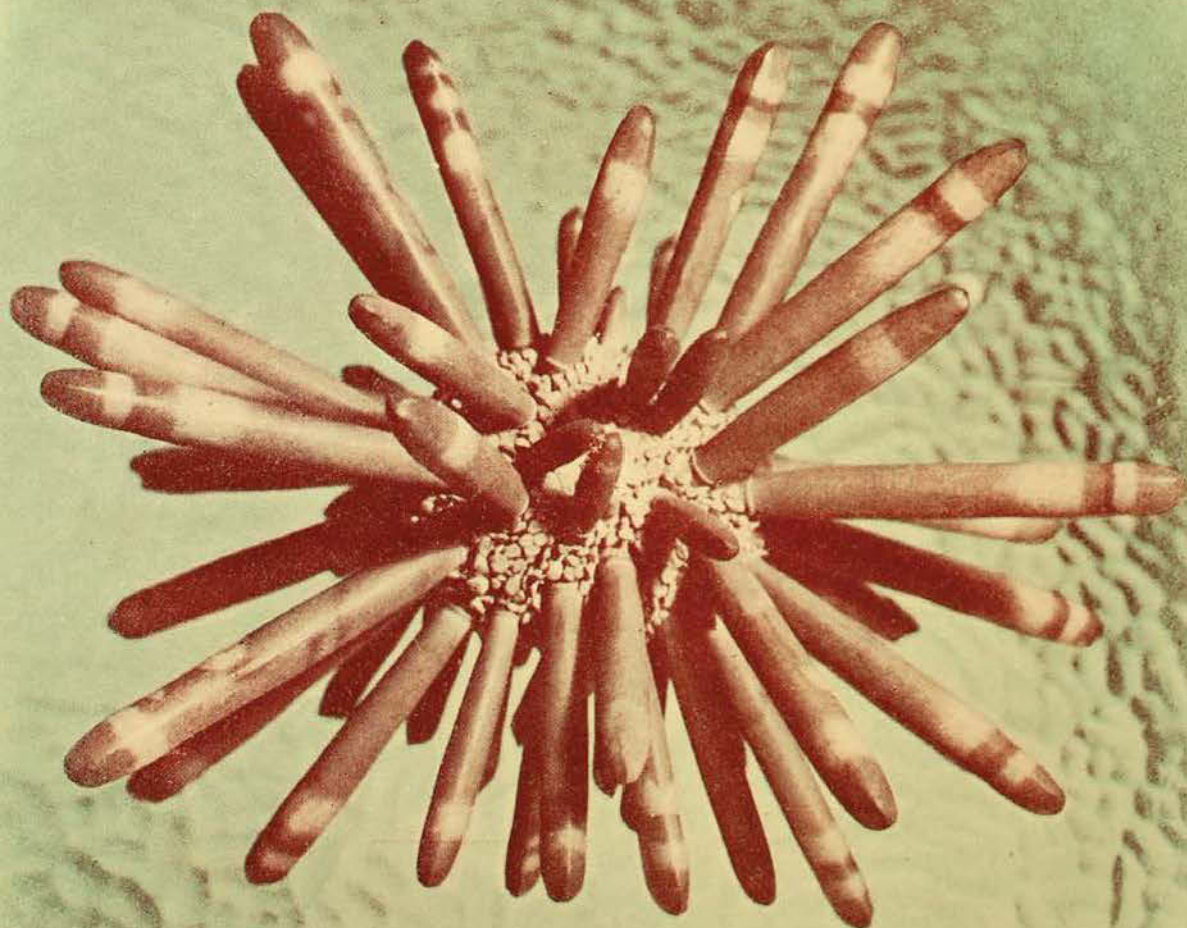


*The*  
AUSTRALIAN  
MUSEUM  
MAGAZINE

Vol. VIII, No. 7.

MARCH-MAY, 1944.

Price—ONE SHILLING.



The Slate-pencil Urchin.

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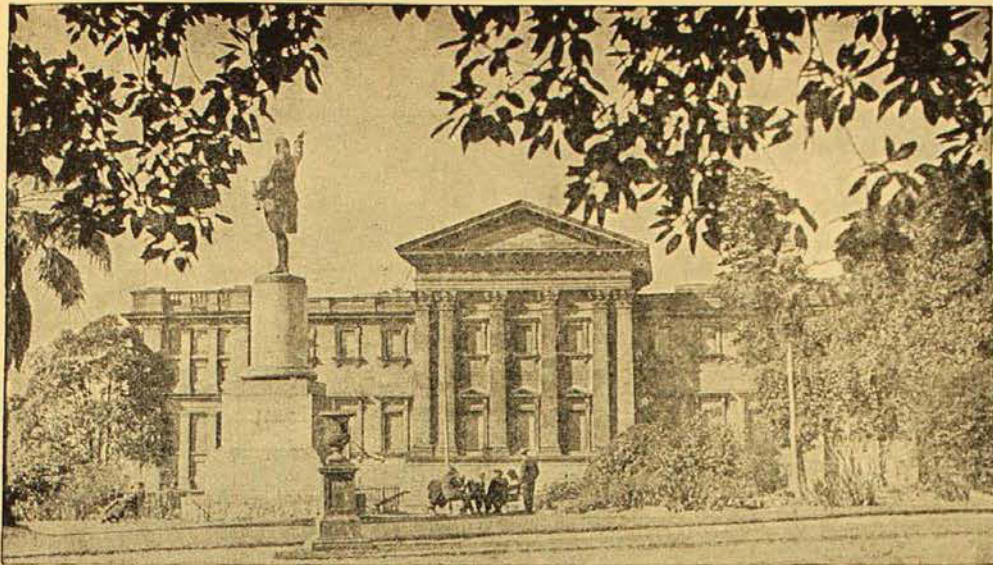
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(Photography, unless otherwise stated, is by G. C. Clutton.)

● OUR FRONT COVER. The Slate-pencil urchin, *Heterocentrotus mammillatus* is an inhabitant of tropical seas, living on reefs of coral. Its striking shape and distinct purple-brown hue at once arrest the attention when the animal is exposed on the edge of the reef at low tide, more often it shelters under ledges and coral boulders. The thick spines which have given the animal its common name increase in thickness towards their free ends, where each is ringed with a faint mauve band. End on, the tip of each long spine is seen to be shaped like the bow of a boat. This streamlining serves to lessen the force of water currents which might tend to dislodge their urchin. The round 'shell' of the body or test is enhanced in appearance by dwarf, mushroom-topped, subsidiary spines which cover its surface.

Like many other sea urchins, this type is carnivorous. It commonly captures small shellfish which are passed by special organs to the mouth on the under side. Astute conchologists make use of this habit and always examine closely the gut contents of the urchins for rarities.

ERRATA.—For *Thopha saccata* and *Cyclochila australasiae* in note on cover illustration of the last issue of the MAGAZINE read *Arunta interclusa* Walk. male and female.



**Papuan girl from Ambasi Village, Ipi River, wearing elaborate shell ornaments.**  
(See page 219.)

Photo.—Frank Hurley.

# THE AUSTRALIAN MUSEUM MAGAZINE

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## A New Order for Our Fauna

THE urgent necessity for one national voice in post-war deliberations regarding the control of our unique animals and problems related thereto was forcefully, but thoughtfully, reviewed by the retiring president, Mr. E. Le G. Troughton, in his address to the Linnean Society of New South Wales. His remarks were more than timely; the need for Commonwealth control of our fauna—a need intensified by the passage of time—has been the subject of numerous resolutions of authoritative scientific bodies and many reports and addresses. The unifying of Commonwealth and States management is an essential step towards the foundation of a Commonwealth agency of control and investigation similar to that in the United States of America.

The complacency regarding the rapid attrition of our slow-breeding and comparatively harmless Australian marsupials is indefensible. Unless this inertia be replaced by some tangible activity, the time is measurable when much of our fauna will exist only as museum exhibits—a position, unfortunately, now the case for some of our species.

“With the exception of cane-field control of some indigenous rats, and the introduced rats and mouse, the rabbit provides our major economic faunal problem. The fertile south-eastern region has known the tragic trail of the poison-cart following that of the rabbit, resulting in wholesale destruction of useful birds and mammals. Decaying rabbit carcasses presumably encouraged the blowfly pest, while the marked increase in grasshopper plagues doubtless reflects the general disturbance of nature’s balance. The rabbit has now extended its activities, which have so strongly influenced the progress of erosion, across to the south-western corner of the continent.

“The spreading of the fox also to that fascinating faunal zone of the south-western corner of Western Australia, where it was reliably reported in 1937 as destroying hosts of black swans, further underlines the imperative need for adequate national reservations from which foxes and rabbits are excluded. Although the individual States have shown increasing awareness of faunal needs regarding protection and provision of sanctuaries, it is undeniable that our larger flora and fauna parks exist mainly for public recreation, rather than the re-creation of fauna, while the control and care of the remoter reservations is utterly deficient in fire, forestry, and faunal supervision.

“It is indisputable that Federal unification supplies the sole means of adjusting the anomalous conditions of faunal control under diversified State regulations, while providing a national authority in post-war territorial and international deliberations. For example, the conference of the States on ‘The preservation and protection of

native fauna' in 1937 proved abortive because of inadequate State representation, and absence of the Commonwealth as the national co-ordinating authority. It was explained that: 'Although the Commonwealth is interested in the subject, *its area of direct administration in regard to these matters is very limited*, and it has been glad to fall into line generally with the policies adopted by State authorities.' Copies of the States' recommendations were requested, however, 'for guidance in connection with the administration of existing laws of the Commonwealth in force in Territories under its control.'\*\*

Federal control of fauna in the United States of America began with the negotiation of Migratory Bird Treaty Acts with Canada and Mexico, leading to a unified control of international fauna. Individual States retain control of species which do not extend beyond their boundaries, and may modify schedules within limits, such co-operation being regarded as essential for the preservation of harmony.

\* Abstract of Proceedings of the Annual General Meeting of the Linnean Society of New South Wales, 29th March, 1944.

Mr. Troughton cited the successful conclusion of the South African convention of 1933, when the views of some ten participating nations were reconciled. If such agreement were possible there, it should also be possible here. That major problems concerning international reconstruction will arise there is no doubt, for in 1937, at the request of the Commonwealth, this Museum prepared a list of our mammals in anticipation of a convention for the protection of the fauna and flora of Asia, Australia, and New Zealand.

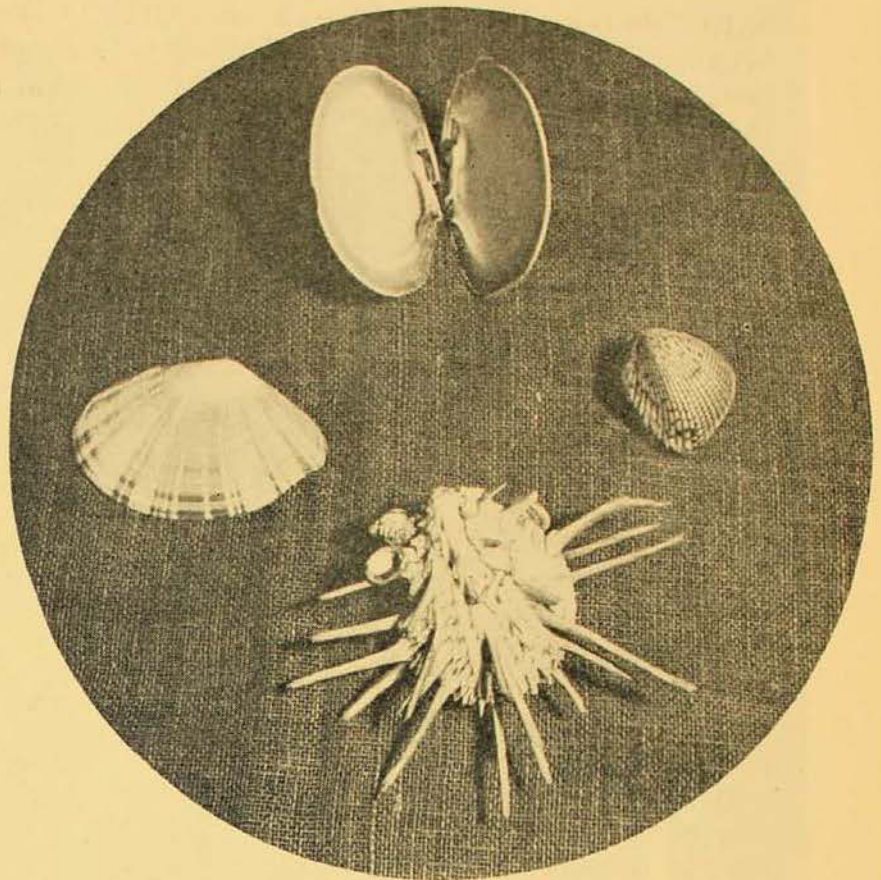
Two decades have passed since Dr. W. K. Gregory, a visiting American scientist and a world authority, deplored in these pages† the devastating toll then being taken and the need for conservation. Intervening time has had its effect.

May we hope that the appeal now made will be heeded. Another decade may mean that action will be too late.

† Gregory, W. K.—Australian Mammals and why they should be protected. AUSTRALIAN MUSEUM MAGAZINE, vol. I, December, 1921, pp. 65-74.

## Showy Shells from the South Pacific

By JOYCE ALLAN



**M**ANY members of the forces in the South-West Pacific are taking advantage of their opportunities to observe the animal and plant life, much of which is very different from that which they are accustomed to see in their home lands.

The marine animals encountered round the islands show a certain degree of uniformity right through the area. From the Red Sea to the Hawaiian Islands, from Japan to Lord Howe Island, the most southern coral island in the world, the marine fauna maintains a constant aspect and numerous species occur throughout. The reason for this, briefly, is that conditions favourable for their existence—temperature, food and environment—are more or less constant throughout these belts.

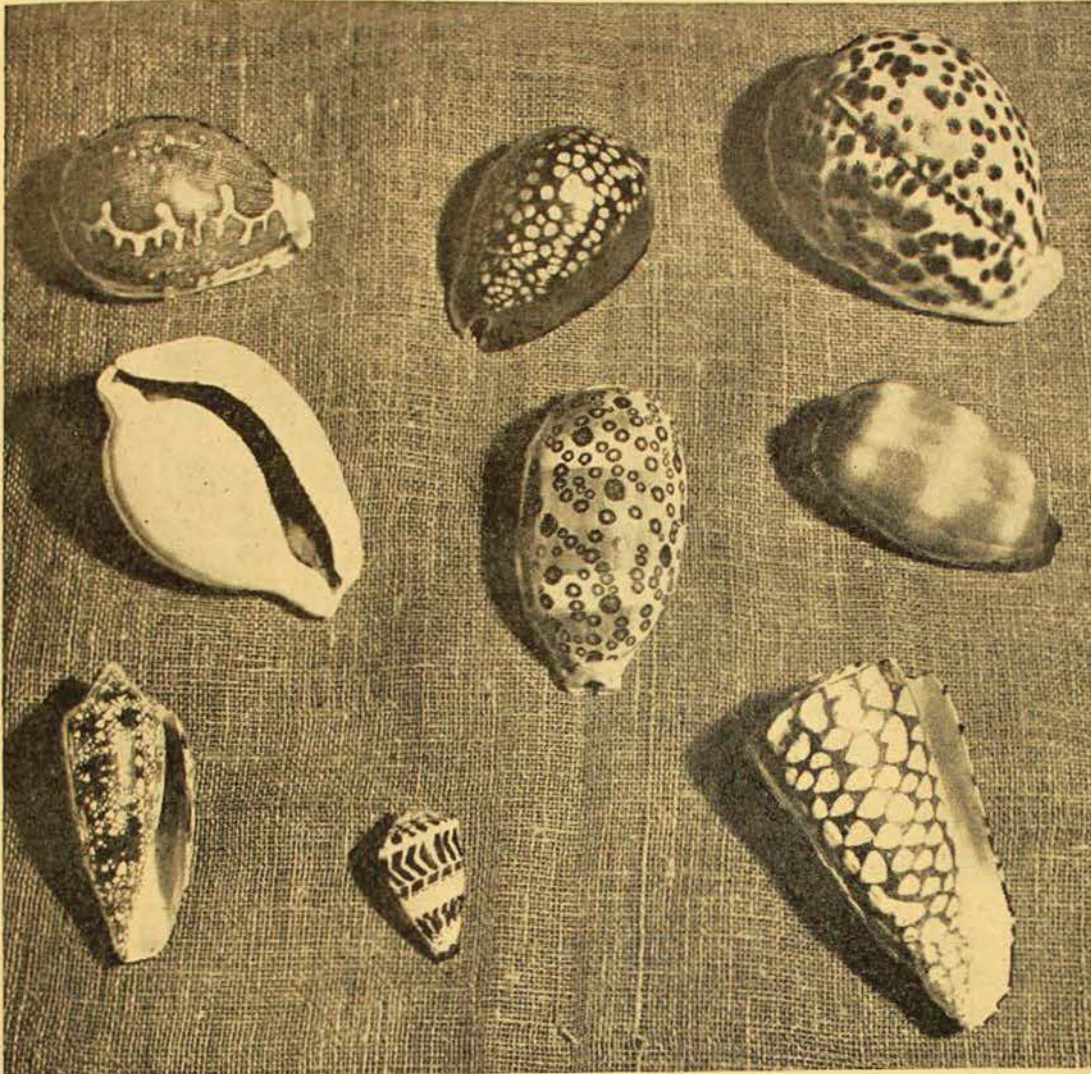
Most of the marine forms of the Indo-Pacific occur also, in restricted numbers, in northern Australian and Queensland waters. Stragglers from these tropical regions are constantly being found along the coast of New South Wales, as far south as Shellharbour and Ulladulla, where, in spite of colder waters, they are

Fewer bivalves than univalves are found in the Indo-Pacific. The Saucer Shell (top) has solid rounded white valves with watermelon pink borders inside; odd valves are commonly found washed up on sandy tropical beaches. The bottom figure is a Thorny Oyster, and the two middle shells are the Sunset Tellen (left), chiefly found at Lord Howe and Norfolk Islands, and the Strawberry Cockle (right).

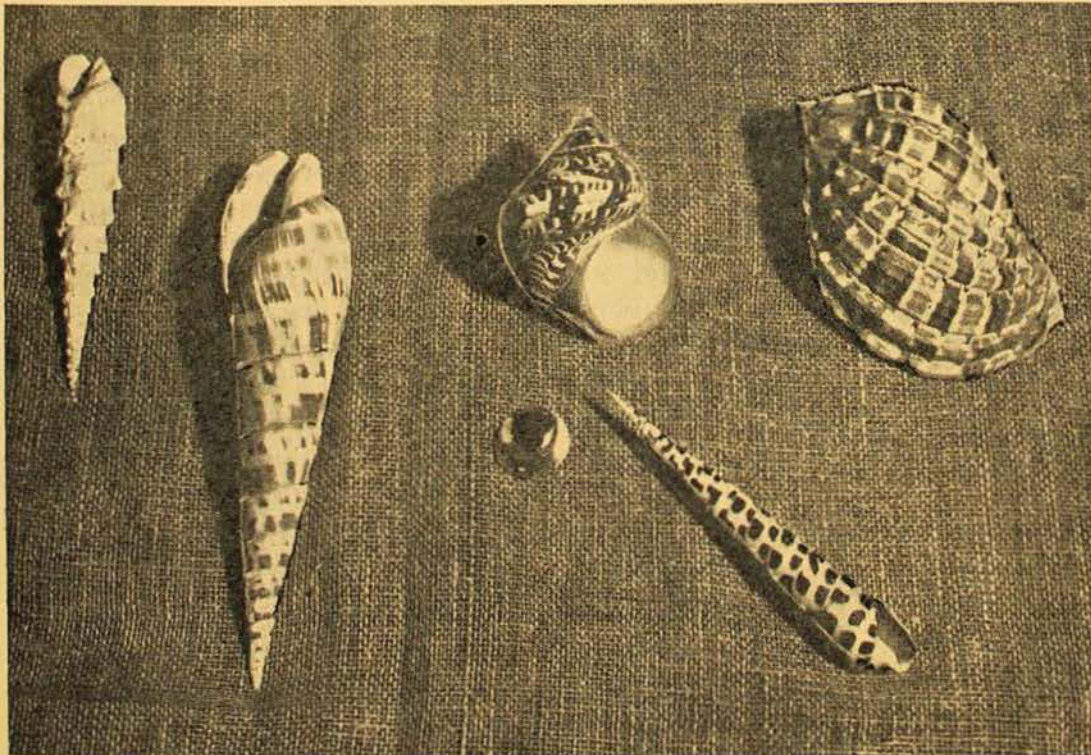
able to establish themselves. This has been noticed particularly with regard to certain genera of tropical shells.

In the warm, shallow waters of the coral reefs of the South Pacific, amongst brilliantly-coloured corals, weeds, crabs and starfish, the most beautiful shells known, are found in great abundance. Displaying every shape and colour imaginable, they provide a wide variety of examples of parasitism, commensalism, camouflage, feeding and breeding habits, and methods of protection and defence.

Shells, or more correctly the animals which build and inhabit them, belong to the phylum Mollusca of the animal kingdom. In common with other marine organisms, they are to some extent dependent on other animals living in the same environment. Some are adapted to spend their lives, from their larval stage on,

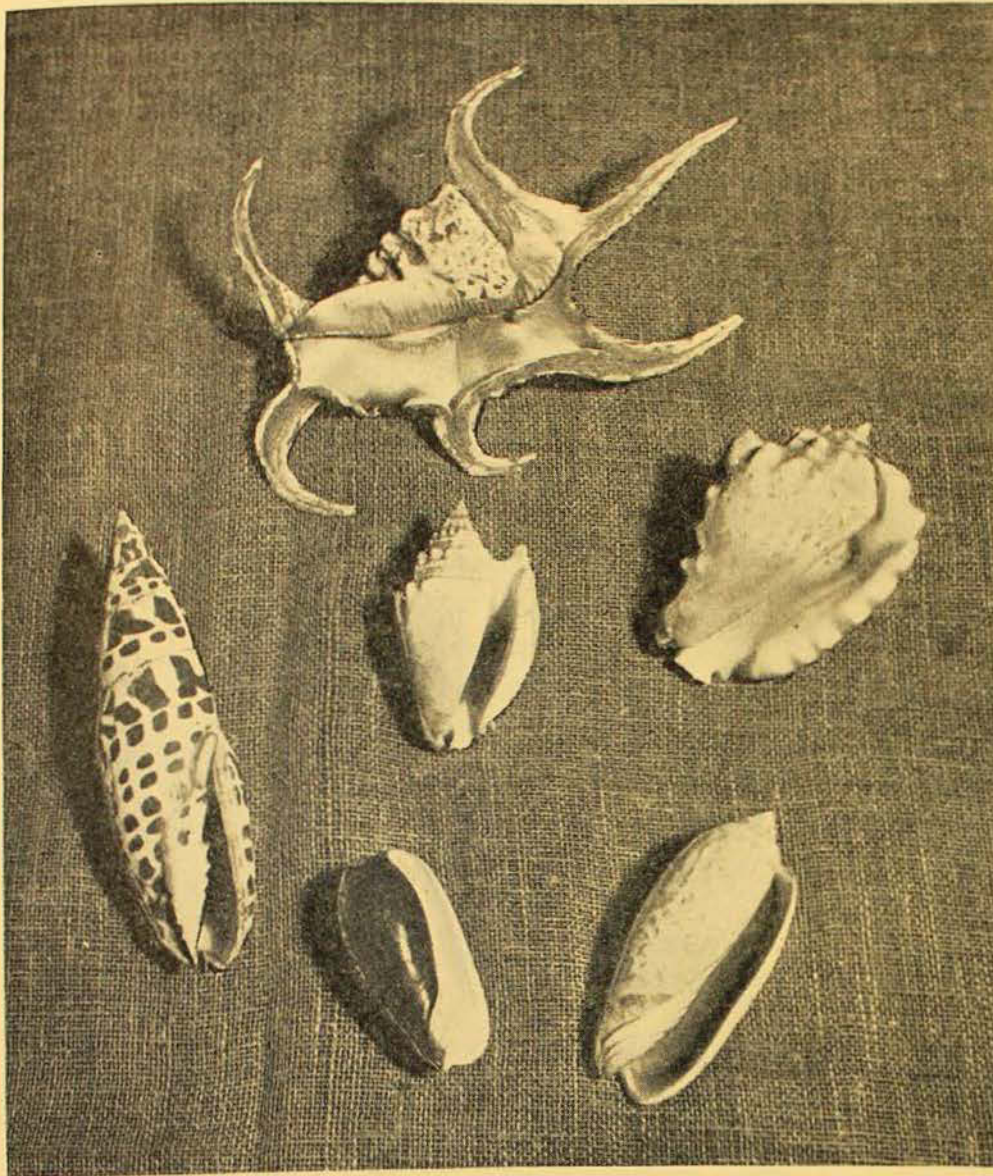


Cowries and Cones, the gems of warm seas, may be found in many islands throughout the Indo-Pacific, and as far north as Japan. Cowries figured in the upper row are the Map Cowry (left), Chocolate Cowry (middle), and the well-known Tiger Cowry (right). The large white Egg Cowry (left) is used extensively by native races for decorative and other purposes. Next to it is the Many-Eyed Cowry, and Chocolate-Banded Cowry (right). Animals of Cone Shells can inflict a poisonous sting and some deaths have resulted. Of the three species figured in the bottom row, the Textile Cone (left) and the Marbled Cone (right) have been known to cause serious poisoning. The small Cone shell in the middle is common in shallow pools on coral reefs.



Quite a number of people are unaware that the prettily marked, highly polished "cat's eye" mounted in rings and other ornaments is an operculum or trap-door attached to the foot of a similarly polished, very handsome shell of the Indo-Pacific—the Cat's Eye Turban shell. By withdrawing into its shell the animal can completely block the entrance with the "cat's eye", thus safeguarding itself from hungry intruders. Directly above the cat's eye can be seen its shell, with a Harp shell alongside it. The three long spiral shells are Auger shells, the middle one of which can grow to more than six inches in size.





No coral reef is complete without a Spider shell (top), its characteristic spikes distinguishing it from plainer members of the same family, such as the two Strombs illustrated immediately below it—the Ass's Ear (left) and the Spotted Stromb (right). Their animals move by ungainly leaps and somersaulting movements, and have a sharp claw-like operculum attached to their foot. The largest Spider shell found is more than a foot long, with six short spikes along its edge. The Orange - Spotted Mitre shell (bottom left) is a very handsome reef dweller, and next to it are two Olive shells, the Moor Olive and the Red-Mouthed Olive, both possessing a polish excelled only by that of Cowries.

embedded in sand, coral, rock, or sponge, in the tissues of other animals, or attached to various surfaces. Others are more independent and are able to crawl or swim from an early stage.

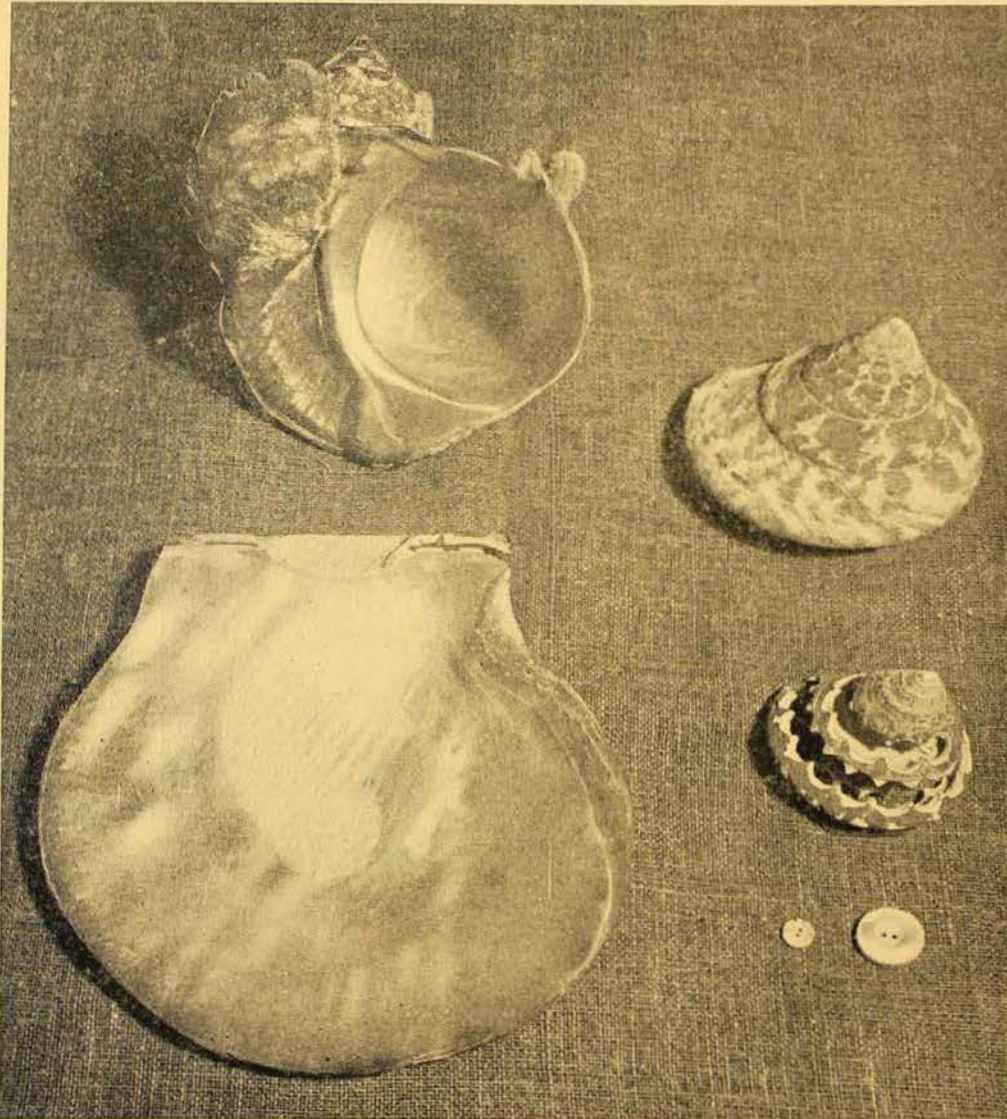
There is always a fascination in shells and shell collecting. Picking up tiny delicately tinted species along sandy surf-swept beaches, searching amongst overturned, weed-covered rocks in little pools, seeking the Giant Clam far out on coral reefs, or dredging in deep water for hidden treasures, attracts young and old alike. The shallow, continually moving waters of coral reefs, where there is abundance of food, provide numerous brightly coloured and heavily ornamented shells. As the water deepens and temperature decreases a marked change takes place in

the shells, both in colour and structure, the deep-water forms no longer exhibiting the brilliant colour patterns, or heavy ornamentations of those from shallow zones.

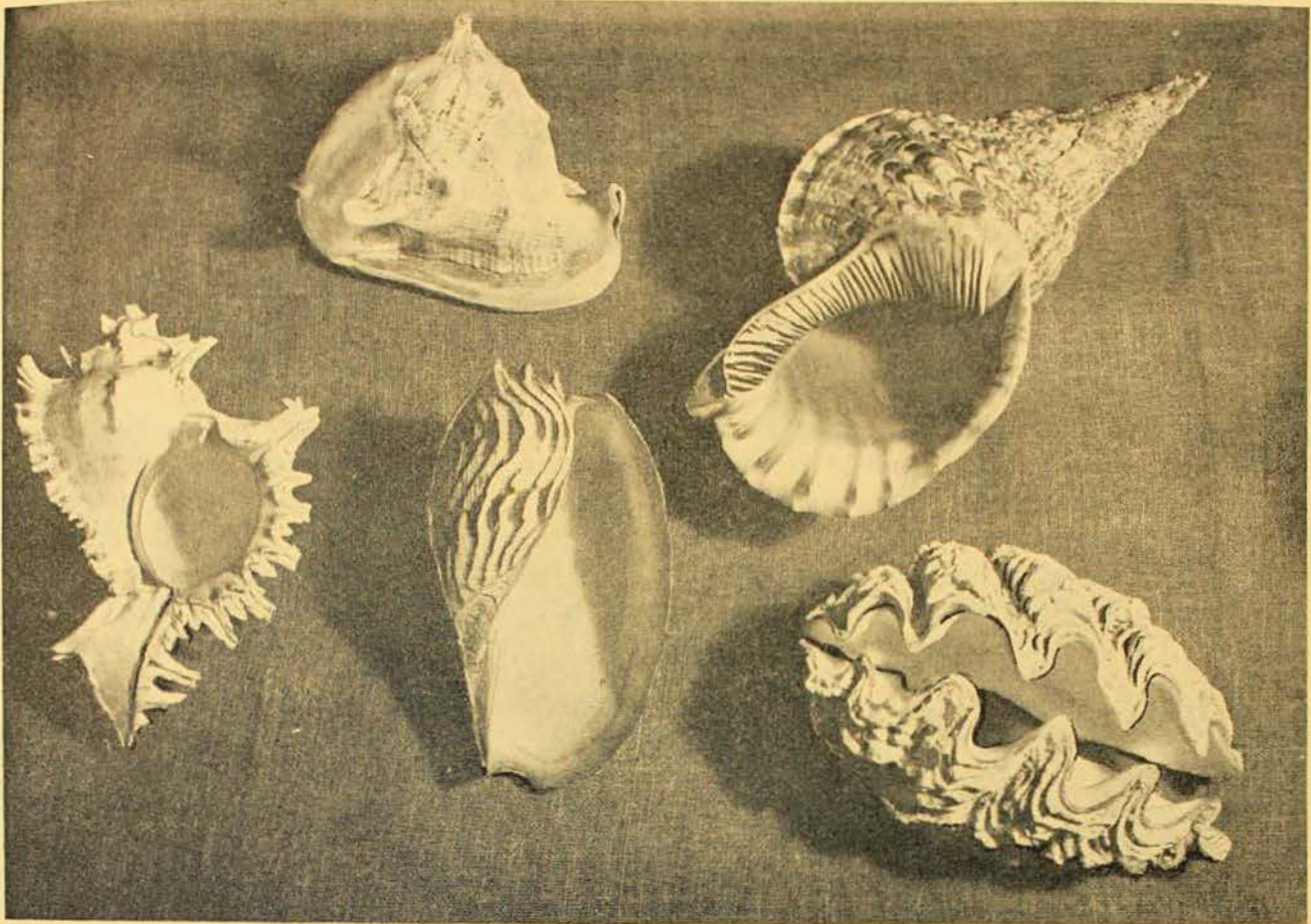
Shallow waters, that is to a depth of about 25 fathoms, are more accessible to most persons, and their shells are therefore the most frequently collected and the best known. Some of the more showy ones are illustrated here. These few give little conception of the many hundreds of species of shells living in close association throughout the South Pacific—there are more than four hundred different kinds of Cone shells alone—but they will serve as a guide for those who may be interested in this branch of tropical marine life.

Natives have shown the extent to which shells may be utilized, as a walk through an Ethnological Gallery in any museum will show. Several species occurring throughout the Indo-Pacific have considerable commercial value, but their fisheries have naturally been disrupted by the war, and it will possibly be some time before they return to their former importance.

Possibly the richest marine fauna in the world exists along the Great Barrier Reef, stretching 1,200 miles along the Queensland coast. Few countries possess such a national asset at their door, with its wealth of oyster, pearl-shell, trochus shell and green snail, bêche-de-mer, turtle and dugong.



Before the war large fisheries existed in the Indo-Pacific in connection with the gathering of shells with a pearly nacre, to provide a world's supply of mother-of-pearl for manufacturing pearl buttons and other articles. Pearl shells, Trochus shells and Turban shells all came into this category, whilst a subsidiary industry existed in connection with pearls and dried animals from the shells. The Golden Lip pearl shell (bottom left), the finest mother-of-pearl shell in the world, is found abundantly in northern Australian waters, the common South Pacific one being the Black Lip pearl shell. The Trochus shell (right) occurs throughout the Indo-Pacific, abundantly along the Great Barrier Reef. From it the familiar small "pearl" button is cut, such buttons being recognizable by reddish markings on their backs. A Trochus shell, from which buttons have been cut, and finished buttons are illustrated. Trochus shell animals are dried and sold to orientals as trochus meat. The Green Snail (top left) is very abundant round the Philippines where large fisheries for it existed before the war. It is rare on the Great Barrier Reef.



Some larger shells of coral reefs. On the upper left is the Great Helmet shell, common in deep water on the Great Barrier Reef. Cameos are cut from many Helmet shells, so called because of their resemblance in shape to a Roman helmet. Natives use the Triton or Trumpet shell (upper right) as a trumpet, blowing through a hole bored in an upper whorl. This is one of the best known shells throughout the Indo-Pacific. Lower pictures show a Rock shell (left); a Bailer or Melon shell (middle), used by natives for bailing and carrying water; and a Clam shell (right). Clams lie embedded in coral reefs exposing at intervals their beautifully marked animals. The strong valves snap to with great force, and can entrap a human's arm or leg. The Giant Clam grows to more than four feet in size, and is believed to live to a great age.

## The R. J. Harris Collection of Medals

ONE of the most important acquisitions to our numismatic collection was received recently from the estate of the late R. J. Harris, of Ashfield, Sydney. The bequest consists of a collection of 652 medals and medalettes from the British Empire and European countries, commemorating all kinds of events and persons, exhibitions and other subjects. The most important groups in the collection are the following: (a) Military and naval medals dating back to 1476, decorations, including many high awards such as Croix de Guerre, Iron Cross and others, and a series commemorating the victories of Louis XIV of France. (b) A series of 75 medals (bronze), on which are shown the por-

traits of French rulers from Pharamond, 417 A.D., to Louis Phillippe I, 1830 A.D. (c) Bronze medals commemorating various Popes and events connected with them. (d) Australian issues for various purposes.

The late Mr. Harris was a keen student of history and numismatics, and at the meetings of the Australian Numismatic Society frequently exhibited and described his specimens, many of which were obtained during trips abroad. The greater part of the collection comprises medals not previously represented in the Museum's collection, and a selected series has been placed on exhibition in the galleries.

# The Coconut-Palm and Its Uses in Oceania

By FREDERICK D. McCARTHY

“WON'T they be scraping coconuts” is a saying of the natives of the Solomon Islands when the crew of a canoe is held up because of bad weather, and it is an apt expression of the dependence of the Pacific islanders generally on this useful tree. *Cocos nucifera* is a graceful palm that fringes the bays and lagoons inhabited by sea-shore folk and adds a characteristic touch of beauty and romance to the scenery of the

innumerable islands of Melanesia, Polynesia and Micronesia.

## GROWTH.

The palm grows best in sandy soil and thrives when whipped by wind and spume. The nuts sprout if left where they have fallen from the palm, but the best of them are usually selected and cared for until the roots and shoot are well developed. Although the seedlings

The Village of Buna, on Buna Creek, northern Papua, set in a grove of coconut palms.  
Photo.—Frank Hurley.



oceanic region. On some of the remote and low-lying islets, its presence makes habitation possible and the groves of swaying palms provide a welcome shade in the steamy heat of the tropic sun.

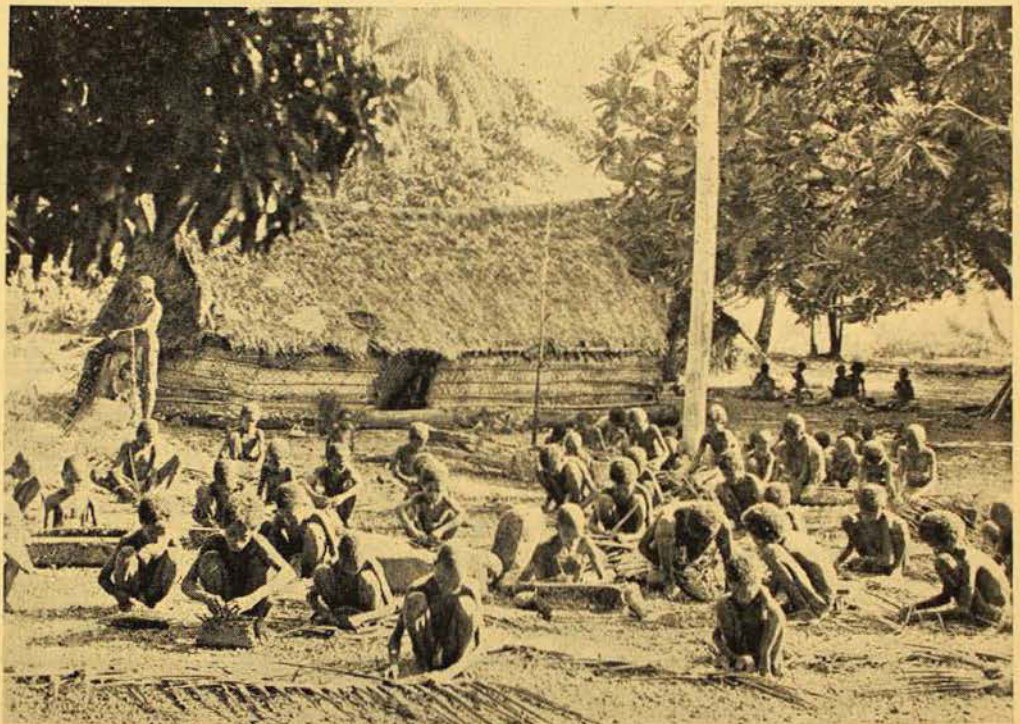
It is still uncertain whether it came from Central America or from the Indo-Malayan area, but adherents of both theories agree that man was the principal agent in the distribution of the coconut-palm, together with other fruit-bearing trees and tuberous plants, throughout the

may be planted at all times of the year, the groves are generally set out at the beginning of the wet season. The plants are placed in the ground so that the shoot is vertical; they need protection from the pigs during the first few years of their life, but an occasional clearing of weeds and undergrowth by the women is all the cultivation necessary. Magical rites accompany the planting, and a feature of them is the drinking of potions composed of ingredients believed to cause

the palms to grow perfectly and rapidly. A characteristic of the palm is its habit of producing fruit practically all the year round, bearing simultaneously the sweet-scented flowers beloved of the lory and the green and ripe nuts valuable to man and prized by the robber-crab. The curved stem is about eighteen inches thick and bears rings marking the position of leaves which have fallen as the palm grew. It reaches a height of from sixty to ninety feet and at its top has a crown of as many as twenty fronds up to fifteen feet long.

that Tuna, the eel lover of Sina, told her of his impending assassination by jealous suitors. He commanded her to cut off his head after he was slain and to plant it, so that from it would grow a tree with a fruit that would furnish her with both meat and drink. He said that on the fruit itself she would see the two eyes that had adored her and the mouth that had spoken tender words of love. So it came to pass that Sina planted the head of Tuna and from it grew the coconut-palm.

The boys of Wamira Village, Papua, plaiting coconut leaf fronds for house walls.  
Photo.—Frank Hurley.



It matures in seven or eight years and produces about one hundred nuts each year in bunches of a dozen or more; the life of a palm ranges to eighty years. In every Pacific language there is a rich vocabulary relating to the varieties of palm, their sacred significance, stages of growth and multifarious uses.

#### SACRED SIGNIFICANCE.

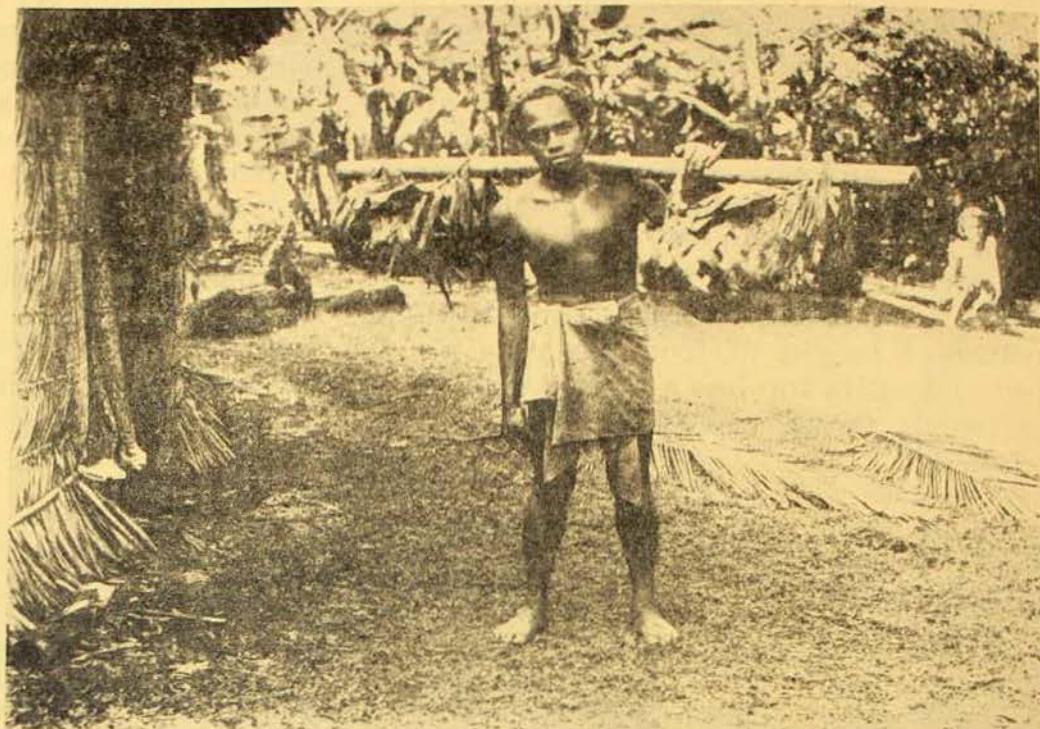
The Pacific islanders attribute the origin of the palm to well-disposed culture-heroes, as, for example, on Kiwai Island, western Papua, where Marunogere made the first coconut out of the hair and ears of a pig. The Polynesians say<sup>1</sup>

While groves are planted in memory of the dead, numbers of growing palms are ruthlessly cut down on the death of their owner or of a chief. The nuts figure as omens of good luck in connection with the fishing and canoe voyages of the Solomon islanders, where plantations are reserved for the ghosts which play such a decisive part in the life of the people. Tabu signs are placed on trees by their owner, or at the order of the village council or chief, and are imbued with a magical power intended to punish thieves in various ways. Visitors and canoe voyagers are entitled to utilize the nuts, providing they leave a recognized sign of having done so, but unscrupulous

<sup>1</sup>Buck: "Vikings of the Sunrise", p. 304.

A Samoan carrying garden produce in baskets made from plaited coconut leaf fronds.

Photo.—Rev. G. Brown.



persons perform counter-magic to safeguard their dishonesty. Sometimes a sorcerer performs magic with the purpose of destroying the palms or crops of nuts of his or his village's enemies.

Tens of thousands of nuts, large coils of sinnet, masses of coconut puddings and large quantities of oil are distributed as gifts on ceremonial occasions. Special dishes which include coconut oil, cream, or kernel are prepared for the sick and various parts of the palm are used in magical rites. The latter applies especially to a hard, bluish-white concretion which forms inside some nuts. The root is chewed as a narcotic instead of areca-nut on some islands.

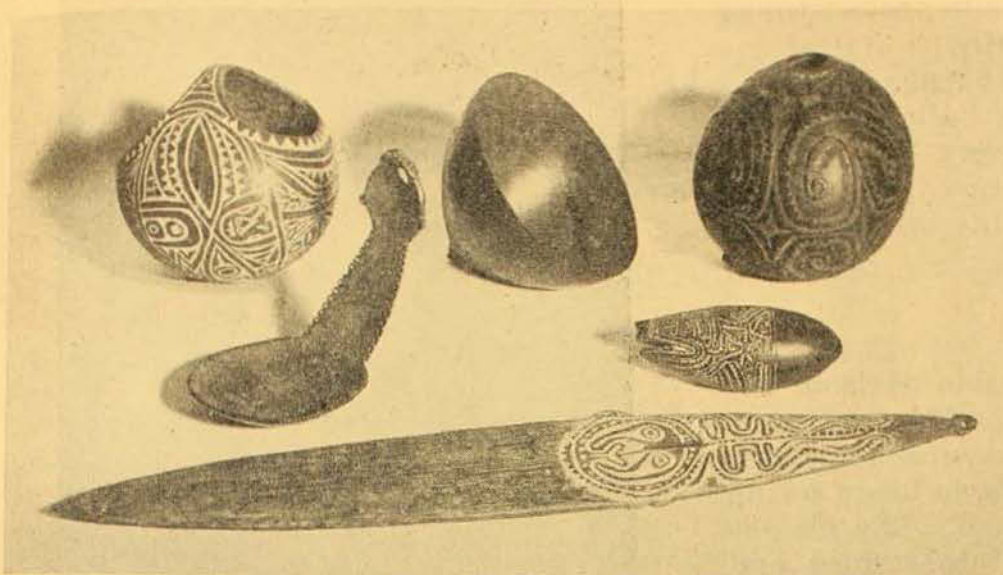
No other tree is as valuable to the natives of the Pacific islands as is the coconut-palm, every part of which, from the roots to the leaves, satisfies innumerable needs of man. A perusal of the uses to which it is put is an interesting lesson in human geography.

#### FOOD.

Food, of course, is one of the first considerations. The oily kernel of both the green and the ripe nuts is highly nutritious, and on the atolls and islets it forms a staple food upon which the people

are forced to rely when tubers like yams and taro yield a poor crop. The nut is husked, split in two with a stone or knife and the kernel scraped out with a shell, bone or wooden implement. The gratings fall into a bowl and, when strained through the inner fibrous sheath of the leaf-spathe, produce a thick and delicious cream which is eaten with banana *poi*, or cooked on the embers of the fire until it curdles. The cream or the curds are placed on banana-leaves between layers of grated yam, taro or sweet potato and the pudding, also wrapped in leaves, is cooked in an oven. The cream is mixed with sea water to make a sauce into which food is dipped. Delicacies relished by everybody are the terminal buds and the soft interior of young palm-stems.

The oil is extracted by cooking the kernel gratings, or by exposing them in a bowl in the sun. Apart from its value in cooking, it is used to clean wooden dishes, and bathers rub it on their skin after immersion in salt water; it is, too, a protection against sunburn. Babies and brides are anointed with this agreeable oil and it is mixed with pigments in the making of paints.



Domestic and ceremonial objects made from the coconut. Water bottles from Tami Island and northern New Guinea (top left and right); Kava cup, Fiji (top middle); spoon and charm-holder, Papuan Gulf (middle left and right); bullroarer, Papuan Gulf, made of coconut-palm wood (bottom).

The milk of the nut is an important liquid where fresh water is scarce, as on the atolls, for example, where it is necessary to utilize every available container, including the hollowed boles of old coconut-palms, for the storage of rain-water. The more active folk are skilful climbers, for it is a daily necessity for them to obtain the green nuts for drinking purposes; each nut contains about one pint of milk, and a thirsty man may consume the contents of half a dozen. When left in a bowl the liquid ferments rapidly and becomes highly intoxicating within a few hours. The sap from the flower stems is also a pleasant drink, sweet but mildly acid, and when boiled it turns into a thick syrup from which the Indonesians obtain a sugar.

#### NUT.

The rounded, hard-shelled nuts make ideal water-bottles, lime-holders and storage boxes for valuable trinkets. In Hawaii the top is cut off a large nut and a fish-skin drawn over it to make a drum. The small nuts are used as charm-holders, tops and tee-totums. To clean out the kernel a perforated nut is secured in a stream until the shrimps have eaten away the flesh, or this may be softened by filling the nut with salt water for a few weeks, after which it is easily scraped out. Portions of the shell are fashioned into cups, bowls, spoons, ladles, paint-

holders, phallocrypts, canoe-balers, pitching- and money-disks; many of these objects are scraped and ground to a remarkable thinness, their surface is oiled and highly polished and they may be carved and decorated with attractive designs in coloured pigments.

#### WOOD.

The heavy wood of the lower stem is coarse-grained, but it is hard and strong and takes a beautiful polish. Occasionally the trunks are used in the construction of houses and platforms and they also serve as rollers in the launching of large canoes. Among the weapons made from this wood are clubs, spears, bows and arrow-heads, and the wide range of implements includes digging-sticks, paddles, loom-frames, tapa-cloth beaters, spindles, betel-mortars and spatulas, skewers, fish-hooks and handles for axes, adzes and drills. Large skin-covered drums in Hawaii, bullroarers in New Guinea, and carvings, staffs and jew's harps in many localities are made from this attractive timber.

#### LEAF.

The large fronds have been adapted to many domestic requirements. They are plaited into coarse baskets in which fruit, vegetables and fish are carried, and into thatching, house panels and mats, fans and brooms, pig-fences and fish-weirs,

food platters and screens to protect young plants from the sun. Strips of leaf are twisted around a stick to make a whistle, or are folded to form a bullroarer. The mid-rib is plaited into very strong mats, stiff baskets and fish-traps. The spathe is simply shaped into straight-sided baskets.

#### SINNET.

One of the most valuable parts of the palm is the fibrous tissue of the nut, stem and roots. The husk is separated from the nut with a shell or bone blade set on a pole stuck in the ground. The fibre is teased out and woven into strings and cords, varying in ply and thickness, which are employed for most bindings. The strength and durability of this sinnet are demonstrated by the fact that all the parts of canoes and houses are bound together with it in highly artistic patterns, skilfully executed by special craftsmen who alone know the magical rites and incantations that are an integral part of the work. In the Gilbert Islands a body-armour, consisting of a flexible jacket and trousers and a rigid jacket, is made out of thick sinnet as a protection against the shark-tooth lacerators which are the principal weapons in this group. In Micronesia panels of the plaited twine, dyed and arranged in intricate patterns, are placed between the house posts. Fishing lines, nets and traps and sandals are made of sinnet on many islands and thick strips of the fibre attached to the waist-girdle serve as the



**Warriors of the Gilbert Islands wearing fish-skin helmets, coir armour made of coconut fibre, and armed with shark-tooth lacerators.**

dress of both men and women in Micronesia. As many as eight pairs of the fibrous roots are plaited round a central strand to make cables, some of them half a mile long, for mooring canoes, fish-traps and nets.

Perhaps no finer example could be given of the manner in which primitive man has adapted himself to his environment than the utilization of the coconut-palm.



# The Kangaroo Family

## Hare Wallabies

By ELLIS TROUGHTON, F.R.Z.S., C.M.Z.S.

AS noted in the first of this series,<sup>1</sup> the kangaroo family embraces a remarkable array of fifty odd species, ranging from comparatively miniature "rat-kangaroos" to the giant grey and red "roos" of the more coastal forests and inland plains. The two preceding articles dealt with the more or less primitive group of rat-kangaroos, which retain evidences of their ancient insectivorous ancestry in both anatomy and dentition. Compared with true wallabies, the rat-kangaroos have shorter faces, more rounded ears, and relatively shorter and thicker tails, often used in prehensile fashion for the gathering of nesting materials. The finger nails of rat-kangaroos also differ in having the middle ones decidedly longer, for scratching out fungi, insect-larvae, and the tuberous roots on which they feed, in addition to certain grasses.

The series of articles now deals with the largest and most varied group of kangaroos, the sub-family Macropodinae, embracing all the more advanced grazing or browsing types, and beginning with the small hare-wallabies. Also included in the group are such quaint kinds as the rock-wallabies and tree-kangaroos, as well as the more normal scrub and brush wallabies, the mountain-loving wallaroos, and the "typical" large kangaroos.

Some popular confusion naturally exists regarding the difference between typical wallabies and kangaroos which, in the absence of any basic anatomical distinction, is merely concerned with size and dental variation. Compared with rat-kangaroos, however, the small wallabies are readily distinguished by the following combination of characters,

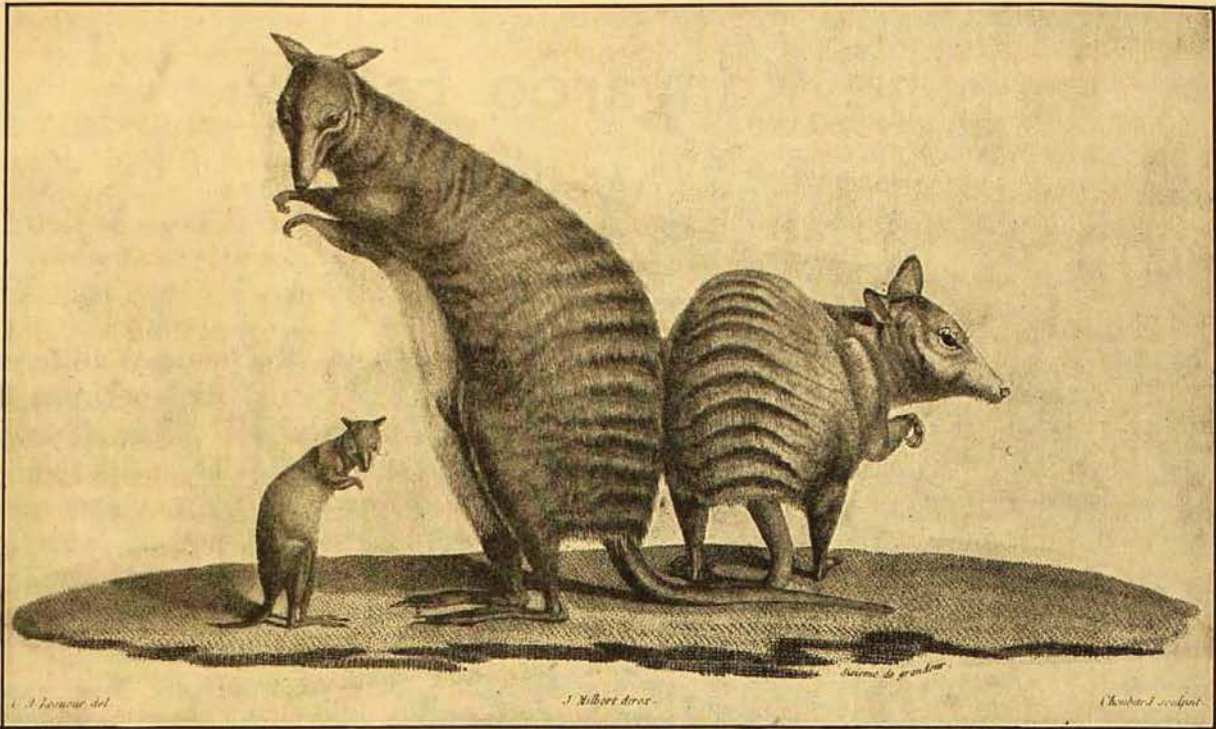
which emphasize the marked differences in general habits and diet between their respective sub-families. The faces and ears of true wallabies are relatively longer, and the middle fore-claws are not specially lengthened beyond the outer ones, while the tail is relatively longer and more slender, though not as supple as in rat-kangaroos. The first upper front teeth, or central incisors, are not so decidedly longer, and the canines are quite rudimentary or absent, while the size of the molars definitely increases backwards, and their crowns are strongly ridged across in the grazing style, instead of having the rounded molar-crowns of rat-kangaroos, used for pulping fleshy roots and insects.

### THE BANDED HARE-WALLABY.

There are four species of the lightly built and brightly coloured little kangaroos, which were appropriately named "hare-wallabies" in the early days when John Gould, the great naturalist-observer, noted their remarkable hare-like speed and jumping abilities. He also observed that instead of constructing a covered-in nest, like most of the rat-kangaroos, they had the habit of crouching close in a "form" or "seat" as hares do, and as typical of their similar solitary habits.

The Banded Hare-Wallaby represents a single species of the genus *Lagostrophus*, appropriately named from the Greek meaning "banded-hare", in allusion to the blackish-brown cross-banding of the lower back, contrasting sharply with the general grizzled-grey coloration. This solitary species, which is restricted to some of the islands in Sharks Bay, and a few isolated localities on the mainland of

<sup>1</sup> Troughton: AUSTRALIAN MUSEUM MAGAZINE, Vol. viii, No. 1, June-August, 1942, p. 17.



**The Banded Hare-Wallaby (*Lagostrophus fasciatus*) of Western Australia. It was first reported as a "Sort of Raccoon" by Alfred Dampier, who observed it on many islands when entering Sharks Bay in 1699.**

From Péron et Freycinet, *Voyage de découvertes aux Terres Australes.*

south Western Australia, is further distinguished from the three other species of hare-wallabies by having the muzzle-tip naked instead of hairy.

The conspicuously banded little wallaby was first recorded by William Dampier, who observed it on many islands when entering Sharks Bay on 6th August, 1699, in command of H.M.S. *Roebuck*, during his second visit to the west coast of Australia. His journal stated that: "The Land-animals that we saw here were only a Sort of Raccoons, different from those of the West Indies, chiefly as to their Legs; for these have very short Fore-Legs; but go jumping upon them as the others do (and like them are very good Meat)." This account is sometimes wrongly claimed to be the first description of a kangaroo, but the banded coloration, which reminded Dampier of the flesh-eating raccoons seen on lands about the Spanish Main, allows of no confusion with the plainly coloured Tammar or Dama Wallaby, described by the Dutch Captain Francis Pelsart from Houtman's Abrolhos in 1629.

Banded hare-wallabies were later collected and named by the French

naturalists Peron and Lesueur, who afterwards placed the specimens in the Paris Museum, and gave an interesting account of their habits on the islands. They lived in the impenetrable thickets of a spiky kind of *Mimosa* where galleries are formed in which the timid creatures take refuge at the slightest sound. The females were carrying their single young in the pouch when the Frenchmen visited the islands, and they referred to the devoted way in which the mothers protected their offspring. If wounded, they would carry the young in the pouch until overcome with weakness and loss of blood. Then, squatting on their hind-legs, they would help the young from the pouch with their fore-paws, and apparently sought to place them favourably for escape.

Commonly observed on most islands in Sharks Bay, the Banded Hare-Wallaby is now restricted to Dirk Hartog's, Dorre, and Bernier Islands. It has been known to breed so freely on Bernier Island that great numbers perished in bad seasons following on the temporary introduction of sheep, while on Dirk Hartog's, the wallabies are said to have entirely forsaken the southern end where a sheep-run

was established. The mainland variety, called "Merrnine" and "Munning" by the blacks, has been regarded as a doubtfully distinct sub-species under the name *albigilis*, in reference to the supposed increase of whitish tipping of the fur. They were plentiful in the early days of the Swan River Colony, inhabiting the prickly thickets on the flats and around swamps, through which men could not force a way. The blacks used to burn the thickets every few years for game and thus destroyed great numbers of this beautiful little wallaby which, prior to the advent of the fox, could not have been killed in any other way. They are now said to occur only in a few favourable localities east of the Great Southern Railway in Western Australia, though formerly occurring in such widely separated areas as Port Hedland, Peak Hill, Laverton, and Eucla. Although the species probably once extended into South Australia, it hardly seems possible that it ever inhabited the Murray scrubs, as Eyre is said to have stated.

#### THE BROWN HARE-WALLABY.

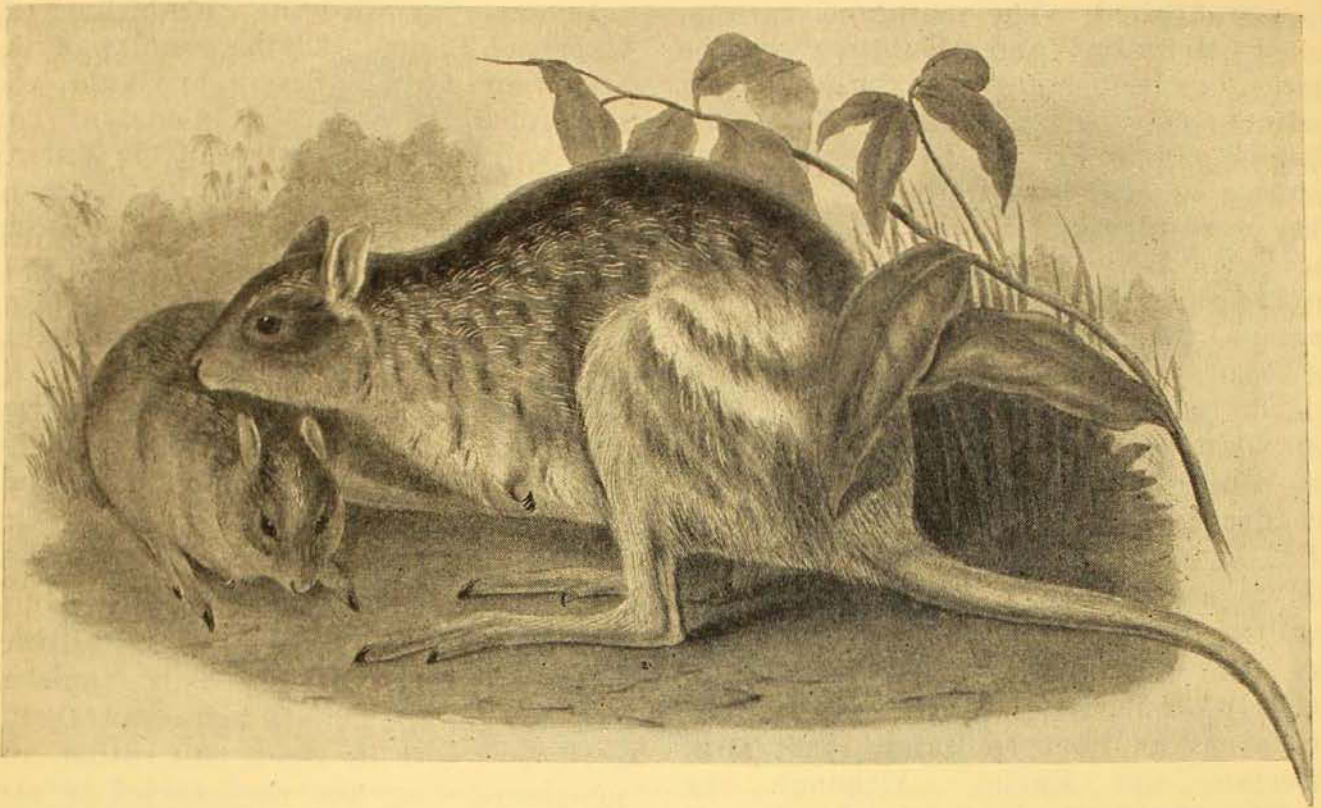
Once widely ranging over inland New South Wales, the Brown Hare-Wallaby is the first of the three unbanded and hairy-muzzled species described by Gould, who formed the genus *Lagorchestes* for them, from the Greek meaning a "dancing hare", in allusion to their agile fleetness. He also confirmed the general likeness by giving the Brown Hare-Wallaby the specific name of *leporoides* (from the Latin *Lepus*, a rabbit or hare) because of the resemblance accentuated by the grey-brown coloration, and the contrast of the unusually long ears with the relatively short head. It was said by Gould to be a solitary creature as a rule, with the habit of squatting close in a "seat" like a hare, and for a short distance to be fleetier than any others of its group. Its powers of leaping were extraordinary as it could make clear jumps of from eight to ten feet when hotly pressed. One which was chased by speedy dogs for a quarter of a mile was stated by Gould to have actually leapt clean over his head when redoubling to find him in its path.

It was recorded as inhabiting the Liverpool Plains, and the vicinity of the Namoi and Gwydir Rivers, by Gould, who also found it "tolerably abundant" on grassy plains in the region of the Murray in South Australia. According to Gerard Krefft, a past Curator of the Australian Museum, the Brown Hare-Wallaby was common up to 1865 on the level country between the Murray and the Darling Rivers, and was known as "Turatt" by the Murray natives. Nocturnal, it was generally found in daytime asleep under a saltbush. Easily tamed when kept about the camp, it lived quite well on an unusual diet of biscuits, bread, and boiled rice.

Unfortunately, this quaint and solitary little kangaroo has not only vanished from all its old haunts before advancing settlement with its stock, cultivation, and introduced fox, but the species is also very poorly represented in the Museum. Residents of the far outback could therefore perform a very real wild-life service by noting the occurrence of hare-wallabies, or similar marsupials, and giving them all possible protection, while forwarding any remains to the Museum for identification.

#### THE WURRUP OR WESTERN HARE-WALLABY.

Inhabiting the interior of Western Australia, and some islands of Sharks Bay, this plain-coloured and hairy-nosed species was named *hirsutus* by Gould in 1844, in reference to the thickening of long reddish hairs on the lower back, which imparts the rather shaggy appearance distinguishing this species from others of the genus *Lagorchestes*. Its original collector, John Gilbert, stated that it constructed a burrow, open at each end, with a rough nest or "seat" near one entrance, from which it plunged into the burrow if alarmed. It fed on the open country adjacent to thickets of low scrub, and was very speedy like the rest of its kind. Because of the unusual habit of uttering a distinct whistling sound when pursued, it was named "Whistler" by colonists. It was also known to the blacks as "Wurrup", but, as is often the case, the aborigines' name is not popularly suitable



The Spectacled Hare-Wallaby of northern Australia, given the specific name *conspicillatus* in 1842 by John Gould, in reference to reddish patches encircling the eyes. The illustration was painted from the Museum specimen collected in the Gulf country by the explorer Leichhardt.

After Gould.

as it applies to the south-western corner where the animal is now apparently extinct.

The unusual combination of a burrow with the typical rough nest, or "seat", was probably encouraged by the more yielding soil about the York district of the south-west, where the species was once abundant. In the less hospitable interior, and on Bernier Island where it was plentiful amongst heath and spinifex, the resting seat is rather deep and half-hidden under a bush or tuft of spinifex. Hence it became known as "Spinifex Rat" to many pastoralists. The Bernier Island sub-species is distinguished as being more sandy in coloration, with shorter hair and ears. The Dorre Island sub-species is described as generally more reddish than the mainland race, with the skull narrower between the orbits.

This attractive little hare-wallaby has long vanished from the York district of the south-west where Gould's type specimen was collected, but it survives in the remote desert country near the South Australian border, and along the Canning

Stock Route. It is greatly to be hoped that adequate sanctuaries, free from grazing, will be maintained on the islands of Sharks Bay to ensure the survival of small marsupials which are apparently doomed on the mainland.

#### THE SPECTACLED HARE-WALLABY.

This striking species was originally made known from a pair collected on Barrow Island, about thirty miles from the coast between Roeburne and Onslow, Western Australia. Collected by Captain Wickham and the naturalist Bynoe of the early survey vessel *H.M.S. Beagle*, who presented the pair to the British Museum, the species was named *conspicillatus* by Gould (1842) in reference to the spectacled appearance caused by reddish patches encircling the eyes. There are two mainland sub-species: *leichardti* which ranges from the north-west to the Gulf Country and across to western Queensland, and a coastal north Queensland race, from Inkerman, named *pallidior* because of its distinctly paler fawn coloration.

The widely distributed northern race (*leichardti*) differs from the typical Barrow Island race in its larger size and more brilliant general coloration and markings. The original specimens were collected just a hundred years ago on explorer Leichhardt's first expedition, casually described as his "trip from Moreton Bay to Port Essington", north of Darwin. It seems that the original locality was between Normanton and Darwin, as no reference is given in the journal of John Gilbert, naturalist to the expedition, who had been speared by blacks on Cape York. The north-mainland race was named by Gould to perpetuate the memory of the intrepid Leichhardt while his fate on the attempted east-west crossing of the continent was still uncertain. The original specimens are

stored in the Australian Museum, and in his description Gould thanked the "Council" for its liberality in sending to Europe the rare specimens from which his beautiful coloured plate was prepared.

The shy and generally solitary brush-haunting habits of the gentle little hare-wallabies make them most susceptible to the ravages of the fox, dingo, and bush-fires, and renders the hope of their survival extremely doubtful. Should mainland species be found fairly plentiful anywhere, immediate efforts to ensure their survival should be made by the careful transference of examples to suitable sanctuaries. Similar islands to those already inhabited in Sharks Bay would provide an ideal haven for hare-wallabies if adequate provision be made against their extermination through settlement.

## THE AUSTRALIAN MUSEUM

### POPULAR LECTURE SYLLABUS, 1944

<i>Date.</i>	<i>Subject.</i>	<i>Lecturer.</i>
May 4 ..	"Dinosaurs—Giant Reptiles of the Past" ..	H. O. Fletcher.
.. 18 ..	"The Aborigines of Central Australia" ..	F. D. McCarthy, Dip. Anthr.
June 1 ..	"Earthquakes" .. .. .	W. H. Bryan, M.C., D.Sc.
.. 22 ..	"Curiosities of Insect Life" .. .. .	K. C. McKeown, F.R.Z.S.
July 6 ..	"Bird Life Near Sydney" .. .. .	K. A. Hindwood, F.R.Z.S., C.F.A.O.U.
.. 27 ..	"Museum Work in Bush and Desert" .. ..	E. Le G. Troughton, C.M.Z.S., F.R.Z.S.
Aug. 10 ..	"Boomerangs" .. .. .	Prof. Harvey Sutton, O.B.E., M.D., D.P.H., B.Sc.
.. 24 ..	"The Edge of the Sea and its Inhabitants"	Elizabeth Pope, M.Sc.
Sept. 14 ..	"The Work of a Biologist in War-time" ..	I. M. Thomas, M.Sc.
.. 28 ..	"A Visit to the Clarence River" .. .. .	Joyce Allan.
Oct. 12 ..	"The Fishery Potential of Australia" ..	H. Thompson, D.Sc.
.. 26 ..	"Dry-rot—White Ants—Borers, and their Control" .. .. .	R. A. Johnson, A.M.I.E. (Aust.).

DOORS, 7.30 P.M.

ADMISSION FREE.

LECTURE, 8 P.M.

*The Lectures are usually illustrated by Films or Lantern Slides.*

# Australian Insects. XX.

## Hemiptera—Homoptera—The Cicadas

(Continued)

By KEITH C. McKEOWN, F.R.Z.S.

### THE NAMES OF CICADAS.

**G**ENUINE popular names for insects—names which have their origin with the children and are not specially invented by some specialist in need of a popular designation—are usually extremely rare in this country. England has many of these joyous names for common creatures—names that have grown up through the centuries: Australia is still young, but perhaps the day will come when we too shall have our “well-loved” names developed by a natural, and not a forced, growth. There is a wealth of these popular names to be found among the Australian cicadas—sometimes even more than one have been bestowed upon a single species—a sure indication that the imagination of the children has been stimulated. W. W. Froggatt collected a number of these vernacular names, but no complete list appears to have been published, so, in view of the many requests received for such a list, I give below all that I have been able to trace. The small boy, of course, refers to them all as “locusts”.

*Macrotristria angularis*: “Union Jack”, “Whisky Drinker”, and “Fiddler”.

*Henicopsaltria edouxi*: “Washer-woman”.

*Thopha saccata*: “Double Drummer”, “Union Jack”.

*Cyclochila australasiae*: “Green Monday”, “Yellow Monday”, “Black Prince”, “Greengrocer” and ? “Lamplighter” (Bennett).

*Psaltoda moerens*: “Red Eye”, and “Black Cicada”.

*Abrieta curvicosta*: “Floury Miller”, and “Baker”.

*Pauropsalta melanopygia* and *P. encaustica*: “Squeaker”.

### AUSTRALIAN CICADAS.

Australia is rich in cicadas; about two hundred species have been described, and it is quite possible that among the smaller and more inconspicuous forms of the inland areas new species still await description.

Perhaps the most remarkable of the Australian cicadas are *Tettigarcta crinita* and *T. tomentosa*, primitive, hairy insects with moth-like habits, hiding under bark by day and flying actively at dusk. The former is found at high altitudes in the Australian Alps and has been caught at altitudes up to 5,000 feet on Mt. Kosciusko; the latter occurs in Tasmania. In these strange cicadas the sound-producing organs are completely absent, as are adaptations for hearing. The Bladder Cicada (*Cystosoma saundersi*) is another amazing creature, bright pea-green in colour, with the almost completely empty abdomen swollen into a huge bladder- or bubble-like resonator. A pinkish variety is also known. The forewings are opaque and match the colouring of the body. This insect has been recorded as feeding upon citrus, willow and briar—of which only a few citrus are native to Australia. Its normal food plant seems to be unknown. The Double Drummer (*Thopha saccata*) is an immense black and reddish-brown species, expanding as much as five inches across the wings; the “drums” are swollen to an enormous size, giving their bearer a remarkable appearance. *Cyclochila australasiae*, the Green Monday, with its numerous varieties, the Yellow Monday, Black Prince and others, is probably the commonest of the eastern Australian cicadas. Its varieties range in colour from a clear green, through orange-yellow, to black and green—I have even seen a

specimen that was nearer powder blue than green. *Psaltoda moerens*, a large black species, powdered with a silvery pubescence, sometimes appears in immense numbers which are conspicuous as they rest on the trunks of the smooth, white-barked eucalypts in the hot sunshine. Species of the genus *Melampsalta* and *Pauropsalta* sometimes occur in vast swarms in the bush and these species have been recorded as injuring fruit trees, not only by depositing their eggs in the branches, but by the extraction of the sap. A number of small species occur in the inland areas in the summer months, resting among the long grass and squeaking incessantly until the grass seems to simmer in the heat. One of these little insects, a minute, bladder-bodied, green species, is apparently undescribed, and possibly there are others among these small grass-frequenting forms.

#### ENEMIES.

The cicada in Australia seems to have comparatively few enemies, strangely enough when one considers the vast numbers of these insects in even a normal year. One might imagine that they would provide a lavish banquet for many different creatures. It is possible that more intensive study will reveal insect enemies, such as egg parasites.

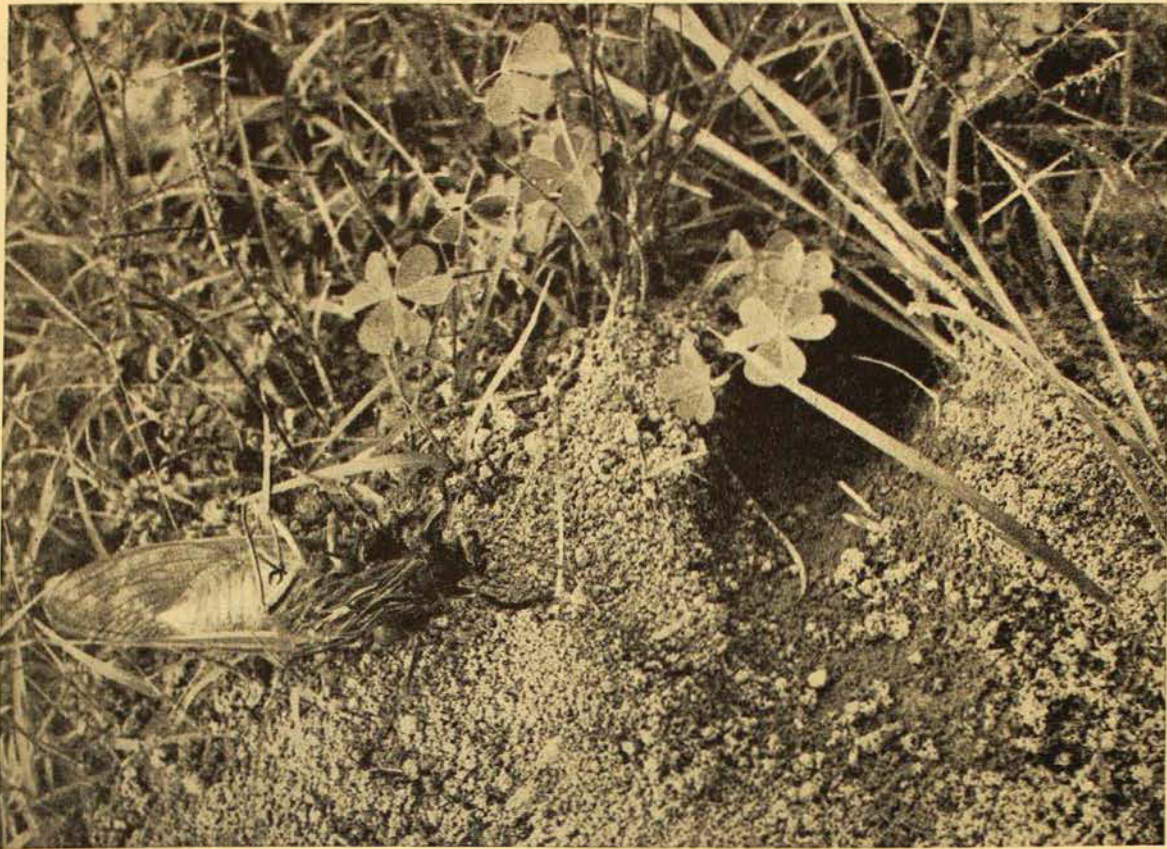
The common introduced Sparrow (*Passer domesticus*) may sometimes be seen in hot pursuit of a cicada as it flies for its life from tree to tree, and captures are not rare, the victim being disembowelled despite its rattling cries of protest. The introduced Starling (*Sturnus vulgaris*), too, has been recorded as killing cicadas. Among the bird foes we find the following listed: the Peregrine Falcon (*Falco peregrinus*), the Nankeen Kestrel (*Falco cenchroides*), the Dollar Bird (*Eurystomus orientalis*), the Leaden Flycatcher (*Myiagria rubecula*), the Yellow Robin (*Eopsaltria australis*), the Butcher Bird (*Cracticus torquatus*) and the Brown Tree-creeper (*Climacteris picumnus*). On November 15, 1942, at Lane Cove, Mr. K. A. Hindwood observed Crested Shrike-Tits



Red-eye Cicadas (*Psaltoda moerens*) resting on the white bark of gum-trees.

Photo.—K. A. Hindwood.

(*Falcunculus frontatus*) capturing two species of the large cicadas. He describes in *The Emu* how he "watched both a male and a female catching cicadas, four of which were captured during about ten minutes. In each instance the bird first crushed, or bit off, the head of the cicada with its powerful bill. This decapitation, or crushing, seemed to be intentional on the part of the Shrike-Tits and a necessary prelude to the eating of the choicest part of the insect, the viscera, the rest of the body being mostly a hard chitinous casing. Having reduced the cicada to a state of non-resistance the bird held it against a twig, opened the wall of the abdomen and then proceeded to eat the intestines. The body of the cicada was then abandoned. The heads of three of the cicadas recovered by me had been entirely removed, the fourth was badly



The Cicada-killer Wasp (*Exeirus lateritus*) dragging the paralysed body of a cicada to its burrow.

Photo.—A. R. McCulloch.

crushed. The opening made in the abdomen was on the under surface in three instances, and along the back in the fourth. All the insects were males, two being 'Double-drummers' (*Thopa saccata*) and two 'Green Mondays' (*Cyclochila australasiae*). The cicadas were not drumming at the time of these observations as it was raining. . . ."

Both Rainbow and Brown Trout (*Salmo irideus* and *S. fario*) are not slow to avail themselves of those occasions when the luckless insects fall from the overhanging bushes and struggle in the water. The fish bring the struggles to a quick finish and I have found their stomachs crammed with the remains of *Psaltoda moerens* and other species.

The large black and yellow Sand Wasp (*Exeirus lateritus*) preys upon cicadas as food for its larvae. One of these wasps will swoop down upon a singing cicada and, with a quick thrust of its sting, render the musician helpless. The huntress, still gripping her prey, volplanes from the tree to the ground, where,

astride its paralysed body, half flying, she drags it to her burrow. Here it is packed into an earthen cell and an egg laid upon it—an egg which develops into a hungry grub that rummages in the intestines. When fully fed, it spins its cocoon among the dried and scattered remnants of the banquet. In early summer next year a new generation of huntresses will emerge from the burrows to exploit again the cicadas in the tree-tops. On occasion, possibly when the maternal cares are not pressing, the wasp has its lighter moments. W. W. Froggatt has amusingly described the insect's behaviour: "As I had heard that wasps had been seen killing Cicadas here, I kept a look out for them. During the height of the 'locust season' I frequently saw the large yellow sand wasp, *Priocnemus bicolor* Smith [*Exeirus lateritus* Shuckard] hunting over the stems of the trees frequented by the Cicadas, which generally flew away with a great clatter without my being able to see what happened. Eventually I saw the whole



	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
<i>Cystosoma saundersi</i> .. .. .	-----	-----				
<i>Cyclochila australasiae</i> .. .. .		-----	-----	-----	-----	-----
<i>Macrotristria angularis</i> .. .. .		-----	-----	-----	-----	-----
<i>Pauropsaltria encaustica</i> .. .. .			-----	-----	-----	-----
<i>Thopha saccata</i> .. .. .			-----	-----	-----	-----
<i>Psaltoda moerens</i> .. .. .			-----	-----	-----	-----
<i>Abrieta curvicosta</i> .. .. .				-----	-----	-----
<i>Henicopsaltria edouxi</i> .. .. .					-----	-----

The seasonal range of some Australian Cicadas.

business; a hornet flew up, caught by the leg a Cicada engaged in sucking up sap, and shook it until it withdrew its style and flew away. The hornet then stood over the spot and eagerly sipped up the sap as it exuded from the puncture made by the Cicada's style. I afterwards saw the same performance on several occasions, the hornet apparently never hurting the Cicada." The large Mound or Meat Ants (*Iridomyrmex detectus*) sometimes attack the soft adults as they emerge from their nymphal skins. Ants of all species do not fail to take advantage of the spring of sap broached by the sharp beak of the cicada.

THE "VALUE" OF CICADAS.

Each year, when the cicada chorus is at its height, numerous inquiries are received concerning the possible, probable, or alleged monetary value of the insects. Such inquiries are almost invariably accompanied by the statement that the optimistic one has "heard that the chemists are buying them". The reason for the pharmacists' 'interest' has always

been—and still remains—obscure! Folklore in other lands has attributed to the cicada certain medicinal properties, but none of these altogether conforms with the requirements of the modern Pharmacopoeia. In the second century Galen prescribed cicadas as a specific for colic, while later authorities recommended them steeped in honeyed wine for the treatment of gall-stones! The discarded nymphal skins are sold in shops in China and Japan as a cure for almost every mortal complaint from earache to convulsions in children, and including hydrophobia, rheumatic pains, and the 'evil-eye'. Recent workers have found little to support any claims regarding its curative qualities, although a plaster of the powdered insect will produce vesication. The cicada's contribution to modern medicine is still awaited!

Since the outbreak of war in 1939 a new inquiry has arisen. Rumour has it that the chemists—the chemists again!—are purchasing cicadas' wings for two shilling and sixpence a pair for use in important war work!

# A Trip to Barrington Tops

## Part 2

By PEARL R. MESSMER and A. MUSGRAVE\*

**I**N the first portion of this article we described the general topography of the Barrington Tops district and the plants of the rain-forest zones near Barrington House on the Williams River.

In the present contribution we describe the marshy uplands and some of the plants and animals encountered, as we proceeded on horse-back up the steep slopes to the Tops.

The soil of the valley floor is deep and rich, consisting of decomposed basalt, washed down from the upper levels, together with humus from the vegetation and the residue of the disintegrated limestones and mudstones.

Intervening between the deep steep rocky-sided reaches of the river are weirs or large flats of small to large water-worn boulders, banking up still pools, in which

**Barrington Tops, viewed from foot of Carey's Peak looking towards spur running out from Mount Barrington. This spur divides Allyn River from Paterson River.**



### GEOLOGY.

In few parts of the valley do we lose the sound of the rushing torrent of the Williams River which, above the 1,000-foot level, has become very narrow, having carved, in its steep descent from the plateau, a deep rocky channel, where the Carboniferous limestones and mudstones, some with and some without stratification, can be examined.

Many of these rocks are highly fossiliferous, the commonest species being *Spirifer striata*, *S. crispa*, *Productus semireticulatus*, *Zaphrentis* sp., and abundant Crinoid stems. In places, alteration by the intrusive mass of the basalts and diorites coming to the surface of the plateau, together with tilting and contortion, can be plainly seen.

trout and occasional perch may be fished. The Rocky Crossing at about five miles from Barrington House is a good example of this.

The Rocky Crossing is also interesting as it is the breeding ground of the long-legged midges of the family Blepharoceridae. The larvae and pupae of these insects occur in the rushing water of the waterfalls, while the adults hover in the spray.

### THE RIDGES—THE ASCENT TO THE TOPS.

On leaving the Rocky Crossing turn-off, the gradual ascent begins and the rain-forest soon starts to thin until, half-way up the spur, the Eccleston track comes in and open-forest grassland, with the Blady Grass and the Tussock or Snow Grass predominating, follows the ridges

\* Photographs by A. Musgrave.

Carey's Peak as seen from the track to the Tops.



of these spurs, the valleys still being filled with the rain-forest.

From here we gradually enter a type of country in which Blue Gums, Turpentine and Tree ferns are the most conspicuous plants. Intermingled with these in the moister areas we encounter the Sassafras tree, which increases in numbers until it merges into the Beech forest.

The steep ascent from the Eccleston (Allyn River) turn-off to the summit follows the hillside in zig-zag fashion, and, up to the Beech forest, the track alternates between the hillsides of the Williams and of the Allyn Rivers. Sometimes, when following the ridge, the watershed between the two is so narrow that it is almost a sheer drop on the right hand to the Williams and on the left to the Allyn valley. Occasionally the track is so narrow that the sure-footed mountain horses have barely room to put their feet, but their disconcerting habit of doing a little "botanizing" on their own account at some of the steeper pinches shows how familiar the track has become to them.

At an altitude of 3,000-3,500 feet the rain-forest grades first into the open forest and then into the Beech (*Nothofagus Moorei*) forest, where, after meeting a few individual trees near the edge of the open forest, one is suddenly enveloped by the majestic dark mass of the solid Beech forest. In the heart of the Beech forest the foliage is so dense and the light so dim that there is little undergrowth. Many of the Beech trees

attain a considerable size and the hoary bark of the lower trunks suggests great age. Some specimens are said to reach a height of 150 feet. Their beautiful dark glossy-green leaves, with their delicate serrated edges, resemble rose leaves. An attractive feature of these trees is the delicate rosy-red colour of the young growths.

Water is scarce on the trip up, but at 3,800 feet the "First Spring" is reached. The "Second Spring" occurs in the midst of a grove of tree-ferns and, after passing through an open forest of Manna and Messmate gums and scattered Banksias, we enter the "Lost World" of the Snow Gum forest. This tree varies in size and shape according to exposed or protected situation, the weight of snow and the prevailing wind contorting it into all kinds of fantastic shapes. The monotony of the Snow Gum forest is relieved to some extent by a beautiful magnolia-like plant, *Drimys purpurascens*, peculiar to this area. The long spear-shaped leaves are glossy-green with an almost blood-red mid-rib springing from a reddish-purple stem. The Beech trees still occur at this elevation, and often near them we may see the beautiful small tree *Prostanthera lasianthos* with its showers of white flowers with their faint purple streaks. Countless small flowers grow everywhere among the Snow Gums, but the Snow Grass is the dominant small plant.

The narrow track winds interminably among the Snow Gums in this "Lost World", until suddenly we emerge on to

the edge of the escarpment culminating in the great Carey's Peak, and gaze in wonder at the view before us.

**THE BARRINGTON SWAMPS AND GRASSLANDS.**

Leaving Carey's Peak, we turn our backs on the escarpment and prepare to cross the plateau in the direction of the swamps, which we reach by following down one of the numerous small water-courses draining from the Peak. Glints of gold, green and brown seen in the distance through the silvery trunks of the

pletely hidden by the compact growth of rushes and sphagnum moss; the latter, often forming dense hummocks up to three feet in height, support a rich and colourful flora consisting of many plants found flowering near sea-level in the Spring.

In the "Big Swamp" Edward's Creek joins the Barrington River, and from this point the river cuts a deep channel between two hills, on whose slopes are scattered huge blocks of granite and diorite. Passing downstream between

**Barrington River looking downstream. Altitude, 5,000 feet.**



Snow Gums, tell us that the first swamp, Saxby's, is near at hand. Soon we leave the shelter of the Snow Gum forest behind, and from now on our trail leads over the grassland bordering the swamps which fill the depressions between the hills. No one who has not seen them can imagine the beauty of these colourful swamps, glowing in the low beams of the afternoon sunlight, and with a tang of winter coolness in the air, even in this month of January. Small brooks, which have to be forded or jumped, flow down between the hills into the swamps which are separated by long tongues of undulating grassland.

Little water is visible in any of these swamps, the surface being almost com-

pletely hidden by the compact growth of rushes and sphagnum moss; the latter, often forming dense hummocks up to three feet in height, support a rich and colourful flora consisting of many plants found flowering near sea-level in the Spring. In the "Big Swamp" Edward's Creek joins the Barrington River, and from this point the river cuts a deep channel between two hills, on whose slopes are scattered huge blocks of granite and diorite. Passing downstream between

these hills much broad swampland opens out before us, but this is in process of being drained and there the river channel is broad, deep and clearly defined. The high grassy undulating banks on either side, with their almost complete cover of pink Trigger Plant, vie in colour and beauty with the heather-clad hills of Scotland. The distance from the junction of Edward's Creek and the Barrington River to the Barrington Gorge is about 10 miles. The river descends by a series of rapids, deep pools and swiftly running flat reaches, rich in trout, to its final leap over the precipice into the valley below. The largest pool is known to fishermen as "the Big Hole". From the



Edward's Swamp.

Big Hole one can make a cross-country trek over the Snow Gum-clad hills by way of the Black Swamp to Carey's Peak.

The Black Swamp is quite isolated and at a higher level than the rest of the chain of swamps and lies in a shallow basin completely ringed with forest. Words fail to describe the colour of this swamp with its browns and golds of the rushes, with here and there considerable areas of intense blue of the flowers of the Sun Orchid, *Thelymitra venosa*, or of mauve of the flowers of *Utricularia*. In the background are the soft greys of the Snow Gums which here come down to the water's edge. In other swamps greens and golds predominate, but all are surrounded by sloping grasslands showing great similarity in the abundance of the flowering plants.

#### INSECTS OF THE TOPS.

On the foliage of the young Snow Gums which grew in the shelter of the larger trees we found many insects. A small leaf-eating beetle of the family Chrysomelidae, *Cadmus litigiosus*, yellow with a black spot on each wing-cover, is particularly abundant at this time of the year.

The larvae of the Sawfly, *Perga lewisii*, were common everywhere, in clusters on the leaves. The young larvae were sometimes seen under the care of the females.

Beating these Snow Gum bushes into a butterfly net yielded many insects and spiders. In the early morning, insects which are normally active during the later hours of the day could be secured by picking them off the leaves in a semi-comatose condition, due to the cold of the early hour. A green-eyed March Fly, *Scaptia crassa*, with transversely barred abdomen was thus secured. Later in the day, the species was captured on the flowers of the everlastings.

Butterflies were common, particularly the Caper White, *Anaphacis java teutonia*, which we met with all the way from Barrington House to the camp. Odd specimens of *Papilio macleayanus* were seen on the upper parts of the mountain, some flying round the flowers of *Prostanthera lasianthos*.

Difficulties of transportation of sufficient camping gear and provisions render only a short stay on the Tops possible, but with each succeeding visit the lure and beauty of this mountain

The Black Swamp. Altitude, about 5,000 feet.



fairlyland make a deeper appeal to the nature-lover.

#### HISTORY OF SCIENTIFIC EXPEDITIONS TO THE TOPS.

For some years past Barrington Tops has attracted scientific folk to its mountain slopes. In 1914 a party led by Mr. W. J. Enright, of West Maitland, visited the Tops, and results were published in the *Proceedings of the Linnean Society of New South Wales*. Another party, under the leadership of the late Professor Launcelot Harrison, of the University of Sydney, spent a month there and mapped the area. In 1926<sup>1</sup> the Royal Australasian

<sup>1</sup> Musgrave and Campbell: With the R.A.O.U. to the Barrington Tops District. AUSTRALIAN MUSEUM MAGAZINE, lii, 1, 1927, pp. 26-34.

Ornithologists' Union visited the district, and camped at Cutler's Pass on the Williams River. A guest house has since been built on the site.

The late John Hopson, of Eccleston, a keen naturalist, led many parties to the Tops, including overseas scientific visitors.

Dr. Lilian Fraser and Miss Joyce Vickery, M.Sc., made repeated visits, during a period of two years, in preparing their paper on the ecology of the Barrington Tops and Williams Rivers District, published in the *Proceedings of the Linnean Society of New South Wales*, 1937, 1938, 1939. This work was of inestimable service to us while on our recent visit.

## S.W.P. Naturalists

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

**S.** W.P. naturalists are those hundreds of men of the Australian and Allied fighting forces who are interested in the fauna and flora of the South-West Pacific area; they range from generals to privates, from admirals to ordinary seamen, and from well-known scientists to "the man in the street". That their interests are as wide as the area in which they are fighting is clearly indicated by their letters and personal visits to the Museum. They have been informed that there are no snakes in New Zealand, and no frogs other than introduced species in New Caledonia; that the death adder is not a true adder despite its superficial likeness to one, and that the large saurian in northern estuaries is a crocodile and not an alligator. The bird population of some of the small, isolated, coral atolls and islands draws forth many inquiries, especially when migratory species such as golden plovers and snipe suddenly appear on an island more than a thousand miles

from the nearest large land mass. Such birds may be a thousand miles off their regular migratory flyway, and have become lost, only to be reported as a "casual visitor" to such and such a place. There have been so many urgent inquiries about snakes and the treatment of snake-bite that a special pamphlet, compiled at the Museum, was published by the army and distributed through its regular channels.

It is really somewhat surprising that so many men trained to "kill or be killed" should be so interested in the harmless creatures of nature, and still more surprising that they can find time to make a study of special groups of animals. Who are these men, and in what particular branch of science are they interested?

In dealing with the zoological side only, we find that some are collecting corals and investigating the formation of coral reefs; others are studying the habits of shells, butterflies and other insects, tropical

fishes, reptiles, birds and mammals, whilst others are collecting fossils, minerals, and ethnological objects.

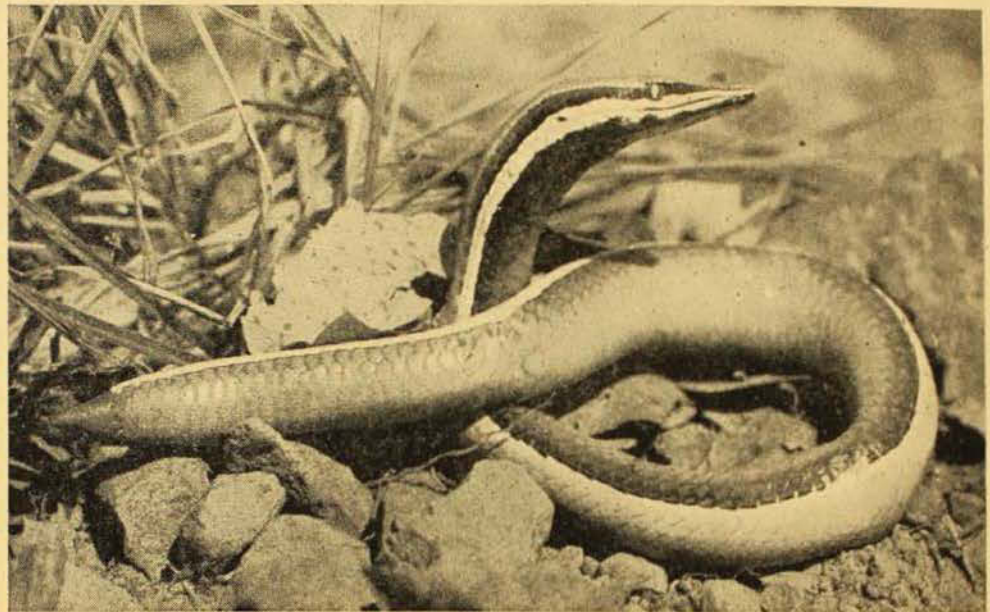
Taking it all round, Americans are much more interested in nature than are the fighting men of any other nation, but this may be attributed to the fact that Americans receive a much more intensive training in this subject, from kindergarten to university, as nature study is taught in most schools, and the museums take a leading part in the general scheme of things.

behaviour. He informed me that his main "grouch" is that invariably at the psychological moment, either his party gets the order to "move" or a few Jap bombs do the moving for him, thus making him a fit subject for anyone studying animal behaviour. It must be this same sense of humour that keeps the morale high in most fighting units.

A gunner, who has seen service in Libya, Greece and Crete is now making a study of New Guinea snakes, and his notes and drawings are a valuable contribution to

**Burton's Legless Lizard.**  
*Lialis burtonis.* This snake-like lizard has a wide distribution in Australia and New Guinea. It grows to approximately twenty-four inches in length. In this specimen the tail has been broken off and a new tip is growing in its place.

Photo.—L.A.C. N. R. Laird, R.A.A.F.



A member of the Netherlands forces is a student of fauna conservation, and is keenly interested in the relationship of the vertebrate fauna of the East Indies to that of Australia. His first-hand knowledge of the snake population and the poisonous and edible species of plants and animals makes him a valuable member of the intelligence section, and he applies his knowledge in teaching the troops how to "live off the land", how to find food and water in case of forced landings in strange mountainous country, or in case of lost patrols, cut off from normal army supplies. His sojourn at the Museum was an inspiration to those who were privileged to meet him.

A corporal of a well-known Australian brigade, a student of psychology before his enlistment, whiles away any spare moments making notes on animal

the herpetology of that area. In his rambles he has found numerous specimens of the Papuan Black Snake, and was fortunate to see several Green Pythons, both in the adult green and the young yellow stages. This, an arboreal species, though small, is one of the most brilliantly coloured of the whole python family. It was through the observations and collections of this gunner that the Taipan, or Giant Brown Snake, was discovered in the Moresby district, previously known only from the Fly River estuary in New Guinea and the northern part of Australia from Cape York Peninsula across the Gulf country to Arnhem Land.

The Taipan is a venomous species growing to more than ten feet in length, and undoubtedly is the most dangerous snake in this part of the world.

Many queer and interesting forms of reptiles are received at the Museum from soldiers stationed in the most outlandish places, and though often these are the subject of some debate on which a wager has been made, our answer leads one or more of the interested soldiers into the paths of nature, and some have developed into keen observers and quite good naturalists.

ship was bombed on the way to Alexandria.

From north-west Australia came the dried skin and crushed head of a small snake which had wriggled from a hollow log thrown on a fire; this specimen excited interest at the Museum as it appeared to be a rare species. The gunners, on being informed, hunted round their "area" for weeks and eventually advised that they

**Brown Tree-Snake** (*Boiga irregularis*). The Brown Tree-Snake is a slightly venomous back-fanged variety, and it grows to more than five feet in length. In north Australia these snakes are brick-red with dark brown bands.

Photo.—L.A.C. N. R. Laird, R.A.A.F.



Quite recently a small snake-like reptile appeared in a gun pit, and after being well squashed under the heel of a heavy boot, its remains arrived at the Museum with a note saying: "I say it is a death adder, my mate is equally certain that it is a whip snake; can you settle the argument for us as there's a day's pay going to the winner?" The "snake" was a legless lizard, and quite a rare form, and I assume that on the reception of our reply, all bets were declared off. The gunners of that battery replied: "Compliments from X battery; we will try and get you a good specimen."

It is not only the fighting forces in the S.W.P. who have developed an interest in natural history; one man who was a "Tobruk Rat" became interested in the migration of birds between North Africa and Europe, and he also made a small collection of local lizards which, to his disgust, were among his losses when his

were sending a perfect specimen, but this was lost in transit or became so decomposed that it had to be thrown away.

In the Darwin area we have built up a small but enthusiastic team of naturalists among members of the Air Force, and one of them writes of the fauna: "The country around here abounds with wild life and is a naturalist's paradise. Flocks of wild geese can be heard honking overhead by day and night; kangaroos, flying squirrels, and other small mammals are plentiful; pigeons, parrots, finches and other birds are everywhere. . . . A selection of insects collected round the light in our tent at night is forwarded for identification, and I will be sending some lizards later . . . some of these frequent our tents in search of morsels of food. . . . Occasionally my nature studies are disturbed through visits from some 'naturalists' from Japan . . . tonight I was awakened by a sound which I thought to be the doover (alarm) signal-



ling us to dive into our slit trenches. Without question I donned tin hat and boots only to be informed by my mates that what I heard was a dingo wailing its theme song. . . . I must have looked silly standing in the moonlight sans everything except tin hat and boots."

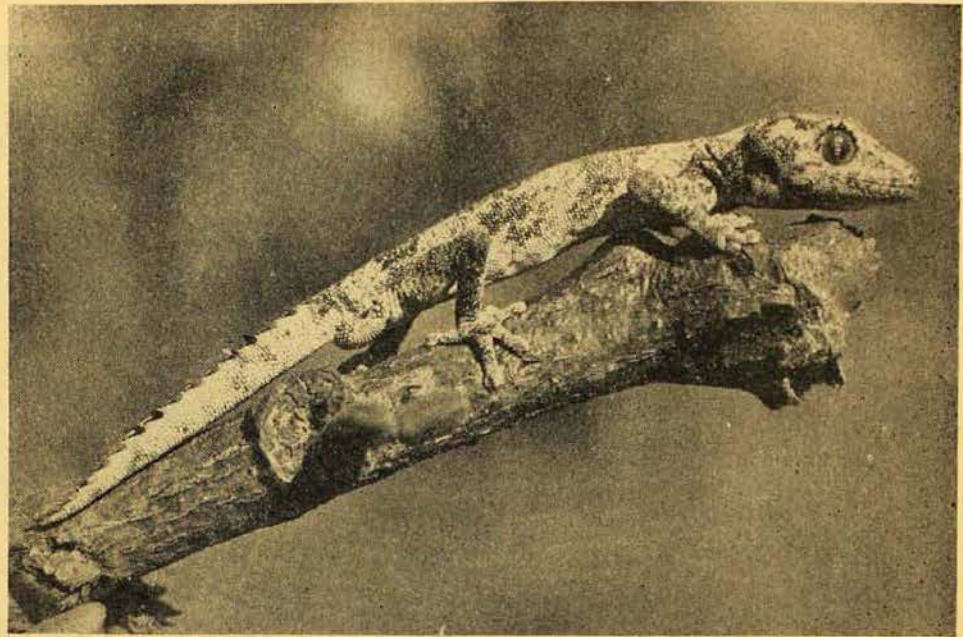
Eventually one of these airmen was wounded and found himself recuperating in a hospital near the Museum, which he visited several times during his convalescent leave.

insect which he mistook for a twig, and it appeared to be pitying his efforts as a camouffleur.

An ack ack gunner had been watching the opening and closing of the lid of a trap-door spider's retreat near the edge of the gun pit, and he is certain he has gained some ideas by which he can improve the quick release nets that cover his gun. These are only two illustrations from many which show that soldiers have added greatly to their knowledge of

**Gecko (*Diplodaectylus spinigerus ciliaris*).** Geckos, which are harmless, visit the tents of the troops at night in search of mosquitoes, flies, and other insects. The one illustrated is a north Australian type, and is not so common as other varieties.

Photo.—L.A.C. N. R. Laird, R.A.A.F.



In addition to the many Americans who are interested in Australian, New Guinea or Solomon Island birds, there are more Australian troops who compile lists of species seen and who forward to the Museum coloured drawings, when identification is uncertain. Extraordinary as it may seem, some of the birds listed have been observed during hazardous patrols near the enemy lines, and it is obvious that a man who can make a mental note of creatures seen during a reconnaissance must be an excellent patrol leader, for he is a trained observer, missing nothing, and often is able to interpret unusual actions of birds and associate them with some movement of a nearby enemy patrol.

One infantryman, while resting during patrol well within enemy territory, found the Japs so close that he tried to camouflage himself to resemble a log of wood. In his own words, he told me that about twelve inches in front of him was a stick

camouflage or personal concealment through watching wild creatures in their natural habitat. They have learned also the art of "freezing" and making the best use of shadow and highlight, two of the fundamental principles of camouflage, well appreciated by Papuans but long forgotten by "civilized" man.

Quite recently an American airman, a professor of zoology in Georgia, spent the whole of his two weeks' leave working on our reptile collection and naming the fine collection of lizards he made round Moresby, Buna, Sanananda and other battle areas, and incidentally he was responsible for entertaining the troops in between times by catching small crocodiles with his bare hands as is done with alligators in Florida.

The New Guinea birds, with their bright plumage, are ever a source of wonderment in the wet and steaming jungle, but none more so than the Birds of Paradise.

A few years ago an extraordinary new ribbon-tailed species was discovered high in the ranges, and several enthusiastic infantrymen are on the look out for further specimens. Even as I write I am able to report that another one of its kind, the most perfect of the three now known to science, has been found.

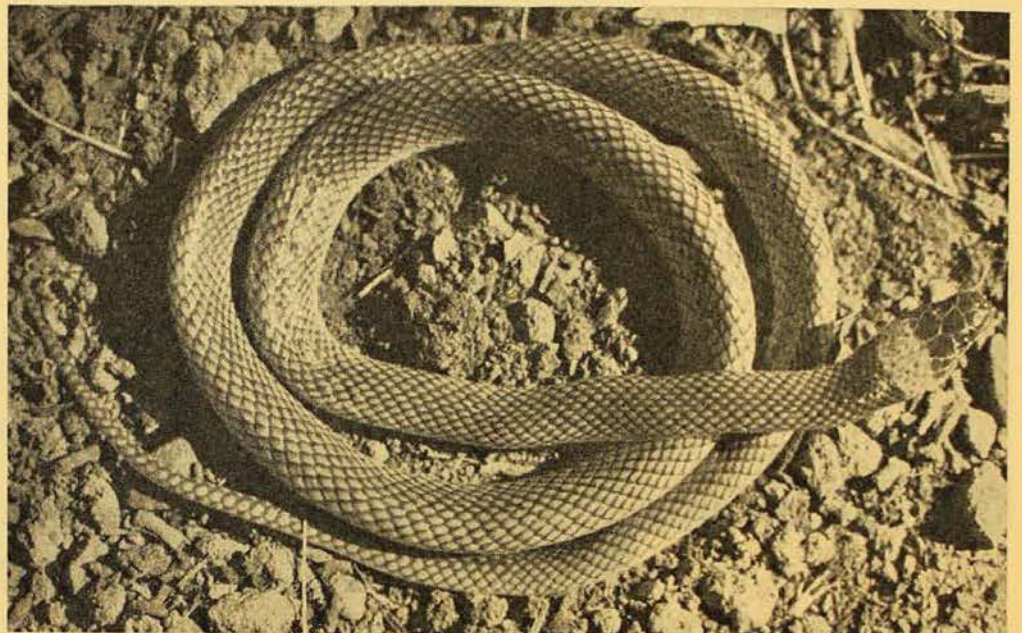
It is interesting to meet these S.W.P. naturalists on leave, and the most surprising feature is that comparatively few of them previously were students of nature. The majority are typical, tough, battle-hardened "diggers", who, with all

love of animals from their fathers, the original Anzacs; and whilst there were many naturalists personally known to me at Gallipoli base on Lemnos, and we were in sufficient numbers to cover a wide field and collect much material in various theatres of war, the naturalist "diggers" of the second A.I.F. outnumber the Anzacs about ten to one.

This interest in nature, and the desire to collect specimens during rest periods, acts like a tonic in relieving the pent-up feelings and the extreme mental strain that follows a particularly strenuous and

***Pseudelaps christearus*.** This is an exceptionally rare species, without common name. It inhabits north Australia and is one of the small, whip-snake varieties growing to about sixteen inches in length. Prior to this it was known from three specimens only.

Photo.—L.A.C. N. R. Laird, R.A.A.F.



their outward toughness, have hearts of gold, and would very quickly deal with the man who dared interfere or disturb the young birds in the nest only a few feet from the gun pit or tent, and there are several cases reported of the same men gently tending some wounded bird or animal, proof of this being the number of pet kangaroos in north Australia that were rescued as tiny creatures from mothers killed during air raids.

The S.W.P. naturalists are not the first of their kind; possibly they inherited a

nerve-racking time, as only those who have been privileged to serve alongside those good fellows know.

There is no doubt that the men who can turn their attention to a study or contemplation of nature gain great and speedy relief from the ravages of battle, and because of this it is the privilege of the Museum to help and encourage these S.W.P. naturalists, not for field notes and specimens received, but because it is some little return for all they are giving so that we may enjoy freedom, comfort, and security in our civil life.

# Holes and Corners of Seashore Life

By ELIZABETH C. POPE

**O**N almost any kind of seashore there are always quite a number of animals which remain unseen unless one knows just where and how to look for them. Some are cunningly camouflaged, while others hide themselves in odd little homes or crevices and so baffle their natural enemies or their would-be

possibilities of the fauna from the upper sides of the rocks and boulders, there still remains a host of animals to be hunted from the lower sides of the stones and from other spots which are sheltered from the strongest action of the waves, or from the all-too-bright rays of the sun.

**A sheltered boulder-strewn beach makes a splendid hunting ground for the naturalist. Long Reef, Collaroy.**

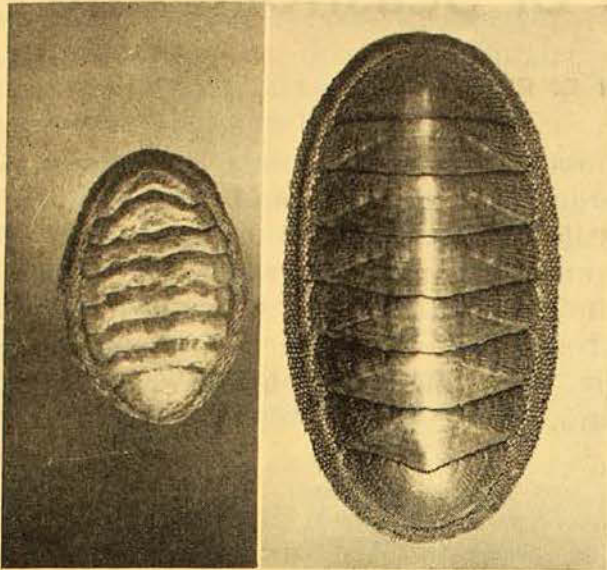
Photo.—E. C. Pope.



collectors. Traces of the presence of some of the more shy dwellers of the seashore can generally be picked up in the form of dead shells cast up on the beaches, or the empty cases which once housed their bodies. However pleasing the collecting of unusual dead shell specimens may be, it is not nearly so interesting as the tracking down to the lairs of their more elusive, living owners.

A splendid hunting ground for the naturalist who wishes to look for shyer animals on the seashore is a rocky part of the coast where there is a moderate degree of shelter from the surf—especially a spot where the rocks are soft and have been broken into boulders, or where there are numerous nooks and crevices in the rocks due to weathering. After the collector has exhausted the

The inhabitants from the sheltered positions among the rocks are generally more delicate in structure than corresponding types from the exposed parts and are, in consequence, all the more pleasing to the eye of the naturalist. Also the denizens of the sheltered spots usually move about more swiftly and easily than their counterparts from the tops of the rocks. This is just what would be expected when the lighter, more delicate build of the former animals is contrasted with the heavier and clumsier build of the animals from the latter group. Two of the common chitons or Coat-of-Mail Shells will serve to illustrate quite clearly the differences between the two groups of animals. On the upper surfaces of the rocks, along the sea coast near Sydney, a rather ruggedly built chiton,



Left: An eroded specimen of *Sypharochiton septentriones* from the upper sides of rocks. Right: *Ischnoradsia australis* from lower sides of rocks. The sculpture of these latter is much more delicate, despite its larger size. Actual size.

*Sypharochiton septentriones*, is found, frequently battered and eroded. The structure and sculpture of this shell is, however, much less delicate than that of *Ischnoradsia australis*, the common form which lives on the lower sides of the rocks. The illustration shows these differences clearly.

A moment's consideration soon discloses the reason why the animals from the lower sides of stones or from other sheltered nooks should be more delicate in build than those from the upper surfaces, for they are not so exposed to

wave action as the corresponding types from the tops of rocks, and the battering these latter receive during each tide would soon damage severely any creature of delicate build.

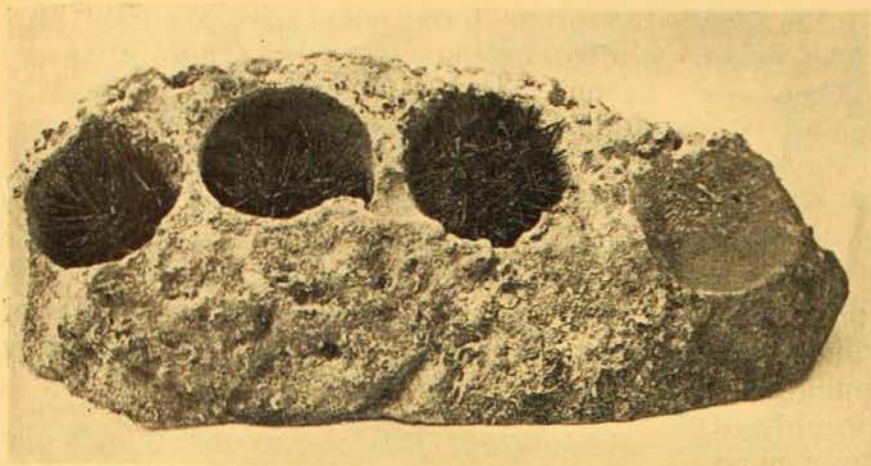
All kinds of devices are employed to combat wave action. Many animals adopt a conical shape for their hard covering, with the broad base held close to, or fixed to, the rock surface, and this streamlined shape offers least resistance to the waves. Limpets and barnacles are exponents of this method of dealing with water currents and their strong, coriaceous shells can stand up to prolonged battering. Coat-of-Mail Shells are more or less conical, but one axis is elongated. At Long Reef, Collaroy, a few miles north of Sydney, there is a rock platform composed of rather soft shale. At the extreme seaward edge of this reef there is a chiton (*Onithochiton quercinus*) which has found another way of sheltering from the full force of the waves—a way quite distinct from the adoption of the streamlined shape. With its fleshy foot, and probably also by means of a secretion of chemicals, it makes a depression in the soft rock surface and thus provides itself with a degree of shelter while the surf dashes over the rocks.

The same method of sheltering from the surf is used by the sea urchin, *Heliocidaris erythrogramma*, which is

In small pits, seen as dark patches in the rocks, the chiton, *Onithochiton quercinus*, shelters from the battering surf.

Photo.—E. C. Pope.





A safe shelter is hollowed out of the rocks by the sea urchin, *Heliocidaris*. So tightly do the urchins fit, it is often impossible to dislodge them without injuring them in the process.

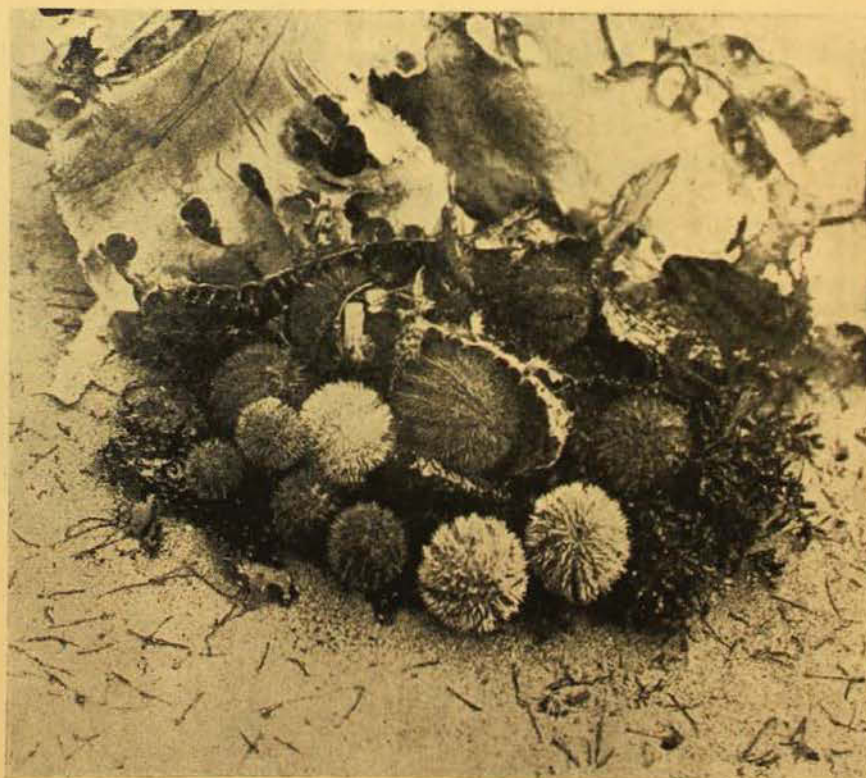
Photo.—A. R. McCulloch.

common on our rocky coasts. Its shape is not streamlined like that of the limpet, so it excavates a house for itself under ledges or boulders. In such small, close-fitting hollows, an urchin is able to cling to the walls of its hollow by means of hundreds of little tube feet which project through the hard outer shell of the body, between the rows of spines.

Out to sea, off the edge of the rocks, grow regular forests of dwarf kelp (*Ecklonia*), and among the fronds of this kelp another kind of urchin, the Sea Burr, *Holopneustes porosissimus*, has made its home. The body of this urchin is spherical and would doubtless be rolled hither and thither by every water cur-

rent were it not for the fact that it makes a secure little retreat in which to shelter. Attaching itself to one of the wide parts of a frond of kelp, the urchin draws some of the smaller side branches of the frond round its body. Cradled thus in a small nest of weed which it holds together with its tube feet, used in the manner of guy ropes, the Sea Burr is able to live quite comfortably above the floor of the sea, and the currents which might have proved a menace to the safety of the sea urchin are now beneficial, since they bring both food and oxygen to the animal.

For quite a number of years this particular urchin was known to me only from specimens of the dead bare test,



*Holopneustes*, sea urchins taken from their kelp-frond homes. In the centre one specimen still holds the kelp walls of its home in place.

found in the debris strewn along the high tide mark on surf beaches. The exact habitat remained a mystery. Then one day a collection was made among the seaweeds cast up on the beach during a severe storm. Heavy seas had torn off tons of seaweeds and piled them in great heaps along the surf beach at Collaroy. In places the kelp was still coming ashore and it was in these floating fronds that the living Sea Burrs were found. A casual glance at the kelp frond would not reveal the urchins' homes, but as a most careful examination of each plant was being made, the parted fronds disclosed numerous urchins still vainly trying to hold together the walls of their homes. Numerous specimens were found in this situation—enough to give convincing proof that this was the normal home of the animal.

A very different type of animal living in a quaint home is the rare little hermit crab, *Cancellus typus*. Most species of hermit crabs dwell in empty mollusc shells into which they thrust the soft abdominal part of their bodies. Protected in this way, the hermit crabs can concentrate on warding off the attacks of enemies without worrying unduly about this vulnerable spot. Full use can then be made of the enlarged 'armour-plated' front nipper limbs when the crab is attacked by an enemy. *Cancellus*, on

the other hand, disdains a shelly home and houses its body in a hole excavated in a stone, or, very occasionally, in a clinker thrown overboard from some coastal steamer still old-fashioned enough to be using coal fuel. When the crab's body is withdrawn into its stony house the door can be completely sealed up with a plug formed by the first two pairs of limbs, as shown in the accompanying picture.

When *Cancellus* moves about only the front part protrudes and the stone is dragged along too—like the gipsy with his caravan—for he likes to have his home with him wherever he goes. As can be imagined, this little hermit crab is hard to detect and is, therefore, rarely found by the amateur naturalist. Only when a collector happens to see a pebble 'walking about' and investigates the reason is he likely to find a specimen, and even then very sharp eyes are necessary for *Cancellus* makes its home below the level of the extreme low tides.

There are many other animals occupying quaint holes and corners on the seashore, but they are too numerous to be dealt with in a survey as brief as this. The best and most interesting way of finding out about them is to join the happy band of shore fossickers and to hunt them out oneself.

The rare hermit crab, *Cancellus typus*, excavates its home from a stone. The hole can be completely sealed up by the first two pairs of limbs, as shown in the left hand specimen. One-third natural size.

