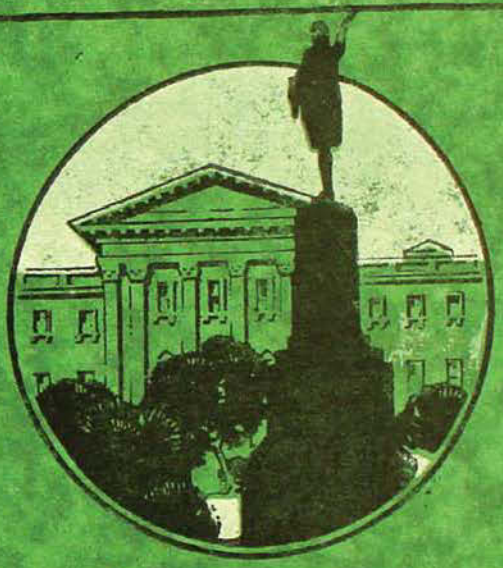
The AUSTRALIAN MUSEUM MAGAZINE

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



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THE AUSTRALIAN MUSEUM

College Street, Sydney.

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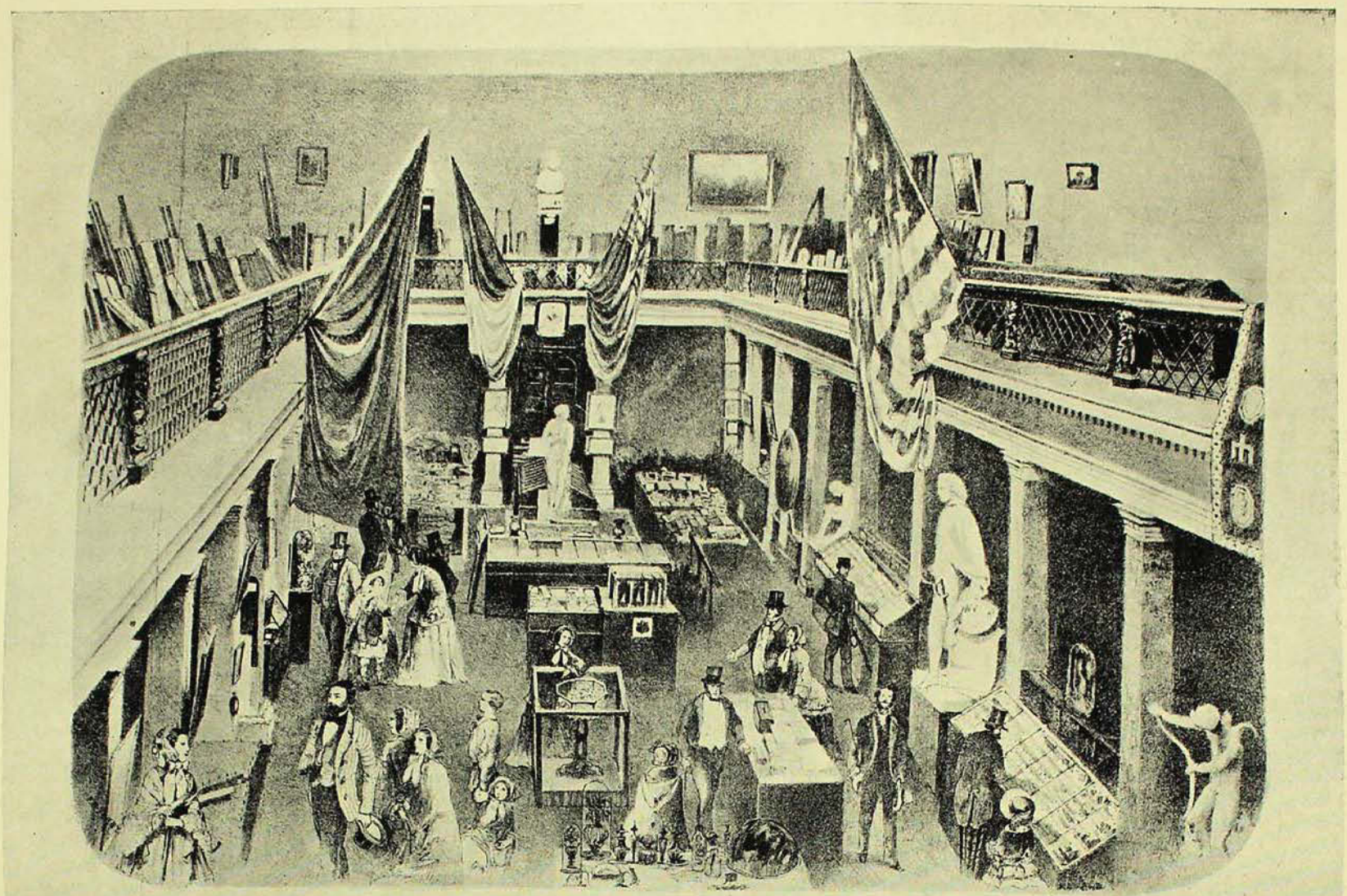

FIRST EXHIBITION HELD IN THE MUSEUM, SYDNEY, N. S. W., 1855.

TAKEN FROM A DAGUERREOTYPE BY SLOW, 141, GEORGE STREET.

THE AUSTRALIAN MUSEUM
MAGAZINE

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VOL. I. No. 6. OCTOBER, 1922.

Editorial.

MUSEUMS ANCIENT AND MODERN.

The first institution which bore the name museum, or temple of the Muses, was that founded by Ptolemy Soter at Alexandria about 300 B.C. But this was not a museum as we to-day understand, it was rather an abode of learning.

Although King Solomon and the Roman Emperor Augustus formed collections of curious objects gathered from distant parts, there is no proof of the existence of any permanent or public record of natural objects among the ancients, but it is said that Aristotle, through the generosity of Philip and Alexander, was supplied with materials for his researches. Perhaps the nearest approach to the museum as we know it were the skins of gorillas collected by Hanno from the W. Coast of Africa and placed in the temple at Carthage.

The revival of learning in the Middle Ages brought into being the collecting instinct, which had for so long remained latent, and museums which contained practically everything pertaining to the arts and sciences, a veritable multum in parvo, were the vogue. Most of these were formed by private individuals for their personal enjoyment, and were rarely associated with any systematic teaching or public benefit. In these early museums the contents were apt to be rather curiosities than objects with real scientific interest. Thus we find such curious entries in the catalogues as unicorn's horns, giants' bones, human skulls "that had never been buried" and were supposed to have marvellous medical properties, petrified toad-stools, Vicar of Bray's clogs, and other strange objects, which, however, were exhibited in accordance with the opinions of the times. Of "Mr. Salter's Collection of Curiosities" it was said in halting verse,

"Monsters of all sorts here are seen.
Strange things in nature as they grow so,
Some relics of the Sheba queen,
And fragments of the famous Bob Crusoe."

The first scientific museum actually founded was the Ashmolean Museum, formed in 1667, chiefly as the result of the labours of the Tradescants, father and son, in Virginia and northern Africa. This museum still exists at Oxford. Later, in 1753, the British Museum, the mother of modern museums, was established, Sir Hans Sloane, who was one of the early scientific explorers of America, bequeathing to the nation his collections. It is interesting to observe that both institutions were founded principally on material from the then American colonies.

Museums as scientific institutions, the exhibits specially selected and arranged for the instruction of the public and the advancement of knowledge, and, generally speaking, supported by public funds, are comparatively modern.

Now the first consideration in establishing a museum is that it should have some aim, and the next is that ample means should be forthcoming to enable it to carry out its services in a proper and creditable fashion. Buildings, cases, and exhibits alone do not constitute a museum. A highly skilled staff, suitably equipped, are an essential, for a museum requires constant and vigilant attention. It cannot stagnate; it must either go forward or decay, and the funds necessary to enable it to satisfactorily discharge its responsibilities are rarely adequate. Specimens, and series of them, are necessary to enable the naturalist to unravel the story, or problems, connected with them. And then there is the "man in the street" to be catered for. Series, though of great value, possess little interest for him, but for his especial benefit there are the group exhibits displaying objects in their natural surroundings, or habitat. Now the obtaining of these means money, and the preparation of the groups more money, but, thanks to the generosity and kindly interest of friends, there will be several new displays of this kind added to our galleries before long. To us it is a great satisfaction to find that our efforts are appreciated in such a practical fashion, and we feel sure that the exhibits thus acquired, besides conveying so much visual instruction to our visitors, will afford keen gratification to their donors.

Notes and News.

Mr. C. Hedley, Principal Keeper of Collections, returned on 16th August from a five months' trip to the Canadian Rockies. He was fortunate enough to get as far north as Alaska, where he had an opportunity of viewing the midnight sun.

Mr. A. R. McCulloch, Zoologist, left on August 29th to join Captain Frank Hurley's expedition to New Guinea and the Barrier Reef. The party is well equipped for scientific work, and have two sea-planes at their disposal with which they hope to make an aerial survey of some little-known parts of Papua. The expedition will be absent for two or three months.

Mr. H. O. Fletcher, of the Museum staff, accompanied Mr. G. H. Halligan's expedition to Lake Eyre, and was away from 26th July till 22nd August. It was the intention of the party to launch a boat on the lake from the Frome River and take soundings and collect samples of the water, and the lake deposits, but, unfortunately, the Frome was dry, and as far as the eye could reach the lake was covered with a crust of salt. Mr. Fletcher, however, made notes on the bird life in the neighbourhood of Marree, and obtained a number of interesting photographs.

Mr. A. F. Basset Hull, Honorary Ornithologist, accompanied by Mr. A. A. Livingstone, of the Department of Lower Invertebrates, made a three weeks' visit to the south coast of Queensland in the end of August and the beginning of September, and secured an extensive collection of marine invertebrates.

In the end of August a party from the Zoological Department of the University of Sydney, led by Acting-Professor L. Harrison, made a short biological survey of the Myall Lakes district and kindly invited two members of the Museum staff, Mr. A. Musgrave, Entomologist, and Mr. W. Barnes, Assistant Taxidermist, to accompany the party. A number of interesting marsupials, rodents, birds, and insects were obtained for the Museum collections.

Mr. Ernest Bryce, who has always shown a kindly interest in our doings, recently left on a world tour to places off the beaten track. With characteristic courtesy he has offered to render us any service that may be in his power.

How Savages Use The Sea Shells.

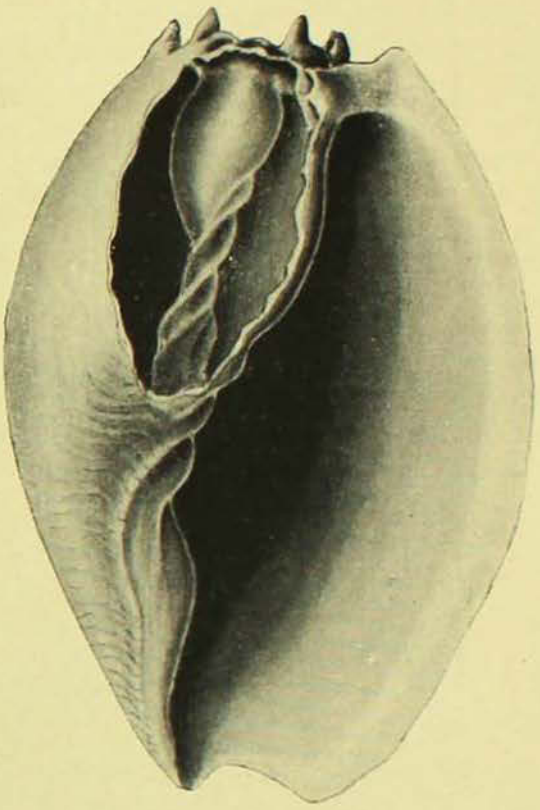
By Charles Hedley.

TO the wild man shells and shellfish were much more valuable than these are to ourselves. In the ages before metals were found, primitive man easily fashioned many useful articles from shells, and without exerting strength or skill he gathered plenty of wholesome food from cockles, mussels, oysters, whelks and limpets.

If a civilised man were so unlucky as to be wrecked on a desert island, being thrown on his own resources and living again the simple life of a savage, he would quickly realise in how many ways he could use his shells. Among the remote islands of the Pacific sea shells are still used not only for ornaments, but for tools, for pots and pans, and many other things. In the galleries of the Australian Museum are many examples of such work, the story of which we will now proceed to tell.

In the good old days the native beachcomber did very well without the trader's store. For the kindly sea gods who managed his fish supply, who brought him the dugong, who guided his turtle to the sand bank where it laid its eggs, also threw upon the beach the material for cups, plates, knives, and all that was needful for his table-ware.

Among such gifts were the giant clam, the great whelk, the helmet shell, and the pearl oyster. One of the most useful of these is the melon shell (*Cymbium flammeum*). Melon shells have been known to reach a length of eighteen inches and a breadth of twelve inches, their backs are as round and smooth as the water-melon from which they take their name, and they are tastefully painted in cream and brown and crowned with a spiral of thorns. The melon shell is at home in the little pools floored with sand that lie among the coral reefs, and, crawling lazily through the wet sand, is the large tough black slug that owns and builds it. In the simple life nothing edible is wasted, so the black slug is wrapped in banana leaves and baked with hot stones for the family breakfast. When rid of its tenant the shell comes into service. In Torres Strait, the islanders, who call it "alup," used it for boiling meat and vegetables. By cutting in it a hand grip they formed it into a bailer; east and west for a thousand miles this melon shell serves the canoe men to bail the water from a leaking craft. The Papuan warrior cut a plate from the melon shell and used it for armour to protect a vulnerable part from his enemy's spear thrust. The womerah of the Cape York Peninsula may be distinguished from every other kind of spear-thrower by the double slip of melon shell at the handle. In fact the melon shell was the handiest thing from which to carve a dish or a spoon or anything else in the crockery line.



Bailer formed from a Melon Shell (Cymbium flammium). The central twisted axis gives a grip for the sailor's hand.

Del.—Miss P. F. Clarke.

Into the upturned hollows of the Giant Clam the rain has dripped from the trees, and a store of water is thus provided for visitors to a waterless cay in Torres Strait.

The giant clam (*Tridacna gigas*) formed excellent water vessels, each valve holding several pints. The people of Torres Strait were found by the explorer, Captain Flinders, in 1802, to store water thus on waterless islands. The fishermen who camped there set rows of clam shells under the trees, and led the rain water by long strips of bark from the tree tops to the upturned shells.

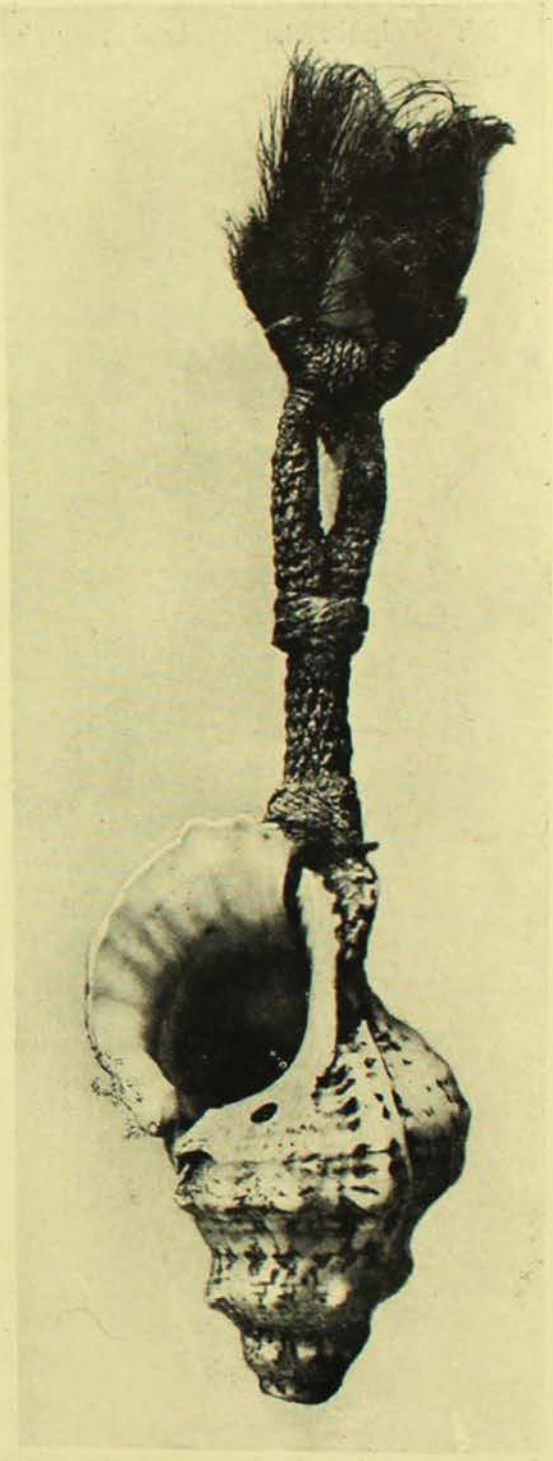
Probably the first musical instruments that were ever invented were made of shells. The most important of the trumpet shells is the great conch shell (*Charonia tritonis*). A mouth piece was made either by slicing off the tip of the spire or by piercing a hole in the side; the apex of a trumpet from New Zealand was protected by being bound with twine. At Tahiti a reed was inserted in the blow hole for a mouth piece. Some practise was required to blow these trumpets properly, but the deep-toned sound reached to a far distance. In the old times it was used as a warning against attack, to assemble the warriors for battle, or to frighten away evil spirits from the village; in modern days the missionaries employ the shell trumpet to call their congregation together for worship.

A trumpet of the Great Conch (Charonia tritonis) decorated as a battle trophy.

Photo.—G. C. Clutton.

In Hawaii the great King Kamehameha possessed a famous military bugle of this kind which had been played in the battles of many generations, and which had exercised supernatural powers in time of peace. Such a trumpet is pictured here from a specimen possessing exceptional interest, having been brought from the South Seas by Captain James Cook, the great navigator. This particular trumpet is thirteen inches long, and the embouchure, as musicians call it, of an inch in diameter is cut in the antepenultimate whorl. It is slung in meshes of flat sennit braid, and a trophy of tufts of long black hair in a stem of human bone is thrust into the axis of the shell. Grim battle souvenirs these seem to be of fallen warriors and cannibal feasts. In Madagascar, according to Dr. Sibree, this conch was called "amjombona," from the trumpeting cry of the flamingo.

Though considerably smaller than the great conch shell, the European conch



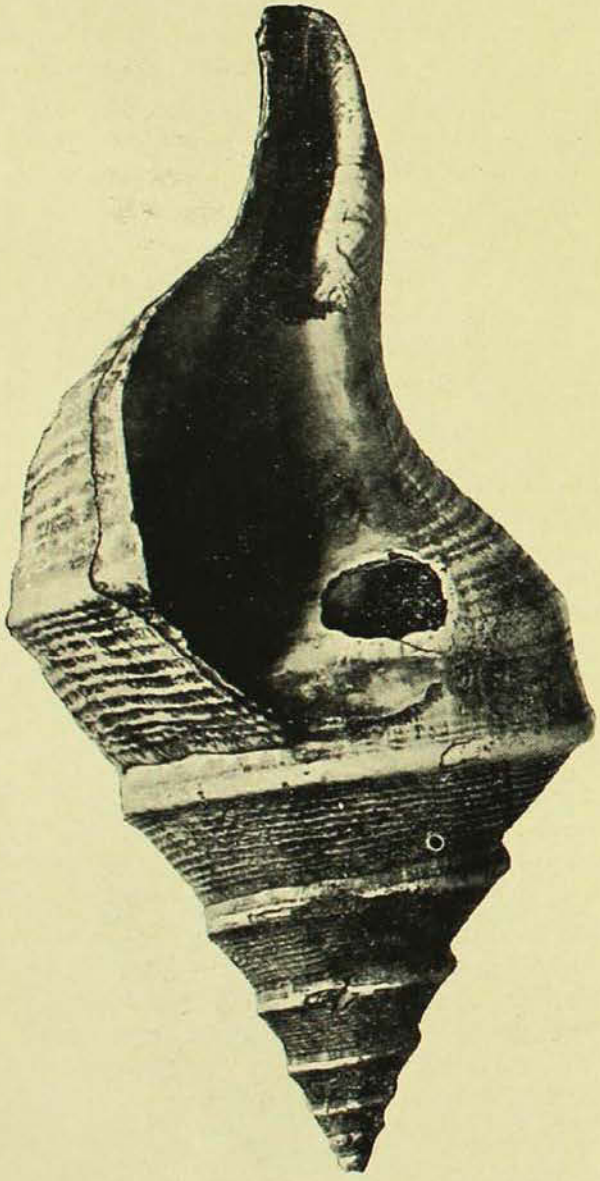
A Fijian shell trumpet made from the Giant Frog Shell (Bursa bubo), drilled with a second hole and mounted with a sennit handle.

Photo.—G. C. Clutton.

(*C. lampas*) made an effective trumpet. Probably in prehistoric times its use was general throughout the Mediterranean area. The sound which it produced has been compared to the braying of an ass. A century ago, at Nice, Verany relates, disapproval of the marriages of unpopular or ill-assorted couples was expressed by a deafening serenade of lampas trumpets. This is the shell which in groups of statuary the impish dolphin riders hold to their mouths.

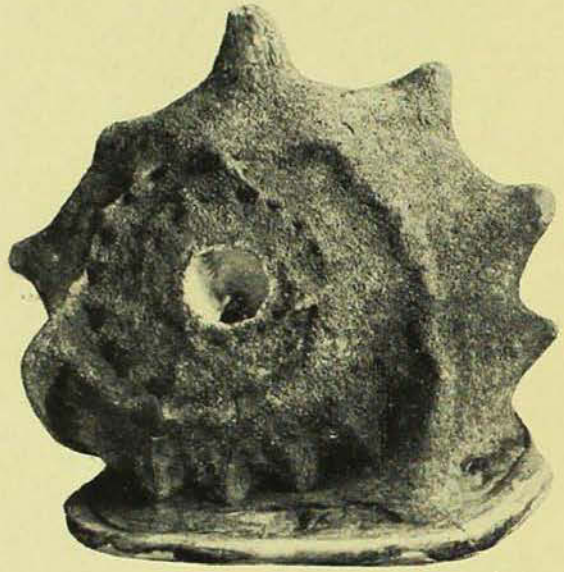
From the Fly River in New Guinea the missionary Chalmers collected a trumpet made from the giant whelk (*Megalatractus aruanus*). This shell was also employed as a water carrier as shown in the accompanying photograph.

In old Fiji, a more elaborate trumpet was made from the giant frog-shell (*Bursa bubo*). A strap of thick coir rope was fastened to the anterior end and served as a handle for the trumpeter when grasping his instrument and also to hang it up on the wall when not in use. The apex was broken off for a mouth piece and a second small hole was cut near the natural aperture. The bugler varied the notes of his call by stopping the small hole with his finger as in blowing a flute.



A water-carrier made from a Giant Whelk (Megalatractus aruanus), Wellesley Islands, Gulf of Carpentaria. In grasping the carrier the thumb fits into the hole shown in the illustration.

Photo.—T. Whitelegge.



A trumpet made from the Helmet Shell (Cassis cornuta), Funafuti, Central Pacific.

Photo.—G. C. Clutton.

A smaller whelk (*Fasciolaria filamentosa*) was made into a shell trumpet by the Papuans of Collingwood Bay.

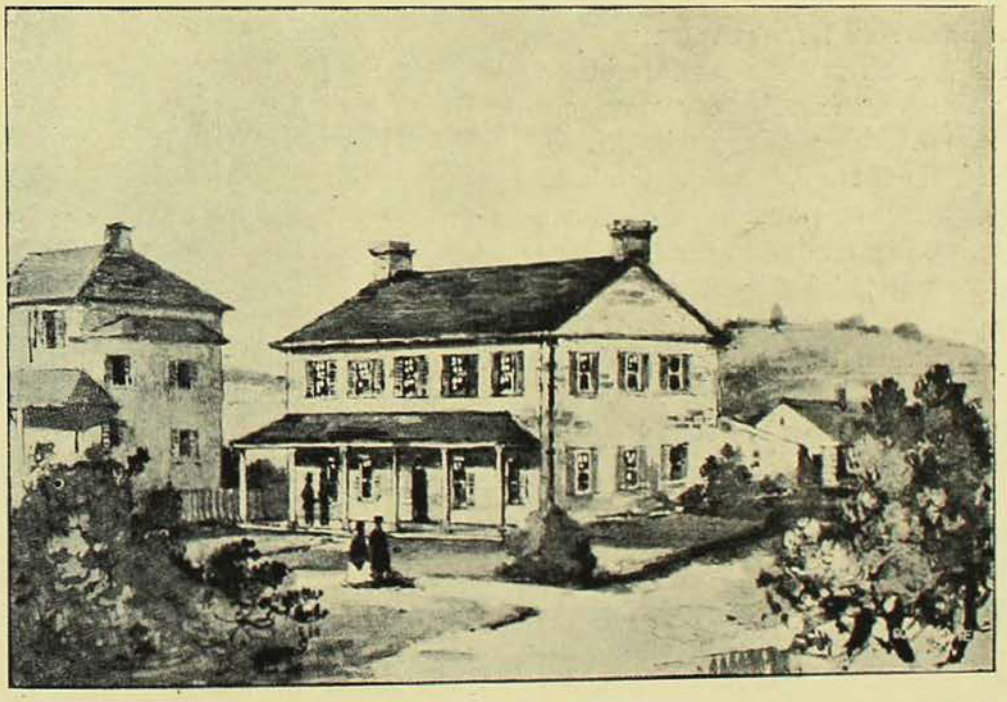
An unusual pattern of trumpet was made from the helmet shell (*Cassis cornuta*), which was perhaps used only when the large elongate conchs were not available. A helmet trumpet, which I obtained at Funafuti in the Central Pacific, is shown in an accompanying illustration. The shell is about ten inches long and the mouthpiece is cut in the centre of the spire. It was employed to assemble the villagers to a trial or other public ceremony.

The distribution of shell trumpets throughout the world has been mapped by Mr. J. Wilfrid Jackson in the *Manchester Memoirs,* vol. LX., 1916, No. 8. Australia is almost the only country in which shell trumpets do not occur, though material for their manufacture is plentiful. If the Australian aboriginals had blown shell trumpets, they might not have taught the whites to "cooee."

Brief History of the Australian Museum.*

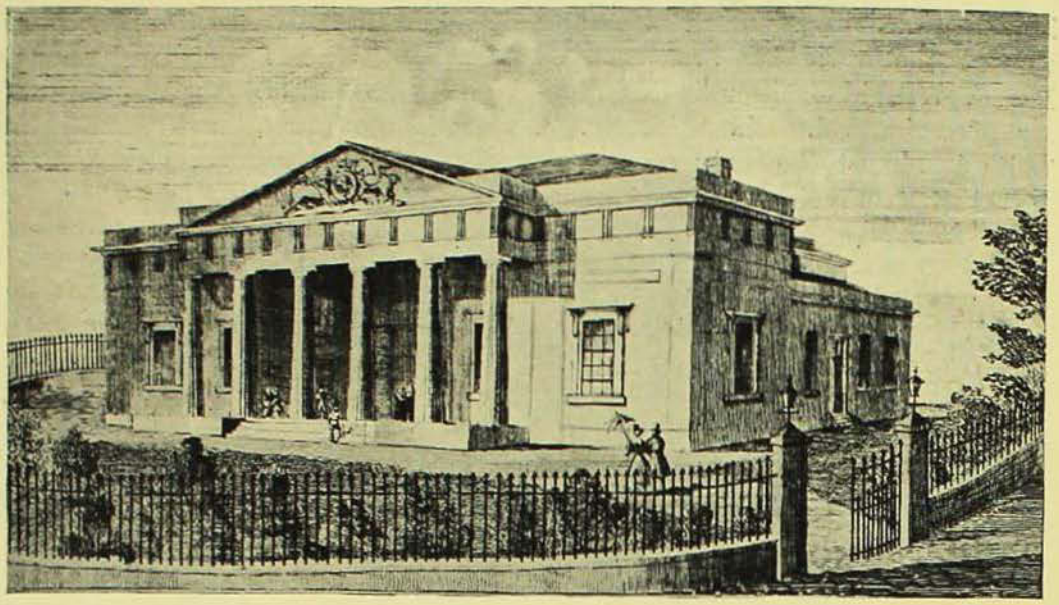
By W. A. Rainbow.

IT has been generally accepted that the Australian Museum was not founded till 1836. Such, however, is not the case. Earl Bathurst in a despatch to Governor Darling dated March 30th, 1827, stated that the advantages of establishing a "Publick Museum" had been represented to him, and though he felt some hesitation in sanctioning money for a building until estimates had been submitted he approved the expenditure of not more than £200 annually to assist the project. As a first step he consented to the appointment of Mr. W. Holmes as Zoologist "who has been well recommended to me as peculiarly fitted for it; and who will, therefore, be immediately sent out to the Colony." In January, 1828, there appeared in the "Australian Journal of Theology, Literature and Science," suggestions for "the establishment of an



The residence of the Chief Justice, in which the Colonial Museum was housed from 1836 to 1840. (After Bladen—"Public Library of N.S. Wales, Historial Notes," 1906.)

* For a fuller account of the museum's history, to the year 1868, see R. Etheridge in "Records of the Australian Museum," vol xii., 1919, p. 239.



The Court House, Woolloomooloo, now the Criminal Court, Darlinghurst, to which the museum was removed in 1840. (After Maclehose, "Picture of Sydney, 1838.")

Australian Museum," and a few months later, in the "Sydney Gazette," June 28th, 1828, it is mentioned, that "the Attorney General (A. M. Baxter, Esq.) is resolving on ways and means to start a Museum in the Colony." It is evident that the institution was founded in this year under the name "Colonial Museum," to be known later, about 1836, under its present title. The collections at this period had no permanent home and were housed in different locations at varying times. In 1830 they were contained in the Judge Advocate's Old Office where the Lands Office now stands. In 1831, with the permission of Governor Darling, two allottments in Hyde Park were selected by the Committee of the Australian Subscription Library, "it being understood that suitable provision be made for a Museum . . . which it is conceded may be united with great advantage to the Public Library." In 1835 Governor Bourke approached the Secretary of State for Colonies asking "permission to propose to the Council of this Colony the appropriation of money for the erection of a building to serve as a Library and Museum and to be placed in connection with the Sydney Botanical Gardens." In 1838, £4,000 having been voted for building a Public Library and Museum, Governor Gipps informed the Committee that the Colonial Architect had been directed to confer with them regarding "the purpose of proposing an eligible situation for the erection of an edifice suitable for those Institutions." From the material available it would seem that in 1836 both the Museum and Library occupied the late residence of Chief Justice Forbes. This was on the corner of Bridge and Gresham Streets where the Lands Office now stands. In 1840 they were transferred to what was formerly the Surveyor-General's Office in Macquarie Street, opposite what is now the Royal Mint. It was only whilst in these premises that the two institutions were together and from here the Museum migrated to the "New Court House," Woolloomooloo, now the Criminal Courts, Darlinghurst. Just when the collections went there one cannot say, but in 1849 they were transferred to the situation at present occupied. The erection of the building, begun in 1846, had been slow. It forms part of the North Wing facing Park Street. As the building approached completion there were many enquiries for the use of the "large room." Several local societies met in it, and on the arrival of R.M.S. "Chusan," inaugurating the steam mail service between the United Kingdom and Australia, it was utilised for a ball. This was on August 26th, 1852, and necessitated the closing of the Museum for a month.

Colonial Secretary's Office,
Sydney 14th June, 1836.

HIS Excellency the GOVERNOR directs it to be notified that the following Gentlemen have been appointed "A COMMITTEE OF SUPERINTENDENCE OF THE AUSTRALIAN MUSEUM AND BOTANICAL GARDEN," viz.:—

THE HONORABLE ALEXANDER M'LEAY, Esq.
SIR JOHN JAMISON, K.G.V.
PHILLIP PARKER KING, Esq.
WILLIAM MACARTHUR, Esq.
JOHN VAUGHAN THOMPSON, Esq.
CHARLES STURT, Esq.
EDWARD DEAS THOMSON, Esq.
GEORGE PORTER, Esq.
ROBERT ANDREW WAUCH, Esq., and
GEORGE M'LEAY, Esq.

By His Excellency's Command,
ALEXANDER M'LEAY.

The proclamation, published in the "Government Gazette," 1836, appointing the first committee.

In 1854 there was held in the Museum an exhibition of objects collected for the "Universal Exhibition for Agriculture and Industrial Products," Paris, 1855. This preliminary display, which was held in what is now the palaeontological room, forms the subject of the frontispiece of this issue.

The first committee controlling the Museum and Botanical Garden consisted of the Hon. Alex. Macleay, Sir John Jamieson, Capt. P. P. King, R. N., Wm. Macarthur, J. V. Thompson, Geo. Porter, Hon. E. Deas Thomson, R. A. Wauch, Geo. Macleay and Capt. C. Sturt. The committee was fortunate in having for its officers men like Dr. Geo. Bennett, author of *Gatherings* and *Wanderings*, Rev. W. B. Clarke, "Father of Australian Geology," Mr. W. S. Wall, osteologist, whose brother Mr. T. Wall, collector, perished through the calamitous ending of the Kennedy Exploring Expedition to Cape York in 1848, and Mr. G. F. Angas, author of "South Australia Illustrated," etc. Reference must be made to William Sharp Macleay, who, as a committeeman, and trustee, from 1841 till 1862 contributed so indefatigably to the success of the institution. His severance, due to ill-health, was keenly regretted by his co-trustees.

In 1853 a sub-committee appointed to consider questions of constitution and management reported in favour of the British Museum system and advised its adoption so far as possible by the Australian Museum. In the following year, 1854, the matter of a seal was considered and the design shown was adopted. This year saw the abolition of the committee of management and in its stead was set up, under an Act of Incorporation, amended in 1902, a Board of Trustees.

The seal of the Australian Museum.

In these early years there was associated with the Museum a menagerie, but in 1854 the number of animals had become too many for Mr. Wall to tend, and the collection was accordingly dis-

posed of to Messrs. Beaumont and Waller, who maintained a menagerie at Sir Joseph Banks' Hotel, Botany Bay. One of the understandings was that the exhibits at death reverted to the Trustees.

From time to time the Trustees were favoured with varying amounts to enable them to extend and equip the buildings, to which since the year 1849 additions had been made. The western wing, fronting College Street, was built during the 'Sixties.

On the retirement of Mr. Wall in 1858, Mr. S. R. Pittard, M.R.C.S., was appointed in his place. He took up his duties in 1860, but his service was short, for he died in 1862. The question of appointing his successor gave rise to much argument. Both the Government and Trustees claimed the right of appointment, which was eventually conceded to the Trustees, and in 1864 Mr. G. Krefft was appointed to be followed in 1874 by Dr. E. P. Ramsay.

In 1877 the late Mr. Thos. Walker, of Yaralla, made the generous donation of the Hargraves Collection of Shells. Other notable gifts have been the Egyptian Mummy case presented by Sir Robt. Lucas-Tooth, Bart., and Mr. Dangar's referred to below.

The year 1878 saw many changes. The galleries were made available to the public on Sunday afternoons and on weekday forenoons also. The groundwork for the establishment of the Technological Museum was laid. In 1882 the institution suffered a heavy loss in the Garden Palace Exhibition fire and the entire exhibit of ethnology, together with the nucleus of the collection intended for the projected Technological Museum, was reduced to ashes. With great diligence the Trustees, ably assisted by Dr. Ramsay, applied themselves to making a fresh start, and so successful were they that additions had to be made to the museum, and the Technological Museum was opened to the public at the close of 1883.

In 1894 the late Mr. R. Etheridge, Junr., was appointed Curator and it was during his earlier years that so much attention was given to the collecting of Cook relics and documents. In referring to this, mention should be made of the generous donation from the late Mr. F. H. Dangar, of Cook's M.S. Journal, which forms one of the institution's prominent exhibits. In 1897 the building of the South Wing was begun, and by its completion in 1910 that useful and necessary adjunct, the lecture theatre, was made available, and space was also provided for the proper display of the interesting and instructive ethnological and osteological collections.

His Excellency Sir Walter Davidson, attended by Mr. G. F. Blandy, A.D.C., was present at Dr. J. V. Danes' lecture, "Travels in North Queensland," delivered in the Museum on August 31st. The lecture was illustrated by a superb series of slides, coloured and plain.

Sir James Barrett, K.B.E., M.D., F.R.C.S., lectured on "National Parks and Memorials to Explorers" on September 13th. The lecturer explained the work of the Victorian National Parks Association and its efforts to perpetuate the memories of explorers and pioneers. The values of a national park as a reserve for our indigenous fauna and flora were also dealt with. During the lecture a fine cinema film was shown, depicting birdlife in Bass Strait.

By the death of Mr. Charles Robinson on July 13th last this institution suffered the loss of a link connecting it with the times of fifty years ago. The deceased was secretary here from 1874 to 1879, then being appointed by the late Sir Henry Parkes as secretary to the New South Wales Commission of the Philadelphia International Exhibition, and later selected to organise the Parliamentary Hansard staff, which he commanded until a few years ago. It was our pleasure to receive him a few weeks before his demise, and conduct him through the institution with which he had been so intimately associated.

Experiences and Impressions of a Collecting Trip on a Trawler.

By

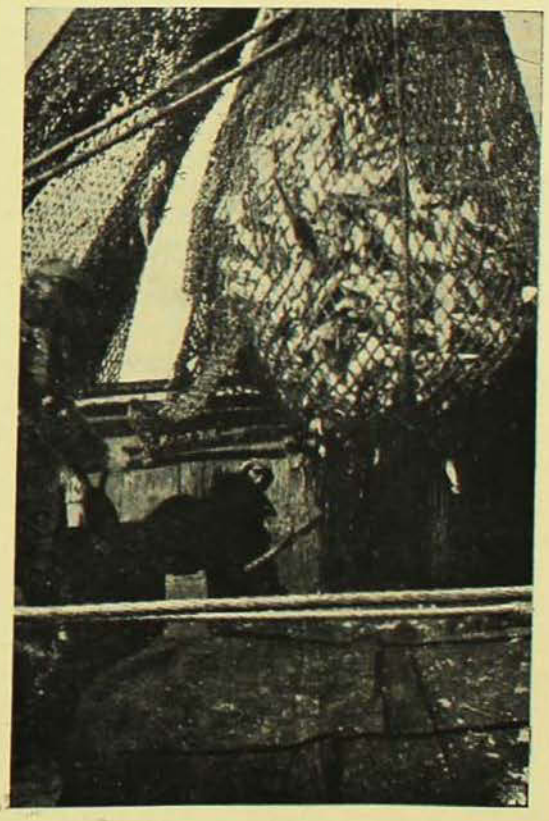
Arthur A. Livingstone.

[It is rarely that a museum is afforded opportunities of securing unlimited supplies of deep-sea fauna. In this respect the State Trawling Industry has been the means by which we are able to carry out one of the most important factors of our work. For this great privilege we owe our thanks to the recommendations of Mr. E. B. Harkness, Under Secretary, Chief Secretary's Department of New South Wales, who at all times has fully appreciated the importance of a museum's work in this direction.]

MOST of us are aware that there is a trawling industry. But just how the fish begins its journey from the sea to the table, few of us have any clear idea. It was my good fortune to learn this from actual experience with the fisher-folk upon the salt sea. My five days' collecting trip on the State Trawler "Goonambee" was so interesting and delightful that I would tell the tale to others.

But first a few words about the build and arrangement of the ship. It is substantially built in such a way as to resist the buffeting of the heaviest seas. Comfort is not studied in the construction of such a vessel, but it can venture out in any weather, which is more than can be said of many larger passenger steamers. The usual gross tonnage of a trawler is two hundred and nineteen, and the length one hundred and twenty-six feet, with a beam of twenty-six feet. At a pinch a speed of eleven knots can be attained. They have a high bow; their decks slope down amidships and rise again at the stern, and the draught is shallower for'ard than aft. Most of the centre is occupied by a sort of armoured citadel for the engines, the cabins of the skipper, the mate, and the chief engineer, and lastly the galley. The crew number twelve. In the for'ard hold is stored the fishing gear, immediately aft of which is the fish hold, with its ice store and fish wells. Adjoining this again are the coal bunkers, followed by the engine-room. Right aft and behind the engine-room is a considerable space, utilised mainly as a food store and dining-room for the crew when the weather does not permit them taking their meals above deck. There are two masts, the aftermost of which is provided with a boom supporting a sail, which is used only when the wind is favourable.

On the completion of coaling operations at noon, Sydney Heads were soon left behind, and once upon the open sea, one began to feel the heave and fall of



A rope is tied around the cod-end and this is hoisted inboard. As it hangs dripping over the well-deck for'ard, a greased rope at the bottom is quickly drawn.

Photo.—H. O. Fletcher.

the swell, which for a little time was rather disconcerting.

The chief fishing grounds of the New South Wales coast are off Norah Head, Botany Bay, Montague Island, Eden, and Gabo Island. The Botany ground is particularly favoured about the month of October, when great schools of flathead abound in its vicinity, and then one may see as many as five ships at work together. On the occasion of the present voyage, Captain Flett decided to exploit the ground off Norah Head, and our destination was reached at about five p.m. During the afternoon busy scenes had been witnessed on board. The deck-hands were getting the net ready; the winch was tested and oiled; a general inspection was made of all gear and tackle, and final preparations were made for fishing. As the engines were slowed down there began a scene of great bustle and activity, and all work seemed to be done with utmost promptitude and precision. The vessel had been skilfully manoeuvered into position for the "shooting" of the net. With three-quarter speed ahead, this was passed over the side, and the heavy otter boards attached to each end were lowered with a thunderous rattle and disappeared with a splash into the sea.

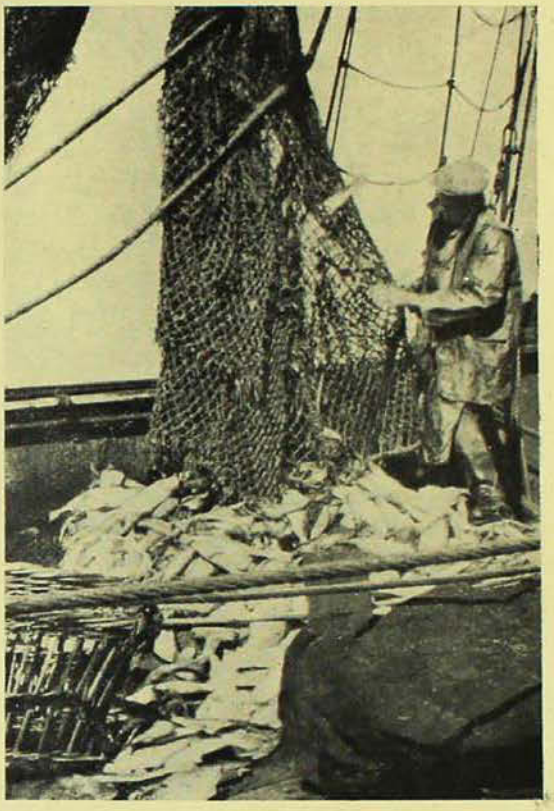
The otter trawl is quite a modern English invention, and appears in diagram very much like a conventional onion bag; the width at its mouth is about ninety feet, tapering off posteriorly to a pointed extremity known as the cod-end. This latter is protected by extra pieces of netting known as the flaps, which are attached by one edge to the outside. The otter boards or "doors" are of massive construction, measuring four feet six inches in height, ten feet in length, and four inches thick; the edges are heavily shod with iron. The action of the water on these doors is comparable to that of wind on a kite, and tends to keep them far apart, and so hold the mouth of the net open. They ride with their long edges on the bottom of the sea, and steel cables or warps are attached to rigid iron frames upon them. The warps pass inboard by way of blocks suspended from the gallows—iron structures shaped like an inverted "U." There are two of these on both port and starboard sides of the ship, one set placed for'ard, and the other aft. Only the gallows of one side, however, are in operation at once.

My attention was attracted by the rattle of the winch, paying out the warps from two separate coils attached to the drums. The winch was straining and screeching, whilst the keen eyes of the operators kept strict watch for the markings on the warps which indicated lengths of twenty-five fathoms. At each of these a temporary halt was made for the purpose of allowing the net to "lay out," thus preventing it from tangling. With the application of the brakes, the winch gradually ceased its noisy part, and held the taut warps secure. By grasping these latter at a point where they left the ship's side, one could feel the vibration caused by the dragging of the net over the sea floor forty fathoms below. This dragging considerably reduces the speed of the ship, so that she only progresses from three to four knots per hour during the period that the trawl is down.

With the completion of the duties associated with the shooting of the net, general quietness supervened, and was broken only by the monotonous droning of the engines, and intermittent jollifications emanating from the region of the galley, where most of the crew had now assembled, busy with their tea. Gradually the glow of the sun waned in the western sky, throwing a red shaft across the sea ere it faded completely. A faint wind fanned the surface of the water and seemed to bring with it night, who immediately began to spread her dusky robes over the watery waste. A dark night without moon, but with a world of stars. Leaning over the side, one saw the dark water agleam with phosphorescent flashes of light, caused by the fish which darted away from the vessel's prow. The vivid revolving light at Norah Head was in the western sky, whilst clusters of smaller lights marked the land in the further distance.

Suddenly the deck was flooded with bright light, and the clanging of the engine-room bell was heard. Within a few minutes all the ship was astir, and

the winch began its contribution to the general noise. When this was warmed up to a certain point, the pin of the block holding both warps together at the stern was freed, and hauling was



A wealth of ocean fauna floods forth.
Photo.—H. O. Fletcher.

begun. For this operation the ship is brought to a standstill with her side to the wind. The net is then hauled slowly to the side, the respective warps rising almost perpendicularly from the depths, and passing over the blocks on the gallows. When the doors are drawn hard up, the net hangs in a semicircle just clear of the ship's side, its outlines appearing strange and grotesque when viewed in the clear water. With the connection to the winch of a line attached to the centre of the groundline, this is drawn over the side. The net itself is then pulled in by hand until the cod-end, with its treasure of fish, lies floating on the surface. A rope is then tied around the cod-end, and with the aid of the winch, this is hoisted inboard. As it hangs dripping over the "pond" in the well-deck for'ard, a greased rope at the bottom is quickly drawn, and almost before the operator is able to leap aside, a wealth of ocean fauna floods forth. Then what a sight! The space is literally alive with fish, wriggling and twisting. Leather jackets (*Cantherines* spp.) grinding their teeth, disregarding the softer-skinned flathead (*Platycephalus* spp.) in their efforts to free themselves from the mass. Saw sharks (*Pristiophorus cirratus*) wave their formidable-looking, but harmless toothed snouts to and fro as they wriggle across the deck. The gaudily coloured butterfly gurnard (*Pterygotrigla polyommata*) is easily distinguished from its allies by the characteristic butterfly-like pectoral fins. Small deep sea whiting (*Sillago* sp.) with their delicate silver-sheen scales, are rudely scattered by their larger neighbours. Huge sting-rays three feet across loudly grunt their protest as the vigorous boots of the seamen bring them to light. They soon subside, however, when their business-like tails are lopped off at the base. These creatures, although repulsive in appearance, provide a dainty dish for the epicure in their wide flappers. There are three principal kinds at present on the market; these are the black ray (*Dasyatis thetidis*), the eagle ray (*Myliobatis australis*), and the sandy-back ray (*Urolophus bucculentus*). The largest of the three is the black ray, which was in great abundance. It is also common in the coastal rivers, and is often speared at night-time when swimming in the shallows. The large thorny tails of this species may be utilised for the making of excellent walking sticks. When these are weighted at one end and placed in the sun to stretch and dry, they closely resemble in appearance the well known and coveted blackthorn. The eagle or bull-head ray, well known for its depredations among the oysters in the river shallows, possesses pointed wing-like flappers, a high bull-like head rounded at the snout, and a short whip tail. It is prettily ornamented with irregular blotches of sky-blue and greenish-yellow. The sandy-back ray is of the conventional shape, and is a delicate

Baskets were passed about speedily and the different varieties of fish were gathered separately with the aid of pointed hooks.
Photo.—H. O. Fletcher.

sandy-pink in colour, with fine reticulating white lines running irregularly over the surface; like its fellows, it has a creamy-white belly. Other things are in abundance; seaweeds, and beautiful alcyonarian corals with their variety of delicate fern-like branches, being strewn about. These particular corals are grouped with the commoner ones of our acquaintance, but to the casual observer such a relationship seems to be out of place. The structure of the "animal" and its habits, however, determines their position under this head (class *Actinozoa*). They are commonly known as "soft" corals, for they are more flexible, and do not possess the same hard calcareous skeletal texture as their reef-building cousins. Multicoloured sea anemones (order *Actiniaria*) and slimy sponges (*Porifera*), dragged from their ocean moorings, lie scattered around, while myriads of sea urchins (*Phyllacanthus*) protest against their harsh treatment by slowly moving their long barbed spines. These latter quaint creatures are evidently extremely plentiful in the depths, for in every haul great numbers were brought to light from their homes at the bottom of the sea. They are armed with long stout spines which are attached by ball and socket joints to the outside of the corona or test of the animal. Their general colour is brownish-green, save for some smaller secondary spines, which are pinkish. Hermit crabs (*Clibanarius* & *Dardanus*) in their stolen shell homes shyly peep out as if to take note of their new surroundings, and hastily retreat at the first sign of interference. Sea lilies (*Ptilometra mulleri*) cling to the net, displaying their frail, red, feather-like arms, doomed to no longer sport these pretty appendages in the current of some ocean garden. Beautiful in its life colours is the "fire-brick" starfish (*Asterodiscus truncatus*), with its red, yellow, and blue mushroom-like tubercles, showing up brilliantly in the glow of the electric light. Amidst such a profusion of wealth from the deep, one is lost in admiration and wonder, and imbued with the truth expressed in the lines of the ancient rhyme.—

"What wonderful sights the diver must see,
When walking alone in the depths of the sea."

The crew soon set to work to clear the deck of the marketable portion of the catch. Baskets were passed about speedily, and the different varieties of fish were gathered separately with the aid of mounted hooks. Almost before one realised it the tally of the catch was shouted to the skipper for notation, and the fish were passed through the hatch into the ice store below. Here each kind was allotted its respective well, where alternate layers of fish and ice were accumulated as the store increased. On the completion of this work there remained only the "rubbish" to be dealt with, which consisted mainly of the small rays and sharks, saw sharks, and other inedible varieties, as well as undersized fishes of the marketable kinds. This was assisted through the scuppers with the aid of hose and broom, a rather unfortunate occurrence, since in its treatment lies the basis of much profit, as a by-product. Meantime the net had been lowered again and quietness recurred as before. With the exception of the man

Many sharks, such as this, were netted, but were cast overboard as "rubbish."
Photo.—H. O. Fletcher.

at the wheel and the engine-room staff, the crew had sought their bunks, and after safely storing the fruits of my collecting labours, I too invited slumber in my quarters aft. This was broken, however, by the occasional thunderous hammering and clanging of the taut steel warps against the ship's side.

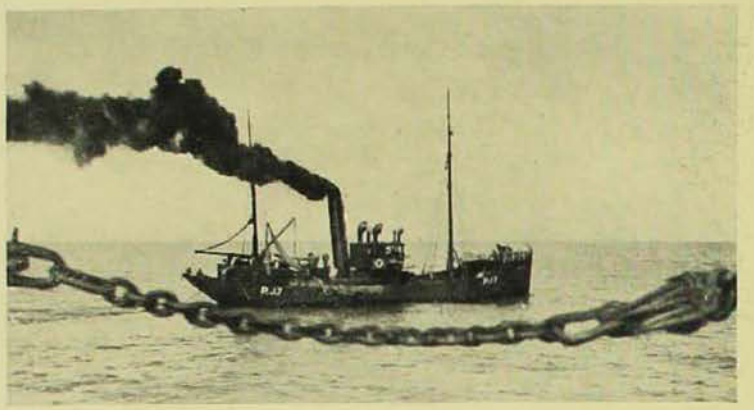
Sunrise the next morning was a memorable sight. Low down on the eastern horizon hung a dark bank of cloud, and as the sun rose, one gazed on a scene of the greatest grandeur; the whole bank was lit up with vast glittering shafts all glowing with the most enchanting hues, until the whole east was flooded with a light like molten gold. The morning broke fine and clear, presenting a vast expanse of ocean over which flew numerous sea birds. Some floated lazily on the swell close alongside, quite unmindful of the frolicking "porpoises" diving about them. The warm sunshine and the pleasant breeze had a most exhilarating effect, so I turned with pleasure to the examination of the collections secured overnight. To the naturalist the microscopic material is just as important as the larger specimens, and on a close scrutiny of seaweeds, etc., I was enabled to disengage quite a lot of minute organisms. Many sea lice (*Isopoda*), and sea fleas (*Amphipoda*), were placed with care in the collecting tubes for later research. Small conical calcareous colonies of sea mat (*Bryozoa*) were found, some sedentary and some free. These colonies often take another form, and are found encrusting either the stem or leaves of marine weeds, or may often be present on the outside of shells. Under the microscope a colony of sea mat reveals numerous primitive animals, each in its tiny cellular home, within the boundaries of which it gathers in food by the aid of delicate tentacles. The cell patterns of individual colonies are wonderfully consistent, and present a scene of exquisite architectural beauty.

In the next haul was an unwanted visitor in the form of a large grey nurse shark (*Carcharias arenarius*), a truly awesome creature when seen out of its natural element. After expending most of its energy by snapping its jaws and beating its tail on the deck, it was despatched by a well placed blow with a sledge hammer, and tossed back into the sea. Many large wobbegongs or carpet sharks (*Orectolobus devisii*), less harmful than their man-eating cousins, were taken in subsequent hauls. Their skin is beautifully marked with a reticulating pattern of brown and lilac, the design of which so resembles that of a carpet that it has earned for the species its vernacular name.

All through the days and nights following the crew shot and hauled with unlimited energy at regular intervals of four hours duration. The store of fish in the hold steadily increased, and in the end totalled about 350 baskets. Every haul, however, was not attended with equal success. Occasionally fortune deserts the crew. This may be by the fouling and consequent tearing of the net on some obstacle on the sea floor. Fortunately this does not often occur, as the regular fishing grounds are by now well known. The nature of the bottom in these localities has been carefully investigated and charted, thus enabling the helmsman to avoid isolated reefs and other submerged objects. Again, trouble may arise from the splitting of a cod-end which has become too weak to support the weight of a catch of fish. This generally occurs while the tackle is hauling it inboard. I witnessed one of these unfortunate occurrences, which caused the loss of half the catch over the ship's side. Only portion of this was regained through the

untiring efforts of the crew, and the use of long-handled landing nets requisitioned for the purpose.

The deck-hands are very experienced in the art of net mending, and most of the minor tears are attended to while the net is being drawn in by hand over the ship's side. I was greatly amazed at the rapidity with which the meshing of an irregular tear was replaced. When extensive damage is sustained, the mending is facilitated by the entire replacement of the particular "section" of the net that has been torn.



Trawling at sea.
Photo.—A. Musgrave.

MARAUDING FISHES. Mr. E. H. Rainford, a valued correspondent of the Museum, which he has supplied with many interesting specimens, sends us the following note from Bowen, Queensland. "When hunting for star-fish on the North Head banks at dead low tide, I came across a shallow depression made by the rooting of some fish, and, at the bottom of the hole, were the fragments of a large heart urchin; its spines were still moving, showing that the creature had only just been eaten. Further on I came across pieces of another still moving, and then a third, all very large with long spines. All about the banks were the fragments of the skeletons of big heart urchins, showing that the incident was not unusual. I suspected stingrays, but, continuing my wading (this was in two feet of water), I at length came on the marauders, a big mob of blunt-nosed trevally (*Trachimotus ovatus*), heads down, tails up, rooting in the sand. So intent were they that I was able to get quite close to them before they decamped. I knew that they fed largely on cake urchins, but I did not think they would tackle the sharp poisonous spines of the heart urchins."

Mr. F. W. Whitehouse, B.Sc., of the University of Queensland, who is proceeding to the University of Cambridge to do post-graduate work in Palaeontology, came to inspect our collection of Cretaceous invertebrates, and Captain G. Pitt Rivers, A.D.C. to the Governor General, made several visits to the Museum to examine the ethnological collections.

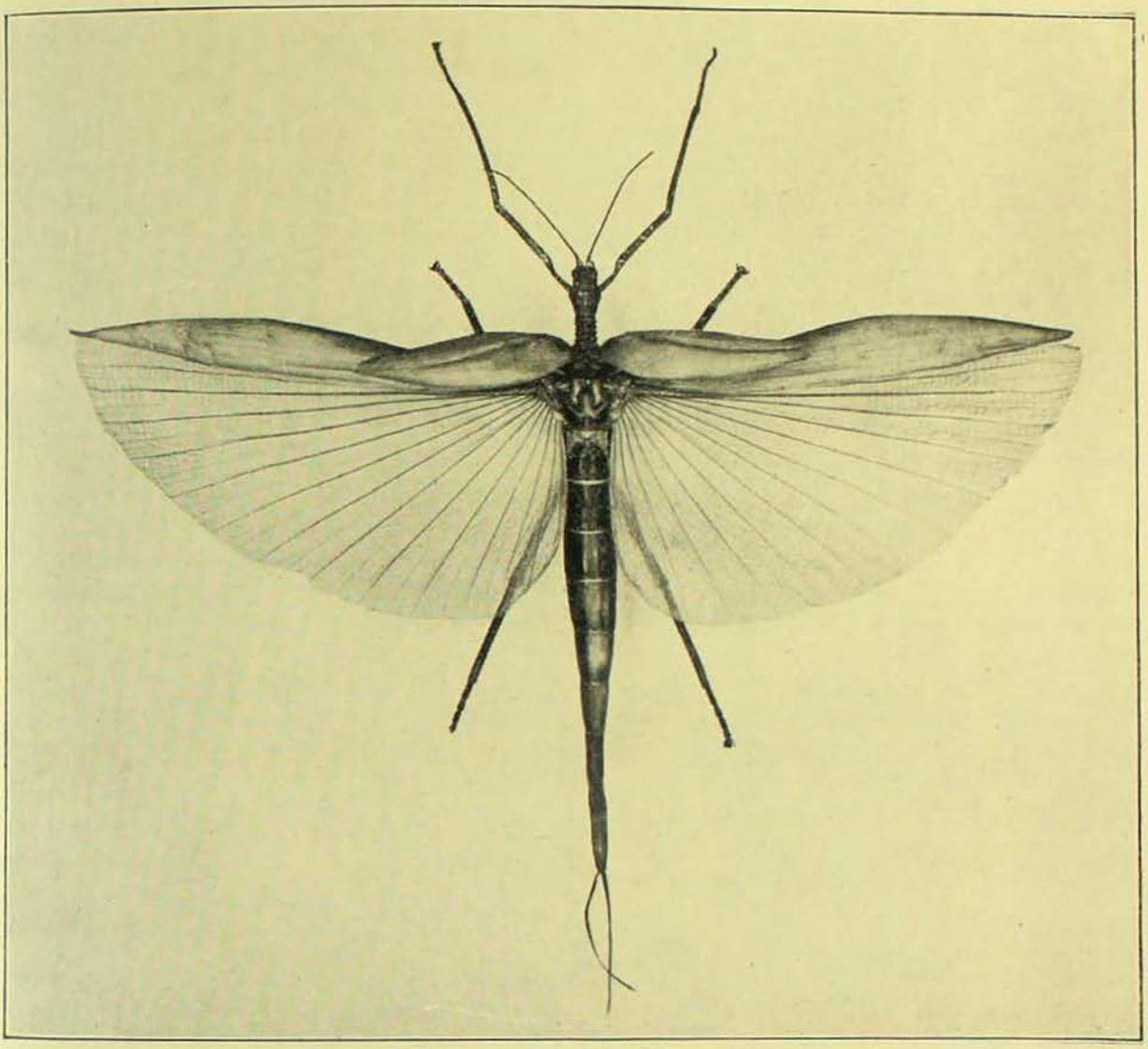
The scientific problems of the Pacific are attracting renewed attention, and recently we were glad to be able to give some assistance and advice to Mr. J. R. Baker, of the University of Oxford, who is making a biological survey of the land and fresh-water fauna of the New Hebrides on behalf of the Percy Sladen Trust, and to Mr. T. T. Barnard, of Cambridge, who intends to do research work in anthropology in the Banks Group.

Mr. Willi Fels, of Dunedin, a generous supporter of the Museum in his home town, who is on his way to England and the continent, spent several days inspecting our ethnological collections, and made arrangements for an exchange of specimens with the Dunedin Museum.

Stick and Leaf Insects.

By

ANTHONY MUSGRAVE.



The female of the Pink Winged Phasma (Podacanthus typhon). This is one of our most beautifully coloured species.

Photo.—A. Musgrave.

OF the many quaint forms of insect life forwarded from time to time to the Museum, none arouse more interest than the stick insects. Their uncanny resemblance to sticks or leaves, and their very often heavily spined bodies excite much curiosity and speculation.

Stick insects are members of the family Phasmidae, and are also popularly known as Spectre Insects or Phasmas. They are placed in the order Orthoptera, which also includes cockroaches, mantids, crickets, and long and short-horned grasshoppers. All these insects have biting mouthparts, and the forewings are usually hard and narrow, and act as wing covers (tegmina) for the large and membranous hindwings.

Many of the stick insects are claimed by their captors to be mantids. The mantids, though closely allied to the phasmas, are placed in a separate family, the Mantidae, and may always be recognised by the presence of their spiny raptorial forelegs. The mantids, too, unlike the stick insects, feed on other in-

sects, which they catch by grasping them with the spiny femur and tibia of the fore legs, which close on one another like the blades of a shears. When at rest a mantid stands semi-erect on the middle and hind pairs of legs, while the spiny fore legs are held together close to the body. This attitude, suggestive of prayer, has earned for them the title of "praying mantids."

Stick insects, however, are purely vegetarian in their diet, and some of our species are extremely voracious and do a great amount of damage to the foliage of our trees. Their attitude, too, while resting, does not suggest any religious pretence. They are chiefly remarkable for their resemblance to the branches and leaves of the plants on which they live. So as to protect themselves from the attacks of insectivorous birds and other enemies, they have evolved a form which enables them to escape detection, and this form always consists of some assimilation to their environment. Added to this mimicry of form, is a simulation of the colours of the plants on which they live; thus we find greens and browns predominating, though at the bases of the hind wings in some of our species beautiful reds and purples are to be seen. These are, however, seen only when the wings are expanded, as the wings are always folded along the sides of the body when the insect is on its food plant so that its resemblance to its surroundings may be maintained.

Phasmas readily succumb to the effects of cold, and they usually disappear after the first frosts.

STRUCTURE.

When we come to examine the structure of stick insects we find that the head is placed obliquely, whereas in the mantids the head is bent downwards. The prothorax (the segment which bears the first pair of legs) is, as a rule, shorter than the mesothorax (the part which carries the middle pair of legs). The body is usually long and slender, and the legs are long and thrust out at awkward angles from the body, so that they resemble the twigs on a branch. Some species are wingless in both sexes and are very stick-like in form, in others the wings may be present in one sex and greatly reduced in the other. In many cases, the wings are present in the male and absent in the female. The fore wings (tegmina) are usually extremely short, and, when at rest, cover only the basal area of the hind wings. The hind wings are divisible into two parts, one, the fore or costal border of the wing, being opaque and usually of the same colour as the elytra, and the other transparent, membranous and usually different in colour from the hard fore border. When at rest the membranous part is folded beneath the harder portion.

In the females there is a large, frequently boat-shaped ovipositor or egg laying organ, situated near the end of the abdomen on the ventral surface, and sometimes projecting beyond the extremity of the abdomen. In both sexes there are, in our Australian species, long flattened appendages which spring from the under side of the last dorsal segment of the abdomen. As the males of most of our Australian phasmas are rarely seen they have been only lightly touched on in this article.

LIFE HISTORY.

The young of stick insects, as in all orthopterous insects, on emerging from the egg resemble their parents, and thus a metamorphosis such as we find in butterflies is absent. The eggs are seed-shaped and have very hard shells, which serve as a capsule to protect the egg contained within. The egg capsule, too, has a lid at one end, which is pushed off by the young phasma when it emerges. The eggs are laid by the female while feeding among the leaves of the food plant, and drop to the ground where they remain for a year or more before the phasmid emerges. After death stick insects become very brittle and the antennae and legs are easily broken off, which accounts for the mutilated condition of some of the specimens figured.

Our Australian species may be placed roughly in two divisions, namely, those in which the mesothorax (that part of

the body carrying the middle legs and extending to the base of the fore legs) is short, and those in which it is long.

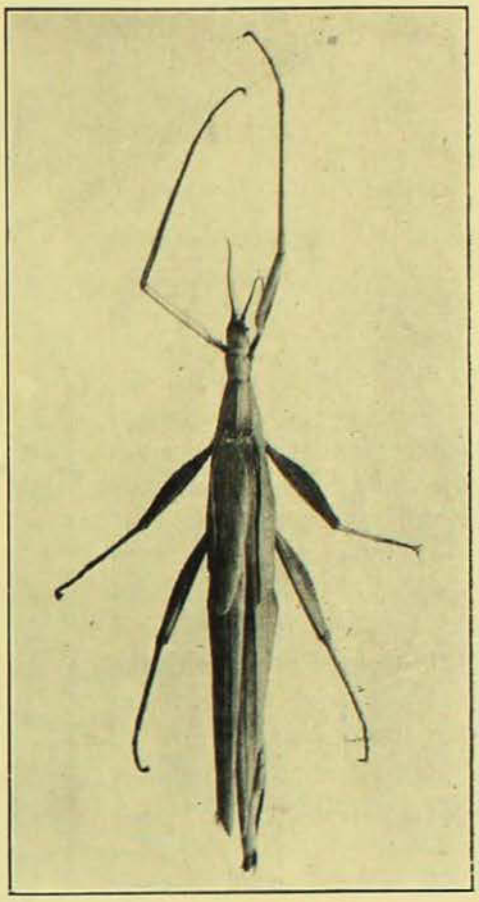
SPECIES WITH A SHORT MESOTHORAX.

The most extraordinary-looking of all our species of phasmas is, without doubt, the Spiny Leaf Insect (*Extatosoma tiaratum*). The female of this species is not uncommon, though the male is very rarely met with. She measures five inches in length, and is green in colour. The head is conical and spiny, and the legs and abdomen have broad, spiny, leaf-like expansions. The wings are reduced to mere flaps in the female but the male has well developed wings. It feeds on the foliage of eucalypts, but Mr. Froggatt, Government Entomologist, has recorded it as having been taken on the foliage of peach trees in an orchard on the Brunswick River. It occurs in Queensland and New South Wales.

The female of the Yellow-winged Spectre (*Tropidoderus childreni*), is much commoner in collections than the male. It measures from five to six inches in length, and from seven to nine inches across the expanded wings. In the thighs (femora) of the middle and hind legs are broad, flat, leaf-like expansions, which in themselves are sufficient to establish the identity of the species and also the sex, the male being without them. The colour of the body is yellow or yellow green, while the thickened parts of the wings and the keel-shaped ventral segments are green. The bases of the wings are yellow, though in some forms the colour is red or purple. The membranous part is hyaline and nearly transparent.

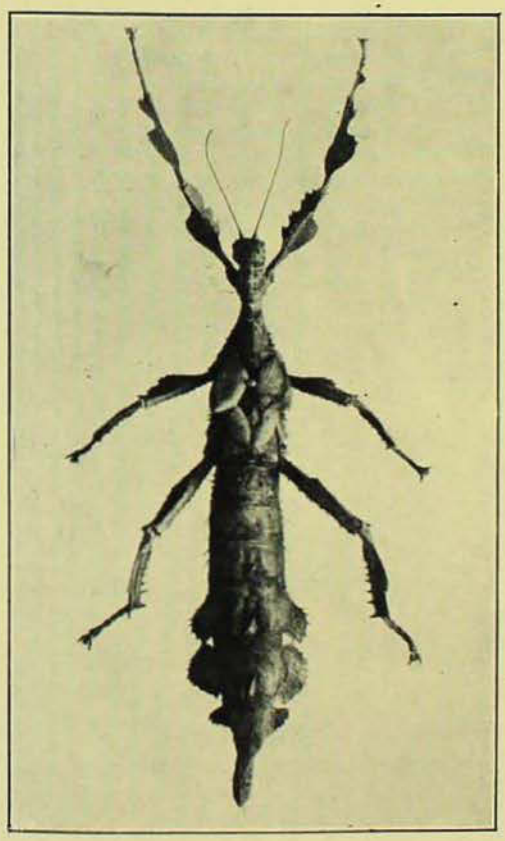
The species occurs in N.S. Wales, Victoria, and Queensland, and feeds on the foliage of gum trees.

The most beautiful examples of our Australian phasmas are included in the



The female of the Yellow Winged Spectre (Tropidoderus childreni) may easily be recognised by the leaf-like expansions on the femora of the middle and hind legs.

Photo.—G. C. Clutton.

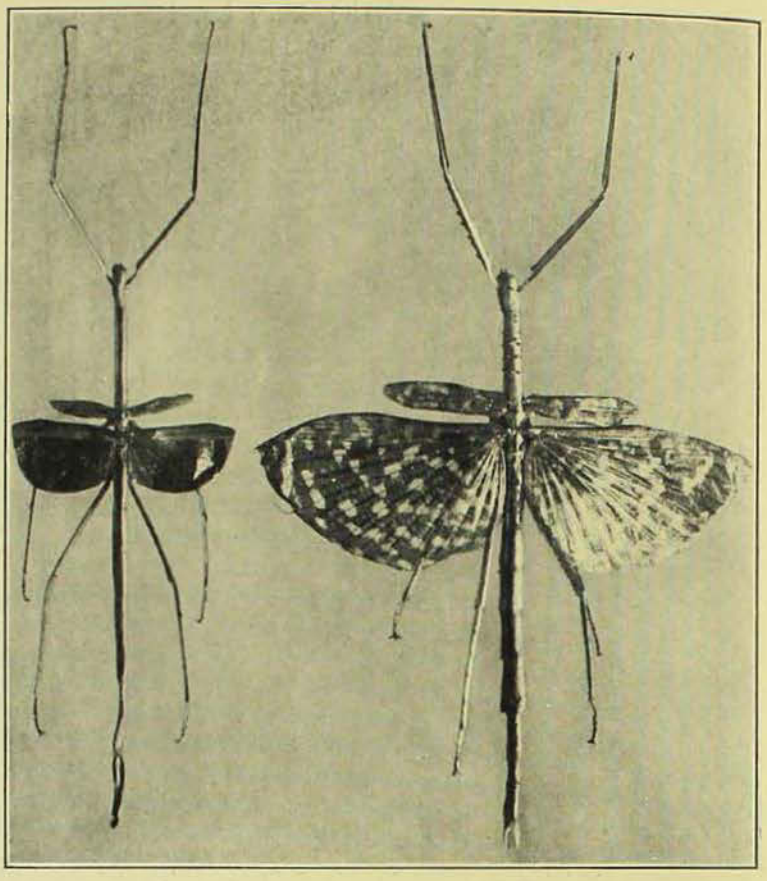


The female of the Spiny Leaf Insect (Extatosoma tiaratum).

Photo.—G. C. Clutton.

genus *Podacanthus*. These usually have the hard parts of the wings green in colour and the fore wings are generally leaf-like. The males are smaller than the females, and their abdomens are slender instead of being broad.

The female of the Pink-winged Phasma (*Podacanthus typhon*) is, perhaps, our most beautifully coloured species. When the wings are outspread the membranous portion is seen to be hyaline in colour and tinged with pink. The bases of the hard fore border of the hind wings are reddish pink, the rest being green. It measures five inches in length and eight inches across the outspread wings. It occurs in Queensland, New South Wales and Victoria.



Male (left) and female (right) of the Great Brown Phasma (Vetilia titan), our commonest species.

Photo.—A. Musgrave.

Another pink-winged form (*Podacanthus viridi-roseus*) resembles the preceding species but is smaller in size and the bases of the hind wings are violet in colour instead of reddish-pink. This violet colour, however, fades after death, and the whole of the thickened fore border of the hind-wings appears a uniform green. The female measures about four and a half inches in length and nearly seven inches across the expanded wings. It ranges from Queensland to Victoria.

The Gregarious Phasmid, or Ring-barker (*Podacanthus wilkinsoni*) is an exceptional stick insect, in that the two sexes are of the same length. They are extremely plentiful in the New England district of New South Wales, where they do great damage, denuding the eucalyptus trees of their leaves so that they appear to have died from the effects of ring-barking. This destructive habit has earned for them their vernacular name of "Ringbarkers." They are said to appear about the beginning of January and deposit their eggs towards the end of February.

The female measures about three and a half inches in length, so it is much smaller than the other members of the genus. It is light green in colour on the upper surface of the body, and almost black on the undersurface. The fore wings are light green and the fore borders of the hind wings are similarly coloured, with the exception of the bases of the wings, which are reddish orange. The membranous portion is purplish-pink.

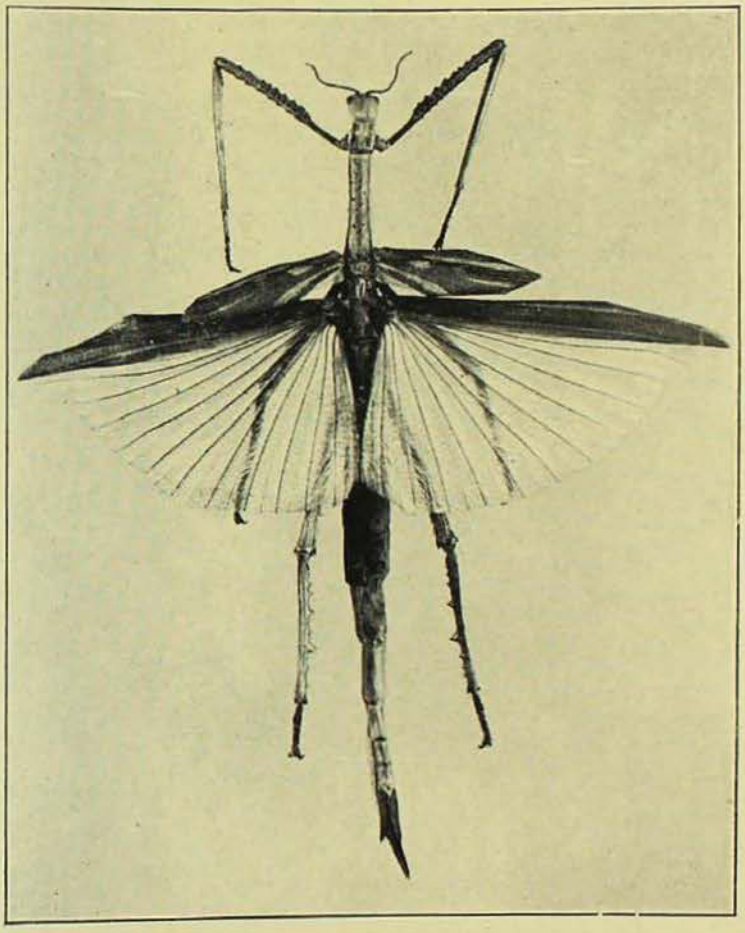
SPECIES WITH A LONG MESOTHORAX.

The species with a long mesothorax seem to resemble sticks rather than leaves as do the short thoraxed forms.

Typical of this section, and by far our commonest species, is the Great Brown Phasma, *Vetilia* (*Acrophylla*) *titan*, which occurs abundantly in the neighbourhood of Sydney and ranges from Queensland to Victoria.

The male of this species, has a body measuring about seven inches in length, while the outspread wings measure only about three inches. The wings are, therefore, reduced in size out of all proportion to the rest of the body so that they are quite useless for flight. The colour of the body is light brown, while the fore wings and foreborders of the hind wings are greenish yellow, the membranous portion of the hind wings being of a brown colour with small light brown mottlings.

The female, on the other hand, is larger in size than the male, and measures eight inches or more in length, while the measurement across the outspread wings varies from seven to eight inches. The wings are thus more strongly developed in proportion to the rest of the body than those of the male. The fore wings are greenish black, irregularly mottled with red, and a cream spot is present about the middle of the front margin. The hard fore borders of the hind wings resemble the wing covers in colour pattern, except that a red spot is present at their base while the cream spot is absent. The membranous portion of the wings is broad and spotted with large irregular white markings.



Female of our largest known stick insect (Clemacantha regale).

Photo.—A. Musgrave.

Our largest Australian stick insect is *Clemacantha regale,* which measures nine inches in length and about the same measurement across the expanded wings. It is a beautiful insect and was originally described from Narrabri, N. S. Wales, but it also occurs in Queensland, and Western Australia. Its general colour is green and yellow, the head being banded with green and pale yellow. The fore wings are green with long white stripes. The hind wings have the hard fore border bright green with white longitudinal bars; the bases of the wings are bright red and their under surface is also of a bright red colour; the membranous portion has a bluish tint and is almost transparent.

On July 19th, Mr. T. Hodge Smith lectured at the Newtown School of Arts; his subject was "The Geological History of Sydney."

Under the auspices of the Parents' and Citizens' Association, of Penrith, Mr. T. Hodge Smith, on September 14th, lectured on "The Formation of the Blue Mountains and the Coastal Plain."

"Belmont British."

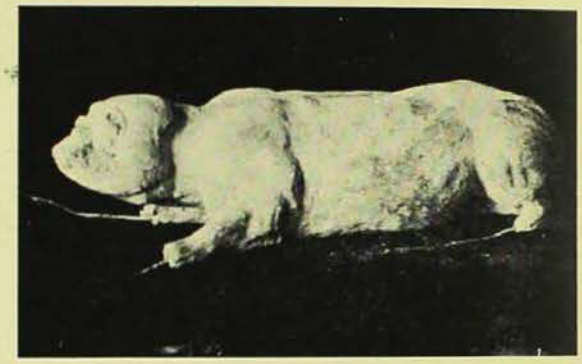
By G. C. Clutton.

TO dog fanciers "Belmont British" was known as one of the few almost faultless specimens of bull-dog breed. But the fact that he was Grand Champion for 1922 did not make this far-famed animal impervious to the sudden attack of sickness which quickly removed him from the canine world; death is no respecter of dogs. Must poor old "Belmont British" be put under the sod and forgotten as if he had been no more than a scavenging habitué of the back lanes? Perish the thought! His owner, Mr. G. Parsons, determined that his canine majesty should be preserved in all his wrinkled beauty; and so the carcase of "Belmont British" went not back to mother earth, but became the subject of earnest contemplation and tedious painstaking labour in the workshops of the Australian Museum.

Those who may take the opportunity of seeing this mounted specimen of a bull dog, now amongst the treasures of our Museum, may be interested to know something of the methods employed in carrying out the work.

The mounting was done on a papier mâchè manikin (this being the first attempt made at the Museum to mount a specimen on a manikin) and the task before the preparator was to get a "true-to-life" reproduction.

After the animal had been carefully skinned, salt and alum were rubbed on the skin and allowed to stand for a few



The exhibit completed. The small illustration depicts the manikin employed. So many pins were used to hold the wrinkles and folds in position till the skin had set, that "Belmont British" rather resembled a spiny ant-eater than the Grand Champion for 1922.

Photo.—G. C. Clutton.

days. The skin was afterwards placed in a tank of brine until ready to mount. The body was placed in the position that had been decided upon for the finished exhibit, and a mould made of plaster-of-paris—in this case a two-piece mould. When this had set the body was taken out of the mould and the latter allowed to thoroughly dry, after which a coat of shellac was placed on its inside surface.

The papier mâchè, consisting of flour paste, wood-wool, and plaster-of-paris, was then prepared. The paste and wood-wool were first mixed together, and, as required, the plaster-of-paris kneaded into the mixture. When thoroughly mixed, but left moist enough to be easily worked, it was pressed into the mould to a thickness of about 1½ inches; so that the manikin would be light, the mould was not filled up.

The papier mâchè having set and become quite hard, the mould was removed, the manikin being ready for the skin to be placed over it. Before this could be done, however, the skin had to be pared down, this making it easier to work and causing it to fit snugly over the manikin. This was done by placing the skin over a board prepared for the purpose. Sufficient of the tissue having been pared off, the skin was then placed in clean water to soak out the salt and alum, the removal of which was necessary, as the salt in damp weather would absorb moisture and affect the hair.

The placing of the skin on the manikin was a difficult and tedious task, requiring an unbroken sitting of nearly fifteen hours. The work had to be completed in one sitting, as the skin must not be allowed to dry.

The skin having been placed in position and sewn up, the preparator's attention was then turned to the still more difficult and tedious task of getting the correct facial expression. Photographs of the animal were used, and the owner, Mr. Parsons, gave invaluable assistance in helping to perfect this part of the work. When the wrinkles were made they were kept in place by the use of pins, and not removed till the skin was dry and set, this taking a considerable time. The eyes, of course, were fixed in place at the same time.

And now "Belmont British" rests on his polished stand, looking just as he looked in real life—"A Perfect Beauty."

Paring the skin.
Photo.—G. C. Clutton.

A Useful Publication. A third edition of the "Guide to the Australian Ethnological Collection in the National Museum of Victoria," by Sir Baldwin Spencer, K.C.M.G., F.R.S., Honorary Director, has just been issued. This guide which is well illustrated, is a valuable contribution to the literature of the Australian aborigines, and a most useful work for museum purposes.

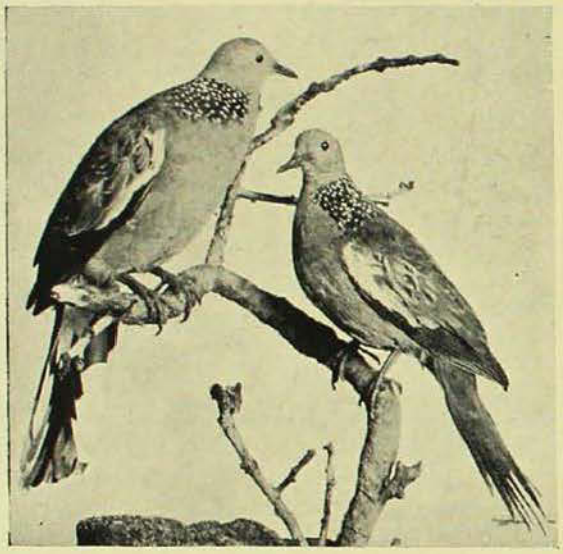
Bird Notes.

By J. R. Kinghorn.

THE INDIAN SPOTTED DOVE.

(*Turtur suratensis.*)

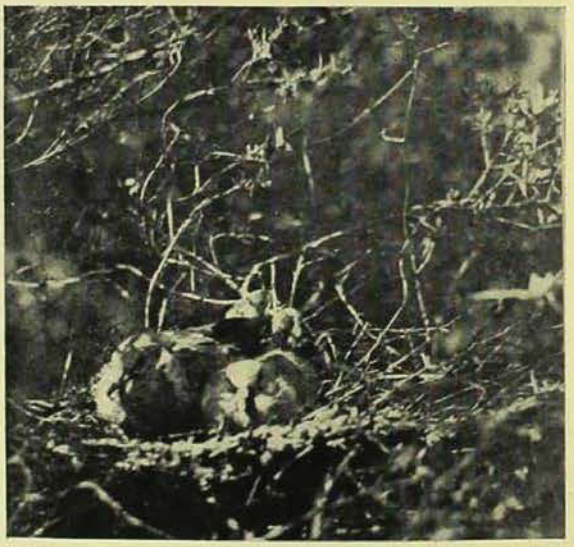
Early in December, 1921, while I was walking in the bush at the head of Woodford Bay, Lane Cove River, a rustling caused me to look up just in time to see an Indian spotted dove



The Indian Spotted Dove, Turtus suratensis, a species which has been with us for over 40 years, and one which is very well known, especially in the parks and gardens round Sydney.

Photo.—J. R. Kinghorn.

fly from its nest. This species is an introduced bird which is well known, especially round Sydney. The nest was built of twigs and leaves; it was rather flat, being about the shape and size of an ordinary tea plate, and was built about 8 feet from the ground in a tea tree bush, one of those long, slim, straight stemmed ones which grow high so as to get well up into the sunlight above the surrounding growth. It was situated immediately behind a Christmas bush in full bloom, and was therefore well within view of any persons picking this much sought after table decoration, the beauty of which completely held the attention of such persons; a lucky thing for the bird when small boys were about. I did not get another chance to visit my find until the twenty-seventh of the month, when I noted that there were two round white eggs in the nest, and I am sorry to say that I do not know the exact date on which they were laid. I next visited the site on 1st January, 1922, during the monsoonal weather we had been experiencing, and, much to my surprise, when the parent flew off the nest I saw two tiny, almost bare chicks, very pathetic looking creatures, with large heads, bulging, frightened eyes, and small bodies, through the skin of which was showing a mass of dark coloured quills. I was very sorry to have frightened the mother away from them as the day was very cold and rainy. However,



Nest and young of the spotted dove. The young are about 10 days old and they are incompletely covered with feathers. Their colour is very mottled, and this, together with the effect produced by the sunlight shining on them through the twigs overhead, made it difficult to distinguish them from their surroundings.

Photo.—J. R. Kinghorn.

my little friends survived, as the photograph taken on the 9th January will show. To obtain this I had to construct a rough tripod of wood strong enough to bear my weight, as the scrub round about was of a very flimsy nature. The moment my head appeared on a level with the nest the young birds

became alarmed; one of them stood up on very shaky legs, and almost threw itself out, but I kept very still, and it soon became more composed. When they both became fully aware of my intentions they at once began to settle themselves in a comfortable pose, and made an endeavour to look pleasant. After the camera finally clicked they moved about uneasily, and I was not quite sure whether their looks indicated relief or disappointment because the "bird did not fly out."

EGG COLLECTING CONDEMNED.

That thousands of boys throughout the Commonwealth indulge in egg collecting is a fact that has lately been brought home to me in a very practical way. Boxes of eggs are being continually sent in to the Museum to be named for the owner. Most of these collections contain only one egg from each clutch, without any data or information of any sort; there are no localities given, no information as to the kind of nest, nothing beyond a bundle of eggs. In view of this such a collection is of no use at all either for a Museum or for any worker in ornithology. Very often it is impossible to name correctly many of the eggs sent in because of the absence of valuable data; for instance, several species of birds lay eggs which are almost identical in colour, shape, and size, and in such cases it is necessary to have a knowledge of the kind of nest from which they came, otherwise only guess work can be employed.

I think it necessary to write a few words condemning the deplorable destruction done to our bird fauna by the boy who persists in robbing nests. In the first place many of the birds that are robbed of their eggs are protected, at least for several months of the year, this period of protection always including the breeding season. It seems obvious, though it apparently is not to many people, that protection during the breeding season applies not only to the parents but also to the young, that they may mature without being disturbed or destroyed by man, therefore, as the nest and eggs are necessary to produce the young, anyone who robs a nest of eggs is in reality committing a breach of the *Birds and Animals Protection Act*. From the point of view of law, steps should be taken to stop this, and from a national and sentimental point of view it should be strongly condemned as a cruel sport, more often than not carried out because of a personal vanity on the part of the collector who wishes to obtain a greater number of varieties than his mate. The boy knows no better because he has never been taught, so his parents and his school teachers should impress upon him that it is not only a breach of the Act but gross cruelty. The best way is to show him something more interesting than robbing the nests, for instance he might be encouraged to take up the study of natural history; he might be shown that it is most interesting to watch a bird build, lay its eggs and hatch them out, and to watch it feeding its young. If he kept a note book in which to jot down all this information giving the complete dates of all happenings, and if he has a camera, and could make photographs from life, it would not be long before he became such a nature-loving boy that he would not only give up nest robbing, but he would find the life study so interesting and profitable that he would soon learn to protect his birds, and encourage others to do the same.

Among recent visitors from overseas were, Dr. F. H. Krenkow, of Quorn, Leicestershire, a keen entomologist, whose principal study is, however, Semitic languages; Mr. W. W. Hornell, Director of Public Instruction, Bengal, and Trustee of the Indian Museum, Calcutta; Mr. Walter C. Mead, Trustee of the Colorado Museum, Denver; Professor C. A. Chant, and Dr. Young, of the University of Toronto, Canada, accompanied by Mrs. and Miss Chant, who were on their way to Wollal, Western Australia, to observe the solar eclipse; Dr. Venkata Rau, M.A., of Madras, who is specially interested in entomology in relation to plant life, and is returning to India after a course of study in England and America.

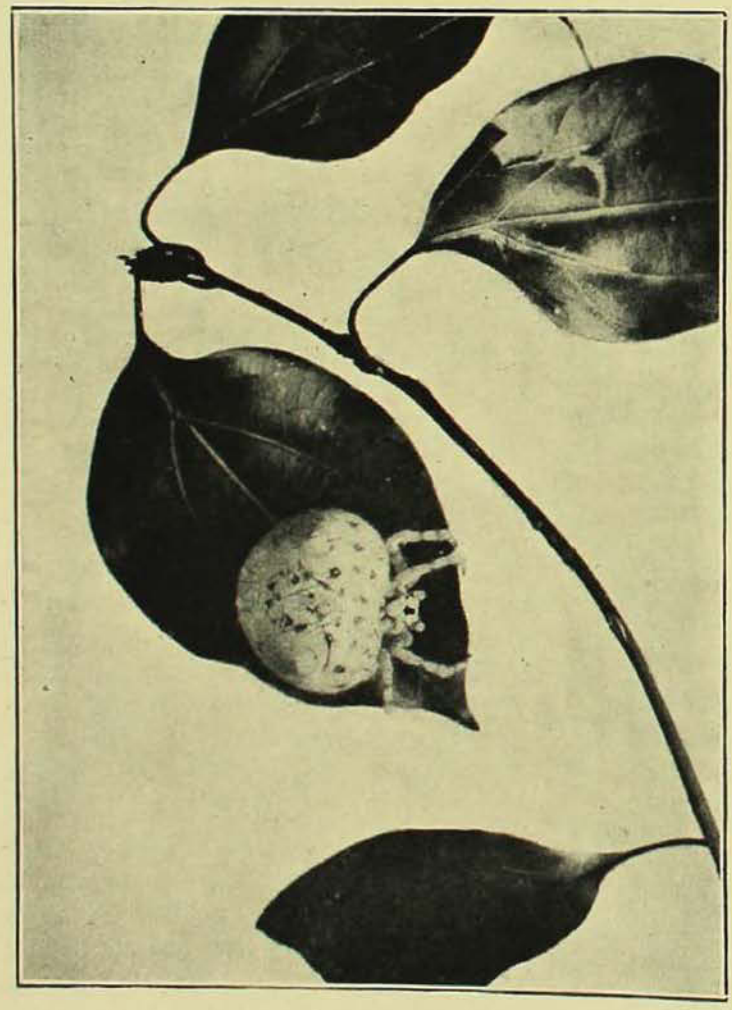
The Queen of Spinners.

By Heber A. Longman.

(Director, Queensland Museum.)

THE large and handsome spider known as *Dicrostichus magnificus*, or, to give it a popular name, the "Magnificent Spider," may well be called the Queen of Spinners. The body of this spider is cream-coloured above, with darker vermiculations and two prominent yellow tubercles, and near the front is a mosaic of fourteen salmon-pink spots. On the head is a dainty little turret, wine-coloured, with an alabaster base, and this supports two pairs of eyes.

This spider is not very rare in Brisbane gardens, but its discovery is usually due to the presence of its large cocoons or egg-bags. These may occasionally be found on the under side of leaves of large palms. In the daytime the spider hides in a cleverly-woven little retreat, in which it stays with its head turned away from the opening. The cocoons vary from three to four inches in length, and are about an inch in maximum diameter. Each contains an inner cocoon, which hangs centrally in the upper half of the outer envelope; it is white in colour and the texture may be compared to fine rice-paper. Within there is a quantity of loose silk surrounding the eggs. From four hundred to six hundred eggs may be present, and as each spider makes on an average six cocoons, about three thousand eggs may be laid in a season. Between the outer envelope and the inner cocoon there is a loose packing of silk, which forms a valuable elastic medium, protecting the precious freight of eggs.



The Magnificent Spider (Dicrostichus magnificus). Natural size.

Photo.—H. Hacker.

As a result of persistent watching, my wife and I have repeatedly seen the whole process of cocoon making by these spiders in our garden. The completion of a single cocoon may take from eight o'clock at night until four the next morning. First the spider slowly spins a strong vertical strand by letting herself down from her lines near the retreat. Then a tiny sheet of web is spun out from the end of this strand. After half-an-hour's work this may be seen as a filmy cloud over the spider's back, to which she, ever spinning, adds to the circumference. Then

this sheet is gathered into a bag, and into this the eggs are laid with surprising quickness, the operation taking but a few minutes. The eggs form a glistening globular mass about three-eighths of an inch in diameter, which can be easily seen through the substance of the inner cocoon at this stage. The slit in the bag through which the eggs are laid is then closed by the spider, and for over an hour work is unceasingly carried on in building up the fluffy packing around and below the inner cocoon. The great task in weaving the large outer capsule

"During the long process of spinning this outer envelope, the spider worked from top to bottom, head downwards, and then from bottom to top on the other side, head upwards. It supported itself by gripping the cocoon with its legs meanwhile. Against the light the minute silk threads issuing from the spinnerets could be seen as a shining band of conjoined lines. The legs were in no way used to manipulate the threads, but the body was moved up and down, up and down, making a stroke of about three-eighths of an inch. One touch of the protruding spinnerets on the cocoon

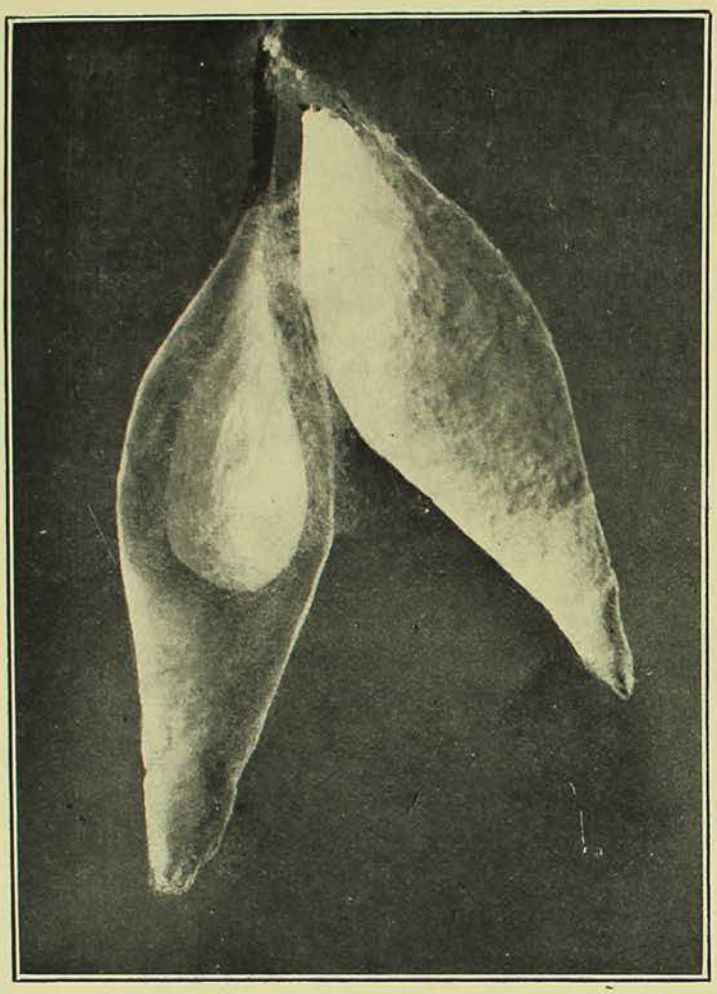
Cocoons of the Magnificent Spider.

Photo.—H. Hacker.

is then commenced. This is by far the most arduous portion of all the mother's labour. The outer envelope has to be made strong enough to protect the inner cocoon from the weather, from friction when blown against leaves and branches, from the attacks of predaceous insects, and from the ovipositors of parasitical insects. Under magnification, its finished texture is seen to be very closely woven, and the final result is a tough material, not easily torn or penetrated.

As the actual method of spinning is of interest, the following extract from my more detailed account is given in full:—

sufficed to attach the strands. The spider moved with surprising quickness, its spinning stroke varying from about sixty to eighty spins per minute. During its journey up and down the capsule two hundred and sixty spinning movements were counted, and this represented but a single narrow sector of the whole circumference. Some idea of the energy expended by the toiling mother in her great work may be gauged by these figures, and one wonders at the strength of the muscles which move the abdomen. With haste and without rest, the process was continued and at mid-



Cocoon sectioned to show structure. Natural size.
Photo.—H. Hacker.

night the cocoon had attained its final contours. The spinning on the outer surface then reached a finer stage, and the glossy waterproofing was being done. Instead of working in vertical lines, the threads were attached from side to side as the spider made its way down and then up the capsule. This lateral movement was very noticeable, and the resultant spinning added to the toughness of the material, giving a criss-cross weaving. The whole surface of the cocoon had been woven over many times."

Spiderlings may emerge from the cocoon in about three months. They are able to penetrate the tough outer envelope without aid from the mother, and, when they emerge through a tiny hole, they spin fine threads and balloon away on the breeze. Apparently very few of these tiny aeronauts survive to maturity, or the species would be far more common.

Dicrostichus magnificus does not catch its prey in a web. Except for the many supporting strands for the cocoons, and the simple lines by which it suspends itself, which are also connected with the closely woven retreat, no other web is spun. None of these lines are sticky and no insect can be caught on them. There is no web entanglement to trap the moths on which it feeds. Shortly after sunset, the spider hangs suspended on a more or less horizontal line near its cocoons. My wife and I repeatedly found it sucking a common species of Noctuid Moth (*Remigra frugalis* Fabr.) which it had secured in some mysterious way. Close and persistent watching through many nights revealed the remarkable method by which it caught them. From its slender bridge it would spin a filament, usually about one-and-a-half inches in length, which was suspended downwards; on the end of this was a globule of very viscid matter a little larger than the head of an ordinary pin, occasionally with several smaller globules above. This filament was held out by one of the front legs, the miniature apparatus bearing a quaint resemblance to a fisherman's rod and line. On the approach of the moth, the spider whirls the filament and globule with surprising speed, and this is undoubtedly the way in which it secures its prey. The moths are unquestionably attracted to an effective extent by the spider and globule, whether by scent or its colour we cannot say. We certainly could not distinguish the slightest odour. But the fact remains that night after night one or two moths would flutter up and be caught. Other moths near by seemed to be indifferent, but two were often secured in the space of an hour, one of which would be packed away on the line to be sucked later. The spec-

tacle of the moth fluttering up to the spider, sometimes two or even three times before it was caught, is one of the most interesting little processes which the writer has ever witnessed in natural history. The supposed desire of the moth for the star is a poet's fancy, but the attraction of the moth to the *Dicrostichus,* although mysterious, can be seen by any patient watcher.

The globule is composed of most tenacious material, and quite large leaves can be suspended on it by a mere touch. The spider can be artificially fed by holding a moth to the hanging globule, to which it can be transfixed by the slightest contact. Occasionally the filament and globule will be drawn up and another manufactured. The spider will ignore a moth which is artifically placed along its upper lines, and apparently its one method of catching them is by the filament and globule. The moth is as helpless when touched by the globule as is a fly on fly-paper. When the insect is secured on the sticky globule it is pulled up, and killed by an injection of venom; it is then neatly bound in a little bundle, leisurely placed in line with the spider's head and there held and sucked, the wings being ultimately discarded.

Probably the study of allied species will reveal other stages in the evolution of this curious habit. *Celaenia excavata,* which makes small spherical cocoons, is also without a web.

The Chameleon.

By J. R. Kinghorn.

ALTHOUGH the Chameleon is not an Australian reptile its name is familiar to us, and the animal causes a fair amount of discussion from time to time. Its true home is Africa, but it has extended to Madagascar, Ceylon and western Asia, only one species being known from India. It is so far removed in structure from an ordinary lizard that it has been placed in a suborder all by itself, the Rhiptoglossa, comprising only one family, the Chamaelodontidae, in which there are about forty-five species known to science.

The body is high and compressed laterally, the head, which is very angular, resembles a hood, and the tail is short and prehensile; that is to say, it can be used after the manner of an extra limb, being curled round branches to enable the reptile to gain an extra hold as it moves about. All the feet are also prehensile; this is made possible by a peculiar structure in the articulation of the digits, the toes being bound together in opposite bundles. In the fore feet the inner bundle contains three and the outer two, while this order is reversed in the hind feet. The eyes are remarkable both as to their structure and their independent relationship; they each rise out of a sunken pit, and resemble large skin-covered cones, each perforated by a minute hole (the pupil opening) at the apex. Being independent of action, one eye can be watching an object ahead, while the other searches about in all directions for possible prey. The tongue is extremely long and extensile, and broadens out into a club-shaped lump towards the tip, and, when fully extended, is seven or eight inches long. The tip is covered with a sticky fluid, and, as the tongue can be shot out with perfect aim, woe betide the unwary fly which comes within range.

Some years ago one of the members of the Museum staff kept a living chameleon as a pet in his room and its movements caused us much merriment It was exceptionally slow and seemed to take a long time to make up its mind

to move forward, keeping one hand, and perhaps a foot as well, poised in air for several minutes before eventually deciding to put them down and continue its journey. The independent movement of its eyes was ludicrous, as one would be looking forward intently at an unwary and unsuspecting fly, while the other would be looking in our direction as if to say "watch me catch this fellow." In its natural wild state the chameleon is not always such a slow moving creature as it appears to be in captivity. It is insectivorous and arboreal, being very clumsy when placed on the ground.

The common Chameleon makes a very interesting pet and is so used in many parts of the world. Its power to change colour is much overrated, and in this respect it cannot compare with some of the Agamas and Iguanas.

Photo.—J. R. Kinghorn.

Although chameleons can change colour, and comparatively quickly, they are rivalled both as to speed of changing and variety of colours by many species of iguanas (the iguana, which is not known to Australia is very distinct from the goana) and even some of the agamas. The following experiments on its colour changes were carried out in the reptile house of the New York Zoological Park, the results being published in *Reptiles of the World* by Mr. R. L. Ditmars.

Four specimens of the common chameleon (*C. vulgaris*) were taken and the first was placed in the sunlight so that only one side was exposed to the rays. The second was also put in the sun, but at such an angle as to entirely suffuse the reptile with rays. A third was placed in a dark box at a temperature of 75° Fahrenheit, while a fourth was placed in a dark box at a temperature of 50° Fahrenheit. After fifteen minutes the specimens were uncovered and the following results were noted:—The first was dark brown on the side that had been exposed to the sun, while the shadowed side was pale brown mottled with green, the second was uniform brown, deeper than the dark side of the first specimen; the third reptile emerged from the box in a brilliant coat of green; the fourth crawled sluggishly from its cold quarters, its colour being a uniform slaty grey.

These specimens were then placed in separate cases with different uniform coloured surroundings, and with uniform light, one on green leaves, another on brown twigs, and a third on white sand. After a time they were all taken out and examined, and were found to be all the same colour, a yellowish brown, which indicates that light and temperature have more to do with the change in colour than have their surroundings. So the story of the chameleon which died through trying to accommodate itself to the diverse colours of a tartan kilt is proved to be a myth.

These little reptiles make very interesting pets, and are much sought after as such in many parts of the world; for a time they were fashionable toys amongst certain society folk who carried them about the streets in this country as well as in many foreign places.