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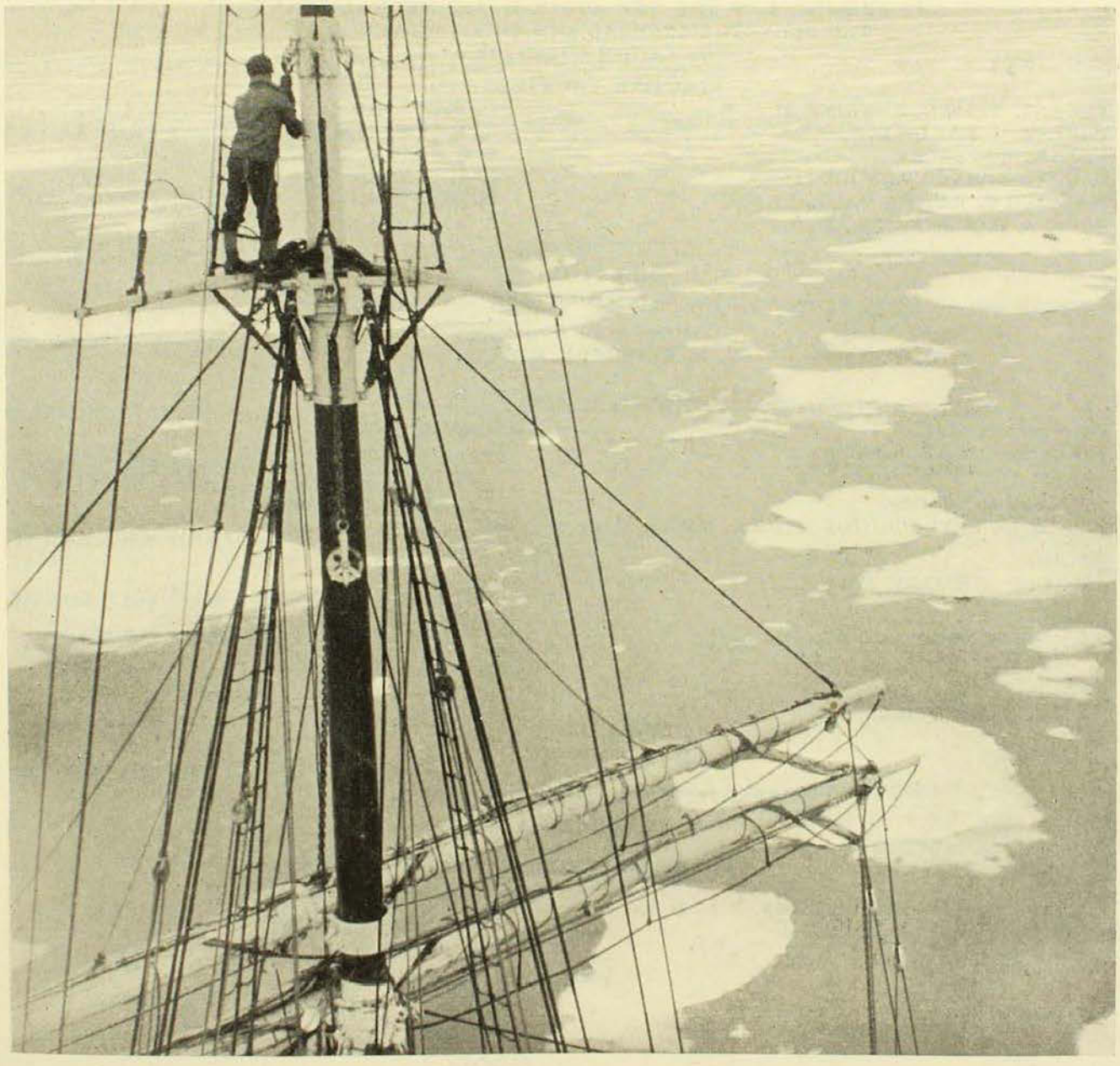

Broken Pack-ice in Antarctic Seas.

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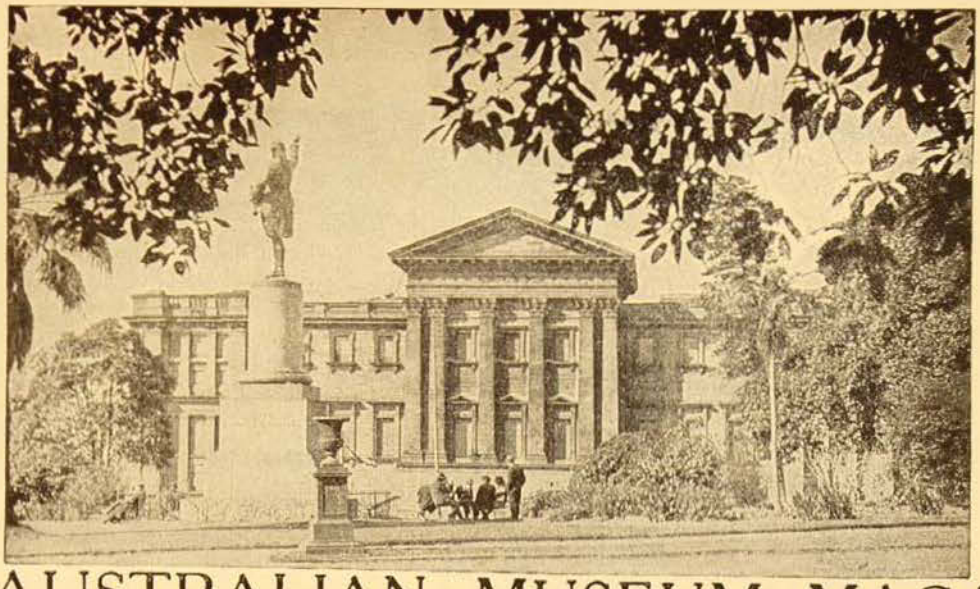

THE AUSTRALIAN MUSEUM MAGAZINE

BEAUTIFUL SHELLS FROM THE MUSEUM COLLECTION .. .. *Frontispiece*

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(Photography, unless otherwise stated, is by Howard Hughes.)

● OUR FRONT COVER.

Broken pack-ice in Antarctic seas. In the early summer months the whaling fleets often have to push through heavy pack-ice to reach the whaling grounds. Photo.—S. C. Campbell.

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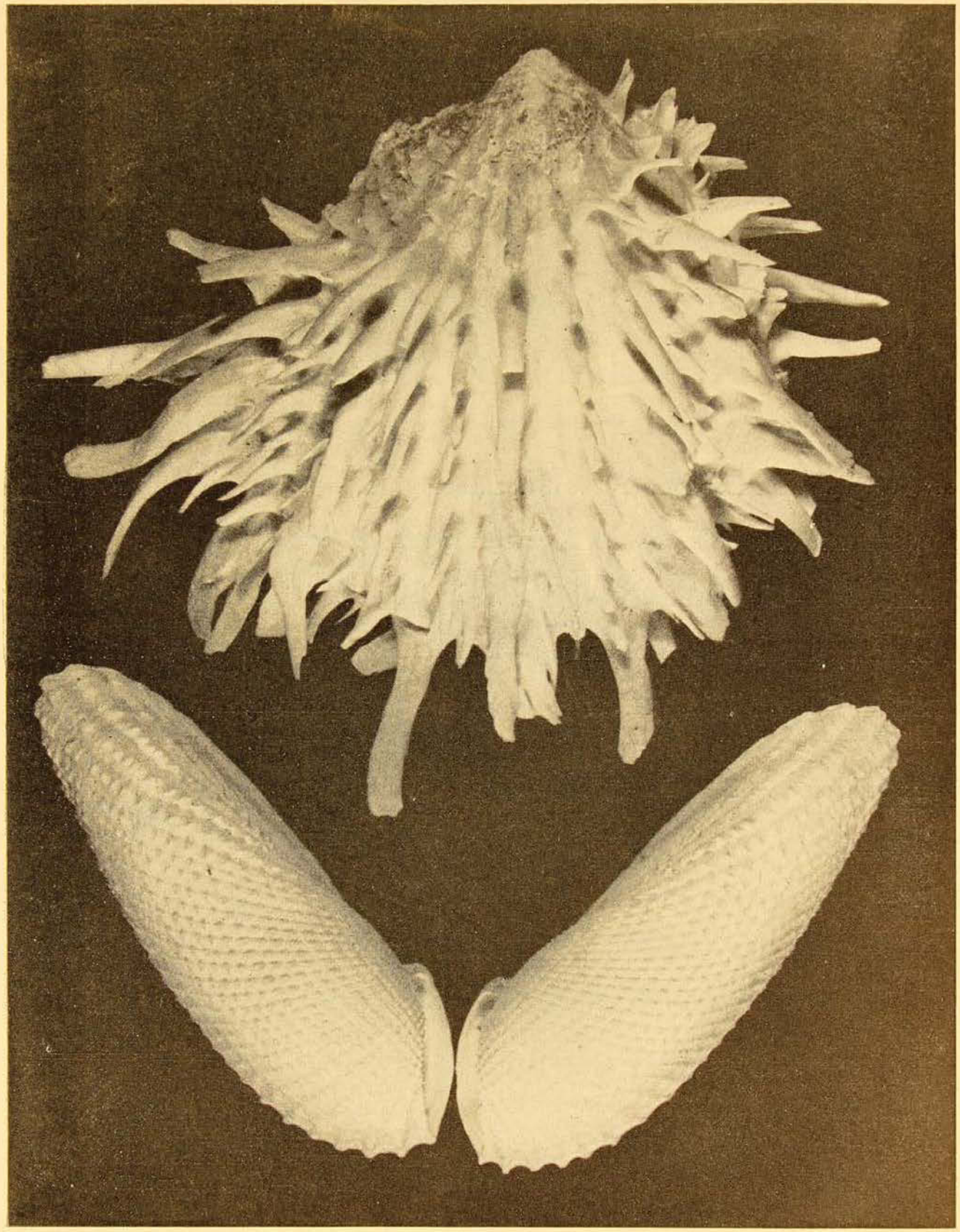

Beautiful bivalve shells from the Museum collection. Above: the Thorny Oyster (Spondylus americanus). Below: Angel's Wings (Pholas costata).
(See page 419.)

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Vol. IX, No. 12. July–September, 1949.

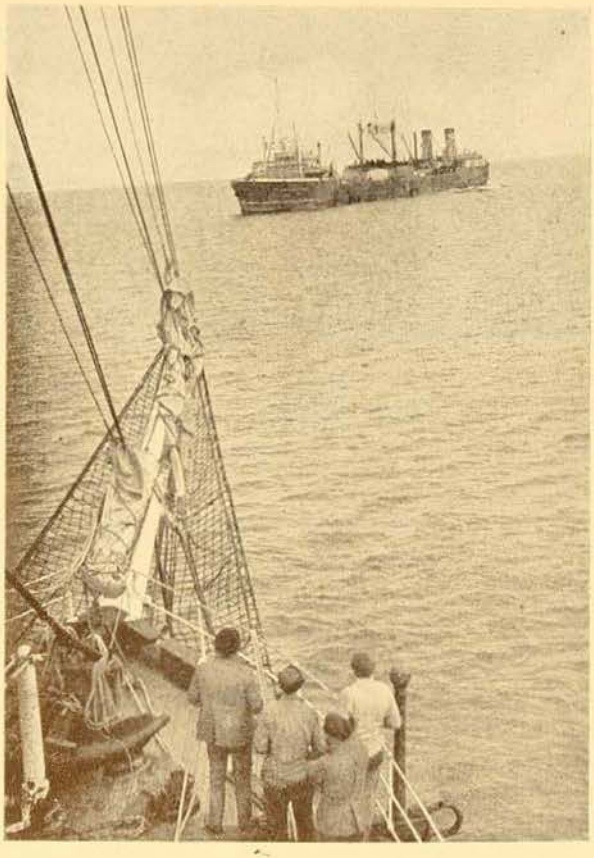
"Thar She Blows": Whaling in Antarctic Seas

By H. O. FLETCHER

AUSTRALIA has never been associated with the whaling industry in Antarctic seas although geographically we are far more favourably situated than other countries who have had whaling fleets operating in the south for the past twenty years.

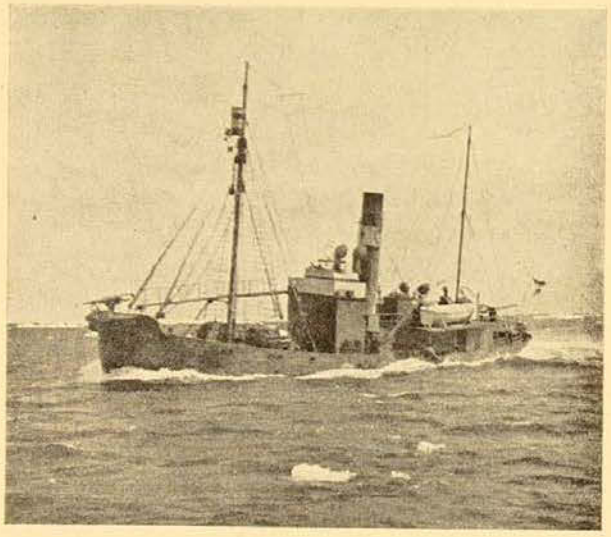
At least one-third of the Antarctic continent is now Australian territory and is controlled and administered by the Commonwealth Government. Our Antarctic land is wedge-shaped, extending back to the South Pole, and has an area of more than 2,000,000 square miles. It was proclaimed Australian territory in a British Order-in-Council dated the 7th February, 1933, which stated "That part of His Majesty's Dominions in the Antarctic seas which comprises all the islands and territories, other than Adelie Land, which are situated south of the 60th degree of south latitude and lying between the 45th degree of east longitude and the 160th degree of east longitude is hereby placed under the authority of the Commonwealth of Australia".

This new Polar possession has very few economic possibilities, with the exception of the whaling industry conducted in the waters north of the ice-covered coastline. In the past this industry has returned very big profits and prior to the last war was exploited to such an extent that the number of whales caught each season reached alarming figures and there was cause for concern over the serious depletion of whale stocks.



The whaling factory ship "Sir James Clark Ross" in Antarctic waters.
Photo.—S. C. Campbell.

During the two seasons of 1927-28 and 1928-29, seventy-two thousand whales were caught in Antarctic seas. Whale oil became so plentiful that the supply exceeded the demand and the price dropped almost two-thirds to £12 10s. per ton. This fall in price, together with the depression years, caused many of the smaller whaling companies with ill-equipped tramp steamers to go out of existence. The difficult depression years allowed the whales a slight respite until the introduction of properly constructed factory ships of large tonnage, such as



A whale "chaser" travelling through broken pack-ice. The harpoon gun is shown well "forward" on the forecastle.

Photo.—S. C. Campbell.

the "Sir James Clark Ross", 10,000 tons, which has been operating in southern seas since 1928. The attendant whale-chasers of these factory ships, with highly perfected harpoon guns, allow the whales little chance of escape when once sighted, and once again the number of whales caught each season began to rise alarmingly.

In the season 1937-38 the catch had reached the amazing total of 46,000 whales, representing 500,000 tons of oil. The following season the total catch was slightly less, being 38,321 whales, representing Blue Whales 14,059, Fins 20,788, Sperm 2,591, other species 883. During this season, which extended from 8th December until 7th March, thirty-four factory ships, two shore stations and 281 catchers took part in the operations. The number of men engaged in active whaling in the Antarctic was 12,705. Whales were caught by Norway, Germany, Britain, Argentine, Panama and Japan.

Naturally no animal group could withstand such slaughter without the risk of total extinction unless there was strict control, and this has been carried out for many years by a very active whaling committee which is international. This committee has been considering lately many problems on the improvement of international regulations as far as pelagic whaling in Antarctic seas is concerned. It was realized that whale stocks prior to the war were showing decided signs of depletion and it was now a matter of vital importance to further the conservation of whales, which had increased in numbers during the war years. This was due to the almost complete cessation of operations while the world was at war, and for the first few post-war years conditions within the industry imposed their own restrictions by a shortage of suitable ships.

Because of the curtailment of whaling after the war through lack of ships the 1944 Conference on the International Control of Whaling proposed that the whaling season should be extended from the 24th November until the 24th March. This period was in place of the pre-war season, which extended from the 8th December until the 7th March, and thus a full four months' whaling was permissible. It was also decided that the catch in waters south of latitude 40° S. should be limited to 16,000 Blue Whale units.

The extended season is the longest that weather conditions in the southern seas will allow, and the limit of 16,000 Blue Whale units is roughly half of the average pre-war catch. It was thought that this catch would not be attained because of the shortage of factory ships and catchers, but if it were the committee was prepared to provide adequate safeguards to ensure the safety of existing stocks of whales.

However, in the season before last two countries operating in Antarctic seas caught whales to the value of £12,000,000. In the 1948-49 season the production of whale-oil from operations in the south was estimated at 438,000 short tons, representing 95 per cent. of the world's output. This compares with 539,000 tons—an average pre-war output.

Several countries hope to increase their whale-oil production, but with international control of the industry and the need for conservation of existing whales it is most unlikely that there will be any large increase in total production.

In the framing of regulations for the conservation of whales it is of the utmost importance to have regard to their breeding habits, distribution and migration.

A very comprehensive report on the natural history of whales was recently published by Dr. N. A. Mackintosh, Director of Research of the "Discovery" Investigations. This report, together with other researches, has led to a great deal being known of these elusive creatures, which spend most of their time in the more remote seas of the world. However, the establishment of the whaling industry provided an opportunity for extensive research on the part of biologists attached to factory ships. Apart from the purely biological point of view, however, it is also necessary to know the migrations of the whales, their food, feeding habits, their numbers and other information. This data has been secured to a great extent by the researches carried out from the cruises of the "Discovery I" and the "Discovery II".

The most important whales in the southern seas and those most sought after by the whalers are the Blue, the Sperm, the Fin, the Sei and the Humpback. Blue whales grow to a length of slightly more than 100 feet and at this length would weigh approximately 160 tons. One would yield about 100 barrels of oil, roughly fifteen tons, which at the ruling price of whale-oil today would be worth about £1,350. Fin whales grow to about 80 feet in length, and the Humpbacks, Sei and Sperm whales are much smaller.

In the summer months the whales spends their time feeding on shoals of shrimp-like *Euphausia superba,* commonly known as "krill"; this crustacean occurs in the southern part of the Southern Ocean, where it is quite abundant. The Sperm Whale, however, occasionally eats fish but its food is principally squids or cuttlefish. The stomach of the Sperm Whale has been found to contain the remains of large cuttlefish, and scars left on the whale's skin give an indication of its struggles with large monsters it must have attacked. It is believed that the once fabulously valuable ambergris, a secretion of the Sperm whale's intestine, is due to the irritation set up by the beaks of squids.

Breeding takes place in the winter months and researches show that the period of gestation is approximately a year. Blue and Fin whales at birth measure about 20–25 feet and Humpbacks about 15 feet. The rate of growth is fairly rapid, as the young become adult in two to three years. Sexual maturity is reached when the Blue whales attain a length of 74 feet 2 inches and 77 feet 9 inches, the Fins at 63 feet and 65 feet 3 inches, the Humpbacks at 39 feet 4 inches and 40 feet. The former figures are those of the males, the latter the females, and it has been found there appears to be very little deviation from the average.

Under normal conditions only one young is born at a time, although twins have been recorded on rare occasions; the interval between births is probably not less than two years. Recent Norwegian investigations indicate that the Sperm Whale, which is a toothed-whale, whose home is more in tropic seas than in the far south, becomes adult in three years from birth.

It would appear from the researches up to the present that whales with such a rapid rate of growth would be conserved in numbers by strict control as far as catches are concerned. All the evidence, however, seems to indicate that whaling activities over the past twenty-five years, even with strict control, have resulted in

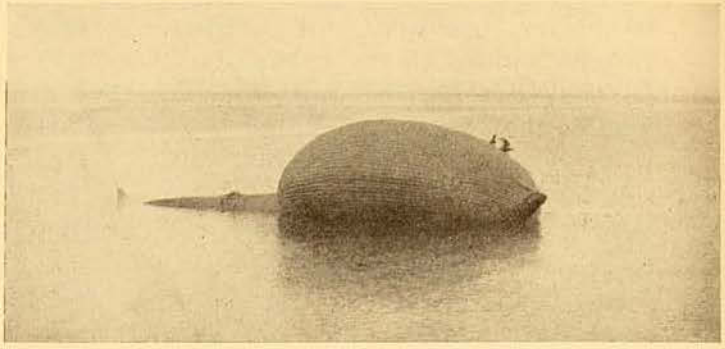
a serious depletion of Blue and Humpback whales.

One can rest assured that the International Committee has this question well in mind and will if necessary impose even further restrictions in the industry. One does not want to see a repetition of what happened in the fur-seal industry. Memories are very short in regard to such happenings, and it may be that the slaughter which almost caused the extinction of the fur-seals in the sub-antarctic is forgotten.

When reports of the prolific seal-life of the sub-antarctic islands reached the ears of the American mariners of Long Island ports early in the nineteenth century vessels sailed south into almost unknown seas and reaped a rich harvest. In the season of 1800–1, 112,000 fur-seal skins were obtained and this rate continued until the species was almost extinct. They partly regained their numbers over the next half-century, but again in 1874–5 were decimated, with only a few escapees surviving. Protected by law when it was almost too late, they have recovered to some extent, and today may be seen in small numbers on some sub-Antarctic islands.

Whaling at the present time is carried out from properly constructed factory ships and chasers all equipped with the most modern methods of catching and treating whales. Large ships of 20,000 to 30,000 tons now proceed south and during the four months' season work feverishly in three shifts a day disposing of the whales.

The scene on the deck of a factory ship is one which is long to be remembered. The great open deck runs boot-deep in blood. As the whales are drawn up through the ramp or slipway in the stern of the ship, flensers with long knives cut the blubber into long strips. Power saws dismember the huge skeletons while many small cranes operating from gantries unceasingly lift red steaming masses of flesh and bone from the deck and lower them into the various apertures in the deck set aside for the

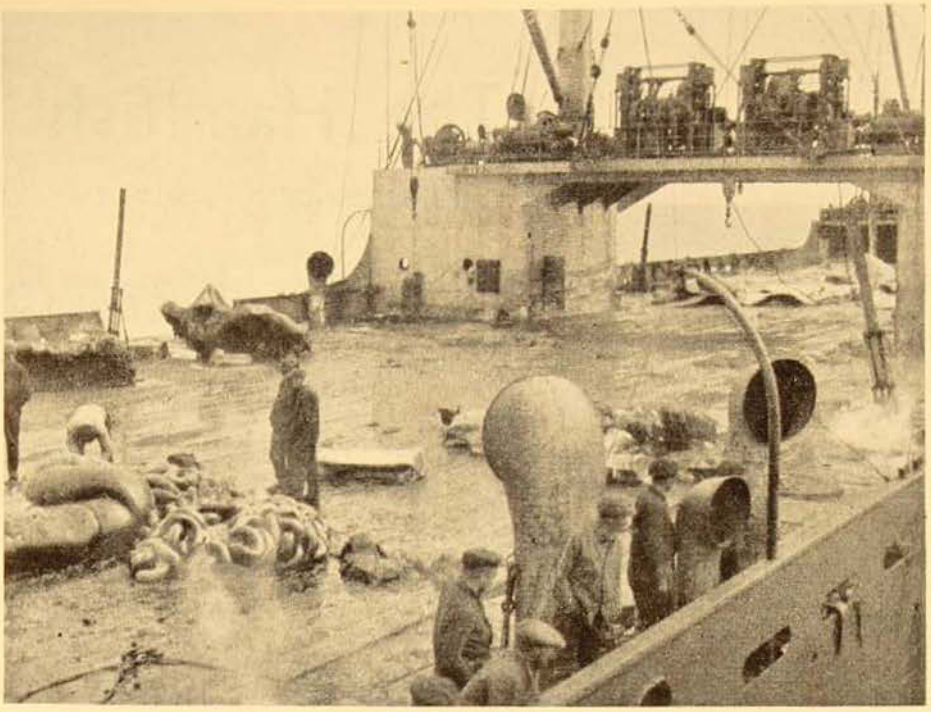


A captured Blue Whale which has been inflated and awaiting the return of a "chaser".

Photo.—S. C. Campbell.

various products. Further treatment goes on below decks. It is a ghoulish scene of destruction and the stench which permeates every corner of the ship is indescribable. The chasers themselves are well-built steel boats of attractive design and ninety feet in length. They are well flared "forrard" with a forecastle about 12 feet above sea-level, on which the gun platform is built. Amidships there is only about three feet freeboard, and these boats not only ride out some of the worst gales one could imagine, but travel south under their own steam through the terrific seas of the "Roaring Forties".

The muzzle-loading gun is fitted on the gun platform so that it can be swung at any angle. The harpoon itself weighs about 110 pounds, and is almost five feet in length. It has three barbs on the swivelled head, kept in place by lashings, which break when the harpoon strikes. The barbs then project outwards and upwards and prevent its withdrawal. A bomb is screwed into the nose-piece of the harpoon which is exploded inside the whale by a time fuse, the delayed action being one to two seconds. A long line is attached to the harpoon, usually about 120 feet of one-inch rope, which is coiled below the gun so that it will uncoil quickly and easily. The rest of the rope runs through pulleys on the foremast, through braking devices to withstand the strain of the whale's actions to get free, and is finally attached to 4,800 feet of



A scene on the deck of the "Sir James Clark Ross".
Photo.—S. C. Campbell.

thicker rope, which is coiled and stowed in the hold.

When a whale has been killed it is drawn alongside the chaser and air is pumped into the body cavity to keep it afloat. A lance with the company's flag attached is driven into the blubber to establish ownership. This is necessary because whales are often left to float about while the chaser searches for more whales, as they rarely return to the factory ship unless towing at least three whales, one on each side and one or two astern.

In foggy weather it is difficult to find the floating carcasses and valuable time was lost, so an interesting device known as a "whale transmitter" was introduced. This small wireless transmitter is attached to the whale and as this emits a signal every minute it is thus easy to find by means of the direction finder on the chaser. To avoid confusion each company has its own signal.

Both the factory ships and chasers are fitted with telephony transmitters and direction finders, so that constant intercommunication is possible and the chasers can return directly to the factory ship.

The experienced gunners find it easy to identify the various species of whales during the chase. The Blue Whale generally bares its back three or four times before finally diving. When breaking the surface the breath is exhaled in a high steaming column which can be seen for miles. The first dive is usually not a deep one and a few minutes later he again breaks the surface, exposing more of his body before diving again. Before finally diving the body has a tendency to arch and the Blue Whale dives deeply and disappears for at least seven to eight minutes. When the Humpback Whale dives its great tail is thrown into the air, giving the impression it is diving vertically. The Sperm Whale can remain under water for 45 minutes and it, like the remaining species, has certain characteristics which make identification easy.

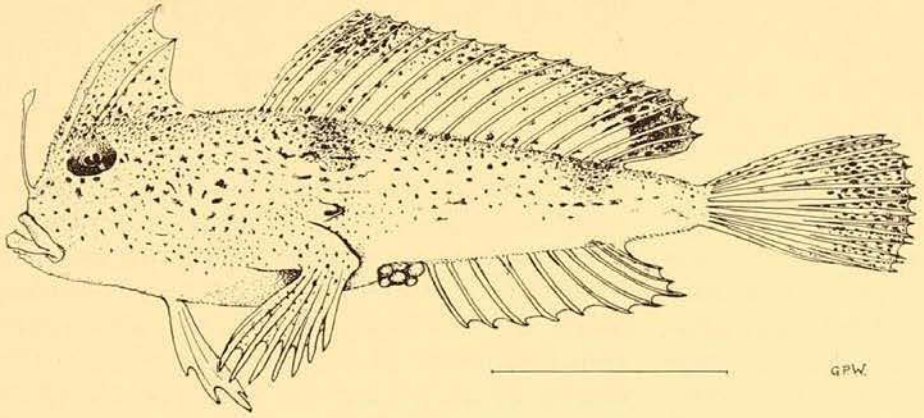
Whaling is a grim and cruel industry in all its phases, but to the hunters it means profits. The large majority of men in the industry are Norwegians and their farewell is always "Fuld fangst!"—Good hunting.

The Handfish

By GILBERT P. WHITLEY

WHEN the cry goes up, "All hands on deck!" the skipper hardly expects the fish of the sea to turn to and report for duty. Yet the "hands" aboard a trawler would perhaps not be so surprised as other seamen if this absurdity came to pass, for they are sometimes confronted by a little fish which actually walks on the deck by means of its hand- or leg-like fins. What is this quaint apparition of the deep?

"What have we here? a man or a fish? dead or alive?
A fish: he smells like a fish; a very ancient and fish-like smell . . .
Legged like a man! and his fins like arms!"

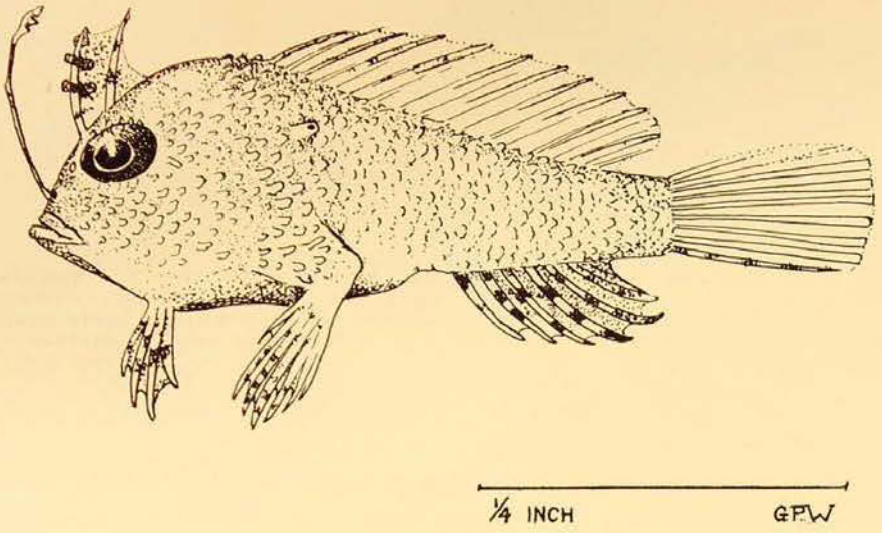


The Handfish (Brachionichthys hirsutus). An adult female, 3¾ inches long, from Tasmania, extruding eggs. The first dorsal spine forms a "fishing rod" and the paired fins are like hands or legs. G. P. Whitley del.

This little fish is no Caliban evoking cries from Trinculo, but is a Handfish (*Brachionichthys hirsutus*), a comical little customer at any time, yet of much scientific interest as it seems to be the most primitive type of Angler Fish in the world today. Mrs. L. A. Meredith, in her book *Tasmanian Friends and Foes*, called it the Tortoiseshell Fish and exclaimed, "It has fins like feet; one small pair where pectoral fins usually are, and a larger pair, with absolute elbows to them, and apparently shoulder-blades too, only those do not belong to the fore pair of feet! A very antipodean arrangement truly! The markings on the body and on the delicate pellucid fins are like tortoiseshell. It seems a link between fish and reptiles." The small pair of fins are the ventrals and the large, elbowed ones are the pectorals. G. W. Walker, in 1852, observed that the fish raised itself on these peculiarly formed fins and sprung from them, "somewhat as a frog would leap".

The Handfishes are placed in the family Brachionichthyidae by naturalists, who note that they differ from the true Angler Fishes (family Antennariidae) in having longer bodies and tails, the second and third dorsal spine connected by membranes, gill-openings behind the base of the pectoral fins (instead of below them), which have only two radial bones. Both families belong to the order Pediculati.

The Handfish may shed some light on how the Angler Fishes evolved, perhaps from some ancestor common to both, but there are several "missing links" in the evidence at the present time. Young animals sometimes show the characters of their remote ancestors better than old ones, the derivation or evolution of a species being reflected in the individual's growth, but the smallest Handfish I have seen shows little that is not evident in the adult. Drawings of both are given

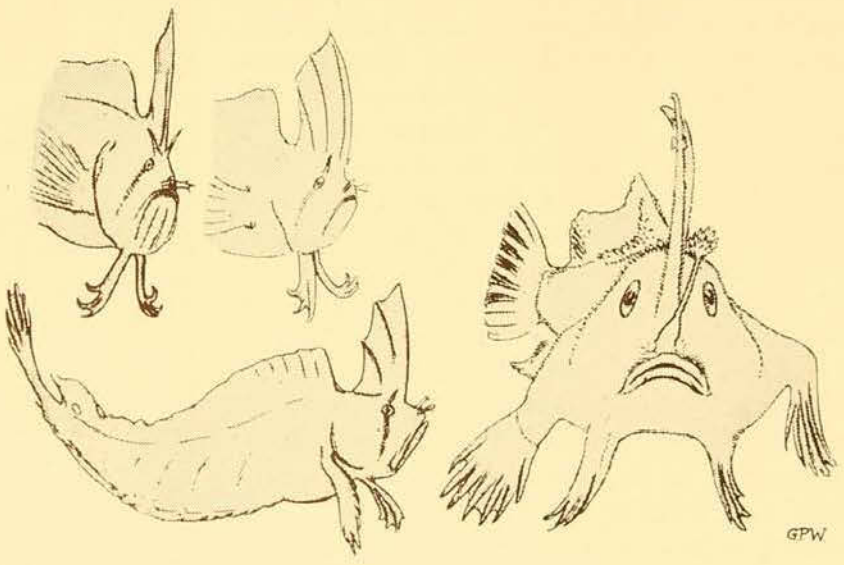


Young of the Warty Handfish (Sympterichthys verrucosus), enlarged about six times, from New South Wales.
G. P. Whitley del.

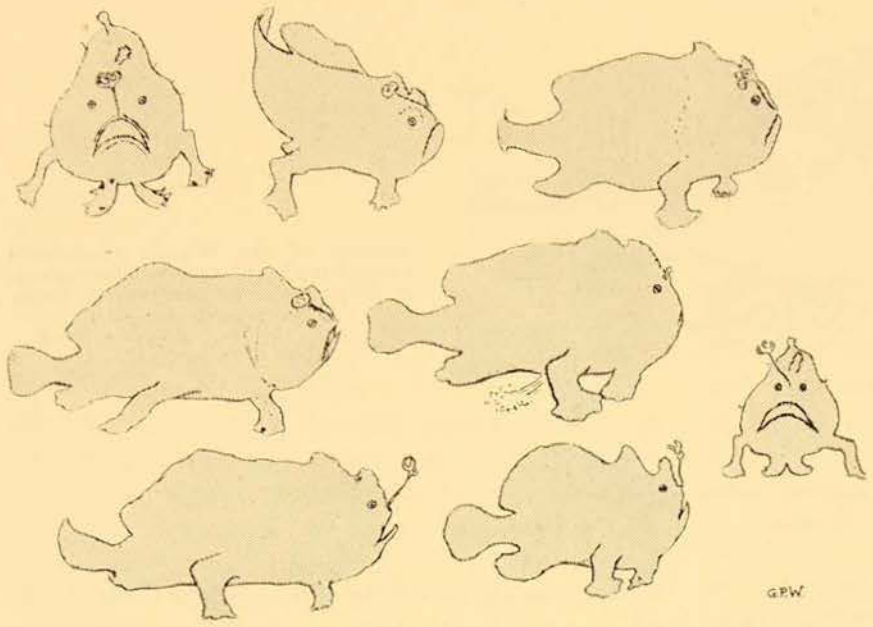
here. The "baby" is about 14 mm. or nine-sixteenths of an inch long and was trawled by the "Thetis" off Wata Mooli, New South Wales, between 54 and 59 fathoms.* Already it is quite a recognizable Handfish, with its first dorsal spine forming the illicium or "fishing rod" as in Angler Fishes, the next two dorsal spines with skinny tags and joined by membrane, a bulbous head, body with wart-like excrescences, gill-opening on upper part of side, and nostrils large. The adult female, $3\frac{3}{4}$ inches long, from Tasmania, is seen to have eggs extruded from the body; the form is slenderer and the skin with a velvety pile, while the gill-opening is above and behind the base of the pectoral fin.

Some sluggish rock cod, morwong, blenny, frogfish or such-like bottom-haunting fish, ancestral to the Handfishes, evidently developed the habit of pushing itself along with its paired fins, which eventually became stubby-fingered and the pectorals became angled or elbowed. Likewise, the dorsal fin of this hypothetical ancestor must have been crest-like, over the head and eyes, rather as in the Forehead Fish or Red Indian (*Pataecus*), probably with the first spine tagged or weed-like. The separation of the first dorsal spine into a "fishing rod" (illicium), the migration of the mobile pectorals around the reduced gill-opening (or *vice versa*), the shortening of the

* Waite in his report on the "Thetis" fishes identified this tiny fish as a young *Brachionichthys hirsutus*, but it appears to be *Sympterichthys verrucosus*, a southern species not hitherto reported from New South Wales.



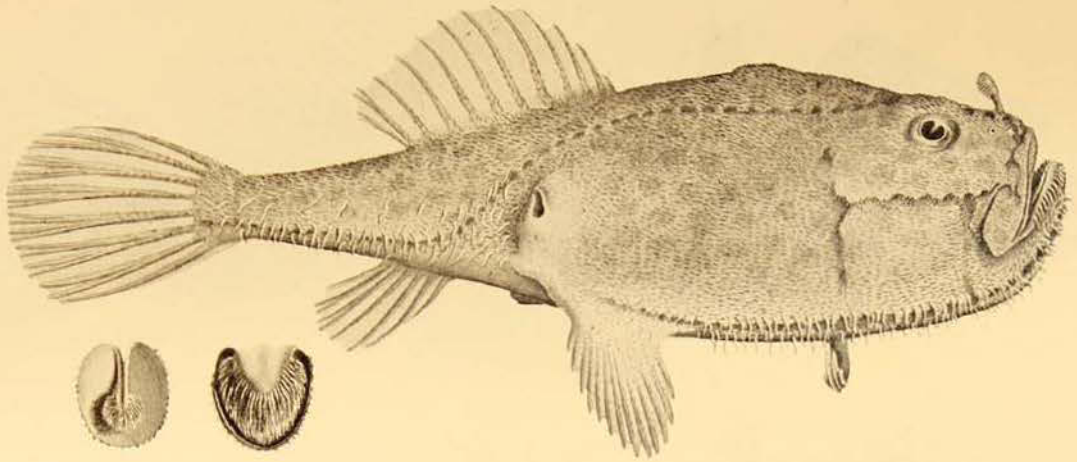
Attitudes of a Blenny, the Crested Weed Fish (Cristiceps aurantiacus) showing the "walking fins" below body and the advanced dorsal fin-spines from life, Maroubra, New South Wales. Also front view of a Handfish (B. hirsutus) from Eden, New South Wales.
G. P. Whitley del.



The Angler Fish goes for a walk. Sketches of a black Sydney species (Batrachopus insidiator) at Taronga Park Aquarium.
G. P. Whitley del.

body and fin-bases, reduction in number of vertebrae, and the development of a very distensible stomach finally resulted in the modern Angler Fishes. Before Darwin had put forth his theory of evolution (which still does not completely explain how such creatures as Angler Fishes, Flounders and other bizarre fishes came into being) Cuvier had observed that Angler Fishes were ordinary bony fishes except for their characteristic differences, but he noted that the Blenny *Cristiceps*, had an advanced dorsal fin with three spines; the Dragonet, *Callionymus*, had small gill-openings; and certain Gobies had faces and stalked "walking" fins rather as in Angler Fishes. He failed, of course, to realize any evolutionary significance in this, but remarked, "dans les familles naturelles bien faites il y a une sorte de balancement ou de répétition des genres de chaque groupe". The only other person to consider the Handfish in relationship to the more specialized Anglers is Dr. W. K. Gregory, of New York, who, in his monograph on fish skulls, regards the former as the most primitive of the pediculates. In the Handfish's skeleton the stout pectoral pterygials ("wrist"-bones) are reduced to two and the pectoral fin is stalked, enabling it to be turned below, behind or above the swollen throat and abdomen. "Here", states Gregory, "we have touched upon what is perhaps the primary adaptation of the pediculates, namely, the great enlargement of the throat and abdomen, which apparently permits them to devour either relatively large prey or a great quantity of small prey at one time. The 'pediculate' portion of the pectoral is simply the remnant of a once very large and continuous pectoral fin which was spread around the side of the enlarged throat, as it is in the batrachoids [frog-fishes]. The branchiostegal rays have shared in the enlargement of the lower part of the opercular flap; in the antennariids this flap finally overlapped the shoulder-girdle and by adhering to the skin on its surface has closed off all the upper part of the normal post-opercular slit. In this way the exhalent respiratory current, instead of escaping in front of the pectoral girdle in the ordinary way, is led around through a special tunnel in the skin that opens above and behind the pectoral fin. According to Cuvier, Renard and Valentyn reported that the 'chironectes' (antennariids) can virtually go on all fours and that they thus pursue their prey among the seaweed and on the mud.* The small size of their branchial opening, he thinks, makes it

* I may interpolate here that, according to *A Companion to Mr. Bullock's Museum*, Renard knew of an Angler Fish kept for three days out of water and which walked about the house in the manner of a dog!

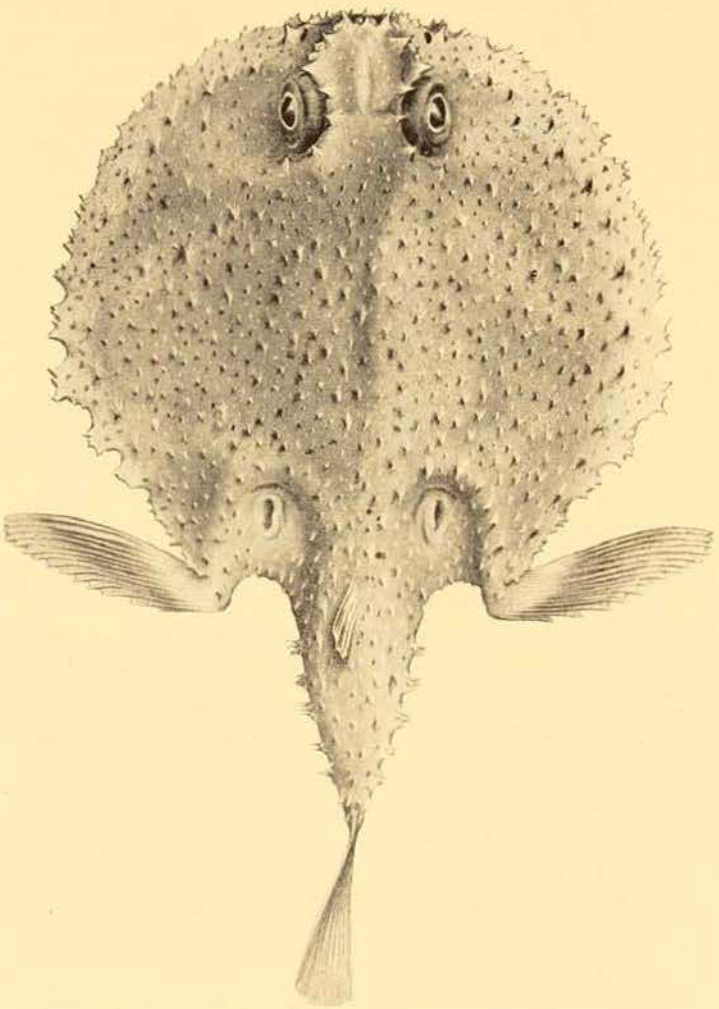


Coffin Fish (Chaunax endeavouri) from Bass Strait. Inset: First, the tiny "fishing rod" of same, and, second, of another species, C. penicillatus from Victoria. A. R. McCulloch del.

very probable that they can live for some time in the air; he even approves the epithet of 'amphibian' that Commerson had applied to the chironectes. He also notes that Margrave, Commerson and others testify that the chironectes have the power of inflating the belly like a balloon, and that anatomical enquiry shows that they could do this only by swallowing air and filling their great stomachs with it, as do the tetrodons [toadoes]. Aquarium specimens can also squirt water forcefully from their branchial orifice."

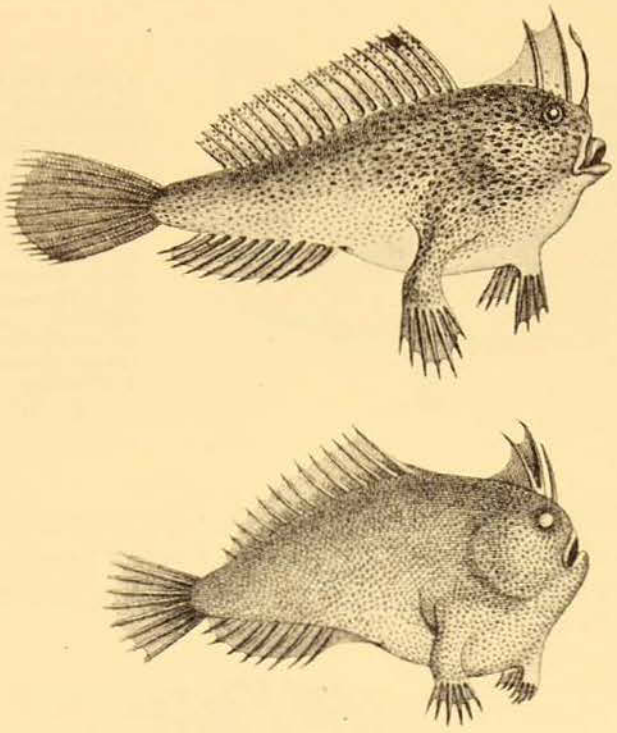
Since no fossil Antennariid Angler Fishes are known, the whole fascinating problem is wrapt in mystery. In comparatively modern times, these Anglers have branched forth into many different forms, culminating in the weird oceanic types with luminous lures, the furry Coffin Fishes (*Chaunax*), and the flattened Deepsea Batfish (*Halieutaea*). Various other types of Angler Fishes have been dealt with before in this MAGAZINE.*

In the fastnesses of the south-eastern Australian Continental Shelf, the Handfishes have not developed the amazing plurality of shapes and species, colours and structures, that the true Angler Fishes have. Whence they came, we know not; they are autochthonous Australians, unknown elsewhere, now only remotely related to their mostly tropical counterparts, perhaps much as the few south-eastern Australian cone shells and cowries are allied to their very numerous relatives of the coral reefs, having perhaps lived here isolated from about Eocene times.

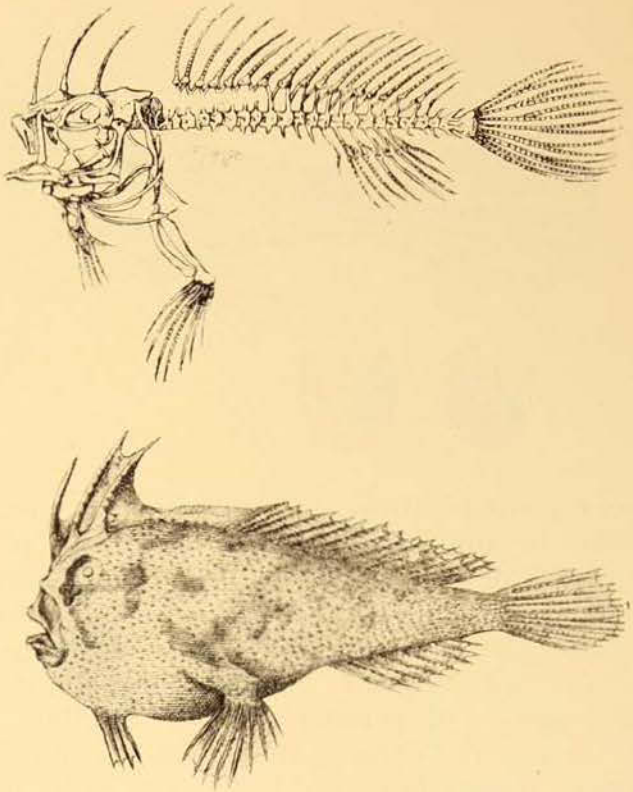


Deep Sea Bat (Halieutaea brevicauda) from off Cape Moreton, Queensland. Flattened like a stingray, with the "fishing rod" almost hidden under the spines before the eyes, this is a highly specialized Angler Fish. A. R. McCulloch del.

* AUSTRALIAN MUSEUM MAGAZINE, Vol. iii, No. 3, 1927, p. 103, and Vol. iv, No. 10, 1932, p. 335.



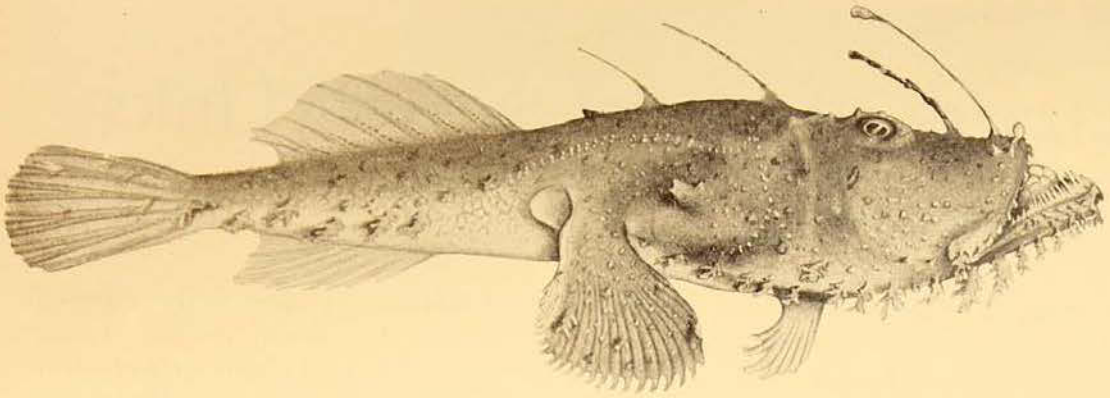
The earliest known specimens of Handfishes: Lacépède's engravings of 1804 showing (above) B. hirsutus and (below) S. unipennis.
After Lacépède.



The Smooth Handfish (Sympterichthys unipennis) from Tasmania, in which the front dorsal membranes are extensive and the "fishing rod" is small, and the skeleton of B. hirsutus showing the two "wrist" bones.
After Cuvier.

The discoverer of the Handfish, that inestimable French naturalist François Péron obtained the two genera we recognize today, but unfortunately published no details of them in his lifetime. He probably dredged them in Tasmania. Péron and LeSueur's drawings of our marine animals, made during Baudin's survey in the earliest years of the nineteenth century, were housed at Le Havre, France, but it is not known whether they survived the bombardment of World War II and no Australian naturalist has seen them to determine whether the Handfish is among them. Lacépède in the Annals of the Museum, Paris, published in 1804, described and figured the Australian Handfishes and his historic illustrations are here reproduced together with Cuvier's excellent engraving of the skeleton, published in 1817. In the early days of the Royal Society of Van Diemen's Land, one of the oldest scientific societies in Australia, examples of this "walking fish" were occasionally brought before the notice of members. A coloured plate was supplied by Mrs. Meredith in her book already quoted and a painting of another one was made by Lady Lefroy. An engraving by Bock of "A Fish caught at Port Arthur" adorned Ross's Hobart Town Almanack for 1835 and crudely represents *Brachionichthys hirsutus*. The Australian Handfishes may be epitomized as follows:

1. The Red or Spotted Handfish or Tortoiseshell Fish, *Brachionichthys hirsutus* (Lacépède, 1804). Skin with minute spines or bristles like the pile of velvet, so that this is a "Handfish of Esau" compared with its smoother ally, *Sympterichthys*. There is considerable variation in the "bait" on the illicium, which may be club- or leaf-shaped or tipped with a bunch of filaments. The colour too is variable, generally creamy-white, dotted with rusty-brown or dark brownish-red on body and fins. A dark blotch near top of second dorsal fin. The distance between the crest-like and main soft dorsal fin also varies. Length 5½ inches. Found in Tasmania and in deep water



Broadheaded Angler Fish (Lophiomus laticeps) from off Cape Moreton, Queensland. Like the classical European Angler Fish (Lophius piscatorius) this has several separate dorsal spines, the front one forming the "fishing rod".
A. R. McCulloch del.

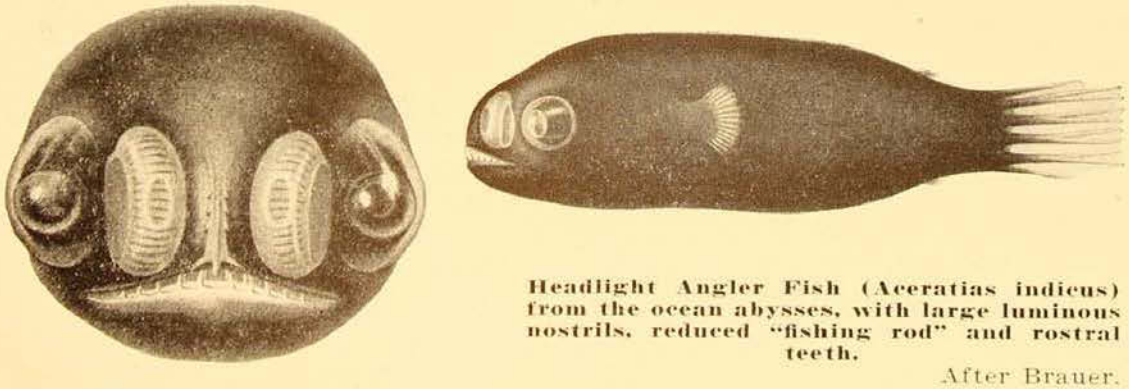
off New South Wales. It can now be definitely added to the Victorian fauna, as the "Endeavour" trawled it off the Gippsland coastline and Wilson's Promontory, and Mr. Melbourne Ward has collected it S.W. of Cape Everard in nearly 100 fathoms. The so-called "Polished Chironectes", *B. politus* (Richardson, 1849) from Tasmania is apparently merely a smoother-skinned variety of *hirsutus*, described as reddish-brown with minute pale marblings or network "seeming to the naked eye like cracks in the cuticle".

2. The Smooth Handfish, *Sympterichthys unipennis* (Cuvier, 1817). This kind is said to differ from *Brachionichthys* by having the dorsal spines and rays connected by membrane to a greater extent, a character that requires confirmation. Unfortunately the Australian Museum has no specimens of it. The body is said to be compressed, smooth. The first dorsal spine is filamentous, almost a hairline. The ventrals appear smaller and the anal fin nearer the tail than in the commoner Handfish, but it is possible that the two may be synonymous. The Smooth Handfish is reddish-brown, marbled with darker brown, is 2 inches long and comes from Tasmania.

3. Warty Handfish, *Sympterichthys verrucosus* McCulloch & Waite, 1918. The soft posterior dorsal fin in this species has 13 or 14 rays instead of 16 to 19 as in all the others, and there are only 6 anal rays. First dorsal spine with fleshy tip, body warty; general appearance similar to the "baby" Handfish figured here. Colour, brown with lighter and darker markings. Length $1\frac{3}{4}$ inches. South Australia, N.S. Wales.

The Handfish surely is an interesting little animal and we have much to learn about its variation and life-history. Men aboard the trawlers can help by sending in specimens to the Museum and gradually a more perfect picture may be obtained.

The Handfish may be the prototype of the Angler Fish, but it is only fair to say that it does not use its hands to show the size of the "one that got away".



Headlight Angler Fish (Aceratias indicus) from the ocean abysses, with large luminous nostrils, reduced "fishing rod" and rostral teeth.
After Brauer.

The Lizards of Eastlakes Golf Links

By R. MACKAY*
(Cadet Preparator, Australian Museum.)

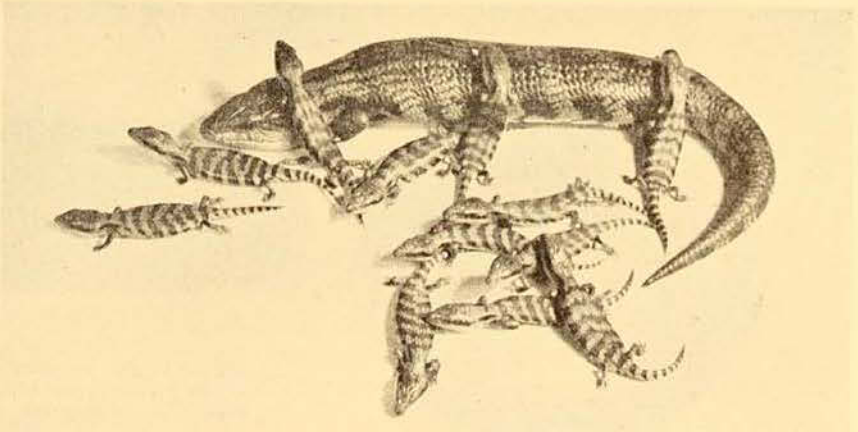
I HAVE been visiting the Eastlakes Golf Links about once or twice a month throughout the past year, collecting reptiles for the purposes of studying the habits and behaviour of the different species. The lakes are situated about six miles south from the city of Sydney and are divided between the municipalities of Mascot and Botany. The whole area is composed of sandhills, the highest of which is about 200 feet above sea-level. There is a layer of thick black mud or silt on the bottom of the lakes from which grow grasses and reeds. Years ago, these lakes were the source of Sydney's water supply. Today, there are pumps, water-pipes and dams still in working order. At the southern end of the lakes area is a block of land with a few wells, evidently this was once a market garden.

The reptiles of this area are divided into two orders: the Testudinata which comprises the tortoises, and the Squamata which is divided into two suborders, the Sauria or Lacertilia which comprises the lizards and Ophidia or Serpentes which comprises the snakes.

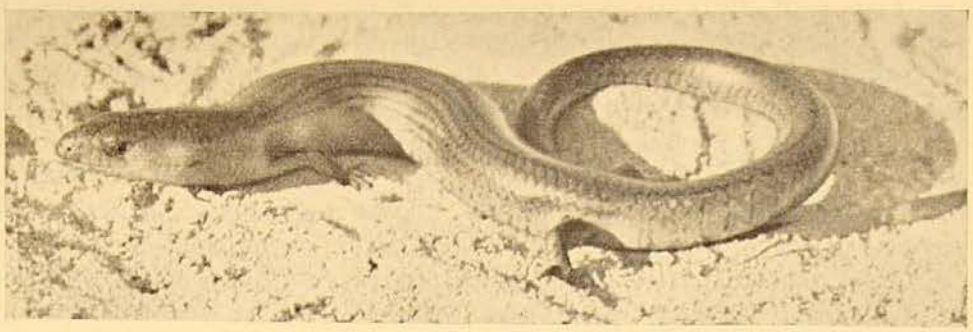
The only member of the order Testudinata found in the area is the Long-necked Tortoise or terrapin (*Chelodina longicollis*) which inhabits all the lakes but due to its extreme wariness is seldom seen. From my observations I would say that this reptile is not plentiful in these lakes. On the occasions when I have seen this tortoise, it was usually found sunning itself on a bed of reeds. Those specimens seen were all about six to eight inches across the carapace. Being carnivorous the food of this reptile probably consists of the small fish, *Gambusia affinis*, and pondsnails, *Lenameria gibbosa*, which are in great abundance in the lakes. I have seen the Macquarie Tortoise (*Emydura macquarii*) in many fresh-water ponds around Sydney but, so far, never at Eastlakes.

In the suborder, Sauria or Lacertilia, we have the largest number of species of any of the orders or suborders represented at the lakes. One of the most common lizards in the area is the Jacky Lizard or Tree-Dragon (*Amphibolurus muricatus*) which is an Agamid and is found on the higher and drier ground either lying on a piece of tin sunning itself or

* Photographs by Margaret Lovett.



A Blue Tongue Lizard, Tiliqua scincoides, and its young. The Blue Tongue is harmless and a friend of the gardener, eating snails, and slugs and insects. Somewhat vicious when young, its temper becomes much milder when adult. It is grey, with black transverse bands across the body, underneath pinkish. Grows to about two feet long.



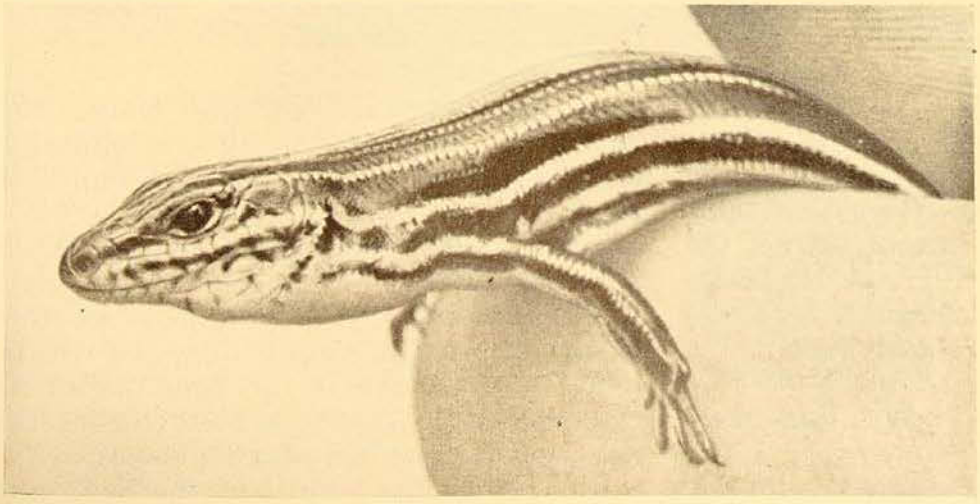
The Oak Skink, Tiliqua casuarinae, a relative of the Blue Tongue. It has short, stubby legs and glides through the grass more like a snake than a lizard. Colour is yellow-ochre, scales have black margins. It is inclined to be vicious and grows to approximately 15 inches long.

under a bush. If the weather happens to be dull or wet this lizard is mainly found under tin or buried in the sand. This species is one of a group of lizards which have the power to change colour and these colour changes are usually due to temperature, environment and disposition. Flies, caterpillars and grasshoppers comprise the bulk of its food. The Jacky Lizard is an excellent climber and does not grow much longer than fifteen inches.

The largest lizard found at Eastlakes is the Blue-tongue Lizard (*Tiliqua scincoides*) which I have collected quite often. The Blue-tongue is mainly found under sheet iron lying on the sandy ground, but no doubt it hides in rat holes and rabbit burrows. Most of the specimens were found under large sheets of roofing iron half sunken into the ground, the largest specimen being about seventeen inches long, but they can grow to a length of two feet. Their food consists of flies, beetles, snails, grasshoppers and berries. It will also eat fruit.

A relative of the Blue-tongue which is known to scientists as *Tiliqua casuarinae*, also abounds at Eastlakes. It is usually found under boards or sheet iron and when disturbed will race through the grass with surprising speed. If cornered it will puff itself out and open its mouth in a threatening attitude. This lizard will attack anything presented to it and if the object be a finger or toe will hang on like a bulldog. It cannot do any harm, grows to about a foot long, is insectivorous but may eat berries and fruit.

By far the most common lizard of the area is the Coppertailed Skink (*Sphenomorphus taeniolata*), known colloquially by the name of "Stripy", due to the black, white and orange stripes running down the full length of the body and part of the tail. It is found under boards or tin, in holes, or running over the surface. The average length is six inches and its food consists of small insects and caterpillars. During the warmer months of the year it is hard to catch on open ground as it twists and turns and dodges



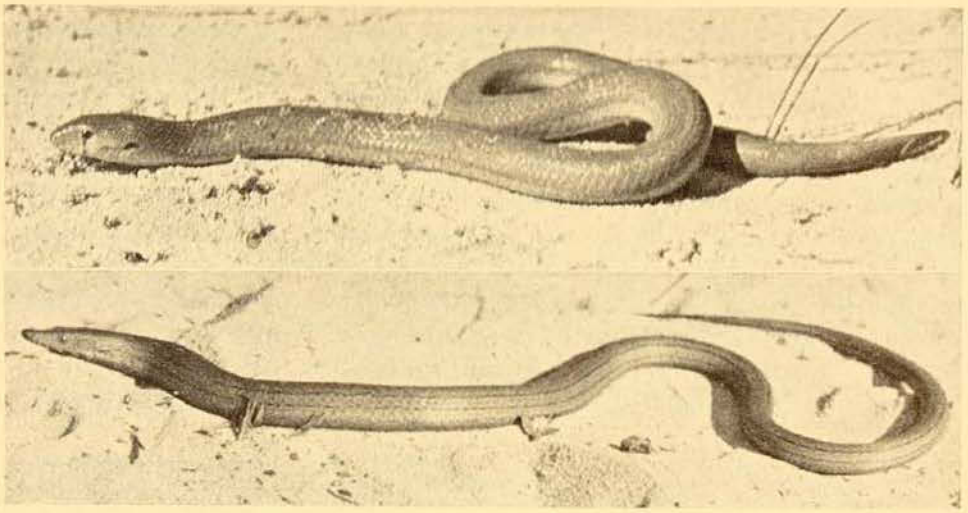
The Copper-tailed Skink or Stripy, Sphenomorphus taeniolata, one of our commonest lizards. Here it is shown held between finger and thumb. It is black with reddish and white stripes, the tail is coppery, the under-surface is white.

this way and that in an endeavour to escape. This lizard and the previously mentioned Jacky Lizard are the only ones to be seen in the open when the sun is scorching the earth on a hot summer day.

We come now to three small brown lizards which look very much alike but if studied carefully the differences can be found quite readily. The three lizards are: the Metallic Skink (*Leiolepisma metallicum*), the Three-lined Skink (*Leiolepisma trilineatum*) and the Common Grass Lizard (*Leiolepisma guichenoti*). The Grass Lizard is the one that is found in nearly every garden or lawn, but it is not as common as the other two at Eastlakes. It is a brown lizard about two to four inches long with a black band on each side, edged with white, and white dots in rows along the tail. The main food of this little lizard is ants and flies. It will eat worms and fruit when available.

or tin in company with the Grass Lizard and the Metallic Skink, which grows to a length of more than six inches. The dorsal surface of this lizard is brown throughout and there is a black band on each side. During the breeding season it has a pink or red throat which seems much more evident in males than in females. This very active species is often to be seen running through the grass or jumping for flies even during the dampest of days.

There are two species of legless lizards at Eastlakes and I have collected both. They are not as common as in the surrounding districts such as Maroubra, Malabar and La Perouse. Their long bodies and apparent absence of limbs cause them to be often mistaken for snakes and they are thus killed. The commoner of the two is the Scaly-foot or Pygopus (*Pygopus lepidopodus*) which is usually of a reddish-brown colour with or without two rows of dots along



The Scaly-foot, Pygopus lepidopodus. Its colour varies, according to environment, from cream to brown and brick red. Has flaps near base of tail which are vestigial hind limbs. Grows to about two feet long.

Burton's Legless Lizard. Its colour varies from cream to brown or nearly black. Grows to about eighteen inches.

The Three-lined Skink is about the same size as the preceding lizard but is differently marked. Besides having a white-edged black band along each side there is a black line running down the centre of the back which is broad or narrow in different specimens; the scales are often striated and edged with white. The habits of this lizard are the same as the preceding species except that it is seldom found in suburban gardens. At Eastlakes it is often found under board

the dorsal surface of the body; this coloration varies greatly in different localities. The average adult length of this lizard is twelve inches. If studied closely, a pair of flaps will be seen at the anal region, one on each side; these are the rudiments of hind limbs. Another characteristic distinguishing the Scaly-foot from a snake is the presence of an external ear. There is no external ear in a snake. The tail of a legless lizard is a least twice the length of the head and

body whereas snakes have a body many times longer than the tail. At Eastlakes the Scaly-foot is mostly found under pieces of roofing iron as is the other legless lizard known as Burton's Legless Lizard (*Lialis burtonii*). The long, pointed, snake-like head and the limbless body are reasons why people regard these reptiles as snakes. They are very active and feed mainly on insects such as small beetles, grasshoppers and flies. The coloration of Burton's Legless Lizard is extremely varied. Some are of a uniform colour and others are marked with rows of dots or dashes.

The only times I have seen legless lizards out in the open were once a Burton's at Mosman, and another, Scaly-foot, at La Perouse. The latter was about eighteen inches from the ground in the branches of a small bush.

The Water Lizard (*Sphenomorphus quoyi*) I have seen once at Eastlakes and that was in one of the wells at the south end. I have captured it many times in adjacent areas, such as Veteran Swamp (Snake Gully), The Millpond, and Botany water works.

Australian Insects. XXXVII

Coleoptera 14—The Auger Beetles

By KEITH C. McKEOWN.

THE family Bostrychidae is economically an important one, since the adult insects together with their larvae tunnel in the timber of forest trees and in the drying logs when they have been felled. It is in the forests and in the timber-cutters' camps that the infestation occurs. Fortunately, when the timber is quite dry it loses its attraction for the insects, and when development is complete and the perfect beetles have emerged into the open air, no further infestation takes place. Sickly and dying trees appear most susceptible to attack, the insects being attracted, as in the case of felled logs, by the drying bark. Unless the infestation is severe the structural strength of the dressed timber is rarely affected; the tunnels are usually widely separated, and may range in size from quite large burrows to mere "pin-holes" according to the species concerned.

Some forty species have been described as native of Australia, but a number of introduced forms have also become established here. The possibility of other species coming into the country in timber, especially from the East, unless their entry is prevented by rigid quarantine, must be at least a potential menace to the welfare of our forests and their timber.

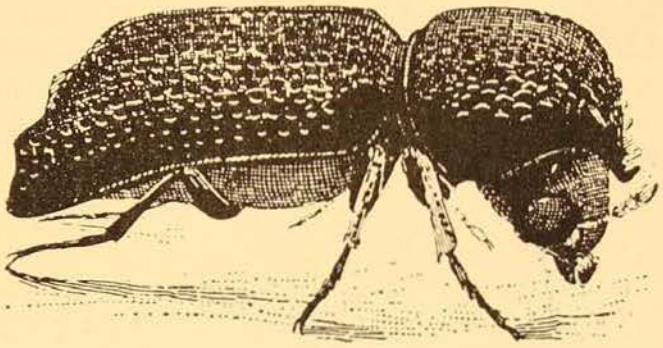
In their characters the insects are close to the Lyctidae (discussed in the last article of this series), but the Bostrychids form a distinctive group of thick-set insects with a hooded thorax which more or less completely hides the head. The apices of the elytra, or wing-covers, are strongly and obliquely truncate and are often armed with spines. The expanded club of the antenna is formed of three segments.

The largest of our Bostrychid beetles is the Auger Beetle (*Bostrychopsis*

jesuita Fab.), which gets its popular name from the clean-cut hole which it makes when boring into the drying wood. The term "Auger Beetles" is popularly applied to the whole group, although some of the smaller species are referred to as "shot-hole borers" because of the appearance of the external holes.

This beetle has been taken in Red Gum (*Eucalyptus rostrata*), Blue Gum (*E. saligna*), and Spotted Gum (*E. maculata*), as well as in fig and other orchard trees.

Xylion collaris Er. is another fairly common and widely distributed species. It measures about a quarter of an inch

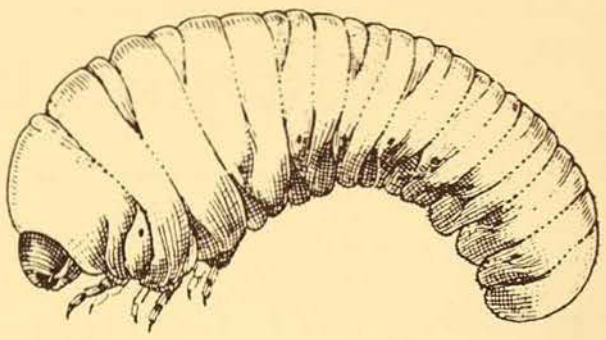


The Auger Beetle (Bostrychopsis jesuita) and its larva. Courtesy N.S.W. Department of Agriculture.

The perfect *Bostrychopsis jesuita* may measure from half to three-quarters of an inch in length and is shining black with red-brown antennae. The head is large and turned down beneath the hood-like prothorax, which is covered with small spines which project beyond the margin above the eyes. The elytra are coarsely and deeply punctured in parallel longitudinal rows. It is common and quite a striking beetle.

Its range of food-plants is wide and, indeed, litle seems to come amiss to it. Its usual native food-plants are eucalypts and wattles, but it also infests other native trees. It has also been bred from White Cedar, fig, apple, and orange trees. But in all cases the trees have been unhealthy, dying, or dead.

Among the larger species, possibly the most common is *Xylion cylindricus*, originally described by Macleay. This dark brown insect, when viewed from above, appears regularly cylindrical, with the truncate apices of the elytra strangely frilled and scalloped, especially in the female. The prothorax is densely covered with small upright points or spines. It measures about a quarter of an inch in length. The appearance of the elytral apices is well shown in the accompanying illustration.



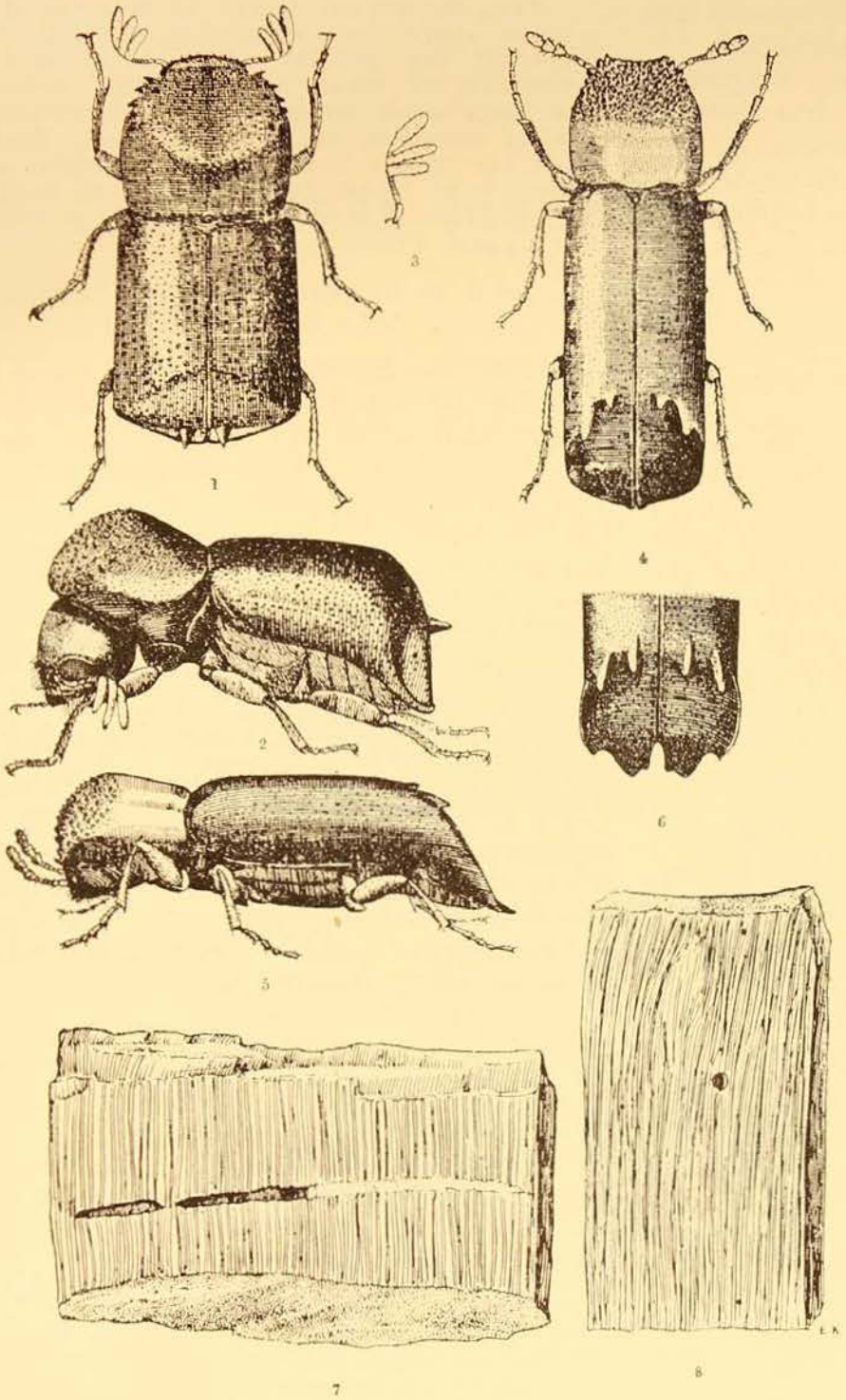
in length, and varies but little in size. The general colour is usually dark reddish-brown, though some examples may be almost black, with the prothorax yellow. The front of the prothorax is finely roughened, the rear smooth and shining.

W. W. Froggatt says:

> The form of the tips of the wing covers vary in the sexes. In the male beetle they are finely punctured, curved sharply down with a pair of blunt spines on either side of the rounded disc, and the extreme tips produced into a blunt projection, slightly turned upward. In the female the spinal projections round the anal disc are smaller, only projecting slightly above the margin, and the tips of the wing covers fitting close together.

He also states:

> The adult beetles may be found all the year round in our more northern forests, but are much more active and numerous in the summer months, particularly in the



Common Bostrychid Beetles. 1-3, Synoxylon anale; 4-5, Xylion collaris; 6, apex of elytra of female Xylion cylindricus; and 7-8, the tunnels of X. collaris in timber.
Courtesy N.S.W. Forestry Commission.

spotted gum forests of the South Coast. From early in October to the end of the summer, almost as soon as a smooth-barked gum tree is felled in the forest, these beetles may be found on the surface of the bark, where they immediately set to work to cut their circular shafts through the bark into the sapwood. When the sapwood is reached in a green log their lateral galleries are somewhat irregular, but in dryer timber they have the habit of excavating long lateral galleries just beneath the bark in the outer surface of the sapwood, as shown in the illustration.

When the felled logs are drawn into the sawmill yard exposed to the heat of the sun, and the bark dries on the log with parallel cracks, many beetles die without finishing their work. The writer found many of the adult beetles dead in their vertical shafts, both in the bark and surface of the sapwood, in the middle of January, when collecting in Bateman's Bay and Moruya districts.

The host timbers of this species are similar to those of *X. cylindricus*.

Sinoxylon anale Lesne, originally described from the East, has become established in northern Australia, having, apparently, been introduced in timber. It is a handsome little beetle, measuring less than a quarter of an inch in length, and proportionately very broad. It is nearly black, with a bright reddish blotch on the side near the base of the wing-covers. The sharply truncate elytral apices bear a stout spine.

In *Xylotyllus lindi* Blackb. the apical spines are very large and strong, having the appearance of curved calipers. There is infinite variety in the form of these truncate and spined apices among the different species; these are a valuable character for identification purposes.

It is unfortunate that, although the insects have been studied in connection with their wood-boring activities, we have little information concerning the details of their life-histories. That these may prove remarkable is shown by A. M. Lea's observations on *Xylobosca bispinosa*, which are exceptionally interesting. He writes how:

> In examining some twigs of the cultivated fig, in December, 1903, I saw numerous holes made by these insects. In most instances, the hole was made close to a bud, and went almost round the twig, just under the bark. In nearly every instance, two insects were in each drill; the one nearest the entrance and always with its tail blocking up the opening was a male; the other, which was always at the head of the drill, was a female. I never saw these positions reversed.
>
> The explanation seems to be that the males guard the entrance to the drill to prevent the females being devoured by Cleridae, or other insects, which devour so many small boring beetles. Frequently, when examined, the male was found dead, but the female living; in other instances, both were found dead, so that it would appear that, even in death, the male protects the young brood.

As well as fig, this beetle also attacks *Acacia* and Redwood (*Cadellia*).

Not all the Bostrychids attack timber. *Rhizopertha dominica* Steph., a minute, reddish-brown, introduced species, has abandoned its wood-boring habits. Froggatt has suggested that although originally a borer, "it discovered that the contents of the containers were better food than the wood and became omnivorous, attacking all kinds of dried foodstuffs". It is particularly a pest of wheat and other stored grain. It was apparently introduced into Australia about 1917, when it appeared as a pest in wheat stacks.

Bostrychid larvae are stout, fleshy, white grubs, somewhat thickened towards the fore part of the body. The larva of *Bostrychopsis jesuita* (illustrated) may be taken as typical of the group.

The principal genera of the Bostrychidae, native and introduced, are *Dinoderus*, *Bostrychopsis*, *Rhizopertha*, *Heterobostrychus*, *Xylodelis*, *Xylodectes*, *Xylotillus*, *Xylion*, *Xylobosca*, *Xylothrips*, *Xylopsocus*, and *Sinoxylon*. It will be noticed that many of these generic names are based upon the Greek *xylon*, wood.

Schools' Service

AT the beginning of June, Mrs. Beryl A. Graham, B.Sc., Dip.Ed., was seconded from the teaching service of the N.S.W. Department of Education to assist teachers, student teachers and pupils, city and country, departmental and non-departmental, in using the facilities available at and from the Museum.

Questionnaires are available to help visiting classes of all ages, to derive the utmost benefit from their visits.

Mrs. Graham may be interviewed at the Museum on week days, including school vacations.

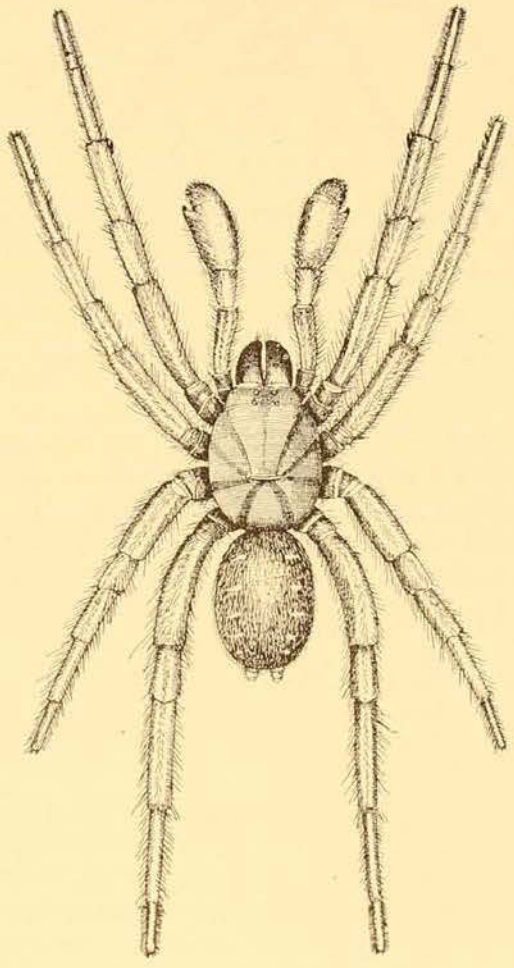
Spiders Harmful to Man. II

By A. MUSGRAVE

THE classification of spiders has undergone a very revolutionary change as a result of the researches of Professor A. Petrunkevitch since the last articles on spiders appeared in THE AUSTRALIAN MUSEUM MAGAZINE. He has shown that the number of ostia in the heart, i.e., lateral or dorsal openings, "is of primary importance for the elucidation of the relationships of different groups of spiders". These vary from five to four, three and two, and the most primitive is five pairs and two pairs the most advanced. The respiratory system of spiders has long been used in their classification. Spiders have, in certain groups, four or two lungs, or no lungs at all, while the tracheal system also varies throughout the order. Five suborders are now recognized in the order Araneida and these may be briefly summarized from Petrunkevitch's key as follows:

1. Suborder *Liphistiomorphae*. Spiders with segmented abdomen. Five pairs of cardiac ostia, two pairs of lungs, etc. This suborder includes two extinct families of spiders and one recent family.
2. Suborder *Mygalomorphae*. Trap-door, funnel-web and bird-catching spiders. Includes spiders with a non-segmented abdomen, four or three pairs of cardiac ostia, two pairs of lungs, and six, four, or two spinnerets, poison gland in the base of the chelicera. Eight families of spiders.
3. Suborder *Hypochilomorphae*. These spiders have four pairs of cardiac ostia, two pairs of lungs, a cribellum and six spinnerets. One family *Hypochilidae*, containing the Cave Spider of Tasmania, *Ectatostica troglodytes*.
4. Suborder *Dipneumonomorphae* (two-lunged spiders) the vast majority of spiders. Three or two pairs of cardiac ostia, one pair of lungs, one pair of tracheae, one to two tracheal spiracles. The poison glands are endocephalic. The spinnerets vary.
5. Suborder *Apneumonomorphae* (no lungs, only tracheae). Two pairs of cardiac ostia, no lungs but two (or one) pairs of tracheae and two (or one) pairs of tracheal spiracles, six spinnerets, no cribellum. This suborder constitutes only very minute spiders found in moss.

Numbers 2 and 4 are the only ones we need consider on our survey of the harmful spiders of this continent.

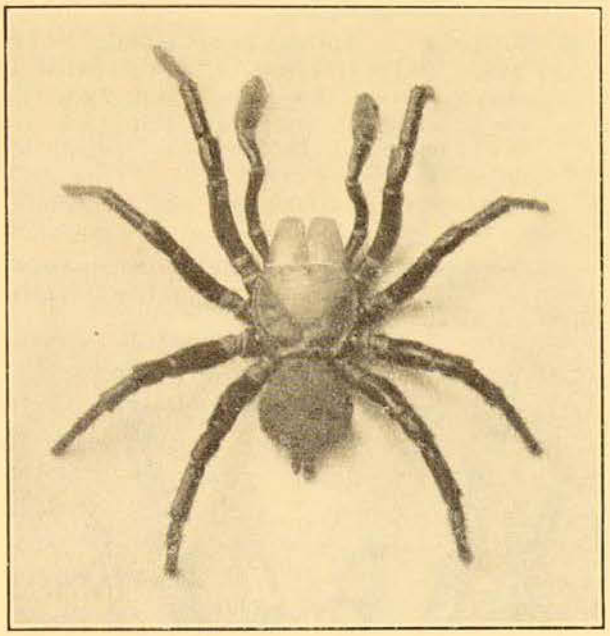


The Brown "Trap-door" Spider, Arbanitis fuscipes Rainbow, male example. Note large palpi.

Ethel M. King del.

MYGALOMORPH OR TRAP-DOOR SPIDERS

The second suborder of the Araneida, the Mygalomorphae, are represented in Australia by about 140 large and medium-sized ground-dwelling spiders. In South America and the West Indies occur the large bird-catching spiders termed "Mygales" whose vernacular name has been utilized in the formation of the name of the suborder.

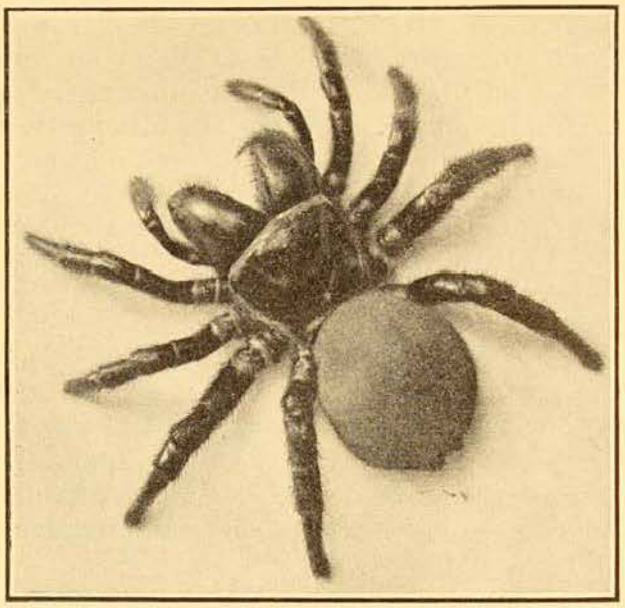


The "Mouse" Spider, Missulena occatoria Walckenaer, male; much smaller in size; note red (lighter coloured) head.
Photo.—G. C. Clutton.

In this group the fangs (chelicerae) are placed side by side and are so jointed that they move in a vertical plane. In order to strike the spider must rear back on its hind legs, the fangs are thrust out and the animal lunges forwards and downwards. On the underside of the abdomen at the base in all Mygalomorph spiders are light-coloured areas upon which are situated the four openings to the lungs.

Six of the eight recorded families of Mygalomorph spiders have representatives in Australia, but of these only three possess species known, or herein cited, as harmful to man.

The family Ctenizidae includes spiders with four pairs of cardiac ostia; three tarsal claws; the chelicerae (fangs) with a rastellum (rake); posterior spinnerets short and with a short terminal joint. They are more entitled to be termed "trap-door" spiders than the members of other families of Mygalomorphae, many of which do not attach lids to their burrows. The term "trap-door" spider may thus be a popular misnomer for certain non-Mygalomorph spiders called "Wolf" spiders which we will consider later, have similar ground-dwelling habits to those of the Mygalomorphae and some species attach simple lids to their burrows.



The "Mouse" Spider, Missulena occatoria Walckenaer, female. The body is uniformly coloured.
Photo.—G. C. Clutton.

Among the members of this family commonly sent in to the Museum are certain species of the genus *Missulena*. In this genus the sexes differ markedly in size and shape and the eyes are widely separated along the margin of the cephalothorax.

One of these bulbous-headed spiders, *M. occatoria* Walckenaer, sometimes called the Mouse Spider, is not uncommon in outlying suburbs of Sydney, and the species is widely distributed over Australia. Its small red-headed male was formerly known as *rubrocapitatum* until, in a recent paper, Mr. H. Womersley was able to show its true affinities with *occa-*

toria. It closely resembles the male of *M. insigne* Cambridge, in its red or scarlet head, but differs in having the anterior median eyes not surrounded by black pigment, and the labium and maxillae carry short spines. In *insigne* the converse holds good. The females of the two species are very different in appearance, that of *insigne* has the head part of the cephalothorax red as in the male, though the colour is darker; the female of *occatoria* is of a uniform dark brown. *M. insigne* also has a wide range over the continent. Females of this last-named appear to be less abundant than the males and not so numerous as the females of *occatoria*. In another species, *M. bradleyi* Rainbow, recorded from the Sydney district, the male is easily distinguished by a light patch on the upper side of the abdomen at the base.

Records of bites.—Only three records of bites from species of *Missulena* have come under my notice. A female *M. occatoria* bit a woman residing at North Narrabeen, N.S.W., on April 1, 1935. The site of the bite was the left hand and swelling occurred in the vicinity of the bite. The patient was treated immediately, the wound being scarified and a tourniquet applied, and she was then taken to hospital. The other two records are for males of *M. bradleyi*. One bit a child aged fifteen months living at Panania, N.S.W., on April 26, 1945. There were no symptoms of poisoning and no discomfort to the child was noticeable. First aid was applied by the mother and medical attention was obtained. The other record is that of a man residing at Cronulla, N.S.W., who was bitten on the toe on March 12, 1949. A doctor was called but no symptoms developed.

Another member of the family Ctenizidae is the Brown Trap-door Spider, *Arbanitis fuscipes*, very commonly met with in the Sydney district. It is a fairly large spider which makes a burrow in the ground which it lines with web, but does not attach a lid to the entrance. The male measures about three-quarters of an inch in length and has the palps swollen so that they resemble boxing gloves, it also has a small spur on the first pair of legs. The female measures about an inch in length and the brownish abdomen is banded with narrow, transverse, light-yellowish bars above in both sexes, though these bands are often indistinct. I have recently heard for the first time of a case of bite from one of these spiders, but the effects do not appear to have been very serious.

THE FUNNEL-WEB SPIDERS

The members of the family Dipluridae do not construct lids to their burrows. This family includes our most harmful spiders, those belonging to the Australian genus *Atrax* being popularly termed "funnel-web" spiders. In the United States the spiders of this family are termed "funnel-web tarantulas", but in Australia, as in other parts of the world, the term "tarantula" is loosely applied to most large spiders. Long ago I suggested a compromise name of "funnel-web spiders" for our large aggressive spiders of the genus *Atrax*, as they, like their American cousins, spin strands of silk from the burrow entrance.

Eight species belong to the genus *Atrax* which ranges from Queensland to Tasmania. Some of these species burrow in the soil in true Mygalomorph fashion, while others prefer to place their silken tubes in stumps, rotting logs, rockeries, by the sides of fence posts, under stones, and in rubbish heaps. The Sydney "funnel-web" usually occurs in such places, though I have recently heard of two occasions in which the spider was taken from a burrow in the soil.

In the males of *Atrax* a spur or group of spines is present on the underside of the tibiae of the second pair of legs. The female has a relatively larger abdomen than the male. Though all species of *Atrax* are potentially dangerous to man, only two are recorded as harmful.

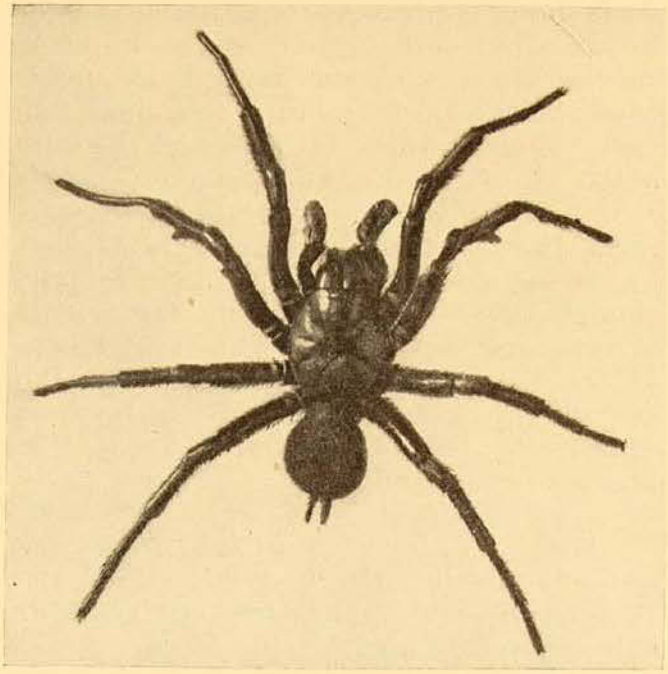
The North Coast Funnel-web Spider, *A. formidabilis* Rainbow, occurs in the Northern Rivers district of New South Wales. It has so far been known only from the male sex which resembles somewhat the male of the Sydney Funnel-web

Spider, but is larger and the spurs on the second pairs of legs are rounded. A case of spider bite was first recorded from Wauchope in 1927,[5,6] by the author, and later (1933) with Dr. W. W. Ingram in *The Medical Journal of Australia.*

THE SYDNEY FUNNEL-WEB SPIDER

The most toxic of all the spiders of the Sydney district is the somewhat local *Atrax robustus*, for, although the Red-back Spider is common everywhere, it does not come so closely into the affairs of man in the city and suburbs as it does in the country.

The Sydney Funnel-web is large, the male measuring about an inch in length and the female about one and one-third inches. The cephalothorax is black, smooth and shining, the abdomen above dull brown, while the body is reddish-brown beneath. The legs of the male are relatively longer than those of the female and it seems to be more active. It is a greater wanderer than the female, judging from the numbers brought into the Museum. Specimens of both sexes kept in captivity proved very aggressive, being quick to rear back and ready to strike when disturbed; otherwise they would remain with their legs hunched up and, to all appearances, comatose. It is well not to be deceived by this passive attitude. While the majority of the cases of bites have been from males, at least three records of bites from females have been brought to my notice, but none of these proved fatal. Five deaths have been recorded since 1927, and of these two (one a child at Carlingford, the other a woman at Mosman) the spider was not secured. The child, however, saw the spider which bit her, but from the case-history of the woman we learn that she was bitten while out of doors at night



The Sydney Funnel-web Spider, Atrax robustus O. P. Cambridge, male; note tibial spurs on under side of second pair of legs and which are not present in female.
Photo.—G. C. Clutton.

and the clinical symptoms all pointed to spider bite. Deaths from *A. robustus* "bites" are here set out.

Sex of person	*Age*	*Time lapse before death*	*Sex of spider*
Male	2	90 min.	Male
Female	5	80 min.	?
*Female	47	11 hrs.	Male
Female	26	12 hrs.	?
*Male	14	12 hrs.	Male

*Bitten indoors.

Though *A. robustus* is a ground-dwelling spider of the Sydney sandstone district and in gardens about the city, nevertheless it is said to enter houses through the ventilators, which may involve a high vertical ascent. The spider may also enter through windows or doors. Inside the house they may sometimes be taken in laundry tubs or baths, or hide in slippers, shoes or boots, and three cases of bites are known (two ending fatally) as a result of these invasions. A notable example of a spider bite indoors was the early record of Dr. C. A. Monticone of Clifton Gardens, Sydney, who was bitten

[5] A. Musgrave, Some Poisonous Australian Spiders. *Rec. Aust. Mus.*, xvi (1), Oct., 1927: 33-46, pls. ii-iii.
[6] A. Musgrave, Harmful Australian Spiders. *Aust. Mus. Mag.*, iii (4), 1927, 134-138, illustr.
[7] A. Musgrave, Some Common Spiders of the Sydney District. *Aust. Mus. Mag.*, iv (5), 1931: 163-173, illustr.
[8] A. Petrunkevitch, An Inquiry into the Natural Classification of Spiders, Based on a Study of their Internal Anatomy. *Trans. Conn. Acad. Arts and Sci.*, 31, April, 1933: 299-389, pls. i-xiii.

on the ball of the left foot while exercising in his room on June 20, 1927. The detailed account of his case was later published by me.[5, 6] Several males have been taken in my home at Gordon, and the majority of specimens submitted to the Museum come from residents on the northern side of Port Jackson. The Museum possesses specimens of the spider from the Gosford district, 60 miles north of Sydney, and from Lakemba, south of Sydney and slightly beyond the city limits.

The spider seems to be chiefly nocturnal in his habits and specimens kept alive at the Museum seemed to shun strong sunlight. People have, however, been bitten while working in their gardens in the daytime, their hands having come too close to the spider which promptly showed its resentment by attacking them. Those thus bitten have remarked that it required quite a strong blow to dislodge the spider. Several such incidents have been reported to me, two being adult males, one a member of the Museum staff, but owing to prompt first-aid action being taken serious symptoms did not result. Though much Press publicity has been given to this spider, some of it rather ludicrous, many records of bites never appear in the newspapers. From some of these bites no symptoms develop, due perhaps to the fact that the spider failed to introduce the venom into the wound made by the fangs, or the skin in the area bitten was too thick to permit the fangs to enter. The nature of the venom and habits of the spider still await investigation.

In the Bird-eating Spiders (family Theraphosidae) we have the largest of all spiders. These spiders include the well-known "Mygales" of South America. The poisonous qualities of these have been cited by Dr. Brazil and Dr. Vellard (1926) and show that the spiders of certain genera *Gammostola* and *Lasiodora* are highly poisonous to certain cold-blooded animals such as snakes, lizards and frogs, but not so toxic to warm-blooded animals, including men. In Australia four genera of Theraphosids are found: these are *Ischnocolus* and three genera of the Selenocosmiae; *Selenotypus, Selenotholus,* and *Selenocosmia.* The spiders of these three last-named are provided with a Wood-Mason's stridulation organ by means of which they are able to produce noises; the Whistling Spider of central Australia described by Professor Baldwin Spencer is a member of the genus *Selenocosmia.* I have not heard of any Australian member of the family causing harm to man from its bite, but a letter from Dr. C. H. Kellaway, dated September 5, 1935, to Mr. K. C. McKeown records a case-history from New Guinea. The letter, which was accompanied by two spiders sent from Port Moresby by Dr. W. E. Giblin, contained an extract from Dr. Giblin's letter.

> A plantation manager was bitten on the palm of the hand by a similar creature last month with most alarming symptoms. About twenty minutes after being bitten he was seized with muscular spasms involving all the muscles of the body and lasting several minutes, with intervals of relaxation in between. The spasms continued for four hours followed by drenching sweatings and collapse.

The spiders were identified as *Selenocosmia* near *stirlingi* Hogg, but the actual spider involved may not have been this species. However, it is interesting to note that a large Mygalomorph spider of this genus was concerned in a serious case of arachnidism.

THE TRUE SPIDERS

In the suborder Dipneumonomorphae we have the great bulk of our Australian spiders, 1315 in number, included in some thirty-three families. Of these only a few contain forms toxic to man, and though the majority are not of great medical significance, nevertheless I record here for the first time some which have come under my notice though the information is sometimes rather fragmentary. Others dealt with are those species frequently mistaken for "funnel-web" spiders owing to their large size and perhaps similar habits. The fangs in this group move pincer-fashion.

The family Ciniflonidae (=Amaurobiidae of authors) is a group of medium-

sized spiders of which about forty-four species are known from Australia. They have a calamistrum and the cribellum is divided; the eyes are arranged in two rows. The small greyish house spiders of the genus *Lycuticus* (*Amaurobius* of authors) are included in this family. The web produced is an irregular one.

The common blackish or dark-grey house spider, *Lycuticus robustus* (L. Koch), which occurs commonly in houses in crevices in windows, walls, outhouses, holes in fences, posts and trees, makes a funnel-like web at the entrance to its retreat. The nature of its web is often the cause of specimens being submitted to the Museum in the belief that a true Funnel-web Spider has been captured. It is, however, much smaller in size. Two records of bites have been reported to me. One by Dr. H. R. R. Grieve on March 20, 1933, of a woman patient who was bitten at an early hour of that morning on the buttock. She subsequently developed the usual symptoms of spider bite, notably severe pains in the lower limbs, sweating and weakness of the limbs, vomiting, giddiness *et cetera*. Another specimen was sent by Mr. R. M. Drummond of Tullarook, Victoria, to the Museum on March 31, 1948. He writes that it "bit me on the leg just above the heel. I did not feel the actual bite, but soon after I got a pain in my leg right up to and into the groin, but the pain gradually got less and the next day I was right."

WOLF SPIDERS

The family Lycosidae (Wolf Spiders) contains the large group world-wide in its range and some 102 species have been recorded from Australia. Supreme in importance and in number of species is the genus *Lycosa* (Gr. *lucos*, a wolf), the spiders leaping upon their prey. This genus contains the historic Tarantula, *Lycosa tarentula* (Rossi), about which so much in story and legend has been interwoven, but which, as we shall see under *Latrodectus*, has been wrongly attributed to it. Wolf Spiders are ground dwellers, making shafts in the soil which they may line with web; some have a turret of leaves around the entrance, while a few construct simple detachable lids to conceal the opening or to keep out sand or enemies. One Sydney species has this habit and for this reason is apt to be confused with the true "trap-door" spiders of the suborder Mygalomorphae. Wolf Spiders are common in every garden about Sydney. The female attaches the round egg-sac to her spinnerets and drags it about after her when she leaves the nest. The young upon emerging from the egg-sac swarm over the body of the female and are carried about by her. This habit seems to be confined to Lycosids. Most of the members of the genus *Lycosa* have a Union Jack-like pattern on the cephalothorax, and this occurs in the best-known species in the Sydney district, *L. godeffroyi* L. Koch, and which ranges widely over the continent. It also has a black mark at the base of the abdomen, while the black undersurface of the abdomen serves to distinguish it from local allies. It measures about an inch in length. Other members of the genus are frequently sent to the Museum. Only one bite from an Australian Lycosid has been reported to me, viz., by the late Dr. John Macpherson who, in a letter to the Secretary of the Museum, dated November 25, 1935, referred to a species of the genus *Lycosa* at Wee Waa, N.S.W. The record and account of the symptoms were sent to him by Dr. Ludovici.

In Brazil occurs *L. raptoria* Walckenaer, whose bite is capable of causing serious necrosis of the tissues in man. An antivenene has been prepared to counteract the venom.

HUNTSMAN SPIDERS

The family Sparassidae (Huntsman Spiders or triantelopes) are large, hairy spiders with flat bodies which enable them to hide under the bark of trees. They have the legs laterigrade, i.e., the front two pairs are longer than the two hinder pairs so that the spider moves sideways. The tarsi are provided with a scopula or pad of hairs. They have acquired the popular name of "triantelopes" in Australia, but are generally regarded as harmless and the majority are timid creatures. They often come

into houses before or during rain and may wander over the walls and ceilings.

The two following records suggest that certain forms are capable of causing discomfort. A male example of *Olios calligaster* L. Koch, bit a boy, a patient of Dr. J. S. Boxall, and a specimen of *O. punctatus* L. Koch bit a woman on the hand through a glove; a doctor saw her within fifteen minutes and she was ill for a short time. These spiders are often brought to the Museum for identification.

THE RED-BACK AND ITS ALLIES

The family Theridiidae (the "Comb-footed" Spiders) includes some 75 Australian representatives. The term "comb-footed" was first suggested by J. H. Comstock, an American arachnologist. These spiders have no cribellum or calamistrum, but they have on the tarsus of the last pair of legs a comb of toothed setae which is employed for throwing the silk in its liquid state over the prey. An irregular type of web is spun to catch insects. The best known members of this family are the spiders of the genus *Latrodectus*, which, wherever they occur in tropical and subtropical regions, are dreaded for their toxic bites. These spiders are usually black with red spots on the upper or lower sides of the abdomen.

The southern European representative of the genus, *L. tredecimguttatus* (Rossi), is known as the Malmignatte in Corsica and the Karakurt in southern Russia, and under a variety of popular names in the Mediterranean countries in which it occurs. As its scientific name suggests, it has thirteen pale spots and it occurs in the open fields where it is said to subsist upon grasshoppers. It is now believed that this spider is the only one harmful to man in Europe, and that the legends which were formerly associated with the bite of the Tarantula, *Lycosa tarentula* L., should have been attributed to the Malmignatte, which frequents the same part of the country.

Best known member of the genus is the Black Widow or Hour-Glass Spider, *L. mactans* Fabricius, which is found in the southern states of the United States of America, California, and in South America. It has, so Dr. E. Bogen, informs me, spread to Hawaii. Its habits are similar to those of the Australian Red-back Spider. A book[9] has recently been devoted to this spider dealing with it from every aspect and listing the works and papers of medical importance.

In South Africa, Dr. M. H. Finlayson[10] and Mr. R. H. N. Smithers[11] have shown that two species of "Knoppie" spiders occur in Cape Province which may cause suffering and death to man. These are *L. geometricus* Koch and *L. indistinctus* O. P. Cambridge. The first resembles our Red-back in being found in out-houses, crevices in walls, windows and doors, while the last-named occurs in cornfields and on the veldt. Extracts made from the heads of *L. indistinctus* were found to be more toxic than those made from the other species and it was suggested that it was as potent as the venom of the Cape Cobra, *Naia flava*. An antiserum which was produced from this spider neutralized the venoms of the *Latrodectus* found in the Cape Province.

In Australia *Latrodectus* is represented by *L. hasseltii* Thorell, variously termed the Red-back, Red-spot, Red-striped or Jockey Spider. It has a wide distribution throughout and far beyond Australia, and Dr. Bogen tells me that it has been found in Hawaii. In New Zealand it is known by the Maori name of "Katipo" (night-stinger) though some writers regard this spider as worthy of specific or sub-specific rank. There it is found by the seashore. In Australia the Red-back is found in a great variety of places, in water and gas meters, watering cans, flower pots, in old tins, under chairs, shelves, sheltered ledges of walls or fences, old chaff or grain bags, and boards on the ground. In the bush it may be found in hollow logs or holes in

[9] R. W. Thorp and W. D. Woodson, Black Widow: America's Most Poisonous Spider (1945).

[10] M. H. Finlayson, "Knoppie-Spider" Bite. *S. Afr. Med. J.*, 10 (2), 25 Jan., 1936: 43-45 (reprint 6 pp.); "Knoppie-Spider" Antivenene, *S. Afr. Med. J.*, 14 Nov., 1936 (reprint 4 pp.); Specific Antivenene in the Treatment of "Knoppie-Spider" Bite, *S. Afr. Med. J.*, 13 March, 1937 (reprint 10 pp.).

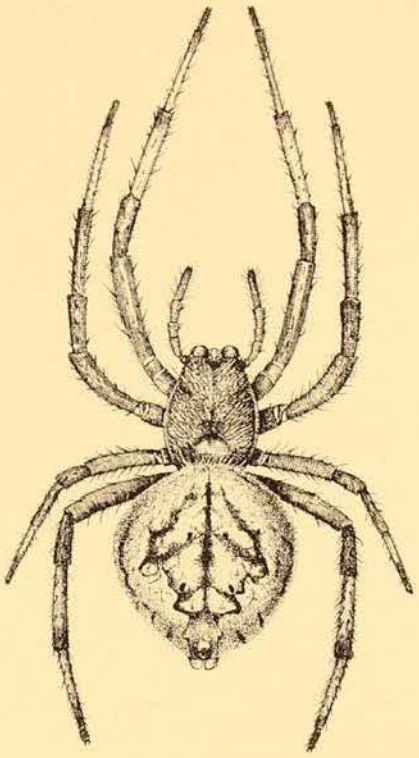
[11] R. H. N. Smithers, Contributions to our Knowledge of the Genus *Latrodectus* (Araneae) in South Africa, *Ann. S. Afr. Mus.*, xxxvi (3), 1944: 263-312, pl. tfs.

tree trunks. In the country districts it is very commonly found under the seats in latrines, and in these outhouses the majority of people are bitten. This may serve as a warning to keep these places free of the spiders and their webs by painting the woodwork below and at the sides with crude oil or creosote as Kaston has advised doing for the Black Widow Spider.

Records of bites.—It is difficult to find reports of deaths from the bites of this spider, but *The Medical Journal of Australia* contains many references to case-histories from doctors. In a paper published by me in 1927,[5] I listed those papers reporting spider-bite cases that had appeared in medical literature since 1916, and this was followed by another bibliography in 1933 in a joint paper with Dr. W. W. Ingram.[4] In this it was pointed out that in 98 recorded cases there were six deaths; more than 64 per cent. were bitten on the buttocks and neighbouring parts. The poison is regarded as a neurotoxin and the effect of a bite from a Red-back Spider usually means, in the words of Dr. Sutherland in *The Medical Journal of Australia* (1921), "a week of aching pains and drenching sweats". Since the death of the boy at Lane Cove, Sydney, from Funnel-web Spider bite, various letters have appeared in the Press asking if a serum is available. No serum has so far been prepared in Australia as an antivenene for our poisonous spiders.

Orb Weavers

The family Argiopidae or Epeiridae (Orb-weaving Spiders) is one of the largest families of spiders, more than 260 species being reported from this continent. They are mostly large or medium-sized spiders, and though diverse in structure the orbicular snare which the majority construct serves as a ready means of identification. The only other family of spiders which constructs an orb web is the Uloboridae, but in this group the threads of the snare consist of a *hackled band* characteristic of those spiders which possess a cribellum and calamistrum. These spinning organs do not occur in the true orb-weavers of the Argiopidae. The Garden Orb-weaver, *Epeira productus*, occurs commonly in eastern Australia and is present in most Sydney gardens towards the end of the summer. I have heard of several cases of bites, one of a boy of two years of age, but none appear to have been serious.



The Garden Orb-weaver, Epeira productus L. Koch, which is widely distributed over Australia.
Ethel M. King del.

Some Miscellaneous Families

The family Gnaphosidae (Drassidae of authors) is a rather large group of 74 Australian species. These are medium-sized spiders with the eyes arranged in two rows of four each, and the anterior spinnerets are widely separated. They live largely under stones or the bark of trees.

Records of bites.—One, the widely distributed *Lampona cylindrata* L. Koch, is represented by a female example which was sent to the Museum by Mrs. S. C. Jenner, who stated that it bit a boy of six under the big toe. He suffered reactions from the venom: cold turns, itchiness, temperature, headache, and the vicinity of the bite became discoloured.

Another record is that of *L. fasciata* L. Koch, which bit a man on the ankle during January 21, 1936: a swelling developed which lasted for an hour.

The small family Dysderidae includes some ten species in Australia. These spiders have only six eyes arranged in a transverse oval, and the sternum is connected with the upper carapace by hard chitin. The third pair of legs is directed backwards.

Records of bites.—Two are here submitted for *Dysdera australiensis* Rainbow. One specimen was sent by Dr. B. W. Stevenson with the information that it had bitten a woman patient about February 26, 1941; another forwarded by Mr. R. Virgona of North Sydney on June 19, 1941, had bitten a child of four on the index finger. The child was taken to hospital for treatment. These spiders would appear to be capable of causing local reactions.

The family Attidae (Jumping Spiders) are well represented in Australia, 273 species having been recorded. They are small or medium-sized spiders, usually with a thickset body and strong legs which terminate in two claws. They have large eyes, particularly those at the front of the cephalothorax, those behind on the upper surface are very small, the eight eyes grouped to form an ocular quadrangle. The body is usually covered with hair. These spiders are common on the trunks of trees, logs, plants, fences, on the outside of buildings or upon window panes. They are hunting spiders leaping upon their prey.

Record of bite.—I have heard of only one case of a bite. A species, *Mopsus mormon* Karsch, recently—March, 1949—bit the collector, Dr. J. G. Brooks of Cairns, north Queensland, on the leg. A painful swelling with local discoloration persisted for about a week.

Our Frontispiece

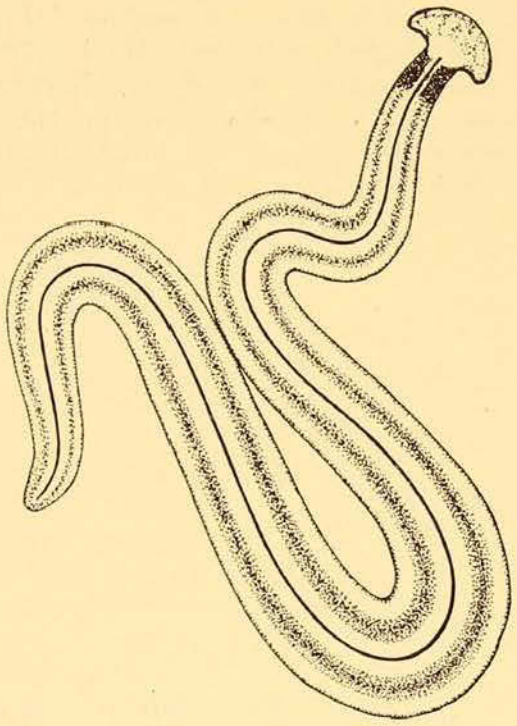
THESE two specimens in the Museum collection came from America, and show considerable variation in their form and structure. The upper one is a Thorny Oyster (*Spondylus americanus*), a beautiful, solid pure white shell with a rosy tip towards the hinge. Its long petal-like spines stand out profusely round the strong shell valves, almost hiding them, and giving the whole appearance of a glowing chrysanthemum. Although Thorny Oysters occur in most warm seas, and a few very attractive ones are found round Australia, undoubtedly the most beautiful and the largest inhabit shores of Florida, Bermuda and the West Indies, where this species occurs. The delicate Angel's Wings bivalve below it is *Pholas costata*, which, unlike those commonly found, is pure white with a delicate pink band of colour running round each valve towards the edge. Angel's Wings live in sandy beds of Florida beaches, and these pink-banded forms were recently discovered in a new bed on the west coast of Florida. Over 10,000 pairs were removed by bulldozers in a short time.

The late Mrs. M. J. Waterhouse presented the Thorny Oyster to the Museum, and Mr. Walter Webb, of Florida, has recently presented the Angel's Wings.

When the Rains Come

By ELIZABETH C. POPE.

AFTER prolonged rains there is nearly always a regular procession of people to this Museum who bring what to them are strange new creatures which have turned up in their gardens and homes. Their enquiries are generally after this style: "Are they harmful to humans?" "Will they eat my plants?" "Should we kill them on sight?"



The Shovel-headed Garden Worm, Placocephalus kewensis is now a cosmopolitan species, having been transported round the world by man with his domestic plants.

For the most part the creatures submitted are quite well known to members of the Museum staff and are merely unknown to the public on account of their nocturnal habits or their love of dark, moist, hiding places. The prolonged, dull lighting which prevails during rains and the general wetness of the ground encourages these animals to venture forth during daylight hours and so come to the notice of the general public.

A worm with a peculiar shovel-shaped head is the creature most frequently brought in, especially when the rains occur in the warmer months of the year. This Shovel-Headed Garden Worm is known to the scientist as *Placocephalus kewensis*—a name which commemorates the fact that it was first described from the hothouses of the famous Kew Gardens in England. From there it was supposed to have been carried to various other parts of the world and to have established itself successfully, just as the common garden snail of Europe has done. Even as early as 1899 this worm was considered cosmopolitan in its distribution.

Examination of the available evidence would seem, however, to show that *Placocephalus* is very probably a native of Australia and that it was taken originally from here to Kew Gardens somewhere about 1878 and from that place subsequently spread to other parts of the world, travelling in the soil round the roots of domestic plants sent out to be grown in the colonies or foreign parts.

It seems reasonable to make this claim for the Australian origin of the Shovel-Headed Worm, for it is plentiful (provided one looks in the right place) in the neighbourhood of Sydney and seems to occur in the native bush, whereas overseas it seems to turn up only in cultivated areas or greenhouses. Also reliable records of its occurrence in Sydney exist and pre-date its discovery at Kew Gardens by four years.

Repeated attempts to photograph *Placocephalus kewensis* were made but met with no success, for the moment enough light was played on the worm to show up its colours and shape it would contract itself into a hopeless tangle and exude slime or throw itself into many short sections. Attempts to narcotize the worm

The Blue Planarian Worm, Geoplana caerulea, is common in moist situations in the bush under logs or stones. It appears in gardens after prolonged rains.

were also of little avail, so that we came to the conclusion that photography by flashlight would be the only method of obtaining satisfactory pictures of the live animal. The accompanying drawing, however, gives a good impression of the general shape of the head and long flattened body with its five longitudinal dark brown stripes of variable distinctness and widths. The general ground colour of the body is light ochre-yellow above and greyish-white beneath.

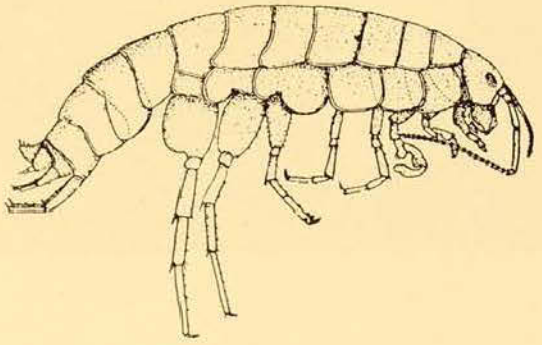
In moving forward the peculiar semilunar head quests about in an apparently aimless manner and the worm slides forward over a slimy carpet of mucus which exudes from glands in the body wall. Because of its slimy nature the worm is unpleasant to handle. *Placocephalus* is carnivorous, eating earthworms, insects and their larvae, and probably also young snails, and is therefore more of a benefit than a nuisance in the garden, since it probably accounts for more pests than earthworms in the long run.

Another worm which turns up in gardens after rains is the Blue Planarian Worm, *Geoplana caerulea*. Normally it can be found in dark, damp spots in the garden or beneath rotting logs or stones in jungly parts of the bush, but dull and humid or wet weather brings the worms out in the daytime.

The worm is two and a half to three inches long, with the body pointed at either end. It is not, however, so robust as the earthworm of corresponding length. Moreover, the body is completely smooth-looking and not divided into segments as in the earthworm. The general colour is a deep Prussian or navy blue on the back with a lighter shade on the crawling surface. There is also a narrow white stripe running along the middle of the back, and the tip of the head may be orange coloured, though this latter marking is not always in evidence.

Geoplana caerulea is definitely a native Australian species and is quite widely distributed about the continent. It is a land-dwelling member of a group of worms which are mostly aquatic in habit, and this accounts for its preference for moist places and its usually nocturnal habits. It is probably also a carnivorous species and therefore more useful than harmful in the garden.

The strangest animal query following the rains was one in which a Sydney householder complained that thousands of small hopping "insects" were eating his sitting-room carpet. When they were examined it was found that, like many

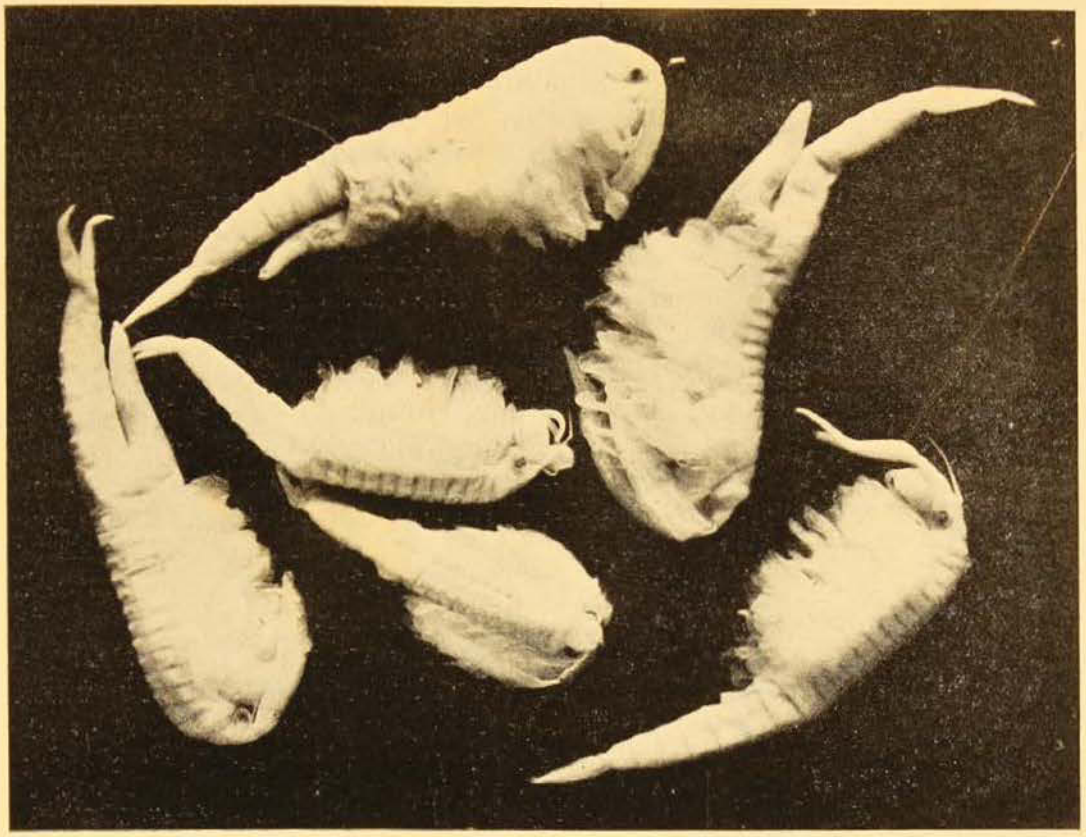


Talitrus sylvaticus, a land-going amphipod which frequents moist places.
(Approximately × 13.)
After Sayce.

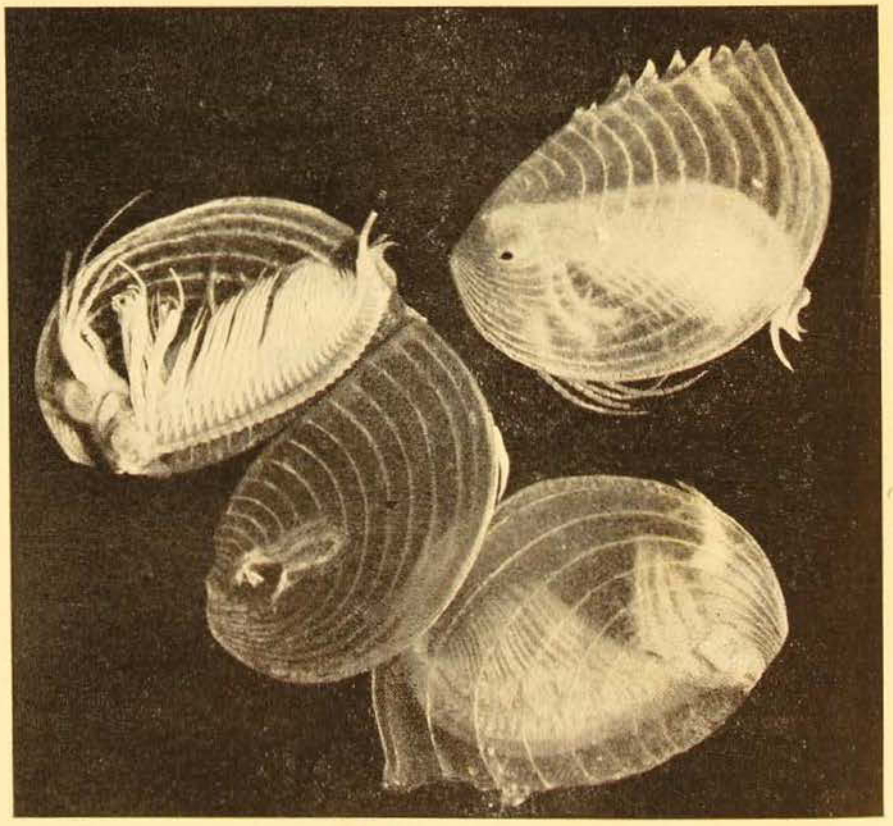
"insects" submitted to us by the public, these tiny creatures had many more than the statutory three pairs of legs. They proved in fact to be amphipods—tiny crustaceans of the sand flea type.

Amphipods are found for the most part in the sea or on the sea shores. A few inhabit fresh-water lakes and ponds, and from this habitat it is but a small step to living among moist, rotting leaves or under damp logs on the edges of ponds and streams. Locally at least one species of amphipod has managed to become a land-dweller and *Talitrus sylvaticus*, as it is called, is often found among rotting leaves or in damp greenhouses.

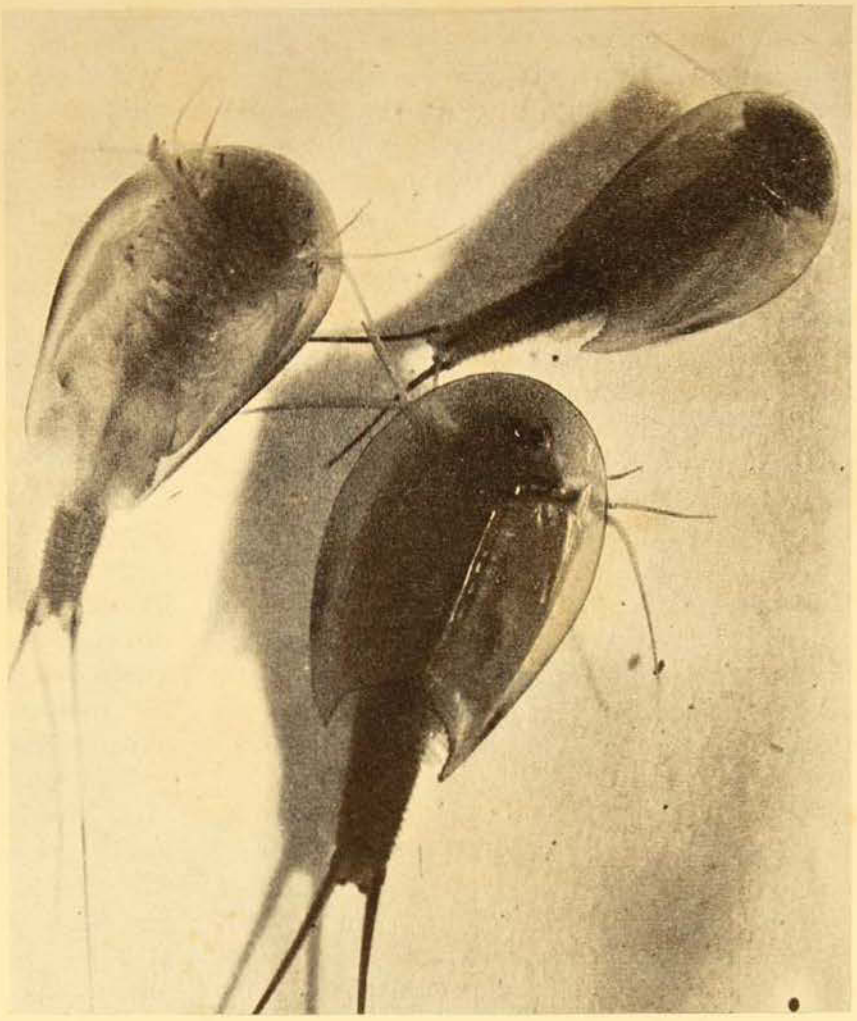
When questioned as to the location of the room in which the amphipods had appeared, the householder admitted that the rains had made the room very damp and that it was next to a damp outside passage-way. This was obviously another



Another fantastic crustacean is the Ostracod, in which the somewhat shrimp-like body is enclosed in a shell divided into two halves, looking like a transparent bivalve mollusc. The specimen on the right has the right-hand side of the "shell" removed to show the body of the animal (Estheria sp.) itself.



Fairy Shrimps (Genus Branchinella) occur in teeming millions in ponds and puddles after prolonged rains in the western areas of New South Wales. They swim upside down by flapping the leaf-like gills which appear as a somewhat opaque white mass beneath the body. × 1½.



Shield Shrimps (Apus australiensis) appear after the rains. The left specimen shows the underside of the animal while the other two are seen from above. The body is protected by the large shield which is absent in the Fairy Shrimp.
(Slightly enlarged.)

occasion when the wet weather had enabled the small quarter-inch long crustaceans to stray from their normal habitat and establish themselves in the damp pile of the carpet. They were not actually eating the carpet, it was found, and were doing no damage. The playing of a radiator on the damp corner of the room soon either killed the invaders or drove them back to their old haunts.

Talitrus rarely grows more than half an inch long and, as may be seen from the illustration, has a small, curved, segmented body which is flattened from side to side. The colour is either an inconspicuous grey or pale straw, which accounts for the fact that they pass unnoticed in their native haunts.

Another land-dwelling crustacean, the common garden slater, which is a relative of the amphipod, will sometimes also stray into our homes, but it is not generally able to establish itself in its new surroundings. Either the slaters die or are captured by the watchful spiders, and their bodies, rolled up into the rounded pill shape and covered with silken webs, are to be found hidden under chairs and bookcases.

Several other types of crustaceans which suddenly appear in great numbers in the puddles and ponds created by the rare prolonged rains in the semi-desert areas of New South Wales are the Ostracods, the Shield Shrimps and the Fairy Shrimps.

To many people their sudden appearance in pools after droughts is a mystery only to be explained by saying that they dropped "like the gentle rain from heaven". In fact, so sporadic is their occurrence that they may not be seen twice in the one locality in a lifetime. The true explanation is that all these

small crustaceans can lay eggs which are so resistant to desiccation that they not only survive the final drying up of their original home-pond but also the eggs can blow about with the dust for years and years and still hatch out and develop when heavy rains cause new ponds and puddles to form.

On one occasion recently (March, 1947) some of the rarer Shield Shrimp, *Apus australiensis*, were brought to the Museum for comment by a man who had been catching pond life for years in a certain pond near Arncliffe, Sydney. He stated that he had never seen such oddly shaped creatures before and many of them swam upside-down. Prior to this the Museum had no records of this particular Shield Shrimp's occurrence east of the Blue Mountains Range. It was thought likely that severe westerly winds had blown drought-resisting eggs of these small crustaceans across the mountains, together with red dust, from the inland. The dust, it may be remembered, had been carried as far east as New Zealand. The original eggs may, of course, have been carried on the feet of water birds or by human agency, but dispersal of eggs by the wind is quite a normal mode of distribution with this species out west.

Owing to the breeding habits of *Apus*, only a few eggs need have been transported originally to colonize a new body of water. These eggs hatch quickly and the resulting generation soon gives rise to thousands of eggs, which develop asexually (i.e. without being fertilized) and this second generation gives rise to a third and so on till there are teeming millions. Only when the pond or puddle begins to dry up do a few males appear and fertilize the eggs. It is the resultant fertilized eggs which are so resistant to drying. In fact, it is claimed that these eggs actually *have* to be subjected to drought conditions before they can develop properly. Thus the resistant, dormant period, first developed by nature to overcome drought, has become a definite part of the life cycle.

The worms and crustaceans which have been cited here are only a few of the more lowly creatures which appear to revel in the rain. There must be many more if one liked to look for them systematically. It must be a rare rainstorm which does not please some creature!

Mr. E. G. Donkin, of Bowral, New South Wales, made a lengthy trip through Kenya, Tanganyika, Rhodesia, Transvaal, Nyanza, Uganda and the Belgian Congo in Africa in 1948 and 1949. He secured a splendid collection of nearly two hundred ethnographical specimens, which he very kindly presented to the Museum. The collection includes a fine series of native musical instruments. Other notable specimens include an old witch-doctor's pipe from Uganda, clay pipes from Nyanza, elephant-hunting spears used by the Masai and Congo Pygmies, a chief's stool and a gaming-board from Kenya, a water-pipe, beautiful papyrus-grass trays, copper money-crosses and ornaments from the Belgian Congo, and many others, among which are ornaments, clothing, weapons and implements from various localities. These objects are a valuable addition to our African collection.

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Mr. F. C. Whitehouse, of Vancouver, visited the Entomological Department of the Museum recently. He inspected the collection of Odonata (Dragonflies) which was largely acquired from the late Australian authority on the group, Dr. R. J. Tillyard, and saw some of the Australian butterflies in the Dr. G. A. Waterhouse collection. Mr. Whitehouse has collected dragonflies extensively in Canada. He is the author of important papers on this order of insects. To the study of entomology he has added the recreation of fishing and is the author of "Sport Fishing in Canada" (1948), which indicates his interest in this pursuit. He will be in Australia for some months.