TWO NEW AUSTRALIAN *PYCNOGONIDA*.

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(With 2 plates and 6 figures).

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(1) Introduction.

There is no doubt that the interest shown in the Antarctic forms of *Pycnogonida*, and the problems raised by the study of this remarkable group of animals in the Southern Polar Regions, have made it advisable, or even necessary, that detailed attention and study should be given to the Australian forms. However, no work has been published on the *Pycnogonida* of the Australian Coast since Professor Haswell's paper (1) in 1884, except a short paper written by myself (2) on *Halosoma haswelli*.

I have, therefore, no hesitation in presenting a description of two new Australian forms, more especially as they represent genera not previously described from this part of the world, and they distinctly help in settling certain problems of distribution, especially in relation to the genus *Ammothea*. These new species belong to the genera *Pycnogonum*, Brunn., and *Ammothea*, Leach. The only *Pycnogonum* recorded from Australia is *P. australe*, Grube (3), described in 1869. I have not seen the original description of this species, but it is mentioned in Hoek's (4) list and also in Haswell's. Loman (5) points out, with good reason, that the species is not recognisable from the description. It was founded upon a larval form with three pairs of legs and traces of a fourth pair. It was also described as possessing like *P. pusillum*, Dohrn (6) small accessory claws. The species of *Ammothea* described as new in the present communication, is the first of the genus recorded as being found in Australia. Haswell's *Ammothea assimilis* (1) from Port Jackson will now rank as an *Achelia* and his *Ammothea longicollis* (1) as an *Ascorhynchus*.*

* For the privilege of examining Professor Haswell's types, of which I propose shortly to issue a redescription, I am indebted to the Trustees of the Australian Museum, and to their courteous Director and Curator, Mr. Robert Etheridge, Jun.

(2) Pycnogonum aurilineatum, sp. nov.

Plate XIII., figs. 1-2; plate XIV., fig. 3.

Description.—Colour, dark brown with a longitudinal mid-dorsal band of yellow, two thirds of a millimetre wide, extending from behind the ocular tubercle to the posterior edge of the penultimate trunk segment, also with various flecks and spots of yellow on the body and limbs. The distal third or so of the propodus of each leg is also of the same colour.

The species belong to the group which have a "shagreened" appearance (Bouvier, 7). Here and there only—for example, on the proboscis—does any of the reticulation found in some other forms of the genus appear.

Body is extremely stout, strong and broad; the segments are strongly marked dorsally and ventrally. Dorsally each segment of the trunk except the last culminates in an obtusely rounded median projection, placed at the hinder border of the segment. In this, *P. aurilineatum* resembles *P. gaini*, Bouvier (8, 9), but in the latter there are four such elevations, each less rounded than in *P. aurilineatum*. The median tubercle found in the last segment of the trunk of *P. gaini* is absent in the species now under discussion. In Plate XIII., fig. 2, showing a side view of *P. aurilineatum*, the elevation behind the third trunk eminence, and which appears at first sight to correspond with the most posterior trunk eminence of *P. gaini*, belongs really to the fourth cruriger of the right side.

The cephalon has its anterior border almost entirely undeveloped, the comparative smallness of this portion being remarkable when compared with the similar region in a form like *P. littorale* (Ström). The first pair of crurigers is almost entirely fused with the lateral borders of the cephalon, practically the whole of the antero-internal edge of each of these crurigers being included.

Each segment of the trunk except the last ends posteriorly in a high and prominent round edge. The last trunk segment is peculiar. Instead of being a broad band like the other segments, it is practically only the meeting place of the posterior pair of crurigers.

The crurigers are broad and stout. The anterior pair are almost entirely fused with the cephalon. The crurigers are separated by well defined intervals, that between the third and fourth pairs being the greatest. At the distal end of the second, third, and fourth crurigers, small elevations occur. These are largest in

the case of the fourth pair, but they do not approach, even in this case, the size of the trunk eminences.

The ocular tubercle is placed a little distance away from the anterior border of the cephalon, and points slightly forward. It is somewhat conical with the apex sharply rounded off. The posterior side of the ocular tubercle passes over into the anterior side of the first trunk eminence by means of a shallow curve. Visual elements are not well marked.

The proboscis is about two-thirds the length of the trunk, and points somewhat obliquely downwards. The basal half or so is of greater diameter than the distal portion. Proceeding from its base, the proboscis very gradually expands to a maximum, after which it suddenly contracts, there being here a wide shallow groove encircling it. From this groove to the rounded mouth extremity there is a very slight taper.

A lateral view shows that the dorsal lip projects slightly beyond the others.

The abdomen arises from the posterior end of the last trunk segment between the last pair of crurigers. It is longer than the first coxa of the hind limb, and this joint closely flanks it on either side. It has a slight tendency upward from the horizontal, and increases slightly in width from before backwards. It ends in an almost straight margin surmounted by a small median tubercle.

The legs are strong and stout. The three coxal joints are short and thick. The second is the longer of the three. In the case of the last limb only, the first and second coxæ bear each a small dorsal tubercle at the distal end. In this position on the coxæ of *all* the legs is a yellowish spot of circular outline. This, as Bouvier suggests for *Pentapycnon charcoti* (9), possibly represents a gland of some sort. Posterior to this spot in *Pycnogonum aurilineatum* on the second coxa of each of the posterior pair of limbs is the rounded reproductive aperture. The femur is very stout and of a complicated shape. At its coxal end it is narrow, but soon expands and presents, on its ventral side, a prominent tubercle. It then curves towards the dorsal side, where there is another distinct elevation, much better developed than is the case of the former one. It then curves ventrally and bears at its distal end two rounded tubercles, only one of which can be seen in the lateral view shown in the figure. The first tibia is a little shorter than the femur and is somewhat similar in shape to that of *Pycno-*

gonum gaini, but rather more nodular and having a low dorsal elevation at its distal end. The second tibia is peculiar. It is very short and very thick. It is also immoveably fused with the tarsus. The line of union is distinct but movement between the two joints is impossible. The tarsus is very small, somewhat swollen ventrally, wedge-shaped, with a very limited portion visible on the dorsal surface. The ventral side of the tarsus bears a number of rudimentary spines. The propodus is somewhat curved and tapers slightly towards the distal end. It bears ventrally a number of small spines. The terminal claw is strong, blunt and slightly curved.

Measurements:—

Overall length (tip of proboscis to end of abdomen)	10.3	mm.
Proboscis, length	3.6	,,
,, max. diameter	1.76	,,
Cephalon, width	2.36	,,
Body, length	5.4	,,
,, width at level of second pair of crurigers	2.9	,,
,, width, including second pair of crurigers	4.94	,,
Abdomen, length	1.50	,,
Third right leg—first coxa	1.1	,,
,, ,, ,, second coxa	1.6	,,
,, ,, ,, third coxa	1.33	,,
,, ,, ,, femur	3.65	,,
,, ,, ,, first tibia	3.0	,,
,, ,, ,, second tibia	.81	,,
,, ,, ,, tarsus and propodus	2.45	,,
,, ,, ,, claw	.1	,,

Affinities.—The species certainly seem somewhat closely allied to *Pycnogonum gaini*, Bouvier (9), from the Antarctic, but differs from it in having three dorsal eminences instead of four, in the shape of the proboscis and ocular tubercle, and in the proportions of the joints of the legs, especially in the shortness of the second tibia.

Occurrence.—Port Arthur (South Eastern Tasmania) in shallow water entangled in the spines of an echinoid (undetermined); collected by Mr. E. Mawle. Two specimens were collected, both females, one (the holotype)

a little larger than the other. The smaller one (co-type) reproduces, in all but very minor details, the characteristics of the larger one.

Holotype, one female, Tasmanian Museum Collection, Nos. C 1667-71. The Holotype consists of one spirit specimen and four microscope slides representing the four right legs.

Co-type, one female, Biological Museum Collection, University of Tasmania.

3. Ammothea australiensis, sp. nov.

Plate XIV., figs. 4, 5, and 6.

The specimen is very minute, and was collected amongst sponges and mussels at Shark Island, Port Jackson, N.S.W. Unfortunately, in tearing apart two closely adhering mussel shells, the little animal was considerably damaged. The result is that the left palp and the third right and left legs are missing. In addition to this there is a considerably older injury of somewhat more serious consequences. At some time or other the ovigers have been broken or torn apart in a curiously symmetrical way, only the basal three joints and a part of the fourth joint on each side remaining. The broken ends have been rounded off and healed showing that the injury is of some standing.

Description.—Colour brownish yellow (in life and after preservation in alcohol).

Body stout with intersegmental divisions strongly marked. The transverse ridges of the body, dorsal and ventral, are very distinct. Dorsally each culminates in an acutely pointed median elevation. None of these is as high as the ocular tubercle. The crurigers are separated from one another by distinct but varying distances. This distance is greatest between the second and third pair.

The cephalon is expanded and is shield-shaped. The first pair of crurigers is united with the cephalon, almost the whole of the anterior border of each of these being continuous with the postero-lateral border of the cephalon. A slight projection of the cephalon gives support for the basal joint of each palp, and there is a much more pronounced ventro-lateral eminence for the attachment of the oviger. Separating these elevations on each side is an obliquely running groove.

The ocular tubercle, situated about the middle of the cephalon, is erect, with a rounded summit surmounted by a sharply pointed apex. It is of greater height than

any of the trunk eminences, with well marked visual elements, anterior pair a little larger than the posterior.

Proboscis has the form and appearance associated with many of the members of this genus. Its shape is roughly that of a long ellipse, the narrow end of which is inserted moveably into the ventral side of the cephalon. At about one-third the distance from its proximal end there is a shallow transverse groove running circularly round the proboscis. In front of this, the proboscis expands greatly and then contracts, ending in a rounded anterior extremity.

Chelifori short, a little less than one-third the length of the proboscis; scape smooth and one-jointed, chela reduced to a single terminal joint.

Palpi longer than proboscis, nine jointed, first joint small, second very long, third a little longer than the first, fourth joint is about equal in length to the second but is a little stouter and slightly curved, fifth is shorter than the fourth but longer than the third. The remaining joints are all small, but the sixth is the longest. All joints are smooth.

Ovigers.—These are damaged as mentioned above, there being only the basal three joints and part of the fourth joint left. First joint is much swollen and of moderate length, the second is longer, narrow and curved, the third is shorter than the second and is also somewhat curved.

Abdomen semi-erect, rising from the posterior border of the penultimate trunk segment; its base is expanded and is very little less in width than the segment of the trunk. The abdomen narrows and again expands fusiformly, ending in a rounded extremity. In side view it presents the appearance of a tube of somewhat even diameter.

Legs.—Owing to the loss of the third leg on each side, the custom which has been adhered to by most writers, of describing and measuring the third leg of the right side, cannot be maintained in this case, and so the measurements here given will refer to the second right leg.

The first coxa is squarish and slightly expanded distally. The second coxa is more than twice as long as the first and is slightly curved. While it is expanded at the distal end it is not so stout as the first coxa. The third coxa is short and thick, a little longer than the first coxa. The armature of the coxal region shows nothing

very characteristic. The femur is stout and straight, its length is not as great as that of the coxal region. The first tibia is about equal in length to the femur, is somewhat narrow at its proximal end but expands more towards the distal end. The femur and tibia are armed with small scattered spines. The tarsal joint is small and bears ventrally a series of small spines crowded together; dorsally there is a single larger spine. The propodus is stout and curved. It is armed with a stout claw with two well-developed auxiliary claws. Dorsally, it bears a number of short spines. Ventrally, the heel is not sharply marked off, but this region is indicated by the possession of four or five short but stout spines, while the sole possesses about twelve, which are much more minute.

Measurements:—

Overall length (from anterior extremity of proboscis to end of abdomen)	4.2	mm.
Proboscis, length	2.0	,,
,, greatest diameter	.92	,,
Cephalon, length	.9	,,
,, breadth in front	.60	,,
Trunk, length	1.12	,,
,, width (level of second pair of crurigers)	.64	,,
,, width (including second pair of crurigers)	1.46	,,
Abdomen, length	.7	,,
Second right leg—		
,, ,, ,, first coxa	.43	,,
,, ,, ,, second coxa	.9	,,
,, ,, ,, third coxa	.55	,,
,, ,, ,, femur	1.72	,,
,, ,, ,, first tibia	1.63	,,
,, ,, ,, second tibia	1.76	,,
,, ,, ,, tarsus and propodus	1.03	,,
,, ,, ,, claw	.30	,,
,, ,, ,, aux. claw	.23	,,

The specimen is a mature female and the general apertures are present on the second coxæ of all the legs.

Affinities.—This certainly seems to be the smallest member of the genus *Ammothea* now known. Following out Bouvier's key (9), the natural group to which *Ammothea*

australiensis belongs is the one which includes *A. striata*, Mobius, and *A. glacialis*, Hodgson. It is, however, easily distinguished from either of them in its bodily form, especially in the shape of the proboscis and the proportion which the length of this organ bears to that of the trunk and in many other points. The species which nearest approach *A. australiensis* in size are *A. minor*, Hodgson, and *A. gracilipes*, Bouvier, and there is also some resemblance in the character of the trunk eminences, but the differences, which are many and fundamental, lie in the relatively shorter and stouter nature of the legs, the different shape of the proboscis, differences in the proportions of the various joints of the palps and ovigers, etc.

Occurrence.—Shark Island, Port Jackson, N.S.W., found at low tide among mussels and sponges.

Holotype, one female, Australian Museum Collection, consisting of one spirit specimen and three microscope slides of the first, second, and fourth right legs.

(4) The distribution of the genus Ammothea.

In 1908, Loman (5) showed that Leach's genotype (*Ammothea carolinensis*) described in 1814, agreed rather with the genus *Leionymphon* (Mobius, 1899) (10) than with the majority of forms placed at that time in the genus *Ammothea*. This suggestion was adopted by Bouvier and Hodgson, the genus *Leionymphon* (Mobius) being replaced by *Ammothea* (Leach) while the old and disused *Achelia* of Hodge (11) was revived and used to distinguish those Ammotheidæ possessing eight jointed palps. The genus *Ammothea* contains up to the present some eleven species. The distribution of these species is somewhat remarkable, all of them except the original genotype coming from antarctic or sub-antarctic regions.

Leach's original type specimens came from South Carolina, in the United States, and since then no similar specimen has been found in the temperate regions of the Northern and Southern hemispheres.

Calman (12) has suggested that a mistake was made in the locality from which Leach's specimen came and that "South Georgia" should have been written instead of South Carolina.

The discovery of another species of this genus in Port Jackson, well within the temperate zone, certainly leads to the suggestion that this genus may be looked for outside the South Polar regions, and that specimens may still be found in the temperate regions of the two hemispheres. Calman's suggestion, therefore, that "it is justi-

fiable to disregard his (Leach's) statement as to the origin" should be regarded with caution.

There is no doubt, however, that appearances point to the Southern Polar Regions as the headquarters of this genus, from which the various species may have radiated northward, in which case Leach's original locality may still be wrong.

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EXPLANATION OF PLATES.

Plates XIII. and XIV.

Figs. 1, 2, and 3. *Pycnogonum aurilineatum*, holotype, ♀, 10.3 mm. from extremity of proboscis to end of abdomen, from Port Arthur, Tasmania.

Fig. 1. Dorsal view of entire animal.

Fig. 2. View of right side with legs removed.

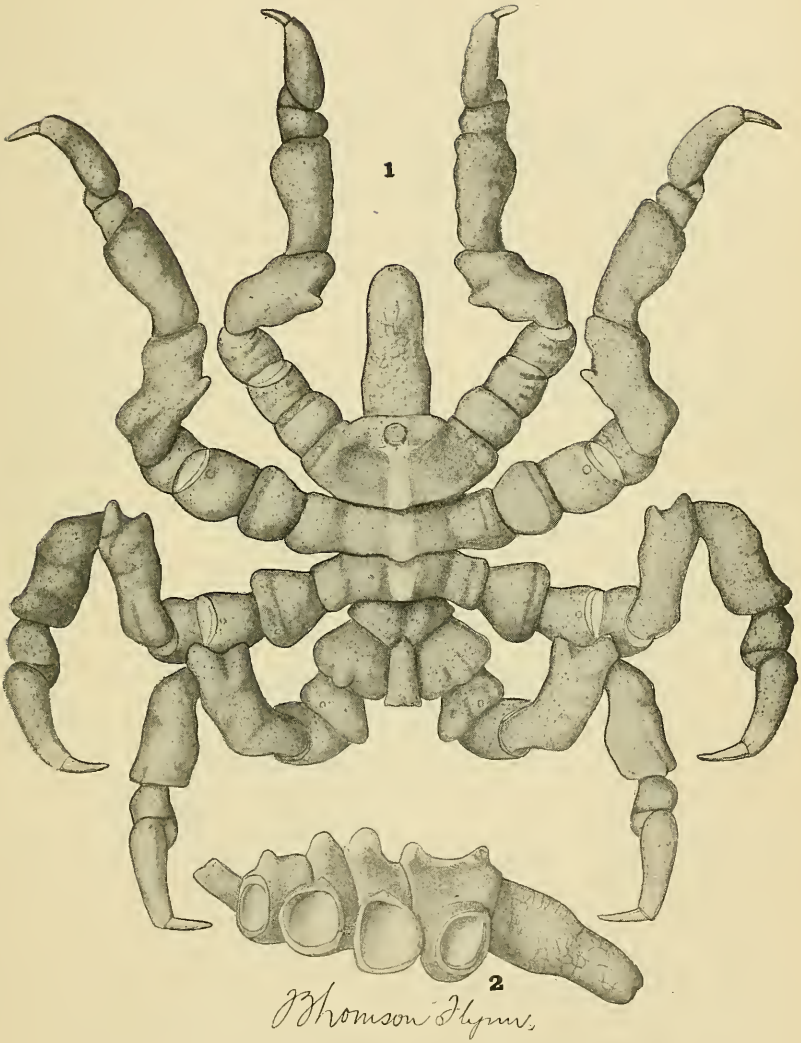
Fig. 3. Terminal portion of leg.

Figs. 4, 5, and 6. *Ammothea australiensis*, holotype, ♀, 4.2 mm. from extremity of proboscis to end of abdomen, from Shark Island, Port Jackson, N.S.W.

Fig. 4. Dorsal view of animal with second right leg.

Fig. 5. View of right side with legs removed.

Fig. 6. Terminal portion of leg.



PYCNOGONUM AURILINEATUM.

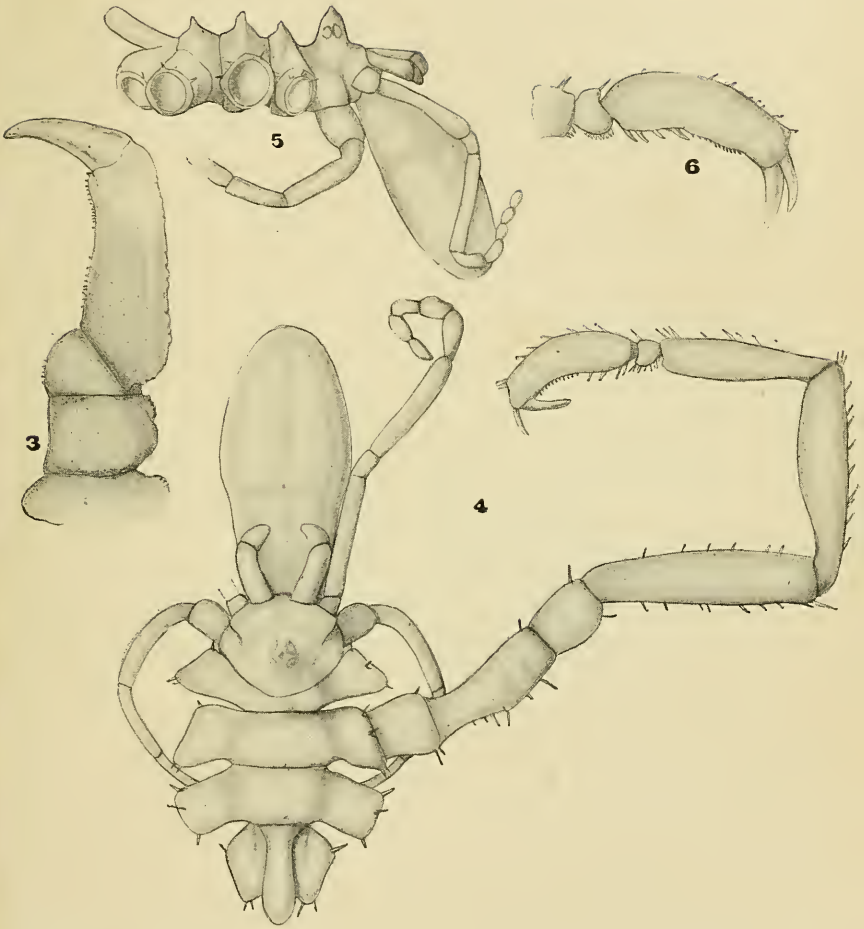


Figure 3—PYCNOGONUM AURILINEATUM.
Figures 4, 5 and 6—AMMOTHEA AUSTRALIENSIS.