

The
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MAGAZINE

Vol. VI, No. 8.

OCTOBER-DECEMBER, 1937.

Price—ONE SHILLING.



Red-capped Robin.

THE AUSTRALIAN MUSEUM

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THE AUSTRALIAN MUSEUM MAGAZINE

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Photography, unless otherwise stated, is by G. C. Clutton.

● OUR FRONT COVER. The Redcapped Robin (*Petroica goodenovii* Latham and Horsfield) is by Lilian Medland. It is one of a series of postcards issued by the Australian Museum.

The Australian Robins are not really Robins at all, but belong to the Flycatcher tribe. They are, however, much more beautiful creatures than Robin Redbreast of nursery fame, their gorgeous scarlet putting his dull chestnut to shame. In addition to Robins with scarlet breasts, we have them with breasts of yellow, pink, rose, vermilion and other colours.

The Redcapped Robin ranges all over Australia, and is a bird of the interior, rarely coming down to the coast. The male is a splendidly beautiful little bird, the female wearing a much more modest livery. They are insectivorous, and feed very largely upon the ground, against which the breast of the male makes a glowing spot of living colour.

The birds nest in the spring, a compact open nest being built in a fork of a geebung or some similar small tree. Three eggs are laid, greenish white, finely freckled with brown, especially towards the larger end.



Group of Red Kangaroos (Megaleia rufa rufa). A family group of this beautiful kangaroo of the inland plains is shown in typical surroundings of the Brewarrina district of New South Wales. The convincing general effect is produced by skilful blending of the painted details of background with the real and artificial materials in the foreground, while accurate modelling produces the correct anatomical detail and life-like attitude of the animals. Photo.—Courtesy, Sydney Morning Herald.



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OCTOBER-DECEMBER, 1937.

New Marsupial Groups in the Australian Museum

By E. LE G. TROUGHTON, C.M.Z.S.

The following brief account of the preparation of new habitat groups was recently given as one of the "National Treasure" series of broadcasts.—EDITOR.

MANY of you may wonder at the inclusion of the new Museum groups as national treasures, but it is actually the unique marsupials—which modern methods are able to group in lovely harmony with their haunts of Blue Mountain and inland plain—that represent for us the national treasures of our adopted land.

Ever since the earliest known record of a kangaroo in 1629, on the coast of Western Australia, the story of the exploration and settlement of Australia has been associated, page by page, with the discovery of unique kinds of marsupial life. At once these became a source of fascinating interest to scientific giants of the past—such as Darwin, Owen, Huxley, and a host of foreign naturalists—creating a world-wide interest which has made them the greatest natural publicity agents a continent has ever known.

More than three centuries ago a wrecked Dutchman described a west Australian wallaby, and expressed the very natural, though mistaken, belief that its young were conceived within the pouch, a subject keenly debated in the bush even today. About one hundred and sixty years ago Captain Cook's party saw wallabies for the first time on the eastern coast, at Cooktown, which the blacks called "kangooroo", thus emphasizing the point that wallabies are merely small kangaroos.

The first settlers of Sydney—the founding of which will be proudly celebrated in the next few months—naturally supposed the kangaroos about Port Jackson to be identical with the species seen by Cook's party about fifteen hundred miles to the north. So great was the interest caused by the mistaken belief that the great navigator first saw kangaroos at Botany Bay that—only twenty-one years

after his discovery of the coast of "New Holland", and three years after the arrival of the first fleet in 1788—Governor Phillip sent a live kangaroo by the armed tender H.M.S. *Supply* to His Majesty King George III, a liberty which he said was taken as no animal of its kind had been seen in England.

So much public interest was aroused by the arrival of the strange creature that for a while some of the lonely exiles probably displaced the "bearded lady" and other doubtful attractions and were billed as the amazing kangaroos from Botany Bay, "which distinguish themselves in shape, make and true symmetry of parts", an undeniable fact which makes a kangaroo one of the most difficult of animals for natural museum display.

Ancient kinds of marsupials are also found in America, but only in Australia have they achieved such infinite variety, as though prehistoric isolation made of this continent a cradle for the development of the remarkable animals, which have survived unchanged for millions of years. In the course of adaptation to environment within this continental refuge, Nature marshalled a peaceful army of marsupials, with the tiny pouched mole and large wombats representing the tunnellers, the flying possums the aerial forces, and a vast land army ranging from small pouched mice and bandicoots to the large kangaroos, whose small ancestors acquired the hopping habit while dodging the attacks of birds and the few marsupials of prey, and in traversing rough country.

In this land of unique mammals the various State museums have a most important and difficult task to exhibit them in an attractive and life-like way while preserving specimens of fading fauna for the instruction of future generations. In all this the purpose is not to destroy, but to build up public interest in native life, so that the cause of national conservation may be put before mere commercial gain.

In such matters we should not lag behind overseas opinion, and the great interest shown abroad has been strikingly



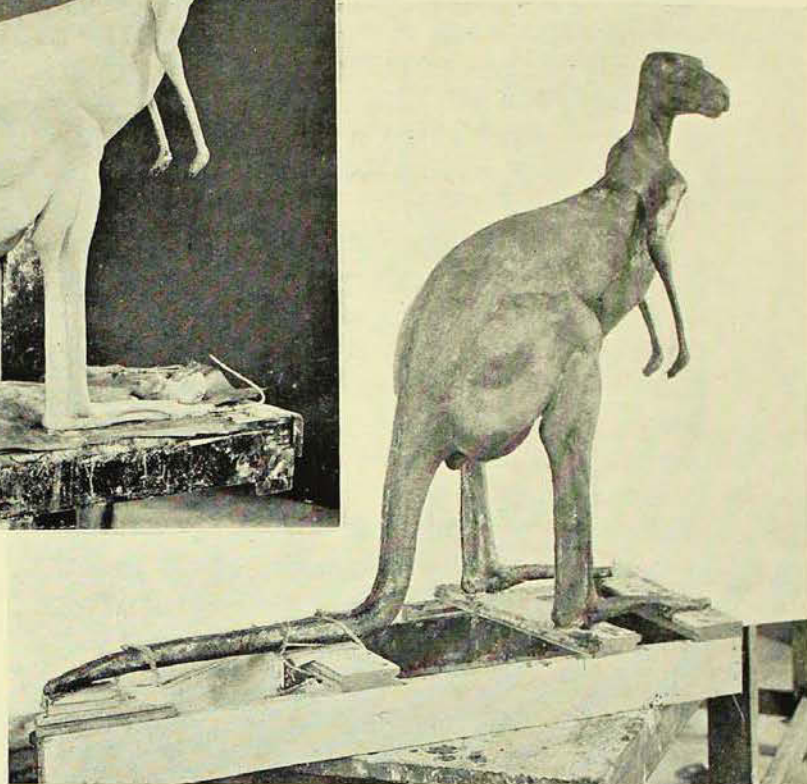
The Koala (Phascolarctos cinereus cinereus). A life-like example of this most appealing of all marsupials is shown in a colourful setting amongst the eucalypts which provide its sole refuge and sustenance. Clearing of such country with advancing settlement undoubtedly threatens the survival of these fascinating creatures.

Photo.—Courtesy, *Sydney Morning Herald*.

illustrated in Sydney by the recent installation of three marsupial habitat groups under the supervision of Mr. Frank Tose, Chief of Exhibits at the California Academy of Sciences, San Francisco, whose services were made available by the generous assistance of the Carnegie Corporation of New York.

Following upon a brief tour by Mr. Tose of all the State museums, and assisted by a willing band of taxidermists—now known by the modern term of preparators—from all save distant Perth, a world record was created in Sydney in designing, assembling, and setting-up in seven weeks three beautiful marsupial groups, while providing instruction at the same time in the latest American technique of group preparation.

The largest of the groups shows a family of Red Kangaroos, with the six foot "Old Man" towering above his

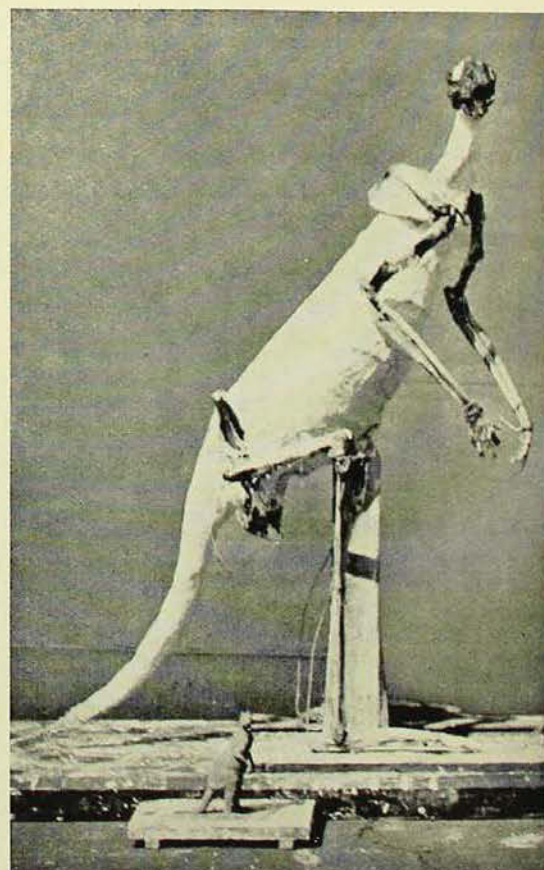


Lower right: A basic framework or "armature" is built for each animal according to the attitude required. Showing how the actual skull and limb-bones are used to obtain the exact proportions for the basis of the model.

Centre: The clay figure ready for the taking of a plaster mould. Correct anatomical detail is obtained by skilled modelling, which enables the composition of group exhibits of similar animals in varied positions.

Left: The plaster mould is gradually enclosing the clay model. A hollow replica of the clay body is afterwards cast in the completed mould, as a sculptor's model is cast in bronze.

Right: The comparatively light model composed of hessian and layers of plaster and known as the "manikin", over which the softened and carefully tanned skin is drawn, the folds being moulded and fixed to the curves of the body and limbs, while the ears are supported by leaden replicas of the actual cartilage.



slender mate, known as the "Blue Flyer" because of her softer blue-grey colouring and the greater speed attained owing to the more elegant build. Another group shows a pair of Rock Wallabies, like little sentinels on a rampart of their Blue Mountain haunt, as they must have appeared to gallant Blaxland, Wentworth and Lawson when conquering the barrier of great ranges which defied the earliest explorers. In the third exhibit is shown a single Koala in a most attractive attitude and setting of its natural leafy home.

When these fine groups are open to the public early in January, few will realize the immense amount of knowledge and work involved in their preparation. Firstly, the long journey to Brewarrina, where the party was generously accommodated and assisted by Mr. Richard Pearson, manager of Quantambone Station, to obtain fresh specimens of red kangaroo, which were measured in great detail, and the skins and skeletons carefully treated. Then the making of colour sketches of the proposed setting, the plaster casting of rocks and animal parts, and the collecting of native grasses, foliage, flowers, and sufficient of the natural soil. Back in the workshops the feverish activity as frameworks were built for each animal, using the actual limb-bones and skull for correct proportions, upon which the art of modelling is used to produce a replica of the body in any life-like attitude required by the composition of the group. A plaster mould is then taken of the model, in which mould is then cast a hollow replica of the body, just as the sculptor's model may be cast in bronze. This final model, known as the "manikin", is comparatively light, being composed outwardly of glued pieces of hessian and lined with layers of plaster. Over this anatomically perfect figure is drawn the carefully pared and tanned skin, the softened folds of which are skilfully moulded to the curves of the body and limbs, while the ears are supported by metal replicas of the cartilage.

Under the guidance of their versatile instructor, all the visiting and local taxi-

dermist—*or, rather, preparators*—took part in all phases of the work, including the making of realistic leaves and flowers in wax and paper. In this work women-folk of the Australian and Technological Museums assisted, so that they might speed the good work and also apply the methods in future exhibits, such as in showing insects pests and food plants.

Admiring the beauty of the three groups even in the unfinished state, it is difficult to credit that the very real effect of scenic background, setting, and animal life achieved in the finished work was conceived and constructed in less than two months. And when we museum folk of Sydney and the various States said a grateful *au revoir* to our tired though happy helper from America, we knew him to have but one regret. It is that constructive criticism from overseas is usually misconstrued, or made to appear as sweeping condemnation by abridged or sensational publication.

During his Australian tour Mr. Tose naturally observed faults which are common to museums the world over because of unsuitable old buildings, lack of facilities, and, especially, inadequate funds. He found, also, great progress in correcting such faults, and, in his own words, found amongst the museum staffs a complete awareness of the needs for improvement, and ability to carry out the work according to the highest standards abroad, should adequate funds and modern facilities be provided by the governing bodies.

As curator of the department of furred animals in which the groups are naturally included, it is my privilege on behalf of the Trustees of the Australian Museum to pay tribute to the splendid efforts of Mr. Tose, as sponsored by the Carnegie Corporation, as well as to the unselfish co-operation of the authorities of the various State museums, and the members of their various staffs who so willingly provided their skilled help, while studying new methods of preparation in friendly association with their Sydney colleagues.

The beautiful animals, shown in their natural haunts within the Museum hall, truly represent the national treasures to which this talk refers, while the patience and skill which placed them there, for the pleasure of visitors for many years, represent both an international and interstate gesture of goodwill which should make the fine groups a source of civic pride and interest throughout the celebrations of the first settlement of Australia.

The quaint marsupials are indeed national treasures, of an infinite variety which age could not wither, nor should custom be allowed to stale the national

interest in their right to survival, for they are of the real glories of the Australian garden and must not pass away. As our helpers return to their various States, new natural groups will be installed in museum halls throughout the Commonwealth, and fascinating creatures will appear as living reminders that our country is the natural sanctuary of marsupial life, which it is a national duty to conserve so that in the future, as Kipling's *L'Envoi* so aptly concludes:

Each for the joy of the working,
And each in his separate star,
Shall draw the thing as he sees it,
For the God of the things as they are.

* * * *

The groups described in the foregoing article were designed by Mr. Frank Tose. Those who took part in their construction, under his direction, were

National Museum, Melbourne—
C. W. Brazenor,
F. W. Gardner Peake,
J. Turnbull.

Tasmanian Museum, Hobart—
W. Cunningham.

South Australian Museum, Adelaide—
Allan Rau.

Queensland Museum, Brisbane—
J. Colclough,
T. Marshall,

besides the Preparatorial Staff of the Australian Museum: G. C. Clutton, H. S. Grant, J. Kingsley, H. Wright, and W. Barnes.

The Misses J. Allan, N. B. Adams (Australian Museum, Sydney), E. Walden (Technological Museum, Sydney), and E. A. King assisted in the modelling of the floral adjuncts. Miss King also helped in the scenic work.—EDITOR.

Major-General Sir Charles Rosenthal, K.C.B., C.M.G., D.S.O., V.D.

AT the meeting of the Board of Trustees of the Australian Museum on 28th October, Major-General Sir Charles Rosenthal, K.C.B., C.M.G., D.S.O., V.D., F.R.I.B.A., M.L.C., was farewelled on the occasion of his resignation consequent upon his appointment as Administrator of Norfolk Island.

Sir Charles Rosenthal was first elected a Trustee in October, 1923, and during the years 1927-1930 was President. His membership of the Board was marked by a very deep interest in all matters associ-

ated with the advancement of the Museum. In many other fields, also, Sir Charles has rendered great and lasting service to the community.

On behalf of the Trustees, the President, Mr. F. S. Mance, presented to Sir Charles a bound set of THE AUSTRALIAN MUSEUM MAGAZINE, suitably inscribed, with book trough, for his desk. Mr. Mance, whilst regretting his departure from Sydney, expressed the hope that he and Lady Rosenthal would have every happiness in their new sphere.

Some Early Glimpses of Australian Wild Life

By KEITH C. McKEOWN

THE wild life of strange lands has always exercised a great fascination upon mankind, and has aroused curiosity from the earliest times. So it is that the explorer, the traveller, and the settler in the bypaths of the world have collected facts—or fiction—regarding the remarkable inhabitants of these countries. At first the imagination of the traveller, or his desire to impress the stay-at-home, was liable to outrun his desire for truth, with the result that an astonishing variety of travellers' tales arose to astonish the world. As the years passed, the voyages of discovery and exploration became more and more scientific, and naturalists were included in their personnel, or, where such provision was not made, there was usually someone with sufficient interest and knowledge who recorded the strange things seen. In the modern exploring expedition, a number of scientists, fully trained in their respective branches, form an important part of the organization.

In Africa and the Americas most of the varied forms of animal life encountered were more or less closely allied to creatures already known, but the first voyagers to Australia found everything strange and new. There were curious beasts that hopped upon their hind legs, balancing themselves with the aid of their stout tails; still stranger creatures apparently compounded of duck and mole frequented the streams and rivers; while large kingfisher-like birds greeted the travellers with harsh, derisive laughter. Australia became known as a land of anomalies. It was this sense of unfamiliarity that was undoubtedly responsible for that impression of harshness and repulsion that was to persist for so long. It is difficult for those of us who have grown up in the country, and come to love

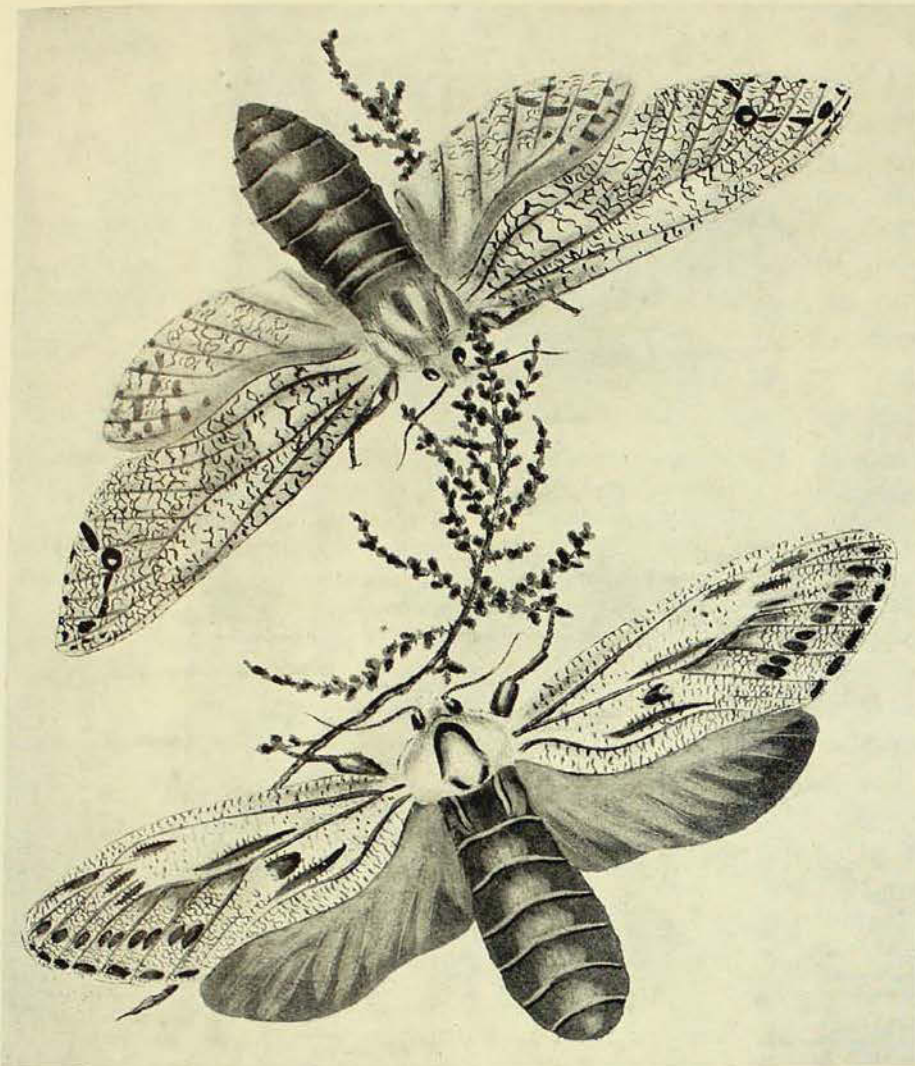
it, to understand the strength of this feeling, but its unmistakable mark has been left upon the pages of the writings of both explorer and early settler.

There is little to be found relating to natural history in the records of the early Dutch explorers until we come to the wreck of the *Batavia*, under the command of Captain Pelsart, on the western coast of Australia in 1629. Here Pelsart saw wallabies, which he entertainingly describes:

We found in these islands large numbers of a species of cats, which are very strange creatures; they are about the size of a hare, their head resembling the head of a civet-cat; the forepaws are very short, about the length of a finger, on which the animal has five small nails or fingers, resembling those of a monkey's forepaw. Its two hind legs, on the contrary, are upwards of half an ell in length, and it walks on these only, on the flat of the heavy part of the leg, so that it does not run fast. Its tail is very long, like that of a long-tailed monkey; if it eats, it sits on its hind legs, and clutches its food with its forepaws, just like a squirrel or monkey.

Their manner of generation or procreation is exceedingly strange and highly worth observing. Below the belly the female carries a pouch, into which you may put your hand; inside this pouch are her nipples, and we have found that the young ones grow up in this pouch with the nipples in their mouths. We have seen some young ones lying there, which were only the size of a bean, though at the same time perfectly proportioned, so that it seems certain that they grow there out of the nipples of the mammae, from which they draw their food, until they are grown up and are able to walk. Still, they keep creeping into the pouch, even when they have become very large, and the dam runs off with them when they are hunted.

Such was, as far as we know, the first encounter between white man and wallaby, and it is not surprising to find Pelsart's original account expressing the mistaken belief in pouch-birth, which is held by many country folk to the present day, in spite of all proof to the contrary.



Two of the large Australian Wood-moths. One of the fine coloured plates in Donovan's "Insects of New Holland", published in 1805, and one of the earliest illustrated books on Australian insects.

At Cooktown, on 24th June, 1770, Captain Cook encountered his first kangaroo. He tells us how:

I saw myself this morning a little way from the Ship, one of the Animals before spoke of: it was of a light mouse Colour and the full size of a Grey Hound, and shaped in every respect like one, with a long tail which it carried like a Grey Hound; in short, I should have taken it for a wild dog, but for its walking or running, in which it jumped like a Hare or Deer. . . .

July 14:

Mr. Gore, being in the Country, shott one of the Animals before spoke of; it was a small one of the sort, weighing only 28 pound clear of the entrails: its body was long: the head, neck and Shoulders very Small in proportion to the other parts. It was hair lipt, and the Head and Ears were most like a Hare's of any Animal I know: the Tail was nearly as long as the body, thick next the Rump, and Tapering towards the End: the fore Legs were 8 inches long, and the Hind 22. Its progression is by Hopping or Jumping 7 or 8 feet at each hop upon its hind Legs only, for in this it

makes no use of the Fore, which seems to be only design'd for Scratching in the ground, etc. The Skin is covered with a Short hairy furr of a dark Mouse or Grey Colour. It bears no sort of resemblance to any European animal I have ever seen: it is said to bear much resemblance to the Jerboa, excepting in size, the Jerboa being no larger than a common rat. . . .

July 27:

Mr. Gore shott one of the Animals before spoke of, which weighed 80 lbs. . . . this was as large as the most we have seen.

For many years it was believed that Captain Cook had seen one of the large species which we know as kangaroos, but after much research it has now been decided that Cook's "kangaroo" was a wallaby.

The encounter of one of Cook's sailors with a flying fox is amusing, and shows how the imagination may carry away an untrained observer when he attempts to describe some unfamiliar object. The

A typical example of J. W. Lewin's work in his "Lepidopterous Insects of New South Wales". The plates were engraved on copper plates from the sheathing of ships' bottoms and printed in Sydney. The insect illustrated is the Banksia Moth (*Danima banksiae*).



seaman's account of his discovery was sensational, to say the least of it, for he announced that he had seen the Devil! Asked in what form the fiend had appeared to him:

He was, says John, as large as a one gallon keg, and very like it; he had horns and wings, yet he crept so slowly through the grass, that if I had not been *afeard* I might have touched him. This formidable apparition we afterwards discovered to have been a batt; and the batts here must be acknowledged to have a frightful appearance, for they are nearly black, and full as large as a partridge; they have indeed no horns, but the fancy of a man who thought he saw the devil might easily supply that defect.

It was to be expected that the larger and more striking creatures should receive the most attention, and it is not unnatural, therefore, to find that the insects, generally comparatively insignificant in size, should receive but scant notice; but there were some that forced themselves upon the attention of even the most unobservant.

To Dampier, in 1688, perhaps, falls the honour of being the first to observe and note an Australian insect, for he comments upon the masses of flies that encircled the eyes of the aborigines that he met with on the west coast.

Banks and Solander, the naturalists who accompanied the Cook expedition, were doubtless responsible for the observations on the insects mentioned in Cook's journal. The mound-like nests of the termites or "white ants" did not fail to attract their attention; vast swarms of butterflies (*Euploea hamata*) were seen in the vicinity of Thirsty Sound, where "for the space of three or four acres the air was so crowded with them, that millions were to be seen in every direction, at the same time that every branch and twig was covered with others that were not upon the wing". Such swarms of butterflies were later observed by Captain King at Bustard Bay, where

they rested in vast numbers upon the flower-spikes of the grass-trees (*Xanthorrhoea*). The naturalists also noted ants living in the swollen stems and roots of certain orchids; but it is in the description of the Green Tree Ants at Bustard Bay, May 23rd, 1770, that Sir Joseph Banks shows himself to have been a keen observer of nature. He says of them:

. . . upon the sides of the lagoons, grew mangrove-trees, in the branches of which were many nests of ants, of which one sort were quite green. These, when the branches were disturbed, came out in large numbers, and revenged themselves very sufficiently upon their disturbers, biting more sharply than any I have felt in Europe.

Later, he writes:

The ants, however, made ample amends for the want of mosquitoes; two sorts in particular, one as green as a leaf, and living upon trees, where it built a nest, in size between that of a man's head and his fist, by bending the leaves together, and gluing them with a whitish paperish substance which held them firmly together. In doing this their management was most curious; they bend down four leaves broader than a man's hand, and place them in such a direction as they choose. This requires a much larger force than these animals seem capable of; many thousands indeed are employed in the joint work. I have seen as many as could stand by one another, holding down such a leaf, each drawing down with all his might, while others within were employed to fasten the glue. How they had bent it down, I had not an opportunity of seeing, but that it was held down by main strength, I easily proved by disturbing a part of them, on which the leaf, bursting from the rest, returned to its natural situation, and I had an opportunity of testing with my finger the strength that these little animals must have used to get it down. But industrious as they are, their courage, if possible, excels their industry; if we accidentally shook the branches on which such a nest was hung, thousands would immediately throw themselves down, many of which falling upon us made us sensible of their stings and

revengeful dispositions, especially if, as was often the case, they got possession of our neck and hair; their stings were by some esteemed not much less painful than those of a bee; the pain, however, lasted only a few seconds.

The insects secured by the various exploring expeditions were described by specialists overseas, men who knew nothing of the insects in their native country, but treated them as natural curiosities from a strange land in which every species was new to science. Fabricius, in 1775, described 212 species of insects from Australia, all of them evidently from the Cook expedition. Other workers described the specimens taken back by the French expeditions.

This state of affairs was to last until, in 1805, Australia found in John Lewin her first field naturalist, a man who lived in the country and observed the insects under their natural conditions. He wrote a book in which he described the life histories and habits of a number of our moths and butterflies. The text of this book was printed in England, but the beautiful plates, from the skilled brush of Lewin himself, were engraved by him in Sydney, upon copper plates from the sheathing of ships' bottoms.

In 1805, Edward Donovan published his book, *An Epitome of the Natural History of the Insects of New Holland*, in which many species were illustrated in colour; some of the insects had already been described by Fabricius, others were named as new.

In the old works there is a wide and fascinating field for the searcher—a field that will reveal much that is curious, for it has been possible here to touch only upon the very fringes of the subject, and that all too briefly.

The Ocean Depths and their Denizens

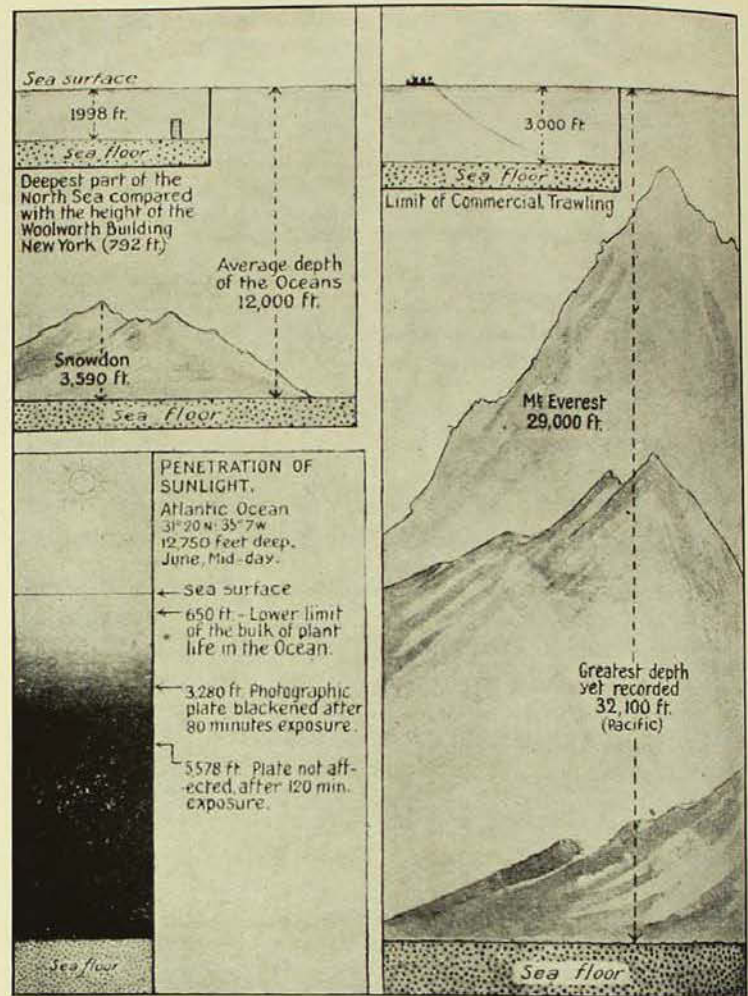
By ARTHUR A. LIVINGSTONE

MAN would perish if the oceans of the world were, by some miracle, suddenly taken from him; the sun would have no reservoir from which to draw the rain-giving vapours so essential to human well-being.

By many folk the oceans are regarded simply as a medium to float the vessels of commerce, and to supply us with fish. Yet, should opportunity allow us to peer behind this veil of general idea, one finds much of absorbing interest, all recorded in volumes possibly outside the ordinary reader's literary orbit. But before we approach some of these strange discoveries, let us turn back along history's path to the days of Columbus. Up to that explorer's day, and even at that time, the oceans were collectively regarded as one vast mystery. In those far-off days it was generally believed that the earth was flat, and that the oceans had boundaries beyond which no man dare venture. But Columbus proved it otherwise, and since his day, especially in more modern times, the vast oceans have been studied, explored and charted. Sailing vessels began to venture further afield and take note of what they saw in strange seas. Sailors often came home with marvellous tales, sometimes garnished with horrible things that they had seen in mid-ocean. Later, governments of various countries equipped and sent out special vessels with crews competent to study the mysteries of the depths, and it was in this way that oceanography, or the science of the sea, became established and gradually developed. A pioneer in such work was the British research vessel *Challenger*, and in her wanderings across the oceans of the world for three and a half years (December, 1872, to May, 1876), she covered a distance of nearly sixty thousand nautical miles.

OCEAN WATERS.

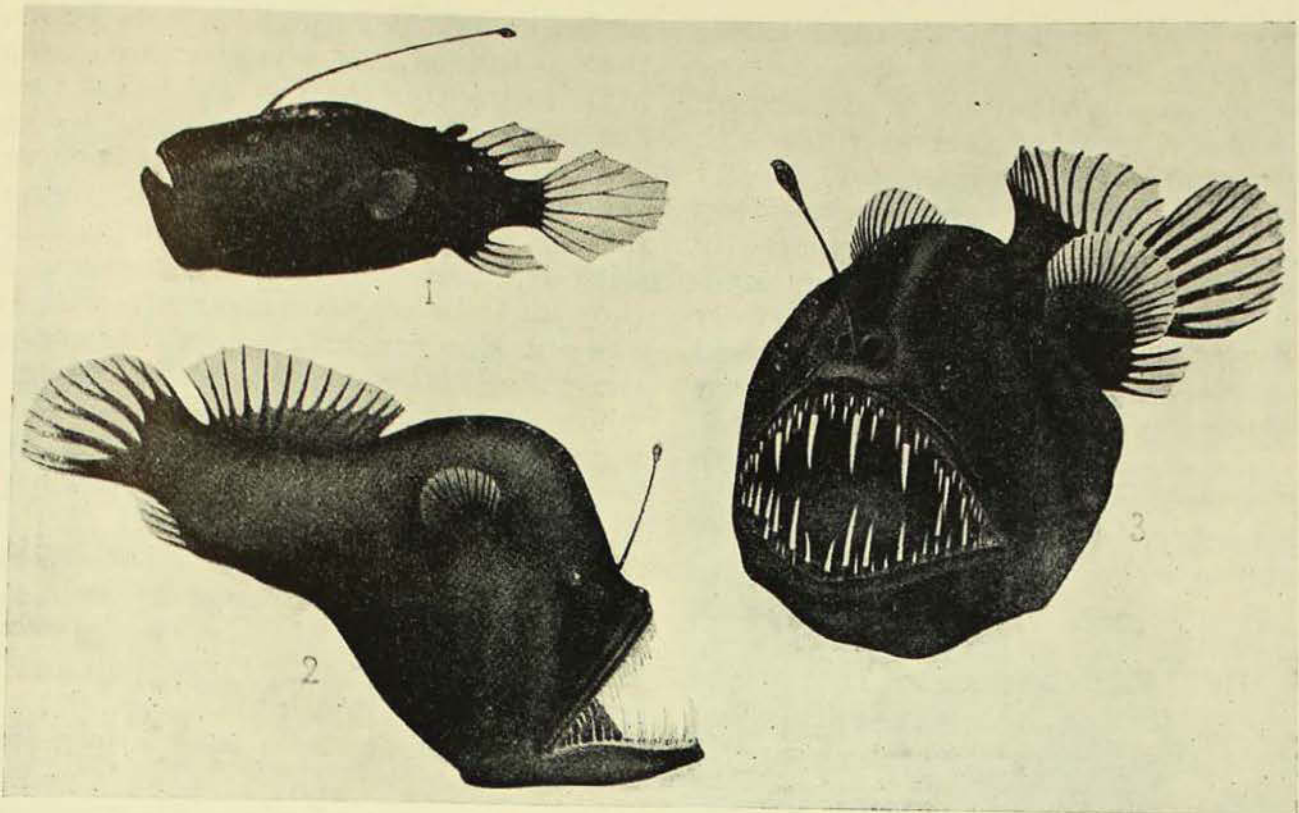
The surface waters of the seas and oceans of the world cover more than three-



Ocean depths.

After Russell and Yonge.

fifths of the entire surface of our globe. Generally speaking, the ocean bed as a whole is comparatively flat, and may be likened to great plains, with a mean depth of more than two miles. Nine-tenths of the ocean soundings will reveal a depth of more than a mile. The greatest depths seem to occur in deep chasms and fissures in the earth's crust, but these great deeps are few in number, and together they would occupy possibly no more than a one-hundred-and-fortieth part of the area of the entire ocean beds. In the Virgin Islands Deep sounding apparatus has revealed a depth of nearly four and a half miles, while the once famed Tuscarora Deep, off Japan, has



Sabre-toothed dwellers of the abyssal depths.

After "Valdivia".

been plumbed to a depth of five and one-fifth miles. There are, of course, other places where the depth exceeds three miles; but the deepest part in the world known up to recent years is the Philippine Deep, which has a depth of six miles.

The penetration of sunlight through the sea water, and its influence upon the growth of vegetable matter such as seaweeds, is of some importance when investigating life in the sea. Every plant, whether a land- or a sea-dweller, requires light for its existence. The degree of light needed, of course, varies according to the type of plant, but all must share in this essential factor. As the transparency of sea water varies in different parts of the world, so does the depths at which plant life ceases to exist vary also. Broadly speaking, light does not penetrate beyond sixty fathoms, and at about this depth vegetable matter ceases to exist. In addition, the nature of the sea life begins to alter according to the pressure of water until we get down to the abyssal depths. Here, ocean currents are absent and wave

action does not exist. All around is profound silence; the water is still and almost at freezing point. A black cloak of darkness envelops this new world like a pall, and everything around is subjected to a prodigious pressure, caused by the weight of water above of over 6,720 lb. to the square inch. The vast plateaux which form the ocean beds vary according to the nature of the animals and materials that rain down from above. In some places calcareous protozoans, known as *Globigerina*, accumulate in vast numbers to form a thick ooze, while elsewhere the sea-floor is composed of diatom and radiolarian siliceous ooze. Bones of dead fish and sea animals of all kinds have been sent to their graveyard, the sea bottom, as well as metallic remains from heavenly bodies. Even the dust and volcanic ashes which drift for hundreds of miles to sea also contribute to the composition of the beds of the ocean.

DEEP SEA DWELLERS.

Owing to the fact that the waters of the abyssal depths reach to nearly

freezing point, even in the tropics, the inhabitants vary little so far as geographical distribution is concerned. The fish are, speaking generally, black in colour, not very large, and mostly luminescent. In most the eyes are very large and staring, and apparently adapted to the artificially lit surroundings. The remainder have only relatively small eyes, and seem not at all concerned with structural adaptation in this sphere. Many are strangely shaped, with baleful, glaring eyes, gaping mouth, armed with long sabre-like teeth which present a truly horrifying appearance. Luminosity is said to be highly developed in these strange creatures, many having spots of light which act as miniature search-lights. It has also been stated that others carry a light on a rod-like stalk springing from the head. It is thought that with all this elaborate lighting system the more predatory fishes can light up their way while in search of food. Latest observation, however, disclaims such ideas, and leans to the belief that luminescence is generally associated with the agitation of small animalculae by fish, as is the case in shallow water.

In the absence of gaudy colours and patterns such as adorn shallow water animals, the prawns, shrimps, echinoderms, and other creatures of the depths are not so drab as the fish life there. The crustaceans are coloured mostly in shades of red, while the echinoderms are a slaty grey, or with shades of orange and red. The absence of elaborate coloration, shades, lines, and patterns may be explained by the fact that deeper water inhabitants live in complete darkness and, therefore, have no need to elude enemies by the adoption of camouflage, mimicry, or protective coloration as practised by the sunlit shallow water creatures.

In the absence of conditions which prevail in water of less than about sixty fathoms, the inhabitants of the abyssal depths are deprived of a large food supply, and here may be the reason why

no large fish or animals are to be found there. Indeed, the struggle for existence must be greater than would be the case in shallow water and competition very keen. In view of the fact that the dwellers of the vast depths are deprived of vegetable matter, and the life that is associated with it, it is reasonable to assume that they must be carnivorous; but, with such a population presumably feeding one upon the other, it would seem that soon the whole world of darkness would have numerically no dwellers of any consequence. Nevertheless, the following explanation given for their continued existence seems to overcome the difficulty. In some way, and strange to us humans, these dwellers of the depths know that the sun's rays regularly appear and disappear. With this knowledge, and when the sun goes down, a vast migration of swimming types takes place. Under the protective cover of night they ascend to the near surface waters and partake of the plentiful food supply to be had there. It seems incredible that such creatures, adapted as they are to withstand the colossal pressure of very deep water, can, without harm, temporarily forsake their normal environment and venture into near surface waters. Yet, such has been reported to be the case, and, when a new day dawns, the migrants, structurally unable to protect themselves from enemies in a lighted world, descend into the protective folds of the depths and darkness. Even the giant squids, which live in the depths and measure many feet in length, venture into the near surface waters in quest of prey, but they often fall victims to the huge cruising whales, after many a long and strenuous struggle. Stories exist of terrific battles fought between giant squids and migrating whales, and we are even asked to believe that huge squids have attacked and wrecked large sailing vessels in mid-ocean. But most of these tales are legendary, and can, with complete safety, be dismissed as products of the higher flights of fancy.

Introducing the Lizards

By J. R. KINGHORN, C.M.Z.S.

PART II.

THE first part of this article dealt mainly with the general characters of lizards, and their systematic position in relation to closely allied groups, so now we introduce some of the various kinds.

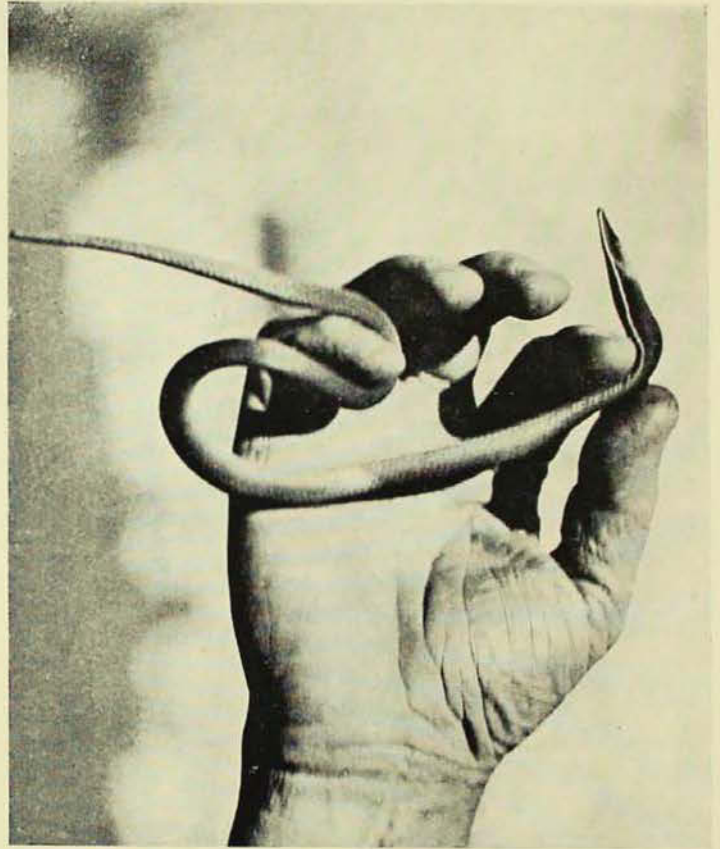
LEGLASS LIZARDS.

The Legless Lizards, or snakes with fins, as they are sometimes called, were dealt with in the pages of this MAGAZINE some years ago (Vol. ii, No. 12, 1926, p. 426), whilst the Geckos were described a year earlier (Vol. i, 8, p. 247); therefore only brief reference will be made to them here.

The Legless Lizards are the most snake-like of the whole group; a very small species, known as *Delma fraseri*, being brown with a black head and a black collar, is so much like a young brown snake that at a distance of a few feet even a specialist might be forgiven for failing to identify it as a lizard. The common Scale-footed Lizard, *Pygopus lepidopus*, which attains a length of about 27 inches when fully adult, is also often mistaken for a snake, particularly when reddish or olive brown in colour, these being the two commonest colour types. This species has a blunt and very snake-like head, but is very variable in colour and pattern, some bearing longitudinal stripes of white, brown or black, others having white or black spots all over the body.

The best known and most widely distributed of the legless lizards is a very sharp snouted one, *Lialis burtonis*, in which the hind limbs are reduced to one scale in length.

Though the external portion of the hind limb in legless lizards is reduced to an



Lialis burtonis, a common type of legless lizard.

almost invisible flap, internally the leg bones are well developed. As it is with most of the skink family, the tails of legless lizards are exceptionally brittle, and if the creature be roughly handled the tail might break into several pieces. The tail, by the way, may be from four to six times as long as the head and body.

The food of these snake-like lizards is very variable, and consists mainly of insects; but *Lialis* occasionally eats other lizards. Though they adopt a vicious attitude when cornered, and squeak a little, they are absolutely harmless.

Diplodactylus vittatus, a
harmless wood gecko.

Photo.—J. R. Kinghorn.



GECKOS.

The interesting and harmless little geckos are much maligned, the common, broad-tailed rock geckos often being referred to as rock adders, whilst those found under the bark of trees are called wood adders. Most geckos are nocturnal in habit, and move about during the evening and night after insects. In some eastern countries they are regarded as sacred, and are encouraged to live in the houses, where they run over the walls and ceilings, devouring flies and mosquitoes. Geckos have a voice, and emit a peculiar little yap or bark when cornered, one species being known as the barking lizard. As geckos are absolutely harmless, the bark can be regarded as worse than the bite.

SKINKS.

The skink family, containing all the shiny-scaled, slippery lizards, is easily the largest of the whole group, and it has representatives in all parts of the world. Various species of this family are just commencing to come out from their long winter rest, for in cold and temperate climates most lizards hibernate during the colder months of the year. To enable them to do this, sufficient fat is stored up by the end of the summer to keep them alive for some months of inactivity, and when they emerge in the spring time their condition is very poor.

In the spring, and even during the summer, it is not unusual, when digging

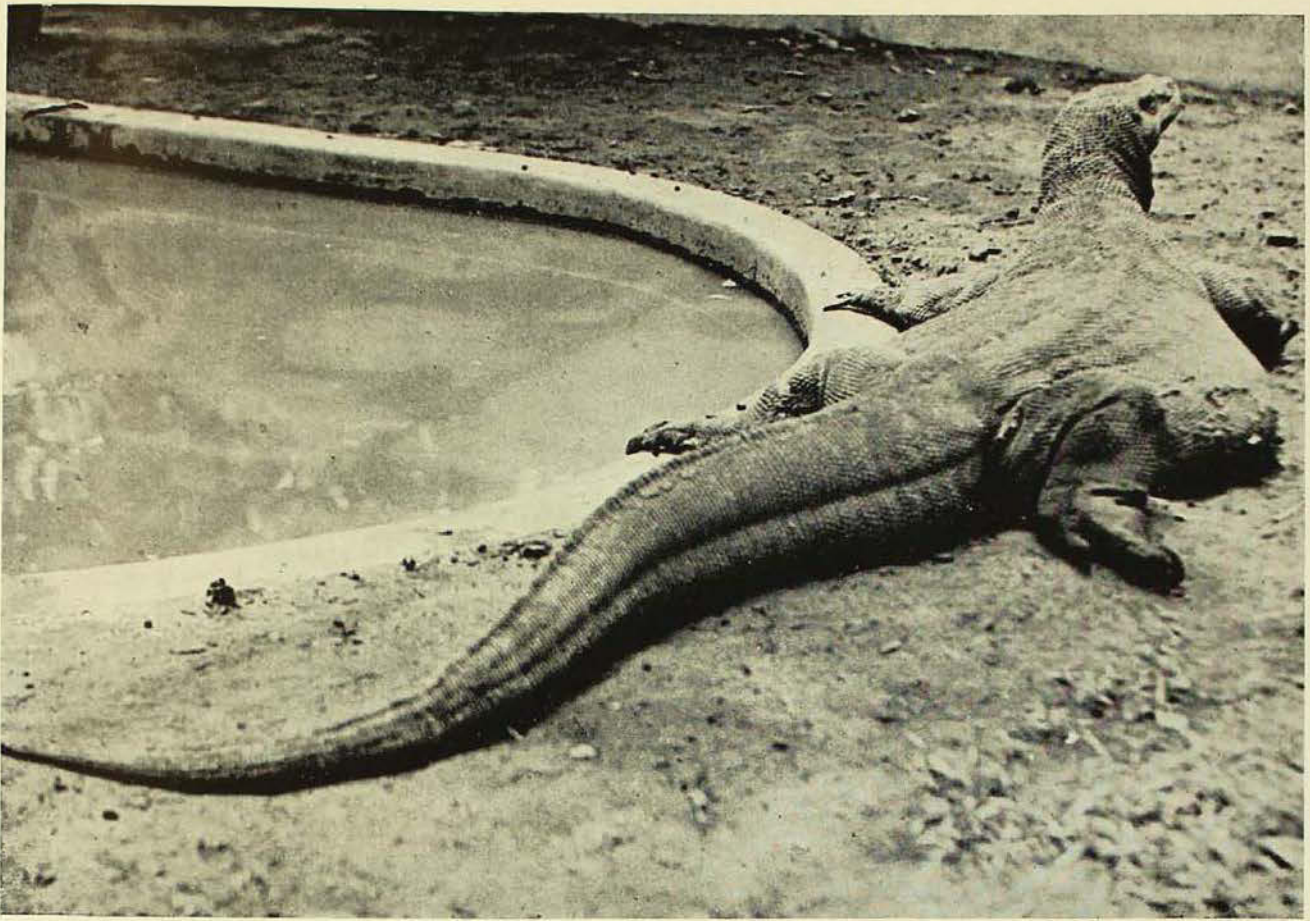
in the garden or the mulch heap, to disturb small lizards. One particular type, known as *Lygosoma Siaphos aequale*, which grows to about six inches in length, is brownish-black above and salmon below, and has mere pin points for limbs. Many of these are forwarded to the Museum during the lizard season labelled young black snakes, and the donor is generally most surprised and relieved to hear that they are lizards and are quite harmless.

Lizards in the garden are the gardener's best friend, and that large and well-known skink, the Blue Tongue, is the most valuable of them all. Blue Tongue Lizards of the genus *Tiliqua* make good pets and are easily fed, being partial to snails.

GOANNAS.

The giant lizards of Australia are the goannas, known in India, Southern Asia, and Africa as monitors. Whilst the largest of the group is the Komodo Dragon, *Varanus komodensis*, which attains a length of about twelve feet, the Parentie (*Varanus giganteus*) of Central Australia, growing to about eight feet, is undoubtedly our largest species. At mention of the name goanna, one conjures up visions of extra large lizards; but all the varanids are not large, there being at least four species, two from Central Australia, which are not longer than twelve inches when fully adult.

Goannas are rather voracious eaters, and will eat almost anything. Most are



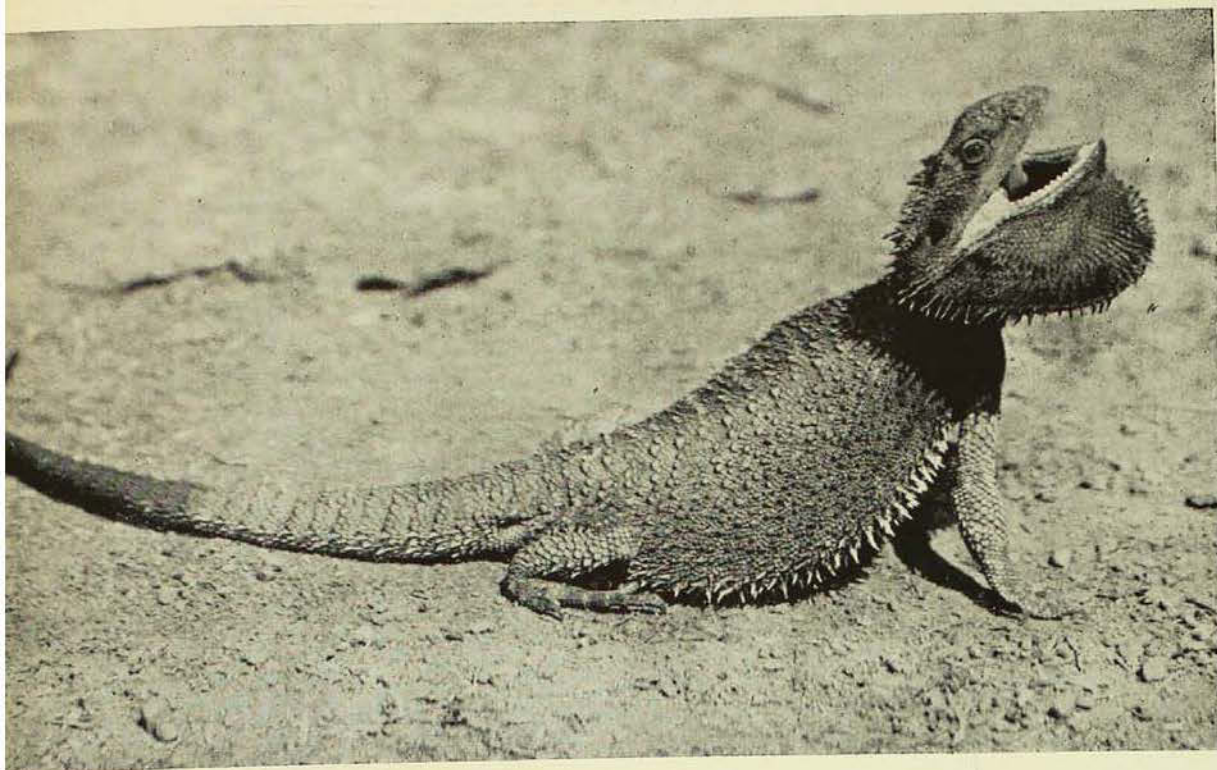
Komodo Dragon, Varanus komodensis.

Photo.—John Williams.

excellent climbers, and devour the eggs and young of tree-living as well as ground-nesting birds. They eat rats, mice, and young rabbits, whilst some raid poultry runs with disastrous results. Goannas have very sharp teeth and can give a nasty bite which might cause blood poisoning if not carefully treated; they can also inflict a flesh wound with a flick from the tail. These lizards are decidedly destructive and a menace to the native fauna; but commercially they are valuable, not only for "goanna oil", but mainly for their skins, from which a tough and beautifully patterned leather is made for the manufacture of shoes and other articles.

Goannas must not be confused with iguanas, the latter being chiefly American, with one species from Fiji Islands and another from Madagascar. Whether the name goanna is a corruption of iguana, or of aboriginal origin, has not yet been satisfactorily settled.

It might be mentioned that the smallest of the iguanas is one known as the Horned Lizard or Horned Toad, *Phrynosoma cornutum*, of the United States of America. It is about five inches in length, and in general appearance is very similar to our extraordinary *Moloch horridus*, or Thorny Devil, from the southern parts of Central Australia. The Moloch, a typical desert lizard, though dangerous-looking, is very gentle and most inoffensive. Its mouth is very tiny, situated on the under-side of the extraordinary horned head, and is only large enough to catch and eat the small ants on which the lizard feeds. Though a few people have succeeded in keeping Thorny Devils as pets for some years, such cases are exceptional. Once it was customary for travellers crossing the Nullabor Plain to purchase these attractive lizards from the natives, and bring them home as pets; but quite nine out of every ten died from starvation.

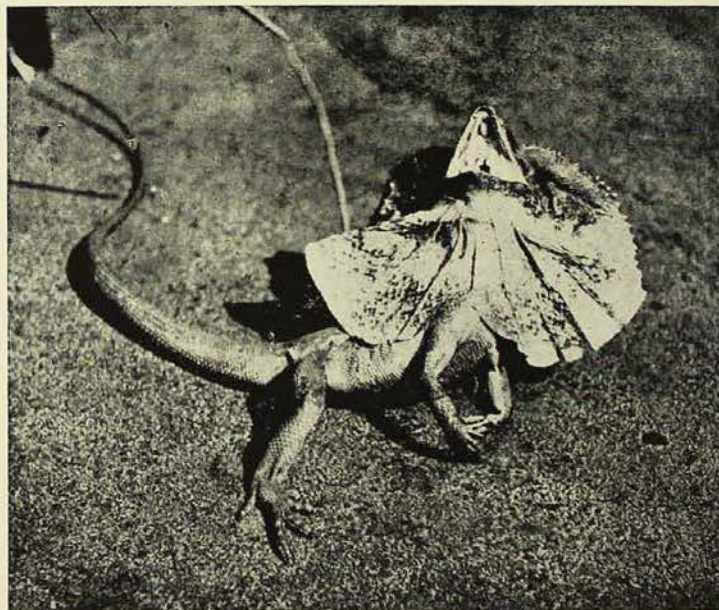


*Jew or Bearded
Lizard,
Amphibolurus
barbatus.*
Photo.—H. C. Barry.

AGAMOID LIZARDS.

The Thorny Devil, though very different in appearance to the Jew Lizard, is a member of the same family. The Jew Lizard, or Bearded Lizard, *Amphibolurus barbatus*, is commonly referred to as "frilled lizard" in many parts of Australia. There are several species, very widely distributed over the continent; some grow to about twenty inches in length, whilst smaller relatives, called "jacky lizards", attain a length of only five inches when fully adult. All are insectivorous, and therefore of more or less economic value to agriculture.

The Jew Lizard does not produce a true frill, but merely puffs out the loose skin on the chin and sides of the throat when annoyed, and the effect is very different from that characteristic of the true Frilled Lizard, *Chlamydosaurus kingii*, of northern Australia and parts of Queensland. This species has a true frill, and one of great expanse. When at rest the frill folds neatly and tightly over the neck and shoulders, but when the lizard becomes annoyed or aggressive it opens its mouth and erects the frill with the aid of greatly developed hyoid bones, which



Frilled Lizard, Chlamydosaurus kingii.
Photo.—J. R. Kinghorn.

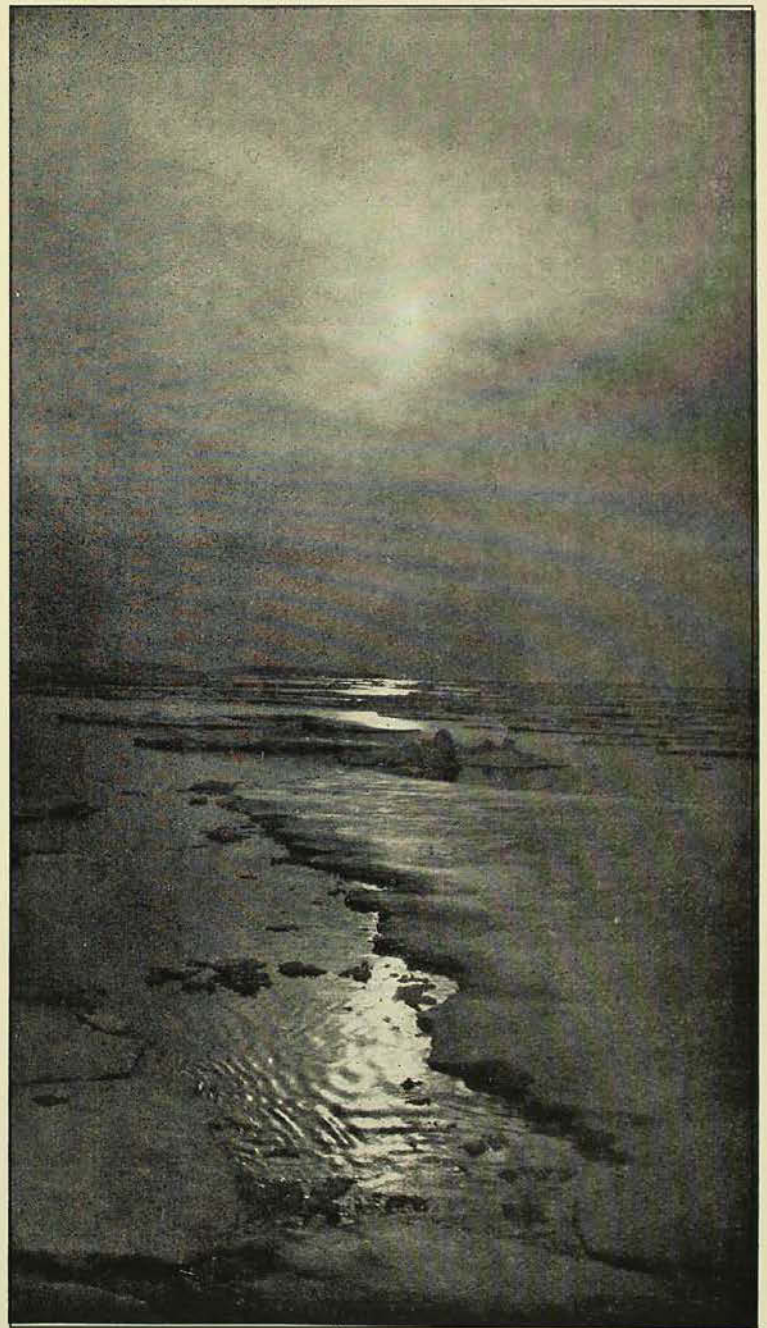
might be likened to the ribs of an umbrella. This attitude of aggression generally succeeds in frightening away most of its enemies. Unlike the Jew Lizard, the Frilled Lizard is not entirely insectivorous, but devours other small lizards. When fully aroused, it might be regarded as the most startling member of the whole tribe.

Great Britain's Most Isolated Outpost of Empire

By HAROLD O. FLETCHER

HEARD ISLAND is one of Great Britain's loneliest and most isolated sub-Antarctic possessions. Situated as far south as 53° , the island lies in one of the stormiest sections of the Southern Ocean. The rugged and forbidding western coast is continually lashed by the tremendous seas of these latitudes, which gather in size and bulk as they sweep free and uninterrupted around the globe. Large logs from the lumber camps of South America have been swept south by favourable currents, and these, during the height of a gale's fury, have been hurled unbelievable distances inland from the beaches. The westerly winds blow almost continually at high velocities, and fine weather with a calm sea is rarely experienced for more than one day in a month.

In Cape Town we had been told by the sealers that a landing on Heard Island is always a difficult and hazardous undertaking and frequently impossible. The island is about twenty miles in length and eight miles wide, elongated in a west-north-west by east-south-east direction, with a high precipitous coast-line and a large mountain mass which towers to a height of over 7,000 feet above sea-level. Originally named Kaiser Wilhelm Peak, this mountain is now known as Big Ben. Its mass takes up practically two-thirds of the island, while the summit, almost perpetually obscured in cloud and mist, is rarely seen. During the winter months the whole island is snow-clad and everything is frozen, so that sealers who have been marooned have had to melt snow or ice for drinking purposes. In the summer season the northern part is free from



South of Heard Island lies the Antarctic Continent—the midnight sun shining across broken pack-ice.



A Rock-hopper Penguin rookery on the rugged coast-line of Heard Island.

ice, but south of a black sandy plain, from Corinthian Bay to South-west Bay, are huge glaciers, which extend to sea for considerable distances and cover the remainder of the island. The great height of the mountain and consequent area of high land over which ice is accumulated account for the large glaciers of Heard Island.

EARLY HISTORY OF HEARD ISLAND.

The island was first discovered in the year 1853 by Captain J. J. Heard, of the barque *Oriental*, when on a voyage between Boston and Melbourne. Many sub-Antarctic islands were found in this way, by chance, whereas ships sent out by the many nations on voyages of exploration frequently passed in close proximity to islands discovered years later. Heard Island has always remained British territory. It is situated about three hundred miles south of Kerguelen Island, a large French sub-Antarctic possession. The French claim to this island has been actively maintained in recent years by the permanent residence of a French family at Gazelle Basin.

Since the discovery of Heard Island the only vessels visiting the island were sealing ships, and parties of men from these were frequently left on shore for a complete season to slaughter the sea-elephants for their oil. Underground huts were built as a protection against the strong winds and the cold, and these huts are still in a fair state of preservation, though now overrun by sea-elephants and penguins. On several occasions the sealers left on the island were not relieved owing to the ship being wrecked or the company going out

of existence, and stories have been told of wild-looking men, with hair grown long and clothes of seal-skin, wading into the surf and imploring the men of visiting ships to take them off.

In 1855 the island was visited by Captain Rogers, of the American whaler *Corinthian*, and his four tenders, the *Atlas*, *Mechanic*, *Exile* and *Franklin*. Being the first sealers to visit the island, they entered a virgin field, and reaped a rich harvest, procuring in one day alone five hundred barrels of oil. After that visit the American sealers established a base at Heard Island, but owing to the continual bad weather it was not continued. The relief ships arrived usually in October, and the barrels of oil were rafted out to them through the heavy surf, hazardous work, and lives were frequently lost.

The only scientific party that had previously landed on the island were members of the "Challenger" Expedition, when on the morning of the 6th February, 1874, they arrived off the island in fairly boisterous weather. They were assisted ashore by the sealers, but had to return to the ship before the end of the day owing to the wind increasing and placing their ship in danger. On the 7th the *Challenger* had to move away from the island. Many observations were made by the scientific party during their short stay, particularly on the flora and geology of the island.

LANDING ON HEARD ISLAND.

Previous to the visit of the British Australian New Zealand Antarctic Expedition to Heard Island a great

amount of scientific work had been carried out on Kerguelen Island. Many of the fjords were charted during our three weeks' stay. On the 4th November the ship left Royal Sound, and as we sailed south the peak of Big Ben Mountain was sighted three days later. An anchorage was made in Corinthian Bay in the shelter of the eastern glacier-face. The weather was ideal, a bright sunny day and a flat calm sea. The launch was swung over the side, and the landing party with their equipment proceeded ashore to do at least two days' investigation of the island and its fauna and flora. The surf on Corinthian Beach was too heavy to attempt a landing, so we made our way around the rugged coast-line, on which we could see countless penguins in their rookeries. After travelling several miles, we rounded Roger's Headland and entered Atlas Cove, a beautiful little harbour surrounded by snow-capped hills, but too shallow for the ship to enter. A landing was easily effected on the beach in a nicely protected corner, and before long we had made ourselves at home in a hut which was discovered nearby. The hut had been built by sealers in case anyone was marooned on the island, and it contained large supplies of food. Large barrels of bread husks and tinned meats were stored in the hut, sufficient to last a stranded party for a long period.

The black volcanic sand beaches of Heard Island are covered with the remains of thousands of skeletons of sea-elephants, mute testimony to the havoc wrought by old-time sealers and even those of the present day. The old rookeries

of these animals were marked by the huge quantities of skeletons in a small area, their orderly arrangement showing that the sea-elephants must have calmly awaited their death, little knowing that the strange visitors to their shores brought death and destruction to their island home.

GEOLOGICAL FEATURES OF THE ISLAND.

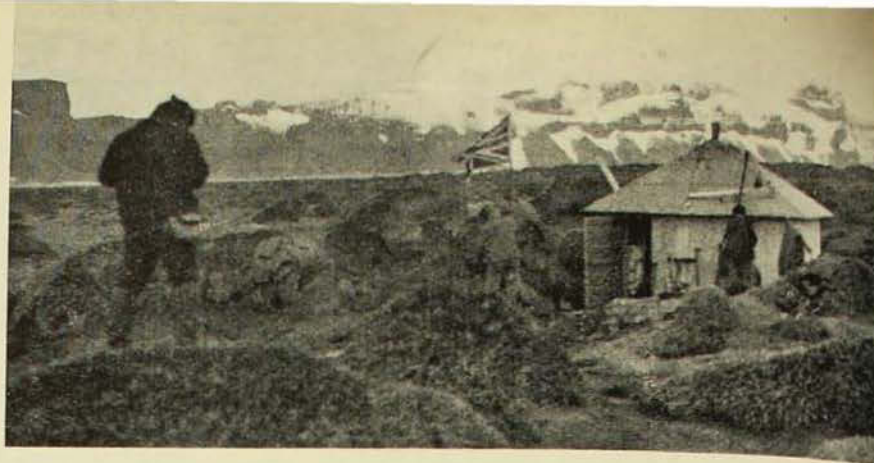
Big Ben Mountain overshadows the island, and is an effective barrier against passing to the southern end of the island on land, as the glaciers which spread out on either side and into the sea are heavily crevassed. A journey by small boat around the glacier face is a most hazardous one, as large masses of ice are constantly falling into the sea; the wave action against the ice-front is constantly undermining it and large overhanging blocks, without any warning, collapse and crash into the sea with thundering roars that can be heard for miles. The displacement of water by some of the larger blocks is so great that the resultant spray appeared to climb steadily into the air for an incredible time and then, slowly stopping, gradually descended until quietness reigned again. In the early days of sealing a boat's crew was overwhelmed when a large ice mass weighing hundreds of tons crashed on to the boat from a height of over eighty feet.

The glacier rested directly on the black volcanic sands and then, extending out to sea, finally ended as a floating mass. From the beach it was possible to walk into large caverns and passages formed in the northern front of the glacier, ice

Members of the expedition going ashore. The leader, Sir Douglas Mawson, is at the tiller.



This hut was erected and stored with provisions for marooned sailors. Atlas Cove in the distance.



caves of enormous magnitude, showing structures of all descriptions. Large masses of rock plucked from the mountain-side by the glacier were distinctly visible in the clear ice overhead as they were imperceptibly, but surely, moved forward to the glacier face. Although the sight was one that would never be forgotten, a prolonged stay in the caverns was uninviting, as every few minutes the beach would heave and shudder as the glacier with its colossal bulk strained and groaned.

The night of our landing was marked by the rising of the wind, and with it came thick snow storms and icy sleet. Immediately we heard the thunder of the surf on the beaches, and feared for the safety of the ship, as she was anchored in an exposed position.

We were safely ensconced in the hut, with the stove fuelled to such an extent that the heat became almost unendurable. All through the night members of the party continually went outside to get cool, only to have to return to get warm. This vicious circle continued until the stove burned itself out in the early hours.

An unwelcome visitor into the hut was a large sea-elephant, which, pushing open the door, shuffled in almost on top of one of the party sleeping on the floor. His excited cries and the frightened grunts of the sea-elephant awakened everybody, and a perfect half-hour was spent in watching the efforts of our colleague in ejecting his unwelcome bed-mate. Moving backwards, it became jammed in the doorway, and it was not until three others assisted that the sea-elephant took itself off, muttering angrily, no doubt at our lack of hospitality.

On the day of our landing we had noticed while rounding Roger's Headland three large, fantastically shaped, conical masses. These had aroused our interest and speculation, particularly one large mass which rose to a height of over two hundred feet. An examination proved this to be the remains of a broken down volcanic crater, the outside surface showing distinct laminations of the lava as it had welled out of the vent and hardened in the cool air. The weather side had been completely worn away and exhibited the central core or pipe. The rock surface of the whole headland is composed of a fresh laval flow, with a peculiar smooth, but irregular, surface, and is honey-combed with small caverns. Beautiful examples of ropy lava were visible in such a good state of preservation that there is little doubt that eruptions have taken place on the island within comparatively recent times. The caverns and ledges throughout the lava were utilized by the rock-hopper penguins for their homes, and at our approach they would pop their heads out through small apertures to see who was visiting them.

Heavy storm clouds were banking up all the morning, and the wind had even increased in velocity since the night before, bringing heavy snow storms and making visibility very poor. Several of the party climbed the cliffs to see how the ship was faring, and were just in time to see her plunging and rolling out to sea. We were relieved to see her reach the open sea and safety, but wondered when we would see her again.

Between the northern headlands and the glaciers of Big Ben is a flat sandy area which forms the head of four bays, Atlas

Cove, Corinthian Bay, South-west Bay, and West Bay. At high tide and with a westerly gale blowing, the waters from either side of the island nearly meet in the centre. This area forms almost a natural funnel through which the wind seems to roar with increased velocity, and at times it was found impossible to walk against it. We collected from this area a number of small rocks which had been worn smooth and into a series of faces by the abrasion of the wind-driven sand; these are known as dreikanter.

THE FLORA.

As the island suffers from constant high winds and is snow-covered for the greater part of the year, it is not surprising to find the flora of the island very poor in species. An extensive area of the sandy plain is covered in more or less sheltered positions with a moss-like plant called *Azorella*. This plant occurs in large flat hummocks, separated from one another by ditches of mud in which the sea-elephants rolled to their hearts' content, and slept for days on end. On some of the hummocks tufts of grass grew in small quantities and were identified as *Poa cookii*. This type of grass was in full flower, and as a rule each tuft served as a nest for the white-eyebrowed "Johnnie" or Gentoo Penguin. The Kerguelen Island cabbage, *Pringlea antiscorbutica*, is common on Heard Island, but not nearly in such quantities as on Kerguelen Island, while its size, particularly of the fruiting stems, is much smaller. The cabbage was in fruit in some cases, while in others the plant was still flowering. The only other vegetation of any distinction found on Heard Island is a type of British plant known as *Callitriche*, and a common Kerguelen Island plant, *Colobanthus kerguelensis*, which in favourable spots grew in greater abundance than at Kerguelen.

It is a remarkable fact that the flora of the sub-Antarctic islands consists mainly of flowering perennial plants, not annuals, that not only is it evergreen, but some of the species flower in mid-winter.

THE FAUNA.

During our four days on the island a continual watch had been kept lest the ship should return to the anchorage in Corinthian Bay. Late on the fourth day she appeared in sight, rolling and pitching in the huge seas, and made in-shore. The wind had not lessened, and we signalled that it would be impossible for us to reach the ship in the launch. The anchorage was still unsafe, and the *Discovery* again turned for the open sea and soon disappeared in the mist.

The sealers at Kerguelen Island had told us that they considered themselves fortunate if they could make a landing on Heard Island once a month; we were now beginning to realize the truth of their statement. Already we had been on the island two days longer than anticipated, with no likelihood of being taken off for several days to come. Continual scientific work was being carried out, however, and in that respect our enforced stay was a blessing in disguise. Practically no record of any description of the bird life had been made, and so in this virgin field our ornithologist was continually making notes and investigations.

The penguins were represented mainly by the large rookeries of Macaroni Penguins at Roger's Head, where an estimation of at least two million birds would have been a minimum. They were nesting during our visit, and many of their eggs were taken and made into beautiful omelets by Captain Hurley, as by this time our food was depleted. The Macaroni Penguin, *Eudyptes cristatus*, is a fair-sized bird, with a long crest of a delicate yellow to orange colour.

On Red Rocks a large rookery of Rock-hopper Penguins was found, equalling in size any other rookery we had seen of this species. Associating with them, but not on a friendly basis, were the Paddy Birds or Sheathbills (*Chionis alba*), who were ever on the alert for a penguin to leave the nest, when they would swoop down, snatch the egg, and, carrying it for only a few yards, would sit down and eat it in front of the frenzied penguin. Beyond becoming greatly agitated and uttering

A black and white iceberg. This rare type of berg was sighted south of Heard Island.



harsh cries of anguish, the female penguin usually accepted such a happening philosophically, and later would return to the nest as if nothing had happened.

The Gentoo Penguin, *Pygoscelis papua*, does not usually occur in large numbers, and place their nests some distance apart, so that the crowding so common amongst the other penguins is absent. The Gentoo Penguins are very stately birds, and walk in a very dignified manner. They are undoubtedly the "Beau Brummels" of the island, and needed only walking sticks to complete the picture.

The flying birds consist mainly of Whale-birds or Fairy Prions, and these daily made flights to sea in tremendous flocks to feed. At dusk they returned to the island, and had to fly the gauntlet of many skua gulls. Continual warfare is waged between these small delicate marine birds and the Skua Gulls, *Catharactes antarctica*, which have been aptly named the vultures of the south. Every evening before dusk the skua gulls go aloft, and, flying high overhead, await the return of the prions. As the prions fly for safety, the skua gulls dive in amongst the flock, killing dozens every evening. After the prions have passed through the barrage and reached the safety of their burrows, the gulls return to the ground and feed off the bodies of their fallen prey. The ground near Roger's Head is almost completely matted with the pelts of the unfortunate prions, and gives one a very good idea of the numbers killed in this interesting phase of the survival of the fittest and the unceasing fight for food that is waged in these latitudes.

Several new varieties of prions were found nesting in burrows, and a new

species of cormorant was also found on the island, which appeared to be closely related to a South American species. As the cormorants are very poor fliers, never trusting themselves far from land, one usually finds a distinct species on each island in these seas.

The only insects found on the island were a few species of inactive wingless flies and a few moths. A large apterous fly common to Kerguelen Island was found amongst the leaves of the Kerguelen cabbage, while a few beetles were collected from the roots of the *Azorella*.

After our ninth day on the island the ship again appeared in sight, and signalled us to come off, although the seas were still very high. The wind was showing no signs of decreasing, so it was decided that three of the party make an attempt to reach the ship. Rounding Roger's Head the launch had to be taken well out to sea, as the waves were breaking from the reef to the headland. From the cliffs we could see the party experiencing great difficulty in making headway, and it was with relief that we saw them, after several hours at sea, range alongside the ship and get aboard. The launch was then hauled on board. Next morning the launch returned, although the wind had increased and visibility was poor owing to continual snow storms, the remainder of our equipment was packed, and the return trip started from the comparative calm of Atlas Cove. Visibility was so poor that a compass course was steered, and it was several hours before we sighted the ship, although we had been cruising backwards and forwards quite close to her for some time. The ship was rolling

so much that it looked impossible to board her, for one minute we would be admiring the keel and the next minute looking down on the deck. Life lines were thrown to the party, and we were slowly transferred, half frozen and covered with snow.

As we steamed slowly away from this inhospitable but most interesting sub-Antarctic island southwards for the Antarctic Continent, it was agreed that we were exceptionally lucky to arrive off the island on a day a landing could be made.

The Nature Lore of Lafcadio Hearn

By GILBERT P. WHITLEY

The wild ducks flying through cloud mist seem to me like letters traced in flowing ink.—Japanese poem.

WHEN dealing with quaint tit-bits of nature lore, several contributors to this MAGAZINE have quoted the writings of Lafcadio Hearn, so that a sketch of this author and his work, so far as it affects us as nature lovers, may not be out of place here. But first a few words concerning our scribe himself.

Lafcadio Hearn was born on an island in the Ionian Archipelago on the 27th of June, 1850, his father being an Irish soldier and his mother a Greek of mixed blood. He went to school in the Levant, Ireland, England, and France, and later migrated to the United States, where he became a journalist. His literary output was considerable, and his reading, in many languages and in the oddest literatures, was immense; this is the more remarkable because he was practically blind in one eye. During the 'eighties, this "little genius" lived and laboured in the southern States and the West Indies, finally proceeding to Japan in 1890. Here he adopted the name Yakumo Koizumi, married a Japanese lady, and became professor of English at the University of Tokyo. His lectures on the history of English literature have been preserved for us by his students, and are masterpieces of simple exposition. Hearn was also unrivalled as an interpreter to Western readers of Japanese life. He died in Tokyo on the 26th of September, 1904.

Hearn loved to write about bizarre subjects; he composed essays and stories recording strange facts and legends dealing with little known oddities.¹ His prose was most painstakingly polished, so that every word had its proper place in the sentence, exact meaning, and "colour" to a most sensitive degree.² Although Hearn was not a professed naturalist, he was a minute observer, and a confirmed evolutionist, so that we encounter in his works references to a surprising number of animals (sometimes even with their technical names, as in the tale of the sacred serpent, *Pelamis bicolor*, in *Glimpses of Unfamiliar Japan*). We must quarry through some forty volumes of his heterogeneous writings to find the nature notes, but the quest is pleasant and the rewards are greater than I can hope to show. There is, for instance, in *Exotics and Retrospectives*, a paper on poems about frogs,³ and another on insect musicians, sandwiched between travel notes, literary researches, and some very abstract essays. Again, amongst some delightful stories in *Kotto*, we find a chapter on fireflies which must surely

¹ Notably in *Exotics and Retrospectives*, *Stray Leaves from Strange Literature*, *Kwaidan*, *Some Chinese Ghosts*, etc., and even in his early American newspaper articles.

² "Words are very much like lizards; they change colour according to position."—Hearn, *Life and Literature*.

³ See also Fawcett's poem "To a Toad" quoted in Hearn's *Letters from the Raven* and the latter's *Les Grenouilles*.

have involved years of patient research for its production. Some of Hearn's firefly studies were later set to music. The entomologist will find more charming chapters on Japanese insects in *Kwaidan*, illustrated by a native artist. Here are quaint Chinese and Japanese stories of butterflies, mosquitoes, and ants, gleaned from much Oriental literature unavailable to foreign students. Many of these tales are tinged with Buddhist ideas of reincarnation, and Hearn, in one of them, whimsically imagines his fate if he were reborn as a mosquito: "I want to have my chance of being reborn in some bamboo flower-cup, or *mizutamé*, whence I might issue softly, singing my thin and pungent song, to bite some people that I know." Again, in "Torn Letters" (*Miscellanies*, ii, 56), he relates an amusing dream in which he is an insect with a human brain.

Hearn's *Japanese Miscellany* contains what is virtually a pocket illustrated monograph of dragon flies, with picturesque quotations, each of which evokes an impression of a Japanese artist's painting. For example,

Lonesomely clings the dragon fly to the under-side of the leaf.

Ah! the autumn rains!

or again,

See! the dragon fly settles down to sleep on the rod of the unskilful angler!

Many of the poems and songs must be read with Hearn's annotations so that the play upon words in the exquisite originals may be better understood. Hearn was a keen collector of poems about insects,⁴ especially Japanese ones, and in *Books and Habits* we find extracts from English and French poems with his usual matchless paraphrases. He was fond of insect song, whether it was that of the raucous *sémi* (cicada) or stridulating locust, and he notes that Keat's poem on the grasshopper is the only one of its kind in English literature. In *Life and Letters*, however, he discovers Lovelace's seventeenth century poem on this insect

(Hearn does not mention Leigh Hunt's sonnet on *The Grasshopper and the Cricket*, written at the same time as Keats').

The cut and colours of butterflies' wings in F. W. Dury's museum inspired a most literary newspaper article in 1876, whilst Hearn also referred to Japanese insects in his *Letters of Ozias Midwinter*. The cicadas of Japan are illustrated in *Shadowings*, with delicate pieces of poetry:

Lo! on the topmost pine, a solitary cicada
Vainly attempts to clasp one last red beam of sun.

This study is followed by an essay on Japanese female names, many of them "zoological" and reminding us of the Buddhist names of plants and animals in Hearn's *Japanese Miscellany*.

Puzzled by the phrasing of a Chinese proverb,

The silkworm-moth-eyebrow of a woman is
the axe that cuts down the wisdom of man,

Hearn studied silkworms and the antennae of the grown moth, and wrote a dainty sketch on this subject in his book *In Ghostly Japan*.

"A Bird Store Reverie" is the title of an article reprinted in *Miscellanies* nearly fifty years after its first appearance in an obscure newspaper: Hearn sees and describes birds in a shop window, also a nearby boa-constrictor and an alligator, and around these creatures weaves a scholarly fantasy on the mystic history of doves and serpents, with a wealth of classic and exotic references. In *Two Years in the French West Indies*, various interesting animals of Martinique are mentioned, and the centipede (*Bête-ni-Pié*) has quite a chapter to itself.

Hearn made only passing references to fishes: to the carp in Japanese wells, to the fish symbols carved on the feet of the Buddha, to Christopher Smart's remarkable lines on the swordfish, or to the varied fishes of the West Indies; but he gave one or two glowing pen pictures⁵ of their colours:

⁴ See his *Japanese Lyrics, Insects and Greek Poetry, Insect Literature, and Insectes musiciens*.

⁵ *Two Years in the French West Indies, and Life and Literature*.

Such the colors of the *carangue*, when the beautiful tropic fish is turned in the light, and its gem-greens shift to rich azure and prism-purple,

or

. . . marvellous little fishes, which, in dying, took a thousand different shapes of changing colour.

It was like an agony looked at through a prism.

"Creole Crab" or "Why Crabs are Boiled Alive" is one of the drollest of Hearn's many quaint stories about crabs. It consists of a curious conversation⁶ between two women, their Creole French idioms being very literally translated:

And for why you have not of crab? Because one must dem boil live. It is all vat of most beast to tell so. How you make for dem kill so you not dem boil live? You cannot cut dem the head off, for dat dey have not of head. You cannot break to dem de back, for dat dey not be only all back. You cannot dem bleed until dey die, for dat dey not have blood. You not can stick to dem troo de brain, for dat dey be same like you—day not have of brain.

The newspaper readers of Hearn's day must have been startled to read his articles on cockroaches, mosquitoes, "News about Ants", studies in cats, animal legends from the Talmud, rats and pied pipers, bird superstitions of the Voodooists, and even upon the odours of bats and of young animals (*parfum de jeunesse*). Yet most of these were scholarly items, except in a few cases where a flippant effect was achieved.

In *Gombo Zhèbes* (1885), Hearn listed numerous Creole proverbs, from which I select a few animal ones:

It is because of his good heart that the crab has no head.

The crab doesn't walk, he isn't fat; he walks too much, and falls into the pot.

'Tis the rat eats the cane; but the lizard dies for it.

The mosquito loses his time when he tries to sting the alligator.

The mosquito is little; but when he sings, your ears are full of him.

One could cite many more, to say nothing of Hearn's references to trees, flowers, and plants, and his weird verses, composed in some Louisiana swamp, about the Spanish moss, but separated quotations lose the flavour of the original context. So if you seek odd tales of Chinese ghost-foxes, sharks and goblins, dragons and monsters, legends of cats, tortoises, spiders, flies, pheasants and birds of prey, you will find them in the pages of Lafcadio Hearn. Would you hear the voices of the nightingale, the cicada, or the grasshopper, or study snails, frogs, hares, and snakes—anything, almost from cattle to cuttles—from a refreshing literary viewpoint, then may I advise you to search the pages of *Kotto*, *The Romance of the Milky Way*, *Japanese Lyrics*, even the early novels *Youma* and *Chita*, but, above all, of the West Indian and Japanese books of Lafcadio Hearn. His writings have been translated into many languages. One booklet, *Aphrodite and the King's Prisoner*, was printed in Sydney in 1929, and is an interesting item of Australiana. Australian animals are mentioned in only one of Hearn's books, for in his *Glimpses of Unfamiliar Japan*, he noted a kangaroo and an emu as curious exhibits at Japanese fairs. Appreciation of his work is growing in Australia, nevertheless, as discriminating readers show, and as several articles bear witness.⁷ The naturalist who loves literature as well as his "books in the running brooks" can ill afford to miss Lafcadio Hearn.

⁶ Quoted from the *New Orleans Item*, Oct. 5, 1879, in *Creole Sketches*; also in Tinker, *Lafcadio Hearn's American Days*, 1924, p. 82.

⁷ *Sydney Morning Herald*, 29 June, 1936 (in an article on the Finnish *Kalevala*), and 27 Oct., 1934; also in the *Australasian*, 14 Nov., 1931, and *Daily News* (Perth), 30 April, 1932.

Australian Shells

Helmet, Tun, Fig, and Egg Shells, and the Cowries

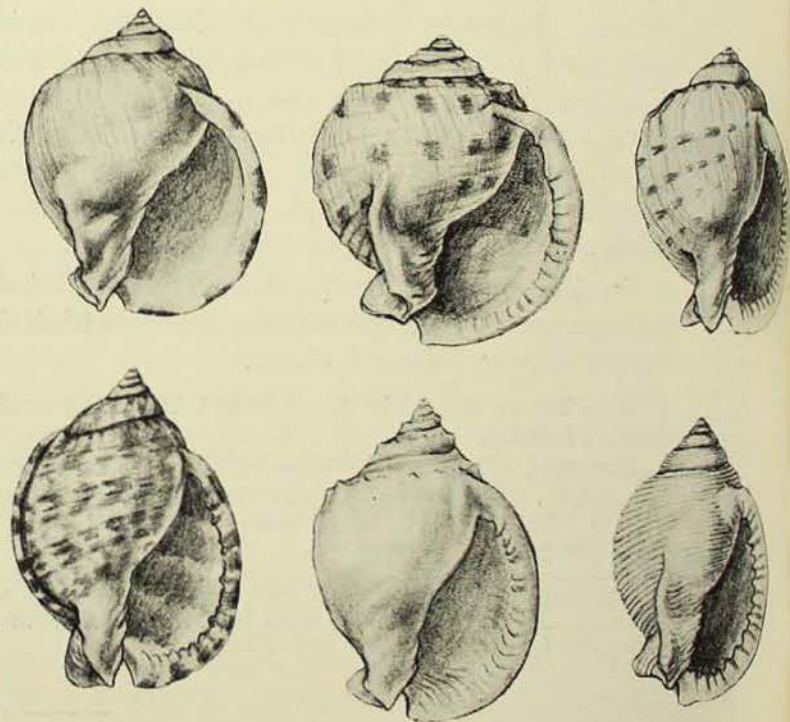
By JOYCE ALLAN

AUSTRALIANS are indeed fortunate that in the waters surrounding their continent there are to be found so many handsome representatives of the Helmet, Tun, and Egg Shells, and the Cowries (Figures 1-22). Many of them are very large and make handsome ornaments, but, whether large or small, their graceful structure and beauty of colouring always attract the attention of the amateur collector, just as their other characteristics interest the research worker.

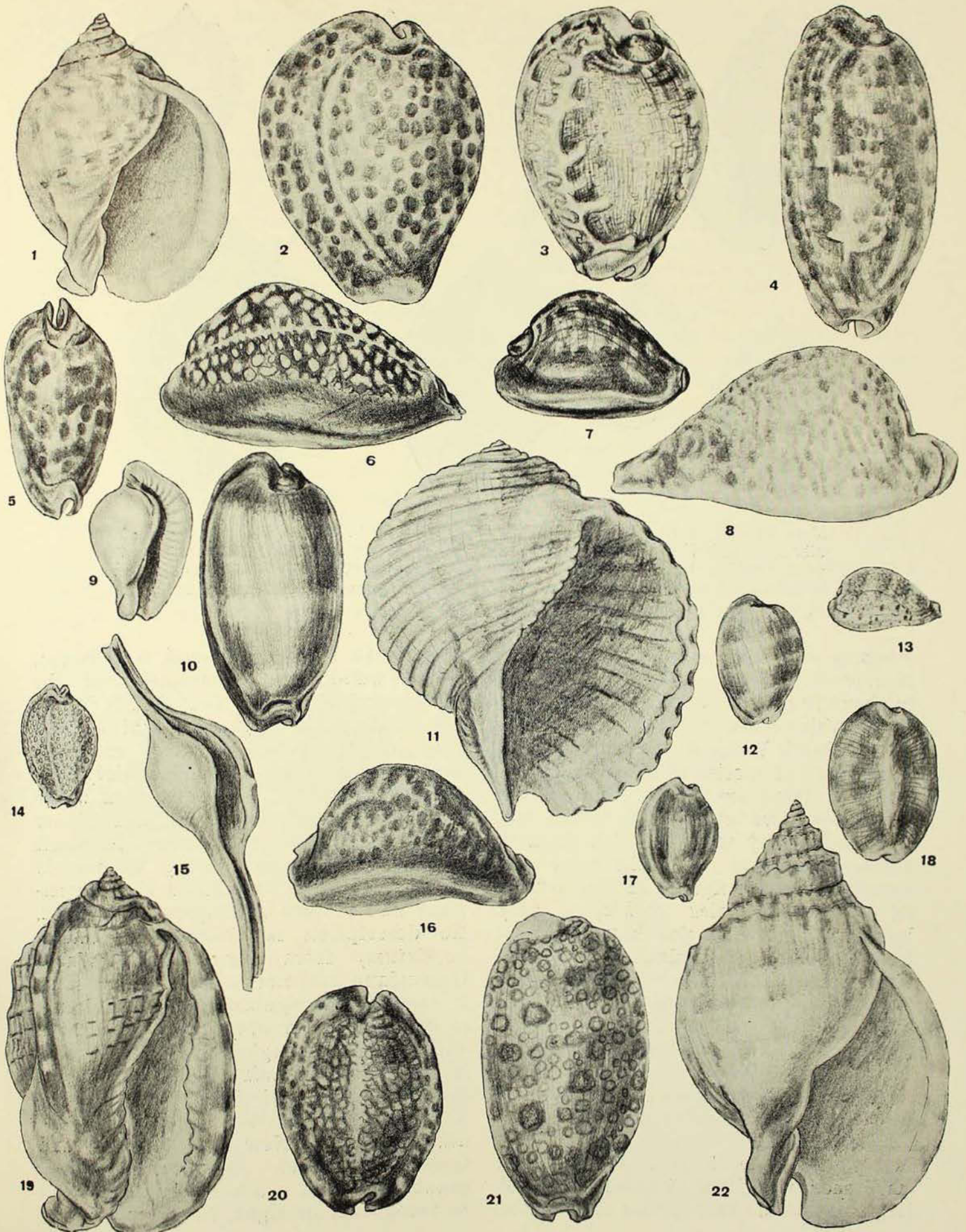
HELMET SHELLS.

The Helmet shells are also known as Cameo shells, because cameos are carved from many of the stronger and larger species. The resemblance in their shape to that of the old Roman helmet is responsible for the use of the more popular name, Helmet shells. They belong to the family Cassididae, and are very active predatory animals, living along sandy shores of warm seas. The larger ones, especially those of the West Indies, are used for cameo carving, owing to the shells having several differently coloured layers most suitable for this work. It is an extremely delicate and intricate process to produce the cameos, and, although the home of the industry is really in Italy, it is practised in other parts of the world, and even in Sydney, by certain highly skilled people. The majority of Helmet shells found in Australia range from about three to six inches, but on the Great Barrier Reef is found the largest Helmet shell in the world, the Giant Helmet, *Cassis cornuta*, a specimen of which, on view in the Museum, measures fourteen inches long. The outside of the shell is usually dirty white, often encrusted with marine growth, in strong contrast to the beauti-

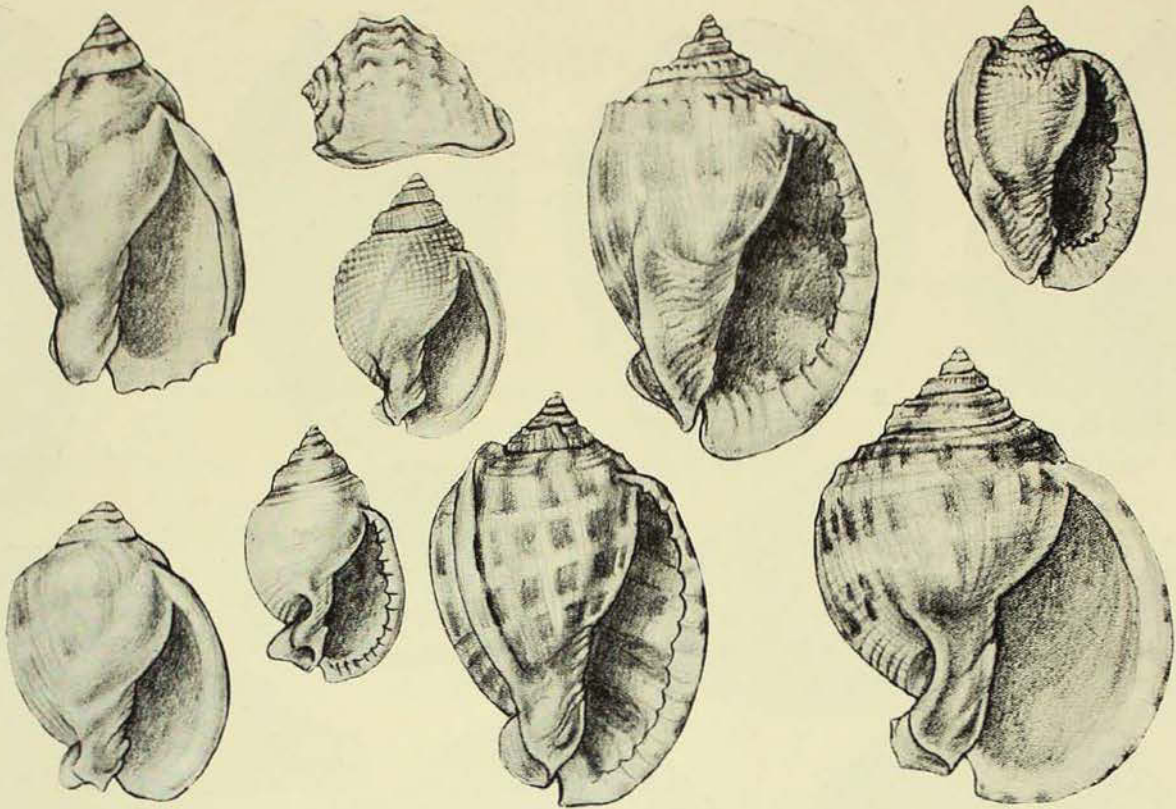
fully polished pinkish-orange inner surface. It ranges in its distribution throughout the Indian Ocean, the Philippines, the West Indies, and the South Pacific. An account of the history of cameo carving appeared in an earlier part of this MAGAZINE.¹ The commonest Helmet shell of the South Pacific, and possibly the handsomest, is the Red Helmet, or Bull's Mouth. It grows to over seven inches long, is very heavy, and is red-brown in colour, with bright orange-red lips. This species, *Cypracassis rufa*, is rare in North Queensland, but is otherwise common throughout the Indo-Pacific, and, as it is the only one of this colouring, it is easily recognized. Other large Helmets are *Hypocassis bicarinata* (fig. 19) from South Australia,



Helmet Shells. In the top row, from left to right, are *Xenogalea pyrum*, *Xenogalea sophia*, *Xenogalea insperata*, and in the lower row, *Xenogalea labiata*, *Xenogalea paucirugis*, and *Semicassis diuturna*.



Helmet, Tun and Egg Shells, and Cowries.



More Helmet Shells. From left to right are figured in the upper row, *Casmaria vibex*, *Antephalium semigranosum*, and above it the side view of *Nannocassis nana*, *Phalium bandatum*, and *Phalium agnitum*; in the lower row, a *Xenogalea insperata* without teeth on the outer lip, *Xenogalea angasi*, *Phalium areola*, and *Xenogalea thomsoni*.

Victoria and south-west Australia, and *Xenophalium hedleyi* (fig. 22), dredged in about 70 fathoms off the southern New South Wales coast. The continental shelf of New South Wales is a favourite haunt of numbers of species of Helmets, but as many of these are closely related and their respective characters would not show sufficiently to distinguish them in half-tone drawings, only the more outstanding ones are figured in this article. Of these, *Xenogalea sophia*, a very beautiful shell, has also been recorded from South Queensland and the Kermadecs; *Xenogalea labiata* has appeared in southern Queensland too, as well as along the whole length of the New South Wales coast, and in Norfolk Island; *Xenogalea angasi*, remarkable for its pure white coloration and small size, is a Queensland species ranging southwards into New South Wales; and *Xenogalea insperata* is a pale pinkish, small shell, with lines of white spots and larger red ones. This species comes from

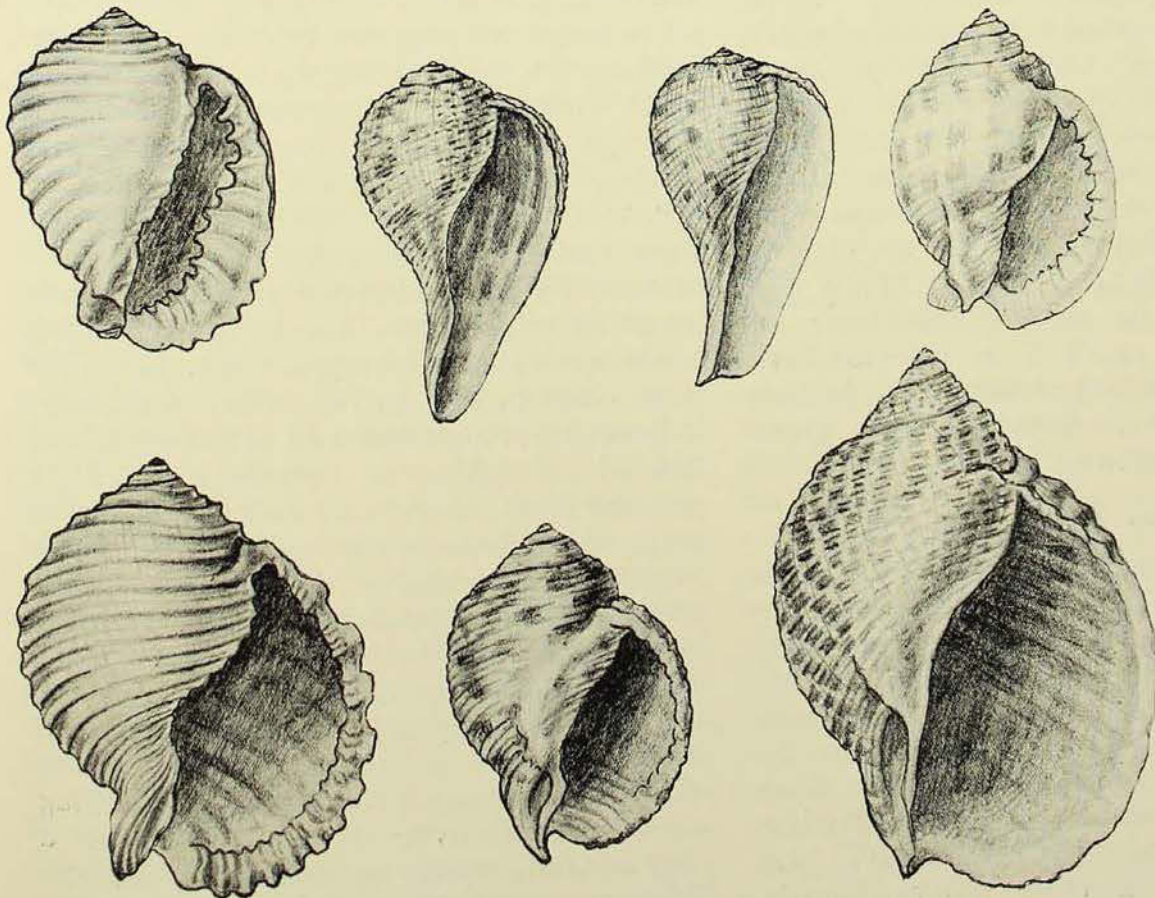
New South Wales and South Queensland. Other well-known inhabitants of the continental shelf of New South Wales are *Xenogalea pyrum*, which also lives in Tasmania, Victoria, and New Zealand; a deep water variety, *X. stadialis* (fig. 1), which lives in 50 to 100 fathoms, and its companion, a thinner shell, *Xenogalea thomsoni*. A small species, *Xenogalea nashi*, occurs in Sydney Harbour, and has a shape somewhat like *labiata* and spots like *sophia*. No description is needed of *Phalium bandatum*, from New South Wales, Queensland and north-west Australia, as it is easily recognizable from a figure, or of *Phalium areola*, which has also a wide range through the South Pacific islands, and *Casmaria vibex*, a well-known inhabitant of North Queensland and the South Pacific islands. Both *Semicassis diuturna*, from New South Wales and Queensland, and *Antephalium semigranosum*, from southern Australia, can be recognized at sight, the former by its

closely packed, flattened, concentric ridges, and the latter by the peculiar semi-granose sculpture of its whorls, particularly the earlier ones. Two Western Australian Helmets are figured in this article, *Phalium agnitum*, a small but conspicuously sculptured and variced shell, and *Xenogalea paucirugis*. Southern Australian forms not figured are *Xenogalea nivea*, *Antephalium adcocki*, and *Antephalium sinuosum*, and northern Australian forms are *Nannocassis nana*, *Phalium glaucum*, *Casmaria erinaceus*, *Casmaria ponderosa*, and *Xenogalea lucrativa*. A description of these may be seen in "A Revision of Australian Helmet Shells", *Records of the Australian Museum*, Vol. XV, No. 5, 1927.

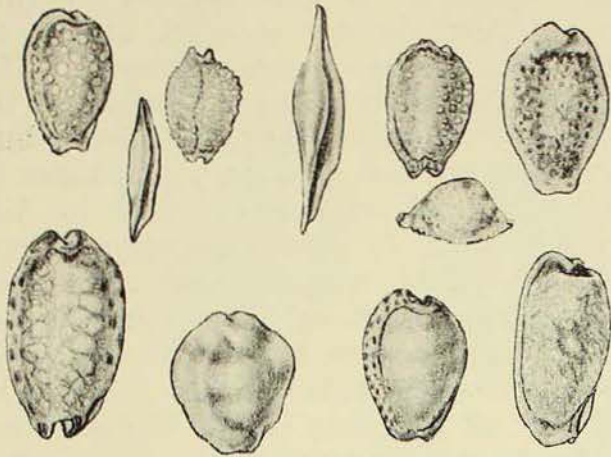
TUN SHELLS.

Tun shells are a small family, the Tonnidæ, living in tropical seas. The shells are amongst the largest of the univalves, the big New South Wales "Beer-barrels" growing to a length of ten inches and being capable of holding several pints of water. Specimens do not

often occur on the beaches, and for this reason they are not so well known as other shells more readily found. The large common New South Wales species is *Tonna cerevisina* (fig. 2), a creamy buff shell streaked and clouded with shades of chocolate and cinnamon, and in life covered with a thin membranous epidermis. This species has also been recorded from several places in Queensland. Another large, but much rarer shell, *Tonna tetracotula*, is dredged in 40 to 80 fathoms off the New South Wales coast. It is more elongated than the former species, and the revolving ribs have interstitial riblets. The colour is white to pale orange, with sometimes three bands of brown, and the surface of the shell is glossy. The West Australian Tun shell, *Tonna variegata*, is rather like *cerevisina*, but is much smaller and narrower. Three common North Australian species, *Tonna allium*, *Cadus rufus*, and *Quimalea pomum*, are easily recognized; *allium* by its widely separated narrow revolving ridges, *rufus* by its peculiar spotted marking and narrow, elongated shape, and *pomum*, the



Reading from left to right in the upper row are the Apple Tun shell, *Quimalea pomum*, two Fig shells, *Ficus communis* and *Ficus tessellatus*, and a Helmet shell, *Xenogalea nashi*. The three shells below are Tuns, *Tonna allium*, *Parvittonna perselecta*, and the Partridge Tun, *Cadus rufus*.



Cowries and Egg shells. Along the top row are *Cribraria cribraria*, *Pellasinia depressa*, *Nuclearia nucleus*, *Phenacovolva nectarea*, *Staphylaea staphylaea*, and *Eclogavena coxeni*; the side view of the small shell below the two last is of *Pustularia cicerula*. In the lower row are *Arabica scurra*, *Monetaria moneta*, *Notocypraea verconis*, and *Palangerosa cylindrica*.

Apple Tun, by its heavy structure and strongly toothed mouth. There are several species of lesser importance, which upon further investigation may be found to be only variable forms of those mentioned. It is interesting to note before leaving the Tun shells, that a large Solomon Island species, *Tonna melanostoma*, which resembles *tetracotula*, but has a rich blackish brown interior in strong contrast to the pale orange buff exterior, has recently turned up on the reef at Lord Howe Island. There has appeared also in Sydney Harbour in recent years a small Tun, intermediate between a small but stronger *rufus* and a thinner *pomum*. This has been given the name *Parvitonna perselecta*.

FIG SHELLS.

Fig shells, of which only a few species are known, owe their name to their fig-like shape, although they are sometimes regarded as being pear-shaped, and for this reason some people prefer the popular name, Pear shells. They belong to the family Ficidae, and inhabit the West Indies, Indian Ocean and South Pacific. Their animals are shy yet active, and crawl actively in their native haunts,

carrying their light and graceful shell with ease; their beautifully marked colouring, pinkish with darker pink or violet marbling, immediately arrests the attention of a collector. They are closely related to the Tun shells, and until recently have been placed in the same family. The common North Australian and South Pacific island form is *Ficus communis*, a stronger ribbed, more mottled and altogether heavier shell than the north-west Australian species, *Ficus tessellatus*. A specimen recently dredged in Sydney Harbour, *Ficus margaretae*, resembles in texture and colouring the latter species.

EGG SHELLS.

Closely related to Cowries in structure and habits, the Egg shells, family Amphiperatidae, inhabit the warm seas, and are very common in the South Pacific, where two types can be noticed, those with elongate shells living among the branches of corals, and those with rounded shells, some of which live amongst soft corals. Of the latter type, the best known is the White Egg shell, *Amphiperas ovum*. This is as large as a goose egg, snowy white, with a rich reddish-brown interior, and a black animal. It is particularly common throughout the South Pacific, where it is used extensively by the natives either for personal adornment or for decorating their canoes. It is regarded as a symbol of fertility, and Murray Islanders, when planting crops, place one at the beginning of the rows to ensure a good harvest. As it is so outstanding in its snowy whiteness, it is easily recognized and is therefore not figured. *Amphiperas costellata* (fig. 9), a smaller form, about one and a half inches long, also common throughout the South Pacific, particularly in the Friendly Islands, is rose-pink inside and is often found with a hole in the upper surface where the natives have bored a hole for stringing. A slightly smaller Queensland shell, *Calpurnus verrucosus*, is white with a rosy tinge at each end, extending sometimes all over the shell, and has a very striking white animal, black spotted. The two remaining Egg shells of the

rounded type figured here are both very small, about half an inch high; one, *Diminovula verepunctata*, is pink, with deeper pink spots and fine revolving lines, and the other, *Prionovolva brevis*, is distinguished from *Diminovula cavanaghi* by having fine teeth on the outer edge of the outer lip. These shells are found in New South Wales and Queensland, and probably have representatives in the South Pacific.

The best example of the elongated Egg shell is *Volva volva* (fig. 15), the largest of them all, and one with a fairly large range through northern Australian and the South Pacific. The shells of this type are usually pinkish white, with one or more white encircling bands; but they may show considerable variation. For instance, *Pellasinia depressa*, from North Australia and the South Pacific, is sometimes creamy white, tipped at each end with orange, and yet again may be pink, with orange-brown ends and a bright lemon-yellow glaze over the inner side of the mouth. In shape, however, the species remain fairly constant, and it is possible there are more species than suspected. The other species figured in this article is *Phenacovolva nectarea*, from Queensland and New South Wales.

COWRIES.

Of all shells, the cowries are undoubtedly the best known and the most admired. This is due to the fact that they are so abundant in the warm seas, and that their very beautiful polish, unsurpassed by any other shell, and wonderful range of colours and markings, immediately attract the attention of all collectors. They are typically inhabitants of tropical waters, living in the shallow regions, where they hide shyly away, though a few are found in colder waters and some are even dredged from considerable depths. Australia, particularly along the Great Barrier Reef, has an extremely rich cowry fauna, many of the South Pacific island forms living and thriving here most successfully. It is impossible here to tell of the habits and uses of cowries, and, as a general account

of them appeared in an earlier part of this MAGAZINE,¹ the reader is referred to that for fuller information. Many enthusiastic collectors over a series of years have hunted the cowry in its natural haunt and studied the animal while living. It is to the tireless efforts of the late Mrs. M. J. Waterhouse, who, with her young sons, one of whom, Dr. G. A. Waterhouse, has been for many years a Trustee of this Museum, collected strenuously on the beaches round Sydney, during the years 1893-6, that we owe a great part of our knowledge of the cowries



Small Cowries. In the top row, from left to right, are *Gratiadusta xanthodon*, *Erosaria nashi*, *Notocypraea bicolor*, *Notocypraea piperita*, *Annepona mariae*, and *Basilitrana isabella*. In the middle row are *Erosaria poraria*, *Melicerona melvilli*, *Talostolida teres*, *Notocypraea declivis*, *Blasierura rhinoceros*, and *Guttacypraea pulicaria*. The bottom row shows *Monetaria barthelemyi*, *Nivigena melwardi*, *Palmadusta humphreyi*, *Erosaria helvola*, and *Erronea nimiserrans*.

of that region. Travelling to the beaches where Mrs. Waterhouse collected, Little Manly, Vaucluse, Balmoral, Pussy Cat Bay, and Port Hacking, was anything but comfortable in those days, with irregular services and bad roads, and necessitated a very early start and several hours' tiring journey. Today, many of the cowries Mrs. Waterhouse so carefully collected then, are no longer found alive in those spots, owing possibly to the contamination of the waters and the increased population. Too often, after a

¹ Joyce Allan, AUSTR. MUS. MAG., Vol. IV, 1932, p. 291.

long search, only dead shells are found, so we can be indeed grateful that her love of conchology and her keen sense of observation enabled her to leave a record not only of those places where cowries could be found round Sydney, but also the colours and markings of the animals.

In recent years Mr. Melbourne Ward has continued this good work and provided considerable data concerning the colour and structure of the cowries of the Great Barrier Reef, Queensland. This enabled Mr. T. Iredale to add coloured plates of the shells and animals to his paper on the Australian cowries, published in *The Australian Zoologist*, Vol. VIII, Pt. II, 1935, and the reader is referred to this for a full list and many illustrations of the cowries at present known from Australia. Since Mr. Ward made his observations on the Queensland cowries, Mr. R. V. Oldham, of Port Moresby, Papua, has become intensely interested in the study of shells, and, being close to a reef, a favourite haunt of cowries, has also been sending to this Museum notes on their habits and the colouring and structure of the animals. These are of intense interest, and it is hoped that such work will be long continued, so that eventually we will have a record of all the animals.

In the present article it has been considered advisable, as there are so many cowries known from Australia and it is impossible to figure them all, to choose mostly those which are not figured in the previously mentioned paper by Mr. Iredale. As with several other families dealt with in earlier parts, some South Pacific island species have been included, as it is these showy shells which are so often collected, and also because it is possible that they may eventually find their way down into tropical Australia.

One of the most conspicuous cowries of the South Pacific is the Orange Cowry, *Callistocypraea aurora*, of uniform rich orange colour and used as a badge of rank by chiefs of certain islands. Its colour and size (it is about four inches long) alone enable it to be recognized at sight. There are a number of similarly large

cowries which are found practically throughout the Indo-Pacific, many reaching as far as Queensland, North Australia, and North-west Australia. These can be recognized with little difficulty, as they all have some outstanding characteristics. The best known of all, and the one with the widest range, is the Tiger Cowry, *Cypraea tigris* (fig. 2), a very variable



Egg shells and small Cowries. In the upper row are Calpurnus verrucosus, Prionovolva brevis, Diminovula verepunctata, Paulonaria macula and Derstolida fluctuans. In the middle row are an upper view of Prionovolva brevis, ventral view of Paulonaria beckii, the Coffee-bean shell (Ellatrivia merces). The lower row contains Ravitrona caputserpentis, Paulonaria fimbriata, dorsal surface of Paulonaria beckii, Palmadusta ziczac, and Derstolida crosseii.

species, varying in colour from orange to dark chocolate brown, profusely dotted with darker colour. Both the Chocolate Cowry, *Mauritia mauritiana* (fig. 6), and the Map Cowry, *Leporicypraea mappa* (fig. 3), are rare on the Great Barrier Reef, but are more common throughout the South Pacific islands; the Eyed Cowry, *Arestorides argus* (fig. 21), with its peculiar elongated shape and rings of warm brown, is also found in these places. A similarly shaped cowry, the Tortoise-shell, *Chelycypraea testudinaria* (fig. 4), although it has a wide range through the Indo-Pacific, has not yet appeared in Australian waters. It is the largest of the cowries, quite six inches long, is mottled like tortoise shell, and has a multitude of white specks like flour over its very beautiful polished surface. Other large cowries figured are a hump-backed

rich brown mottled West and South Australian species, *Zoila thersites* (fig. 16), the brilliantly polished, chocolate coloured *Zoila decipiens* (fig. 7), which is restricted to West Australia, a peculiarly flattened West and South Australian species, *Zoila friendii* (fig. 5), and a representative of colder water cowries, the Wonder Cowry, *Umbilia hesitata* (fig. 8), from the southern regions of Australia. This species has several different forms showing sufficient characters to warrant their being regarded as at least subspecies. The northern New South Wales form, for instance, varies from the southern one, and is named *Umbilia hesitata beddomei*, the West Australia one is *Umbilia armeniaca*, and the white form dredged in deep water of Bass Straits is *Umbilia (hesitata) howelli*. *Talparia talpa* (fig. 10), from the Indo-Pacific, is about two and a half to three inches long.

The smaller ones from the South Pacific and northern Australia are *Arabica westralis* (fig. 20), a shell rather like *Arabica arabica*; *Ponda ventriculus* (fig. 18), with characteristic fine lines extending from the base towards the centre back; a very common species, *Erronea nimiserrans*; an elongated form, *Palangerosa cylindrica*; *Lyncina vanelli*; the orange tipped *Basilitronea isabella*, another very common species about one and a half inches long; and *Gratiadusta xanthodon* (fig. 13). Though the characters of these show sufficiently well to enable identification with comparative ease from half-tone illustrations, yet cowries, more than other shells, should definitely be portrayed in colour, to show their true brilliance and remarkable polish. Some more South Pacific and North Australian species figured are *Adusta onyx* (fig. 17), the small humped whitish Rhinoceros Cowry (*Blasierura rhinoceros*), the Serpent's Head (*Ravitronea caputserpentis*), which reaches as far south as New South Wales, *Cribraria cribraria*, tan-coloured with white spots and a cerise red animal, *Nuclearia nucleus*, *Staphylaea staphylaea*, a bluish shell with raised milk-white spots, the yellow and brown spotted *Pustularia*

cicercula, and *Arabica scurra*. The bright yellow Money Cowry (*Monetaria moneta*) has an elongated abnormal relative in New Caledonia, *Monetaria barthelemyi*, and a widely distributed relative, the Ringed Cowry (*Monetaria annulus*), which is cream with a gold ring on the dorsal surface. Other common shells from these regions are *Erosaria metavona* (fig. 14), a small creamy-yellow shell with darker rings (*Annepona mariae*), a violet brown spotted form with a vermilion red animal (*Erosaria poraria*), the common dark-banded *Melicerona melvilli*, a very small species (*Talostolida teres*), an almost pure white cowry with a scarlet animal (*Nivigena melwardi*), a tan one with dark spotting and two revolving white lines (*Palmadusta humphreyii*), another tan one with whitish spots (*Erosaria helvola*), *Paulonaria macula*, a very dainty dark-spotted Queensland shell (*Paulonaria becki*), *Palmadusta ziczac*, *Erosaria nashi*, and *Paulonaria fimbriata*.

There is an extremely rare pretty cream cowry, the dorsal surface marbled with warm brown, found in the New Hebrides; it is about an inch or more long, and is called *Eclogavena coxeni*. Another one, *Derstolida fluctuans*, has a strongly contrasting broad splash of deep brown colour on its cream back, and has a stumper, almost deformed relative in New Caledonia, *Derstolida crossei*. The latter has four patches of brown, one on each side at either end of the upper surface of the shell.

Of the small cowries inhabiting the southern regions of Australia, New South Wales, Victoria, South Australia, and West Australia, the ones figured here are *Austrocypraea reevei* (fig. 12), a pale shell which does not look quite fully developed, but is, and is restricted so far to West and South Australia, *Notocypraea declivis*, *Notocypraea piperita*, *Guttacypraea pulicaria*, *Notocypraea bicolor*, and *Notocypraea verconis*.

Small cowry-like shells with elevated ridges running from the centre to the margins are often found amongst rocks along the shores of northern Australia, New South Wales, and the South Pacific

generally. These are often pure white or white with patches of rose pink on them, and some may be uniform pink with deeper pink marking. Although they are mostly tropical shells, one species is even found on parts of the English coast. They are known as Coffee-bean shells, of the

family Triviidae, and as they all very closely resemble one another, only the common species is figured here, *Ellatrvia merces*. This is found practically throughout southern Australia. It is the largest of the Coffee-beans, and has the rose pink patch of colouring on its white surface.

Carnegie Corporation of New York

THE Carnegie Corporation of New York, which a year or two ago conducted a survey of the Australian museums to ascertain their most pressing needs, subsequently made grants to aid them in their work. These grants have enabled the institutions to acquire equipment which, otherwise, would have been beyond their means. In our last issue reference was made to the visit of Mr. F. Tose to the Commonwealth for the purpose of instructing Australian preparators in the most advanced methods of their art and technique, and in this issue we show the results of his labours and those who collaborated with him.

In continuation of its generosity, and realizing the isolation of Australian museums, the Corporation has made available a number of grants to museum officials to enable them to travel abroad and observe what museums in other centres are doing.

Mr. J. R. Kinghorn, C.M.Z.S., of this Museum, has received such a grant, and recently left Sydney for the United States, where he will give attention to the many educational activities of museums and the problems with which they have to contend. Similar grants-in-aid have been made to Mr. L. Glauert, B.A., of the Western Australian Museum, Perth, and Mr. E. O. G. Scott, B.Sc., of the Queen Victoria Museum, Launceston, Tasmania.

The experience, gained first-hand, and contacts which they will make, cannot but prove of inestimable value to these officers and their institutions in the prosecution of their duties. The thanks of Australian citizens are due to the Corporation for its generosity, likewise their homage to him whose name it bears, and who made such wise provision for promoting the cultural advancement of the world.

Among recent visitors to the Museum may be mentioned the following: Dr. Oscar Meyer, Trocadero Museum, Paris; Dr. J. L. Kandel, Professor of Education, Teachers' College, Columbia University, New York; Professor W. Beyers Unger, Dartmouth College, New Hampshire; Professor Albert D. Mead, Brown University, Rhode Island; Professor W. H. Shideler, Miami University, Ohio; Fräulein Gabrielle Neuhäuser, Berlin;

Miss Madeline Corlette, Malekula, New Hebrides; Ata, Minister for Lands, Tonga; Akauola, Governor of Vavau, Tonga; Miss Barbara Lawrence, Museum of Comparative Zoology, Harvard University, Massachusetts; Professor H. C. Richards, University of Queensland; Mr. D. J. Mahony, Director of the National Museum, Melbourne; Mr. H. M. Hale, Director of the South Australian Museum, Adelaide; and Mr. T. C. Marshall, Queensland Museum.