

AUSTRALIAN MUSEUM SCIENTIFIC PUBLICATIONS

Clark, W. C., 1963. Australian Pycnogonida. *Records of the Australian Museum* 26(1): 1–82. [18 December 1963].

doi:10.3853/j.0067-1975.26.1963.669

ISSN 0067-1975

Published by the Australian Museum, Sydney

nature culture **discover**

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AUSTRALIAN PYCNOGONIDA

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(Figs 1-38)

Manuscript received 15.7.62

ABSTRACT

A large collection of Pycnogonida from the Australian Museum has been examined. Of the 42 species represented 22 are new, and many others belong to species hitherto known from single specimens, or from one sex only. The following new species are described and figured: *Nymphon molleri* n. sp., *N. novaehollandiae* n. sp., *N. bunyipi* n. sp., *Oropallene minor* n. sp., *Parapallene obtusirostris* n. sp., *Pseudopallene dubia* n. sp., *Stylopallene cheilorhynchus* n. gen. et sp., *S. dorsospinum* n. sp., *S. tubirostris* n. sp., *Pallenopsis macneilli* n. sp., *Anoplodactylus evansi* n. sp., *A. simplex* n. sp., *Ascorhynchus compactum* n. sp., *Ammothella stocki* n. sp., *A. thetidis* n. sp., *Cilunculus australiensis* n. sp., *C. hirsutus* n. sp., *Pycnogonum torresi* n. sp., *P. tuberculatum* n. sp. Two new species of *Anoplodactylus* are described but not named (females only), and a new form of *Callipallene* is also described, but because of the confused state of the taxonomy of this genus in Australian waters it has not been named.

A check-list of all 62 species recorded from the Australian region is included.

INTRODUCTION

Studies on the Pycnogonid fauna of Australia have been few and sporadic. The majority of studies have been undertaken by workers outside Australia, and as a result all studies have been purely systematic. No information is available on the biology of Australian species. The first work of any note was that of Hoek (1881), which resulted from the Challenger Expedition and which also provided the inspiration for Haswell's paper of 1884. Nothing further was done until Flynn's series of papers (1919a, 1919b, 1920, 1929). After Flynn left Australia, material continued to be sent to him and this was described by his colleague Williams (1933, 1940, 1941). There have also been short papers by Loman (1923) and Hedgepeth (1944). The most important paper of recent times is Stock's (1954) report on the material collected by the Mortensen Expedition.

The present study is based on a large collection of Pycnogonida in the Australian Museum which was made available to me by the kindness of the Director, Dr. J. W. Evans. This collection has been amassed over the past 80 years, and the excellent state of preservation of the collection as a whole says much for the curation it has received.

The Australian Museum collection I have examined consists of 808 specimens referable to 42 species belonging to 18 genera. Of these, 22 species are new to science, and many represent species hitherto known from a single specimen or from specimens of one sex. This abundant material has permitted me to re-describe many species and to provide more detailed figures of a number of others. Even with this large collection it is still not possible to confidently delimit some species, especially in the genera *Callipallene* and *Achelia*. Larger collections of these genera are desirable.

The bulk of the material is from the New South Wales coast, the region which is already best known in this respect. Even so, this collection has increased the number of known Australian species from 40 to 62. Figure 1 shows all the localities in Australia from which these animals have been recorded. South-eastern Australia

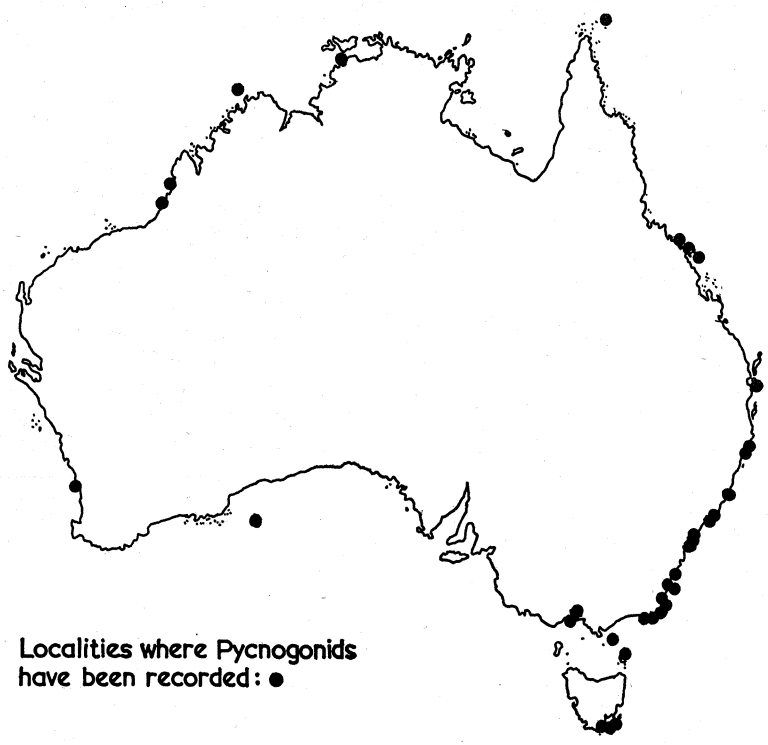


Fig. 1.—Map showing the Australian localities where pycnogonids have been collected and reported. Localities mentioned in this paper are included.

is fairly well covered by comparison with the rest of Australia. It is a striking fact that no pycnogonids have been recorded from Port Philip westwards to Rottneest Island, Western Australia, and only three species between Rottneest Island and the Gulf of Carpentaria. It is probable that careful shore collecting in any part of the country would increase the number of short-legged littoral forms which often tend to the production of local species.

THE AUSTRALIAN FAUNA

As far as it is possible to speak of an Australian fauna in the present state of comparative ignorance, the Australian region appears to be characterized by an abundance of genera and species in the Callipallenidae, many of which are endemic or appear to have the centre of their distribution in the Australian region or in the Austro-Malayan region. In this connection the distribution of the genus *Parapallene* Carpenter as discussed by Stock (1953, 1956b) is interesting. The only exception to the West Pacific—Indian Ocean distribution of this genus is the inadequately described *P. bermudensis* Lebour, 1949. A very similar distribution is found for *Pseudopallene* Wilson, which has one species widely distributed in Arctic seas. The smaller genera also show this type of distribution. An interesting type of distribution is that shown by the species of *Oropallene* Schimk. and *Anoropallene* Stock, with *Oropallene* being mainly Australian in distribution and *Anoropallene* mainly restricted to the Pacific coast of North America. *Anoropallene valida* (Hasw.), which appears to be transitional between the two genera, is most interesting in this case.

The Ammotheidae of Australia are of interest because of the number of species of *Cilunculus* Loman and *Ammothella* Verril. *Cilunculus* generally shows a similar distribution pattern to *Parapallene*, and *Ammothella* is similar to *Pseudopallene*.

At present there is little more to be said on this matter until more is known of the rest of the Commonwealth.

GENERAL REMARKS

All material has been returned to the Australian Museum and the types are deposited in that institution. In the lists provided under the heading "Material" in the descriptions the combination of a letter and figures which follows the letters A.M. is the Australian Museum registration number.

Because few zoologists are familiar with these animals I have included (fig. 2) a figure of a *Nymphon* sp. and labelled it fully to illustrate the terminology used in the descriptions and to enable others to use the keys provided. Pycnogonids are usually preserved in tubes of 70 per cent. alcohol. The tubes should not be stoppered with cotton-wool plugs as the claws become hopelessly entangled in this, and there is great danger of damage to the specimens in extricating them. Such plugs are best wrapped in tissue paper. When collecting pycnogonids growths of hydroids are usually good places to search, as a number of species feed on hydroids, and some are parasitic within them in the larval stages.

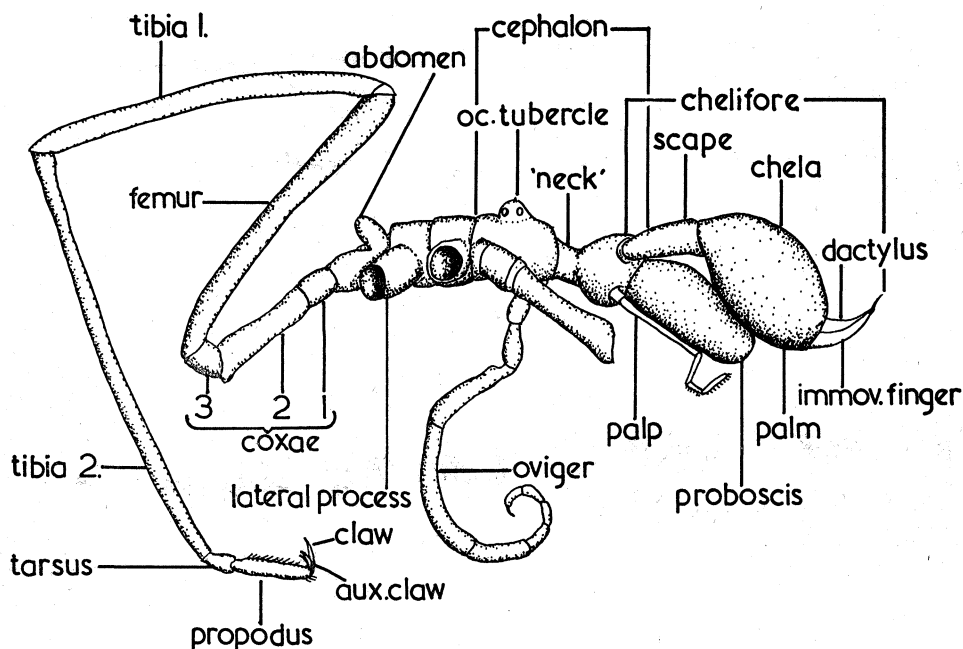


Fig. 2.—A diagrammatic figure of a *Nymphon* sp. to illustrate the terminology used in the descriptions and keys.

ACKNOWLEDGEMENTS

I should like to express my gratitude to Dr. J. W. Evans, Director of the Australian Museum, for entrusting this collection to me, and to Mr. F. A. McNeill, of the same institution, for consulting types and answering many queries. Thanks are also due to the Director of the British Museum and Dr. Isabella Gordon for facilities enjoyed there while examining type material, and also for permission to describe the female of *Parapallene famelica* Flynn.

CHECK-LIST OF AUSTRALIAN PYCNOGONIDA

(* Indicates Species not Represented in Collection)

NYMPHONIDAE

- Nymphon aequidigitatum* Haswell, 1884
Nymphon immane Stock, 1954
Nymphon singulare Stock, 1954
Nymphon molleri n. sp.
Nymphon novaehollandiae n. sp.
Nymphon bunyipi n. sp.

CALLIPALLENIDAE

- Anoropallene valida* (Haswell, 1884)
Oropallene minor n. sp.
Callipallene emaciata micrantha Stock, 1954
Callipallene brevirostris novaezelandiae (Thomson, 1884)*
Callipallene sp.
Parapallene australiensis (Hoek, 1881)
Parapallene challengerii Calman, 1937*
Parapallene famelica Flynn, 1929
Parapallene haddoni Carpenter, 1892
Parapallene obtusirostris n. sp.
Parapallene (?) *aculeata* Stock, 1954*
Metapallene languida (Hoek, 1881)*
Pallenella laevis (Hoek, 1881)*
Pseudopallene ambigua Stock, 1956
Pseudopallene pachycheira (Haswell, 1884)*
Pseudopallene dubia n. sp.
Stylopallene cheilorhynchus n. gen. et sp.
Stylopallene dorsospinum n. sp.
Stylopallene tubirostris n. sp.
Pallenopsis denticulata Hedgepeth, 1944*
Pallenopsis gippslandiae Stock, 1954
Pallenopsis hoekii Miers, 1884
Pallenopsis macneilli n. sp.
Pycnothea flynni Williams, 1940

PHOXICHILIDIIDAE

- Anoplodactylus longiceps* Stock, 1954* (= *A. longicollis* Williams, 1941 preocc.)
Anoplodactylus haswelli (Flynn, 1919)
Anoplodactylus tubiferus (Haswell, 1884)
Anoplodactylus evansi n. sp.
Anoplodactylus simplex n. sp.
Anoplodactylus spec. A.
Anoplodactylus spec. B.

AMMOTHEIDAE

- Ammothea australiensis* Flynn, 1919
Achelia aspersa Loman, 1923*
Achelia assimilis (Haswell, 1884)
Achelia australiensis Stock, 1954
Achelia variabilis Stock, 1954
Nymphopsis acinacispinatus acinacispinatus Williams, 1933*
Nymphopsis acinacispinatus bathursti Williams, 1940*
Nymphopsis armatus Haswell, 1884*
Ascorhynchus longicollis Haswell, 1884
Ascorhynchus melwardi Flynn, 1929*
Ascorhynchus minutum Hoek, 1881
Ascorhynchus tenuirostris Carpenter, 1892*
Ascorhynchus compactum n. sp.
Ammothella biunguiculata australiensis Williams, 1940
Ammothella stocki n. sp.
Ammothella thetidis n. sp.
Cilunculus australiensis n. sp.
Cilunculus hirsutus n. sp.
Tanystylum orbiculare Wilson, 1878

COLOSSENDEIDAE

- Colessendeis macerrima* Wilson, 1881
Rhopalorhynchus clavipes Carpenter, 1893*
Rhopalorhynchus tenuissimum (Haswell, 1884)*

PYCNOGONIDAE

- Pycnogonum aurilineatum* Flynn, 1919*
Pycnogonum torresi n. sp.
Pycnogonum tuberculatum n. sp.

INCERTAE SEDIS

- Parapallene chiragra* (Milne-Edwards, 1840) not sufficiently well described to be recognizable; the types have been lost; see remarks under *Parapallene australiensis*.
Phoxichilidium charybdaeus of Haswell, 1884, is not *Endeis charybdaeus* (Dohrn.). Haswell's specimen was a juvenile which is not identifiable at present.
Phoxichilidium plumulariae Lendenfeld, 1883, from Melbourne (Port Philip?) is a larva which cannot be associated with any known adult.
Austrodecus glaciale Hodgson, recorded very doubtfully by Gordon (1944, p. 6) from south of Tasmania, is such a doubtful record (see Stock, 1957, footnote to p. 46) that it can hardly be discussed further at this stage.
Pycnogonum australe Grube, 1869, is based on a larva with three pairs of legs and traces of a fourth pair. It is not recognizable at present.

Family **Nymphonidae** Wilson, 1878

Genus **Nymphon** J. C. Fabricius, 1794

Nymphon aequidigitatum Haswell

Figs. 3 A—G

- Nymphon aequidigitatum* Haswell, 1884; 1022-1024, pl. 54, figs. 1-5. —Whitelegge, 1889; 233. —Loman, 1908; 38. —Flynn, 1919b; 72-75, pl. XVIII, figs. 4-5, pl. XIX, fig. 6.

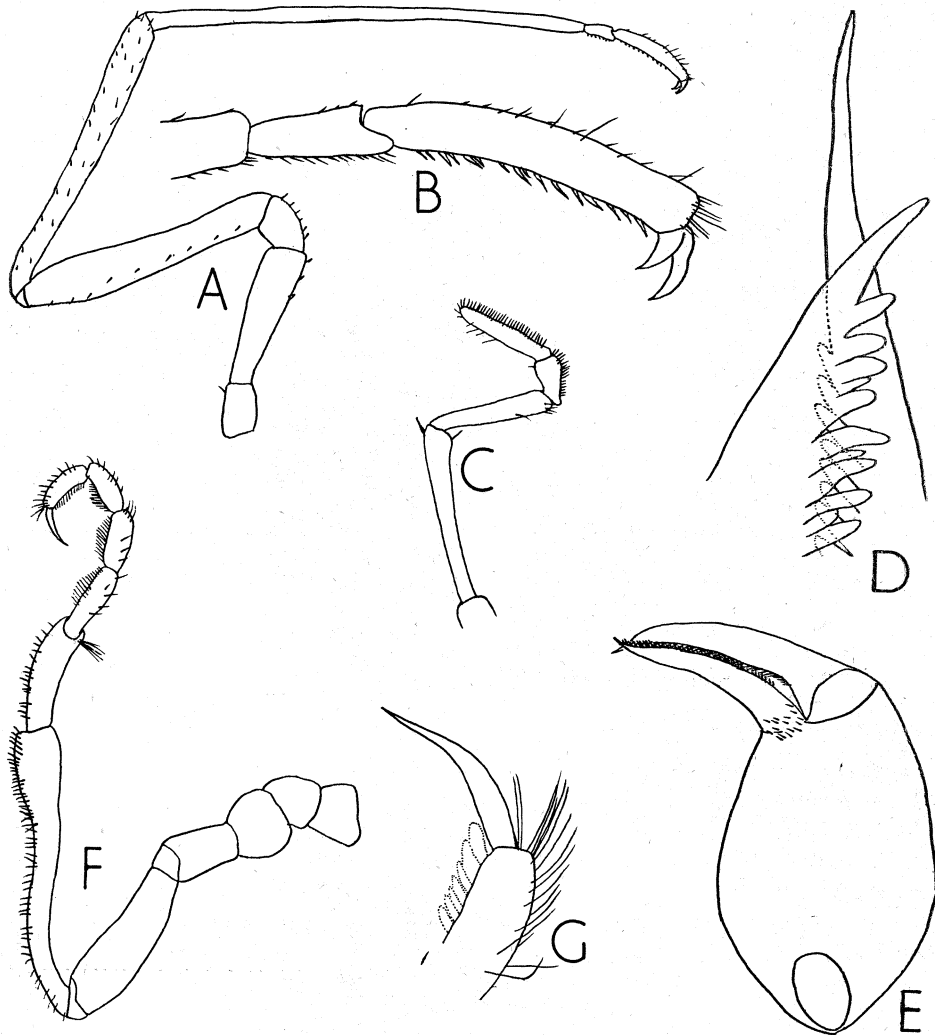


Fig. 3.—A-G, *Nymphon aequidigitatum* male. A, third leg; B, propodus; C, palp; D, detail of tip of chela; E, chela; F, oviger; G, tip of oviger.

MATERIAL

3 males, Shark Island, Port Jackson, N.S.W., A.M. P.3253 (part).

1 male, Nelson's Bay, Port Stephens, N.S.W., A.M. P.13586.

1 female, Shark Island, Port Jackson, N.S.W., coll. C. Hedley and A. R. McCulloch, A.M. P.2112 (One of two specimens mounted on a microscope slide.)

3 males, 3 females, 8 immature, Shark Island, Port Jackson, N.S.W., coll. C. Hedley and A. R. McCulloch, 1909. A.M. P.2113 (part).

1 male, 1 female, Port Jackson, N.S.W., A.M. P.3250.

1 male, Port Jackson, N.S.W., A.M. P.3251.

REMARKS

This species has been satisfactorily redescribed by Flynn (1919), but since some of the detailed figures are rather inadequate new ones have been prepared. These differ a little from the figures of the type; the palm of the chela is more inflated than appears from the earlier figures; the spine formula of the male ovigers examined is 15:14:13:14. The hairs on the fifth and sixth oviger joints are much shorter than shown in Haswell's figure. The male genital pores are on the ventral surface of the second coxae of the third and fourth pair of legs.

Nymphon immane Stock.

Figs. 4 A—B

Nymphon immane Stock, 1954: 25-28, figs. 9-10.

MATERIAL

1 female, about 28 miles off Port Jackson, N.S.W., on edge of continental shelf, 540 metres. A.M. P.13587.

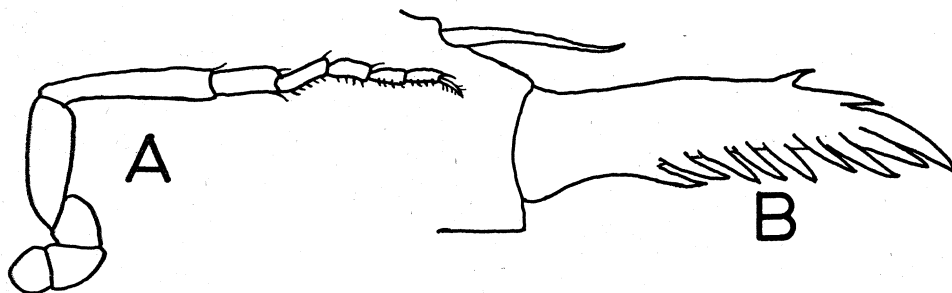


Fig. 4.—A-B, *Nymphon immane*, female. A, oviger; B, terminal claw of oviger.

REMARKS

This is the first female, and indeed only the second specimen of this species to be recorded. The specimen agrees perfectly with Stock's figures and description, differing only, as is to be expected, in the structure of the oviger. The female oviger is 10-jointed, the fifth joint is the longest, but is relatively not as long as in the male, nor is it clavate or strongly curved. Setae are lacking except for a small one at the distal end. The spine formula is 5:4:4:4. The terminal claw has two spines on the outer margin instead of one as in the holotype.

This female is a little larger than the male, measuring 4.25 mm. from the tip of the cephalic segment to the tip of the abdomen, as compared with 3.67 in the male.

Nymphon singulare Stock

Nymphon singulare Stock, 1954: 21-25, figs. 7-8.

MATERIAL

1 male, off Twofold Bay, N.S.W., 81-90 metres, coll. Capt. K. Moller, trawler "Durraveen", Aug., 1929. A.M. P.13588.

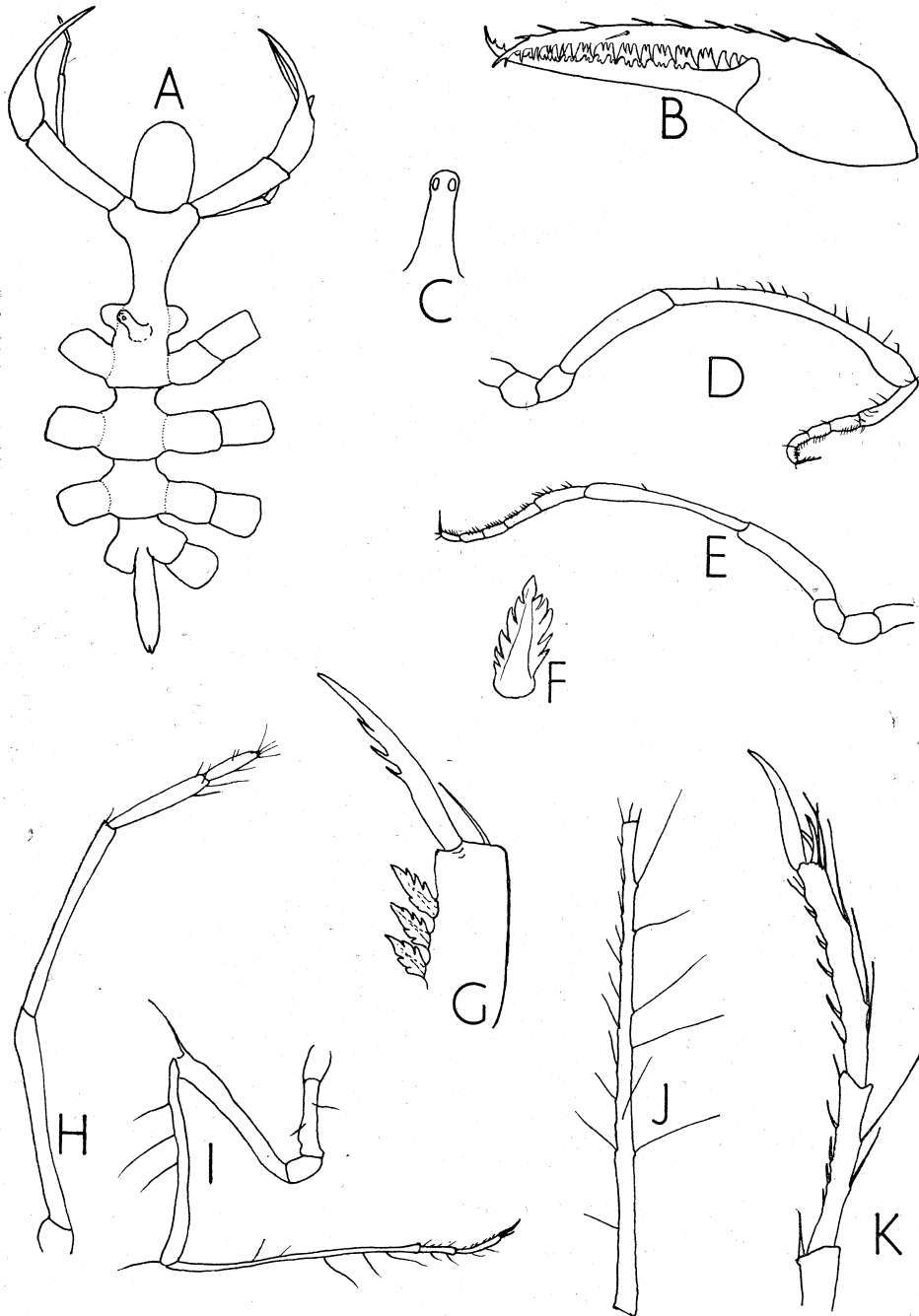


Fig. 5.—A-K, *Nymphon bunyipi*. All figures of a male paratype, except E. A, dorsal view of trunk; B, chela; C, ocular tubercle; D, male oviger; E, female oviger; F, male oviger spine; G, tip of male oviger; H, palp; I, third leg; J, second tibia; K, propodus.

REMARKS

The one adult male in the collection fits Stock's description perfectly, and there is nothing that can be added to it. This species is undoubtedly closely allied to *Nymphon novaehollandiae* n. sp., but is readily distinguished from that species by the total absence of a narrow neck region, the much closer spacing of the chelifore bases, and the lack of tubercles on the first coxae.

Nymphon bunyipi n. sp.

Figs. 5 A—K

MATERIAL

66 males (1 is the holotype), 56 females (1 is allotype), 1 juvenile, off Cape Everard, Victoria, 126-135 metres, trawled, coll. H. O. Fletcher, May, 1929. A.M. P.13589, P.13590, P.13591.

73 males, 55 females, 4 juveniles, Station 57 "Thetis" Expedition, 3½-4 miles off Wata Mooli, near Botany Bay, N.S.W., 96-105 metres, dredged. A.M. P.13592.

1 male, 4 females, Station 37 "Thetis" Expedition, 2-2½ miles off Botany Bay, N.S.W., dredged 90-93 metres. A.M. P.13593.

1 male, 1 female, 5 miles off Green Cape, 81 metres, trawled, coll. K. Moller, May, 1930. A.M. P.13594.

1 male, 1 female from conglomerate boulder taken by trawler "Goonambee" about lat. 33° 44' S., long. 151° 38' E. (about 16-18 miles north-east of South Head of Port Jackson, N.S.W.), 135-144 metres, coll. C. W. Mulvey, May, 1924. A.M. P.13595.

1 male, 1 female, off Wata Mooli, N.S.W., 88-90 metres, "Thetis" Expedition, 1898, found intermingled with hydrozoa and polyzoa. A.M. P.13956.

DESCRIPTION

Trunk moderately robust, anterior lateral processes separated by about their own width; posterior ones may be closer together. Integument smooth, without spines or tubercles. Cephalon long; equal to remaining trunk segments; with a moderate neck region which is expanded anteriorly to provide for insertion of proboscis, chelifore scapes and palps. Ovipositor bases arise as cervical processes a little anterior to first lateral processes, and slightly anterior to ocular tubercle. Narrowest part of neck a little narrower than proboscis.

Ocular tubercle moderately tall, two and a half times as high as diameter at base; flattened on top, sides concave, four eyes.

Proboscis cylindrical, twice as long as wide, rounded at tip.

Abdomen elevated at an angle of about 30°, cylindrical, tapering towards tip, reaching beyond ends of first coxae.

Chelifores: scape one-jointed, smooth, wider distally than proximally, chela with fingers longer than palm, with a row of small spines along outer edge of immovable finger. Fingers curved at tips, tips cross slightly; teeth of immovable finger, in central portion at least, arranged in alternate series of two small ones and one large one; teeth uniform in size distally. All teeth sharply pointed.

Palps five-jointed, basal joint short, second and third joints long, fourth and fifth decreasing in size and beset with a few setae.

Ovipositor 10-jointed in both sexes; joints 1-3 short, fifth joint longest; arcuate and clavate in male, less so in female, joints 7-10 decreasing in size and beset with denticulate spines. The fifth joint in the male bears a number of setae along its

length; the seventh joint bears two moderately stout simple spines and four denticulate ones in the same row. If this situation be represented by the notation (2 + 4), then the spine formula of joints 7-10 in the male is (2 + 4) : 5 : 4 : 5 or (2 + 5) : 5 : 4 : 5, and (3 + 5) : 6 : 4 : 5 in the female. Measurements of the oviger joints in mm.:—

Joint	1	2	3	4	5	6	7	8	9	10
Male	0.225	0.285	0.3	0.825	1.65	0.39	0.225	0.15	0.12	0.135
Female	0.21	0.255	0.3	0.75	1.0	0.39	0.27	0.18	0.135	0.135

Third Leg slender, somewhat hairy; second coxa longer than first and third combined; femur one of the stoutest joints with a long and prominent seta on the dorsal distal extremity; first tibia longer and more slender than femur, somewhat arcuate, with a dorsal border of a few long setae; second tibia the longest and most slender of the long joints, with a number of long setae. Tarsus three-quarters as long as propodus; propodus with fine spines on sole, claw more than half as long as propodus, auxiliary claws less than half as long as main claw.

Genital Pores on slight swellings on distal part of ventral surface of all second coxae in the female, but only on the third and fourth pairs in the male.

Measurements (in mm.): length trunk (anterior margin of cephalon—tip of abdomen) 3.3, length of cephalon 1.35, width second lateral processes 1.3, length of chelifore scape 0.75, length of proboscis 0.75, greatest width of proboscis 0.4, length of abdomen 0.7. Third leg: 1st coxa 0.4, 2nd coxa 1.0, 3rd coxa 0.5, femur 2.1, 1st tibia 2.65, 2nd tibia 3.12, tarsus 0.45, propodus 0.6, claw 0.36, auxiliary claw 0.15.

REMARKS

This species is easily recognized by the short palm and the spination on the fingers of the chelae. In sorting mixed collections, the setose limbs, especially the second tibia, are a useful character. The general form of the trunk resembles *N. arabicum* Calman, 1938, and *N. pixellae* Scott, 1913, but is readily distinguished from these species by the greater length of the abdomen and the structure of the chela. The male ovigers of *N. bunyipi* and *N. pixellae* are very similar.

***Nymphon molleri* n. sp.**

Figs. 6 A—H

MATERIAL

3 females (1 is holotype) Shark Island, Port Jackson, N.S.W., coll. C. Hedley and A. McCulloch, 1909. A.M. P.2113 (part).

2 females Port Jackson, N.S.W. (Old Collection). A.M. G.5173.

1 female, Shark Island, Port Jackson, N.S.W., coll. C. Hedley and A. R. McCulloch (one of two specimens mounted on a microscope slide) A.M. P.2112 (part).

DESCRIPTION

Trunk smooth, without spines or tubercles; lateral processes well spaced, separated distally by one and a half times their own width. Neck long and narrower than proboscis, expanded distally to provide articulations for chelifore scapes, with

a slight median furrow between these. The cervical processes arise very close to the anterior margin of the first lateral processes.

Ocular tubercle low, rounded above, in lateral view appears flattened above; two small tubercles are seen in front view. Tubercle situated over anterior part of first lateral processes and posterior part of cervical processes. Four large eyes present.

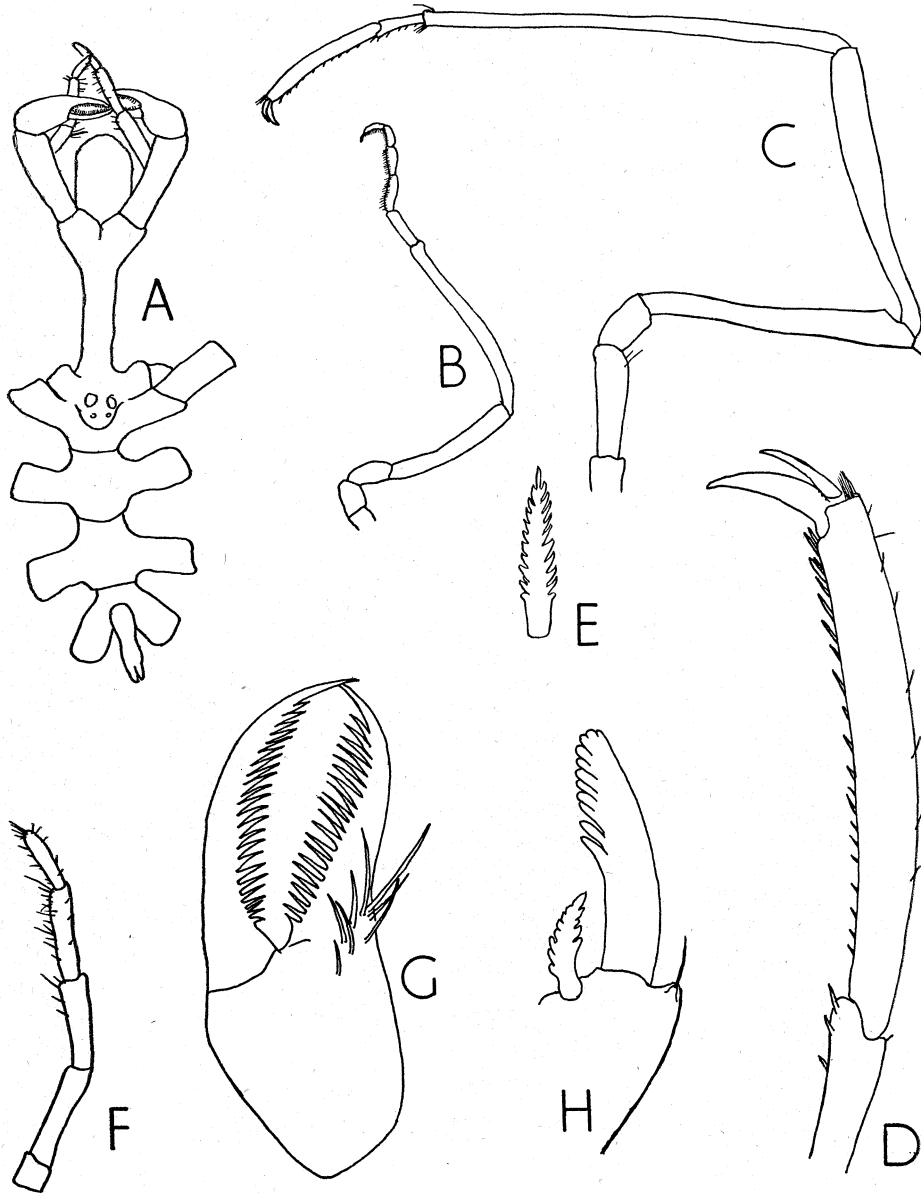


Fig. 6.—A-H, *Nymphon mollerii*. A, dorsal view of trunk; B, male oviger; C, male third leg, D, propodus; E, oviger spine; F, palp; G, chela; H, tip of oviger.

Proboscis stouter than neck, cylindrical; slightly inflated in distal half, tip rounded.

Abdomen reaching a little beyond tip of fourth lateral processes, set at an angle of 35° to dorsum; with a slight constriction about middle, tapering towards tip, anus terminal.

Chelifore scape one-jointed, smooth, chelae with fingers a little longer than palm, bowed, tips cross when fingers closed. Teeth long, slender, regular, 23 on dactylus, 21 on immovable finger. A group of setae present at base of immovable finger.

Oviger (female) 10-jointed, first three joints short, fifth joint longest, fourth joint the second longest; joints 6-10 decreasing in length. Lengths of joints (in mm.): 1—0.26, 2—0.45, 3—0.55, 4—1.75, 5—2.4, 6—0.75, 7—0.47, 8—0.73, 9—0.33, 10—0.3. Denticulate oviger spines present on joints 7-10 according to formula 14 : 12 : 10 : 10. Terminal claw present; bluntly denticulate through distal half of inner edge only.

Third leg slender, almost without setae on the long joints; second coxa longer than first and third combined, femur slender and shorter than either tibia. Second tibia the longest joint, without setae except at distal extremity; first tibia intermediate in length. Tarsus about one-third as long as propodus with small spines on ventral margin; propodus slightly curved with small simple spines on sole; main claw about one-quarter the length of propodus, auxiliary claws four-fifths as long as main claw.

Genital pores (female) on ventral surface of distal ends of all second coxae.

Measurements (in mm.): length of trunk (tip of cephalon to tip abdomen) 4.35, length cephalon 2.14, width second lateral processes 1.65, length of proboscis 0.78, greatest width of proboscis 0.47, length of chelifore scape 1.85, length of abdomen 0.7. Third leg: 1st coxa 0.4, 2nd coxa 1.4, 3rd coxa 0.8, femur 3.4, 1st tibia 3.8, 2nd tibia 5.33, tarsus 0.6, propodus 1.73, claw 0.37, auxiliary claw 0.3.

REMARKS

This species is named in honour of Captain K. Moller, whose industry in collecting Australian pycnogonids will be obvious to all readers of this report. This species is easily distinguished from all other known Australian species of *Nymphon* by the presence of the long neck and the characteristic form of the chelae. *N. molleri* is rather similar to *N. angolense* Gordon, 1932, in the general appearance of the trunk and limbs, but differs from that species in its smaller size, the smaller number of denticles on the chelae, and the relative proportions of the distal leg joints. There is a similar, but less marked, similarity between *N. molleri* and *N. subtile* Loman, 1923.

Nymphon novaehollandiae n. sp.

Figs. 7 A—I and 8 A—C

MATERIAL

2 males (1 is holotype), 2 females (1 is allotype), Station 37, "Thetis" Expedition, 2-2½ miles off Botany Bay, N.S.W., 90-93 metres, dredged. A.M. P.13597, P.13598, P.13599.

1 male, 2 miles east of Jibbon, at mouth of Port Hacking, N.S.W., trawled, 100 metres on mud, Jan. 17, 1945. Presented by C.S.I.R.O. Division of Fisheries. A.M. P.11528 (part).

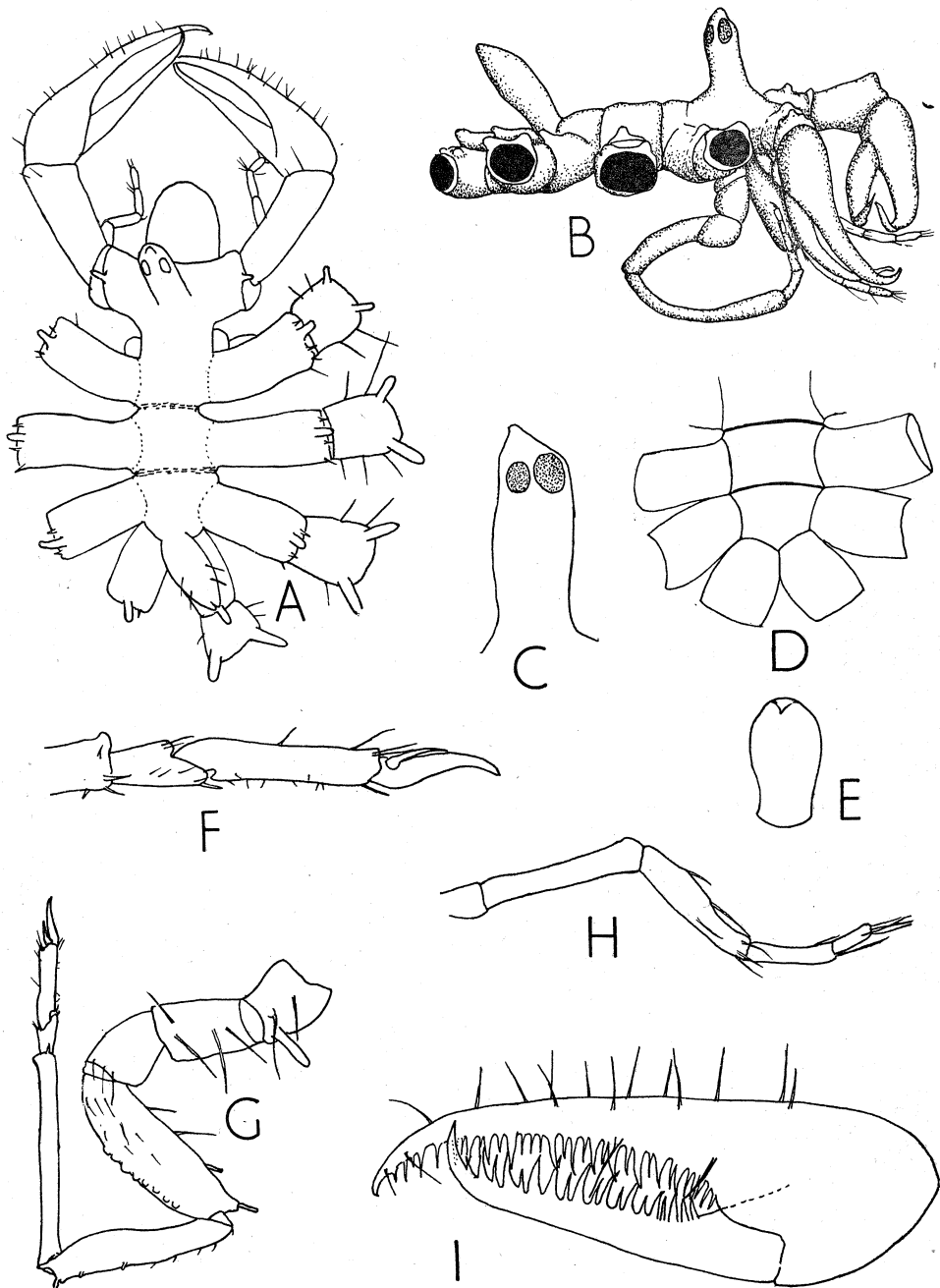


Fig. 7.—A-I, *Nymphon novaehollandiae*. A, dorsal view of trunk; B, lateral view of male paratype; C, ocular tubercle; D, ventral view of posterior trunk segments; E, proboscis; F, propodus; G, third leg; H, palp; I, chela.

1 female, off Botany Bay to Wata Mooli, N.S.W., 90 metres, from deck and nets of trawler "Thistle" (in port), coll. M. Ward, Jan. 19, 1925, A.M. P.7868.

1 female, off Botany Bay, N.S.W., 59-96 metres, taken from ground line of trawl on trawler "Karangai", coll. F. McNeill and A. Livingstone, Aug., 1921. A.M. P.5597 (part).

3 juveniles, 5 miles east of Port Hacking, N.S.W., 100 metres, presented by K. Sheard, C.S.I.R.O., Division of Fisheries, July, 24, 1943, A.M. P.11527 (part).

DESCRIPTION

Trunk robust, moderately compact, neck short, thick, chelifore bearing processes arranged at right angles to long axis of trunk, and provided with a tubercle near base of each chelifore. Segmentation lines between segments 1, 2, and 3 indistinct, no intersegmental line between segments 3 and 4; fourth segment almost suppressed, only the lateral processes visible in dorsal or ventral view (c.f. figs. 7 A and D). Lateral processes diverging, separated distally by their own width, much closer proximally, each armed distally with a low or moderately tall round-tipped tubercle, and sometimes a number of small pointed spines.

Ocular tubercle implanted between bases of chelifores and ovigers; tall, parallel-sided, rounded at tip, four eyes.

Proboscis short, cylindrical, distal half swollen, rounded at tip.

Abdomen set at an angle of up to 45° , fusiform with a few setae, reaching to end of fourth lateral processes, anus terminal.

Chelifores with one-jointed scape; scape with a few setae; chelae large, fingers longer than palm, tips crossing; immovable finger setose, longer than dactylus; teeth on both fingers slender; alternating one large tooth and one smaller one. Thirty-six denticles on immovable finger, nineteen on dactylus.

Palps five-jointed, second joint longest, third joint almost as long as second, fourth and fifth joints decreasing in size. Terminal joint with a few long setae; setae also present on joints three and four.

Oviger (male) basal joints short, fourth joint long, fifth joint longest, clavate and bowed, joints 6-10 decreasing in length. Oviger spines on joints 7-10 quite without denticulations, and conform to formula 3 : 3 : 2 : 3. Terminal claw pinnate along inner margin. Female oviger similar to that of male but fifth joint shorter, straight, and not clavate. Spine formula the same. Lengths of oviger joints (in mm.) are:—

Joint	1	2	3	4	5	6	7	8	9	10
Male	0.225	0.405	0.33	0.675	1.15*	0.3	0.24	0.15	0.105	0.12
Female	0.3	0.375	0.345	0.735	0.84	0.42	0.225	0.18	0.15	0.18

* = measured as a chord.

Third Leg short and robust in proximal joints. Coxae short, thick, subequal; the first with two distal dorso-lateral round-tipped tubercles and a few setae. Femur stout with a number of small tubercles along ventral margin. First tibia a little shorter and more slender than femur; second tibia the longest joint. Tarsus almost half as long as propodus, with a few setae; propodus straight, with a few very weak setae on sole. Claw half as long as propodus, auxiliary claws half as long as main claw.

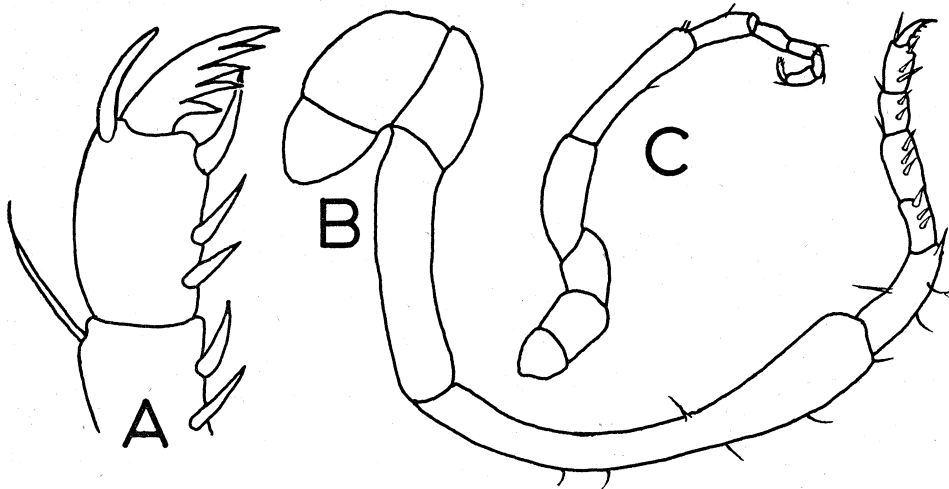


Fig. 8.—A-C, *Nymphon novaehollandiae*. A, terminal joints of male oviger; B, male oviger; C, female oviger.

Genital pores on distal part of ventral surface of second coxae of all legs in female where they are bounded by tumid lips. In males pores restricted to a similar position on third and fourth pairs of coxae only.

Measurements (in mm.): length of trunk (tip of celaphon—tip abdomen) 2.3, length of cephalon 0.92, width across second lateral processes 1.92, length chelifore scape 0.88, length proboscis 0.65, greatest width proboscis 0.5, length abdomen 0.65. Third leg: 1st coxa 0.57, 2nd coxa 0.6, 3rd coxa 0.525, femur 1.275, 1st tibia 1.125, 2nd tibia 1.35, tarsus 0.225, propodus 0.525, claw 0.3, auxiliary claw 0.165.

REMARKS

This species appears to be closely allied to two other Australian species, *N. singulare* Stock, 1954, and *N. immane* Stock, 1954. All three species have been taken in the same general region. The features shared by these species are (a) the long-fingered chelae, (b) the general structure of the oviger, i.e. the similarity of the joints, (c) the small number of denticulations on the oviger spines, (d) the small number of the spines themselves, (e) the presence of tubercles over the bases of the chelifores and on the distal ends of the lateral processes, and (f) the general structure of the propodus. *N. novaehollandiae* differs from these species, however, in the presence of non-denticulate oviger spines, the two tall tubercles on the distal dorso-lateral surfaces of the first coxae, and in the fingers of the chelae being of markedly unequal length.

Key to Australian species of *Nymphon*

- | | |
|--|----------------------------|
| 1. Fourth trunk segment not visible ventrally (as in fig. 7D) | 2 |
| Fourth trunk segment visible in ventral view (not as in fig. 7D) | 3 |
| 2. Distance between chelifore bases greater than width of trunk | |
| <i>N. novaehollandiae</i> n. sp. | |
| Distance between chelifore bases less than width of trunk. | <i>N. singulare</i> Stock. |

3. Fingers of chelae bent almost at right angle to palm. *N. aequidigitatum* Haswell
 Fingers of chelae not bent at a marked angle to palm. 4
4. Second tibiae beset with setae longer than twice width of tibia. *N. bunyipi* n. sp.
 Second tibiae without long setae. 5
5. With tubercles over chelifore bases; neck short. *N. immane* Stock
 Without tubercles over chelifore bases; neck long. *N. molleri* n. sp.

Family **Callipallenidae** Hilton, 1942

Genus **Anoropallene** Stock, 1956

Anoropallene valida (Haswell)

Figs. 9, A—J

Nymphon validum Haswell, 1884: 1024-1025, pl. 54, figs. 6-9.

Parapallene valida Loman, 1908: 48.

Pallene (?) *valida* Flynn, 1920: 75-77, pl. XIX, figs. 7, 8.

Oropallene valida Marcus, 1940: 33. Stock, 1954: 29.

Pallene valida Stock, 1954: 31.

Anoropallene (?) *valida* Stock, 1956a: 46.

MATERIAL

2 larvigerous males and 1 female Nelsons Bay, Port Jackson, N.S.W. A.M. P.13600.

1 ovigerous male, Port Stephens, N.S.W. A.M. P.13601.

Despite the generic changes it has undergone, this species does not appear to have been recorded since Haswell's description. The female was previously unknown. Flynn's description of the male is satisfactory, but since he refers to Haswell's earlier description as a matter of convenience I provide a new description below and incorporate some new details.

DESCRIPTION

Trunk moderately robust, distinctly segmented, lateral processes separated from one another by about three-quarters of their own diameter. Cephalon expanded anteriorly and projects over proboscis. Neck well developed, short, but fairly wide. On cephalon above base of each chelifore is a distinct tubercle which bears two spines in the males but only one in the female. The only other spines or setae on trunk are the small spines found at the distal ends of lateral processes.

Ocular tubercle situated posterior to neck, and just anterior to origin of first pair of lateral processes. Tubercle low (about one-third of height of abdomen), rounded, or rather flattened, above. Eyes, four, well pigmented. On ocular tubercle are a pair of small, rounded eminences.

Abdomen short, appears vertical from above, but from the side is seen to be one and a half times as long as wide, and directed upward and backwards at an angle of about 70°.

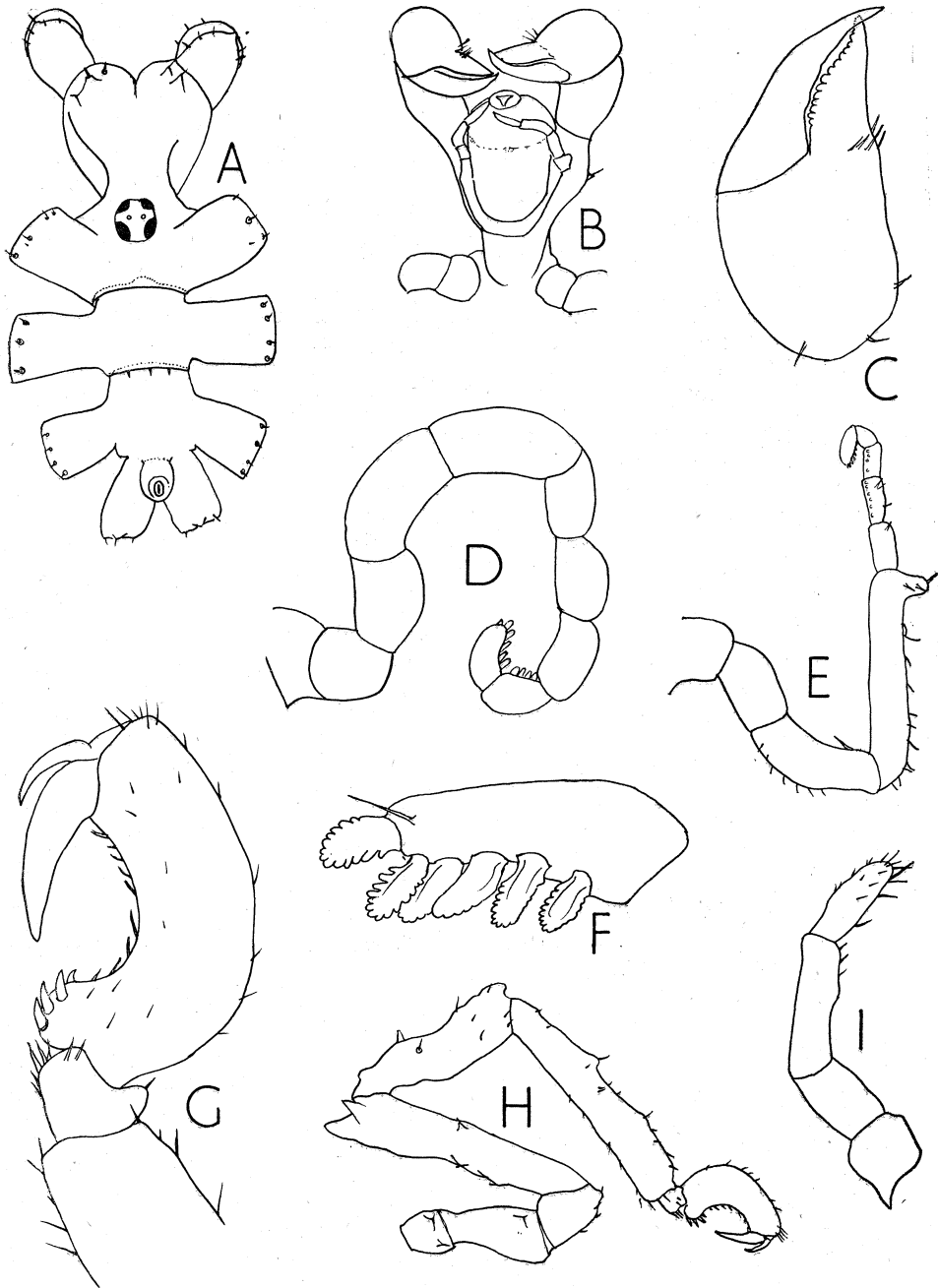


Fig. 9.—A-I, *Anoropallene valida*. A, dorsal view of trunk; B, ventral view of proboscis region of male; C, chela; D, female oviger; E, male oviger; F, tip of male oviger; G, propodus; H, third leg of male; I, male palp.

Proboscis short, about one and a half times as long as wide, directed obliquely downwards, basal part cylindrical, terminal third markedly triangular, especially in female, with a constriction about two-thirds of the way along. The tip is obtusely conical. I am unable to find the "wreath of very delicate bristles round the mouth" described by Flynn. Proboscis inserted into ventral surface of cephalon some distance behind anterior margin.

Chelifore scape of one joint, widest distally, and armed near the distal end with three spines, of which the most distal is the longest. Chela longer than scape, fingers shorter than palm; palm bulbous, ovoid. Inner margin of immovable finger finely crenulate, dactylus the longest finger, gently curved, margin untoothed but with several very slight callosities. Several spines near base of immovable finger, and a few short hairs on surface of palm.

Palps present in male only; four-jointed, extend beyond end of proboscis; third joint longest, first joint shortest. Flynn states that there "are scattered hairs on all the joints, but on the last there is a well marked ventral fringe of setae," but in the present material setae have been found only on the third and fourth joints.

Oviger 10-jointed in both sexes, without terminal claw; fifth joint longest in both sexes, but clearly so in the male where it is furnished with a large distal apophysis which is absent in the female. Denticulate spine formula for the four terminal joints of female oviger 4 : 6 : 4 : 6. No terminal claw; last spine very short. In the male oviger Haswell described five denticulate spines on the tenth joint, but his figure shows six. In the material before me two specimens have six spines, and one has seven on the last joint. Female oviger appears devoid of simple spines.

Third leg stout, armed with a number of blunt tubercles, each of which is armed with a simple spine. 1st coxa short, 2nd coxa twice as long as 1st coxa; femur with two large distal tubercles; equal in length to 2nd tibia. Propodus strongly curved, sole strongly concave, a moderate heel is present bearing four stout short spines, the more distal spines sparse and small. Terminal claw half as long as propodus, auxiliary claws less than half as long as terminal claw.

Genital apertures on second coxae of all legs in both sexes.

REMARKS

See under *Oropallene minor* n. sp.

Genus **Oropallene** Schimkewitsch, 1930

Oropallene minor n. sp.

Figs. 10 A—L

MATERIAL

3 males (1 ovigerous male is the holotype), 14 females (one is the allotype, the rest are paratypes). Off Cape Everard, Vict., 125-135 metres, trawled, coll. H. O. Fletcher, May, 1929. A.M. P.13602, P.13603, P.13604.

6 males, 11 females, 1 juvenile, off Twofold Bay, N.S.W., 81-90 metres, coll. Capt. K. Moller, trawler "Durraween", Aug., 1929. A.M. P.13605.

2 males, 2 females, 1 juvenile, 5 miles off Green Cape, 81 metres, trawled, coll. Capt. K. Moller, May, 1930. A.M. P.13606.

2 males, 2 females, trawled 2 miles east of Jibbon at mouth of Port Hacking, south of Port Jackson, N.S.W., 100 metres, on mud, July 17, 1943, pres. C.S.I.R.O., Division of Fisheries. A.M. P.11528.

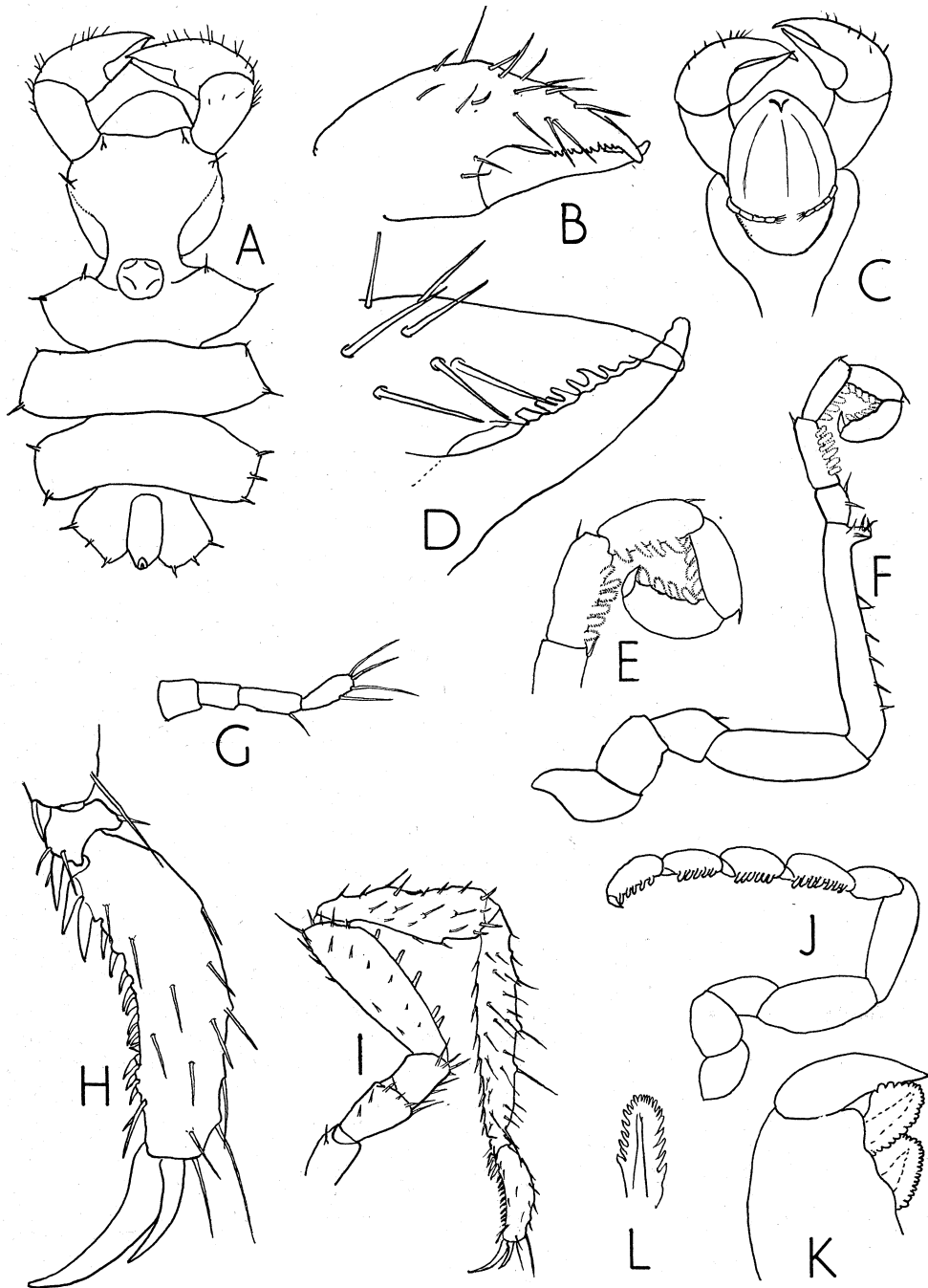


Fig. 10.—A-L, *Oropallene minor*. A, dorsal view of trunk; B, chela; C, ventral view of proboscis region to show rudimentary palps in male; D, tip of chela; E, tip of male oviger; F, male oviger; G, male palp; H, propodus; I, third leg; J, female oviger; K, tip of female oviger; L, oviger spine.

8 males, 5 females, station 57 "Thetis" Expedition, $3\frac{1}{2}$ -4 miles off Wata Mooli near Botany Bay, N.S.W., 97-107 metres, dredged. A.M. P.13607.

7 males, 13 females, station 37 "Thetis" Expedition, 2-2 $\frac{1}{2}$ miles off Botany Bay, N.S.W., 90-93 metres, dredged. A.M. P.13608.

6 males, 5 females, station 35 "Thetis" Expedition, $1\frac{1}{4}$ -2 miles off Port Hacking, N.S.W., 39-69 metres, dredged. A.M. P.13609.

2 males from conglomerate boulder taken by trawler "Goonambee" about lat. $33^{\circ} 44'$ S. long. $151^{\circ} 38'$ E. (about 16-18 miles north-east of South Head, Port Jackson, N.S.W.). 135-144 metres; coll. C. W. Mulvey, May, 1924. A.M. P.13610.

Fragmentary material, south-east from Cape Everard, Vict., 125-134 metres F.I.S. "Endeavour", March 25, 1915. A.M. E.6172.

DESCRIPTION

Trunk compact, clearly segmented, dorsum smooth, colour (in alcohol) light straw, mid-brown, or dark brown; lateral processes touching proximally, but separated distally, and armed at ends with a few small setae. Cephalon produced anteriorly to form distinct neck; expanded beyond neck region to provide for the implantation of chelifores, proboscis and palps (the latter in males only). Near bases of chelifore scapes are two small spine-bearing tubercles.

Ocular tubercle situated in posterior half of cephalon in line with anterior margins of first lateral processes. Tubercle low, squat, rounded above, four eyes.

Proboscis short, directed ventrally and distally; basal half cylindrical, distal half triquetrous, tip rounded.

Abdomen short, wide at base, tapering towards tip. Abdomen set at an angle of 60-70° to dorsum.

Chelifore: scape one-jointed, stout, wider distally than proximally, with a few setae, chelae about same length as scape. Fingers almost as long as palm, crossing slightly at tips when closed, immovable finger with a few short irregular teeth, cutting edge of dactylus with a few low callosities in lieu of teeth; hand with a number of spines, especially on immovable finger.

Palps present in males only; four-jointed, very small. Basal joint shortest and widest, second joint a little longer and narrower; third and fourth joints longest and equal, with one and four setae respectively. Length of joints (in mm.) 0.056, 0.07, 0.1, 0.1. Palps arise from ventral part of cephalon alongside proboscis, and immediately below origins of chelifores.

Ovigers 10-jointed in both sexes. In male the fifth joint is long and bears a distal apophysis (a characteristic of this and allied genera); the fifth joint also bears a number of simple spines along its length. Denticulate spines present on joints 7-10 according to formula 6 : 4 : 4 : 4. Terminal claw present in both sexes. Female oviger similar to that of male, but smaller, fifth joint not conspicuously longer than fourth and lacking distal apophysis and simple spines; denticulate spine formula of female 7 : 6 : 5 : 5. Lengths of joints (in mm.):—

Joint	1	2	3	4	5	6	7	8	9	10
Male ..	0.135	0.18	0.225	0.42	0.6	0.135	0.18	0.165	0.165	0.165
Female ..	0.103	0.15	0.165	0.315	0.33	0.135	0.18	0.165	0.165	0.165

Third leg moderately robust, very setose, coxae short; second coxa a little longer than others, femur stout, in male set with five peg-like cement glands on ventral surface, wider distally than proximally. First tibia equal to femur, second tibia the longest joint, widest in central region, with a row of regular setae along ventral margin. Tarsus short with one heavy spine and several setae on ventral margin. Propodus slightly arcuate, two large basal spines on heel, spines on the sole smaller. Claw strong, half as long as propodus; auxiliary claws well developed, more than half as long as main claw.

Measurements (in mm.): total length (tip proboscis to tip 4th lateral process) 1.6, length cephalon 0.6, width across second lateral processes 0.8, length abdomen 0.25, length proboscis 0.55, greatest width of proboscis 0.4, length chelifore scape 0.53. Third leg: 1st coxa 0.3, 2nd coxa 0.37, 3rd coxa 0.3, femur 1.05, 1st tibia 1.02, 2nd tibia 1.275, tarsus 0.075, propodus 0.525, claw 0.27, auxiliary claw 0.18.

Remarks

This species agrees in all respects with the characters of the genus *Oropallene* Schimk., and, like the type species, *O. dimorpha* (Hoek), it possesses auxiliary claws and a terminal oviger claw. When Stock (1956 a) erected the genus *Anoropallene*, he suggested that *O. valida* (Haswell) from Australia might be better included in that genus. The problem of placing of this Australian species is due to the fact that *O. valida* lacks a terminal oviger claw and so does not fit readily into *Oropallene*, but since it possesses auxiliary claws it does not fit comfortably into *Anoropallene* either. I agree with Stock's view that within the Callipallenidae the oviger characters (such as the presence or absence of a terminal claw) are of greater taxonomic importance than the presence or absence of auxiliary claws. Because of this I incline towards Stock's view and provisionally assign *valida* to *Anoropallene* with the comment that this action is justified solely by the absence of the terminal oviger claw. The two species *A. valida* and *O. minor* are readily distinguished by the strongly curved propodus with auxiliary claws less than half as long as the propodus in *A. valida*, but in *O. minor* the propodus is only slightly curved, and the auxiliary claws are at least half as long as the main claw. Further, the lateral processes are more closely spaced and the chelae more setose in *O. minor* than in *A. valida*. *O. minor* differs from *O. dimorpha* (Hoek) in its much smaller size, the relative lengths of the coxal joint (the second coxa is relatively much shorter in *O. minor* than in *O. dimorpha*) in the shape and spination of the propodus, and in the fewer setae on the palps.

Genus **Callipallene** Flynn, 1929

Callipallene emaciata micrantha Stock.

Figs. 11 A—I

Callipallene emaciata micrantha Stock, 1954: 44-46, figs. 19 a-g, 20 a-b.

MATERIAL

2 males, 1 female, off Twofold Bay, N.S.W., 81-90 metres, coll. Capt. K. Moller, trawler "Durraveen", trawled Aug., 1929. A.M. P.13611.

1 male, 5 miles off Green Cape, N.S.W., 90 metres, trawled, coll. K. Moller, May, 1930. A.M. P.13612.

5 males, 3 females, about 7 miles off Twofold Bay, N.S.W., trawled 81 metres, coll. K. Moller, trawler "Durraveen", Oct., 1929. A.M. P.13613.

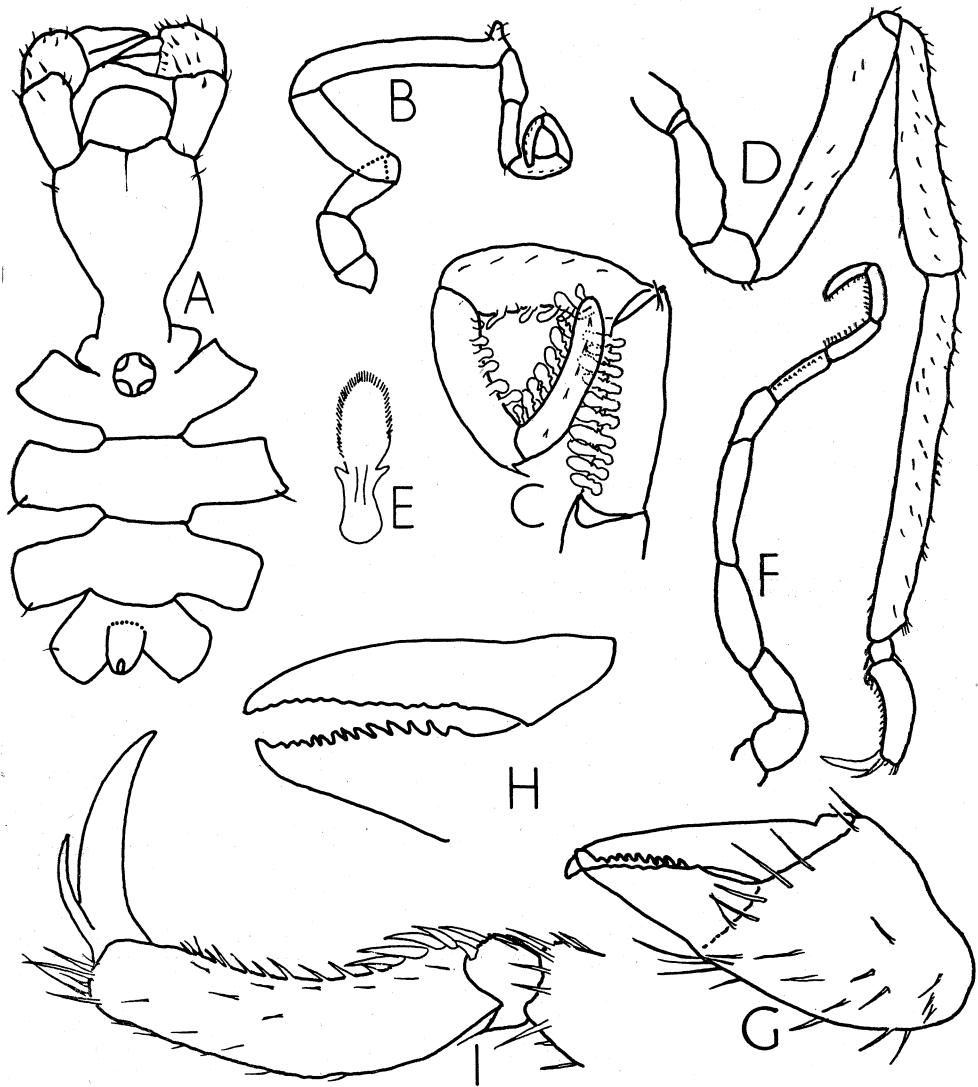


Fig. 11.—A-I, *Callipallene emaciata micrantha*. A, dorsal view of male trunk; B, male oviger; C, tip of male oviger; D, third leg; E, oviger spine; F, female oviger; G, chela; H, detail of chela fingers; I, propodus.

4 females, west-south-west from Gabo Island, N.S.W., trawled 126 metres, coll. K. Moller, trawler "Durraveen", Dec. 1929. A.M. P.13614.

12 females, 13 males, 14 miles off Bateman's Bay, N.S.W., trawled 135 metres, coll. Capt. K. Moller, trawler "Durraveen", A.M. P.13615.

4 males, 2 females, off Cape Everard, Vict., 126-135 metres, coll. H. O. Fletcher, trawled, May, 1929. A.M. P.13616.

1 male, 1 female, off Gabo Island, N.S.W., "Endeavour" Expedition, A.M. E.4649.

REMARKS

The subspecies of the *Callipallene emaciata* and *C. brevisrostris* groups are not easily distinguished because of the variation present in a number of characters. I am, however, fairly confident that the material listed above is all referable to this subspecies. Much of this material differs from Stock's figures and description, particularly in the spination of the lateral processes and the cephalon near the chelifore bases. The spination of the chelifores is also somewhat variable. The number of spines near the chelifore bases varies from 1-4 in each group, and the number on the lateral processes is also variable, but the processes of trunk segments 2-4 always appear to have at least one spine each. The male ovigers vary greatly in the development of the simple spines of the fifth joint, and in the arrangement of the compound spines on the terminal joints. The following arrangements have been found: 9 : 8 : 7 : 9, 10 : 8 : 7 : 10, 11 : 9 : 11 : 10 and 12 : 10 : 10 : 11.

The female is new to science, and is very similar to the male except that in some specimens the inner margin of the distal part of the chelifore scape is armed with more spines than shown in Stock's figure (of the male). As is to be expected, the oviger differs in having a shorter fifth joint which is quite without any distal apophysis. Oviger spine formulae of the females examined: 10 : 10 : 9 : 9, 10 : 9 : 9 : 11, 10 : 9 : 9 : 10.

The distribution of this species is still restricted to the area between Cape Everard in the south and Batemans Bay in the north, and the bathymetric range extends from about 80 metres to 135 metres.

Callipallene sp.

Figs. 12 A—H

MATERIAL

1 male, 1 juvenile, about 7 miles off Twofold Bay, N.S.W., trawled, 81 metres, coll. Capt. K. Moller, trawler "Durraveen", Aug., 1929. A.M. P.13617.

DESCRIPTION

Trunk moderately compact, neck region well developed, crop large with slight median fissure anteriorly, cephalon slightly longer than remainder of trunk. Lateral processes separated by about their own width, quite unadorned.

Ocular tubercle tall for the genus, acutely conical above (fig. 12 F), eyes well pigmented, four.

Proboscis short, when viewed ventrally is sharply angled at the distal lateral extremities, in dorsal view appears rounded distally and bears a few short setae near tip.

Abdomen short, cylindrical, almost erect, anus terminal.

Chelifore scape one-jointed, with a few spines on inner margin and a circlet of spines at articulation with chela. Chela palm strongly inflated, palm longer than fingers which are set at a slight angle to it. Dactylus with 14 low rounded teeth; margin of immovable finger entire. Setae most abundant at base of dactylus.

Palps absent.

Oviger (male) 10-jointed, typical of genus with a long fifth joint bearing a distal apophysis and a number of short simple spines. Compound oviger spines

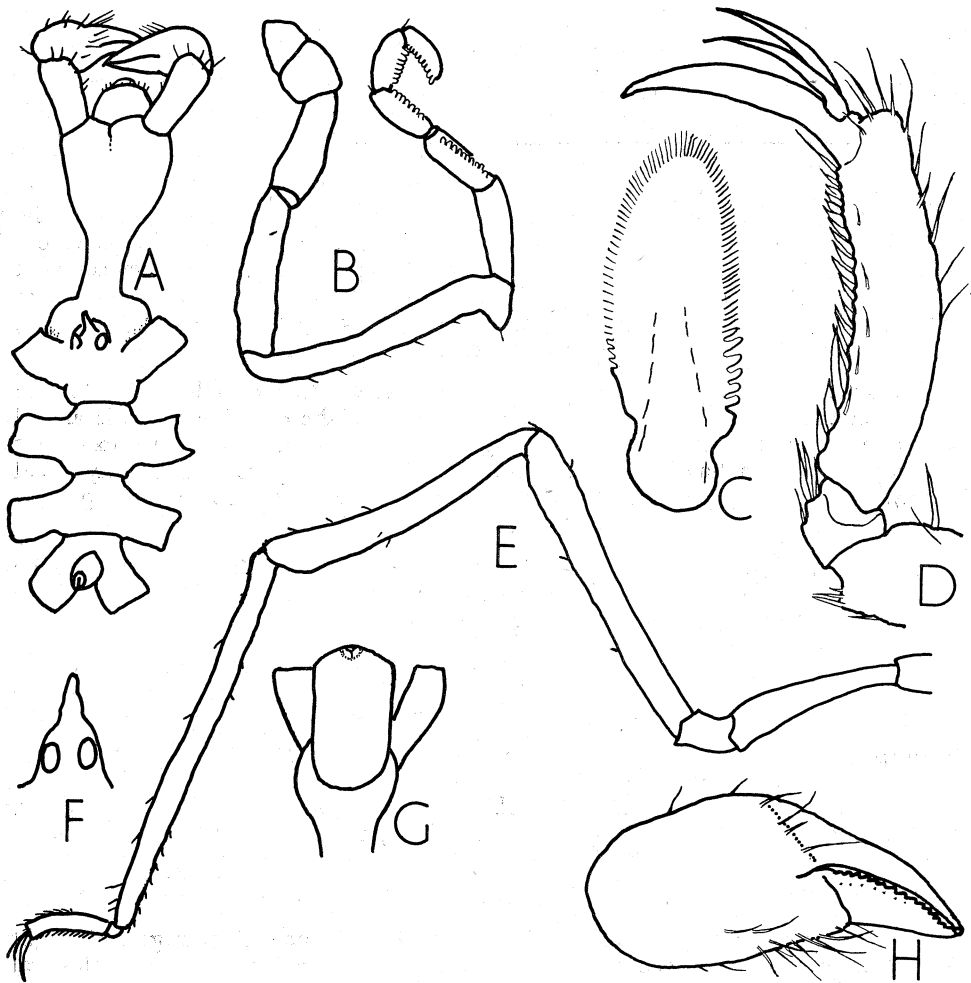


Fig. 12.—A-H, *Callipallene* sp. (all figs. of male). A, dorsal view of trunk; B, male oviger; C, oviger spine; D, propodus; E, third leg; F, lateral view of ocular tubercle; G, ventral view of proboscis; H, chela.

present on joints 6-10 according to formula 10 : 9 : 8 : 9. Compound oviger spines with rather more elongate blades than usual (fig. 12C). Length of joints 1—0.18, 2—0.2, 3—0.42, 4—0.62, 5—0.95, 6—0.38, 7—0.275, 8—0.23, 9—0.24, 10—0.21.

Third leg slender, without any outstanding characters (see fig. 12E). Propodus of *brevirostris* type, i.e., almost straight sole and long auxiliary claws.

Measurements (in mm.): total length (anterior margin of cephalon to tip fourth lateral process) 2.33, length cephalon 1.27, width across second lateral processes 0.87, length chelifore scape 0.5, length abdomen 0.33, length proboscis 0.6, greatest width of proboscis 0.4. Third leg: 1st coxa 0.27, 2nd coxa 1.18, 3rd coxa 0.41, femur 2.32, 1st tibia 2.03, 2nd tibia 2.78, tarsus 0.12, propodus 0.58, claw 0.32, auxiliary claw 0.23.

REMARKS

In view of the paucity of material and the variation which exists in other Australasian species in this genus I refrain from naming this form. The fact that it was taken with other specimens of *C. emaciata micrantha*, which is itself a variable subspecies, throws some doubt on the status of this form which appears to differ from the other Australian forms in the great height of the ocular tubercle, the well developed neck region, and the presence of teeth on the dactylus only. Taken in combination these characters may indicate a new species.

Genus **Parapallene** Carpenter, 1892

Parapallene australiensis (Hoek)

Pallene australiensis Hoek 1881: 76-78, pl. XI figs. 1-7 (in part). —Haswell 1884: 1022.

Parapallene australiensis Carpenter 1892: 553. —Loman 1908: 48. —Calman 1937: 530-532 (redescr. of types). —Stock, 1954: 50, fig. 24 d-e.

MATERIAL

1 male, 1 female, vicinity Sow and Pigs Shoal, Port Jackson, N.S.W., about 8 metres, coll. F. A. McNeill and M. Ward, Nov., 1929. A.M. P.13618.

4 males, 3 females, same data as above, Oct. 18, 1927. A.M. P.13619.

1 female, reef on shore between tidemarks, Kurnell, Botany Bay, N.S.W., coll. M. Ward, Jan. 22, 1928. A.M. P.9060.

3 females west-south-west from Gabo Island, N.S.W., 130 metres, coll. Capt. K. Moller, "Durraween", trawled Dec., 1929. A.M. P.13620.

1 male off Green Cape, N.S.W., coll. Capt. K. Moller, trawled July, 1926. A.M. P.13621.

1 male, trawled 3-4 miles off Eden, N.S.W., 46-56 metres, trawler "Goonabee", coll. H. O. Fletcher and A. Livingstone. A.M. P.13622.

1 male off Cape Everard, Vic., 130-140 metres, trawled, coll. H. O. Fletcher, May, 1929. A.M. P.13623.

1 female, Jarvis Bay, N.S.W., in prawn trawl, Pres. C.S.I.R.O. Div. of Fisheries, Feb. 12, 1952. A.M. P.13624.

1 male, 1 female off Twofold Bay, N.S.W., 83-93 metres, coll. Capt. K. Moller, "Durraween", trawled Aug. 1929. A.M. P.13625.

1 male, 5 miles off Green Cape, N.S.W., 83 metres, trawled, coll. K. Moller, May, 1930. A.M. P.13626.

REMARKS

The present collection of this species consisting of ten males and eight females allows one to draw up the characters of this species with more confidence than was possible on the three specimens known previously. The present material differs slightly from the descriptions of Hoek (1881) and Calman (1937). I can find no sign of the cuticular fold in front of the ocular tubercle mentioned by Calman (=the "true articulation" of Hoek which divides the cephalic from the thoracic part). The ocular tubercle is situated over the region of the anterior half of the first lateral

processes and the posterior half of the bases of the ovigers. The ocular tubercle is directed slightly backwards, and may bear either one or two minute apical tubercles. The eyes bulge slightly. Situated laterally on the upper half of the tubercle is a pair of small papillae. Hoek notes that in his specimens the abdomen is "directed a little upwards", but in all the specimens before me the abdomen is practically vertical.

A feature of the proboscis not mentioned by earlier authors is the pair of groups of setae placed dorso-laterally at the distal extremity of the inflated portion of the proboscis. In both sexes, each group is composed of five or six setae.

Calman states that the compound oviger spines of the males are present in the types according to the formula 8 : 6 : 5 : 5; this feature is apparently variable, as in three males examined the formulae were 8 : 8 : 7 : 8, 9 : 8 : 7 : 7, and 8 : 9 : 7 : 8.

The female oviger differs from the male in that the basal joints are not as robust, the fifth joint is straight (strongly curved in male), lacks the terminal apophysis and the sixth joint is not furnished with setae as in the male. The ovigers of the two sexes also differ in the relative lengths of the joints as shown below. Compound oviger spines in three females examined had the formulae 11 : 11 : 8 : 9 (two specimens) and 12 : 9 : 8 : 8. Lengths of oviger joints (in mm.):

Joint	..	2	3	4	5	6	7	8	9	10
Male	0.39	0.66	1.42	1.93*	1.36	0.46	0.39	0.33	0.33
Female	0.31	0.55	1.39	1.22	0.89	0.55	0.45	0.41	0.39

*Measured as a chord.

The legs of the two sexes differ as noted by Stock (1954) in that the females lack the prominent coxal spines of the males. The spination of the propodus also differs very slightly.

The genital pores of both sexes are found on the second coxae of all legs. The female pores are much larger than the male ones.

It seems likely that the female of this species is the form Milne Edwards described as *Pallene chiragra* from "Jervis Bay, New Holland". Hoek appears to have suspected this when, in 1881, he noted the prominent coxal spines of male *P. australiensis* and contrasted them with the description of *P. chiragra*. Dr. Louis Fage informs me (*in litt.*) that the type specimen of *P. chiragra* is not in the Paris Museum, and that it has probably been lost with much more of Milne Edwards's material. As the description of *P. chiragra* is brief, unillustrated, and no type material is available, I regard it as a *species inquirenda*, and prefer to use the name *P. australiensis* for the material which is before me and which agrees with the types in the British Museum.

Parapallene haddoni Carpenter

Figs. 13 A—J

Parapallene haddoni Carpenter, 1892: 553-555, pl. 22, figs. 1-6. —Loman, 1908: 44.

MATERIAL

1 damaged and 1 moulting juvenile, Murray Island, Torres Strait, coll. C. Hedley and A. R. McCulloch, Aug., Oct., 1907. A.M. P.13627.

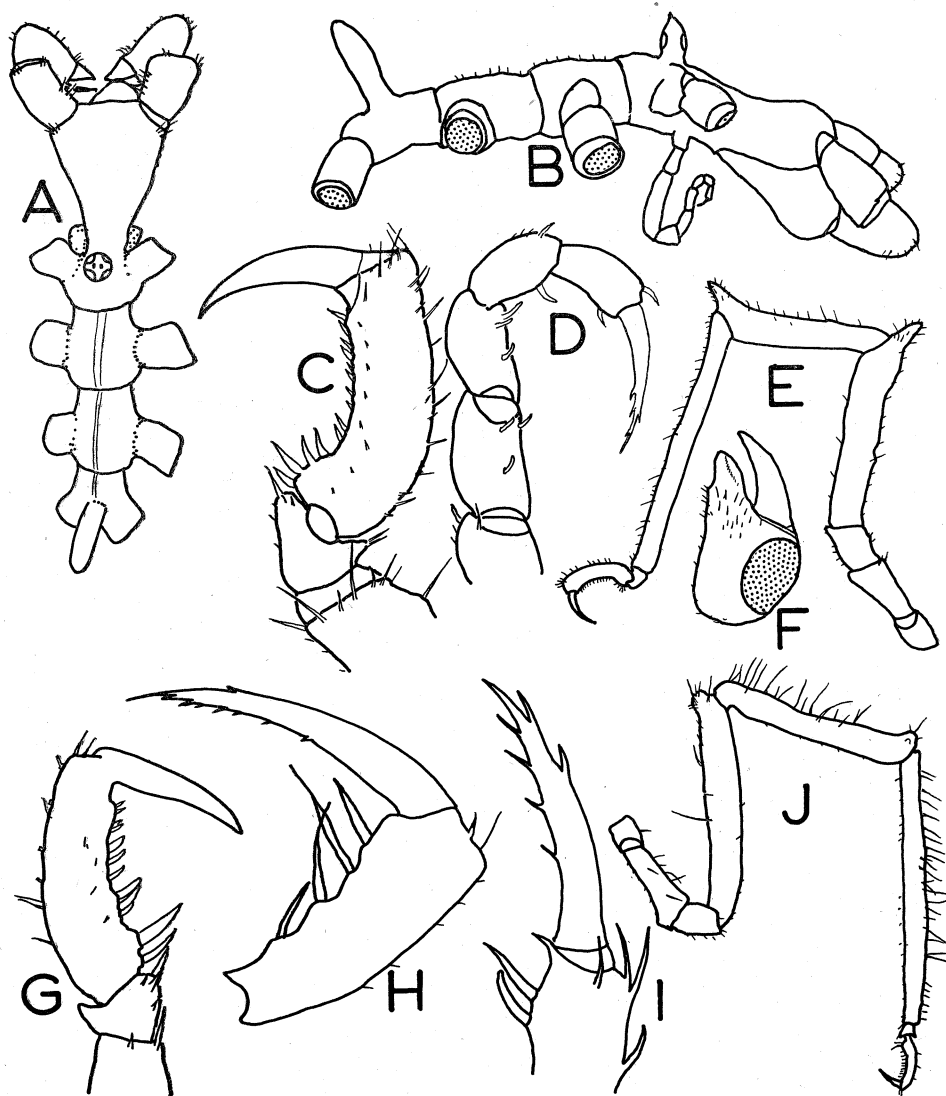


Fig. 13.—A-J, *Parapallene haddoni* (figs. A-F of an immature specimen from Murray Island). A, dorsal view of trunk; B, lateral view; C, propodus; D, terminal joints of oviger; E, third leg; F, chela; G-H, propodus and terminal oviger joints of a female from Holothuria Bank; I-J, terminal oviger claw and third leg of female co-type.

1 female, Holothuria Bank, Northern Australia, Coll. H.M.S. "Penguin" and presented to the British Museum by the Admiralty, 1893.

REMARKS

I have examined the syntypes of this species which are now in the British Museum (Nat. Hist.) and find they consist of one juvenile and one female, not male and female as stated by Carpenter. There are a number of differences between them. The female has strongly spinose legs (fig. 13J) and resembles the present

material more closely than does Carpenter's larva. The female from Holothuria Bank, apart from its larger size, is more like the juveniles from Murray Island than is Carpenter's female. The problem of whether more than one species is represented cannot be decided on the material available. In the meantime, I regard the material as representing a single species.

Because Carpenter's figures are inadequate by modern standards, I have provided new ones based on the material available.

***Parapallene famelica* Flynn**

Figs. 14 A—G

Parapallene famelica Flynn, 1929: 258-260, figs. 6-9.

MATERIAL

1 female from off Port Philip. (Specimen in collection of the British Museum (Nat. Hist.).)

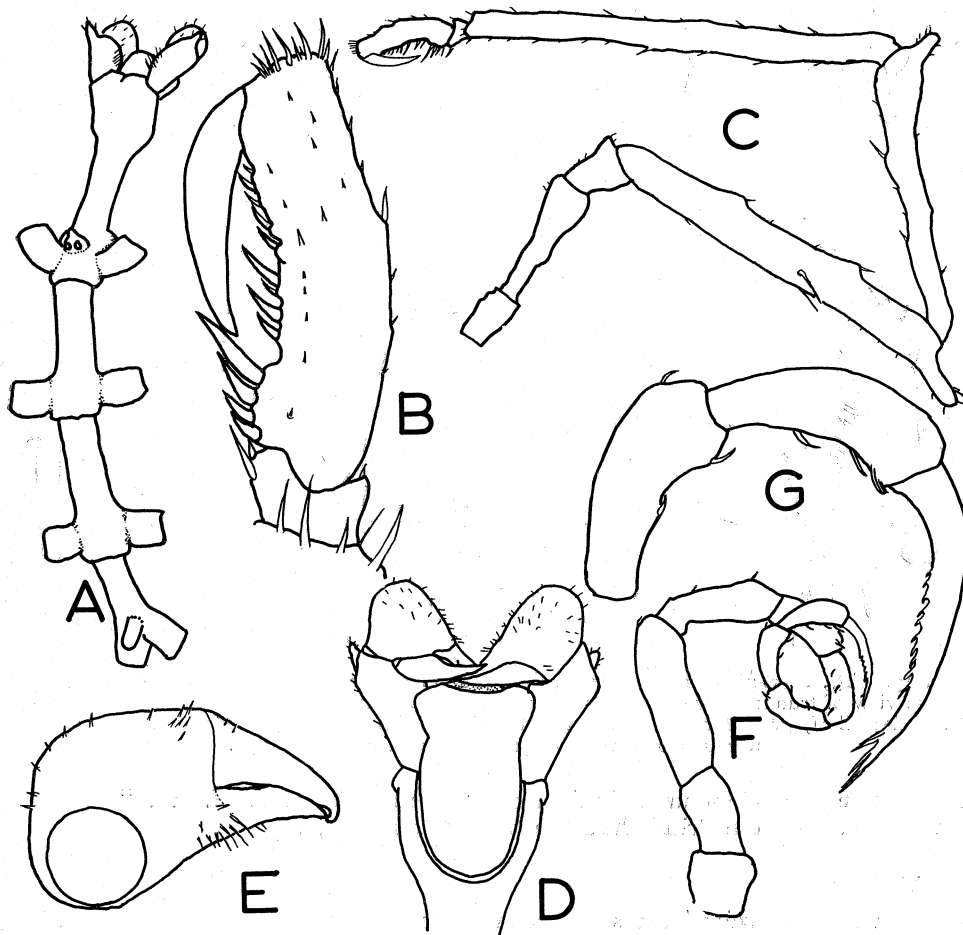


Fig. 14.—A-G, *Parapallene famelica* female. A, dorsal view of trunk; B, propodus; C, third leg; D, ventral view of proboscis region; E, chela; F, oviger; G, tip of oviger.

REMARKS

Although this specimen differs in some respects from Flynn's description, which was based on a single male, I believe that it is referable to this species. The differences may be sexual in character. The chief differences are in the presence of pronounced dorso-terminal processes on the distal ends of the single-jointed chelifore scape, and the abundance of spines on the inner edges of the scapes. The proboscis is much more truncate than Flynn's figure indicates. The spination of the legs is almost entirely omitted in his figure, and the figure of the propodus is wholly inadequate. The terminal oviger claw also differs. The almost complete fusion of the third and fourth oviger joints in both specimens point to their being the same species. Because Flynn's figures are inadequate by modern standards, new figures are provided.

Flynn suggested that this species is very closely allied to *P. nierstraszi* Loman, but the similarities seem to have been over-emphasized as the two species differ radically in the form of the trunk, legs, propodus, oviger, and in the shape of the proboscis.

Measurements (in mm.): total length (tip cephalon to tip fourth lateral process) 12 mm., width across second lateral processes 2.66, length cephalon 4.86, length chelifore scape 1.07, length proboscis 1.87, greatest width proboscis 1.13, third leg; 1st coxa 1.2, 2nd coxa 2.53, 3rd coxa 1.2, femur 8.0, 1st tibia 6.0, 2nd tibia 8.0, tarsus 0.4, propodus 2.0, claw 1.07, oviger joints: 1—0.44, 2—0.57, 3 and 4—1.09, 5—0.775, 6—0.545, 7—0.47, 8—0.45, 9—0.39, 10—0.417, claw 0.57.

Parapallene obtusirostris n. sp.

Figs. 15 A—I

MATERIAL

1 female (holotype), dredged off Portsea, Port Phillip, Victoria. Coll. C. Gabriel, May 7, 1914, A.M. P.3958.

DESCRIPTION

Colour (in alcohol) brown, with an irregular median stripe of pale straw colour.

Trunk robust, segmented, lateral processes separated by about half their diameter throughout their length. Integument ornamented by a few simple spines: three on dorsum, two or three at ends of lateral processes, and a few on abdomen. Neck region of cephalon strongly developed; just anterior to first pair of lateral processes and ocular tubercle arise a pair of cervical processes to which the ovigers are articulated. Distal part of cephalon much expanded to accommodate origins of proboscis and chelifore scapes. A slight cleft present in dorsal mid-line of cephalon.

Ocular tubercle implanted with anterior margin in line with anterior edge of first lateral processes; a little higher than diameter of tubercle at base, parallel sided, tip a rounded cone; four large eyes.

Proboscis inserted on ventral side of anterior part of cephalon, which forms a low collar about the base. Basal two-thirds cylindrical with a constriction at two-thirds of total length, after which proboscis expands, especially in the ventro-lateral parts to make anterior margin of proboscis appear as a straight line in ventral view. Distal third markedly triquetrous, and bears four fine setae in a dorso-lateral position. On ventral side of each of anterior corners of proboscis is found a single stout seta.

Abdomen cylindrical, truncated, set at an angle of 45°, with a few setae at tip, anus terminal.

Chelifores: scape one-jointed, short, thick, with a single stout spine on outer dorso-lateral extremity; inner margin with a number of finer setae. Hand of chela strongly inflated, rather spherical, with numerous short setae. Fingers shorter than hand, cutting edges of both fingers curved, crossing slightly at tips, dactylus slightly longer than immovable finger. Rows of setae surround bases of fingers.

Palps lacking.

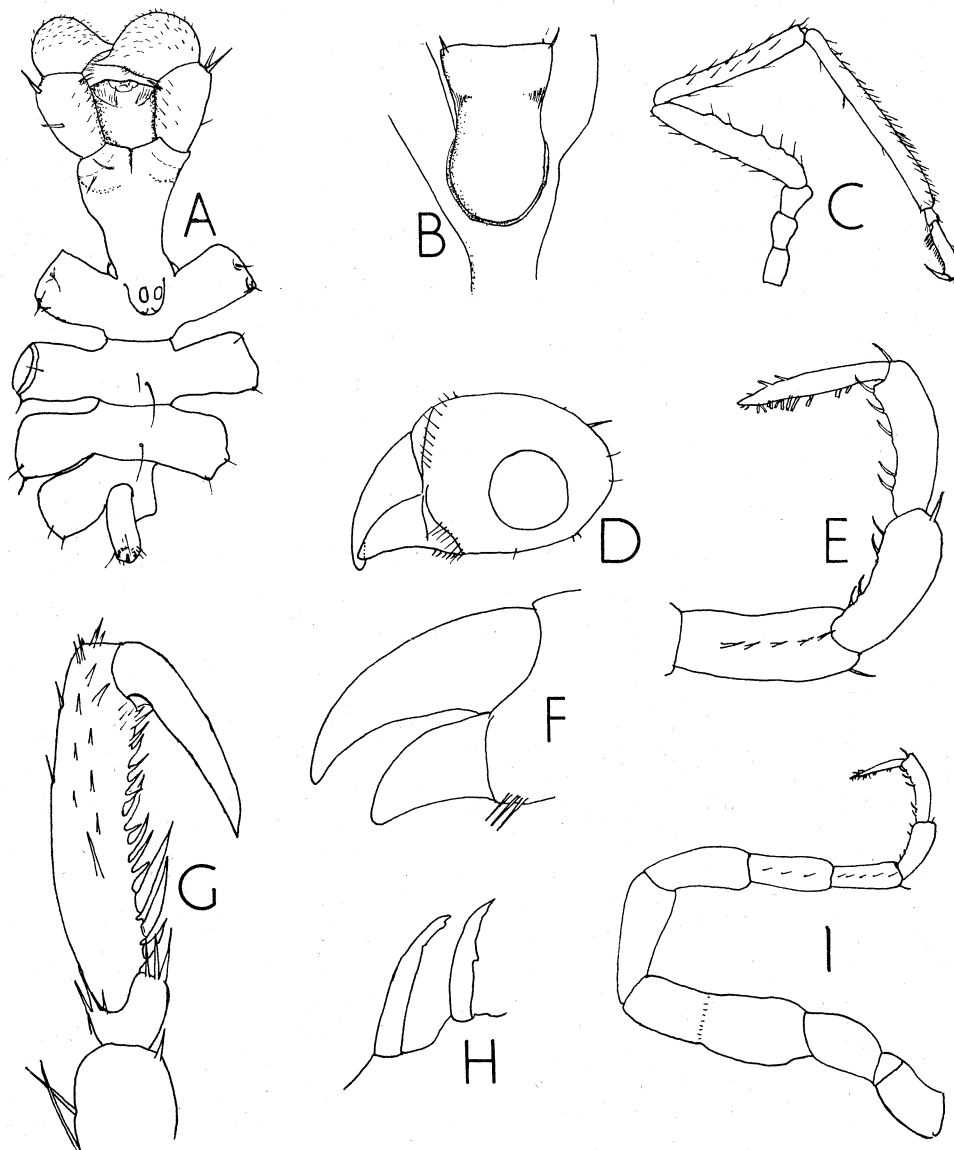


Fig. 15.—A-I, *Parapallene obtusirostris*. (All figs. of female holotype.) A, dorsal view of trunk; B, ventral view of proboscis; C, third leg; D, chela; E, tip of oviger; F, fingers of chela; G, propodus; H, proximal spines of tenth oviger joint; I, oviger.

Ovigers ten-jointed, third and fourth joints fused, together making the longest "joint"; fifth joint next longest, succeeding joints decreasing in length. Joints 7-10 with simple oviger spines according to formula 3 : 6 : 5 : 6. Oviger spines simple with very slight irregular denticulations near tip. Terminal claw long, almost straight, with denticulations on both edges, mostly distally, and more on inner edge.

Third leg moderately robust, all joints with some setae, second coxa longest coxal joint, but not equal to first and third combined. Femur and first tibia subequal in length, but femur more robust, and with a series of spine-bearing tubercles along ventral margin. Second tibia longest joint, both tibiae clothed with long setae whose length is equal to width of joint. Tarsus short; propodus moderately robust. Three proximal basal spines strong, more distal ones decreasing in size. Terminal claw strong, more than half as long as propodus; auxiliary claws lacking.

Measurements (in mm.): total length (tip of proboscis to tip of abdomen) approximately 3.75, length cephalon 1.6, length of proboscis 1.0, greatest diameter of proboscis 0.62, width across second lateral processes 1.5, length chelifore scape 0.75, length of abdomen 0.8. Third leg: 1st coxa 1.1, 2nd coxa 1.6, 3rd coxa 1.3, femur 5.5, 1st tibia 5.33, 2nd tibia 7.0, tarsus 0.4, propodus 1.9, claw 1.1.

REMARKS

Parapallene obtusirostris differs from all other species in the genus in the possession of a terminal oviger claw which is denticulate on both edges and a square-ended proboscis. The spine on each of the anterior ventral corners of the proboscis also appears to be unique.

Key to Australian species of **Parapallene**

- | | |
|--|--------------------------------|
| 1. Auxiliary claws present | 2 |
| Auxiliary claws absent | 3 |
| 2. Terminal oviger claw not denticulate; oviger spines broad as in <i>Callipallene</i> spp.; fingers of chelae denticulate | <i>P. (?) aculeata</i> Stock |
| Terminal oviger claw denticulate; oviger spines not as in <i>Callipallene</i> ; fingers of chelae not denticulate | <i>P. challengerii</i> Calman |
| 3. Lateral processes separated by at least their own width | 4 |
| Lateral processes separated by less than their own width | <i>P. obtusirostris</i> n. sp. |
| 4. Lateral processes separated by more than three times their own width | <i>P. famelica</i> Flynn |
| Lateral processes separated by less than three times their own width | 5 |
| 5. Distal ends of femur and first tibia with conspicuous processes and propodus with a moderate heel | <i>P. haddoni</i> Carpenter |
| No processes on distal ends of femora or tibiae; no heel on propodus | <i>P. australiensis</i> (Hoek) |

Genus **Pseudopallene** Wilson, 1878

Pseudopallene ambigua Stock.

Figs. 16 A—F

Pseudopallene ambigua Stock, 1956 b: 40-42, fig. 5.

MATERIAL

2 females, trawled 3-4 miles off Eden, N.S.W., 45-54 metres, trawler "Goonabee". Coll. A. Livingstone and H. O. Fletcher. A.M. P.13628.

2 males, 4 females, 6 juveniles, Port Arthur, Tasmania, coll. E. Mawle. A.M. P.13629.

1 female, trawled west-south-west from Gabo Island, N.S.W., 126 metres, coll. Capt. K. Moller, trawler "Durraween", Dec., 1929. A.M. P.13630.

1 ovigerous male off Nobby's Head, Newcastle, N.S.W., Sept. 1, 1911. A.M. P.4902.

1 immature, between Long Reef and Narrabeen Head, north of Port Jackson, N.S.W., about 5 miles off shore, brought up on small anchor from about 95 metres, coll. W. Steltzer, A.M. P.10471.

REMARKS

In 1956 Stock described *P. ambigua* from Bass Strait, and at this time he noted that he had only described it as new after some hesitation. His new species differed from *P. pachycheira* Haswell mainly in size, *P. ambigua* being much larger. Stock suggested that the unique specimen of Haswell's species may not have been fully adult. Mr. F. A. McNeill, of the Australian Museum, has examined the type of this species for me and reports that the genital apertures are present. I have examined all the mature males before me to determine whether one or more species is involved. No differences apart from size have been discovered in the trunk. The third legs

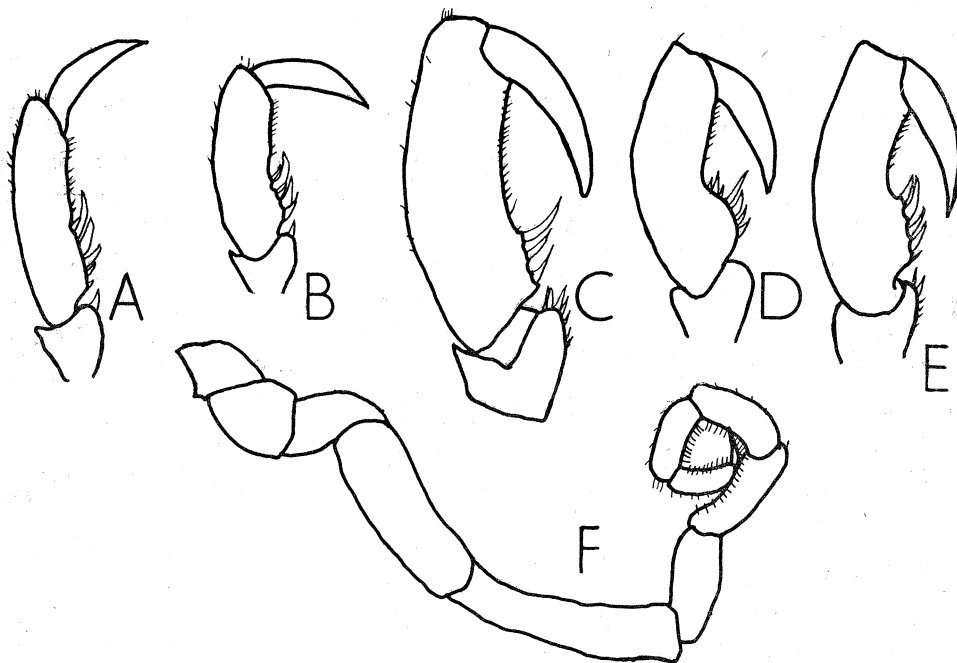


Fig. 16.—A-F, *Pseudopallene ambigua*. A-E, propodes of third legs of males showing the variation encountered (all at the same magnification); A-C, from ovigerous males; D and E, from non-ovigerous males; A and D, off Eden, N.S.W.; B and E, Port Arthur, Tasmania; C, Nobby's Head, N.S.W.; F, female oviger.

have been measured and the number of denticulate oviger spines counted. The results are set out in the table below:

Source	Spine Formula	Coxa			Femur		Tibia		Tarsus	Pro- podus	Claw
		1	2	3	1	2	1	2			
Off Eden ..	18:12:10:10	0.75	2.5	1.05	4.6	4.4	5.9	0.33	1.15	0.6	
Off Eden ..	11:6:6:6	0.77	2.2	1.0	3.68	3.0	3.68	0.33	1.22	0.74	
Nobby's Head ..	14:12:11:11	0.8	2.75	1.3	5.75	5.25	6.8	0.44	1.65	0.85	
Pt. Arthur ..	25:18:15:15	0.85	2.85	1.35	4.95	4.35	5.34	0.33	1.3	0.77	
Pt. Arthur ..	14:11:9:10	0.7	1.62	0.66	3.12	2.68	2.45	0.26	0.9	0.66	
Type <i>ambigua</i> ..	15:9:10:10	0.93	2.0	0.8	4.7	4.5	5.0	0.2	1.3	0.8	
Type <i>pachycheira</i> ..	*5 or 6:5:4:4	0.45	1.09	0.44	2.05	1.82	—	0.93		0.51	

* Mr. McNeill states that because of a bubble in the balsam in which the specimen is mounted, he is unable to be certain of the number of spines on the seventh oviger joint.

As shown in Fig. 16, the form of the propodus is rather variable. One immature specimen from between Long Reef and Narrabeen Head is intermediate in size between the two types. A note with this specimen records that "in life, body was spotted black and yellow; limbs dark red, yellow at joints—the yellow edged with black". None of this colour persists in the preserved specimen.

Up to the present no two males (or females) of this group have been found to be exactly alike. Rather than give nomenclatorial recognition to each specimen, I propose, in the meantime, to treat all the material as belonging to *P. ambigua* in full awareness of the fact that further material may make this position untenable.

None of the present material shows signs of the regular annular constrictions of the long joints as described by Flynn. The palms of the chelae of the present material all resemble Stock's figure rather than Haswell's, though the fingers are practically identical in both. Stock states that in his specimen the terminal oviger claw is untoothed, whereas all the specimens before me have toothed oviger claws as described by Flynn, but not as figured by Haswell. The oviger spines resemble those of Stock's figure, and are quite unlike Haswell's figure. Unfortunately, I have not been able to examine either of the types personally.

***Pseudopallene dubia* n. sp.**

Figs. 17 A—H, 18 A—B

MATERIAL

5 females (1 is holotype), Port Arthur, Tasmania, in kelp weed. Coll. Barnett, A.M. P.13631, P.13632.

2 females, Port Arthur, Tasmania. Coll. E. Mawle. A.M. P.13633.

DESCRIPTION

Trunk compact, almost circular in outline, smooth, without ornament; lateral processes touching or almost touching. Cephalon greatly expanded anteriorly over bases of chelifores and proboscis, with or without a slight cleft at anterior margin.

Ocular tubercle low, rounded above, placed anterior to first lateral processes. Four eyes. A pair of latero-apical papillae present.

Proboscis directed ventrally; of two regions, a rather barrel-shaped basal part and narrow tapering distal region. The distal portion is fused, i.e., not composed of three separate or distinguishable lips.

Abdomen stout, fusiform, directed slightly downwards, and reaching almost to end of first coxa.

Chelifere scape one-jointed, almost as long as proboscis; chela short, squarish, palm strong, but rather variable in shape and spination. Fingers short and weak

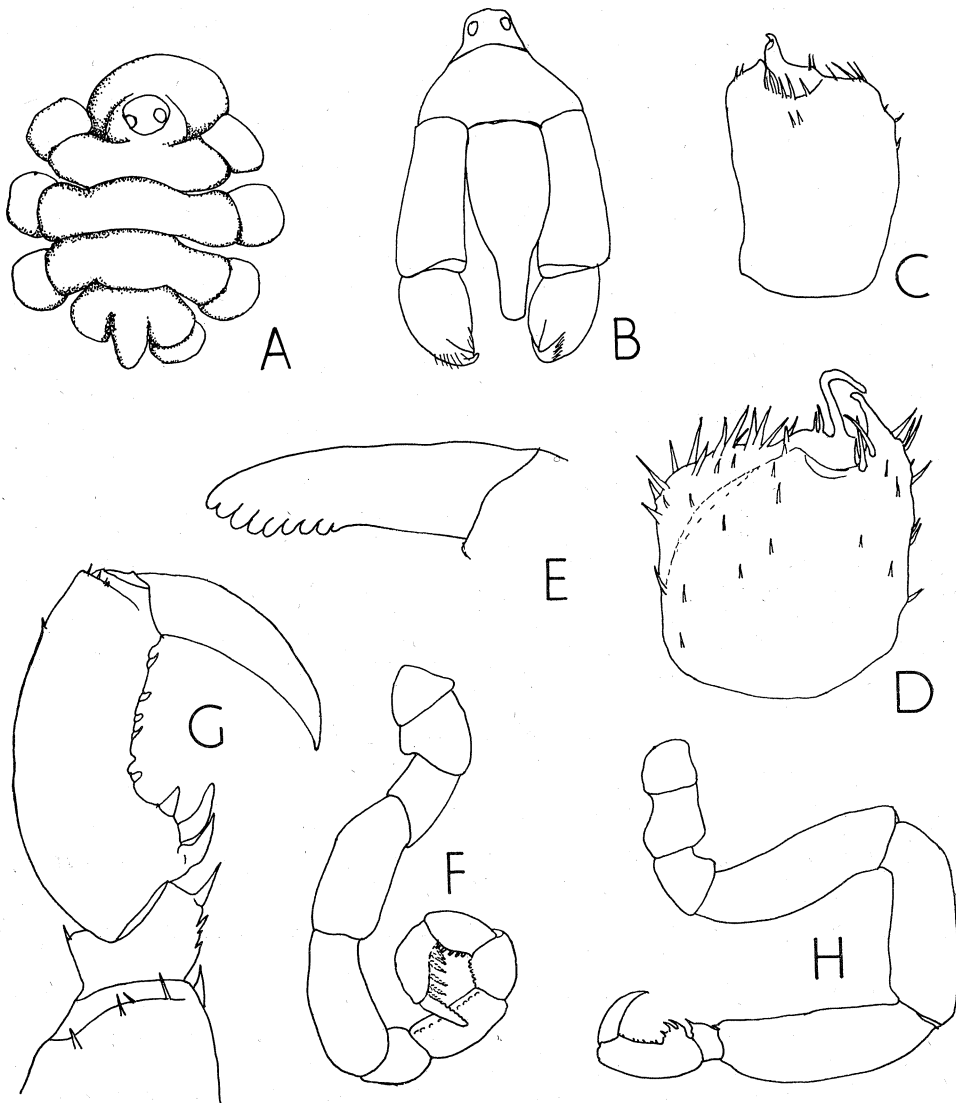


Fig. 17.—A-H, *Pseudopallene dubia* female; A, dorsal view of trunk; B, anterior region; C and D, the two types of chelae; E, terminal oviger claw; F, oviger; G, propodus; H, third leg.

without teeth; in some specimens dactylus is longer than immovable finger, but is then thin and weak.

Palps lacking.

Oviger 10-jointed, fourth and fifth joints about equal and the longest. Denticulate spine formula (female) 10: 5: 5: 6. Terminal claw strong and denticulate throughout distal half of inner edge.

Third leg moderately robust, coxae short, long joints subequal, tarsus short, propodus curved with a well developed heel with large spines. Spines on sole small and sparse. Claw strong, more than half as long as propodus; auxiliary claws lacking.

Measurements (in mm.): Total length (anterior margin of cephalon to tip of abdomen) 1.86, width across second lateral processes 1.2, length abdomen 0.37, length chelifore scape 0.87, length proboscis 0.4. Third leg: 1st coxa 0.31, 2nd coxa 0.49, 3rd coxa 0.36, femur 1.36, 1st tibia 1.18, 2nd tibia 1.28, tarsus 0.18, propodus 0.74, claw 0.45.

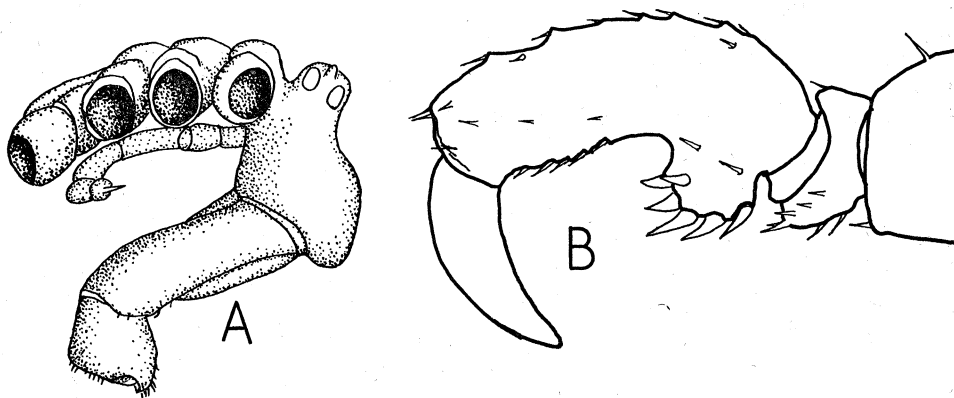


Fig. 18.—A-B, *Pseudopallene dubia* female. A, lateral view of trunk; B, a further propodus.

REMARKS

The difficulty in placing this species in a genus is reflected in the specific name. The general form of the trunk is typical of *Pseudopallene* Wilson, and the form of the proboscis may be regarded as a development of the condition in *Ps. ambigua* Stock and *Ps. zamboangae* Stock with the narrow distal part becoming more elongate. At the same time this type of proboscis may be compared with *Stylopallene* n. gen. The female oviger is similar to both of these genera, as is the propodus with its strongly developed heel. The chelae, on the other hand, ally it through *Ps. zamboangae* to the genus *Cheilopallene* Stock (*C. clavigera* Stock, 1955 and *C. brevichela* Clark, 1961).

Genus *Stylopallene* n. gen.

Callipallenidae. Trunk robust, almost oval in outline, lateral processes almost touching; cephalon well developed, almost equal to rest of trunk, ocular tubercle usually low, rounded, placed in posterior half of cephalon. Proboscis with a broad cylindrical basal part, but tapering to a narrow tubular distal region. Tubular region may be composed of closely apposed or fused lips. Chelifores with one-jointed scape, chelae linear, fingers bowed, untoothed. Palps absent. Oviger 10-jointed in both sexes, with non-denticulated terminal claw, distal apophysis on fifth joint in male often globular. Legs stout, propodus often with a pronounced heel. Auxiliary claws absent.

Type species: *Stylopallene cheilorhynchus* n. sp.

Diagnosis. Callipallenidae with compact robust trunk, distal region of proboscis narrow, tubular. Chelae linear, fingers bowed. Ovipiger 10-jointed, males with distal apophysis on fifth joint, terminal claw not denticulated. Auxiliary claws wanting.

REMARKS

The tubular elongation of the proboscis and the linear chelae combine with the compact robust trunk to characterize this genus, which is undoubtedly closely allied to *Austropallene* Hodson, *Cheilopallene* Stock, and perhaps to *Pseudopallene* Wilson. The proboscis with its tubular extremity is probably to be viewed as a continuation of the condition seen in *Cheilopallene* spp. where the three lips project from the distal end of the proboscis, but are not fused or even closely apposed, except basally. A series of species *C. clavigera* Stock—*C. brevichela* Clark—*S. cheilorhynchus* n. sp.—*S. tubirostris* n. sp., illustrates the way in which these specialized forms may have arisen. The chelifores most closely resemble those found in *Austropallene*, where a greatly attenuated proboscis is often present. *Austropallene* is, however, always distinguished by the presence of marked spurs over the chelifore bases and on the lateral processes. *Austropallene* is an Antarctic genus, whilst *Stylopallene* is restricted to Australian waters.

***Stylopallene cheilorhynchus* n. sp.**

Figs. 19 A—I

MATERIAL

7 males (1 is holotype), 7 females (1 is allotype), 4 juveniles, Port Arthur, Tasmania, in kelp weed. Coll. Barnett. A.M. P.13634, P.13635, P.13636.

1 juvenile near Mainwaring Cove, west coast of Tasmania, 90 metres, F.I.S. "Endeavour", June 21, 1914, A.M. E.6393.

DESCRIPTION

Trunk robust, very compact, broad, lateral processes touching, dorsum marked off from lateral processes by integumentary lines; third and fourth trunk segments not separated by a segmental line. Cephalon large, equal to rest of trunk; region anterior to first lateral processes broad with a very slight longitudinal cleft anteriorly.

Ocular tubercle low, rounded, set on posterior part of cephalon; eight eyes arranged in four groups of two.

Proboscis of two parts, a basal cylindrical part and a distal tubular part composed of three lips closely apposed, and greatly developed. Basal part with widest point at two-thirds of its length, tapering slightly towards base and slightly rounded toward base of lip region. Lip region less than half as long as basal region, tapering distally, ending in the pointed tips of the three lips which diverge very slightly at distal extremity.

Abdomen short and broad, rounded, with a downward flexure, reaches beyond ends of fourth lateral processes.

Chelifore scape one-jointed, directed forward and downwards; chelae rather cylindrical in cross-section, palm a little longer than dactylus. Fingers bowed, dactylus rounded, untoothed, but with a few small spinules near outer edge.

Immovable finger strong, slightly nodulous at tip, with a few blunt spinules on side near the tip, and with a number of pointed spinules posterior to these and extending back on to anterior part of palm.

Palps lacking in both sexes.

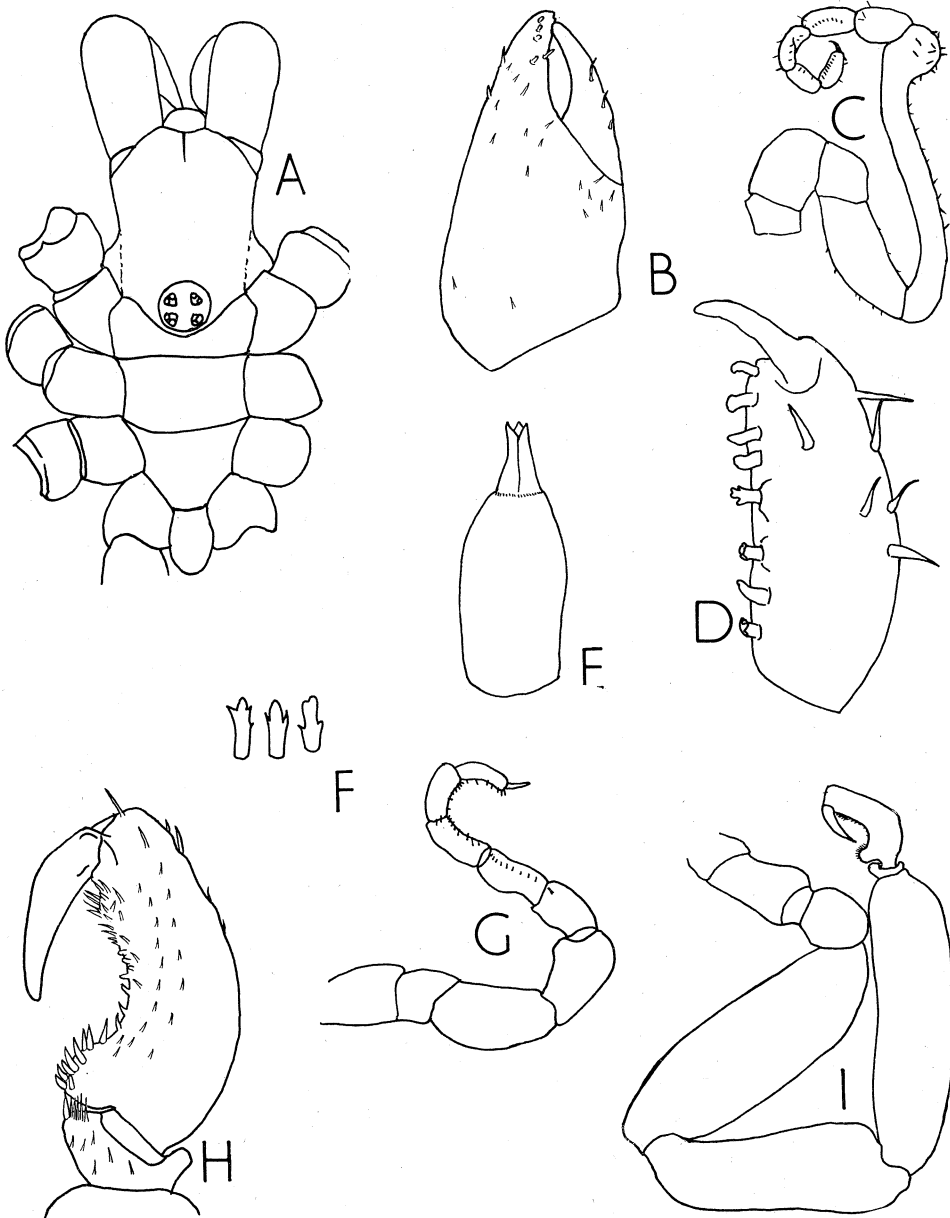


Fig. 19.—A-I, *Stylopallene cheilorhynchus*. A, dorsal view of trunk; B, male chela; C, male oviger; D, tip of male oviger; E, proboscis; F, oviger spines; G, female oviger; H, male propodus; I, male third leg.

Oviger 10-jointed with a terminal claw; in male the three basal joints short and stout, fourth joint long with a few small spines, fifth joint longest, bent, with a marked globular distal apophysis, also with a few small spines. Joints 6-10 decreasing in size, joints 7-10 with denticulate spines according to formula 8 : 7 : 3 : 8. Shape and denticulation of spines are very irregular. Terminal claw non-denticulate. Female oviger somewhat similar to that of male but joint five shorter than joint four, and without any apophysis. Spine formula 9 : 9 : 7 : 6. Length of joints in mm. are:

Joint	1	2	3	4	5	6	7	8	9	10
Male	0.27	0.46	0.4	1.0	1.91	0.36	0.34	0.29	0.23	0.25
Female	0.27	0.46	0.31	0.81	0.545	0.545	0.46	0.37	0.34	0.34

Third Leg. Legs stout, second coxa longer than first or third, long joints strongly inflated with a sparse investiture of small spinules, femur and second tibia subequal, first tibia a little shorter; tarsus very short, propodus curved with a strong heel. Basal spines of heel region moderate, but weaker on distal parts of sole, many small spinules on sides of the propodus. Claw strong, half as long as propodus; auxiliary claws lacking.

Genital pores on ventral surfaces of second coxae of all legs in both sexes.

Measurements (in mm.—male paratype): length trunk (anterior margin of cephalon—tip of abdomen) 2.86, length cephalon 1.4, width second lateral processes 1.7, length chelifore scape 0.86, length abdomen 0.6, length proboscis 1.2, greatest width proboscis 0.7. Third leg: 1st coxa 0.47, 2nd coxa 0.86, 3rd coxa 0.6, femur 2.34, 1st tibia 2.26, 2nd tibia 2.73, tarsus 0.2, propodus 0.93, claw 0.47.

***Stylopallene dorsospinum* n. sp.**

Figs. 20 A—I

MATERIAL

2 females (one is holotype) trawled about seven miles off Twofold Bay, N.S.W., 90 metres. Coll. Capt. K. Moller, trawler "Durraween" Oct., 1929. A.M. P.13637, P.13638.

1 damaged male (allotype), 1 female, 2 juveniles, trawled of Wata Mooli, near Botany Bay, N.S.W. (3½-4 miles), 91-93 metres, dredged, Station 57, "Thetis" Expedition. A.M. P.13639 (2 parts).

DESCRIPTION

Trunk very compact, robust, clearly segmented, lateral processes touching or nearly touching, with one or two terminal or sub-terminal tubercles; central area of dorsum marked off from lateral processes by lateral grooves reminiscent of *Rigona*. Cephalon large, very broad, region anterior to ocular tubercle greatly expanded, forming massive bases to chelifore scapes. Low tubercles present over bases of chelifores. Posterior portions of segments 1-3 thrown up into pronounced ridges, which on segments two and three are surmounted by tall, tapering, cylindrical processes which may bear a few setae.

Ocular tubercle situated between anterior margins of first lateral processes, anterior face about 1½ times as high as basal diameter, rounded above with a slight transverse apical groove; eyes four, well-pigmented.

Abdomen stout, set at 45° from horizontal, taller than ocular tubercle but lower than dorsal tubercles, anus a terminal slit.

Proboscis consisting of two regions, a pear-shaped basal part and a distal, slender tapering part composed of the closely apposed and partly fused lips. Proboscis rather similar to that of *S. tubirostris* n. sp. but the regions are not demarcated by transverse lines.

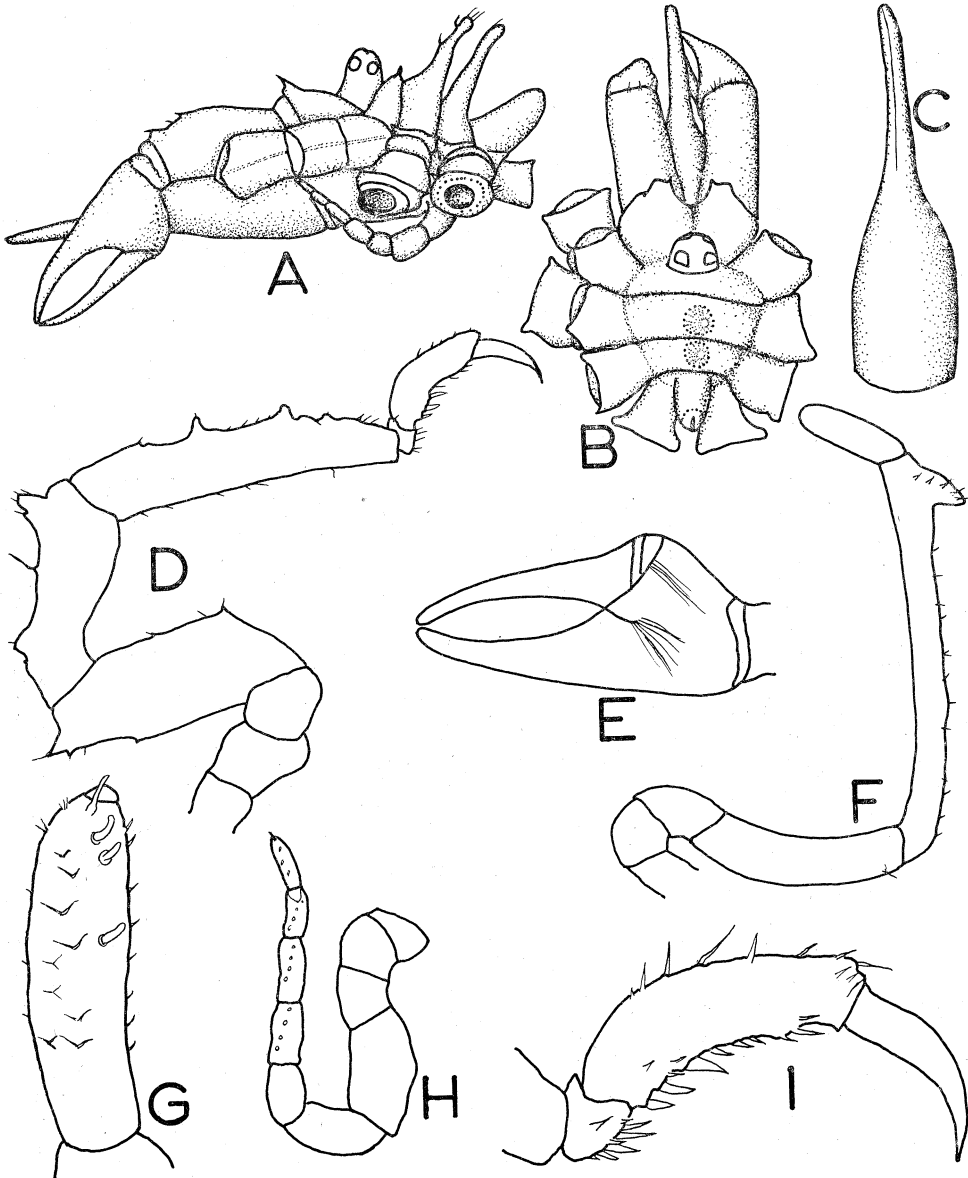


Fig. 20.—A-I, *Stylophallene dorsospinum*. A and B, lateral and dorsal views of female; C, proboscis; D, female third leg; E, female chela; F, damaged male oviger; G, tip of female oviger; H, female propodus; I, female propodus.

Chelifore scape one-jointed with a few small spines near distal end. Chela linear, strong, fingers longer than palm, dactylus and immovable finger equal, slender, gently bowed, untoothed, meeting at tips.

Palps lacking.

Oviger (female) 10-jointed, joints 1-3 short and stout, fourth joint stoutest and longest, fifth shorter than fourth and three-quarters as wide; joints 6-10 subequal in length becoming progressively more slender. Terminal joint difficult to interpret, possessing a terminal boss-like structure which is interpreted as the remnant of a terminal claw, joints 7-10 each bear four reduced compound (?) oviger spines and a number of bifid and trifid setae.

The only male specimen available bears a single damaged oviger from which the following information may be derived: joints 1-3 short and stout, fourth joint longer than any joint of the female oviger, fifth joint almost twice as long as fourth, with a marked distal apophysis, short setae present along one edge of joint and several spines on apophysis; sixth joint shorter than fourth.

Third leg stout, robust, coxae subequal, femur solid with strong spine bearing tubercle distally, first tibia shorter and more slender than femur, also armed with spine bearing tubercles, 2nd tibia the longest joint, with tubercles on dorsal surface. Tarsus short, propodus slightly curved with strong spines on heel region but weaker further along sole; claw strong, more than half as long as propodus, auxiliary claws absent.

Genital pores, both sexes, on ventrodistal part of second coxae of all legs.

Measurements (figured paratype in mm.): length trunk (anterior margin of cephalon to tip 4th lateral processes) 1.98, length cephalon 0.84, width 2nd lateral processes 1.8, length proboscis 2.35, greatest width proboscis 0.61. Third leg: 1st coxa 0.48, 2nd coxa 0.51, 3rd coxa 0.485, femur 1.88, 1st tibia 1.62, 2nd tibia 2.35, tarsus 0.15, propodus 0.85, claw 0.56.

REMARKS

In the form of the proboscis this species is very similar to *S. tubirostris* n. sp. It is readily distinguished from *S. tubirostris* and *S. cheilorhynchus* by the dorsal tubercles and the long fingers of the chelae. The oviger is more reduced than in any of the other species.

***Stylopallene tubirostris* n. sp.**

Figs. 21 A—I

MATERIAL

1 ovigerous male (holotype) Port Jackson, N.S.W., Nov. 7, 1927. A.M. P.6744.

DESCRIPTION

Trunk very compact, clearly segmented, lateral processes touching or nearly touching, surface of dorsum smooth, not ornamented by spines or setae. Cephalon large, equal in length to remaining three segments; anterior portion expanded over base of proboscis. Trunk segments marked with lateral lines running from anterior to posterior margins in a manner reminiscent of those found in *Rigona*.

Ocular tubercle very low, in line with first lateral processes, and thus situated two-thirds of the way back from anterior margin of cephalon; eyes small, well pigmented; appear to be eight in number arranged in four groups of two.

Abdomen horizontal, short, reaching beyond fourth lateral processes, but not beyond first coxae.

Proboscis consisting of two distinct regions; a moderately stout basal region, and a long tubular distal region of about the same length as basal region. Proximal portion of basal region slightly expanded, then narrowing slightly, to continue as a cylinder towards distal part of this region when it becomes much narrower at base of tubular region. Tubular region about one-fifth as wide as basal region, tapering slightly throughout its length.

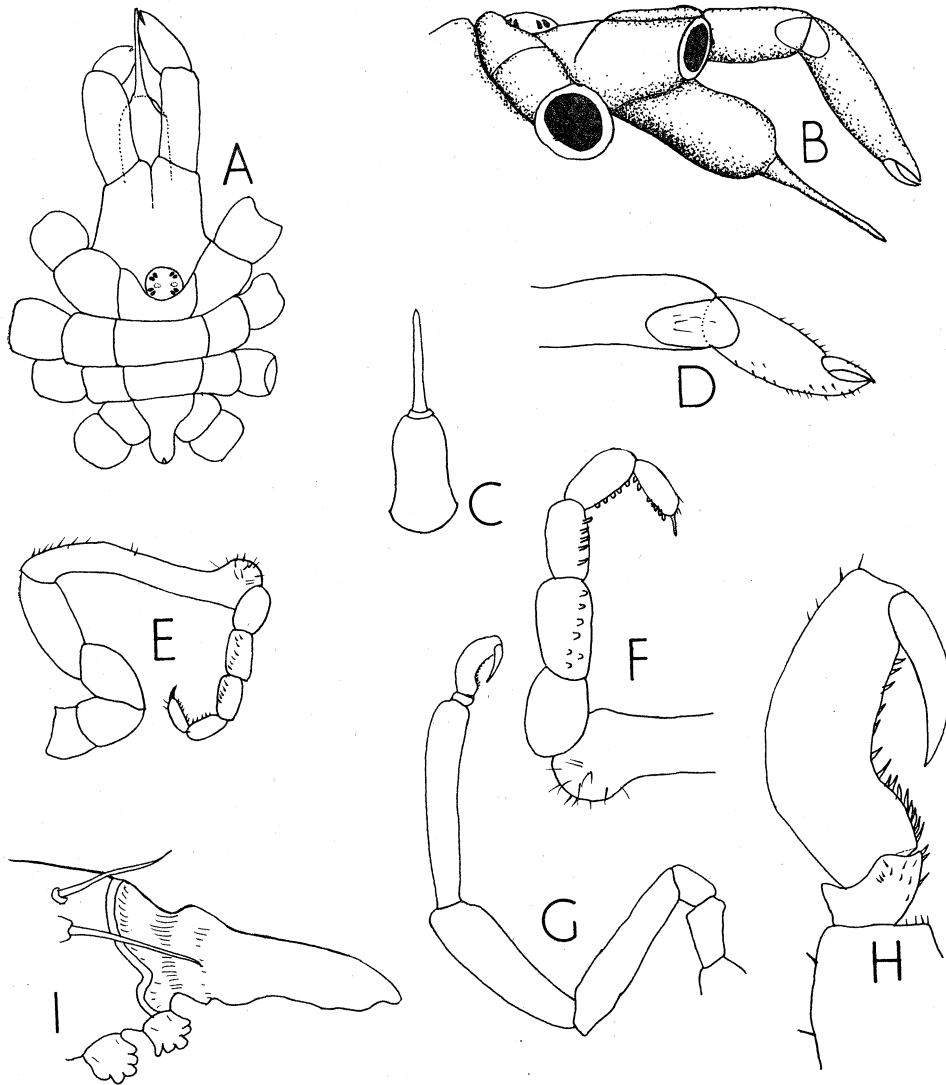


Fig. 21.—A-I, *Stylopallene tubirostris* (all figs. of male holotype). A, dorsal view of trunk; B, lateral view of cephalic region; C, proboscis; D, chela; E, oviger; F, tip of oviger; G, third leg; H, propodus; I, terminal oviger claw.

Chelifores linear, scape one-jointed, smooth. Chelae linear-ovate, palm about twice as long as fingers, dactylus curved, immovable finger almost straight, fingers not toothed. Chelae with a few short setae scattered irregularly over surface.

Palps lacking.

Oviger 10-jointed, joints 1-4 normal, fifth joint with a marked globular terminal swelling which bears a number of simple setae; joints 7-10 with denticulate spines according to formula 7 : 5 : 5 : 7. Terminal claw present. Oviger joints of the following lengths (in mm.): 1—0.44, 2—0.476, 3—0.44, 4—0.95, 5—1.965, 6—0.393, 7—0.419, 8—0.375, 9—0.321, 10—0.245.

Third leg robust, slight ventral swellings on distal ends of all second coxae bear genital apertures. There do not appear to be any femoral cement glands. Femur and tibia stout, almost spineless; propodus slightly arcuate; basal spines uniform in size, more closely spaced in heel region. Claw strong, auxiliary claws lacking.

Measurements (in mm.): Total length (tip proboscis to fourth lateral processes) 3.75, width 2nd lateral processes 1.78, length chelifore scape 0.9, abdomen 0.32, proboscis (measured ventrally) basal region 0.98, stylar region 0.8, total length 1.78, width proboscis at base 0.59, width at distal part of basal region 0.54. Third leg: 1st coxa 0.45, 2nd coxa 0.93, 3rd coxa 0.89, femur 2.68, 1st tibia 2.5, 2nd tibia 2.95, tarsus 0.43, propodus 1.18, claw 0.675.

Key to Species of *Stylopallene*

1. Dorsum with tubercles taller than ocular tubercle, propodal heel poorly developed
S. dorsospinum n. sp.
- Dorsal tubercles not taller than ocular tubercles, propodal heel moderately developed. 2.
2. Proboscis with narrow distal part less than half as long as wider basal part.
S. cheilorhynchus n. sp.
- Proboscis with narrow distal part almost as long, or as long as wider basal part.
S. tubirostris n. sp.

Genus **Pallenopsis** Wilson, 1881

Pallenopsis hoekii Miers

Fig. 24E

Pallenopsis hoekii Miers, 1884; 324, pl. 35, fig. B.

—Carpenter, 1893; p. 23, pl. 2, fig. 11.

? *Phoxichilidium hoekii* Haswell, 1884; 1022. —Loman, 1908; 70-71.

Pallenopsis (Rigona) rigens Loman, 1908: 68-69, pl. 9, fig. 128-133.

Pallenopsis (Rigona) hoekii Flynn, 1929: 257-258.

Pallenopsis hoeki Stock, 1954: 8.

REMARKS

During the preparation of the key to Australian species in this genus I examined the type material in the British Museum and found that the figures of the oviger already published are inadequate. I have therefore provided a new figure of the terminal joints of one of the syntypes.

Pallenopsis gippslandiae Stock

Fig. 22 I

Pallenopsis gippslandiae Stock, 1954: 65-68, figs. 28-29.

MATERIAL

1 ovigerous male, off mouth of Manning River, N.S.W., 84-93 metres, trawler "Ben Bow", pres. Capt. K. Moller, March 17, 1947. A.M. P.11755.

4 ovigerous males, 5 females, trawled 25 miles south-east of Double Island, Queensland, 62 metres, F.I.S. "Endeavour". A.M. P.13640.

1 female, trawled 40 miles south-south-west off Mt. Cann, Vict., 130 metres F.I.S. "Endeavour", March 27, 1914. A.M. P.13641.

1 female, trawled off Green Cape, N.S.W., coll. Capt. K. Moller, July, 1926. A.M. P.13642.

2 males (1 ovigerous), 2 females, trawled 30 miles south of Gabo Island, N.S.W., 148 metres, coll. Capt. K. Moller, trawler "Durraween", July, 1939. A.M. P.13643.

1 male, trawled 11 miles west by west off Crowdy Head, 93 metres, coll. Capt. K. Moller, Sept., 1935. A.M. P.11761.

1 female, no data, found in tube associated with the young of the crab *Latreillopsis petterdi* Grant (P.6776), a species occurring off the south-east and south coastline of Australia in deep water. From an F.I.S. "Endeavour" locality. A.M. P.13644.

1 female, off Disaster Bay, N.S.W., about 95 metres, trawled, coll. Capt. K. Moller, May, 1930. A.M. P.13645.

2 females (1 immature) off Botany Bay, N.S.W., 61-99 metres, taken from ground line of trawl on trawler "Karangai", coll. F. McNeill and A. Livingston, Aug., 1921, A.M. P.5597 (part).

1 ovigerous male, off Cape Everard, Vict., 130-140 metres, coll. H. O. Fletcher, trawled May, 1929. A.M. P.13646.

1 juvenile, 10 miles off Montague Island, N.S.W., 130-148 metres, "Bar-ea-Mull", coll. G. P. Whitley and W. Boardman, Aug. 24, 1925. A.M. P.8220.

1 female, 25 miles south of Cape Everard, Vict., 150 metres, F.I.S. "Endeavour", Oct. 20, 1914. A.M. E.6029.

1 male, east of Babel Island, eastern slope Bass Strait, 122 metres, trawled F.I.S. "Endeavour", May 28, 1914. A.M. P.13647.

20 males, 17 females, 1 juvenile, trawled west-south-west from Gabo Island, N.S.W., 130 metres, coll. Capt. K. Moller, trawler "Durraween", Dec., 1929. A.M. P.13648.

1 female (abnormal ocular tubercle), off Babel Island, eastern slope Bass Strait, 148-555 metres, F.I.S. "Endeavour", 28 May, 1914, A.M. E.4650.

4 males, 3 females, trawled about 7 miles off Twofold Bay, N.S.W., 83 metres, coll. Capt. K. Moller, trawler "Durraween", Oct., 1929. A.M. P.13649.

2 females, 1 juvenile, trawled off Twofold Bay, N.S.W., 83-93 metres, "Durraween", coll. Capt. K. Moller, Aug., 1929. A.M. P.13650.

REMARKS

Although this species was previously known only from two males, the description provided by Stock is adequate for both sexes, though in the females the spine-bearing tubercles on the central third of the femur are not always as numerous as in the males. The ocular tubercle is often rather more pointed than shown in Stock's figures.

One female from off Babel Island is abnormal in that the ocular tubercle is bifid at the tip and bears eight eyes. A frontal view of this ocular tubercle is shown in fig. 22 I.

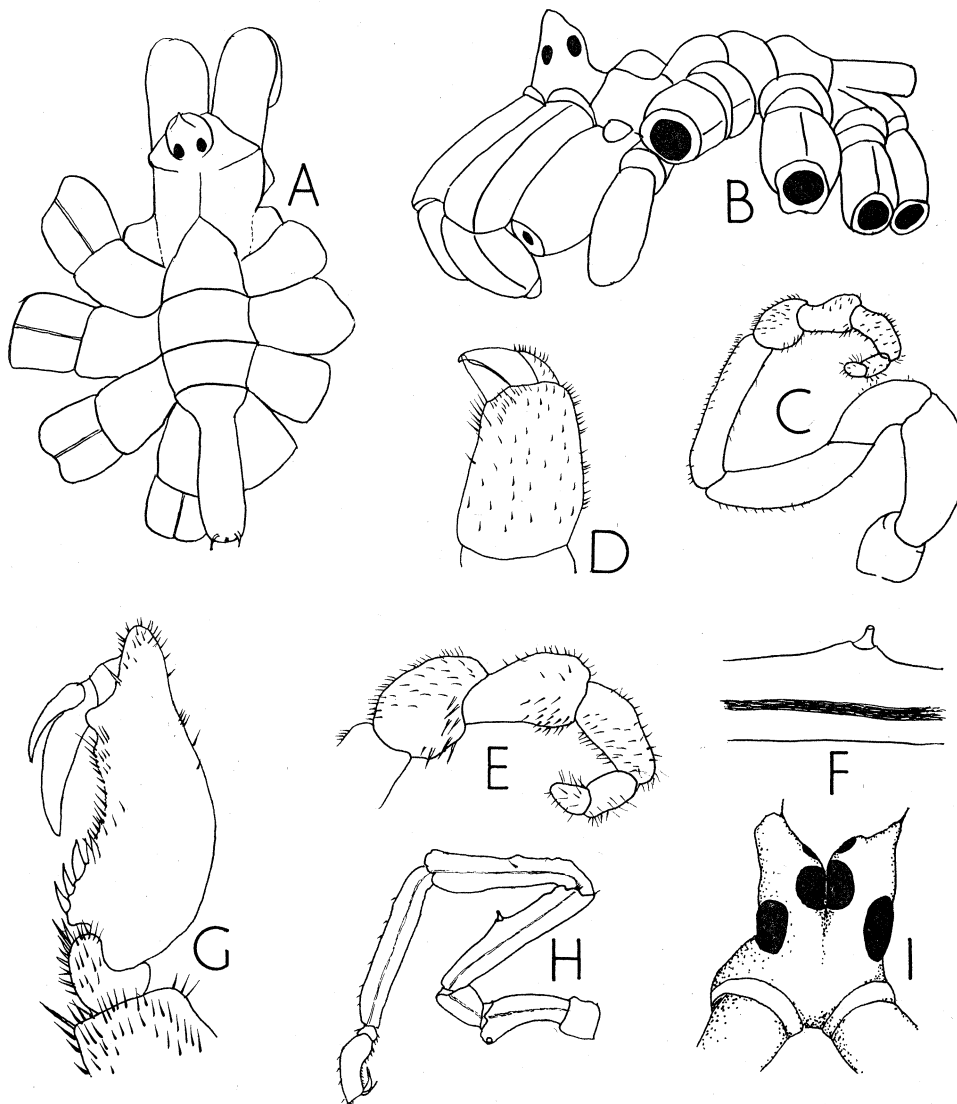


Fig. 22.—A-H, *Pallenopsis macneilli*. A, dorsal view of male paratype; B, lateral view of female paratype; C, male oviger; D, male chela; E, tip of male oviger; F, femoral cement gland duct; G, male propodus; H, male third leg; I, *Pallenopsis gippslandiae*, anterior view of ocular tubercle of abnormal specimen.

Pallenopsis macneilli n. sp.

Figs. 22 A—H

MATERIAL

1 male (holotype) and 5 females (1 is allotype, the rest paratypes), Nelson's Bay, Port Stephens, N.S.W., A.M. P.13651, P.13652, P.13653.

1 damaged larvigerous male, on weed, low-tide mark, Bondi, coast near Sydney, N.S.W., Nov., 1927, coll. M. Ward. A.M. P.8930.

1 juvenile, Shoreline Cave, Narooma, N.S.W., among growths in rock pool, coll. Miss E. Pope, July 15, 1949. A.M. P.11952 (part).

DESCRIPTION

Trunk compact, robust, without spines or tubercles except at tip of abdomen. Lateral processes touching or almost touching throughout length. Trunk typical of type found in subgenus *Rigona*, i.e., lateral processes are marked off from central portion of trunk segments by transverse cuticular grooves, central region rather inflated. Segmental lines moderately well-developed in males, but somewhat obscured in some females. Anterior portion of cephalon bears at its tip the ocular tubercle, and, posterior to this and extending in mid-line to anterior limit of central swollen portion of trunk, is a dark, somewhat depressed line in the cuticle. Oviger bases inserted on ventral side of neck region of cephalon, immediately anterior to first lateral processes.

Ocular tubercle slightly higher than diameter at base, roundly conical at tip, without setae. Four well-pigmented eyes.

Proboscis cylindrical, length about twice diameter, slightly constricted at one-third and two-thirds of its length.

Abdomen reaches to tip of first coxa, slightly narrower near base than at two-thirds of its length where it reaches its maximum width. Tip truncated, and armed with two small spines. Abdomen may be horizontal or slightly elevated.

Chelifore scape of one joint, widening slightly towards distal end; with short sparse pubescence near distal end. Chela two-thirds of length of scape, palm rather rectangular, fingers about half as long as palm, dactylus a little longer than immovable finger, tips of fingers cross, cutting edges untoothed. At base of dactylus is a small pad furnished with short setae, another group of slightly longer setae is present at base of immovable finger. Palm bears a number of short sparse hairs.

Palp a single knob-like joint inserted ventro-laterally on cephalon level with posterior part of ocular tubercle.

Oviger (holotype—male) of 10 joints, fourth and fifth joints longest, sixth joint short and stout; terminal joints as shown in fig. 22E. Compound spines lacking. Orientation of the simple setae appears almost random. Female oviger (allotype) nine-jointed, weaker than that of male, basal joint not as robust as in male and fourth joint is longest; apart from ninth joint, almost without setae. Ninth joint bears five moderate and one small simple oviger spines.

The measurements of the oviger joints (in mm.) are:

Joint	1	2	3	4	5	6	7	8	9	10
Male ..	0.66	1.22	0.88	1.6	1.72	0.5	0.5	0.8	0.25	0.17
Female ..	0.3	0.33	0.28	0.67	0.55	0.33	0.48	0.2	0.16	—

Third leg stout, robust, with few short hairs. First coxa one-third as long as second, which is almost twice as long as third. Femur and first tibia equal, femoral cement glands of male with ducts about one third as long as width of femur, inserted on a mound about middle of femur. Second tibia longest joint, and tarsus shortest. Propodus curved, more markedly so on dorsal surface; with a spinose distal process. The three proximal basal spines are strong; remainder weak. Terminal claw strong, reaching to tip of third basal spine; auxiliary claws two-thirds as long as main claw.

Measurements (in mm., male holotype) length proboscis (measured ventrally) 1.9, greatest width proboscis 0.9, length (tip of cephalon to tip 4th lateral process) 4.2, width second lateral processes 3.1, length chelifore scape 1.7, length abdomen 1.2. Third leg: 1st coxa 0.77, 2nd coxa 2.3, 3rd coxa 1.3, femur 3.8, 1st tibia 3.8, 2nd tibia 4.2, tarsus 0.3, propodus 1.6, claw 0.7, auxiliary claw 0.46.

Genital apertures on small swellings on ventral surfaces of distal portions of all second coxae in females, but only third and fourth pairs of legs in males. Genital mounds larger in males.

REMARKS

This species is at first sight rather similar to several other species of *Pallenopsis* known from this general region. It differs from *P. hoekii* Miers in the possession of the setose pad at the base of the chelifore dactylus, the closer spacing of the lateral processes, the shape and spination of the propodus, as well as fundamental differences in the ovigers. It differs from *P. ovalis* Loman in the lesser development of the genital mound in the male, the reduced spination of the male oviger, and the well-developed intersegmental lines in the male. In *P. ovalis* the integument is reticulated, but not in *P. macneilli*. Similarly, it is readily distinguished from the New Zealand *P. obliqua* (Thomson) by the lack of spines and tubercles on the trunk and chelifore scape. Further, this species may be distinguished from *P. persimilis* Stock by the presence of the full complement of intersegmental lines and the absence of setae on the ends of the lateral processes. More important features are found in the male oviger, which lacks the terminal process on the sixth joint that is found in *P. persimilis*, and the reduced spination of the female oviger. The ocular tubercle and propodus also differ. There can be no doubt that *P. macneilli* is closely related to the *P. ovalis-obliqua-persimilis* group, but a comparison of this species with the others discussed by Stock (1956b) shows this new species to differ from those previously known.

Key to the Australian species of **Pallenopsis**

- | | |
|--|----------------------------------|
| 1. Trunk very compact, lateral processes touching or almost touching. | 2 |
| Trunk not very compact, lateral processes separated by almost their own width. | |
| | <i>P. gippslandiae</i> Stock. |
| 2. Proboscis with a fringe of setae near tip. | <i>P. denticulata</i> Hedgepeth. |
| Proboscis without a fringe of setae near tip. | 3 |
| 3. With a setose pad at base of chelifore dactylus. | <i>P. macneilli</i> n. sp. |
| Without a setose pad at base of chelifore dactylus. | <i>P. hoekii</i> Miers. |

Genus **Pycnothea** Loman, 1921

Pycnothea flynni Williams

Figs. 23 A—G

Pycnothea flynni Williams, 1940: 202-204, figs. 6-9.

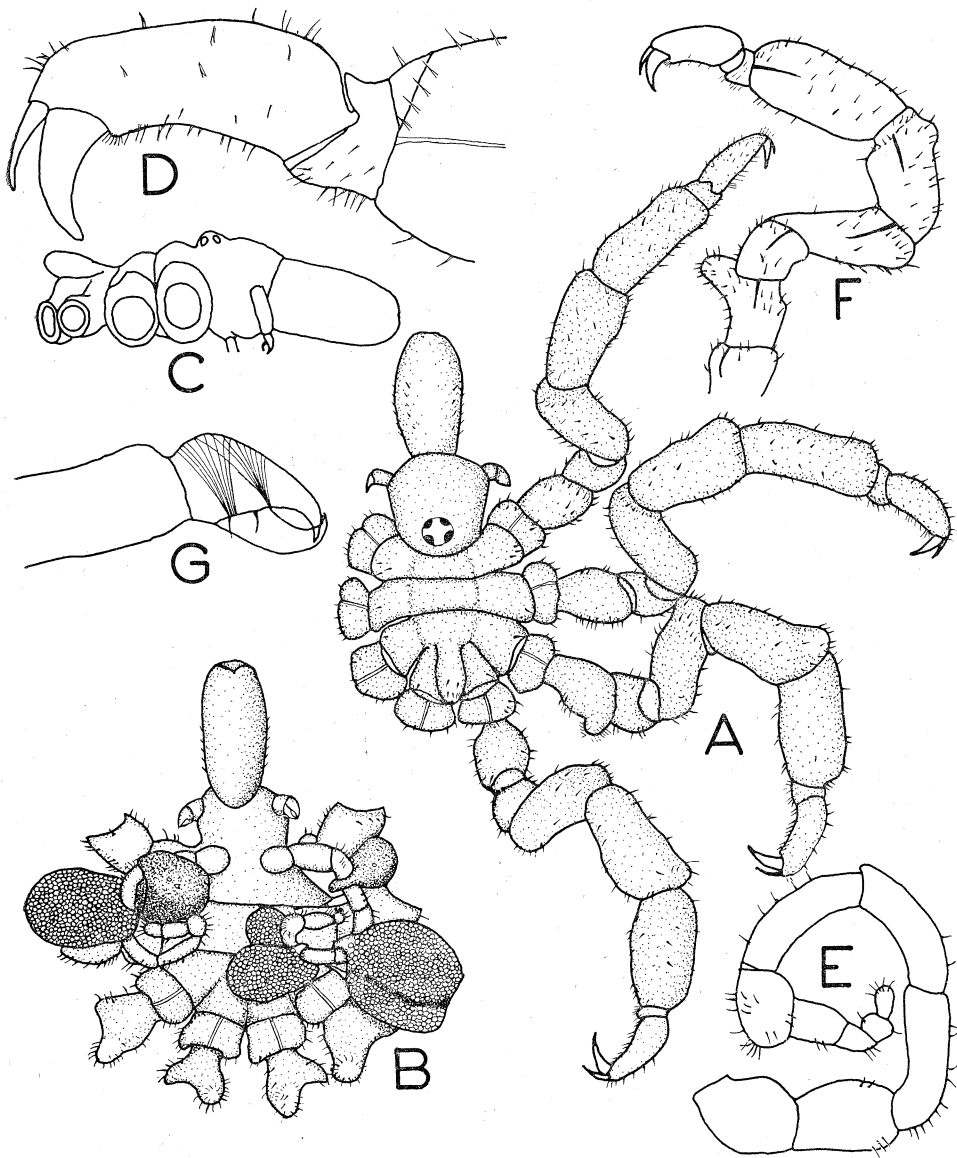


Fig. 23.—A-G, *Pycnothea flynni* male. A, dorsal view; B, ventral view showing egg masses; C, lateral view; D, propodus; E, oviger; F, third leg; G, chelifore.

MATERIAL

1 ovigerous male, Norfolk Island, coll. W. Laing, 1902 (in writer's collection).

1 male, reef at Shelly Beach, west mouth of Clarence River, N.S.W., coll. A. Cameron, Jan., 1939. A.M. P.11018.

1 ovigerous male, under stones, Angowrie, south of Clarence River, N.S.W., coll. Miss E. Pope, April 6, 1947, A.M. P.11951.

REMARKS

One specimen was noted as uniformly red in colour in life; in alcohol all specimens were straw-coloured.

P. flynni, hitherto only known from Rottneest Island, Western Australia, is now recorded from the eastern coast and from Norfolk Island. The only other species in this genus is *P. selkirki* Loman, from Juan Fernandez Island.

Pycnothea stands very close to *Pigrogromitus* Calman, from which it is distinguished by the single jointed chelifore scape, the presence of auxiliary claws and the absence of a terminal oviger claw. *Pigrogromitus* is monotypic (*P. timsanus* Calman, 1927); *Pigrogromitus robustus* Hilton, 1942, is in fact *Pycnosoma stronglylocentroti* Los.—Los. (Hedgepeth *in litt.*).

Family **PHOXICHILIDIIDAE** Sars, 1891

Genus **Anoplodactylus** Wilson, 1878

Anoplodactylus haswelli (Flynn)

Figs. 24 A—D

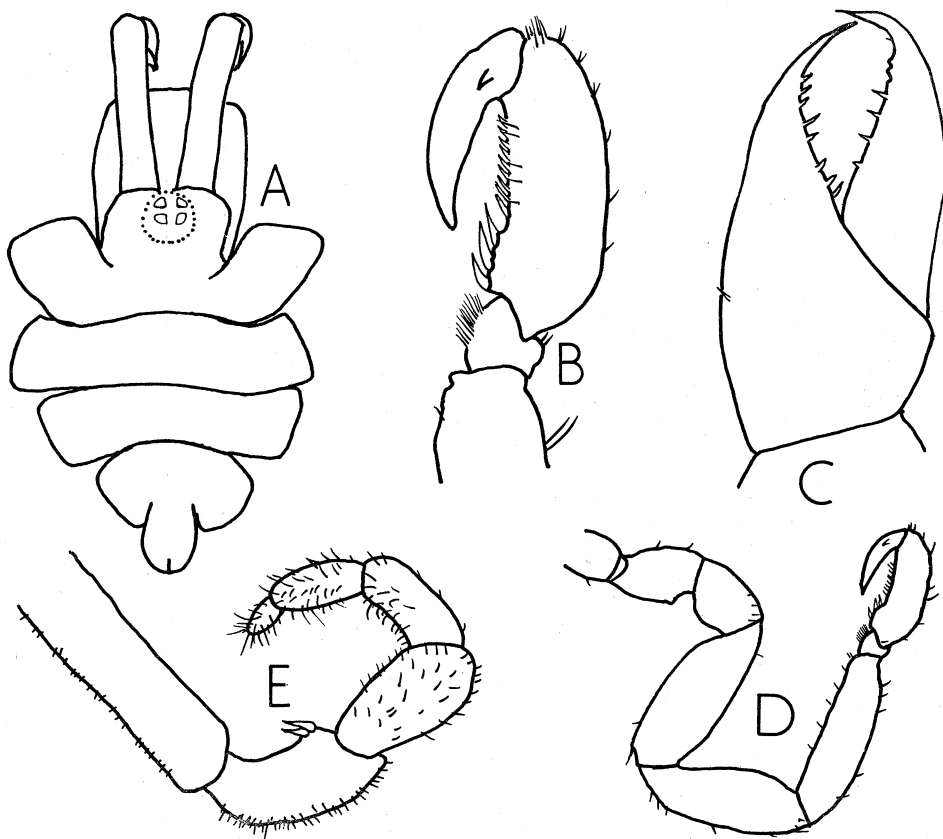


Fig. 24.—A-D, *Anoplodactylus haswelli*, female. A, dorsal view of trunk; B, propodus; C, chela; D, third leg; E, *Pallenopsis hoekii* terminal oviger joints, male from Murray Island.

Halosoma haswelli Flynn, 1919a: 11-15, pl. 1.

Anoplodactylus haswelli Stock, 1954: 86-88, fig. 40 a, b.

MATERIAL

4 females, Burning Palms Beach, south of Port Hacking, N.S.W., rocks near high tide mark, coll. G. P. Whitley, Feb. 11, 1934. A.M. P.10506 (part).

REMARKS

The females of this species are new, the species being previously known from two males. Some of the differences noted may be sexual in character. The females differ from Flynn's description in having the intersegmental lines well developed on the dorsal side, and strikingly in the spination of the tarsus and propodus. Further, the femora and tibiae do not all possess the terminal spine which is so prominent in Flynn's figures. In other characters they agree well enough, even to measurements. These specimens differ strikingly from the chelifore figured by Stock (1954). Stock's specimen came from New Zealand and undoubtedly represents a different species.

Measurements (in mm.): total length (tip proboscis to tip fourth lateral processes) 1.04, width across second lateral processes 0.7, length proboscis 0.57, greatest width proboscis 0.38, length chelifore scape 0.47. Third leg: 1st coxa 0.19, 2nd coxa 0.38, 3rd coxa 0.38, femur 0.78, 1st tibia 0.81, 2nd tibia 0.82, tarsus 0.09, propodus 0.55, claw 0.35.

The genital apertures are situated on very small papillae on the ventral surface of all second coxae.

***Anoplodactylus tubiferus* (Haswell)**

Phoxichilidium tubiferum Haswell, 1884: 1032, pl. 57, figs. 1-5. —Whitelegge, 1889: 233.

Anoplodactylus tubiferus Cole, 1904: 288. —Loman, 1908: 72. —Flynn, 1920: 79-81, pl. xx, figs. 12-14, pl. xxi, fig. 15 —Williams, 1941: 35.

MATERIAL

1 male off Cape Everard, Vict., 126-135 metres, trawled, coll. H. O. Fletcher, May, 1929. A.M. P.13654.

1 male, 1 female, station 37, "Thetis" Expedition, 2-2½ miles off Botany Bay, N.S.W., 90-93 metres, dredged. A.M. P.13655.

1 male, station 35, "Thetis" Expedition, 1¼-2 miles off Port Hacking, N.S.W., 39-69 metres, dredged. A.M. P.13656.

REMARKS

The material before me does not differ in any respect from the descriptions of Haswell or Flynn. *A. tubiferus* is readily distinguished from all other Australian species of the genus by the great height of the ocular tubercle. The only other species with a high ocular tubercle is *A. longiceps* which has a pointed ocular tubercle and low, broad cement glands in the males. In *A. tubiferus* the cement glands discharge through a long fine tubular duct more than one third as long as the femur

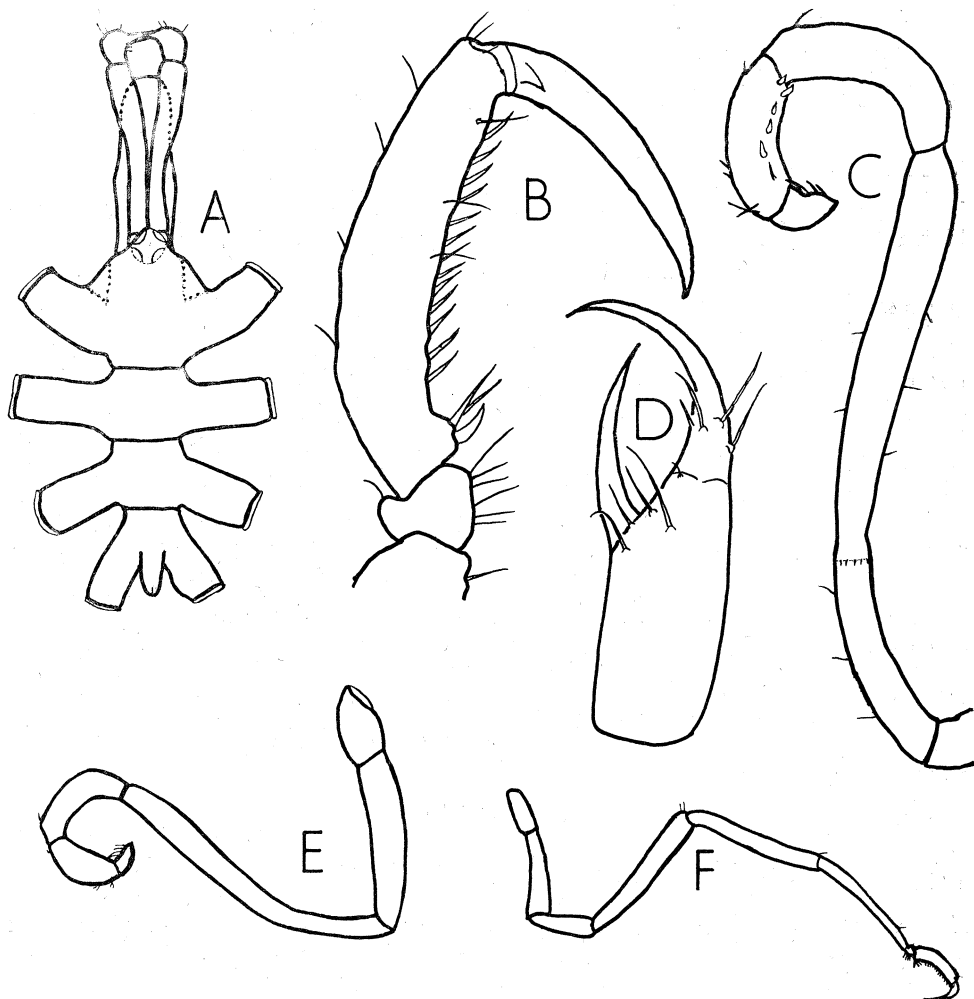


Fig. 25.—A-F, *Anoplodactylus simplex* (all figs. of male paratype). A, dorsal view of trunk; B, propodus; C, distal joints of male oviger; D, chela; E, male oviger; F, third leg.

***Anoplodactylus simplex* n. sp.**

Figs. 25 A—F

MATERIAL

2 ovigerous males, 8 females (1 male is holotype, a female is allotype, the remainder are paratypes), Shallow Bay, just south of Kurnell, Botany Bay, N.S.W., dredged in 15 feet, sand and weed, coll. F. McNeill and party. A.M. P.8938.

DESCRIPTION

Trunk clearly segmented, lateral processes separated distally by their own diameter or more. Surface of trunk and lateral processes smooth, without spines or other ornament.

Ocular tubercle tall, obtusely pointed, directed slightly forward, eyes not well pigmented.

Abdomen slightly tapering towards tip, directed upwards at nearly 90°.

Proboscis long, cylindrical, inflated near middle.

Chelifore scape slender, wider distally, reaching over proboscis, with a few small setae; chelae at right angles to proboscis, fingers about same length as palm, dactylus strongly curved, immovable finger less strongly curved, margins of both fingers entire. Four simple spines on palm near base of fingers, and on sides of dactylus.

Palps lacking in both sexes.

Oviger (in male only) six-jointed, third joint longest, with a trace of an unarticulated joint near proximal end; fourth and fifth joints curved, sixth joint very short, third and fourth joints with sparse fine setae, fifth joint with fine setae and five short peg-like spines near inner margin; terminal joint armed with a stout proximal spine, and beyond this two fine setae.

Legs moderately stout, femur the longest joint. Propodus with a strong heel, armed with a stout spine proximally, and a pair of longer and more slender spines distally. Sole of propodus armed with 13-15 basal spines of uniform size. Terminal claw long, auxiliary claws minute.

Genital apertures: in the males these appear to be restricted to a slight spur on distal ventral surface of second coxae of fourth legs. In females genital apertures are found on a slight mound on ventro-distal surface of all legs.

Measurements (in mm.) male paratype: Length (tip proboscis to tip 4th lateral process) 2.1, width across 2nd lateral processes 1.1, length chelifore scape 0.74, greatest width of proboscis 0.26. Third leg: 1st coxa 0.35, 2nd coxa 0.94, 3rd coxa 0.94, femur 1.67, 1st tibia 1.58, 2nd tibia 1.36, tarsus 0.1, propodus 0.71, claw 0.45.

REMARKS

This species is very close to *A. longiceps* Stock, 1954 (= *A. longicollis* Williams, 1941 preocc.) from Lindeman Island, Whitsunday Passage, Queensland. *A. simplex* differs from *A. longiceps* in the following respects: the lateral processes are not as widely spaced; the third joint of the oviger is relatively longer in *A. simplex*; the tarsus is without the long spine shown in Williams's figure; the basal spines of the propodus are uniform in size in *A. simplex*, not decreasing markedly towards the distal end as in *A. longiceps*; the femur and first tibia of *A. simplex* lack the spinous terminal processes of *A. longiceps*.

Anoplodactylus evansi n. sp.

Figs. 26 A—G

MATERIAL

2 ovigerous males (1 is the holotype), 1 female (allotype), between tidemarks, Shark Island, Port Jackson, N.S.W., coll. B. Dew, Jan., 1952. A.M. P.12129.

1 female, Shelly Beach, Yamba, N.S.W., coll. A. Cameron, Feb. 22, 1940, A.M. P.11268.

1 female, Port Arthur, Tasmania, coll. E. Mawle. A.M. P.13657.

1 female, Port Jackson, N.S.W., A.M. G.5774.

1 male, Shell Harbour, N.S.W., between tidemarks, coll. G. McAndrew Dec., 1925. A.M. P.13658.

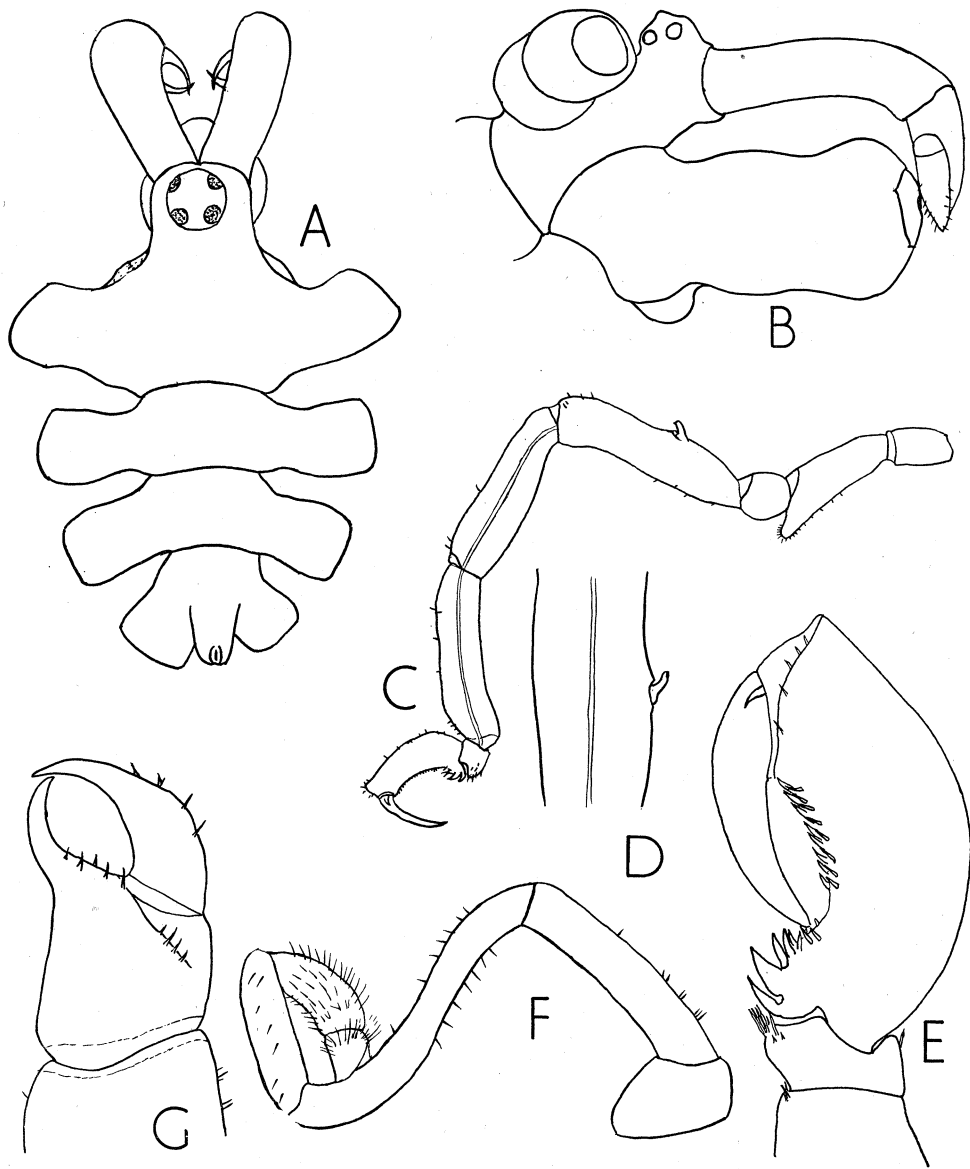


Fig. 26.—A-G, *Anoplodactylus evansi*. A, dorsal view of male; B, cephalic region of female; C, third leg of male; D, femoral cement gland; E, male propodus; F, male oviger; G, male chela.

DESCRIPTION

Trunk stout, compact, well segmented, smooth, without spines, lateral processes separated distally by about half their own width. Cephalon well developed, neck region short.

Ocular tubercle fairly low, obtusely pointed, eyes well pigmented.

Abdomen about same height as ocular tubercle, pointed upwards at an angle of 60 degrees. Anus terminal.

Proboscis stout, triquetrous, with a swelling at the mid point, and inflated distally, terminal portion truncated. In the female there is a marked bilobed eminence on ventral surface of proboscis about one-third of the distance from ventral insertion of proboscis.

Chelifore scape one-jointed simple, with a few very small spinules, fingers of chela almost as long as palm, curved, tips cross when closed, inner margins of fingers entire, central portion of outer margin of dactylus with a few setae; four setae near basal portion of inner margin of immovable finger.

Palps absent in both sexes.

Ovigers (male only) six-jointed, sigmoid third joint the longest. Joints 2, 3 and 4 armed with short sparse setae; fifth and proximal half of sixth joints with fairly dense investiture of setae, all of which are directed backwards.

Legs stout, femur the longest joint. Second coxae of third and fourth legs of male bear a large terminal ventral process beset with short setae, and bearing the genital apertures. In female similar, but rather shorter processes present on all legs; those on first and second legs much shorter. Femoral cement glands of male have a single short tubular duct inserted at two-fifths of femoral length. Tarsus short bearing only simple spinules. Propodus with heel bearing two stout spines and a number of finer ones; basal spines of two types, a median row of large regular ones, and on distal half of sole a lateral row of finer spines. Terminal claw strong, auxiliaries weak.

Measurements (in mm.) holotype male: Length (anterior margin of cephalon to tip 4th lateral process) 3.33, width 2nd lateral processes 2.77, length chelifore scape 1.11, length proboscis 1.94, greatest width proboscis 0.88. Third leg: 1st coxa 0.95, 2nd coxa 1.47, 3rd coxa 0.7, femur 2.9, 1st tibia 2.53, 2nd tibia 2.47, tarsus 0.41, propodus 1.5, claw 0.82.

REMARKS

Despite the confused state of the taxonomy of the *Anoplodactylus-Phoxichilidium-Halosoma* group of genera and the large number of species involved there seems no doubt that *A. evansi* is in fact new. In the form of the trunk *A. evansi* most closely resembles *Phoxichilidium capense* Flynn, but differs from that species chiefly in lacking the peculiar outgrowths of the body wall between the first lateral processes and the insertion of the proboscis, in the possession of bilobed eminences on the ventral surface of the female proboscis, and in the presence of spines on the chelifores.

This species is named for Dr. J. W. Evans, Director of the Australian Museum.

Anoplodactylus spec. A.

Figs. 27 A—D

MATERIAL

1 female, Burning Palms Beach, Port Hacking, N.S.W., coll. G. P. Whitley, Feb. 11 1934. A.M. P.10506 (part).

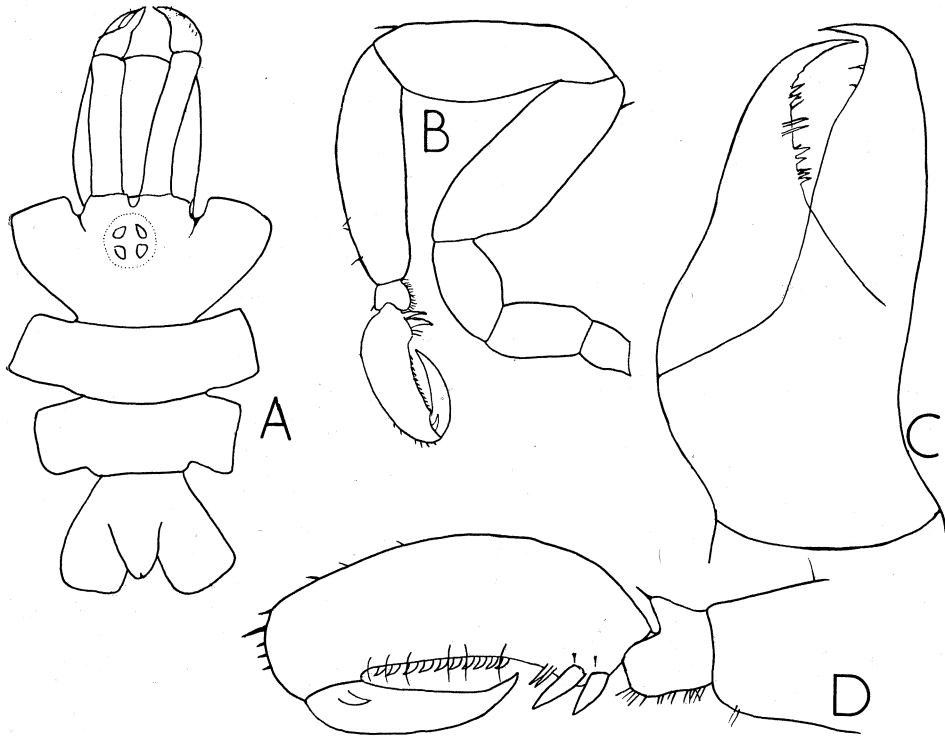


Fig. 27.—A-D, *Anoplodactylus*, spec. A, female. A, dorsal view of trunk; B, third leg; C, chela; D, propodus.

DESCRIPTION

Trunk robust, compact, smooth, lateral processes separated distally by less than their own width.

Proboscis short, cylindrical, rounded at tip, width slightly more than half length, no ventral processes; carried horizontally and anteriorly.

Ocular tubercle low, broad, rather flattened above; four well pigmented eyes present.

Abdomen short, thick at base but narrowing toward rounded tip, set at about 15° from the horizontal.

Chelifore scape one-jointed, without conspicuous setae; chela palm shorter than fingers which are sharply bent near tips. Dactylus a little shorter than immovable finger and bearing a few irregular denticulations.

Palps and ovigers lacking.

Third leg robust, coxae rather narrow by comparison with the long joints. Third coxa the longest coxal joint. Long joints subequal. Propodus with slight heel bearing two stout spines and two more slender ones. Spines on sole smaller than on heel but regular in size. Claw a little more than half as long as propodus. Auxiliary claws minute.

Measurements (in mm.): length trunk (anterior margin of cephalon to tip abdomen) 1.33, length cephalon 0.47, width across second lateral processes 0.6, length chelifore scape 0.47, length proboscis 0.66, greatest width proboscis 0.43, length abdomen 0.17. Third leg: 1st coxa 0.22, 2nd coxa 0.44, 3rd coxa 0.51, femur 1.13, 1st tibia 1.12, 2nd tibia 1.19, tarsus 0.15, propodus 0.68, claw 0.41.

REMARKS

This species is distinct from all others recorded from this region, but in the absence of males it cannot be decided with any certainty whether it is new to science or not. I therefore refrain from naming this species.

Anoplodactylus spec. B

Figs. 28 A—F

MATERIAL

1 female, Port Darwin, North Australia, A.M. P.6833.

DESCRIPTION

Trunk moderately robust, smooth, intersegmental lines distinct. Lateral processes short, without tubercles or spines, separated by about their own width.

Ocular tubercle low, rounded-conical above; eyes four, well pigmented.

Proboscis cylindrical with slight constriction at two-thirds of its length; tip rounded, with callosities on the ventral surface (fig. 28D).

Palps and *ovigers* lacking.

Third leg moderately robust, all joints with some spines, second coxa with a marked genital process. Femur the longest joint, but not markedly longer than tibiae. Femur with a marked spine-bearing distal dorsal process. Tarsus short. Propodus with pronounced heel bearing three large spines, sole with nine spines. Claw strong, five-eighths as long as propodus; auxiliary claws minute. Genital pores present on the ventrodistal extremity of all second coxae.

Measurements (in mm.): total length (anterior margin of cephalon to tip fourth lateral processes) 2.0, length cephalon 0.8, width across second lateral processes 0.87, length proboscis 1.07, greatest width proboscis 0.4, length chelifore scape 0.73. Third leg: 1st coxa 0.27, 2nd coxa 0.82, 3rd coxa 0.5, femur 2.09, 1st tibia 1.73, 2nd tibia 1.64, tarsus 0.14, propodus 0.73, claw 0.47.

REMARKS

In the absence of males which are of great systematic importance in this genus, I have refrained from naming this species. Of the known Australian forms it approaches most closely to *A. longiceps* Stock, 1954 (= *A. longicollis* Williams, 1941 preocc.), but is readily distinguished from that species by the low ocular tubercle and the three large spines on the heel of the propodus (*A. longiceps* has one very large and two slender spines).

Key to Australian species of **Anoplodactylus**

- | | |
|--|---|
| 1. Ocular tubercle more than twice as high as diameter at base | 2 |
| Ocular tubercle less than twice as high as diameter at base | 3 |

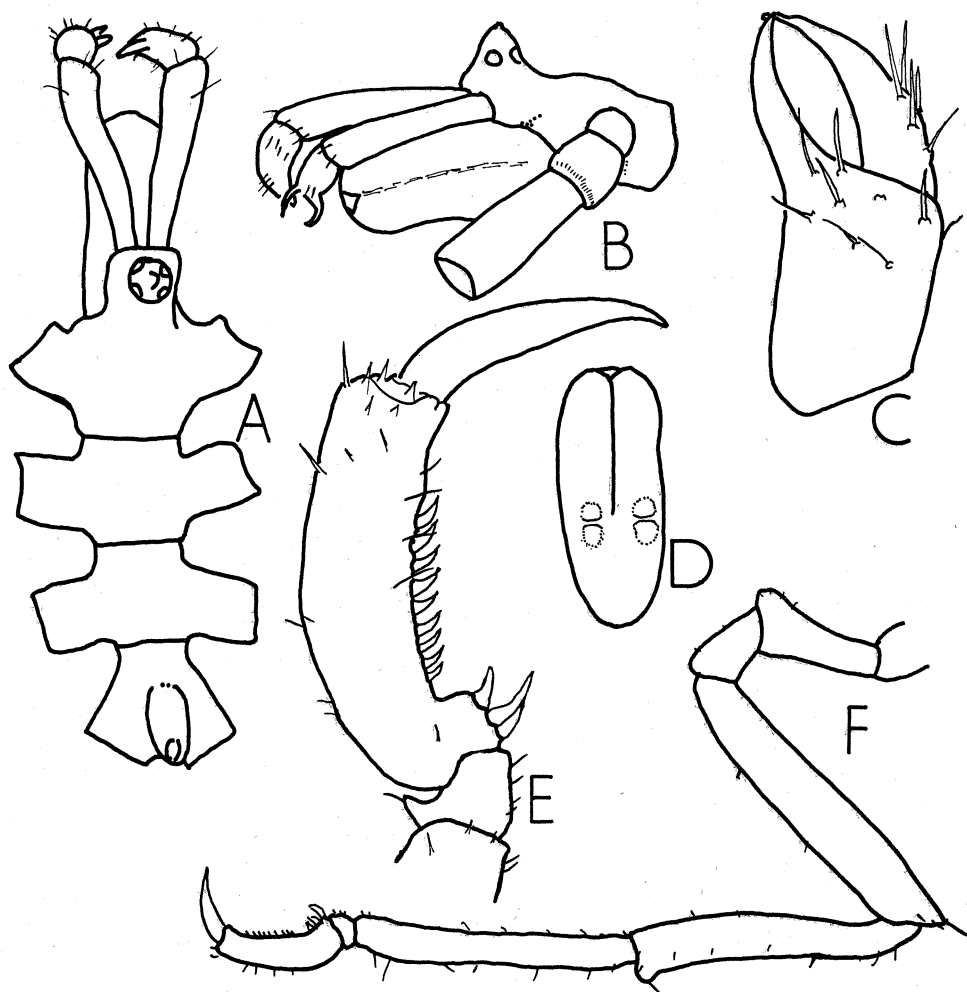


Fig. 28.—A-F, *Anoplodactylus*, spec. B, female. A, dorsal view of trunk; B, lateral view of cephalic region; C, chela; D, ventral view of proboscis; E, propodus; F, third leg.

2. Ocular tubercle rounded above, eyes near apex; chelifore scape with five or more long setae near middle
A. tubiferus
Ocular tubercle pointed distally, eyes set below mid-point; chelifore scape without long setae near middle
A. longiceps
3. Lateral processes separated by their own width throughout length; females with four ventral eminences on proboscis
A. spec. B.
Lateral processes not separated by more than half their own width; females with two or no ventral eminences on proboscis 4
4. Legs with lateral darker stripe, females with pair of ventral eminences on proboscis.
A. evansi
Legs without lateral darker stripe, females without ventral eminences on proboscis 5

5. Second and third lateral processes in contact, or almost so throughout their length (fig. 24A). *A. haswelli*

Second and third lateral processes diverging throughout their length (fig. 27 A).
A. spec. A.

Family **AMMOTHEIDAE** Dohrn, 1881

Genus **Ammothea** Leach, 1814

Ammothea australiensis Flynn

Figs. 29 A—G

Ammothea australiensis Flynn, 1919b: 95-99, pl. XIV, figs. 4-6.

Achelia flynni Marcus, 1940: 84, 124.

Ammothea australiensis Stock, 1954: 105. —Stock, 1956a: 43.

MATERIAL

1 male, Port Jackson, N.S.W., A.M. P.13660.

1 juvenile, Green Point, Port Jackson, N.S.W., coll. T. Iredale and G. P. Whitley, Jan. 15, 1934. A.M. P.13661.

1 male, 4 females, Port Jackson, N.S.W. A.M. P.13659.

REMARKS

This species has not been recorded since it was described by Flynn. As Stock (1956a) pointed out, the two most northern members of this genus, usually regarded as strictly Antarctic in distribution, have long been overlooked by Pycnogonid workers. *A. australiensis* Flynn, known only from New South Wales, and *A. magniceps* Thomson, from several localities in the South Island of New Zealand, provide the exceptions to the otherwise Antarctic distribution of the genus.

Flynn's only specimen was rather badly damaged. The following points complete his otherwise satisfactory description:—

Chelifore (adult male) short, scape of one joint with two setae at distal end, chela reduced to a globose knob. Juvenile scape of one joint, smooth; chela almost as long as scape; fingers of chela equal in length to palm. Fingers bowed; immovable finger slightly longer than dactylus.

Palps: relative lengths of joints as stated by Flynn, but joints 5-9 bear a number of spines and setae along their ventral margins.

Oviger (male) 10-jointed, the joints having the following lengths (in mm.) 1—0.17, 2—0.67, 3—0.47, 4—0.56, 5—0.56, 6—0.39, 7—0.19, 8—0.11, 9—0.09, 10—0.06. The seventh joint has a lateral swelling beset with strong setae. Joints 8-10 bear a few small pinnate oviger spines according to formula 2 : 3 : 3. There is no terminal claw.

Genital apertures in male appear to be restricted to second coxae of third and fourth pairs of legs. There is no genital eminence.

Cement glands appear as low mounds about three-quarters of the distance along the dorsal surface of femur.

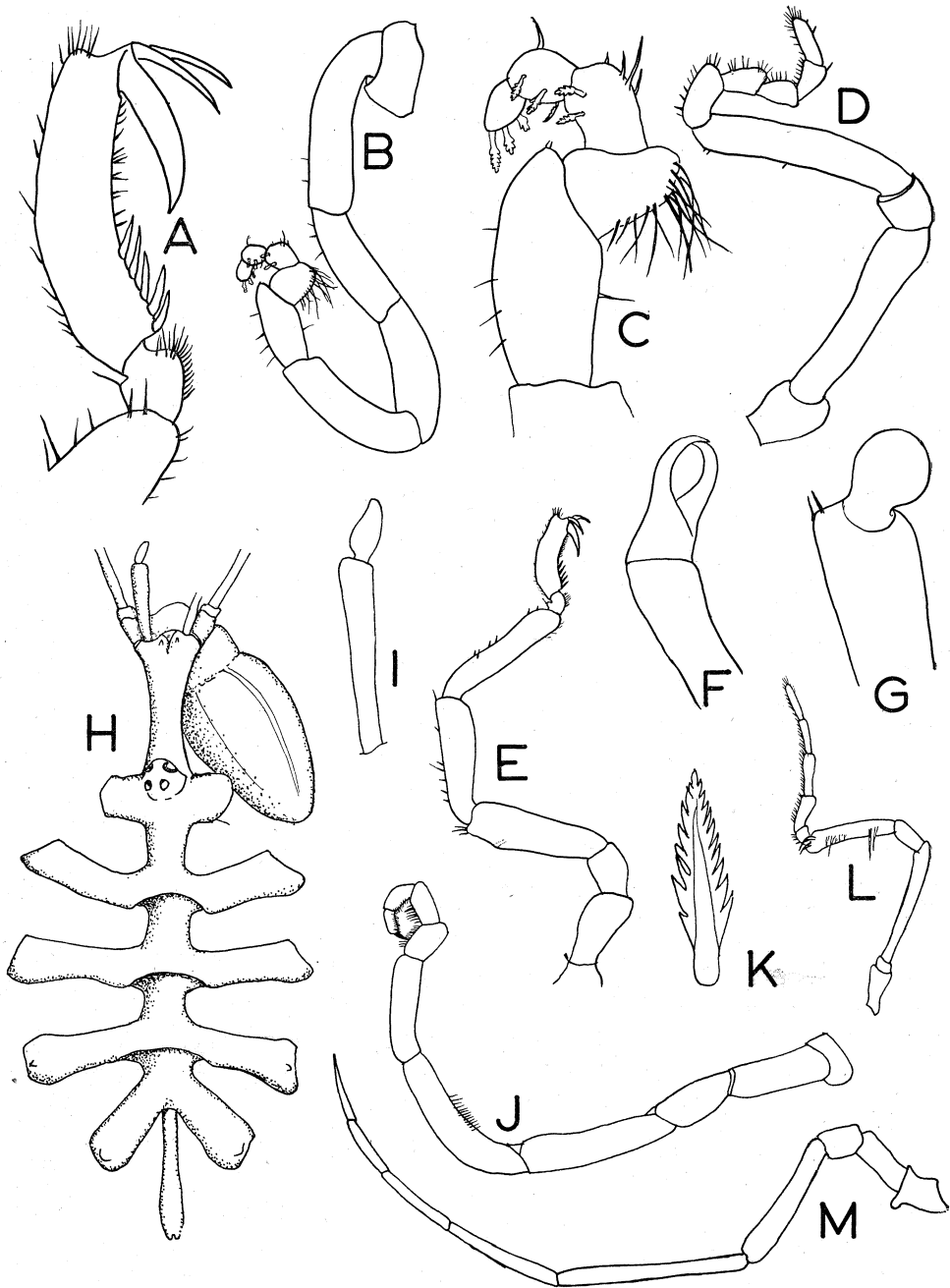


Fig. 29.—A-G, *Ammothea australiensis* (all figs. of female except F). A, propodus; B, oviger; C, terminal oviger joints; D, palp; E, third leg; F, chela of juvenile; G, female chelifore. H-M, *Ascorhynchus longicollis* female. H, dorsal view of trunk; I, chelifore; J, oviger; K, oviger spine; L, palp; M, third leg.

Stock (1956a: 43) says, "Ich habe sogar lange gezweifelt, ob *A. australiensis* nicht mit *magniceps* identisch sein sollte. *A. australiensis* hat aber längere Nebenkrallen und spitzere Rückenbuckel."

Since I have adequate material of *A. magniceps* available I have compared the two species. The following table of differences establishes the validity of the two species:—

<i>A. australiensis</i>	<i>A. magniceps</i>
Total length adult male, tip cephalon to tip 4th lateral process, 1.6 mm.	Total length adult male, tip cephalon to tip 4th lateral process, 3.0 mm.
Dorsal eminences high, pointed.	Dorsal eminences in form of low ridges.
Scattered spines on dorso-lateral extremities of lateral processes and 1st coxae.	No spines on lateral processes or 1st coxae.
Ratio of length auxiliary claw: terminal claw: propodus 1: 1.43: 2.75.	Ratio of length of auxiliary claw: terminal claw: propodus 1: 1.66: 3.44.

Genus **Achelia** Hodge, 1864

Achelia assimilis (Haswell)

Ammonothea assimilis Haswell, 1884: 1026-1027, pl. LIV, figs. 5-9. —Whitelegge, 1889: 233. —Loman, 1908: 59-60.

Achelia assimilis Bouvier, 1913: 140. —Flynn, 1920: 87-90, pl. XXI, figs. 22-26. —(small form) ? Stock, 1954: 97-99, fig. 45. —Stock, 1956a: 42-43.

MATERIAL

1 female, Port Jackson, N.S.W., A.M. P.13662.

1 chelate juvenile, Clark Island, Port Jackson, N.S.W., timber test pile, coll. F. McNeill and M. Ward, Oct. 18, 1927. A.M. P.13663.

REMARKS

Though the present material differs in a few minor respects from that described by Flynn and Stock, I do not doubt that it is to be identified with this species. The differences that exist between the female specimen before me and the previously published descriptions are: the lateral processes bear 3 spine-bearing tubercles, not 2 as in Stock's material; the compound spines on the oviger segments 6-10 have the formula 1 : 1 : 1 : 1 : 2 instead of 1 : 1 : 2 : 1 : 2, and the abdomen has a slight constriction in the proximal half, but Flynn and Stock figure it as slightly dilated in this region. The movable finger of the chela is represented by a rudimentary knob.

The variation which appears to exist in the representatives of this species in New Zealand waters, as mentioned by Stock (1954 and 1956a), will be dealt with in some detail in a future paper on the Pycnogonida of New Zealand and will not be discussed here.

Achelia variabilis Stock.

Achelia variabilis Stock, 1954: 100-105, figs. 47, 48.

MATERIAL

1 male, trawled 5 miles off Green Cape, N.S.W., 81 metres, coll. K. Moller, May, 1930. A.M. P.13664.

1 ovigerous male, about seven miles north-east of Cape Pillar, Tasmania, 90-108 metres clinging to sponge. Trawled F.I.S. "Endeavour", July 25, 1914. A.M. P.13665.

REMARKS

These two specimens fit Stock's figures and descriptions, except that the tubercles shown on the anterior margin of the cephalon on either side of the ocular tubercle in his figure 47a are not present. This species is otherwise only known from a locality in 65 fathoms near the Three Kings Island, New Zealand.

Genus **Tanystylum** Miers in Wilson, 1878

Tanystylum orbiculare Wilson, 1878

Literature and synonymy Stock, 1954.

MATERIAL

1 female from shoreline cave, Narooma, N.S.W., amongst growths in rock pool, coll. Miss E. Pope, July 15, 1949. A.M. P.13666.

REMARKS

Previously known in Australia from one male taken in the intertidal zone of Sydney Harbour (Stock, 1954: 145), but like the earlier recorder I am restricted by the limited material available in giving any critical evaluation of the recording of this species, widespread elsewhere, from Australian waters.

Genus **Ascorhynchus** G. O. Sars, 1877

Ascorhynchus longicollis (Haswell)

Figs. 29 H—M

Ammothea longicollis Haswell, 1884: 1028-9, pl. 56. figs. 1-4. —Whitelegge, 1889: 223.

Ascorhynchus longicollis Loman, 1908: 32. —Flynn, 1920: 81-83, pl. XXI, figs. 16-17.

Eurydyce longicollis Thompson, 1909: 533.

MATERIAL

1 ovigerous male, Gunnamatta Bay, Port Hacking, N.S.W., on tuft of seaweed, coll. E. Pope, Nov. 11, 1946. A.M. P.13667.

REMARKS

This appears to be the first record of this species having been taken since Haswell's description. From Flynn's comments (1920) it seems that the present specimen may be the first complete male to be examined. From it the following points emerge: the eyes appear to be normally pigmented, and not unpigmented as recorded previously; the palps are much more hirsute than earlier descriptions indicate; the fifth joint bears a number of spines arranged in three groups as indicated in fig. 29L, and joints 6-10 have a dense fringe of hairs on the ventral margin. The male oviger consists of 10 joints, of which the fourth and fifth joints are the longest

and about equal. The fifth joint bears on its inner margin a row of glandular (?) hairs or spines. Joints 7-10 bear pinnate spines arranged in three ranks, and disposed according to the approximate formula 45 : 33 : 26 : 25. I cannot be certain that these counts are correct. A terminal claw is present.

The legs are quite without spines or setae. I am unable to find any trace of the setae shown at the distal ends of the first tibia and propodus in Flynn's figure. Genital apertures occur on the second coxae of the second, third and fourth pairs of legs.

The differences between this specimen and previous descriptions may be sexual in character.

Ascorhynchus minutum Hoek

Ascorhynchus minutus Hoek, 1881: 55-57, pl. VI, figs. 10-16. —Loman, 1908: 33.

Ascorhynchus auchenicus Calman, 1922: 199-203 (part).

Ascorhynchus minutum Stock, 1954: 121-124, figs. 57 d-h.

MATERIAL

6 ovigerous males, 1 female, Station 28, "Thetis" Expedition, 4-6½ miles off Manning River, N.S.W., 40-42 metres. A.M. P.13696.

2 females off Eden, N.S.W., 30 metres, Oct. 8, 1943; pres. K. Sheard, C.S.I.R.O., Div. of Fisheries. A.M. P.11530.

2 males, Station 37 "Thetis" Expedition 2-2½ miles off Botany Bay, N.S.W., 92-98 metres. A.M. P.13697.

2 juveniles, 5 miles east of Port Hacking, N.S.W., 100 metres, July 24, 1943; pres. K. Sheard, C.S.I.R.O., Div. of Fisheries. A.M. P.11527 (pt).

1 ovigerous male, 5 miles off Green Cape, 83 metres, coll. K. Moller, May, 1930. A.M. P.13698.

2 females, 4 miles off Eden, N.S.W., in silt, 70 metres; pres. K. Sheard, C.S.I.R.O. Division of Fisheries, Oct. 8, 1943. A.M. P.13699.

1 female, 12 miles north-east Bustard Head, near Pt. Curtis, Queensland, "8 fathoms patch" (from coral reef), Sept. 5, 1946. Pres. H. S. Hynd. A.M. P.12211.

REMARKS

I have compared these specimens with the types in the British Museum and they do not differ in any important respect.

Ascorhynchus compactum n. sp.

Figs. 30 A—H

MATERIAL

3 males (one is the holotype), Port Jackson, N.S.W., A.M. P.13668, P.13669.

5 females (one is the allotype) 2 males, 2 juveniles, Port Jackson, N.S.W., A.M. P.13670.

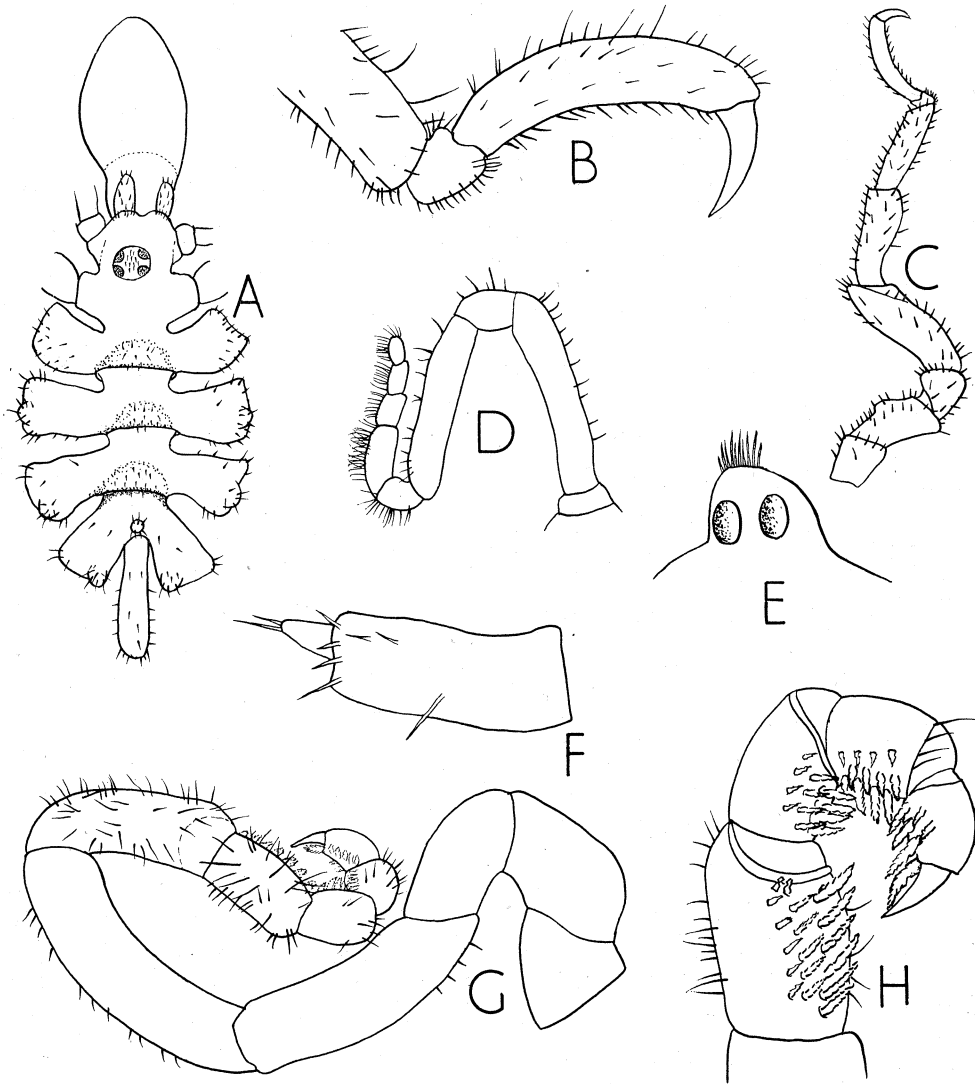


Fig. 30.—A-H, *Ascorhynchus compactum* male. A, dorsal view of trunk; B, propodus; C, third leg; D, palp; E, lateral view of ocular tubercle; F, chelifore; G, oviger; H, tip of oviger.

2 females on rocks near high tide mark, Burning Palms Beach, south of Port Hacking, N.S.W., coll. G. P. Whitley, Feb. 11, 1934. A.M. P.10506 (part).

1 male, 1 female, inside Fossil Island, Eagle Hawk Neck, Tasmania, between tide marks, coll. Prof. T. Flynn, Jan., 1928. A.M. P.13700.

DESCRIPTION

Trunk elongate oval in outline, compact to very compact; lateral processes touching or separated by about half their own width. Trunk distinctly segmented.

spinose; cephalon well developed; a short distance in front of first lateral processes arise the "cervical processes" which articulate with bases of ovigers. In some specimens these are very close to the first lateral processes, but in others there is a distinct gap between them. Cephalon slightly expanded anterior to ocular tubercle and provides articular processes for palps. At anterior extremity of cephalon a pair of spinose swellings overly the chelifore bases. Distal portions of lateral processes bear a number of setae. In dorsal midline are four setose eminences; the first three are broader than long, but the fourth, just anterior to origin of abdomen, is a cylindrical tubercle.

Ocular tubercle situated immediately in front of cervical processes; it rises steeply on anterior face and slopes away more gently behind. Tubercle capped with a number of short setae. Four well-pigmented eyes present.

Abdomen long, reaching to tip of second coxa, horizontal in position, setose. Anus almost ventral.

Proboscis pyriform, typical of genus.

Chelifores: scape of one joint with knobs as rudiments of chelae; both scape and knob spinose.

Palps nine-jointed, second and fourth joints longest; all joints with setae, last five joints with a dense ventral fringe of setae.

Oviger 10-jointed with a terminal claw, setae numerous on joints 5-9, sparse on joints 4 and 10, and absent from joints 1-3. Joints 7-10 bear numerous denticulate spines arranged in three rows as in figure 30H. Lengths of male oviger joints are 1-0.3, 2-0.48, 3-0.42, 4-0.65, 5-0.83, 6-0.77, 7-0.3, 8-0.18, 9-0.15, 10-0.14, claw 0.095 mm.

Leg setose; femur the longest joint, bears a large distal process, tibiae subequal; propodus without heel; basal spines weak, claw about half length of propodus, auxiliary claws lacking.

Genital Apertures on slight swellings on ventral surfaces of second coxae of third and fourth legs of male, and on second coxae of all legs in female.

Measurements (in mm.), holotype (male): total length (tip proboscis to fourth lateral processes) 4.23, width 2nd lateral processes 1.73, length abdomen 0.67, length chelifore scape 0.29, length proboscis 1.46, width proboscis 0.73. Third leg: 1st coxa 0.35, 2nd coxa 0.58, 3rd coxa 0.38, femur 1.06, 1st tibia 0.86, 2nd tibia 0.82, tarsus 0.15, propodus 0.77, claw 0.35.

REMARKS

Although superficially similar to *Ascorhynchus melwardi* Flynn, 1929, from Albany Passage, near Cape York, Queensland, this species is quite distinct, differing markedly in size, spination of the lateral processes, the dorsal eminences, the ocular tubercle, the shape and relative lengths of the leg joints and the details of the oviger.

Genus **Ammothella** Verrill, 1900

Ammothella biunguiculata australiensis Williams

Figs. 31 E—H

Ammothella biunguiculata var. *australiensis* Williams 1940: 197-200, figs. 1-3.

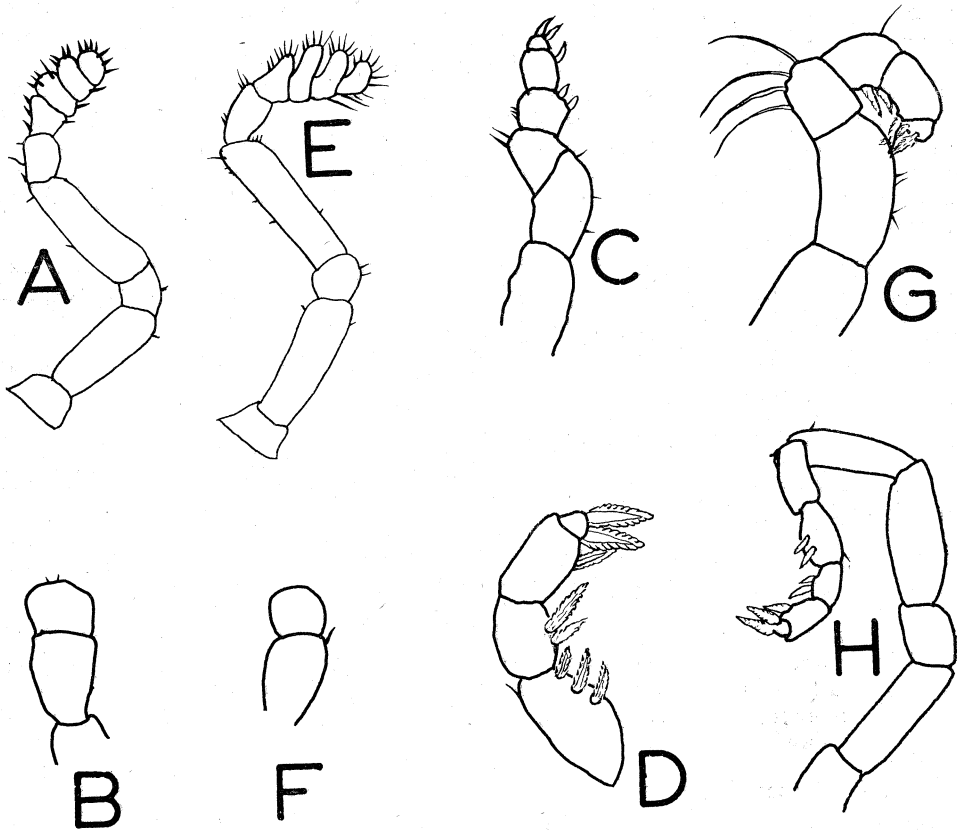


Fig. 31.—A-D, *Ammothella biunguiculata biunguiculata*. E-H, *A. biunguiculata australiensis*. A and E, palps; B and F, male chelifores; C and G, tips of male ovigers; D and H, tips of female ovigers.

MATERIAL

1 male, 1 female, Bottle and Glass Rocks, Port Jackson, N.S.W., Jan. 15, 1934, coll. G. P. Whitley. A.M. P.10472.

1 ovigerous male, Bottle and Glass Rocks, Port Jackson, N.S.W., under stone, Oct. 22, 1930, coll. T. Iredale. A.M. P.13673.

1 larvigerous male, Bottle and Glass Rocks, Port Jackson, N.S.W., Jan. 20, 1934, coll. G. P. Whitley and T. Iredale. A.M. P.13674.

1 damaged female, Bottle and Glass Rocks, Port Jackson, N.S.W., March, 1926, coll. M. Ward. A.M. P.8617.

1 damaged female, Long Reef, Collaroy, on coast north of Port Jackson, N.S.W., Sept. 22, 1930, coll. T. Iredale and G. P. Whitley. A.M. P.13675.

2 females, 2 males, Shark Island, Port Jackson, N.S.W., A.M. P.3253.

1 male, 14 miles off Bateman's Bay, N.S.W., 135 metres, trawled, coll. K. Moller, trawler "Durraveen". A.M. P.13671.

1 male, Bottle and Glass Rocks, Port Jackson, N.S.W., between tide marks, coll. F. A. McNeill, Oct. 12, 1927. A.M. P.13672.

REMARKS

The adequate material available leaves little doubt that this form is identical with William's var. *australiensis*. The status of the "varieties" (= subspp.) of *A. biunguiculata* is not very satisfactory. Hedgepeth (1941: 259) considers Hall's (1911) var. *californica* to be identical with *A. biunguiculata* Dohrn (1881), and discontinued the use of the varietal name. Williams (1940) also doubted that the Californian form should have been given varietal recognition. Since this time Hilton (1942a) has described *A. biunguiculata fusca* from Hawaii. It is impossible to tell from Hilton's figures and description whether *fusca* is really distinct from *australiensis* or the other forms. His description is without detailed figures of the palps, chelifores and legs. The figure of the male oviger is wretched. The measurements of *A. b. australiensis* and *A. b. fusca* are about the same, and judging from the descriptions the chief differences appear to lie in the setae on the legs, but since Hilton uses the terms "long", "really long" and "very long" without reference to any other structure, and omits such setae from his figures entirely, one cannot at present sort out this tangle. Hairiness varies considerably in *A. b. australiensis*, and Hilton does not discuss the features in which *A. b. fusca* differs from the previously known subspecies.

I have carefully compared the Australian material before me with two males and a female of *A. biunguiculata* from Los Angeles, California (coll. and det. J. W. Hedgepeth) and find that the termino-lateral apophyses of joints 6-9 of the palps are more produced in the Australian material than in the Californian. The terminal joint of the chelifore is almost spherical in *A. b. australiensis* and rather squarish in the Californian specimens. The male ovigers of the two forms differ in spination and the relative lengths of the joints. In *A. b. australiensis* the 4th and 5th joints are proportionately much longer than in the Californian material. The 7th joint in *A. b. australiensis* bears four setae which are longer than the width of the joint, but the Californian specimens bear only two such setae. The female ovigers appear to be very similar. Colour (in alcohol) varies in *A. b. australiensis* from pale straw colour through bright orange to brown.

Measurements of male ovigers (in mm.).

Joint	1	2	3	4	5	6	7	8	9	10
Californian specimen	.. 0.22	0.42	0.217	0.367	0.361	0.230	0.132	0.096	0.090	0.041
Australian specimen	.. 0.18	0.42	0.241	0.482	0.482	0.217	0.156	0.090	0.108	0.030

Measurements of female oviger

Joint	1	2	3	4	5	6	7	8	9	10
Californian specimen	.. 0.06	0.30	0.20	0.33	0.29	0.17	0.14	0.09	0.12	0.04
Australian specimen	.. 0.06	0.29	0.14	0.30	0.29	0.18	0.12	0.09	0.10	0.03

Measurements of male palps

Joint	1	2	3	4	5	5-9
Californian specimen ..	0.12	0.34	0.09	0.43	0.14	0.31
Australian specimen ..	0.12	0.36	0.12	0.45	0.18	0.33

***Ammothella stocki* n. sp.**

Figs. 32 A—J

MATERIAL

1 male (holotype), Grain Jetty, Darling Harbour, Port Jackson, N.S.W., amongst marine growth on oregon test piece of timber; coll. F. A. McNeill, Oct. 11, 1927. A.M. P.13676.

DESCRIPTION

Trunk segmented, oval in outline, lateral processes moderately stout, separated distally by not more than half their diameter, ends of lateral processes bearing a number of spines and a dorsal, median, round-tipped papilla. Near posterior border of median part of second trunk segment are two erect blunt papillae. Cervical processes, on which ovigers articulate arise at level of ocular tubercle, and just anterior to first lateral processes. Neck region short. Two spurs present behind palp bases. A transverse furrow marks off anterior and posterior regions of first trunk segment.

Ocular tubercle anterior to first lateral processes, tall (height three times the basal diameter), directed slightly forward, eyes near tip, four, well pigmented.

Abdomen curved, arising from dorsal surface of last trunk segment, proximal half directed upwards and backwards, distal half directed slightly downwards. Abdomen armed with two types of spines; simple spines arranged (in dorsal view) as a lateral pair in mid-region and a dorso-lateral subterminal pair, and the more obvious large, stout, hollow, cylindrical spines arranged in a group of four at about one-third of abdomen length and a further pair at two-thirds of abdomen length. Similar abdominal spines are known in *A. appendiculata* Dohrn, 1881 and *A. indica* Stock, 1954.

Proboscis twice as long as wide, narrowest at base, widest near middle and narrowing again towards tip. Tip rather flattened. Length slightly more than twice greatest diameter.

Chelifores with two-jointed scape, armed with simple and hollow spines. As spination differs between left and right scapes in the holotype this is not discussed in detail. Second joint bears a circlet of spines at distal end surrounding an invagination from which projects the knob-like remnant of the chela. Terminal joint bears a single simple spine.

Palps nine-jointed; first joint short, second and fourth joints longest. Joints 1-4 with a few simple spines, but joints 5-9 with conspicuous ventral fringe of setae. No hollow spines on palps. Length of joints (in mm.): 1—0.09 (approx.), 2—0.36, 3—0.09, 4—0.41, 5—0.15, 6—0.18, 7—0.09, 8—0.08, 9—0.17.

Oviger 10-jointed, first joint wide and short, joints 4 and 5 equal and the longest joints, joints 9 and 10 equal and the shortest. Joint 8 bears five large spines with wide bases and entire margins, and also a few simple setae; joint 9 with one serrated

and two simple spines, and the tenth joint bears 3 pinnate spines. Length of joints (in mm.): 1—0.17, 2—0.37, 3—0.27, 4—0.425, 5—0.425, 6—0.16, 7—0.13, 8—0.09, 9—0.09, 10—0.02.

Third leg stout, spinose, with hollow spines on coxae 1 and 2, femur and both tibiae; all joints with some simple spines, especially tibiae. Femur very stout.

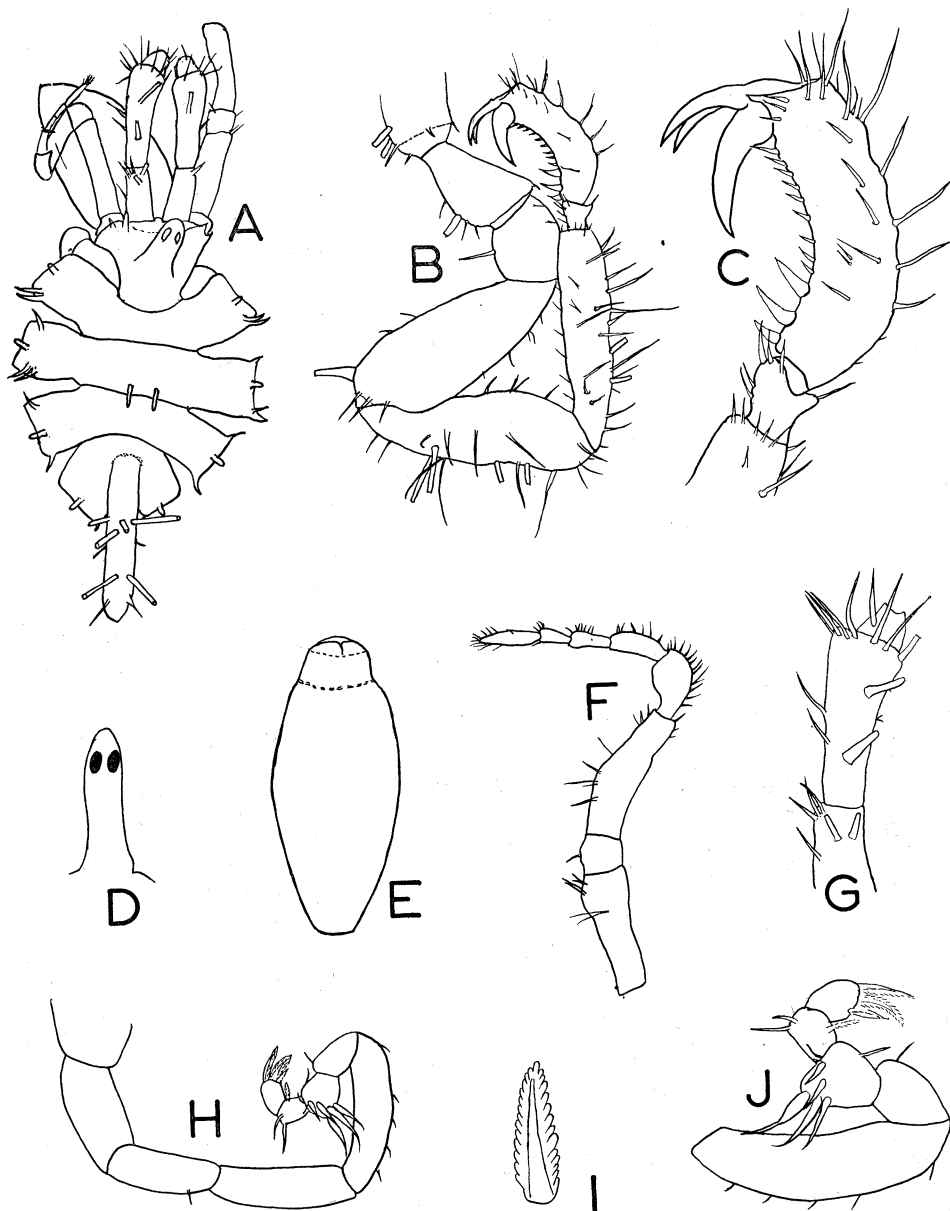


Fig. 32.—A-J, *Ammothella stocki* holotype male. A, dorsal view of trunk; B, third leg; C, propodus; D, lateral view of ocular tubercle; E, proboscis; F, palp; G, chelifore; H, oviger.

Propodus curved, sole with three large basal spines proximally and nine smaller ones distally. Claw strong, almost half as long as propodus; auxiliary claws three-quarters as long as main claw.

Genital apertures on very slight eminences on second coxae of third and fourth legs.

Measurements (in mm.), holotype (male): Length (anterior margin of cephalon to tip of fourth lateral processes) 1.1, width across second lateral processes 0.83, length proboscis 0.83, length of abdomen 0.59, length chelifore scape 0.55. Third leg; 1st coxa 0.33, 2nd coxa 0.41, 3rd coxa 0.33, femur 0.91, 1st tibia 0.92, 2nd tibia 0.87, tarsus 0.106, propodus 0.55, claw 0.24, auxiliary claws 0.17.

REMARKS

I have named this species in honour of Dr. Jan H. Stock, of the Zoological Museum, Amsterdam, who has done much to further knowledge of the Pycnogonida of the world.

A. stocki resembles *A. indica* Stock, 1954, in the armature of the abdomen, but differs in other important respects (oviger, leg and chelifores). The Australian species of the genus are readily separated on the relative sizes of the main and auxiliary claws; in *A. biunguiculata* the main claw is virtually lacking, in *A. thetidis* n. sp. the auxiliary claws are the longest, and in *A. stocki* the main claw is longer than the auxiliaries.

***Ammothella thetidis* n. sp.**

Figs. 33 A—G, 34 A—F

MATERIAL

27 males, many ovigerous (of which one is the holotype), 33 females (one is the allotype), 18 immature, station 57 "Thetis" Expedition, $3\frac{1}{2}$ -4 miles off Wata Mooli, near Botany Bay, N.S.W., 107-115 metres, dredged. A.M. P.13677, P.13678, P.13679.

8 males, 8 females, Station 37 "Thetis" Expedition, 2-2 $\frac{1}{2}$ miles off Botany Bay, N.S.W., 93-97 metres, dredged. A.M. P.13680.

1 ovigerous male, Station 35, "Thetis" Expedition, $1\frac{1}{4}$ -2 miles off Port Hacking, N.S.W., 40-70 metres, dredged. A.M. P.13681.

DESCRIPTION

Trunk clearly segmented, oval in outline, integument smooth, pale straw coloured (in alcohol); lateral processes slender, twice as long as broad, separated by more than their own width distally. Dorsum ornamented in mid-line by two tall, round-tipped tubercles on the posterior margins of segments 2 and 3, similar in height and shape to ocular tubercle. Distal ends of lateral processes each armed with a single tall round-tipped tubercle about half as high as median tubercles.

Ocular tubercle tall, slender, situated in centre of dorsal surface of cephalon anterior to first lateral processes. I am unable to find any trace of eyes.

Proboscis with a short basal stalk, ovate beyond stalk and with two slight callosities on ventral surface (fig. 33E).

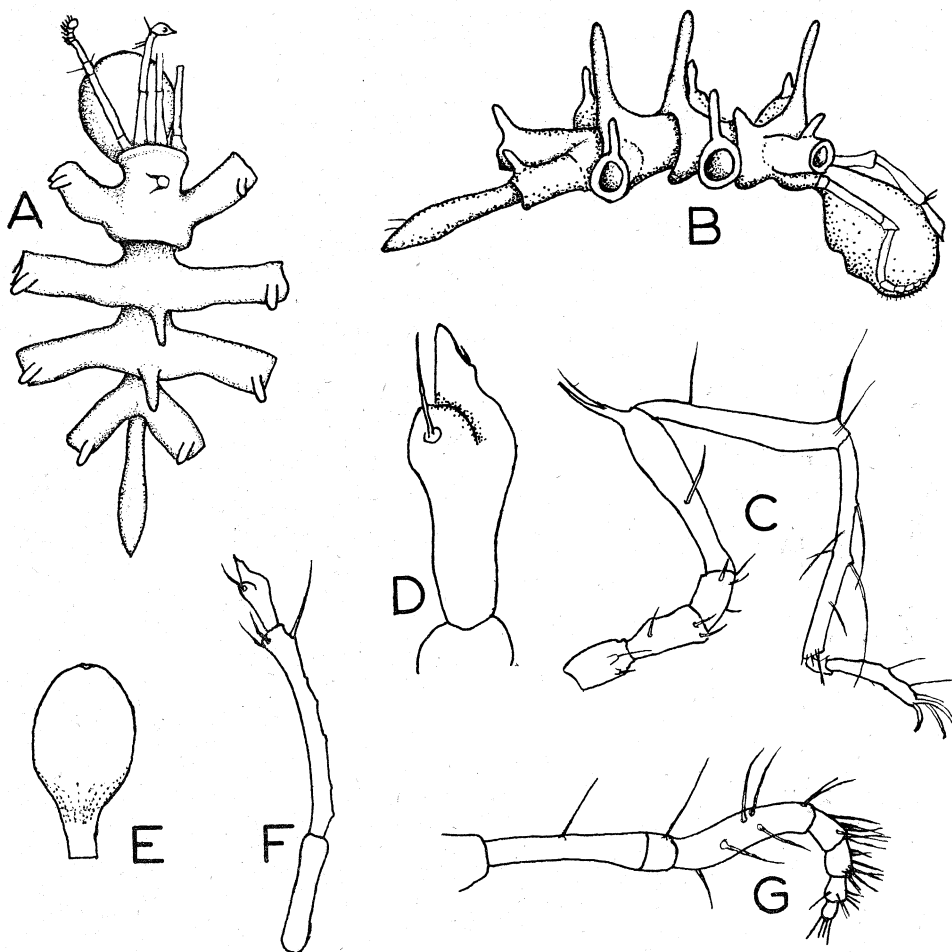


Fig. 33.—A-G, *Ammothella thetidis* male. A and B, dorsal and views of trunk; C, third leg; D, chela; E, proboscis; F, chelifore; G, palp.

Abdomen horizontal, clavate, reaching to end of second coxae of fourth legs.

Chelifores with two-jointed scape, the second joint almost twice as long as first, and bearing three spines at its distal end. Terminal joint achelate; dactylus reduced to a spine-bearing knob.

Palp eight-jointed, first joint short and wide, second the longest and bearing a single spine, third joint short, fourth almost as long as second but with more spines. Joints 5-8 short, with ventral fringe of setae.

Oviger 10-jointed, very similar in both sexes. Lengths of joints (in mm.): 0.18, 0.3, 0.215, 0.36, 0.3, 0.12, 0.1, 0.07, 0.09, 0.02. Joint 5 with a group of reversed spines near distal end. Denticulate spines on joints 9 and 10 only, but stout simple spines on joints 6 and 8.

Third leg moderately robust, all joints with a few setae, coxae 1 and 3 subequal, coxa 2 the longest coxal joint; femur robust, thickened distally, and with a long thin

tubular cement gland on dorsal extremity in males. Tibia 1 longer than femur, and equal to tibia 2; tibia 2 with a few long spines; tarsus short; propodus moderately long, straight along sole with one or two long spines on dorsal surface. Basal spines differ with sexes, being very sparse in males and more numerous in females, but small in both sexes. Terminal claw two-thirds as long as auxiliary claws which are large and well-developed.

Measurements (in mm.), male paratype: Length (anterior margin of cephalon to tip of abdomen) 1.6, length cephalon 0.32, length proboscis 0.75, greatest width of proboscis 0.32, width across second lateral process 0.65, length chelifore scape (both joints) 0.6, length abdomen 0.65. Third leg: 1st coxa 0.03, 2nd coxa 0.37, 3rd coxa 0.25, femur 0.7, 1st tibia 0.99, 2nd tibia 1.0, tarsus 0.09, propodus 0.42, claw 0.12, auxiliary claw 0.180.

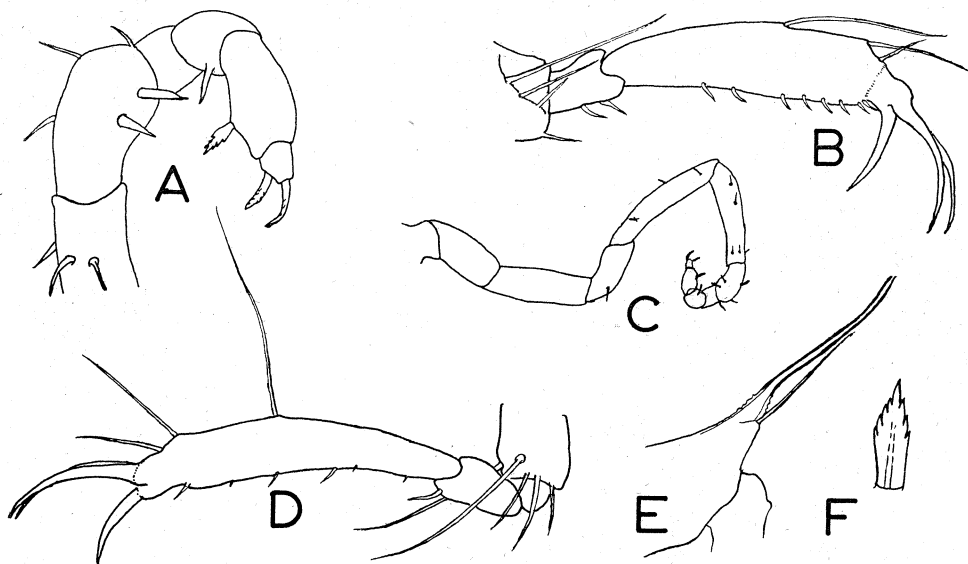


Fig. 34.—A-F, *Ammothella thetidis*. A, tip of male oviger; B, female propodus; C, male oviger; D, male propodus; E, femoral cement gland; F, oviger spine.

REMARKS

Ammothella thetidis is easily distinguished from all other species in the genus by the unique combination of characters it presents, namely, auxiliary claws longer than the main claw, two-jointed chelifore scape without tubercles, and well-developed median tubercles on the posterior margins of trunk segments two and three.

Key to the Australian species of *Ammothella*

1. Principal and auxiliary claws well developed 2
 Principal claw rudimentary, auxiliary claws well-developed
A. biunguiculata australiensis.
2. With median dorsal tubercles on trunk segments 2 and 3; no blunt-ended spines on legs, abdomen or chelifore scapes *A. thetidis* n. sp.
 Without median tubercles on trunk segments; with blunt-ended spines on chelifore scape, legs and abdomen *A. stocki* n. sp.

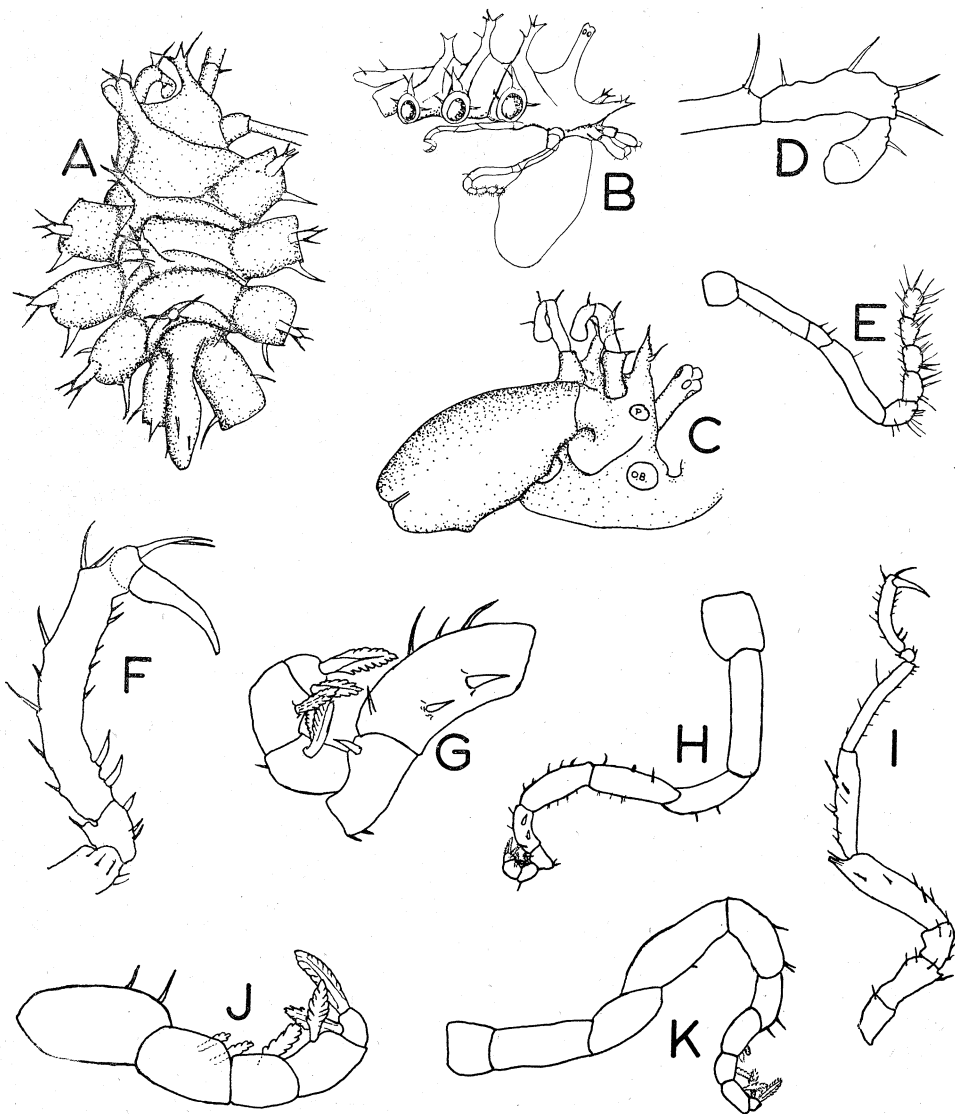


Fig. 35.—A-K, *Cilunculus australiensis*; A and B, dorsal and lateral views of trunk; C, ventro-lateral view of cephalic region (P = palp base, O.B. = oviger base); D, chelifore; E, palp; F, male propodus; G, tip of male oviger; H, male oviger; I, male third leg; J, tip of female oviger; K, female oviger.

Genus **Cilunculus** Loman, 1908

Cilunculus australiensis n. sp.

Figs. 35 A—K

MATERIAL

1 ovigerous male (holotype), 2 females (one is allotype), Station 35, "Thetis" Expedition, $1\frac{1}{2}$ -2 miles off Port Hacking, N.S.W., 40-70 metres; dredged. A.M. P.13682, P.13683, P.13684.

1 ovigerous male, 1 female, 1 juvenile, Station 57, "Thetis" Expedition, 3 $\frac{1}{4}$ -4 miles off Wata Mooli, near Botany Bay, N.S.W., dredged. 96-107 metres. A.M. P.13685.

1 ovigerous male, 1 female, Station 37 "Thetis" Expedition, 2-2 $\frac{1}{2}$ miles off Botany Bay, N.S.W., 90-94 metres; dredged. A.M. P.13686.

DESCRIPTION

Trunk compact, distinctly segmented; oval in outline; cephalon much longer than succeeding segments, greatly expanded anteriorly to form a hood over bases of chelifores and proboscis. Anterior margin of cephalon produced into two columnar projections which project forwards over chelifores. Each such projection bears three or four spines or setae. Sides of hood provide for articulation of palps. Posterior part of dorsum of segments 1-3 marked by a transverse ridge which is surmounted by a tall spinose tubercle. Lateral processes narrowly separated at base; with simple and compound spines distally.

Ocular tubercle very tall, erect with a spreading base, appears to be divided into four at tip. Four eyes present.

Proboscis inserted and carried ventrally, pyriform, narrowest at base, with two low transverse ridges on ventral side, tip rounded.

Chelifores with a scape of two joints, the first with a single spine, the second with four; terminal joint achelate.

Palps nine-jointed, geniculate; first and third joints short, second and fourth joints longest and subequal; joints 5-9 short and setose.

Ovigers 10-jointed, inserted just anterior to first lateral processes. Female: fourth joint longest; all joints fairly straight, joints 5-6 with a few simple setae; joints 7-10 with compound spines according to formula 2 : 1 : 1 : 2. Male: second joint longest (as in other species of the genus); joints 3-6 bearing more simple setae than in female; sixth joint with two stout spines in addition to setae; compound spines on joints 8-10 according to formula 1 : 1 : 2. Measurements of oviger joints (in mm.):—

Joint	1	2	3	4	5	6	7	8	9	10
Male	0.15	0.31	0.22	0.32	0.19	0.14	0.07	0.06	0.05	0.02
Female	0.07	0.16	0.14	0.22	0.12	0.1	0.08	0.05	0.06	0.02

Third leg moderately robust, all joints setose; coxae 1 and 3 subequal, coxa 2 longer; femur stout, twice as long as second coxa, with distodorsal cement gland in male. Tibia 2 equal in length to femur and slightly longer than tibia 1. Tarsus short, propodus slightly curved with a number of strong dorsal spines, two strong basal spines proximally, but weaker distally. Claw strong, nearly half as long as propodus; auxiliary claws two-thirds as long as main claw.

Measurements (in mm.) of holotype male: Length (anterior margin of cephalon to tip of abdomen) 1.32, length cephalon 0.42, width across second lateral processes 0.8, length proboscis 0.67, greatest width proboscis 0.37, length abdomen 0.37, chelifore scape (both joints) 0.38, height ocular tubercle 0.37. Third leg: 1st coxa 0.21, 2nd coxa 0.35, 3rd coxa 0.18, femur 0.6, 1st tibia 0.52, 2nd tibia 0.6, tarsus 0.075, propodus 0.4, claw 0.18, auxiliary claw 0.12.

REMARKS

Cilunculus australiensis differs from all other known species of the genus in the presence of setose columnar processes on the anterior expansion of the cephalon and in the great height of the dorsal trunk tubercles. It is difficult to say to which of the known species of the genus *C. australiensis* is most closely allied; in the development of the dorsal tubercles it is approached by *C. sewelli* Calman; in the shape and position of the cement gland duct and in details of the propodus it is similar to *C. antillensis* Stock, while the processes on the anterior margin of the cephalon are most closely approached by those of *C. perspicax* Loman.

***Cilunculus hirsutus* n. sp.**

Figs. 36 A—L

MATERIAL

5 males (one is holotype), 2 exuviae, Station 57 "Thetis" Expedition, 3½-4 miles off Wata Mooli, near Botany Bay, N.S.W., 96-107 metres; dredged. A.M. P.13687, P.13688.

DESCRIPTION

Trunk robust, oval in outline, segmented. Lateral processes separated by about three-quarters of their own width. Anterior margin of each trunk segment fits into a recess on expanded posterior face of preceding segment. Posterior margin of segments 1-3 ornamented in dorsal midline by a small blunt-ended tubercle. Lateral processes bear a number of hairs on lateral margins and dorsally a single small tubercle bearing a long hair. Cervical processes bearing ovigers situated just anterior to first lateral processes. Anterior to cervical processes cephalon expands over base of proboscis. Palps arise from posterior limit of this expansion, and chelifores from anterior limit. Antero-lateral extremities of expansion drawn out to form two spine-bearing processes, on whose ventral sides the chelifores are inserted.

Ocular tubercle tall, slender above, pointed at tip, base spreading. Eyes not pigmented, appear to be four.

Proboscis with a slender proximal region, expanding gradually to attain maximum diameter at middle and tapering slightly towards tip, which is bluntly rounded. In the material examined the proboscis is either carried pointed downwards as in the figures, or horizontally against the ventral surface of the trunk.

Abdomen long, clavate, flexed slightly downwards, reaching just beyond distal end of 2nd coxae, with distinct cuticular fold at base. Spination of abdomen regular; two long setae on dorsal surface at one-third of its length, two shorter lateral setae about midway, and two lateral and two long dorsal setae at two-thirds of abdominal length. There may be two short setae beyond this point.

Chelifore scape two-jointed, basal joint short, second joint longest, beset with setae and inflated at end to form a shallow cup-like invagination in which is inserted the knob-like terminal joint. Terminal joint achelate, with a small rudiment of dactylus set in a pit (fig. 36D).

Palps nine-jointed, second joint longest, third short, fourth moderately long; joints 5-9 decreasing in size and with a ventral fringe of setae.

Oviger (male only known) 10-jointed, second joint longest (as in all other males in genus), first and third joints short, fourth and fifth of moderate length with

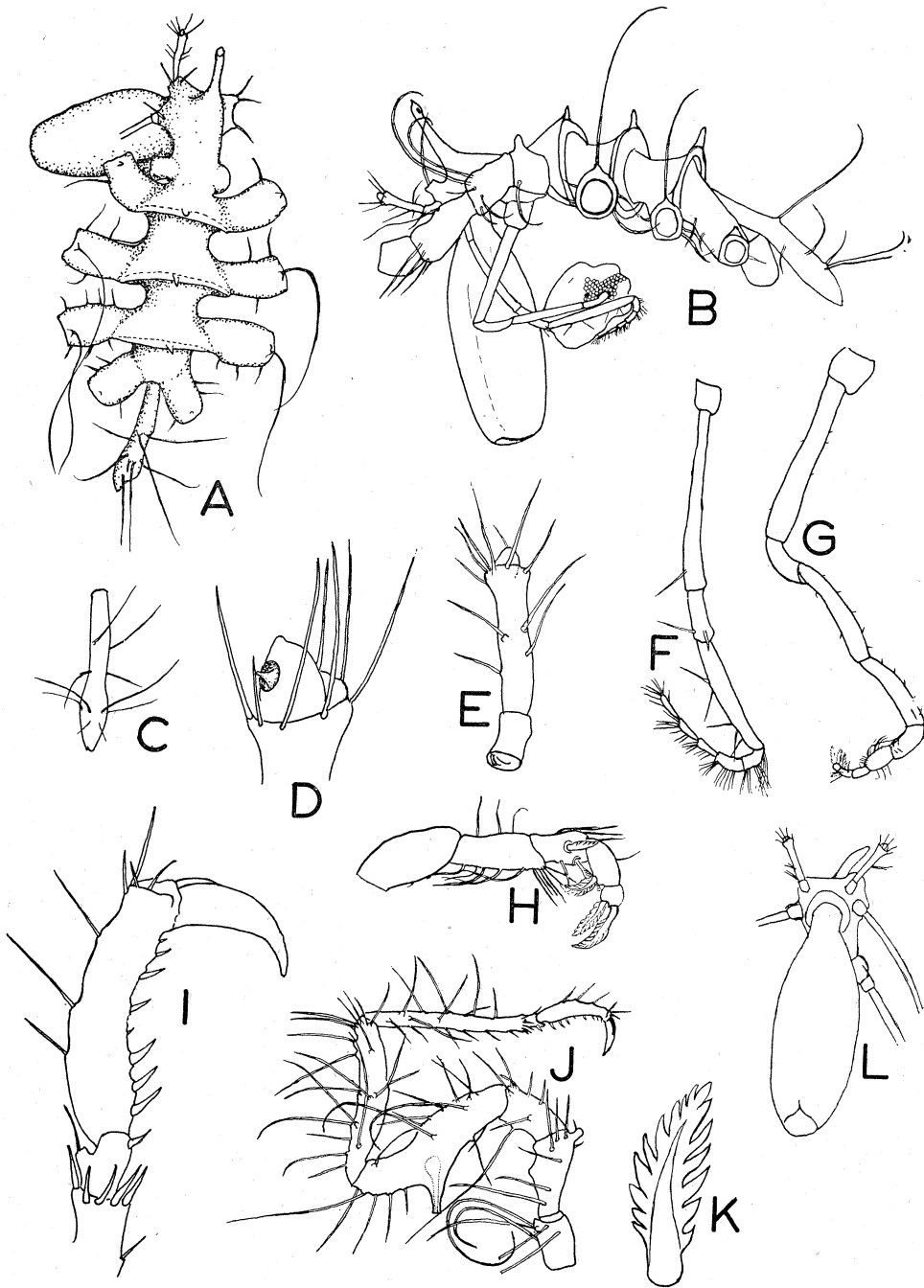


Fig. 36.—A-L, *Cilunculus hirsutus*; A and B, dorsal and lateral views of trunk; C, abdomen; D, tip of chelifore; E, chelifore; F, palp; G, male oviger; H, tip of male oviger; I, propodus; J, male third leg; K, oviger spine; L, ventral view of anterior region.

short setae. Joints 6-10 decreasing in size. Joint 7 with a number of long setae; joints 8-10 with denticulate spines according to formula 2 : 1 : 2. No terminal claw.

Third leg robust, all joints beset with long setae. First coxa shortest, second coxa longest coxal joint and bearing the genital pore on a small, rounded, genital tubercle on ventrodorsal extremity. Femur robust, with a very large conspicuous tubular cement gland on dorsal surface; femur and tibiae subequal. Tarsus short, propodus robust, almost straight, with three strong basal spines proximally, remaining spines on sole weaker; claw strong, curved, half as long as propodus. Auxiliary claws weak.

Measurements (male paratype in mm.): length trunk (anterior margin of cephalon to tip of abdomen) 4.7, length cephalon 1.3, width across second lateral processes 2.55, length proboscis 2.9, greatest width proboscis 1.0, length chelifore scape (both joints) 0.8, length abdomen 1.75. Third leg: 1st coxa 0.5, 2nd coxa 0.9, 3rd coxa 0.65, femur 1.8, 1st tibia 1.72, 2nd tibia 1.6, tarsus 0.17, propodus 0.65, claw 0.37.

REMARKS

C. hirsutus is most similar to *C. frontosus* Loman, 1908, in the general form of the trunk and the setose legs. It differs however in the greater robustness of the legs, especially the femur, the antero-lateral processes of the cephalic expansion, and in the possession of three jointed chelifores. The last joints of the chelifore, especially the reduced dactylus, is reminiscent of *Ascorhynchus parvituberculatum* Stock, 1953. In both species the chela is set in the excavated tip of the preceding joint, and the dactylus is short, peg-like, and set in a pit (Stock 1953: 301 calls it the "immovable finger").

The distribution of members of this genus is of interest:

C. armatus (Böhm, 1879) Japan.

C. antillensis Stock, 1955, St. Croix, Virgin Islands.

C. australiensis n. sp. New South Wales, Australia.

C. hirsutus n. sp. New South Wales, Australia.

C. frontosus Loman, 1908, north of the Celebes Islands.

C. perspicax Loman, 1908, north of the Celebes Islands.

C. sewelli Calman, 1938 (= *Ammothella gigas* Fage, 1956 n. syn.) off Zanzibar, and new record: in 100 fathoms just south of Mayor Island, New Zealand.

Family **COLOSSENDEIDAE** Hoek, 1881

Genus **Colossendeis** Jarzynsky, 1870

Colossendeis macerrima Wilson, 1881

For chief literature see Stock, 1953.

MATERIAL

1 female, Great Australian Bight, long. 126° 45', 190-320 fathoms, coll. F.I.S. "Endeavour", April 4, 1913. A.M. E.3742.

REMARKS

This species was first recorded in the Australian region by Hoek (1881) under the name *C. gigas-leptorhynchus* from Lat. $50^{\circ} 1' S.$, long. $123^{\circ} 4' E.$ The species is very widespread and is now regarded as a cosmopolitan deep-water form.

Family **PYCNOGONIDAE** Wilson, 1880

Genus **Pycnogonum** Brünnich, 1764

Pycnogonum torresi n. sp.

Figs. 37 A—D

MATERIAL

1 female (holotype) Murray Island, Torres Strait, 10-15 metres, coll. C. Hedley and A. R. McCulloch, 1907. A.M. P.13689.

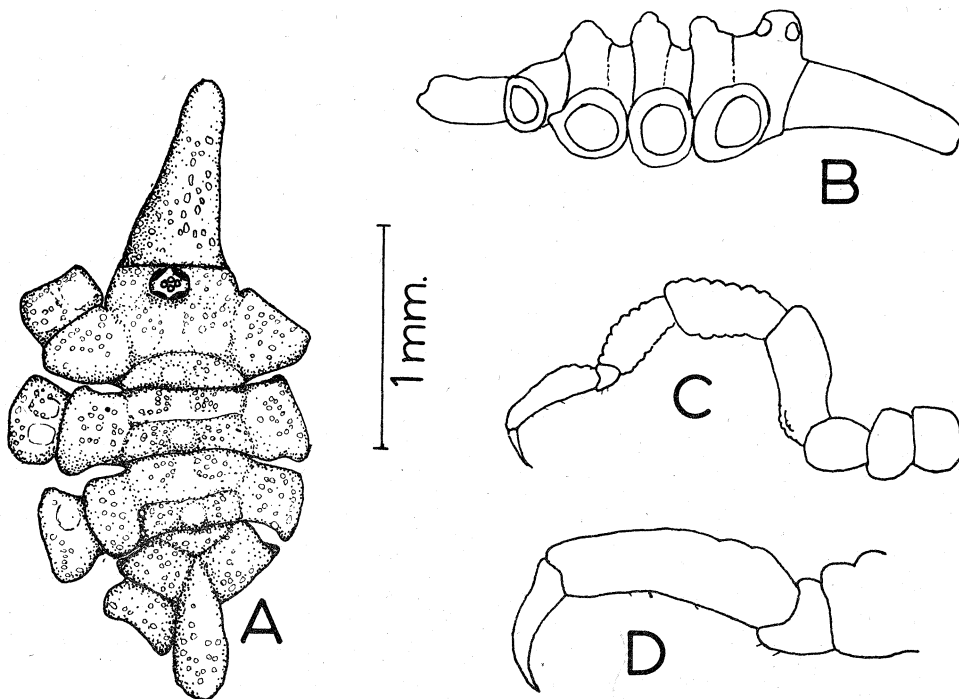


Fig. 37.—A-D, *Pycnogonum torresi* female. A and B, dorsal and lateral views of trunk; C, third leg; D, propodus.

DESCRIPTION

Trunk: integument strongly granular with signs of incipient reticulation; colour (in alcohol) brown. Trunk stout, oval in outline, no fusion of segments. Segments 1-3 with lateral processes marked off from central area by antero-posteriorly directed furrows. Central region of segments further divided by a transverse furrow into a fairly smooth anterior part and a posterior part which is thrown up into a round-topped ridge that is surmounted centrally by a round-topped tubercle. Median

tubercle lacking on fourth trunk segment. Lateral processes very close or touching. Posterior borders of fourth pair of lateral processes fused to the basal part of abdomen.

Ocular tubercle placed near anterior margin of cephalon; about as high as wide, rounded on top; four eyes, lightly pigmented.

Proboscis conical, tapering towards tip; with a slight downward flexure, about as long as trunk segments 2-4.

Abdomen horizontal, thick, rounded at tip, reaching to posterior margin of second coxae of fourth legs.

Oviger unknown. (Only one female specimen known).

Third leg moderately stout, integument somewhat nodulous; femur and first tibia subequal and the longest joints; propodus slightly arcuate; basal spines very few and small. Terminal claw almost half as long as propodus; auxiliary claws absent.

Genital pores (female) on dorsal surface of second coxae of all legs.

Measurements (in mm.), female holotype: total length 2.85, length cephalon 0.55, width second lateral processes 1.1, length proboscis 1.07, width proboscis at base 0.52, length abdomen 0.5. Third leg: 1st coxa 0.18, 2nd coxa 0.27, 3rd coxa 0.27, femur 0.6, 1st tibia 0.57, 2nd tibia 0.39, tarsus 0.13, propodus 0.46, claw 0.21.

REMARKS

This species shows considerable resemblance at first sight to *P. tenue* Slater, from Japanese waters, in the shape of the proboscis, the surface of the integument, and the shape of the legs. It differs, however, in being only about half the size of that species (measurements of *P. tenue* are given by Stock, 1954, and Utinomi, 1955), and also in the absence of the first post-ocular tubercle and the tubercle of the fourth trunk segment. Hedgepeth, 1949, and Stock, 1954, both found genital pores on the last pair of legs only in *P. tenue*, whereas in *P. torresi* they are present on all legs.

***Pycnogonum tuberculatum* n. sp.**

Figs. 38 A—D

MATERIAL

3 females (one of which is the holotype), trawled west-south-west of Gabo Island, N.S.W., 130 metres, coll. K. Moller, trawler "Durraween", Dec., 1929. A.M. P.13690, P.13691.

2 females off Gabo Island, N.S.W., 148 metres, coll. F.I.S. "Endeavour", Nov. 18, 1913. A.M. E.4649 (part).

1 female, East of Babel Island (eastern slopes of Bass Strait), 125 metres, coll. F.I.S. "Endeavour", May 28, 1914. A.M. E.5111 (part).

1 female, 25 miles east of Babel Island, Bass Strait, 119 metres, trawled F.I.S. "Endeavour", March 28, 1914. A.M. P.13692.

1 female trawled 14 miles off Batemans Bay, N.S.W., 140 metres, coll. K. Moller, trawler "Durraween". A.M. P.13693.

1 female off Botany Bay to Wata Mooli, N.S.W., about 90 metres, collected from nets (in port) off trawler "Thistle", coll. C. W. Mulvey, Nov. 19, 1924. A.M. P.7579.

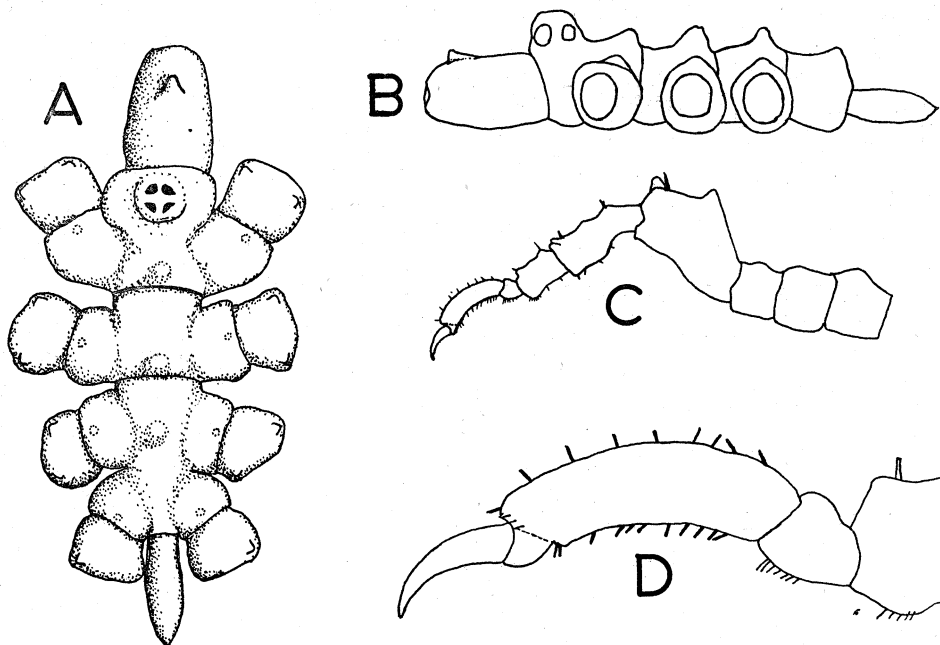


Fig. 38.—A-D, *Pycnogonum tuberculatum* female. A and B, dorsal and lateral views of trunk; C, third leg; D, propodus.

DESCRIPTION

Trunk: integument granular, colour (in alcohol) reddish-brown; trunk stout, heavy, width across second lateral processes roughly equal to half length of trunk segments. First and second trunk segments clearly marked off from each other, and from posterior segments by intersegmental lines. Third and fourth segments fused. Segments 1-3 each bears a low, round tipped eminence in mid-line near posterior margin. Lateral processes slightly separated at base, more widely separated distally. Lateral processes 3 and 4 almost touching. A small tubercle is present distally on dorsal surface of each lateral process.

Ocular tubercle placed at anterior margin of cephalon, flattened on top, almost as high as basal diameter. Four eyes.

Proboscis cylindrical, tapering slightly towards the tip; tip rounded. Length (in dorsal view) about equal to that of abdomen. At two-thirds of length from base on dorsal surface is a single median tubercle, rising steeply on the anterior face and sloping gently downwards posteriorly (this is not very obvious in dorsal view).

Abdomen horizontal, reaching to a point half way along third coxa; widest part at about two-thirds of its length, after this it tapers to a rounded tip. Anus terminal.

Palps, chelifores and ovigers absent. (Only females known).

Third leg stout, first and second coxae subequal, third coxa smaller, femur massive, roughly triangular in outline, with a prominent dorsal tubercle. First tibia the second longest joint, wider distally than proximally. Second tibia about

half as long as first tibia. Propodus arcuate with a few weak spines; basal spines sparse, blunt-ended. Terminal claw about half as long as propodus. Auxiliary claws lacking.

Genital pores (female) on dorsal surface of second coxae of all legs.

Measurements (in mm.), female holotype given first, female paratype next in brackets: Total length 5.65 (4.85), length proboscis (ventral) 1.4 (1.3), greatest width proboscis 0.8 (0.7), width second lateral processes 1.85 (1.45), length cephalon 1.05 (0.95), length abdomen 1.0 (0.9). Third leg: 1st coxa 0.5 (0.45), 2nd coxa 0.5 (0.45), 3rd coxa 0.5 (0.45), femur 1.47 (1.2), 1st tibia 1.0 (0.8), 2nd tibia 0.5 (0.5), tarsus 0.25 (0.2), propodus 0.7 (0.5), claw 0.35 (0.3).

REMARKS

P. tuberculatum differs from the only other species of the genus known from the southern part of Australia, *P. aurilineatum* Flynn, in a number of features, its smaller size, the absence of a segmental line between trunk segments 3 and 4, and the longer abdomen, which is round-tipped in *P. tuberculatum* and square-ended and reaching only to the end of the first coxae in *P. aurilineatum*. *P. tuberculatum* resembles *P. forte* Flynn from South Africa in the partial fusion of the third and fourth trunk segments, and *P. rhinoceros* Loman in the presence of a tubercle on the proboscis, but differs from both of these species in most other features.

Key to Australian species of **Pycnogonum**

- | | |
|---|-------------------------------|
| 1. Tip of abdomen squarish, truncated. | <i>P. aurilineatum</i> Flynn |
| Tip of abdomen rounded | 2 |
| 2. Proboscis barrel-shaped with a small dorsal tubercle | <i>P. tuberculatum</i> n. sp. |
| Proboscis conical, without a dorsal tubercle. | <i>P. torresi</i> n. sp. |

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