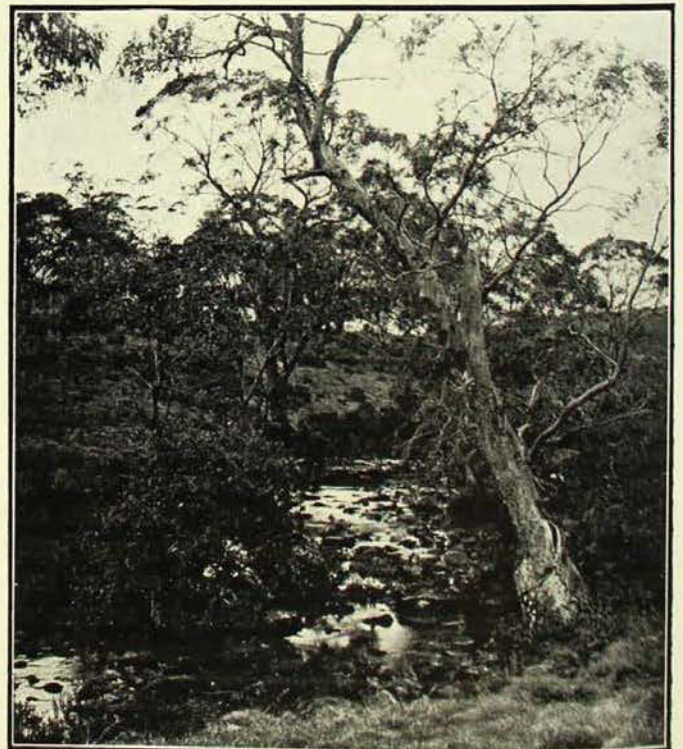
A typical scene on the Barrington Tops, near Edwards Hut, with tussocky snow-grass in the foreground, and snow-gum covered hills in the distance.

[Photo.—*L. Cavalier.*]

until the track again ascended and soon brought us among the snow-grass and snow-gums of the Tops. A detour to the edge of the precipice, gave us an opportunity to see the wonders of the Allyn Valley. Carey's Peak was now on our right and close at hand. Then we descended to the foot of the low hills which encircle the wide marshy plains through which the tributaries of the Barrington meander. These marshy plains are entirely devoid of trees, but the hills surrounding them are covered with snow-gums and other eucalypts. The forests of snow-gums are monotonous, and the wide expanses of brown meadows soon made us long for the green of the brushes. Upon the ground, under the snow-gums, lay many dead branches, and these, our guide pointed out, had been broken off by the weight of the winter snows. After a mile or two had been traversed, we at length arrived at the hut. Edwards' Hut, and Saxby's Hut some miles away, are the only habitations on this wide and bleak plateau. Near Edwards' Hut rises the Middle Barrington tributary, at an altitude of 4,800 feet. During the winter months the Tops are a waste of snow, but in the summer, during droughty periods, the cattle men drive their stock up from the lowlands, for here there is always ample water and pasturage.

Some of the party had come with the intention of spending the night at the hut and walking down to the camp the next day, and blankets had been brought up. Five accordingly spent the night on the Tops, including one of the writers (T.G.C.), and some insect collecting was done before a heavy mist came down compelling them

to take shelter. Then sleet and hail fell covering the ground with a glistening white pall, which lasted for some hours and disappeared only when the sun rose. During the night the wind which blew over the icy-cold ground whistled through every crack in the old hut. Fortunately, one of the party with a knowledge of Dorrigo Mountain conditions, had laid in a plentiful supply of firewood, and the fire in the hut was kept going until morning, though the occupants were alternately toasted and frozen back and front before morning broke, and they



The Middle Barrington tributary, Barrington Tops.

[Photo.—*A. Musgrave.*]



A panorama over the Allyn River Valley, and the distant hills which separate it from the valley of the Paterson.

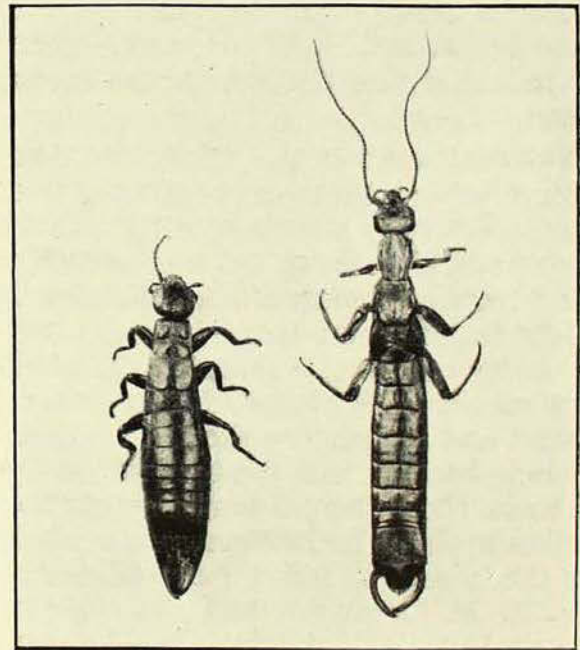
[Photo.—L. Cavalier.]

were able to get breakfast and depart from the chilling heights.

INSECT LIFE ON THE BARRINGTON TOPS.

As the season was not far enough advanced at the time of our visit, and the effects of the rigorous winter were still apparent insect life was somewhat scarce. At lower altitudes insects are usually most abundant during November and December, but on the Tops January and February appear to be the favoured months. Plant and animal life remains more or less dormant at such an altitude, and does not awake to its full vigour until late in the season.

As little insect life appeared on the wing we spent the few hours at our disposal in turning over logs. When the logs were removed many of the insects appeared to be in a state of stupor, making it easy to secure them, a marked contrast to their more active brethren of the lower brushes. One of the most interesting finds was a large, flat-bodied "ear-wig" *Apachyus australiae*, a handsome species measuring some one and a half inches in length, marked with reddish-brown, black and creamy-white markings. This species has been recently described and figured by Dr. R. J. Tillyard in his book on *The Insects of Australia and New Zealand*, in which he states that it occurs in the forests of the Dorrigo and Barrington Tops.



Two ear-wigs, *Titanolabis colossea* (left); an inhabitant of the brushes, and *Apachyus australiae* (right), which occurs on the Barrington Tops and the Dorrigo Plateau.

[Photo.—A. Musgrave.]

Numerous ants, beetles, and cockroaches were found below logs, while a small thicket of eucalypt seedlings yielded plant-bugs, beetles, and flies of various kinds. Another interesting, though by no means rare find, was a "pig" or "snout" beetle, *Leptops gladiator*, one of the true weevils. This insect measures from one-half to three-quarters of an inch in length, its shiny body being glossy black in colour, with a

broad creamy-white band down the centre of the back, and similar markings at the sides of the body. This beetle occurs during a somewhat lengthy season each year, as specimens were recently collected during October, while others were secured by the authors on two different expeditions in the months of December, January and February.

CONCLUSION.

The people of the Dungog district were extremely hospitable to us during our visit, and every facility was put at our disposal. The Barrington Tops League has its headquarters in Dungog, and its members are very keen to see a road constructed from the Dungog side to the Tops, and a health resort

similar to that of Mount Kosciusko established for the benefit of the residents of northern New South Wales. That this route is closer to Sydney and Newcastle than the alternative one on the other side of the range, from Scone via Moonan Flat, nobody would deny, and its natural beauties greatly excel those of the more gradual, but less inspiring ascent from the Scone side. The ascent from the Allyn River sign board to the summit however, is so steep that to construct a road capable of taking motor car traffic would undoubtedly be a colossal and extremely expensive undertaking. In the future, something of the kind will doubtless be accomplished, for the area would afford a fine natural winter-playground, and a cool retreat from the heat of the plains in summer.

Reviews.

Feathered Minstrels of Australia. By A. H. CHISHOLM and N. W. CAYLEY. (Simmons Limited, Sydney, 1926). Angus & Robertson. 2/-.

The first series of this little work has just been issued; three succeeding parts are promised. It is a praiseworthy attempt to rescue our birds from the undeserved reputation for songlessness which some thoughtless writer fastened on them in the long ago. In truth our bird vocalists can challenge comparison with those of any other continent, and in mimicry they excel any.

Each booklet will treat of seven species of birds, the principal songsters of the Australian bush. The letterpress is contributed by the accomplished writer and naturalist Mr. A. H. Chisholm, and the illustrations are by Mr. N. W. Cayley, well known as a bird artist. The first series includes a Lyre-Bird, Magpie, Grey Thrush, Golden Whistler, Silveryeye, and White-throated Warbler. There is a fine coloured frontispiece depicting the male Lyre Bird on its dancing mound.

Admirably produced, the booklet reflects great credit upon authors and publisher alike.

Psychology and Ethnology. By W. H. R. RIVERS, F.R.S. (Kegan Paul, Trench Trubner and Co. Ltd., 1926). From Dymock's.

The late Dr. Rivers was primarily a psychologist, but circumstances led him to

the study of ethnological problems, and both psychology and ethnology have gained thereby. Equipped with a thorough scientific training, particularly in neurology and psychology, he was also an adept at collecting and sifting data, and drawing logical conclusions therefrom.

Professor G. Elliot Smith, who contributes the preface and a valuable introduction, tells us that the volume is the outcome of a promise made to Dr. Rivers to collect and publish in book form a series of his scattered memoirs on ethnological subjects. The selection has been well made, and we are presented with some of the author's most important ideas in anthropology, sociology, psychology, and psycho-medicine. As the essays and addresses are not all of the same date we are enabled to trace the evolution of the author's thought, and to understand for instance, his conversion to the "diffusionist" point of view, namely the view that similar cultural features have not evolved independently in different areas, but are the result of contact and infiltration.

The relation between psychology and ethnology is complex but intimate. It is for the psychologist to enquire into the motives which have prompted and guided human thought, and, on the other hand, the ethnologist, by his study of racial customs and beliefs, provides material for the psychologist. Dr. Rivers, by his training and his extensive experience in field studies, which he pursued in Torres Strait, Egypt, India, Melanesia,

and other places, was enabled to make important contributions to both sciences.

His paper on "The Problems of Australian Culture" (pp. 158-166) is of special interest to us. A general belief in the simplicity of Australian culture had led to the assumption that aboriginal customs have originated in, and grown out of ideas and sentiments of a race unassisted by, and independent of external influences. Dr. Rivers shows that this belief is erroneous, and that there is far more community between Australian and Melanesian culture than had been supposed. He demonstrates that the diversity of funeral rites practised by the aborigines forbids the assumption that their culture is really simple, for there are few areas in the world where so many different modes of disposal of the dead are present.

The fact that the Tasmanians were unable to construct sea-going canoes has been urged as evidence that they must have crossed to Tasmania while it was still a peninsula of Australia. But Rivers, in his instructive essay "The Disappearance of the Useful Arts" (pp. 190-216), shows that knowledge of navigation and of canoe-making may be lost, and has been lost in at least two places in Oceania. Perhaps, therefore, the Tasmanians crossed to Tasmania after the formation of Bass Strait.

Maori Symbolism. Being an Account of the Origin, Migration, and Culture of the New Zealand Maori as recorded in certain Sacred Legends. By ETTIE A. ROUT. (Kegan Paul, Trench Trubner & Co. Ltd., London, 1926). From Dymock's.

Miss Rout, who has resided in New Zealand for thirty years, has done good service by collecting the legends of the Maori in the book before us. The evidence has been supplied mainly by Hohepa te Raka, an Arawa noble, but the authoress has endeavoured to record corroboration wherever possible.

One of the most interesting features of the book is the detailed account of health practices by which the Maori maintained their physical fitness. Maori cultivation of the body by games and dances is claimed to be an ordered system of physical education, designed to improve and preserve health and

physical strength. Unfitness was regarded by the ancient Maori as little better than a crime, and the maintenance of physical fitness was recognized as a personal and national obligation.

When the Maori arrived in New Zealand they found the islands occupied by the Moriori, a peaceful and apparently slothful race, careless of physical wellbeing and sanitation. According to the authoress the Maori took upon themselves to exterminate the Moriori so as to prevent their own deterioration by inter-marriage. "The Maori considered it a religious duty to substitute their own culture." But that affords no excuse for the invasion of the Chatham Islands (where the Moriori remnant had obtained refuge) by a Maori war party in 1835. Finding that after a thousand years of settlement these islands were only sparsely populated, the warlike and prolific Maori considered that this "justified the extermination of the Moriori as sinful people who had neglected health and race culture."

The views concerning the origin and migrations of the Maori, as set forth in this work, will not, we feel, be accepted readily by anthropologists. According to the legends of the New Zealand Maori, mankind (Maori) was divided into four races, the Brown, the Yellow, the Black, and the White Maori. The Maori originated in Assyria, the traditional descent being from I-Haka (Isaac), who was the son of A-Para-Hama (Abraham) and the son of I-Haka was Ha-Kopa (Jacob). Comment is unnecessary.

The Brown Maori, from whom the New Zealand Maori are descended, emigrated across Europe to Portugal, whence they sailed to America, settling in Mexico (Hawaikiniui), and afterwards in Peru, finally embarking on the long western voyage to New Zealand by way of Easter Island. One may be pardoned for doubting whether Maori legends can give any reliable information of events prior to the arrival in New Zealand of the seven canoes with their eight hundred passengers.

The work forms a fine tribute to a noble race, but Miss Rout is sometimes inclined to lose the sense of proportion in her intense admiration of the Maori "the bravest of all travellers, the greatest of all discoverers, and the most enduringly successful of all nation-builders."

The Insects of Australia and New Zealand.

BY R. J. TILLYARD, M.A., Sc.D. (CANTAB.),
D.Sc. (SYDNEY), F.R.S., ETC. (Angus and
Robertson, Ltd. 1926). £2 2s.

A text-book of Australian entomology has long been a desideratum, for Mr. W. W. Froggatt's *Australian Insects*, which appeared in 1906, has been out of print for many years, and, since the date of its publication, entomological knowledge has so greatly advanced that when Dr. Tillyard's book was first mooted the suggestion was cordially received. Messrs. Angus and Robertson have now splendidly produced a work, which reflects the highest credit on author, printers, and publishers. In many respects it resembles *A General Text-book of Entomology*, by A. D. Imms, M.A., D.Sc., but that author treats more with the internal anatomy and, moreover, the types selected to illustrate the different orders are of interest chiefly to European students. Dr. Tillyard's book, though dealing with the internal organisation to a certain extent, concerns itself chiefly with the external morphology of Australian and New Zealand insects, but taken in conjunction with Imms's text-book, students will find their requirements fully catered for.

The book Dr. Tillyard has prepared consists of 560 pages and 44 plates, of which eight are in colour, the work of Mrs. Tillyard. The plates in monochrome are excellent, especially those in wash. Considering the general high standard of the plates, it seems unfortunate that a better choice was not made for the frontispiece than the picture of the mutilated specimen of *Coscinocera hercules*. In addition to the plates are many fine text-figures. The work is divided into thirty chapters, two appendices, and an index. References to monographs and papers on the members of the particular order, are listed at the end of each chapter. These further enhance the value of the work, rendering it an invaluable guide to students. The book is thus seen to be of a most ambitious nature, and is a model of its kind.

Of particular interest are those groups which were formerly included in the old Linnean order Neuroptera, but which have been raised to the dignity of orders themselves, and their old order used in a more restricted sense. By a liberal use of keys and explanatory diagrams, one can now place these insects in their proper family.

The other groups are dealt with in like manner. In the large order Coleoptera, Chapter xx. (a group which we previously learn from Chapter i., page 8, includes 16,600 out of the 37,080 species recorded from Australia), Dr. Tillyard has been assisted by Mr. A. M. Lea, Entomologist to the South Australian Museum, who has himself described some hundreds of new species of Australian beetles. In Australia so many beautiful and bizarre forms are included in this order that it ranks next to the Lepidoptera (butterflies and moths) in popularity with collectors. In the book seventy-three pages and five plates are devoted to this important group, which comprises about forty-two per cent. of the known insect fauna of the world. Despite the immensity of the order and its great economic importance, only a page more is devoted to it than to the order Lepidoptera, chapter xxviii., and which comprises 72 pages and eighteen plates. This order is the second in importance, and 8000 species have been described from Australia, and these are included in sixty-six families.

In Chapter xxx. we find a splendid account of the methods employed in collecting and preserving insects. Dr. Tillyard has had such wide experience as a collector in Australia, and is equipped with such a complete knowledge of laboratory methods that the chapter is one which can be recommended as authoritative in every sense.

Systematic workers will doubtless deplore the fact that Dr. Tillyard has described new species in his book. While this in no way detracts from the value of the book as a teaching medium, nevertheless, such descriptions are out of place in a work of this nature.

The book is one which should be in the library of every nature-lover, and certainly in that of every entomologist, for it represents the last word in recent entomological research. In view of the elaborate nature of the work, and the great cost involved in the preparation of coloured plates and the excellent typography, the price asked is by no means excessive. The book should certainly meet with even greater enthusiasm than that which it evoked when Dr. Tillyard first suggested placing his knowledge of insects in accessible form, for it has in style and construction far exceeded the hopes of its most sanguine supporters.