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THE AUSTRALIAN MUSEUM

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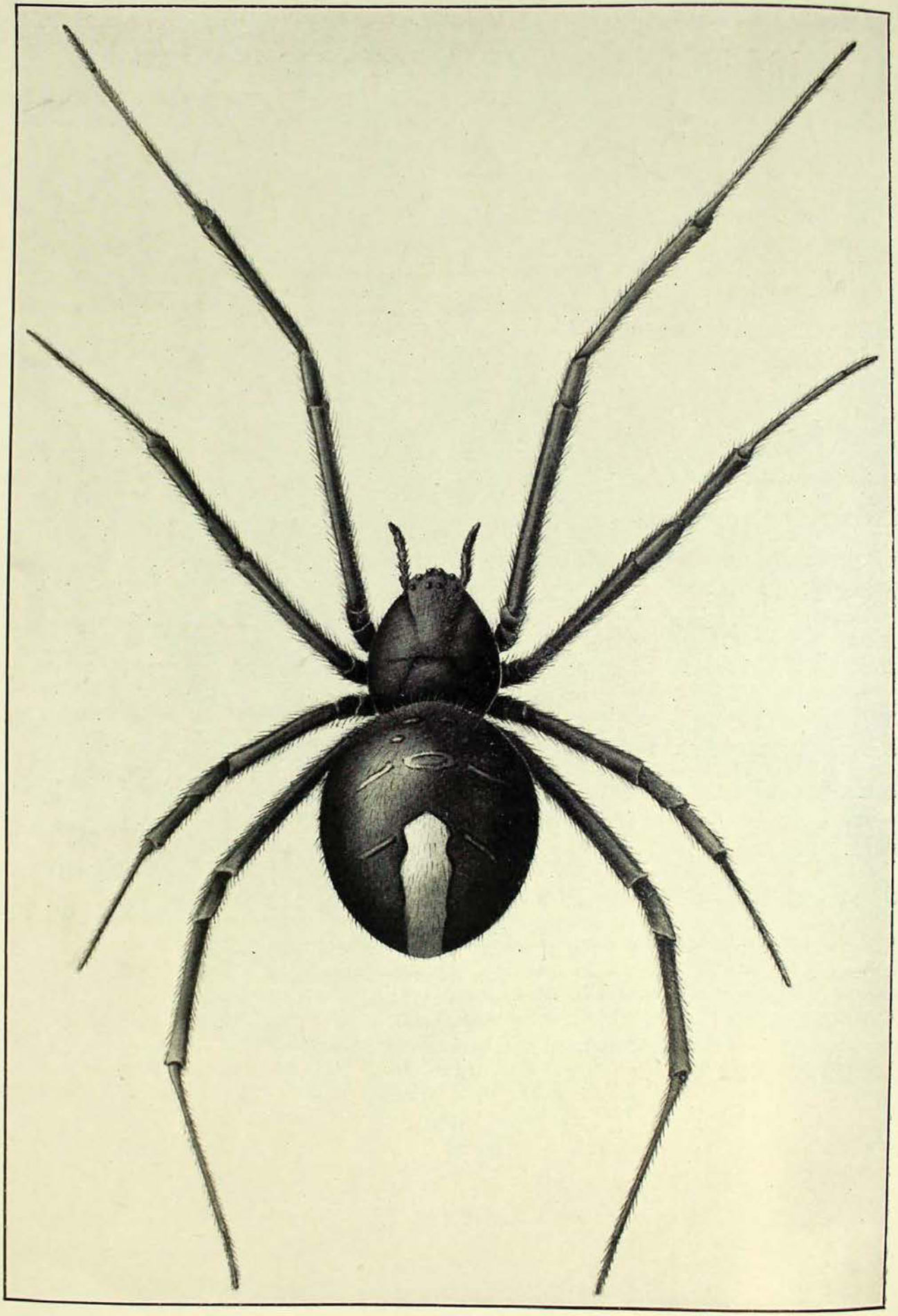

The Red-Spot Spider, Latrodectus hasseltii, a widely distributed species, is our most dangerous spider, and many cases of serious bites have been recorded. About five times natural size.

[*Phyllis F. Clarke*, del.

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VOL. III., NO. 4. OCTOBER-DECEMBER, 1927

The First Australian Museum.

AS has been previously mentioned in this MAGAZINE (Vol. III., No. 1, Jan.-March, 1921), there is good evidence that a public or semi-public museum which subsequently grew into the present institution, was founded in 1827, and in our last issue it was surmised that Alexander Macleay was the first to suggest its establishment. We have to thank Mr. R. H. Cambage, Trustee (Honorary Secretary of the Royal Society of New South Wales) for calling attention to the fact that, prior to Macleay's arrival in Australia in 1825, a museum was already in existence in Sydney.

The Philosophical Society of Australasia, the forerunner in a manner of the present Royal Society of New South Wales, was founded as a sort of scientific club in July, 1821. The minute-book of this short-lived Society (which apparently became defunct in 1822) was recently discovered in the Chief Secretary's Office and a copy has been published.* These minutes make interesting reading. The members met " every Wednesday at each other's Houses in Sydney, alphabetically, at 7 o'clock in the evening. Fine for non-attendance at a quarter of an hour after that time, five shillings." Subsequent minutes show that this rule was rigidly (and frequently) enforced, but the most humourous entry is that referring to the meeting of 30th January, 1822, which is as follows :—

" At Mr. Field's
Present,
Mr. Field.

The Minutes of the last Meeting were read and confirmed."

But what chiefly interests us is an entry in the minutes of the meeting on 11th July, 1821, where we read :—

" Major Goulburn having offered the use of a room in the Colonial Secretary's Office for the Society's Museum and Library.

Resolved, That the same be thankfully accepted, and that he and the Treasurer and Secretary be a Committee for the purpose of fitting up the same."

At the next meeting, 18th July :—

" The Museum Committee report that they have contracted with a tradesman for the fitting up of the room in the Colonial Secretary's Office for the sum of £9."

In the Minutes of subsequent meetings we come across references to the Society's Museum ; for example on 22nd August, 1821, it was reported that the Museum room was ready for contributions.

On 26th September, 1821, it was resolved:

" That the Museum Committee be requested to open a book for the purpose of entering a Catalogue of the Specimens and other Donations presented to the Society, together with the names of the Donors, leaving a column for such remarks as may be

**Royal Society of N.S. Wales, Journal.* LV, 1921, Appendix, pp. LXVII-CII.

deemed necessary to illustrate the locality and nature of such specimens."

At the meeting of 19th December, 1821, Mr. Wollstonecraft informed the Society, that "Mr. Hume reported the existence in Lake Bathurst, of an animal, supposed from his description to be the manatee or hippopotamus.

"Resolved, that Mr. Wollstonecraft be authorized to reimburse Mr. Hume any expense he may incur, on the part of himself or any black natives, in food or labour, for the purpose of procuring a specimen of the head, skin or bones of this animal, and that the treasurer to make good the same." It is not recorded that the treasurer was ever called upon to "make good."

It is clear from these extracts that as early as 1821 a museum was established in a room in the Colonial Secretary's Office, though it does not appear that it was ever open to the public, or that anyone not a member of the Philosophical Society (the membership was apparently never more than ten) had access to its contents. Information regarding the specimens preserved in the Museum is exceedingly meagre, nor do we know what became of them when the Society ceased to be. As Alexander Macleay became Colonial Secretary in 1825, it is more than probable that the little museum came under his notice, and it is quite possible that its contents formed the nucleus of the "Colonial Museum."

The Native Bear.

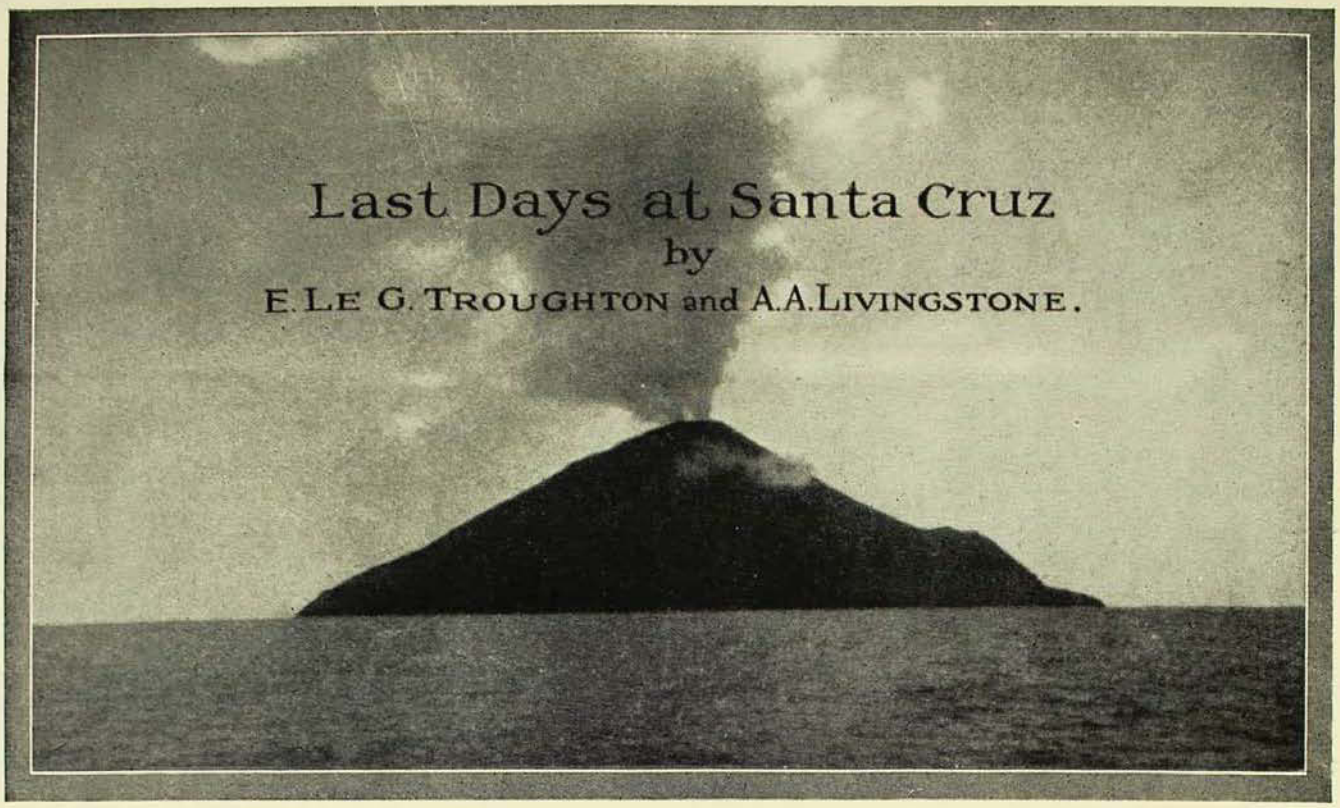
KEEN regret has been expressed in scientific circles and elsewhere at the resolution of the Queensland Government which declared August last an open season for the destruction of the Native Bear.

It is generally realised that all over the world the Age of Mammals is approaching its close, and that, except for those species which, by reason of their economic value, man chooses to preserve as domestic or semi-domestic animals, wild mammals will gradually diminish in numbers and ultimately become extinct. Australia has a huge area not yet effectively occupied for settlement purposes, and in all probability a remnant of our wild mammals will linger on for a long time. Yet very serious inroads have already been made on Australian wild life, and many interesting species have vanished, and others are now very rare.

Of the latter the Native Bear, one of the quaintest and most engaging of marsupials, is one. Not so long ago the koala was common in all the eastern states, but in 1901 or thereabouts an epidemic reduced its numbers very materially, and now it has quite disappeared from many of its old haunts in New South Wales, and in Victoria it has been saved only by the forethought which has established a sanctuary on Wilson's Promontory, where it is pleasing to relate the koala seems to be thriving.

In Queensland Native Bears are still to be found in fair numbers, and no doubt the Queensland Government was influenced by this fact when it removed the protection which the animals have enjoyed since 1919. But it is certain that even in one month their numbers will be seriously depleted. The koala has no cunning tricks to save him from the hunter. He does not hide in hollow trees during the day, but may readily be seen dozing in the fork of a gum, an easy mark for the "sportsman." We are not therefore surprised to learn that at the first sale after protection was removed 23,510 skins were offered. It was estimated that at the next sale the numbers would reach 50,000 and fur and skin brokers in Brisbane considered that before the season closed 300,000 skins would have been disposed of. It is doubtful whether this estimated total will have been reached, but it has to be remembered that many young will perish when deprived of the parental care of their mothers, which carry the little ones "pick-a-back" from June until towards the close of the year.

Such destruction is deplorable, and, as unlike the kangaroo and the wombat, which, when they occur in numbers, may do a certain amount of damage, the koala is quite harmless, its food consisting entirely of gum leaves, there is really no adequate excuse for this retrograde step. It is to be hoped that perpetual protection will now be afforded to this interesting and in some respects unique Australian native.



The island of Tinakula, which is actually the cone of a volcano, was in a comparatively restful mood as we approached the jungle-covered side opposite to that on which the crater opens. Its outbursts occur at regular intervals, accompanied by deep rumblings and great gusts of smoke and red-hot stones. They became fiercer during the day as if in resentment at our landing, and the sight was magnificent in the evening, with the setting sun turning the sea to molten lava.

[Photo.—*A. A. Livingstone.*

A DETAILED account of Carlisle Bay, Santa Cruz Island, where the British flag of annexation was hoisted in 1898, might easily absorb our last instalment, were it not that the wrathful mutterings of Tinakula, and the Reef Islands beyond, are yet to be investigated, and so the picturesque spot must be briefly dealt with before proceeding on the cruise.

Around the bay dark caverns in a seemingly impenetrable wall of green invited exploration, with their promise of shady jungle paths, and coral banks offered a rich store of marine life, so that the beautiful reef-locked anchorage provided strenuous days and some tedious night watches labelling, preserving, and storing our varied catch. On one side is the rough pier and few orderly huts constituting the headquarters of the trusted Headman " Willie," whose badges of office were a belt with the Royal coat-of-arms and khaki shorts. His important and by no means easy job was to keep *au fait* with all native affairs, enforce Government orders, and act as liaison officer between the natives and the District Officer, to whom he reported daily. Once free of official cares Willie delighted to join us, prancing over jagged shore rocks with a butterfly net, or chasing tree-crabs or lizards with much loss of dignity. Opposite Willie's abode of law and order is the memorial to Commodore Goodenough, and the crumbling overgrown walls of the village whose people launched the poisoned arrows on that fatal day in 1875.

Mention has already been made of the tax of 5/– per head, in return for which the natives are protected from attack, medically treated, and forced to maintain sanitary conditions in the villages. It had been the duty of our host, Mr. N. S. Heffernan, as the first District Officer resident in the group, to open up the island with roads connecting the villages, which he considers the secret of settling a native country. When villages are cut off by thick jungles the people seldom communicate, except by means of poisoned arrows, while isolation breeds suspicion which ripens into feuds at the slightest provocation.

An enclosure formed of dead coral built up by the natives to aid them in netting fish which are left within by the falling tide. Rarely met with in the group, the enclosures are about two acres in extent, and the fish are scooped out of them in nets fastened by four corners to the ends of crossed sticks.
[Photo.—*A. A. Livingstone.*

WEAPONS AND WARS.

The simple nature of *casus belli* in these regions is illustrated by an incident leading to hostile feeling which nearly culminated in war during our visit. A native from Graciosa Bay went to Nia Island, on the west coast, to buy a shell armlet and, having no money, was told to take it and pay later. Visiting Nia Island again to say he could not pay, the Graciosa boy was told " you pay or we fight " and on returning told his chief " Master I can't pay, Nia man say pay or fight," to which the chief, with fine disregard for the Locarno spirit, remarked simply " Alright, you can't pay—we fight " ; the trinket causing all the trouble was worth about twopence halfpenny, or the exchange of a grass armlet or two.

The most favoured weapon for war or hunting is the bow and arrow, the bow being six feet and the arrow a yard long, dimensions which appear to be most suitable for the strength and reach of the average man, and the happy medium most savage races have found practicable. Arrows are made of slender bamboo, pointed with sharp strips of bone for warfare and wooden points for game. Bone points are obtained by splitting a human shin-bone into pieces which are pared to fine points and sunk into the hollow ends of the bamboo shafts, where they are glued firmly by a resinous substance and bound by fibre string. Though it is not certain which is the most favoured way of poisoning the point, there is no doubt of the efficacy of the poison ; one method is to leave the bone in decomposing flesh until saturated with virulent germs of blood poisoning, while some maintain that arrows are infected with tetanus germs by being left sticking in taro beds in which the bacteria thrive. Another method is to coat the arrowhead with lime mixed with resin, which introduces air into the victim's blood-stream and usually has fatal results.

Yet another use devised for the poisoned shafts of bone caused the D.O. some concern when the humid heat led us to favour bare feet and shorts for our walks along the village paths. When unwanted visitors were expected, small pieces of the poisoned bone were stuck upright in the ground in areas, which were no doubt charted by the layers, as a sort of mine field, with disastrous results to the barefooted invader. It is a tribute to wise administration that, although Lever

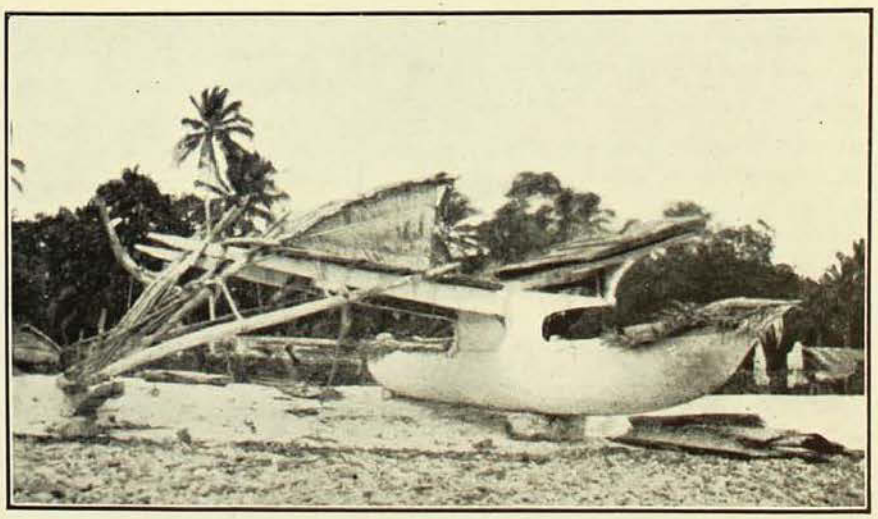
The western side of Tinakula is a vast slagheap of debris cast up by the dynamic forces of the volcano. Wreathed in sulphurous smoke, great rocks come bowling and crashing down the 2,000 foot slopes to the sea, while jets of yellow smoke and steam hiss out from crevices, even at the water's edge.
[Photo.—*A. A. Livingstone.*

Brothers abandoned their trading station on Graciosa Bay in 1918, and a white overseer was killed there in 1916, our peaceful invasion met with only friendly interest regarding our eccentric behaviour as wog-hunters. There are villages on Santa Cruz never entered by white men, and many which the D.O. could not enter without an armed force, but those along the east coast are friendly, and on entering them we quickly acquired a retinue of volunteer collectors and a string of wide-eyed youngsters.

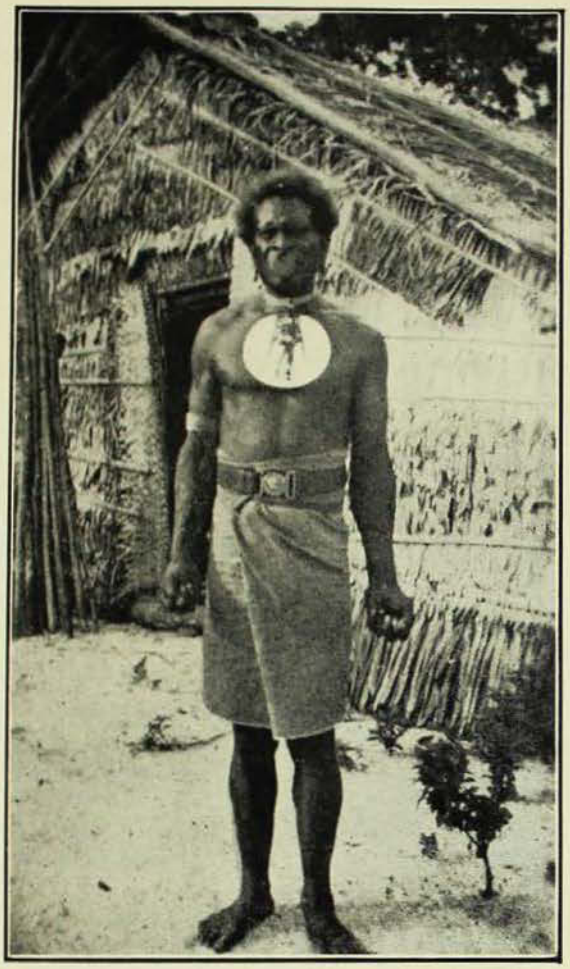
Inside the huts confusion reigns amongst the heterogeneous collection of treasures, such as bits of carved wood and food bowls, shell ornaments, rags, buckles, and broken knives, and the large conch shells of various sizes and notes which, with holes bored in their sides, serve as bugles in the south seas. One old fellow with horribly jagged and lime-stained teeth gave an impromptu vaudeville turn by blowing on a range of shell trumpets and, becoming almost blue-black in the face with exertion, invited us to join the band, an offer politely but firmly declined. The furniture is very simple, usually consisting of raised wooden platforms serving as beds, the Government insisting that natives sleep off the ground where possible. Pillows are replaced by wooden head-rests cut from trees so that the smaller branches act as legs, the whole resembling a badly bent fire-dog, which keeps the much-combed frizzy hair of the gentlemen from being crushed. In the centre of the huts there is usually a sort of combined sideboard and kitchen-range built of rough wooden shelves, upon which the "flesh" of the coconut is spread for drying and smoking into copra by a fire nearly always burning underneath or nearby, staining everything with acrid smoke, apparently unnoticed by natives, though rather stifling to visitors.

HEAD-HUNTING AND CANNIBALISM.

It is a fact, somewhat gratifying to visitors, that head-hunting, once ardently practised at Rubiana, and cannibalism, until recently rife on Malaita, in the Solomons, is non-existent in the Santa Cruz Group. Our personal satisfaction at the absence of these acquired tastes was enhanced by the D.O.'s gruesome account of cannibalism, which, boiled down so to speak, was to this effect. In the Solomons it was practised only by the Malaita people who bought their human rations from Marau Sound, Guadalcanal, where a subsidiary tribe of the Malaitans used to capture



One of the large ocean-going canoes of the type which has played an important part in the blending of mid-Pacific races. Note the ingenious manner in which the cabin is supported, and the navigating platform to the right, beside which the large sail is raised and lowered.
[Photo.—*E. Le G. Troughton.*



Dick, Headman of the Reef Islands, parades before his official residence for the D.O.'s inspection. The ornamented disc, ground from a large clam-shell and suspended from a tight necklet of seeds and shells, is worn only by important personages, while the Royal coat-of-arms on his belt buckle is a badge of Government service.

[Photo.—*E. Le G. Troughton.*

children from other districts, feed and rear them to about the age of sixteen and sell them to the natives of Malaita. The D.O. intercepted a party of these doomed ones in 1906 and found them absolutely without training or mental reaction, apparently quite unconscious of their fate, like any beasts for slaughter, and we were glad to hear that the abominable trade was wiped out about 1914.

Roaming the jungle roads with our instructive host, and amiable bodyguard, festooned with butterfly-nets, cameras, guns, tubes, and other paraphernalia, was a pleasant and very profitable experience for collectors. Occasional sorties into the dense bush yielded brilliantly coloured birds and insects, several species of flying-foxes, an occasional gaudy lizard or snake, and tree-living snails and crabs. These tree-climbing crabs have an ingenious method of aerating their blood; a small supply of water, after passing through channels in the body, and the gills, flows out over a sort of radiator arrangement or grill, where it is re-oxygenated for return to the body. The largest tree-climber is the Robber or Coconut Crab, a hermit-crab which has outgrown any shells large and light enough to shelter its softer hind-part, and spends most of its life ashore, up to 300ft. above sea-level, though the females return to the sea to deposit their eggs. Giant of land crabs, it lives on fruit, though it is even cannibalistic at times, while the powerful claws enable it to tear off the husks and break holes in large coconuts. The burrows in which it lives are generally near the roots of trees, and it is a trifle disconcerting, when bagging some wog, suddenly to realise that one's toes are being furtively eyed, or menaced by the nut-cracking nippers.

Amongst the nine new kinds of shells collected on the expedition, perhaps the most important was a species of *Placostylus*, a genus of large, heavy-shelled land snails, which is represented by many species at New Caledonia, and also occurs at Lord Howe Island and other places separated by wide expanses of ocean. Too heavy to float and unable to survive on the sea-bottom, its presence plays an important part in learned discussions upon ancient land connections, so that our discovery of a species on Santa Cruz, where the genus was not known to occur, was important as indicating a continental connection for the island, though conflicting with the abundant signs of volcanic origin.

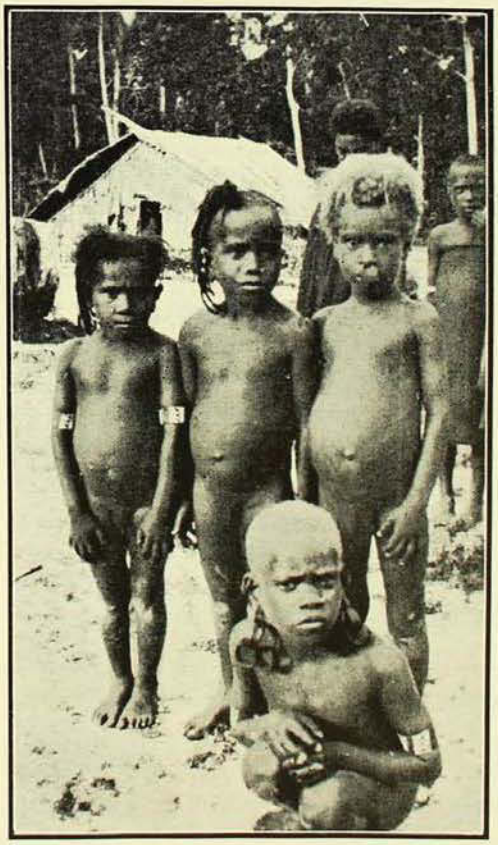
There is a strong factor in field-work known as "collector's luck," which certainly was in our favour when another new species of shell was secured. One morning while the whites of the *Tulagi's* complement were enjoying a plunge overboard, young Piccaninny shouted excitedly "Master, some fella crocodile he stop" and pointed out a large crocodile basking log-like on a mud bank formed by the mangroves which border the stream flowing into Carlisle Bay. Creeping through the mangrove mud-swamp for a close shot was a trying experience, for we sank to the knees in mud and skinned our shins on the oyster covered roots, so that it was a fortunate chance that "David" Livingstone, cutting his toe on a hidden shell, resisted the temptation to hurl it from him and popped it into a tin dangling

Troughton finds the tenth little nigger boy too large for his haversack, and a rather serious proposition to nurse, though to some his attitude suggests previous experience.
[Photo.—*A. A. Livingstone.*

round the neck of the patient Keo. In the rush of work the shell was overlooked, and a few days later, when bound for Tinakula and the Reef Islands, it rolled forth, a smellful mess, near Troughton's head as he lay staving off the pangs of sea-sickness on the cabin roof. As he was about to hurl it overboard, again collector's instinct fortunately overcame the ravages of mal-de-mer and he staggered aft to preserve the specimen, which added a striking new species to the fauna of the island.

CROCODILES AND THEIR CHARACTERISTICS.

Crocodiles are quite common, growing up to about twenty feet, and frequenting the lagoons and rivers as in the Solomons, where they are often seen swimming in the sea, though popularly supposed to be fresh-water reptiles. A favourite question in the islands is " are they alligators, and if so what distinguishes them from crocodiles ? " As a matter of fact there are about nineteen species of crocodile and but two species of alligator, neither of which occur in Australasia, and, though there is practically no absolute distinction, certain features make it easy to distinguish them. Alligators have very broadly rounded snouts as opposed to the narrow pointed ones of crocodiles, while in the latter the lower fourth tooth from the front projects slightly outward and fits into a notch in the side of the upper jaw; the corresponding tooth in the alligator fits into a socket and is hidden from view. The island species is the Estuarine or Salt-water Crocodile, which ranges from India to northern Australia, and is a man-eater, savage and untamable in captivity, and possibly the most vicious of reptiles. Instances are known of natives being pulled under in the lagoons, and just before our advent the D.O. and the doctor at Vanikoro had nursed a native back to life after a crocodile had bitten a large piece from his side while he was bathing in the lagoon. Dogs or pigs have an especial attraction for them, which caused us some trouble when exploring rivers where triple marks scored in mud-banks showed where big



A few Piccaninny collectors supply studies in expression and hair-dressing. The youngest, on the right, was always in attendance to pounce on even the smallest cigarette butt, and decorated each finger with a cartridge case to the envy of his small brethren. The tortoiseshell earrings of the lad in front have already dragged large holes in the lobes.
[Photo.—*E. Le G. Troughton.*

A coil of the "Tavau" or red-feather money, made of a fibre core bound with fibre string and covered with rows of small feathers gummed at their bases and held down by pigs' bristles. The feathers were once supposed to be from Lorikeets, but the D.O. showed them to be from the breasts of small honey-eaters, which are plucked and then released, which is fortunate, as otherwise the thousands needed for making the belts would doubtless lead to extermination.

[Photo.—*G. C. Clutton.*

"crocs" slid into the water at our approach. The two dogs which accompanied us on most of our outings evinced a wild desire to spring out of the dinghy in pursuit of leaping fish in the murky shallows. Our Norfolk Island friend McCoy's dog repeatedly offered himself as croc-bait, and had to be hauled aboard scattering mud and profanity in his wake; he also used to sit down sopping wet on the cushions reserved for "white fella Masters" and bark joyously at birds or bats just as "David" took aim, so that "Black Prince" was many black things in the course of the day's work. However, Trixie, who had travelled with the D.O. for many years, was a perfect little lady; sitting up between us at table, balancing remarkably well on her broad beam even in a rolling sea, she occasionally waxed impatient and was sternly ordered aft, where Piccaninny could be heard sympathising "my word Trissie, master he plenty cross along you."

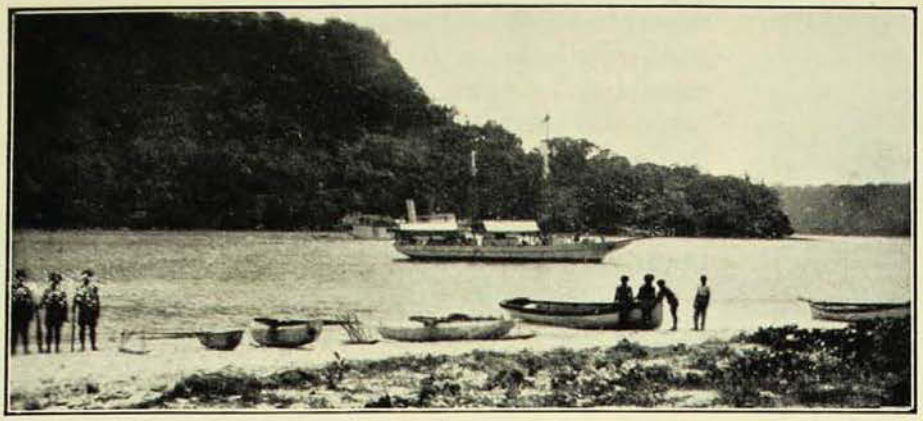
TINAKULA VOLCANO.

After a busy week for all hands, the bustle of departure for the outlying Reef Islands was too much for one of the crew, who was heard to say, "Me fella shake up too much, me fella no kiki yet," to which Bosun Asa replied, "Master he say no matter bymeby all fella outside takem some meat, some fella biscuit; orright some fella heave up." Then followed the report "anchor close up leavum bottom" and the D.O.'s order, "Pullem staysail and jib—hold 'im along wind, heave away. Alright Asa, let her go," and in the words of the dusky helmsman, "Master he givem course along Reef Island."

About fifteen miles from Carlisle Bay the cone-shaped Tinakula raises its fuming head 2000ft., and we were delighted when the D.O. altered course so that we might make a close acquaintance with the source of the intermittent glare and rumblings which had intrigued us for the past week. The island presented a wonderful sight, apparently constituting the above water portion of the volcano from whose summit at regular intervals of about eleven minutes there came a roar and burst of black smoke resembling heavy broadsides of artillery. The crater opens slightly to one side of the summit and on the other side brilliant green forests were seen to stretch half way up the giant cone where they faded out into long tongues of grass, becoming bleached towards the summit where dark furrows of ill-

One of the D.O.'s patients, with a painful arrow wound in the groin, being taken across the lagoon at Peleni, Reef Islands, to the "Tulagi" for treatment on board and transport to the dressing station at Vanikoro.

[Photo.—*A. A. Livingstone.*



The Government vessel "Ranandi" and the A.V. "Tulagi" met at Santa Cruz Island to disarm the factions threatening war. On the left is part of the squad of parading soldiery sent from the Solomons, and in the background a typical tangle of foliage.

[Photo.—*A. A. Livingstone.*

tempered outbursts were scored in the volcanic rock between them.

Skirting the green slopes to the crater side of the mountain we were spell-bound at the evidences of the mighty power of this great safety valve, which is quite small as volcanoes go. This side of Tinakula was a gigantic slag heap from summit to sea, covered with rocks and ashes deposited for hundreds of years. As we watched and timed the regular bursts, columns of black smoke ascended, and a shower of red-hot boulders came rolling and bounding down the slopes, as if cast out by subterranean giants busily excavating fresh storehouses in their underworld. They rolled down leaving spirals of sulphurous smoke like huge catherine wheels, while here and there yellowish vapour oozed from crevices or poured out in jets, one of which was at the water's edge.

Having seen Tinakula in angrier mood throwing heavy stones out to sea, the crew showed nervousness when ordered to take us ashore for some marine specimens and rocks wanted by our mineralogist, but their spirits revived at the spectacle of our landing to collect, garbed only in pith helmets and haversacks. The fairly heavy sea necessitated leaping from the dinghy to the barnacle-covered rocks, a far from pleasant experience, but in the brief time available we were able to throw some interesting minerals to the natives in the dinghy. Our excursion was cut short to the crew's immense relief, by the D.O.'s orders, as Tinakula seemed inclined to take a hand when a huge boulder split on a ledge high up to one side and pieces plunged into the water nearby with all the noise and appearance of shell bursts. There are several volcanoes in the New Hebrides, the one at Ambrym being larger and more active than Tinakula, a headland on which stood a hospital being sunk in one of its disturbances not long ago, but there must be few volcanoes rising straight from the sea as does that at Santa Cruz. As we departed towards evening, Tinakula let itself out to entertain us with extra loud rumblings and bursts of fiery smoke, a magnificent sight with the setting sun turning the sea to molten lava about its base.

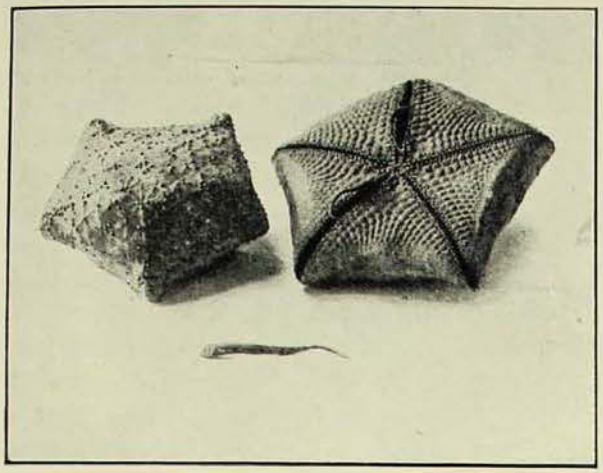
THE REEF ISLANDS AND THEIR BLENDING RACES

The several mid-Pacific races have already been described in this MAGAZINE[1] and the Santa Cruz people appear to be an intermixture of two or more of them, though mainly of the dark brown, frizzy-haired Melanesian type, and the blending of races was most apparent in the Reef Islands group which we now approached. The Duff Islands, a few hundred miles north-east, are inhabited by Polynesians with light brown skin and straightish black hair, and this type, strangely enough, occupied several islands of the Reef group, notably Nukapu, where Bishop Patteson was slain in 1871, and Peleni, where we landed. Both small islands

Grotesquely decorated skulls of departed Santa Cruzians collected from a headhouse by Livingstone while with the Government party which enforced the destruction of stocks of poisoned arrows. Dyed a brilliant yellow, the crude restoration of features is hardly complimentary to the past owners.

[Photo.—*G. C. Clutton.*

[1]Thorpe, "Native Races of the Mid-Pacific," Vol. i, No. 4, 1922, p. 97.



These large starfishes, measuring up to a foot across, are seen everywhere on the reefs when swimming with native diver's goggles. Set out to dry, they provided a surprise packet, as some small fishes (Carapus homei) which were living within the water-bloated bodies of the starfish, emerged to investigate the cutting-off of their food supply.

[Photo.—*G. C. Clutton.*

are within sight of each other and of the main cluster of the Reefs, where until recently only the Santa Cruz type of Melanesian was to be found. The D.O. explained that racial hostility must have kept these adjacent peoples apart for many years, until Government and Missionary workers broke down such barriers, so that now the effect of intermarriage is clearly seen. Thus by one of nature's paradoxes we find that the elimination of the warring instincts which kept the races pure has saved some casualties, but has led to a blotting out of racial individuality and reduced the hardihood entailed by warfare, thus aiding the spread of epidemics and impairing resistance to disease. The Melanesians, forming the bulk of the group's population, like the Polynesians build large canoes in which they make journeys of several hundred miles. Nearing the Reef Islands one of them was sighted and we altered course for a close view ; it looked a strange craft, somewhat suggestive of a disabled seaplane, with its cabin-de-luxe supported by poles joining the outrigger to the large canoe, and big two-horned palm-leaf sail bending to the breeze. Being buoyant and shallow, and without centre-pieces, they cannot tack, and the natives show great skill and intelligence in handling their craft when winds are unfavourable. They attain a speed of about fifteen knots at times, and as we approached a collision was avoided only by the D.O. taking the wheel while pandemonium reigned amongst both crews, and Livingstone nearly fell overboard trying to get what he appropriately termed an " action picture." As we flashed by there was a glimpse of the terrified faces of " some fella Mary along cabin " and a burst of language, fortunately unintelligible, from dusky navigators straining at their sail on the platform beside the cabin.

The Reef Islanders are an interesting people as the D.O. can testify, as he was nearly " cut out " there in 1918 in a 300 ton steamer one calm Sunday afternoon, when about seventy natives tackled the ship and a timely shot from the skipper ended the trouble. As he put it " The poor blighters were terribly scared when I turned up later as the new D.O. but we are now good pals." The main instigator is now gaol warder at Vanikoro, where we noted his rather villainous look, and could quite imagine the D.O.'s feelings when sometime after his trial, this " Johnny Mauli " was deputed to carry a light behind him one evening after dining with the Resident Commissioner at Tulagi. On the way home along a lonely path the D.O. said " Am I forgiven Johnny ? " to which came the somewhat non-committal reply " No more some day."

Dick, the Headman, was a competent but absurdly pompous person, with whom life seemed to be one long report of some new case of robbery, desertion, or the appropriation of an undue quantity of wives. He had a strapping and youthful figure, belied by a shortness of breath which made him adopt an absurdly drum-major walk when ahead, and to wheeze asthmatically when the D.O. forced him to set the pace. Hanging from his nose was a carved tortoiseshell disc which covered his mouth and seemed to help him say the name of his village, Namumblo, better than anyone else.

BATS, RATS AND REPTILES.

He proved a useful guide and led us to some interesting caves, in the coral limestone of the island's centre, haunted by small insectivorous bats. The islanders and our boat's crew enjoyed the bat-catching party immensely, firing shots into the cave and catching the bats in butterfly nets or sweeping them down with branches as they flew out. So interested did they become that we moved

everywhere accompanied by a retinue, of which the small boys were most persistent. Attractive little chaps with their hair shaved or mixed with mud or gum into fantastic tufts, they took an intelligent interest in the collecting, sticking their noses into the cyanide-bottles when one wanted to shut them quickly, bringing messes of squashed butterflies and spiders in their grubby little paws, and pointing excitedly to unwanted specimens so that one missed the special ones. However, with the aid of a fine type of native, Daniel Vanos, who got his name and training at the Mission School in the Solomons, the piccaninnies soon became useful as well as ardent collectors. Vanos enjoyed chatting with us in his quite good English and proudly showed us his little chapel and the bible printed in Motu, a Papuasian language used in the southern Pacific for communication between peoples of different parts.

Two phases of our collecting were most popular with the residents of Namumblo, one of which made us heartily glad to see the last of the village. The huts were overrun with a small species of rat which " Mrs. Headman " graciously allowed Troughton to trap in her abode, whereat other householders impressed with the morning's catch, declared open house and made him a sort of municipal ratcatcher, quite an agreeable matter as it established a friendly accord. Snakes, however, proved the last straw, for a sagacious piccaninny observing us catch one, spread the good news, and the village turned out *en masse* to collect snakes for us, actuated by a desire to be rid of them, rather than by the interests of science. Landing early the following morning we were besieged all day with festoons of wriggling reptiles. Although found in the Solomons, there are no frogs in these islands, but there are brilliantly coloured lizards and snakes of several species, the latter though non-venomous being dreaded by the natives as "debil-debil." Overcoming their dislike at the chance of getting rid of them, they offered us snakes by the dozen, tied to poles and trees, wrapped up in green leaf bundles, and dangling from nooses of string. Not wishing to damp a collecting ardour which often yielded valuable specimens, we took them off in the dinghy, to the rowers' alarm when some wriggled loose amongst their untrousered legs. On the ship life became a nightmare, with snakes crawling everywhere, until the bulk of them were thrown overboard for a reptilian race shoreward, and all hands retired exhausted, seeing snakes in more senses than one.

PELENI ISLAND.

It was with considerable relief that we made an early start next day for one of the outlying islands, about five miles from the main cluster of the Reefs, above which clouds of the big yellow-shouldered fruit-bats or " flying-foxes " were flapping in the bright sunlight. Skirting the surf-tossed reefs, we soon approached Peleni, which is a small island about a mile long and barely a hundred feet high. It is almost surrounded by a coral reef, from which we took a fine collection of living corals, starfishes, shells, crabs, and fishes, to the amazement of the reception committee of natives of all ages, who soon joined in the collecting with the usual result of rather overdoing things.

One of the crew, Jose-Kini, otherwise known as " soremouth," who had been busy with a bit of mirror and a long-pronged wooden comb, frizzing out his hair and decorating it with plaited grass and a flower or two, was obviously upset by the delay on the reef. He brightened visibly as we crossed the beach, on which a row of large canoes was drawn up like a parade of aeroplanes, and passed into the village which was built amongst a maze of stout rock walls. The reason for his special toilette became apparent when he quickly brought forward a buxom and presumably blushing " fella Mary " and asked that a marriage be arranged.

Simplicity is the keynote of the ceremony, which runs somewhat like this. The two natives go before a responsible person and say " Me two fella wanta marry " and are questioned, " Mary, this fella you wantem ? " To which the reply is a feeble " Yes master." " Alright, boy wanname belong you " then " Tom you wantem this fella Mary ?" " Yes, me wantem " the boy shyly whispers with hands over his eyes. " Alright now you two fella shake hands " which is coyly done, when the man hands over the equivalent of £25 in red-feather money, which concludes the ceremony.

Apparently Jose-Kini lacked the necessary settlement or sufficient manly charms, for

the girl showed what we considered good taste in turning down the crestfallen boy after an hour's patient negotiation by the D.O., during which a diversion was caused by us dashing off after some big butterflies of a species we had been shown in Sydney and specially asked to get. The largest butterfly secured, it proved to be a species having its headquarters in New Guinea from whence it has radiated out, being known about Sydney as the Orchard Swallow Tail; its occurrence at Santa Cruz had been either doubted or the form found there had been confused with another species, and our seven specimens have opened up an important discussion on the radial distribution of species and other complicated things.

We saw another phase of the D.O.'s work when we helped him examine a sick native who lay groaning in a fly-haunted hut. Though reluctant to admit it, he had evidently received a spear or arrow wound in the groin, which was frightfully septic and must undoubtedly have caused his death if untreated. After much patient persuading by the D.O., his family agreed to his going on the *Tulagi* for treatment on board and at the native hospital at Vanikoro. Our patient safely below we left late that evening after an interesting and profitable day. We had barely settled down to repacking and collecting at Vanikoro when rumours of war caused the D.O.'s return to Santa Cruz to join the official steamer from the Solomons, with its squad of the Resident Commissioner's soldiery under a white officer. Livingstone had some interesting experiences with them while the work of searching for poisoned arrows was carried out, especially at a village on the wild west coast, where the natives held suspiciously aloof. Here, to Livingstone's delight, a headhouse used for storing the possessions and heads of the departed was discovered hidden in the jungle. He found it eerie work, sorting the weird collection of relics which formed a kind of ethnological "lucky dip," including splendid examples of the grotesque decorated skulls, with their side-tufts of grass, and eye-sockets filled with carved wood on which black lines represented eyelashes.

During the absence of the D.O. and Livingstone, Troughton was the guest of the Vanikoro Timber Company, and many thanks are due for the helpful courtesy extended through the Manager, Mr. Court. Young Daumago also remained as a sort of cook-valet, preparing tasty breakfasts of hot scones, eggs and bacon, and coffee, making the bed in the "house along water," and collecting in his spare time.

Two Japanese trochus-shelling friends of McCoy provided another instance of the helpful attitude displayed towards our work, by putting their vessel and native divers at Troughton's disposal for a day on the reef, which included a course of special dishes and liqueurs. Even the Timber Company's Australian terrier "Boozer" was a useful ally in collecting the quaint pop-eyed fishes (*Periopthalmus*), which skip over the mud in mangrove swamps by means of fins bent at an angle for the purpose. Clinging to the banks of pools opposite to one's approach, they evaded capture until Boozer advanced to the attack, when they obligingly skipped across the water into a waiting net.

A native headhouse in which skulls and property of the dead are stored, in a typical setting of tangled undergrowth. As we enter on hands and knees through the small entrances seen in front, the heavy atmosphere is oppressive with the odours of decay and the incessant hum of insects.

[Photo.—*A. A. Livingstone.*

As case after case of corals and native gear was added to our half dozen large cans of spirit, we felt more than ever grateful to Burns, Philp and Co., for granting free

freight in consideration of the nature of our work.

The night of departure from Peu, Vanikoro, was a memorable one, as we said good-bye to the white officers of the company and McCoy who had made our stay so pleasant, and to Mr. Heffernan whose hospitality and great care of us made the trip and its undoubted success possible. Outside the natives staged a farewell dance with the gigantic warder Solo, an energetic M.C., urging them to "Come on now, shake him up little bit." Kesi the cook excelled himself at the last dinner, and the Piccaninnies presented us with baskets saying shyly, "Me give him along you," at which stage Billy and Jose-Kini set up a flattering if somewhat trying wail which the D.O. firmly suppressed.

The last kauri log rolled into place by a party which alternately screamed with alarm or laughter, we had our final glimpse of friendly dark faces, the faithful orderly Koviko, proud of himself in a grey tweed coat of Troughton's, staying till the last. As the *Makambo* nosed a careful way through the reefs, Mount Kopogo's vanquished head was wreathed with misty clouds in a vain attempt to emulate past glories. Here also must we take grateful leave of those who have followed our cruise through the medium of the printed page, adding in the words of Koviko "Thank you, plenty too much."

Notes and News.

Among recent visitors may be noted the following:—Baron Mulert, Ommean, Holland, who on behalf of the Ethnological Museum Rotterdam, is on his way to Vanikoro in search of relics of La Perouse; Mr. R. D. Elliott, Chairman of the Committee of the National Museum, Melbourne, who was seeking information regarding Museum lectures and other educational activities; Dr. T. Findlay Mackenzie, Professor of Economics in Columbia Unoversity, New York; Mr. H. E. Vaile, President, and Mr. Kenderdine, Councillor of the Auckland Institute, New Zealand; Mr. Harald Tanner, Consul for Finland, who takes a keen interest in natural history, particularly marine biology.

Mr. Melbourne Ward, Honorary Correspondent, who is ever on the alert to advance the interests of the Museum, has just returned from an extended trip, during which he visited several Pacific Islands, California, Mexico, Panama and Cuba, bringing with him an interesting collection of lizards, frogs, and marine invertebrates.

A collecting party consisting of the Director, Mr. T. G. Campbell and Mr. J. H. Wright was in the Yerranderie district from 8th to 23rd July. Their headquarters were at Coolong homestead, from which forays were made into the surrounding country, much of which is still in a more or less primeval condition. A number of kangaroos were obtained, which will subsequently be used for a habitat group in the Museum, and several smaller marsupials, such as the Taguan Flying Phalanger (*Petauroides volans*) and the Ring-Tailed Opossum (*Pseudochirus peregrinus*), besides a number of rats and a large series of bats from the Coolong Caves. Mr. H. N. Patton and his two sons were of the greatest assistance to the Museum party.

A detailed account of the trip will be published in a succeeding number.

Mr. T. H. Pincombe has for some time past been working in the Museum going through a collection of Permian shale from Werner's Bay, Lake Macquarie, in search of fossil insects. He has already been successful in developing an interesting series of insect remains from these beds.

The death of D. F. Cooksey of Mayfield, Newcastle, removes one who was a keen observer and who had taken special interest in aboriginal stone implements. He was the first to observe the occurrence of flake work in the Newcastle district and on the beaches in the neighbourhood, and presented an interesting collection to the Museum. Many new and unexpected forms were thus added to the collection, and by his hospitality and under his guidance, Mr. W. W. Thorpe of the Museum staff was enabled to visit the locality and gather information regarding the native workshop sites.

A Romance of Two Words.

AMMONITE AND AMMONIA.

By H. E. Crabb.

MUCH pleasure and profit may be derived from the study of the origin and history of almost any word in our language. In the present case, I propose to take two words, ammonite and ammonia, widely divergent in meaning, but both having a common origin, and try to find the relationship that exists between them. To the geologist ammonite means a great and wonderful family of animals that at one time flourished in the ocean. To the Biblical student, the word might signify that somewhat troublous race, the Ammonites, that lived north-east of the Dead Sea, while the chemist might be forgiven for believing that the writer was referring to the explosive of that name. In this article, ammonite means that wonderful group of fossil animals.

The ammonites have been extinct for many millions of years, and they belonged to the same group of animals as the present-day nautilus, cuttlefish, and octopus. Their shells are found in enormous numbers in certain rocks, particularly in Britain, and a large number of genera and species are known; specimens, often of large size, are of common occurrence in the cretaceous rocks of South-Central Queensland. The ammonites were in existence when giant reptiles were lords of the earth; they were at their zenith about the time of the appearance of the primeval birds, and they gradually died out during the ages when the first mammals were appearing. Their fossil shells vary from less than an inch in diameter up to the size of a cartwheel.

The characteristic shell of the ammonite is a flat closely-coiled spiral. In the old days, when a belief in fossils was tantamount to being an atheist, it is not remarkable that they were explained as being "petrified snakes" without heads! Even up to the nineteenth century they were referred to as snakestones, and I have seen in old books pictures of them showing the supposed head that had been miraculously broken off. These fossils are plentiful along the base of the cliffs in Yorkshire, and it is there related that they resulted from a miracle performed by St. Hilda. As recorded by Sir Walter Scott in "Marmion," the nuns of Whitby tell:—

> . . . how in their convent cell
> A Saxon princess once did dwell,
> The lovely Edelfled;
> And how, of thousand snakes, each one
> Was changed into a coil of stone
> When holy Hilda prayed;
> Themselves within their holy bound
> The stony coils had often found.

Scott, in a footnote, says that they were termed by palaeontologists "ammonitae."

An Ammonite from Queensland.

[Photo.—*H. Barnes.*

This name is derived from the Latin cornu Ammonis, "the horn of Ammon."

AMMONIA.

The second word is the name of that substance known as ammonia. This is a colorless, transparent gas with a penetrating odour, but possibly readers know it better in its liquid form, which is simply a solution of the gas in water. How is ammonia connected with ammonite ?

While ammonium compounds are in these days mainly obtained as factory by-products, they are produced also by the slow decay of animal and vegetable products. The gas itself is a compound of nitrogen and hydrogen, and is important in medicine, agriculture, and industry. The name ammonia was first used by Bergman in 1782 because he had produced it from ammonium chloride, commonly called sal-ammoniac. This white salt was, long ago, produced from camels' dung, accumulated near the ruins of the temple of Jupiter-Ammon in the Libyan Desert. In the multitude of the Roman gods Jupiter stood supreme ; he corresponds to the Greek Zeus.

When one people comes into close contact with another there is a tendency for the myths and customs of both to blend. Similarly, when a new religion is adopted, the old traditions are honoured, and any opposition is overcome by the inclusion in the new religion of some of the festivals, symbols, and even favoured gods of previous beliefs. The Christian religion, for instance, assimilated certain pagan festival days, and the Greeks and Romans came to identify some of their deities with those of Egypt.

Egypt had a complex mythology, but from the crowd of deities three stand out above all others, namely, Ra, Osiris, and Amen. The latter god, also known as Amun, and Ammon, meaning hidden, was probably, according to Flinders Petrie, numbered among the lesser gods as early as 4000 B.C., but it was not until much later that he became so powerful as to be fused with the great sun-god Ra, and so called Amen-Ra. About 1000 B.C., when the twenty-first dynasty came to power, the high priest of Amen-Ra was raised to royal rank, but owing to the lack of military genius this priesthood ultimately decayed, and robbers desecrated the temples and tombs. Subsequently, when Amen's power was probably at its height, the Greeks identified him with Zeus, as did the Romans with Jupiter. Hence Zeus-Ammon, and Jupiter-Ammon.

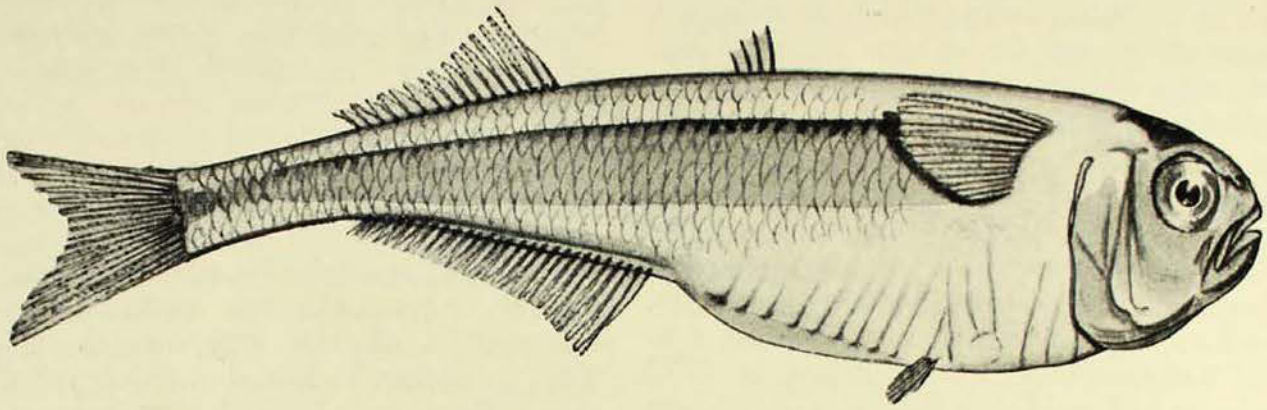
CONCLUSION.

One can scarcely be surprised that the Roman priesthood was confused by the complexity of the Egyptian mythology. The god they adopted and consulted at the Libyan temple of Jupiter-Ammon was Amen, but he appears to have been confused in form with a local, ram-headed divinity. Ammon was frequently represented by the Egyptians as a serpent-headed man, or as an ape or lion. The above confusion ultimately led to the representation of Jupiter-Ammon as a man with two prominent flat-coiled ram's horns. The temple in the Libyan Desert became renowned beyond all other temples of Ammon, and was regarded as the most wonderful of all oracles. It was much frequented by Greeks and Romans alike. Lysander and Hannibal journeyed thither for guidance, as did also Alexander the Great. It is interesting to remember that the latter claimed divinity as a descendant of Jupiter-Ammon.

There is not much difficulty in arriving at a conclusion. The coiled ammonites were so called from their resemblance to the flat-coiled horns of Jupiter-Ammon, made famous by that temple in the Libyan Desert, and from the desolate ruins of that same temple came the white crystals that provided the source and the name of the gas ammonia.

The Flower of the Wave.

By Gilbert P. Whitley.



The Flower of the Wave (Iso rhothophilus), a little fish which is found in vast numbers in the surf near Sydney. 2½ times natural size.

[*Allan R. McCulloch*, del.

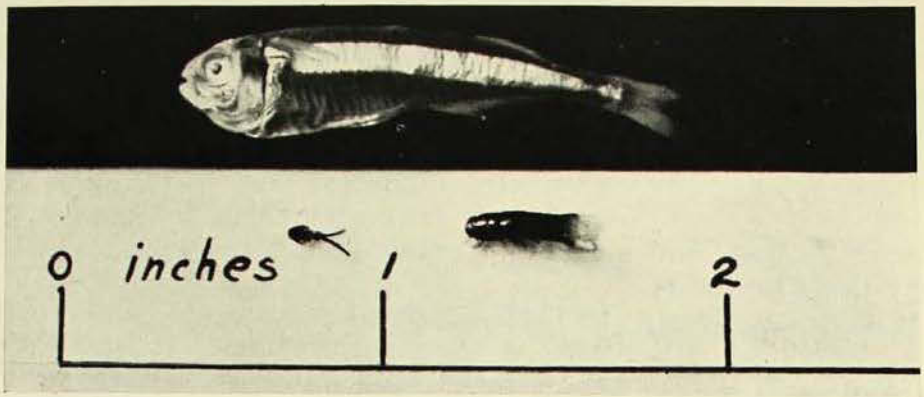
THIS is not a botanical essay, as its title might lead one to believe, it is merely an account of a kind of little fish which is at times quite common near Sydney and a cousin of another species from Japan which is similar to it in appearance. The Japanese call their little fish the "Flower of the Wave," so, as a more appropriate name for such a dainty creature could not well be devised, no apology is made for borrowing the poetical Japanese title for the Sydney Surf Fish or, as it has also been termed, Surf Sardine. It is not, however, a sardine, although it occurs in schools, grows to a length of about two inches and is somewhat similar to one in shape and colour; it is more closely related to the Silversides or Hardyheads, small fishes which live in our harbours and rivers.

HABITS.

Flowers of the Wave are essentially surf fishes, living in large numbers in the fairly deep waters behind the seething combers which sometimes carry them into gulches and pools amongst the rocky reefs. They do not descend to the bottom, but swim a few inches below the surface, appearing as greyish lines which, as they turn in the water, change to silvery streaks, as they show the broad bands which glisten like tinfoil on their sides. These fishes probably feed on microscopic organisms in the water. They are quite at home in the surging waters around the rocky parts of our coastline, but act strangely when confined to a very small space. Some specimens taken from the sea and placed in a billy-can swam madly to and fro with tremendous energy, quickly becoming exhausted until, in a quarter of an hour, all were dead.

OCCURRENCE.

The Australian Flower of the Wave or Surf Fish (*Iso rhothophilus*) was discovered by the late Thomas Whitelegge, a veteran naturalist, at Maroubra in March 1893, and was described by Ogilby and by Waite, two leading Australian ichthyologists. The species is evidently quite plentiful all the year round in our coastal waters, but surprisingly little is known regarding its distribution. Whether its range extends into Queensland or Victoria, for instance, has not yet been established. Perhaps our readers would keep a look out for it and send any specimens they may find to the Museum.



A Surf Fish and its aggressors. The smallest figure shows a species of copepod crustacean (Caligus) with a juvenile stage of a cymothoid fish louse (? Anilocra) on the right. About 1½ natural size.

(Photo.—*G. C. Clutton.*

In May 1927, Messrs. F. A. McNeill and A. A. Livingstone came upon thousands of these fishes swimming in a large bathing pool at Long Bay, New South Wales, and obtained an interesting series of crustacean parasites from them which are dealt with in the succeeding article in this MAGAZINE. Some of the specimens in the baths were seen turning on their sides and showing their characteristic silvery bands. The collectors suggested that this was probably caused by their being overbalanced by the attachment of parasites or by their struggles to free themselves from their unwelcome attentions. Many of the fishes were noticed apparently dead or dying, dropping towards the bottom, where waiting fishes seemed ready to devour them, whilst from the air, a tern occasionally dived into their midst and took its toll from their numbers.

TUMBLING FISHES.

Subsequent observations made by the writer on the Flowers of the Wave in the Long Bay bathing pool suggested that the turning of apparently sickly fishes was not necessarily performed by those carrying parasites and that, taken as a whole, the affected fishes turned, or rather tumbled, to either side, though individual examples turned left or right consistently. The action appeared as follows: a fish turned suddenly on one side, sinking and drifting rapidly, head or tail first, towards the bottom, giving one or two feeble flicks of its tail, but otherwise seeming as if paralysed. Before reaching the bottom, it gave a few energetic wriggles and swam upwards to regain its former level, but after a while its pace slowed down and it sank again on the same side as before. This process was often repeated several times by a fish, after which it seemed to recover and swam normally amongst its myriad fellows.

A medical acquaintance has suggested eye disease as an explanation of the tumbling of the Surf Fishes, but it seems unlikely that so many specimens should have been thus affected. A fish which had a parasitic isopod on its right side was noticed swimming normally, whilst another, attacked on a gill-cover, was in evident distress, but did not tumble in the manner described. No specimens were seen dead or dying on the floor of the pool by the writer, neither were any other fishes eating the afflicted ones.

Long Bay, near Sydney. After entering this inlet, the surf becomes calmed, except in very rough weather. Deep pools and rocky gulches here are sometimes invaded by the "Flowers of the Wave."

(Photo.—*G. P. Whitley.*

As the tide rose, the neat olive forms of young Rock Blackfishes (*Girella elevata*) became apparent as they issued from their retreats to search cracks and rocky faces for food. Here and there a sandy-coloured goby darted along the bottom, becoming practically invisible when it stayed still for

a moment. A crab crept from its hiding place to join some ghost-like prawns (*Leander serenus*) which were feasting on a tasty morsel nearby. But these, and the Stripeys, Sweep, and other fishes which swam near the Flowers of the Wave, did not in any way molest them.

The rock-pool fishes knew every nook and cranny of their haunts, but the Flowers of the Wave were strangers in a strange land, doubtless puzzled at the absence of the commotion to which they had been accustomed in the surf. They were plentiful in the baths until the end of May, but, by the first week of June, practically all had disappeared. The majority probably returned to the ocean in the waves which had broken over the baths during the stormy weather, and were doubtless glad to return to their turbulent native element, for none appear to have revisited the place since.

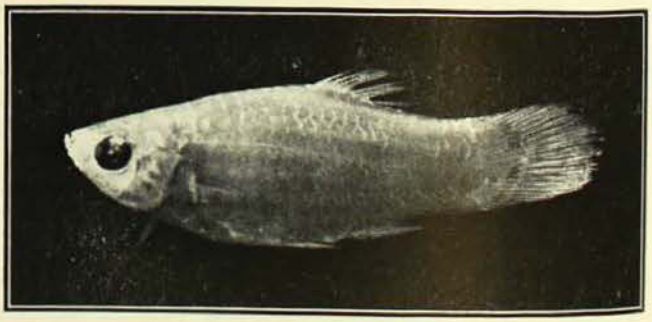
Their unusual occurrence and strange actions there must remain, at least for the time being, an unsolved mystery of the seashore.

Tropical Aquarium Fishes. How to Breed and Rear Them. By A. E. HODGE, F.Z.S. H. F. & G. WITHERBY, London, 1927. 8Vo. 128 pp., illustr. (Dymock's Book Arcade Ltd., Sydney, 10/–.)

Australian aquarists and fish-fanciers as a rule do not confine their attention to our native freshwater fishes as they are mostly not very ornate in appearance. They accordingly procure the more brilliant foreign fishes, and find much of interest in studying the conditions they require and in trying to breed them. They will therefore welcome this book about their interesting hobby by Mr. Hodge, who is president of the British Aquarists' Association.

In simple terms, the aquarium and the needs of fishes are explained, and practical hints of value are given. A classified list of sixty-seven "Tropicals," with notes on their characteristics and the lengths they attain, will aid in the recognition of species, whilst examples selected from various families are dealt with *seriatim* with notes on their habits and hints on their care. The Millions Fish (*Lebistes reticulatus*), which has been imported into Australia to eat mosquito larvae, has, of course, a place in this book.

The attention of taxonomists is called to a somewhat paradoxical new name, *Platypoecilus maculatus* var. *immaculatus*, proposed on page 54 for a fish called the "Goldplaty," but not included in the index.



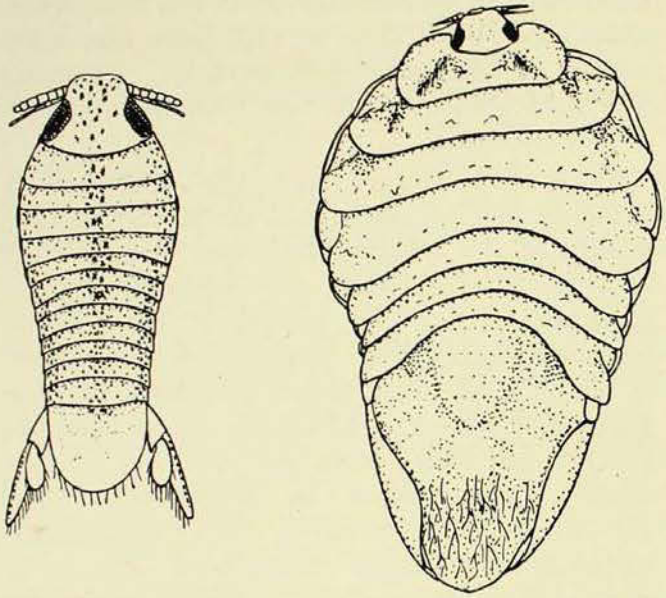
The Goldplaty (Platypoecilus maculatus immaculatus), a new tropical fish, from Mr. A. Royce's aquarium, Sydney.

[Photo.—*G. C. Clutton.*

Short chapters deal with foods, diseases, and appliances. The book is well illustrated with photographs and drawings of fishes, snails, plants, and diagrams of apparatus, and should form a useful addition to the book-shelves of all who are interested in keeping tropical fishes.

A Lilliputian Marine Battle.

By Frank A. McNeill and Herbert M. Hale.

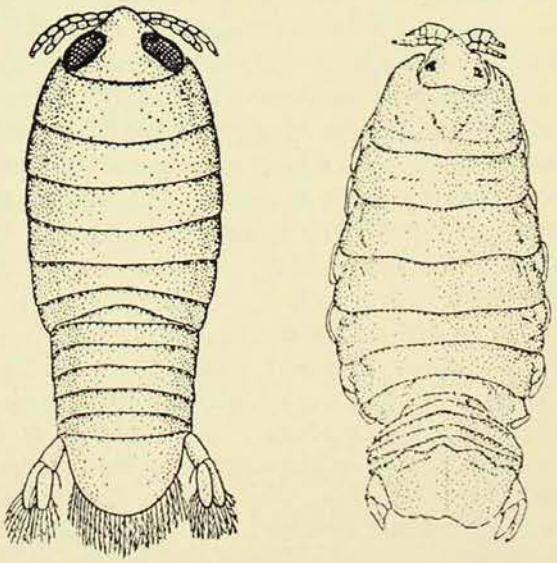


Leatherjacket Fish Louse (Ourozeuktes owenii); juvenile approximately 25 times natural size, and adult female approximately twice natural size. The free-swimming juveniles of cymothoid fish lice differ very considerably from the adults and, as in the above species, some are incapable of leaving their hosts once they become established and modified for the permanent parasitic period of their lives. The adult female illustrated on the right was removed from the hole it had made in the side of an Australian Leatherjacket (Cantherines sp.), the juvenile represents a stage at which the youngsters are almost ready to leave the maternal brood pouch.

[*H. M. Hale*, del.

WITHIN the confines of a rock-girt bathing pool at Long Bay, near Sydney, an enormous school of surf fishes (*Iso*) had sought sanctuary and a temporary respite from a laborious life struggle on the fringe of the surf in the open sea. One of us visited the spot on May 5th of this year, and gazed with fascination on the fishes as the water from an incoming tide swept gently through a cavernous break on the seaward side, the rise and fall of the water inexorably moving the vigorous swimming school bodily backwards and forwards as in some ludicrous nautical dance.

The day was quiet and the scene suggested tranquillity, but closer observation proved that even here Nature exacted her price. Some of the fishes were noticed turning on their sides so that the silver lateral bands of their little bodies glinted in the bright sunlight. In this apparently disabled condition many of the fishes sank a considerable distance in the water seemingly dying, but would recover their equilibrium and rejoin the main school. Curiosity thus awakened, a collector's net was dipped into the water and a number of specimens secured. An examination of these helpless captives now revealed the only probable solution of the strange behaviour just described. Intermingled with the fishes were numerous small crustaceans, many of which darted actively hither and thither as the water drained through the thin meshing of the net. Some of the active forms came to rest on the fishes, where they clung tenaciously, while others, less fortunate, made contact with the cotton strands of their prison. Numerous tiny and inert fleshy bodies lying in the bottom of the net were of a less aggressive type, but are nevertheless known to bear a bad reputation as crustacean depredators in the fish world. Obviously these crustaceans

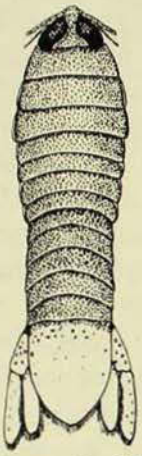


The common Australian "Tongue-biter" (Codonophilus imbricatus), juvenile, 13 times, and adult female, 1½ times natural size.

[*H. M. Hale*, del.

had been making vigorous assaults on the little surf fishes, causing the discomfort and apparent agony still noticeable amongst those swimming in the pool.

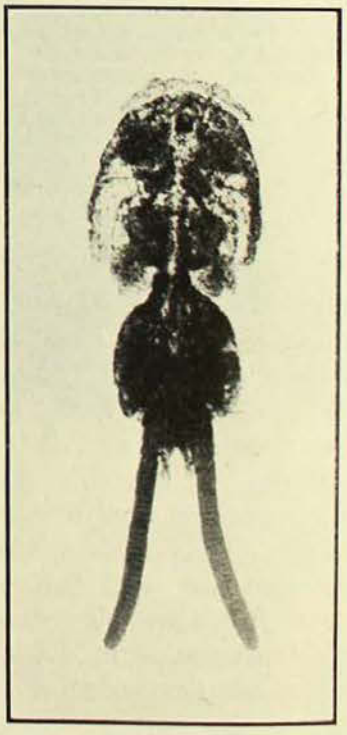
The two very different species of Crustacea present were recognised, without doubt, as being parasites of fishes for part of their existence. It does not seem at all probable, however, that they were definitely attempting to parasitise the surf fishes. The large active forms were young isopods of the family Cymothidae, embracing numerous species which, in the adult stage, are well known parasites of fishes. At least five stages were present, and these ranged in length from 3.2 to 9.5 millimetres. The whole are probably referable to one of the several species of a genus called *Anilocra* or closely allied thereto, although the definite determination of a juvenile stage of a cymothoid fish parasite is not an easy matter. After hatching from the eggs, the young fish parasites, like others of their near crustacean relatives, are retained for a time in a large pouch on the underside of the mother. When they leave their maternal brood-pouch the little parasites are not quite one-eighth of an inch in length and lack the last pair of legs; the tiny creatures swim about freely for a time and pass through several stages of development, during which the hinder limbs appear and other marked changes take place. Unfortunately, very little is known of the various species of baby parasites during the period which elapses after they have left the brood-pouch, and before they have permanently attached themselves as adults to some unwilling fish host. In this regard it is interesting to recall that one young stage of the common Australian "Tongue-biter" (*Codonophilus imbricatus*) which, when adult, clings to the tongue or attaches itself under the gill-cover of some of our larger fishes, has been found sheltering in numbers under the umbrella of the large jelly-fish *Catostylus mosaicus*. Further, one of us has discovered what later proved to be still more advanced young of the same fish parasite swimming freely in shallow water at Kangaroo Island, South Australia.



One of the largest of a pack of juvenile free-swimming cymothoid fish parasites discovered making vigorous assaults on Surf-fishes, 4½ times natural size. The dark colour of the body is due to massed pigment cells which disperse as growth increases.

[*H. M. Hale*, del.

It would seem, from the structure of juvenile fish parasites and the known feeding habits of the adults, that they casually and indiscriminately suck the juices of marine animals during the period of their active free-swimming life. An unlikely fact, then, is that in the occurrence witnessed at Long Bay the young cymothoids were fastening to the surf fishes with the object of utilising these unfortunates as permanent hosts. As already mentioned, the disablement noticeable amongst the school was in all probability due to the vigorous onslaughts of their comparatively large aggressors, and much larger prey would necessarily have



A photo-micrograph of a free-swimming copepod crustacean (Caligus) which occurred in great numbers amongst a school of Surf-fishes at Long Bay, New South Wales.

[Photo.—*G. C. Clutton.*

to be selected before a stable footing was effected and permanent parasitism accomplished. Also, it is worthy of note that young parasites in several stages were captured at one and the same time, thus suggesting that all were engaged together in gaining temporary sustenance at the expense of the surf fishes. The whole episode tends to indicate that the habits of at least some young cymothoids are similar to those of certain of their voracious relatives, the sea-lice of the family Eurydicidae, and is evidence in support of their evolution from the same stock. These latter are free-swimmers throughout their lives and hunt in packs, swarming upon their fish prey and literally eating it alive. Their mouth-parts, however, are modified only for biting, and are not of the more highly specialised suctorial type characteristic of the cymothoid fish parasites. It is because the jaws are adapted for sucking and the limbs for clinging, that cymothoids are able to progress a step further in their predaceous habit and, singly or in pairs, fasten more or less permanently on to a host. Indeed, in some species the specialisation, or degeneration, of the mouth-parts and limbs of the adult cymothoid is so complete that the established parasite is quite unable to leave its host.

The second type of crustacean present at the curious affray we are describing is a member of the group Copepoda. Many of the minute " water-fleas " to be found in clouds in both fresh and salt water belong to this group, but certain aberrant forms are so modified in structure that their relationship is not readily recognised. These lead a parasitic existence, and many of them have a fascinating life-history. The copepod parasites captured with the little surf fishes were adult males and females of a species included in the genus *Caligus*, and two to three millimetres in length, exclusive of their caudal appendages (furcae). Species of *Caligus* are parasitic upon fishes during some of the earlier stages of their life-histories, but in a few cases they become free rovers when the adult stage is reached, and merely attach themselves to fishes long enough to obtain sustenance from the body of their prey. This is obviously what was occurring in the school of surf fishes at Long Bay, for none of the copepods were found attached, and we must presume that they were in association merely for the purpose of temporarily satiating their hunger, as was also the case with the young cymothoids escorting them.

Obituary.

DR. E. W. FERGUSON.

Dr. Eustace William Ferguson, who died on 18th July last, was a son of the late Rev. John Ferguson, and was born in New Zealand in 1884. He was educated in Sydney, and in 1908 took his medical degree at the University here. In 1913 he joined the staff of the New South Wales Health Department. In August 1915 he volunteered for military duty, and served in England, France, and Palestine with the Australian Army Medical Corps, being engaged mainly in bacteriological and entomological work. On his return Dr. Ferguson resumed duty with the Health Department, and in 1920 he succeeded Dr. J. B. Cleland as Principal Microbiologist, a position he occupied until his death.

As a student Dr. Ferguson had been attracted by the subject of entomology, and he always retained his love for the study of insects. He made numerous important contributions to entomological research, particularly in the group of the flies, on which he was a recognised authority. He had been honoured by election to the Presidency of the Royal Zoological Society and of the Linnean Society of New South Wales.

Dr. Ferguson was a genial and lovable man, always willing to assist his colleagues in any possible way. He was a generous benefactor to this Museum, to which he presented a large number of specimens, including the types of new forms described by him, and he was most generous in placing his expert knowledge at the disposal of the scientific staff. His death leaves in the ranks of Australian entomologists a gap which it will be difficult to fill.

A Gigantic Extinct Lizard.

By C. Anderson, M.A., D.Sc.

Thigh bone of the extinct lizard, Megalania prisca. The thigh bone of a large goana is shown for comparison. From specimens in the Australian Museum.

[Photo.—*G. C. Clutton.*

READERS will remember that when Captain Alan Cobham arrived in Australia after his memorable flight from Europe he brought with him accounts of the "Dragons of Komodo," monstrous beasts of savage habits, supposed to be survivors from the age of dinosaurs. These East Indian "dragons," first described in 1912, are the largest living members of the varanid family of lizards, to which our own "goana" (*Varanus*) belongs. The Komodo lizard reaches a length of ten to twelve feet, with a weight of about 300 pounds, and by comparison our largest goana, with a length of about five feet, is quite puny. Yet in days gone by, when *Diprotodon* and *Thylacoleo* roamed over the Australian landscape, they had for companion an even larger lizard than the Komodo dragon. This was *Megalania prisca*, first described by Owen from the Darling Downs, Queensland, a district which has long been a happy hunting ground for the palaeontologist. This extinct lizard was a near relative of the varanids of to-day but exceeded them in size, for its length has been estimated at thirty feet.

A complete skeleton of *Megalania* has never been found, and therefore its form and proportions are not known with certainty, and we can arrive at some idea of its size only by comparison with existing lizards of the same type.

In the palaeontological room of the Australian Museum, an exhibit of megalanian bones is on display, accompanied by corresponding bones and a complete skeleton of a goana. Let us make some comparisons as to dimensions. The exhibited goana skeleton, a comparatively small one, measures twenty five inches from the anterior end of the skull to the tip of the tail; its thigh bone is one and a half inches long and the thigh bone of *Megalania*, shown alongside, is $11\frac{3}{4}$ inches long. A simple calculation, made on the assumption that the relative proportions of *Megalania* were similar to those of the goana, would give the former a length of about seventeen feet. As it is usual for the larger members of a group to be stockier in build than the smaller ones, we may assume that the body and limbs of *Megalania* were more bulky and ponderous in proportion to length than in any living varanid.

It had a massive though relatively small head and its jaws were armed with strongly serrated teeth. Its limbs were well developed, and it was evidently an active and powerful animal, predominantly terrestrial and car-

nivorous; it must have been a formidable enemy to its contemporaries.

Since its first discovery at the Condamine River, fragmentary remains of this large lizard have been found in various parts of Australia, as at Marmor, Queensland, Wellington Caves and the Castlereagh River in New South Wales, near Melbourne, Victoria, and at the Warburton River, South Australia; it was therefore widely distributed in eastern Australia in Pleistocene times.

Part of a lacertilian jaw of large dimensions was discovered at Cuddie Springs, near Brewarrina, N.S. Wales, and described by Owen under the name *Notiosaurus dentatus*, but this animal is now considered to be identical with *Megalania*.

It has been pointed out that the fossa, or depression on the floor of the skull which accommodates the pituitary body, is relatively large in *Megalania* as in the giant dinosaurs, and it has been suggested that the large size of these creatures is a result of the over development of this gland, which causes gigantism, as it is called. Gigantism is frequently associated with stupidity, and it may be that *Megalania* was much less alert and intelligent than its smaller living relatives, which, as exemplified by the goana, are endowed with a fair measure of cunning.

As to its habits and food we may suppose that it preyed on its lesser relatives and the smaller marsupials. It is not probable that it was a tree climber like the goana, which often makes a meal of eggs and small birds.

Obituary.

THOMAS WHITELEGGE, F.R.M.S.

Thomas Whitelegge, veteran zoologist and able botanist, has passed from his circle of intimates. His death on August 4 marks the severance of one of our last links with the Australian scientist of last generation. Whitelegge was born at Stockport in Cheshire, on August 17, 1850, and his early life was fraught with difficulties, so his later achievements speak much for the perseverance he exercised in the face of these apparently insurmountable obstacles.

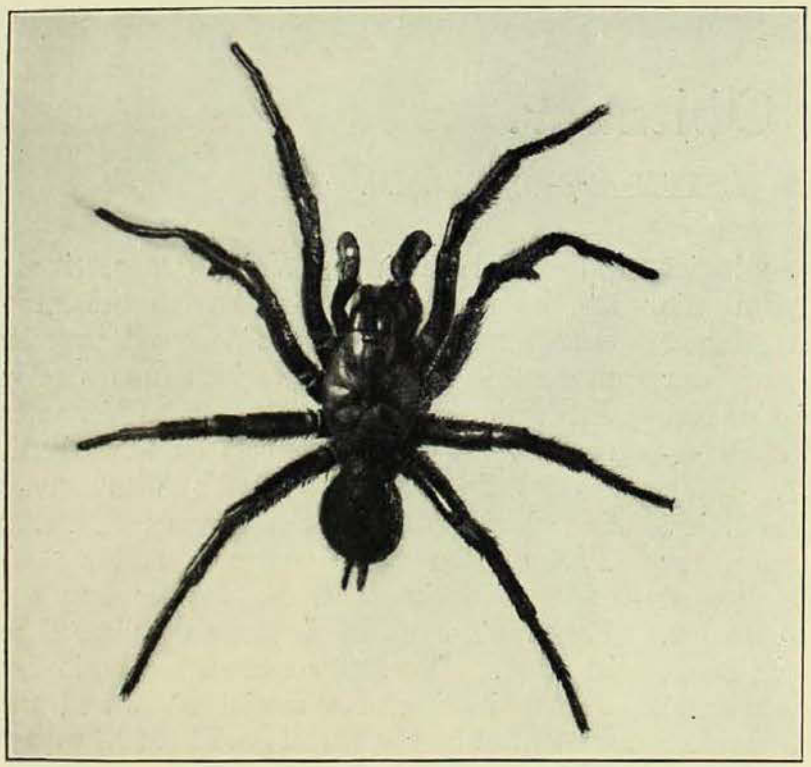
He arrived in Sydney in February, 1883, in possession of excellent testimonials from such prominent men as Sir Joseph Hooker of Kew Gardens, and Professors W. C. Williamson and Milnes Marshall of Victoria University, Manchester. These letters led to an early appointment on the staff of the Australian Museum in 1883, where Whitelegge remained as Zoologist of Lower Invertebrates, until his resignation in 1908. His first paper was based on an investigation of the oyster pests which were causing such havoc on the Hunter River leases at Newcastle about 1883. This work was undertaken at the instigation of the late Dr. J. C. Cox, then president of the Australian Board of Trustees. For the resultant report, published in 1884, Whitelegge received a special recognition grant from the Parkes Government. This was followed by many more fine papers on various groups of the Australian invertebrate fauna. Chief among these were several reports on the scientific results of the New South Wales Government fisheries investigation vessel H.M.C.S. *Thetis* from 1898 onwards, and a "List of the Marine and Freshwater Fauna of Port Jackson and Neighbourhood," published in 1889. The latter earned for Whitelegge the distinction of a special medal and prize presented by the Royal Society of New South Wales.

Always of a most unassuming and modest bearing, Whitelegge will be remembered by his intimates for the quiet yet forceful energy which he brought to bear during the execution of his work. Right up to the date of his death he retained the unquenchable enthusiasm for science which marked his earlier career. This was exemplified by his continued association with the zoologists of the Australian Museum, and the fact that he retained a small post in the National Herbarium at the Botanic Gardens, where he was the authority on mosses and ferns.

Harmful Australian Spiders.

By A. Musgrave, F.E.S.

DOWN through the ages man has possessed an almost ineradicable dread of spiders, but of recent years arachnologists have shown that these fears are for the most part groundless, and that the vast majority of spiders are incapable of causing suffering to man from their bites. Many of these European workers have permitted themselves to be bitten, and as no serious effects were suffered it has come to be generally accepted that all spiders are innocuous to man. Some writers have even expressed the opinion that a spider could not cause the death of a human being. In this article, which is based upon my paper which recently appeared in the *Records of the Australian Museum*,[1] I shall endeavour to state the position in Australia in regard to our harmful spiders, and to show that the old inherent fear of spiders is not entirely baseless.



The male of Atrax robustus is easily identified by the tibial spurs on the second pair of legs. It was responsible for the death of a baby boy.

[Photo.—*G. C. Clutton.*

THE RED-SPOT SPIDER.

In a former article I showed that the Red-spot Spider, *Latrodectus hasseltii*, a member of the family Theridiidae, is our most poisonous spider, for many cases of bites attended by great suffering have been recorded. No deaths have been placed on record in the Department of Public Health, Sydney, but the *Medical Journal of Australia* contains numerous references from doctors, of cases of spider bites and their toxic effects. One of the cases is that of a little boy of three or four years who died from the effects of a bite; this is the only recorded case that I know of. In my paper in the *Museum Records* I have given a bibliography of references to Red-spot Spider bites which have appeared since 1916.

The Red-spot, Red-striped, Red-backed, or Jockey Spider is widely distributed from eastern Arabia through India and the Malay Archipelago to Australia and the Pacific Islands. It occurs also in New Zealand, where the Maori know it as the "Katipo," which means night-stinger. In Australia it is distributed throughout the length and breadth of the continent, and may be found in all sorts of dark corners, under shelves, in gas and water meters, watering cans, old tins, and in rockeries. In country districts a

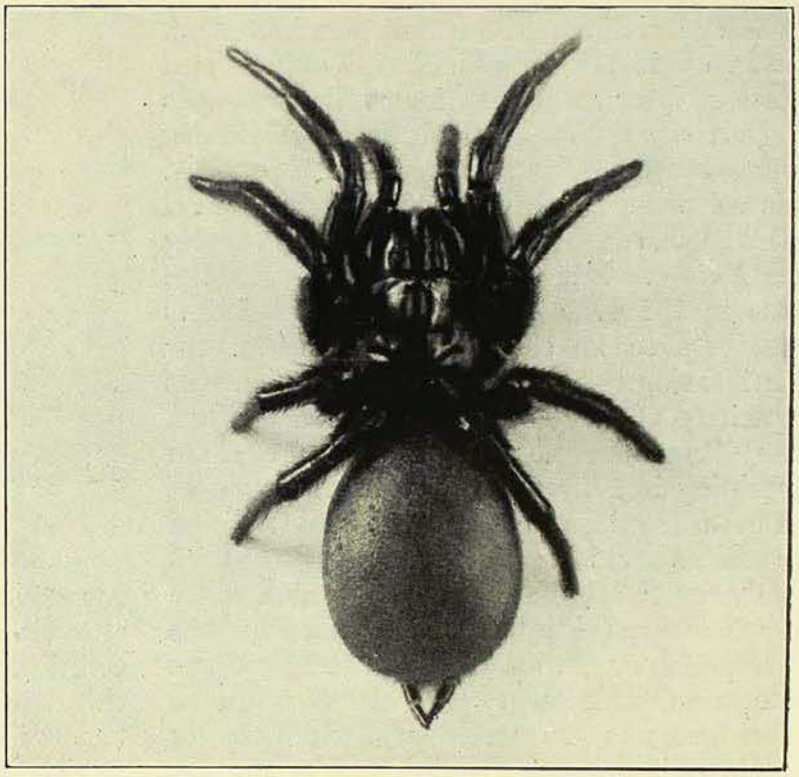
[1] Musgrave. — "Some Poisonous Australian Spiders." *Rec. Austr. Mus.* xvi, 1, 1927, p. 33.

favourite spot is under the seat in latrines and the fact that the majority of people are bitten while visiting one of these places should serve as a warning. In the southern states of America and in California the Black Widow, *Latrodectus mactans*, has similar habits. In a recent paper Dr. Bogan shows that fatal results may be attendant on a bite of this spider; in fact wherever the spiders of the genus *Latrodectus* occur, and they are common in tropical and sub-tropical regions, they are dreaded on account of their bites.

The various species construct irregular webs with which to catch their prey, and it is their habit of invading houses to search for desirable web-building sites which brings them into contact with man.

AVICULARIIDS OR TRAP-DOOR SPIDERS.

The large earth-dwelling spiders of the family Aviculariidae, which in Australia is represented by 148 species included in eight sub-families, had up to February, 1927, not been recorded as harmful to man. These spiders are popularly known as "trap-door" spiders, from their habit of constructing hinged trap-doors to the openings of their silk-lined burrows which they place in the ground or, rarely, in trees. They differ from other spiders in that the chelicerae or falces project forwards, and the claws of the chelicerae move vertically; two pairs of book lungs are present. These book-lungs are plainly visible at the basal end of the ventral surface of the abdomen as lightish-coloured areas. The spiders of the sub-family Diplurinae do not construct trap-doors to their nests, which are usually placed in rotting logs and stumps of trees. The avicularid spiders which I record here as harmful to man are both members of the genus *Atrax*, which is included in the Diplurinae. Eight species of *Atrax* have been recorded from Australia and Tasmania, and these, with two exceptions, have been described from female specimens, and the males have been unknown. In 1914 the late W. J. Rainbow described as new two species of aviculariids from male specimens, one *Euctimena tibialis*, and the other, *?Atrax formidabilis*. These two species I will show later to be very venomous. Both have the eyes similarly arranged, and both bear on the tibiae of the second pair of legs an apophysis or spur covered with spines, while a smaller elevation is present on the metatarsi of the same legs. I consider them to belong to the genus *Atrax*. In the male of the Tasmanian avicularid, *Atrax venenatus* Hickman, the spurs are absent, and their place taken by groups of spines. The females of the genus *Atrax* are without prominences or clusters of spines on the tibiae and metatarsi of the second pair of legs. How the venomous qualities of the two spiders first became known, is a story to which I will devote the remainder of this article.



The female of Atrax robustus is larger than the male, the legs are relatively shorter and the tibial spurs are absent.
[Photo.—*G. C. Clutton.*

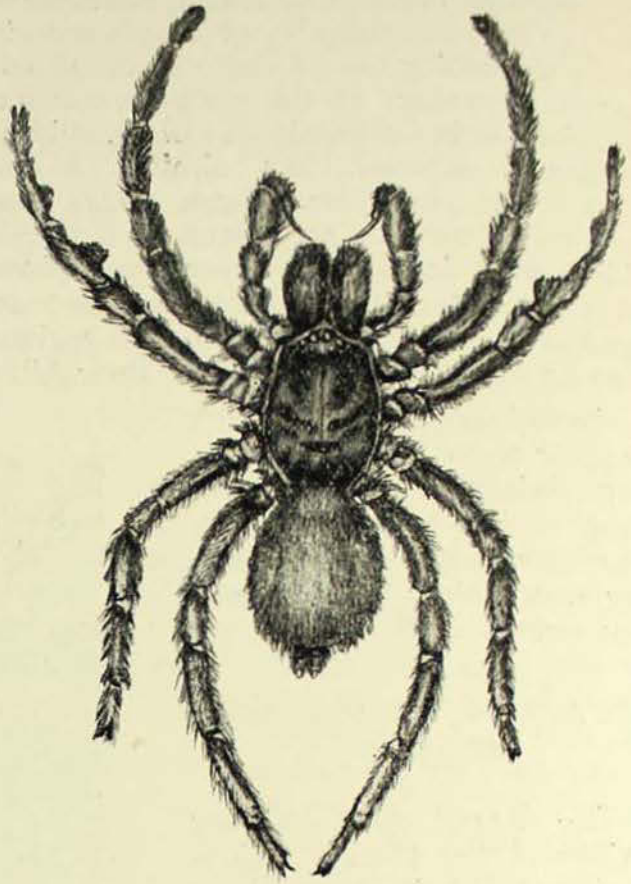
ATRAX ROBUSTUS.

On the 16th February of this year, I was informed by *The Sun* newspaper that a baby boy had died the previous night at Thorn-

leigh from the bite of a spider and within 90 minutes of being bitten. On being asked to comment on the case, I pointed out, " that unfortunately the Museum authorities seldom had the opportunity of examining the actual spiders that had bitten people." I suggested that the Red-spot Spider, *Latrodectus hasseltii*, was responsible.

A paragraph which appeared in the paper that evening had the effect of arousing interest, and, through the courtesy of the Thornleigh police, the spider which had bitten the child was sent to the Museum. Though it was badly mutilated, with some of the legs missing and the abdomen indented, it was obviously an avicullariid spider and it proved later to be identical with the types of *Euctimena tibialis* Rainbow, originally recorded from Turramurra and Mosman. This scientific name subsequently appeared in the Press, the *Medical Journal of Australia* and *Nature*. The interest created by the Press in the case caused many specimens of spiders to be sent to the Museum for identification. Among those submitted, was a specimen of *Atrax robustus* O.P. Cambridge, from Artarmon near Sydney, and upon examining it I found that the structure of the eyes, maxillae, labium, and dentition of the falces was very similar to that of *Euctimena tibialis* Rainbow, of which only the male was known. Reference to the literature upon *A. robustus* showed that the male was unknown. Therefore upon *a priori* grounds, as well as upon that of structure, it appeared that I had before me the sexes of the same species of spider. Eventually, through the enthusiasm of Mr. Eric Osborne of Collaroy, near Sydney, two males and two females were secured on the same block of land at Collaroy, thus removing all doubts in my mind as to the status of *Euctimena tibialis*. Subsequently, Mr. L. Bulmer collected a male, female, and egg sac at the residence of Mr. T. C. Campbell at North Harbour, Manly. They were secured from the one nest, while he was excavating the foundations of a retaining wall.

The male of *Atrax robustus* is a large spider, over an inch in length and nearly half an inch in breadth, and with legs which may measure one and a half inches in length. The cephalothorax is black, shining, and smooth, while the abdomen is dull-brown and covered with long black spine-like hairs. Ventrally the body is reddish-brown except



The spider, Atrax formidabilis, whose bite caused great pain and suffering.

[*Joyce K. Allan*, del.

for the coxae or basal joints of the legs. On the tibiae of the second pair of legs is a pointed apophysis or spur which projects downward and serves readily to identify the spider.

The female is usually larger and more thickset than the male, and may measure over an inch and a half in length and over half an inch in breadth. The legs are relatively shorter than those of the male and are not quite an inch and a half in length. The cephalothorax above is red-brown, smooth and shining, while below the sternum is redder than the rest of the under surface. The abdomen above is black-brown and covered with hairs. Both sexes possess poison-fangs which measure about a quarter of an inch in length.

Since the death of the child, eight males and eleven females have been presented to the Museum and these have all been taken on the northern side of Port Jackson, though two females are in the Museum collection from localities on the southern side.

A female taken by Mr. Osborne at Collaroy was dug out of its nest in a crevice in a gum-

tree stump about eighteen inches below the surface of the ground. Portion of the silken lining of the burrow contained fragments of beetles which had evidently formed the food of the spider. This spider was alive when brought to the Museum, and it had evidently just cast its skin, for the fangs were bright red in colour, the under surface of all the leg-joints and base of the falces light-green, and the upper parts a dark-green.

EFFECTS OF BITE.

In a paper on Australian trap-door spiders, the late W. J. Rainbow and Dr. R. H. Pulleine point out in regard to *Atrax valida* from Tambourine Mount, Queensland, " Like others of the genus *Atrax*, this species is of a vicious disposition, and puts up a strong fight before it can be induced to enter a collecting tube." This statement holds good from my own experience of *Atrax robustus*, all those brought alive to the Museum being very aggressive and necessitating care in handling. Mr. Hickman has also pointed out that a Tasmanian species which he has recently described under the name of *Atrax venenatus*, has the same savage habits and from its practice of discharging venom from the ends of its falces he has given it the specific name of *venenatus*.

Most of the specimens of *A. robustus* sent to the Museum were taken in gardens, but four of the males were taken in houses, one captured by Mr. Osborne springing at him.

On Monday, 20th June, 1927, a male specimen was submitted to me for identification on behalf of Mr. C. A. Monticone, LL.D., of Clifton Gardens, Sydney. The spider had bitten him on the ball of the left foot while he was exercising in his room that morning. Later in the day Dr. Monticone informed me by telephone that after being bitten he took no notice of the bite and treated it as if it were a mosquito bite. He did not see a doctor until mid-day when he became so ill that he was forced to get medical advice. Five days later I saw him at the Museum, and he handed me a typed account of his case with all the details set out with great clarity; this has appeared in detail in my paper.

Dr. Monticone's account of the action of the spider toxin on the human body is of value in that it teaches us the effects the venom produced over a given period, for the death of the baby boy showed only how potent the venom could be ; it thus removes any doubt of the ability of an avicullariid spider to cause great suffering to an adult, or, as in the child's case, death. Dr. Monticone expressed the opinion that a child under the age of fifteen years would have little hope of recovering from the effects of a bite.

ATRAX FORMIDABILIS.

In January, 1926, I received for identification, from the Department of Public Health Sydney, an avicullariid spider, which I was informed had bitten a man residing at Wauchope, New South Wales. An extract from the letter which was sent with the specimen to the Department by Dr. W. Begg, of Wauchope, is given below, and shows what painful results may ensue from a bite of this spider. Upon examination, the spider proved to be identical with the type of ?*Atrax formidabilis* Rainbow, of which, at present, only males are known. I consider that the query in front of the generic name should be dropped for reasons previously stated. The spider is a large one with a body length of one and a half inches, a breadth of nearly half an inch, and with legs which may measure one and three quarter inches in length ; it is therefore a much larger spider than the male of *Atrax robustus*. The cephalothorax is reddish-brown, shining, and smooth, while the abdomen is drab-coloured and clothed with long hairs. Ventrally the the body is reddish-brown with light patches between the joints of the legs. On the tibiae of the second pair of legs is a rounded apophysis or spur similar in position to that of *A. robustus*. The dark-coloured fangs may measure over a quarter of an inch in length.

In his letter Dr. Begg states, " The specimen in question bit a man on the buttock when in the act of dressing, the spider evidently getting on the trousers in the night. He knocked it off and it fastened to his finger. Pain in the region of the bites was intense from the first and then the parts became numb. The bites were not scarified, and when I saw him three hours later he had had intense vomiting, profuse perspiration, violent cramps in the limbs and abdominal muscles, and the regions of the punctures were still so numb he did not

mind incisions into them. He was more or less delirious, thinking somebody was spraying him with something. He had a frightened, anxious look, slow, weak pulse, 60 per m.

Respirations laboured, and coughing up quantities of mucus, saliva trickling from the mouth, and pupils contracted."

The patient I learnt eventually recovered.

SUMMARY.

From the above records we note that three species of Australian spiders are definitely harmful to man. This shows that, while there may not be any cause for undue alarm, in view of the fact that over a thousand species of spiders have been listed from Australia, certain spiders, particularly the Red-spot, represent an ever-present source of danger. We need not expect to hear of many persons being bitten by trap-door spiders, the three cited being the only ones of which I have been able to obtain any record. The habits of the spiders of the family Avicularíidae and those of the genus *Latrodectus*, family Theridiidae, are very different, those of the former bringing them but rarely into the sphere of man's activity. All spiders have poison fangs with which they kill their insect prey, but the amount of venom secreted is usually too small to do much damage when injected into the body of a human being. The few exceptions to this rule however, compel one to regard all spiders with suspicion.

Review.

Natural History Magazine, Vol. I., Nos. 1-3. BRITISH MUSEUM (NATURAL HISTORY). (The Trustees of the British Museum).

Sometime back the British Museum (Bloomsbury) commenced the publication of the *British Museum Quarterly*. We have now to welcome the appearance of the *Natural History Magazine* issued by the Natural History Branch, South Kensington, of which three numbers have now appeared. This, too, is a quarterly like our own AUSTRALIAN MUSEUM MAGAZINE and contains thirty-two pages of instructive and interesting reading matter.

The purpose of the *Magazine*, as explained by Sir Sidney Harmer, Director (now retired) in a short introduction, is to convey to non-scientific readers some idea of the absorbing interest of the study of natural history, and to form a medium by which the indebtedness of the Museum to donors who have contributed to the collection may be acknowledged.

The articles contained in the three numbers now before us are in general short, one of the longest being an interesting account by Mr. F. W. H. Migeod of the British Museum Expedition to Tendagaru in Tanganyika Territory in search of dinosaur remains which appears in No. 2.

An account in No. 3 by Mr. W. E. China of "Some Strange Relations of the Frog-hopper or Cuckoo-Spit Bugs" is interesting to us in that it gives some details regarding the life history of Australian forms in which the earliest observations were made by the late Felix Ratte, at one time a member of the Australian Museum staff, whose work has been supplemented by Mr. Henry Hacker of the Queensland Museum.

Other informative articles are by Dr. G. T. Prior on Tektites, those curious glassy bodies which include our own "Australites" and are currently believed to be of meteoric origin, and on the Sirenia by Mr. A. Tindell Hopwood.

The *Magazine*, which is excellently illustrated by reproduction from photographs and drawings, is sure to create an interest in natural history and make the contents of the Museum and the work of the scientific staff better known to the public.

A Remarkable Fish Parasite.

By Gilbert P. Whitley.

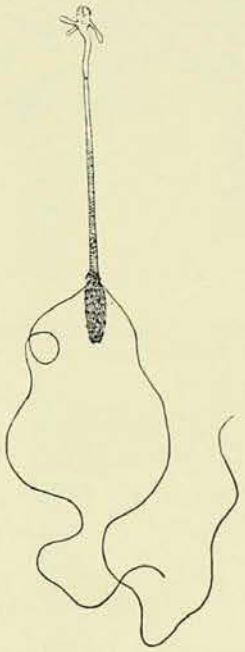
CASES of hyperparasitism, the presence of a parasite upon a parasite, are by no means rare in Nature, and are especially common in the insect world. Indeed, Jonathan Swift alluded to the phenomenon in the following well known, but somewhat unscientific, verse :

> So, naturalists observe, a flea
> Has smaller fleas that on him prey ;
> And these have smaller still to bite 'em ;
> And so proceed *ad infinitum.*

A curious case of this kind was recently brought before the writer's notice by a lady who brought to the Museum two Sucking Fishes (*Remora*) which had been caught in New Zealand waters. For the purpose of this article, we may waive quibblings and regard the Sucking Fish as a parasite, for it is nearly always found attached to ships, sharks, and other moving objects by means of a large sucking-disc on the top of its head, whereby its easy transport from place to place is arranged. Attached to the body of one of the New Zealand Sucking Fishes was a remarkable parasite, of which an illustration is given here. It was a brownish object, five and a quarter inches long, excluding the elongate string-like processes arising from its bristly tail. The whole animal was somewhat arrow-shaped and, when attached to the fish reminded one somewhat of a banderilla stuck in a bull by a toreador.

At the top of the illustration may be seen its mouth, surrounded by series of papillae which hide the antennae and other structures. Behind the mouth are the " horns " by which the parasite attaches itself so securely to its host. Four little marks on the body between the horns represent legs, so degenerate in an animal which needs no locomotive organs of its own that they have almost disappeared. The long body terminates in a thick tail covered with stout bristles. Two long brown strings trail behind this curious animal. These are really bags of tiny eggs, which are liberated from time to time into the water.

What was this curious hyperparasite ? One could perhaps be pardoned for thinking that it might be a worm, but the wildest guess might not have classified it as a crustacean. Yet such it proved to be : a crustacean of the Copepod order ; a species of *Pennella*, —" a little feather."



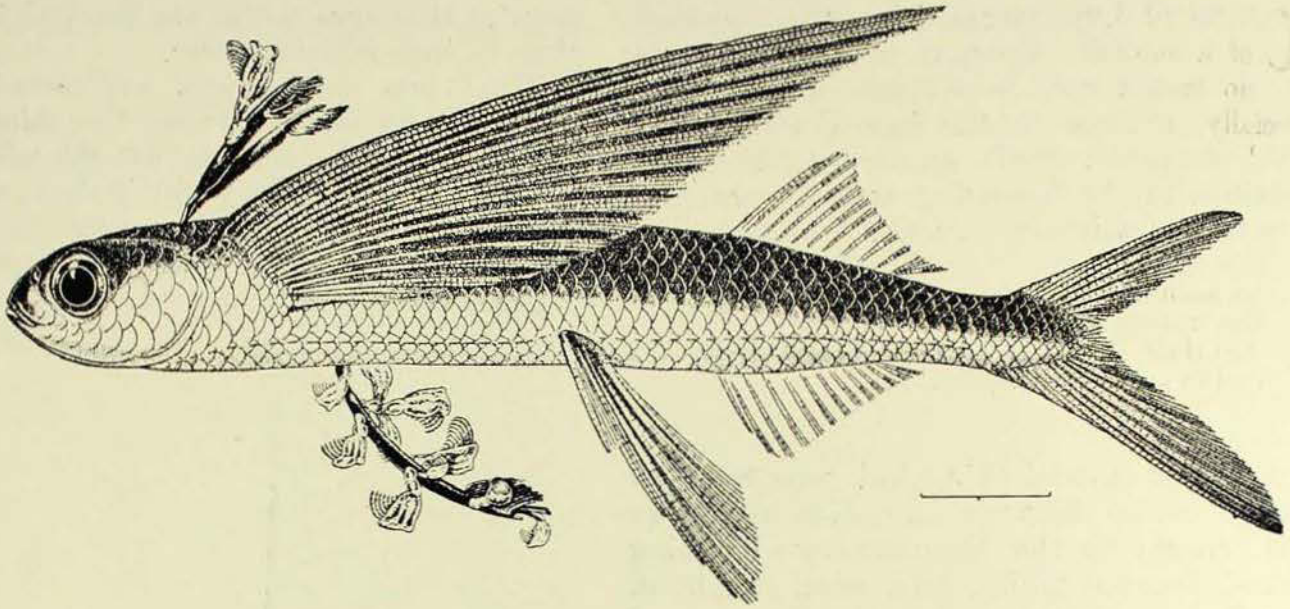
A remarkable crustacean parasite (Pennella) found attached to a Sucking Fish. Note the two long strings of eggs.

[*G. P. Whitley*, del.

Little is known regarding *Pennella*. Its nearest relatives are those copepod parasites which, when young, are somewhat shrimp-like, free-swimming creatures possessing only one eye. The young parasites soon attach themselves to fishes, some as blood-suckers, others as eaters of mucus. Whilst the females lose the cyclopean eye, and allow their limbs to degenerate, becoming in some cases almost mere bags of eggs, the males often retain the more orthodox crustacean characters ordained by their ancestors. The male of *Pennella* is said to be very small, almost spherical in shape, with a curious sucker on its head

surrounded by six pointed outgrowths. He clings to the female with two pairs of nipper-like limbs.

A Flying Fish (*Cypsilurus cribrosus*), caught in the Tasman Sea off Sydney, which had several specimens of *Pennella* clinging to it, is also depicted here. Parasitic barnacles (*Conchoderma virgatum*) are attached to each *Pennella* and afford another interesting case of hyperparasitism.



A Flying Fish (Cypsilurus cribrosus) from the Tasman Sea. Parasitic on the fish are several specimens of Pennella, to which are attached barnacles, looking like a cluster of strange orchids.

[After *D. S. Jordan and A. Seale.*

Jimmy Clements ("King Billy"), who was on August 28th found dead in the streets of Queanbeyan, was a picturesque old aborigine. His tribal name was Yangar and he was a son of "Billy Lambert," or Gayan-Blouer-Galoom, a former "King" of the Orange tribe. Jimmy claimed to be 85 years of age, and his recollection of happenings in the old bushranging days gave considerable support to his claim. He was a typical nomad and spent much of his time in the bush. He would periodically return to civilization, with a few pennyweights of gold, though he would never disclose the source of his findings. He was very athletic in build, and for that reason he was used by Mr. Rayner Hoff as a model when he was constructing the aboriginal figures now on view in the Australian Museum, the gift of Mr. Ernest Wunderlich. He was dignified in bearing, highly intelligent, and could converse in a fluent and interesting manner.

The following Popular Science Lectures will be delivered in the Museum Lecture Theatre. There is no charge for admission to these lectures and they will be illustrated by slides and gallery exhibits.

October 13th—"Early Migrations in the Western Pacific"—Prof. Griffith Taylor, B.A., D.Sc.

October 27th—"The Capture of Fish"—T. C. Roughley.

November 10th—Gould and his Birds"—Tom Iredale.

This will conclude the session for 1927.

The Case and Faggot Moths.

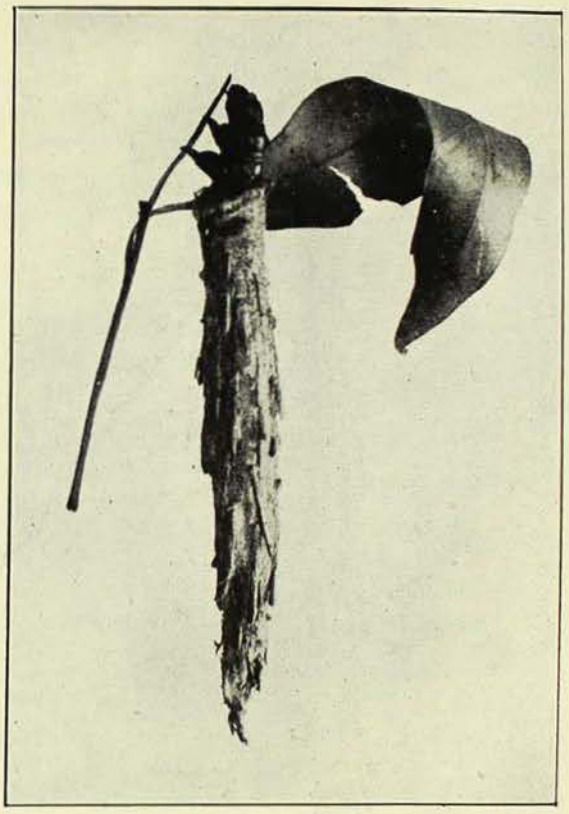
By Maud Preston Day.

THE Case-moth, Bag-moth, or Faggot-moth, is considered by some nature students to be one of our most ingenious weavers and builders. The caterpillars, when present in large numbers, injure young gum and pine trees by eating the tender outer coating of the twigs and leaves, so that growth is stopped and the shrub becomes stunted and malformed. A black boy once said to me "Where 'maambi' be gum-tree he come up every time clean; emu-apple too, 'maambi' make him clean everytime." We came to the conclusion that Tommy meant that the grub would clean the shrubs of scale, but we were not able to verify the statement.

The long cocoon of the case or faggot-moth bears a resemblance to a miniature balloon in a state of collapse, and may be of any length, from an inch and a half to six inches and a half according to the development of the architect and builder, and the species to which it belongs. The family name of these moths is Psychidae, and naturalists tell us that there are over two dozen varieties of this family in Australia. Six of these may be easily collected around Brisbane, or rather, the bag-shelters of the caterpillars may be found. Inside the bags will often be found the remains of the parasites who made use of the chrysalis as a crèche and food supply for the coming generation.

LIFE-HISTORY.

The life cycle of the Case-moth is completed in something over two years. The little caterpillars may be seen in the very early morning in September or October dropping in scores from the bottom of the mother's silk-lined nest, each one suspended on a fine thread like young spiders. The thread is so fine that a careless observer might think that the tiny living things were floating in the air. Streaming like a living shower, the babies lower themselves to the ground or any convenient leaf or plant to which they are borne by the gentle morning breeze. I do not know what is the average number of eggs laid by each moth-mother, but I have counted up to a hundred and seventy caterpillars floating downwards from one bag-shelter. As soon as the grubs find themselves on a food plant they begin to eat. They eat the tender outer skin of the

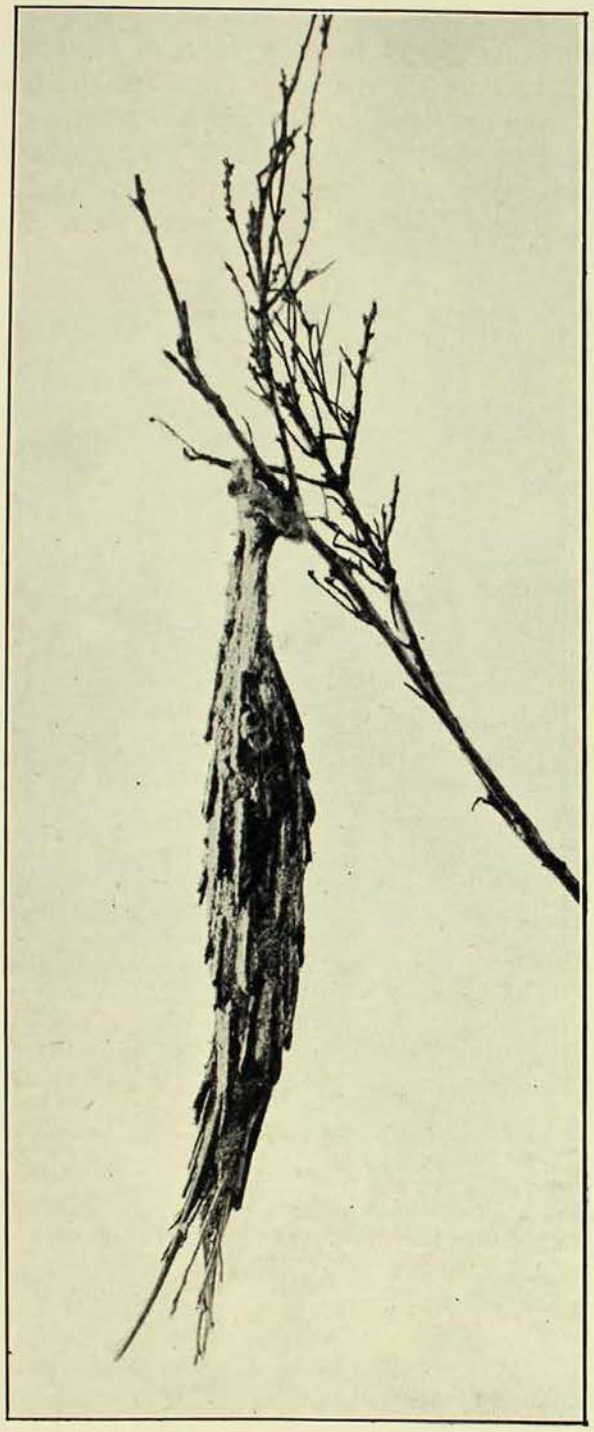


Saunder's Case Moth (Oeceticus elongata) showing the front segments of the body protruding from case while feeding.

[Photo.—*G. C. Clutton.*

gum, ti-tree, pine, or peach, and, besides obtaining sustenance from this diet, they secrete in their wonderful little bodies the substances required to spin the tough silk and the gum-like fluid which is needed to cement and make waterproof their leathery bag-houses. Each small caterpillar that has escaped the seeking eye of early-rising insect-eating birds will be found about three or four hours after emergence to have constructed for itself a little tent in which it lives and moves and has its being. To observe intelligently the various phases of the case-

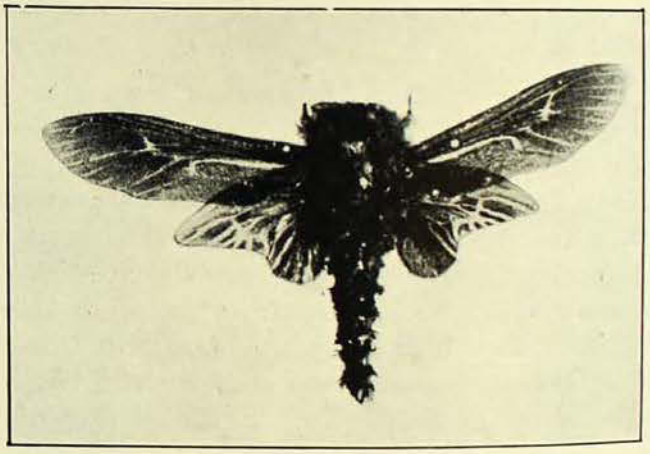
moth's existence it is necessary to be self-denying in the matter of sleep, and to be abroad in the very early hours of the morning with a lantern or electric torch, for the



Case of Saunder's Case Moth (Oeceticus elongata) with mouth of bag closed.
[Photo.—*G. C. Clutton.*

weaving, stick-laying, pine-needle gathering, and sawing are nearly always carried on when the world is quiet and their enemies are at rest. Amongst these are the silver-eye, mistletoe bird, and another small brown and yellow insect-eater, who between them destroy a great number of the case-moth caterpillars during the first weeks of their lives.

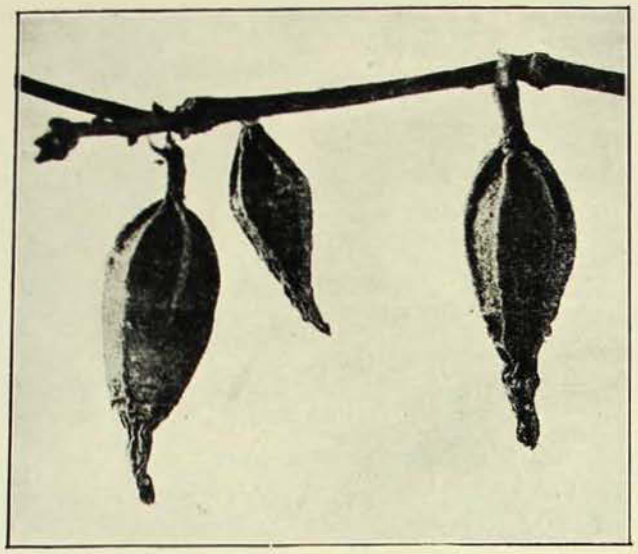
The first protective shelter the young builder makes for itself is shaped like a tent or cone, and is camouflaged with tiny scraps of leaf and bark. By standing quietly near the trees which have afforded refuge and food for the tiny creatures, we shall probably see one or more of the funny little cones, like fools' caps, moving about. With the help of a glass the head and first two segments with four tiny feet may be seen protruding from the cap, which is carried in a vertical position. After a few weeks, during which time the fools' cap has evolved into a small, leafy bag-shelter, the vertical position has been changed, evidently by increasing weight, to the horizontal. In all dealings



Male of Saunder's Case Moth (Oeceticus elongata) is an active flyer, unlike the female which is wingless.
[Photo.—*G. C. Clutton.*

with these night builders it is advisable to keep silent, and, when using the lantern or torch, to bring it gradually to bear upon the subject, also to let the light shine from behind the insect, not in front of it.

When the caterpillar is full-grown it does not wander about so much, but fastens its large case to a twig or beam in comparative shelter. Here it may hang, suspended by a strong silken girdle, for some weeks, perhaps gathering strength for the stupendous demands that will shortly be made upon it. So tightly closed and strong is the neck of the case that the fingers alone cannot open it, and scissors or penknife must be used if one wants to examine the interior. After a period of rest the insect begins to add wood to his house. At early morn, with "the



The Ribbed Case Moth (Hylarcta nigrescens) has a parchment-like case with the surface marked by longitudinal ridges.

[Photo.—*G. C. Clutton.*

lantern dimly burning" we may see the architect at work. He does not make use of promiscuous scraps of wood but discriminates by choosing a straight clean twig which will cut into two or more neat "logs." After having decided where the "log" is to be severed, the caterpillar fastens his bag-house, which he has just lengthened with webbing, so that it hangs below the intended cut. Reaching out of the bag, two feet gripping the interior, and with two pairs of feet above the bag, the little creature, with his strong jaws, quickly cuts through the twig. Some cut the wood around, getting a sharpened-pencil effect, while another cuts through from one side only thus attaining a crescent effect. The twig must now be cut through again, and one may see the caterpillar "putting his muscle into it" and also *hear* his strong jaws gnawing through the twig. Prior to the second cut he has put out a slender guy-rope, and lashed the timber to the top of the bag, so that when cut through the "log" shall not fall to the ground. Now comes the wonderful instinct of the creature. He telescopes himself backward into his house and biting a tiny hole in the side of the case, puts his head and feet through, then seizing the stick in his jaws, he proceeds to place it just where it is wanted, weaving and cementing it firmly into place. The operation as described above took three hours and twenty minutes. This process was repeated for several nights, when the builder evidently decided that his residence was sufficiently fortified against buffetings of weather and intrusions of parasites.

I observed that the large variety of caterpillar when travelling inside the roof of my bush-house put out little blobs of sticky web on the battens; this substance looked like a snail's track, and appeared to be a support for the case.

The lower end of the bag shelter does not appear to be sealed after the caterpillar begins to fortify its home, but seems rather to be closed to intruders by the loose twisting of a few strands of tough webbing, and by the further protection of a few projecting twigs. It will be seen that two or three of these are noticeably longer than any others. The interior of the bag is perfectly clean, so the insect must get rid of waste matter by means of this protected outlet.

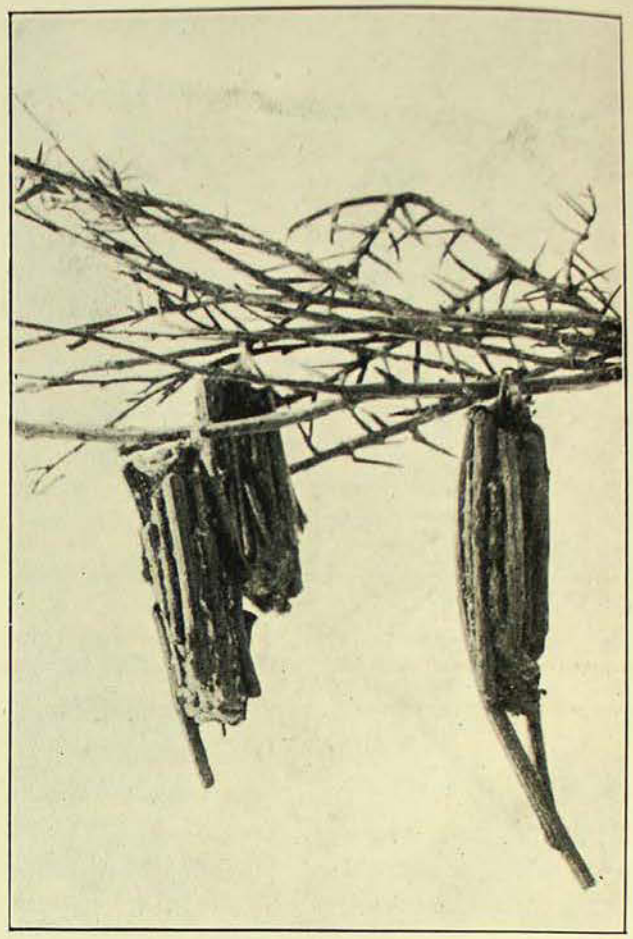
One feels inclined to wonder if the fortifying of its home by the caterpillar is a defence against the onslaughts of birds and other enemies such as bats, or whether the aim is to minimise injury to the occupant from the oscillation caused by winds and storms, whilst hanging in a comparatively

The Leaf Case Moth (Hylarcta huebneri) may place upon its case pine needles, or pieces of Eucalyptus leaves or the leaves of whatever plant on which it happens to be feeding.

[Photo.—*G. C. Clutton.*

exposed situation during the six or seven months of pupation. Butcher birds and crows will snap up an unwary caterpillar who tries to work late in the morning. Once the bag or case is sealed at the neck and suspended to a twig by its tough girdle, no bird will attack it, except a butcher-bird, and even this audacious thief is chary of spending the time it takes to tear open a case, unless he has previously seen the caterpillar feeding.

About eighteen to twenty months after hatching the caterpillar prepares to pupate. The male does not line his case with such fine silk, nor does he spin the beautiful little silken nest in the central portion of the bag suggestive of a diaphragm. I have a specimen now before me ; the case measures six and a half inches, and the grub three inches. As the case is fully lined and the occupant head upwards the caterpillar was probably a female, which, while ready to pupate, was parasitised. Pupation is supposed to cover a period of six months, but in some seasons the period may be shorter. The male, whose case is much smaller than that of the female, pupates head downwards.



The Faggot Case Moth (Clania ignobilis) has its case adorned with a strong fence of stout twigs placed longitudinally or closely together. Several of these are usually much longer than the others.

[Photo.—*G. C. Clutton.*

THE ADULT MOTH.

Some species are rather pretty little moths. They are not very active, apparently live only a few days, and in the early morning may sometimes be seen entangled in spiders' webs.

The female case-moth resembles the Tussock Moth. Being wingless and sluggish, she does not leave her shelter at all, but there awaits the visit of the male moth, then lays her eggs, and, having fulfilled the purpose for which she was created, dies.

The moth (*Hylarcta nigrescens*) of the parchment, or ribbed, case is dull black with a gray bar across its body ; the caterpillar is sienna-brown, with a few black markings on the first three body segments. The moth varies in size from one-and-a-half inches to two-and-a-quarter inches across the wings. The adult of the porcupine species, also known as the Leaf case-moth (*Oeceticus hubneri*) measures only about an inch and a quarter.