

# Pycnogonida of Western Australia

C ALLAN CHILD

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 190

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# Pycnogonida of Western Australia

*C. Allan Child*



SMITHSONIAN INSTITUTION PRESS

City of Washington

1975

## ABSTRACT

Child, C. Allan. Pycnogonida of Western Australia. *Smithsonian Contributions to Zoology*, number 190, 29 pages, 11 figures, 1975.—A brief discussion of previous work with Western Australian pycnogonids is provided, followed by a resumé of faunal affinities and a map showing collecting localities mentioned in the taxonomic section. Twenty-seven species in thirteen genera are discussed and four are described as new: *Nymphon flindersi*, *N. rottnesti*, *Rhopalorhynchus dampieri*, and *Pallenopsis cidaribatus*. Three additional species are discussed as probably new, but with insufficient diagnostic characters to be named.

OFFICIAL PUBLICATION DATE is handstamped in a limited number of initial copies and is recorded in the Institution's annual report, *Smithsonian Year*, SI PRESS NUMBER 5211. SERIES COVER DESIGN: The coral *Montastrea cavernosa* (Linnaeus).

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### Library of Congress Cataloging in Publication Data

Child, C. Allan

Pycnogonida of western Australia.

(Smithsonian contributions to zoology, no. 190)

Supt. of Docs. no.: SI 1.27:190

I. Pycnogonida—Western Australia. I. Title. II. Series: Smithsonian Institution. Smithsonian contributions to zoology, no. 190.

QL1.S54 no. 190 [QL447] [595'.394'09941] 74-13822

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For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402  
Washington, D.C. 20402 - Price 95 cents (paper cover)

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# Pycnogonida of Western Australia

*C. Allan Child*

## Introduction

This report is an attempt to fill the gap in our knowledge of Australian pycnogonids from the Indian Ocean segment of that country. Clark (1963:2) made the telling comment that "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." Stock made a "partial fulfillment" (1973:99) of this gap from Port Philip (Melbourne) to Rottneest Island (Perth) with his report on southeastern Australian pycnogonids.

There are few other contributions to the pycnogonid fauna of this immense area, and indeed most of the collections to date have been fortuitous captures made while in search of other fauna. Williams (1940) described one new species and two new varieties of known species from Western Australia. Hedgpeth (1944) described an additional new species from the State. Clark (1963) added a cosmopolitan deep-water species to the list and only two other species from the Northern Territory to the Gulf of Carpentaria. Stock (1968) added two new and two known species to the fauna of the Great Australian Bight, but from South Australia. Since then, no additional species have been described from Western Australia. With the present report, the known fauna is increased from two species and two varieties to 26 species, including varieties and subspecies, with an additional three possible new species remaining unnamed for lack of sufficient diagnostic characters.

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There is little risk in predicting that this total could be doubled by intensive search for the small littoral forms that must exist on coasts accessible to the hardy collector in this harsh countryside. The difficulties of collecting here are attested to by the present collection, most of which was taken while aboard vessels instead of from the shore.

The collections treated here are mainly from the Western Australian Museum, Perth, and the types are assigned their Museum (WAM) numbers. Some lots of the collection were contributed by Dr. J. L. Barnard, Smithsonian Institution, while collecting amphipods in Western Australia. Two lots are included from South Australia, because it would not be worthwhile to report on these separately. They were given to Dr. Barnard with amphipods by Mr. S. A. Shepherd, Senior Fisheries Officer, Department of Fisheries, Adelaide. One other lot was examined, from the Museum of Comparative Zoology (MCZ), Harvard University, Cambridge, Massachusetts. Some type-material has been deposited in the National Museum of Natural History, Smithsonian Institution, under the catalog numbers of the United States National Museum (USNM), and given appropriate catalog numbers in the text. The collecting localities treated in this report are identified on the map (Figure 1) of Western Australia.

The pycnogonids of Western Australia have their closest affinities with the fauna of eastern Australia, as might be expected. Of the 20 previously known species treated here, 12 also occur on the southern and eastern coasts of Australia, while only two are also found in New Zealand waters. There is less relationship to the warmwater Indian Ocean fauna, with three species shared with Madagascar and the East African coast. None of

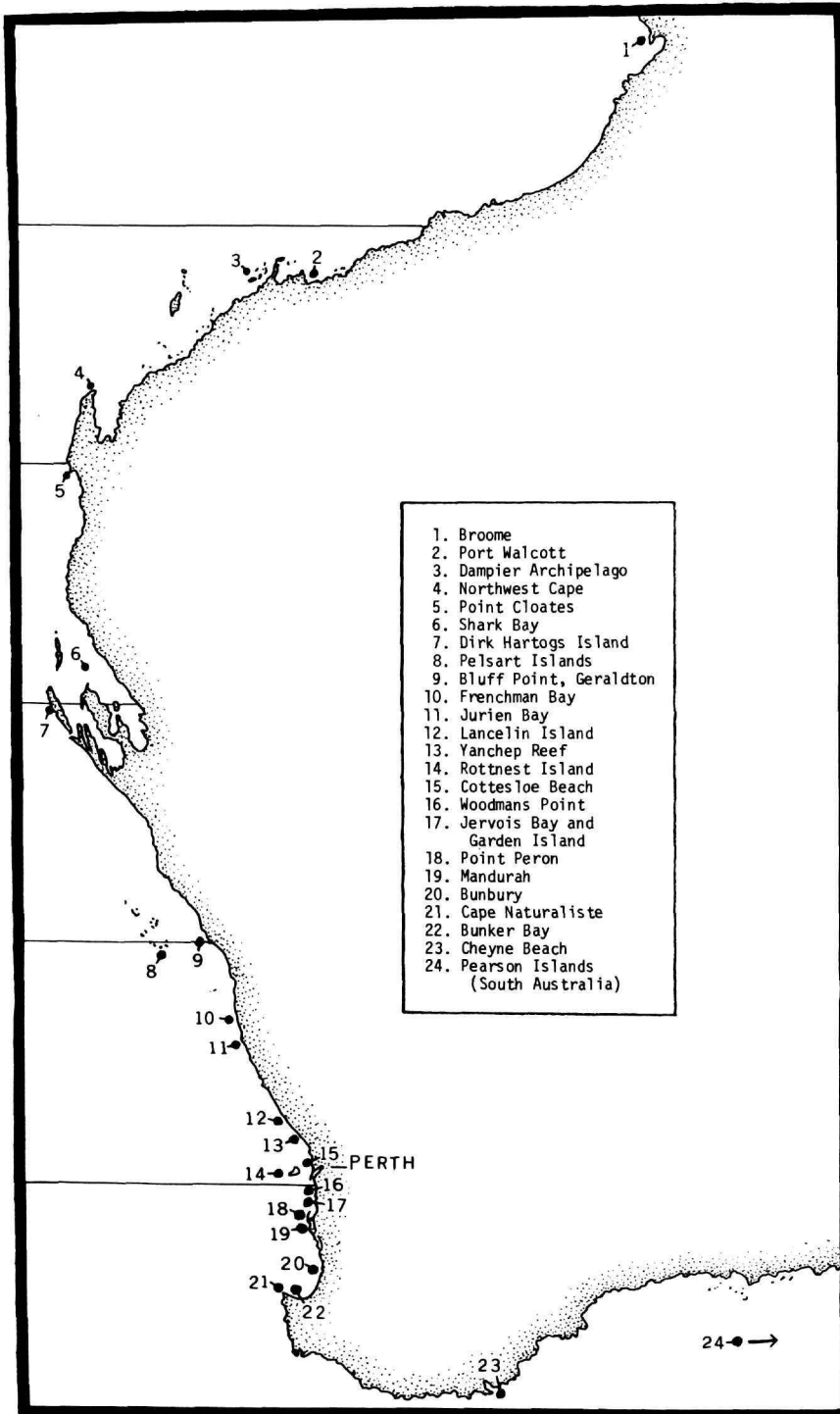


FIGURE 1.—Map of western part of Western Australia, showing collecting locations mentioned in the text.



the comparatively well-known Indian species are found (so far) on the Western Australian coast.

The East Indies relationship is considerable, with six species or almost one-third of the known fauna also occurring in Indonesia, and two additional species each from the Philippines and Japan. These last relationships possibly represent patterns of collecting in better known areas as much as good distribution knowledge for each species. This whole picture of distribution may change entirely when more is known concerning Australasian pycnogonids. All of Southeast Asia remains sparsely collected as does northern Australia.

None of the genera treated in this report are new to Australia. The Family Callipallenidae is predominant as it is in all other reports on Australian fauna. Five of the 14 genera are from this family and 13 of the 29 species are callipallenids. Two families have not yet been found in Western Australia, the Pycnogonidae and Endeidae, although both have representatives on the eastern Australian coasts.

The pycnogonid fauna of Western Australia, as it is now known, consists of 29 species, including those remaining unnamed:

Family NYMPHONIDAE Wilson, 1878

Genus *Nymphon* Fabricius, 1794

*Nymphon flindersi*, n. sp.

*Nymphon rottneisti*, n. sp.

Family COLOSSENDEIDAE Hock, 1881

Genus *Rhopalorhynchus* Wood-Mason, 1873

*Rhopalorhynchus sibogae* Stock, 1958

*Rhopalorhynchus dampieri*, n. sp.

Genus *Colossendeis* Jarzynsky, 1870

\**Colossendeis macerrima* Wilson, 1881

Family CALLIPALLENIDAE Hilton, 1942

Genus *Callipallene* Flynn, 1929

*Callipallene brevirostris novaezealandiae* (Thomson, 1884)

*Callipallene emaciata micracantha* Stock, 1954

*Callipallene* sp. A

*Callipallene* sp. B

Genus *Parapallene* Carpenter, 1892

*Parapallene australiensis* (Hock, 1881)

*Parapallene haddoni* Carpenter, 1892

*Parapallene nierstraszi* Loman, 1908

Genus *Stylopallene* Clark, 1963

*Stylopallene tubirostris* Clark, 1963

Genus *Pycnothea* Loman, 1920

*Pycnothea flynni* Williams, 1940

\* Species not represented in this collection.

Genus *Pallenopsis* Wilson, 1881

*Pallenopsis cidaribatus*, n. sp.

*Pallenopsis denticulata* Hedgpeth, 1944

*Pallenopsis hoeki* (Miers, 1884)

*Pallenopsis macneilli* Clark, 1963

Family PHOXICHILIDIIDAE Sars, 1891

Genus *Anoplodactylus* Wilson, 1878

*Anoplodactylus pycnosoma* (Helfer, 1938)

*Anoplodactylus longiceps* Stock, 1951

\**Anoplodactylus pulcher* Carpenter

*Anoplodactylus* sp.

Family AMMOTHEIDAE Dohrn, 1881

Genus *Achelia* Hodge, 1864

*Achelia shepherdii* Stock, 1973

*Achelia assimilis* (Haswell, 1884)

Genus *Ammothea* Leach, 1814

*Ammothea australiensis* Flynn, 1919

Genus *Ammothella* Verrill, 1900

*Ammothella biunguiculata australiensis* Williams, 1940

Genus *Ascorhynchus* Sars, 1877

*Ascorhynchus minutum* Hock, 1881

Genus *Nymphopsis* Haswell, 1884

*Nymphopsis acinacispinatus bathursti* Williams, 1940

*Nymphopsis korotnewi* Schimkewitsch, 1887

ACKNOWLEDGMENTS.—I am indebted to Dr. L. E. Koch, Curator of Entomology, Western Australia Museum, for entrusting the Museum collection to me, and for his prompt replies to my inquiries. I am grateful to Dr. J. L. Barnard, Curator of Crustacea, National Museum of Natural History, for donating pycnogonids from his algal washings for use in this study, and to Dr. H. W. Levi, Curator of Arachnology, Museum of Comparative Zoology, Harvard University, for his loan of additional specimens of *Pallenopsis denticulata* Hedgpeth, and to Dr. T. E. Bowman, Curator of Crustacea, National Museum of Natural History, Smithsonian Institution, for his critical reading of the manuscript.

Family NYMPHONIDAE Wilson, 1878

Genus *Nymphon* J. C. Fabricius, 1794

*Nymphon flindersi*, new species

FIGURE 2

MATERIAL EXAMINED.—One female holotype. West of Garden Island, 32°13.3'S, 115°33.3'E, to 32°13.0'S, 115°31.1'E, coll. L. Marsh and M. Shepherd on F.R.V. *Flinders*, haul 1, 17–33 meters, 8 March 1972. WAM 73–76.

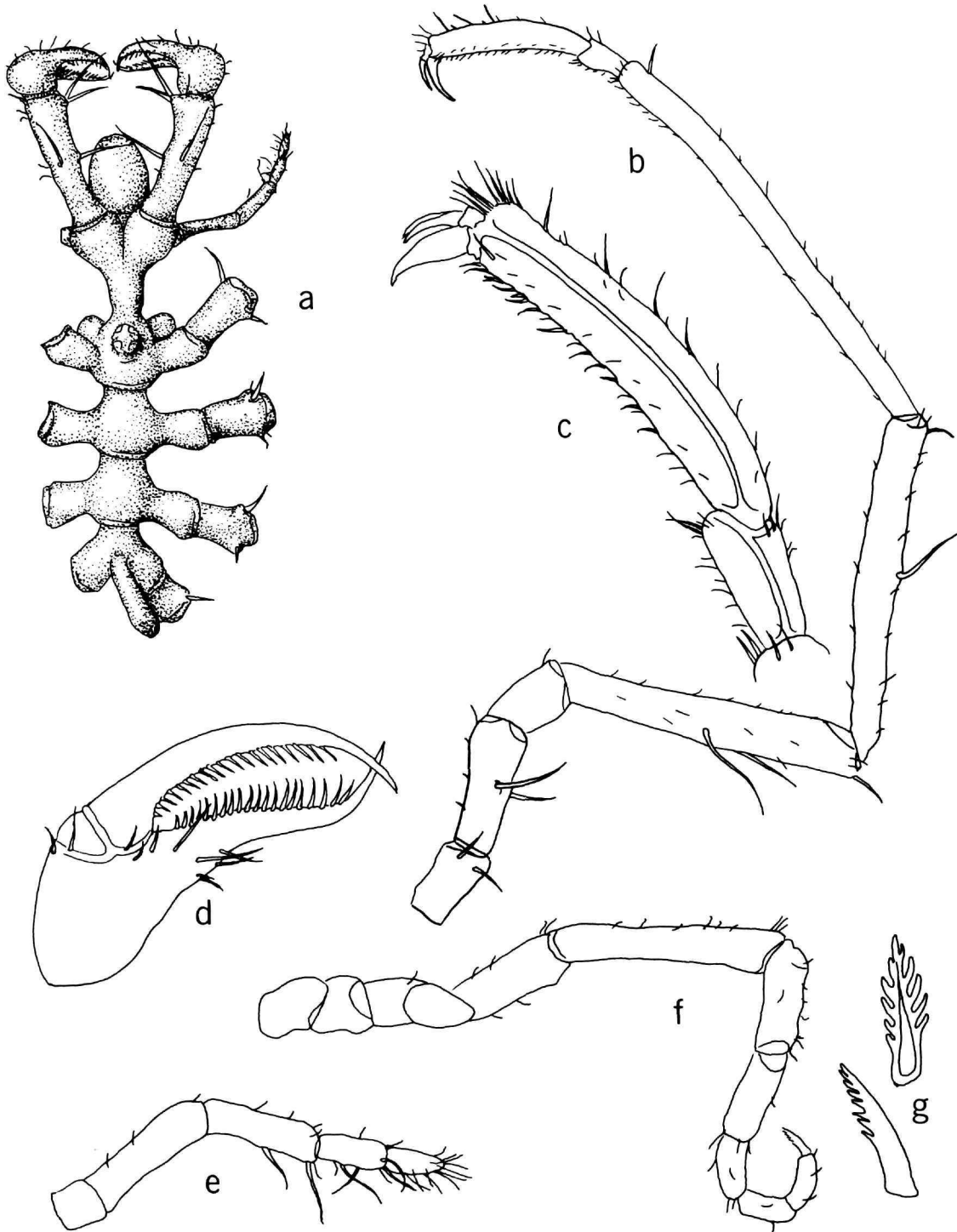


FIGURE 2.—*Nymphon flindersi*, new species (holotype): a, body; b, third leg; c, terminal segments of third leg; d, chela; e, palp; f, oviger; g, terminal claw and compound spine of oviger.

DESCRIPTION.—Trunk completely segmented. Lateral processes glabrous, separated by their own diameter or slightly more. Neck of medium length, thinning in diameter where it attaches to cephalic segment. Ovipiger implantation anterior to, but touching, first lateral processes. Ocular tubercle low, rounded, with 2 tiny lateral bumps. Eyes distinct, unpigmented in alcohol. Proboscis cylindrical, tapering toward truncated tip. Abdomen cylindrical, long, armed with 2 dorsal setae.

Chelifores large, well developed. Scape longer than proboscis, armed at midlength with single long dorsal and endal setae, several short lateral setae, and distally with a single long dorsal seta and 2 long endal setae. Longest setae are 1 to  $1\frac{1}{2}$  times diameter of scape. Chela with slightly globular palm, a ring of setae around insertion of fingers. Fingers almost 2 times length of palm, armed with 20 teeth on fixed finger, 19 on movable finger. Teeth homogeneous, becoming slightly longer distally on finger.

Second palp segment slightly longer than third, twice the fourth, and over twice the fifth. Setae sparse, increasing in number toward tip.

Fourth and fifth oviger segments relatively short, armed with few ectal setae. Fifth segment half length of fourth, with succeeding segments progressively shorter. Segments 7 through 10 with compound spines, increasing in length toward distal end of each segment, with the formula 8:7:7:8. Terminal claw shorter than tenth segment, armed with 7 ventral teeth. Larger compound spines with 5 denticulations per side.

Legs thin, sparsely setose. Coxa 1 with 2 long dorsolateral setae and 2 short lateral setae. Coxa 2 twice length of coxa 1, armed with 2 lateral setae, each longer than segment diameter. Coxa 3 slightly longer than coxa 1, armed with single ventrodistal seta. Femur armed at midlength with 2 long lateral setae, 1 dorsodistal seta of medium length, and few scattered lateral and ventral setae. Tibia 1 slightly longer than femur, armed with single long middorsal seta, a shorter dorsodistal seta, and few short lateral and ventral setae. Tibia 2 almost  $1\frac{1}{2}$  times length of femur, armed with few dorsal and ventral setae and a single dorsodistal seta.

Tarsus short, one-third propodal length. Propodus thin, slightly curved. Tarsus and propodus armed with row of ventral spines, without larger heel spines. Claw less than one-fourth length of

propodus. Auxiliaries almost three-fourths length of main claw.

MEASUREMENTS (in mm).—Trunk length (insertion of scape to tip 4th lateral process), 2.81. Trunk width (across second lateral processes), 1.28. Proboscis length (ventral), 0.87. Abdomen length 0.62. Third leg: Coxa 1, 0.46; coxa 2, 0.96; coxa 3, 0.64; femur, 2.36; tibia 1, 2.56; tibia 2, 3.25; tarsus, 0.32; propodus, 1.10; claw, 0.27.

REMARKS.—This species bears a short tarsus (less than one-half propodus length), and appears most closely related to *N. setimanus* Barnard, a species found in South Africa and Madagascar. There is no outstanding character in this single female that immediately separates it from all others in this cumbersome genus, but the combination of neck length, various length ratios of leg and palp segments, and terminal leg segment configuration do not agree with any recorded species.

The second palp segment is longer than the third, unlike *N. setimanus*, in which they are equal. The long lateral leg and scape setae are seldom found in this combination and do not agree with Barnard's species or with any other. This species is quite like *N. setimanus* in trunk shape, length of lateral processes, length and shape of terminal leg segments, and length of ocular tubercle and abdomen. It is little more than half the size of Barnard's type-specimen and has considerably fewer denticulate spines on the oviger segments. The chela is also more robust and less setose than that shown in Barnard's figure 8 (1954:104).

ETYMOLOGY.—The species is named for the research vessel *Flinders*, which undoubtedly was named for Matthew Flinders, early English explorer of Australian waters.

### *Nymphon rotnesti*, new species

FIGURE 3

MATERIAL EXAMINED.—One ovigerous female, holotype, 1 ovigerous female, 1 juvenile?, paratypes. West of Rottnest Island, 32°00'S, 115°16'E, CSIRO Sta. 225, 12 October 1963, beam trawl with fish and shells, 137–143 meters. WAM 70–3985, 3986, USNM 149236.

DESCRIPTION.—Trunk thin, fully segmented. Neck moderately long. Ovigigers implanted anterior to,

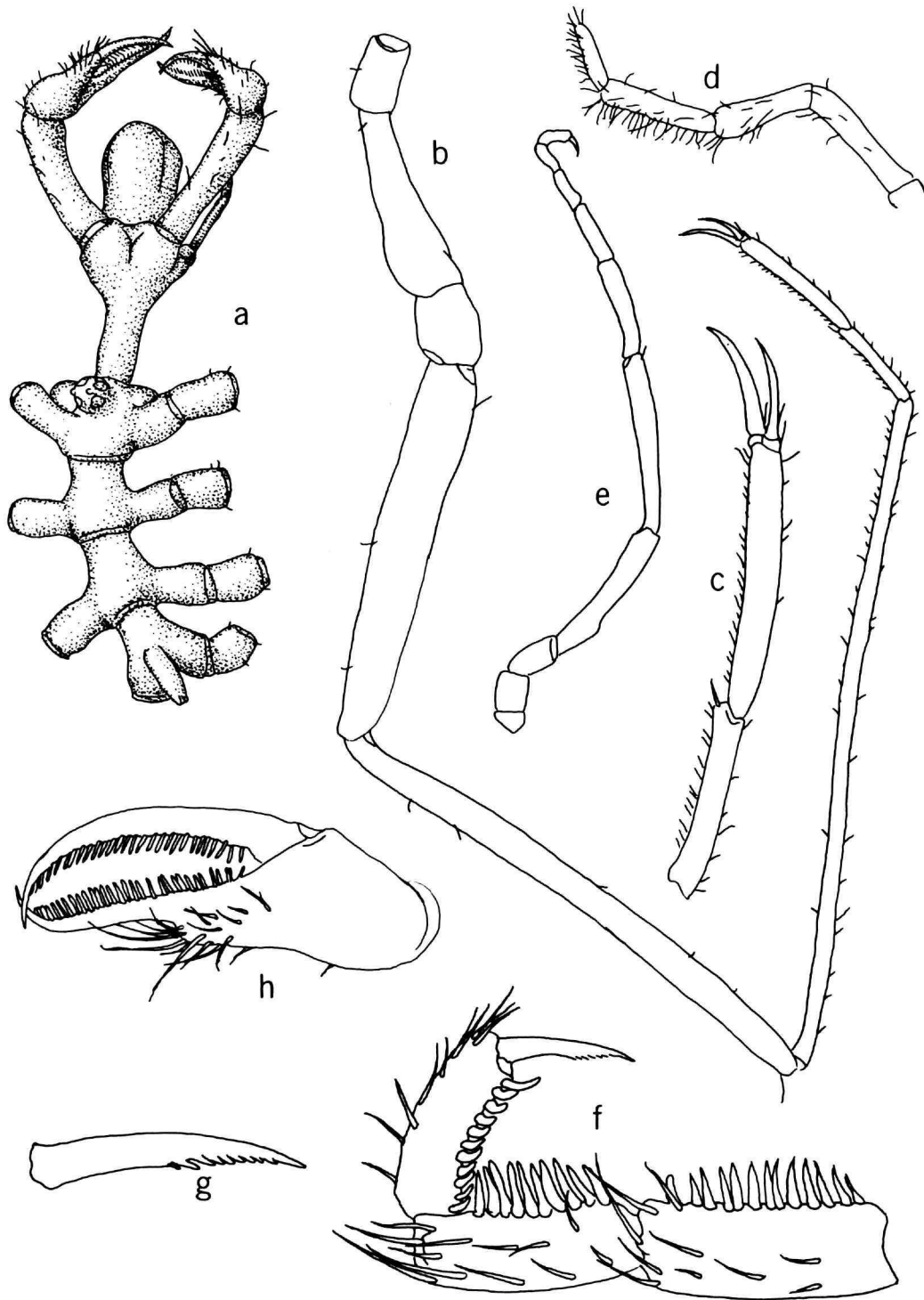


FIGURE 3.—*Nymphon rottnesti*, new species (holotype): a, body; b, third leg; c, terminal segments of third leg; d, palp; e, oviger; f, terminal segments of oviger; g, oviger claw; h, chela.

but against first lateral processes. Lateral processes separated by over twice their diameter, without tubercles or setae. Abdomen short, slightly longer than fourth lateral processes. Ocular tubercle low, rounded, capped by two tiny lateral papillae. Eyes large, slightly pigmented in alcohol. Proboscis cylindrical, slightly longer than neck.

Chelifores 2-segmented, scape with few scattered setae. Chela robust, slightly curved, little longer than scape. Fingers long, armed with 29–30 uniform teeth closely set on dactyl and immovable finger. Low hump over base of immovable finger, armed with thick tuft of setae. Fingers more than  $1\frac{1}{2}$  times length of palm. Fingers overlap when closed.

Palp segments 2 and 4 equal, third slightly shorter, fifth segment shortest, more than one-half length of second. Terminal 3 segments thickly setose ventrally, and scattered setae on all segments but the first.

Oviger with fourth segment swollen at one-third its length. Fifth segment longest, slightly longer than fourth, with several setae at tip. Distal segments increasingly shorter. Terminal segments with denticulate spines having the formula 16:13:10:11. Terminal claw with endal serrate edge having 9–10 minute teeth.

Legs long, thin, with sparse setae becoming more numerous distally. Second coxa almost three times length of first. Femur slightly inflated with eggs, three-fifths length of tibia 2. Tibia 1 is four-fifths length of tibia 2. Tarsus almost three-fourths length of propodus. Propodus very slightly curved, armed with row of uniform small spines on sole. Terminal claw almost one-half length of propodus, moderately curved. Auxiliary claws nine-tenths length of primary claw.

MEASUREMENTS (in mm).—Trunk length (ocular tubercle anterior to tip 4th lateral process), 2.41. Trunk width (across 2nd lateral processes), 1.31. Neck length, 1.20. Proboscis length, 1.36. Diameter between 2nd and 3rd lateral processes, 0.35. Third leg: Coxa 1, 0.52; coxa 2, 1.4; coxa 3, 0.58; femur, 2.88; tibia 1, 4.05; tibia 2, 4.92; tarsus, 0.7; propodus, 0.99; claw, 0.46.

REMARKS.—This species is very close to *N. andamanense* Calman. It differs in the following respects: Overall size is only two-thirds that of Calman's species; it has a shorter neck and shorter third trunk segment so that the posterior three

segments are more nearly the same length; the chela is longer than the scape in the new species and there are almost twice the number of teeth on the fingers. The fourth palp segment is longer than the third, whereas the third is longer with *N. andamanense*. The legs are more setose and the femur is only a little over one-half the length of the tibia 2 instead of being 78 percent of the length. The tarsus is only one-third the propodus length in *N. andamanense*, but is seven-tenths the propodus length with the new species. The claw is also longer in relation to propodus length for this new species. *Nymphon rotnnesti* shows similarities to *N. molleri* Clark, but again with sufficient differences to warrant its separation. Clark's species has a longer neck, shorter tarsus, shorter claws, and various differences in appendage segment length ratios. The oviger denticulation differs in number and spine denticulations, although the longer fourth and fifth oviger segment lengths can only be attributed to sex differences between Clark's male specimen and the present female specimens.

ETYMOLOGY.—The species is named for Rottnest Island, the nearest land to its point of capture.

#### Family COLOSSENDEIDAE Hoek, 1881

#### Genus *Rhopalorhynchus* Wood-Mason, 1873

#### *Rhopalorhynchus sibogae* Stock

*Rhopalorhynchus kroeyeri*.—Loman, 1908 [part], pl. XV: fig. 217.

*Rhopalorhynchus sibogae* Stock, 1958:124–125, figs. 22–27.

MATERIAL EXAMINED.—Two juveniles, NW of Lancelin Island, 31°05'S, 116°55'E (sb 114°55'E?), beam trawl with bryozoa in 113–122 meters, 5 February 1964, CSIRO Sta. 46.

Two males, W of Rottnest Island, 32°03'S, 114°20'E, beam trawl with coral and sponges in 113–139 meters, 15 February 1964, CSIRO Sta. 50.

One female, 1 legless specimen, NW of Point Cloates, 22°52'S, 113°39'E, dredge with crustaceans and shells in 134 meters, 6 October 1963, CSIRO Sta. 172.

One female, NW of Dirk Hartogs Island, 25°30'S, 112°29'E, beam trawl in 130 meters, 9 October 1963, CSIRO Sta. 200.

REMARKS.—I have placed these specimens only tentatively under *R. sibogae*. They may be *R. tenuissimum* (Haswell), but his published description, as pointed out by Stock (1958:125), is insufficient for specific determination. None of Haswell's specimens are available for comparison.

The specimens in hand conform to the ratios given by Stock for *R. sibogae*, except for the placement of the proboscis tubercle or tooth. It is only about one-fourth (24–26 percent) the distance along the inflated part instead of 39 to 43 percent of the distance as with *R. sibogae*. The sixth-seventh palp segment ratio is the same as is the tarsal ratio (about 93 percent). The claw is the same length as the propodus; the tarsus is longer than either propodus or claw. The proboscis tip is not as blunt in the female specimens as that shown by Stock (1958:124, fig. 26). If these specimens are not *R. tenuissimum*, then the distribution and depth range of *R. sibogae* are considerably extended from Flores Island in Indonesia to near Perth, Western Australia, and from 27–36 meters to 113–139 meters deep.

#### *Rhopalorhynchus dampieri*, new species

##### FIGURE 4

MATERIAL EXAMINED.—One male, holotype, W of Lancelin Island, 31°05'S, 116°55'E (sb 114°55'E?), beam trawl with bryozoans in 113–122 meters, 5 February 1964, CSIRO Sta. 46. WAM 70–3953.

One female, paratype, W of Mandurah, 32°33'S, 115°04'E, 110 meters, 23 November 1970, R.V. *Diamantina*, Sta. 4. WAM 71–1789.

One ovigerous female, paratype, SW of Jurien Bay, 30°38'S, 114°47'E, 110 meters, 9 December 1970, R.V. *Diamantina*, Sta. 108. WAM 71–1791.

One female, paratype, NW of Bunbury, 32°57.5'S, 114°48.0'E, 122–139 meters, 15 March 1972, R.V. *Diamantina*, Sta. 8, cruise DM 1/72. USNM 149237.

DESCRIPTION.—Trunk slender, glabrous, with flaring articulations. Lateral processes separated by almost twice their diameters. Abdomen shorter than fourth lateral processes, downcurved, almost hidden in dorsal aspect. Ocular tubercle short, globular, with low apical tubercle and lateral papillae. Eyes unpigmented, with swollen or convex surfaces.

Proboscis with short, poorly developed "stalk," merging abruptly with inflated posterior portion. Posterior and larger anterior portions separated by marked constriction. Proboscis slightly downcurved distally, one-eighth longer than trunk length. Dorsal tubercle or tooth lacking.

Palp 10-segmented. First segment very short, second reduced to articulated ring, third longest, being 2½ times length of fifth. Third segment with 8–9 dorsal spines and few dorsal, lateral, and ventral setae. Five terminal segments armed with few dorsal setae and many short ventral setae.

Oviger 10-segmented. First segment a short ring, second and third short, equal in combined length to fifth. Fourth segment long, thin, equal to sixth, which is armed with few scattered setae and an ectal fringe of short spines. Terminal 4 segments twice their diameters in length, curved, armed with 4 rows of denticulate spines, the central rows having the formula 12:8:9:10. Denticulate spines of varying lengths with finely serrate edges. Terminal claw robust, two-thirds length of segment, almost spatulate on one side, armed with 2 tiny claws or teeth distally.

Legs extremely thin, longest segment almost 20 times its diameter. Coxae short, not much longer than their diameter, second coxa slightly longer than first or third. Femur one-tenth shorter than tibia 1 and one-tenth longer than tibia 2. Tarsus nine-tenths length of propodus. Claw and propodus subequal. Femur and tibiae armed with dorsal row or 8–9 short sharp spines and few scattered setae, increasing in number distally. Tarsus and propodus armed with few dorsal setae and no heel or sole spines or setae. Claw slightly curved, of equal size on all legs.

MEASUREMENTS OF HOLOTYPE (in mm).—Trunk length (proboscis insertion to tip 4th lateral process), 4.21. Trunk width (across 2nd lateral processes), 2.11. Proboscis length (ventral), 4.97. Abdomen length (ventral), 0.25. Third leg: Coxa 1, 0.38; coxa 2, 0.55; coxa 3, 0.5; femur, 4.7; tibia 1, 5.15; tibia 2, 4.19; tarsus, 1.4; propodus, 1.66; claw, 1.67.

REMARKS.—This is the seventh described species of the nontoothed or *articulatum*-group of the genus. Following Stock's (1970:9) key, the new species can be worked down to the third couplet where it falls in line with *R. dofleini*, its nearest morphological ally. It differs from *R. dofleini* in

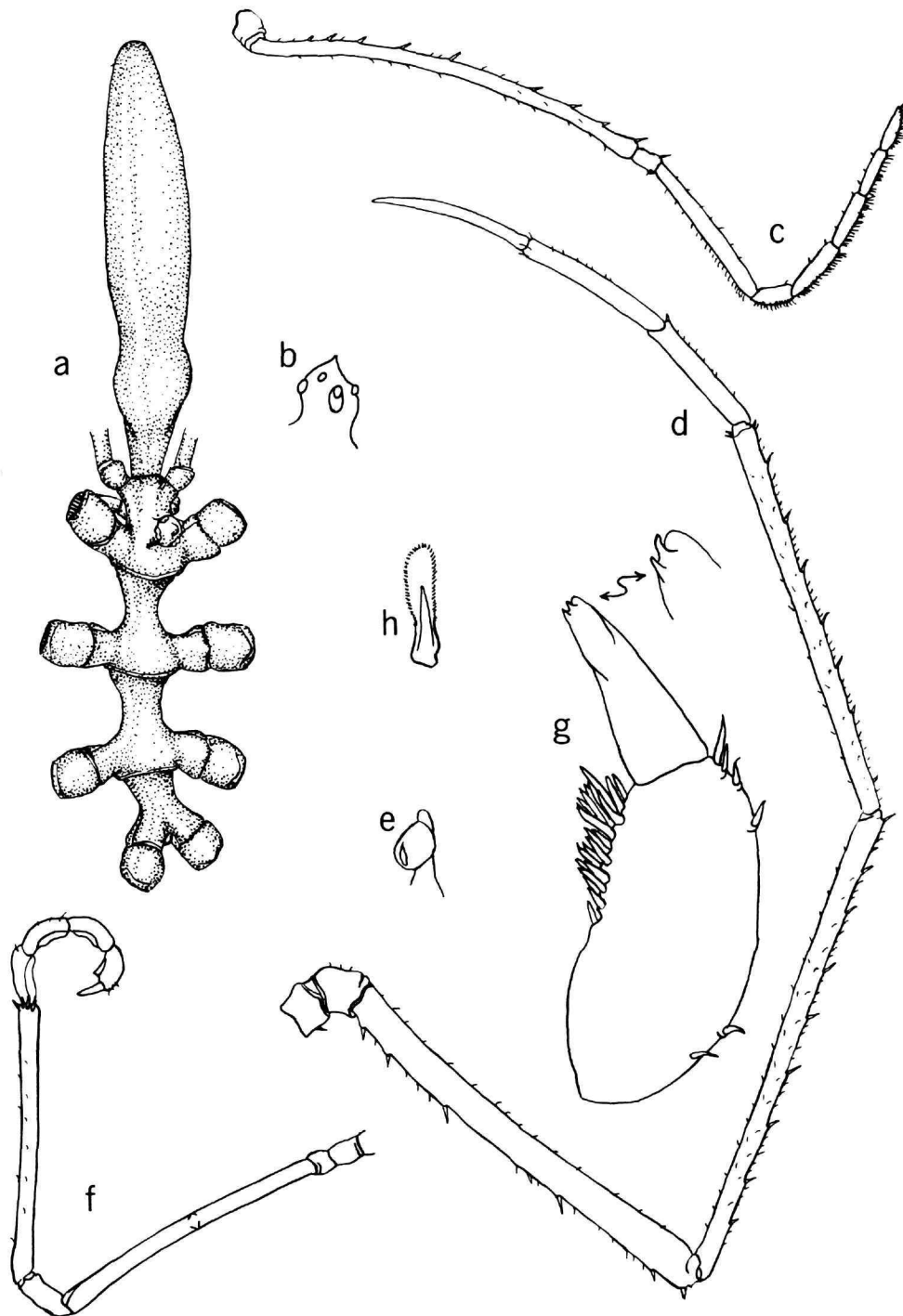


FIGURE 4.—*Rhopalorhynchus dampieri*, new species (holotype): a, body; b, ocular tubercle, lateral; c, palp; d, third leg; e, abdomen, ventral; f, oviger; g, terminal oviger segment with enlargement of claw showing teeth; h, compound spine from oviger segment 7.

having a tarsus shorter than the propodus, a considerably longer claw, shorter palp segments, a different proboscis shape, and different trunk-proboscis length ratio. The most noticeable difference of *R. dampieri* is in the sharp spines on the dorsal surfaces of the appendages. These are absent from *R. dofteini*, as is the curious serration of the oviger claw tip in *R. dampieri*.

ETYMOLOGY.—The species is named for William Dampier, a rover, buccaneer, explorer, and genius who, in 1699, contributed much to the geographic knowledge of western "New Holland" by being the first Englishman to visit Australia.

### Family CALLIPALLENIDAE Hilton, 1942

#### Genus *Callipallene* Flynn, 1929

#### *Callipallene brevisrostris novaezealandiae* (Thomson)

*Pallene novae-zealandiae* Thomson, 1884:246-247, pl. 14: figs. 1-4.—Hutton, 1904:247.

*Callipallene brevisrostris* ssp. *novae-zealandiae*.—Stock, 1954: 48-50, fig. 21 a-h.

*Callipallene brevisrostris* cf. ssp. *novaezealandiae*.—Arnaud, 1972:162.

MATERIAL EXAMINED.—One female, South Australia, Investigator Island Group, Pearson Islands, in algae on horizontal reef face in 13-18 meters, coll. S. A. Shepherd, diving, 8 January 1969, Sta. 13-B.

REMARKS.—The distal denticulate oviger spine on each of the terminal oviger segments is as drawn by Thomson (1884, fig. 3, also a female). This specimen corresponds very closely with the other figures except for the finger denticulations of the chelae. Thomson mentions denticulations, but only hints at their presence in his figure 2. There are 12 denticulations or teeth on the movable finger and 7 on the fixed finger.

The specimen had recently molted, and the trunk suture is indistinct and almost lacking between the third and fourth segments.

The leg segments are all somewhat shorter than the female leg of Stock's figure 21, but in light of the remaining close conformity of this specimen to Thomson's and Stock's figures, it will be assigned to this species until more is known of the bewildering variety of Australian callipallenids.

If all of the published specimens turn out to be this species, it is distributed from North and South Islands, New Zealand, Tasman Sea, South Australia, to Madagascar, and has a depth range of from less than 1 meter to 91 meters.

#### *Callipallene emaciata micracantha* Stock

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

*Callipallene emaciata micracantha*.—Clark, 1963:21-23, fig. 11 A-I.

MATERIAL EXAMINED.—One female, South Australia, Investigator Island Group, Pearson Islands, on *Acrocarpa* sp. in 10 meters, coll. S. A. Shepherd, diving, 8 January 1969, Sta. 7-B.

REMARKS.—This single specimen is again provisionally assigned to a species because of sparse material and the great variation known to exist with the genus. It agrees in most characters with Stock's subspecies except for the probably variable oviger spine formula which is 8:7:8:8. The auxiliary claws are shorter than those of Clark's male (figure 11 I). The femur and coxa 2 of this specimen have a row of small humps or swollen areas with a single short seta arising from each, which are not figured by either author.

The distribution of this species is extended from Victoria and New South Wales, to South Australia, and the depth range from 10 to 135 meters.

#### *Callipallene* species A

##### FIGURE 5

MATERIAL EXAMINED.—One ovigerous female, 1 female, 1 larva, 1 juvenile, Perth, Cottesloe Beach, intertidal algal wash, coll. R. A. L. Barnard, 7 September 1968, Sta. JLB 10.

DESCRIPTION.—Trunk compact, completely segmented, lateral processes almost touching at bases. Neck short. Ocular tubercle very short, at posterior half of cephalic segment, capped by small round tubercle flanked by tiny papillae. Eyes slightly pigmented to unpigmented in alcohol. Proboscis long for genus, cylindrical, tapering distally to slightly more than half maximum diameter. Abdomen extremely short, triangular, unarmed.

Chelifore scape 1-segmented, medially inflated,



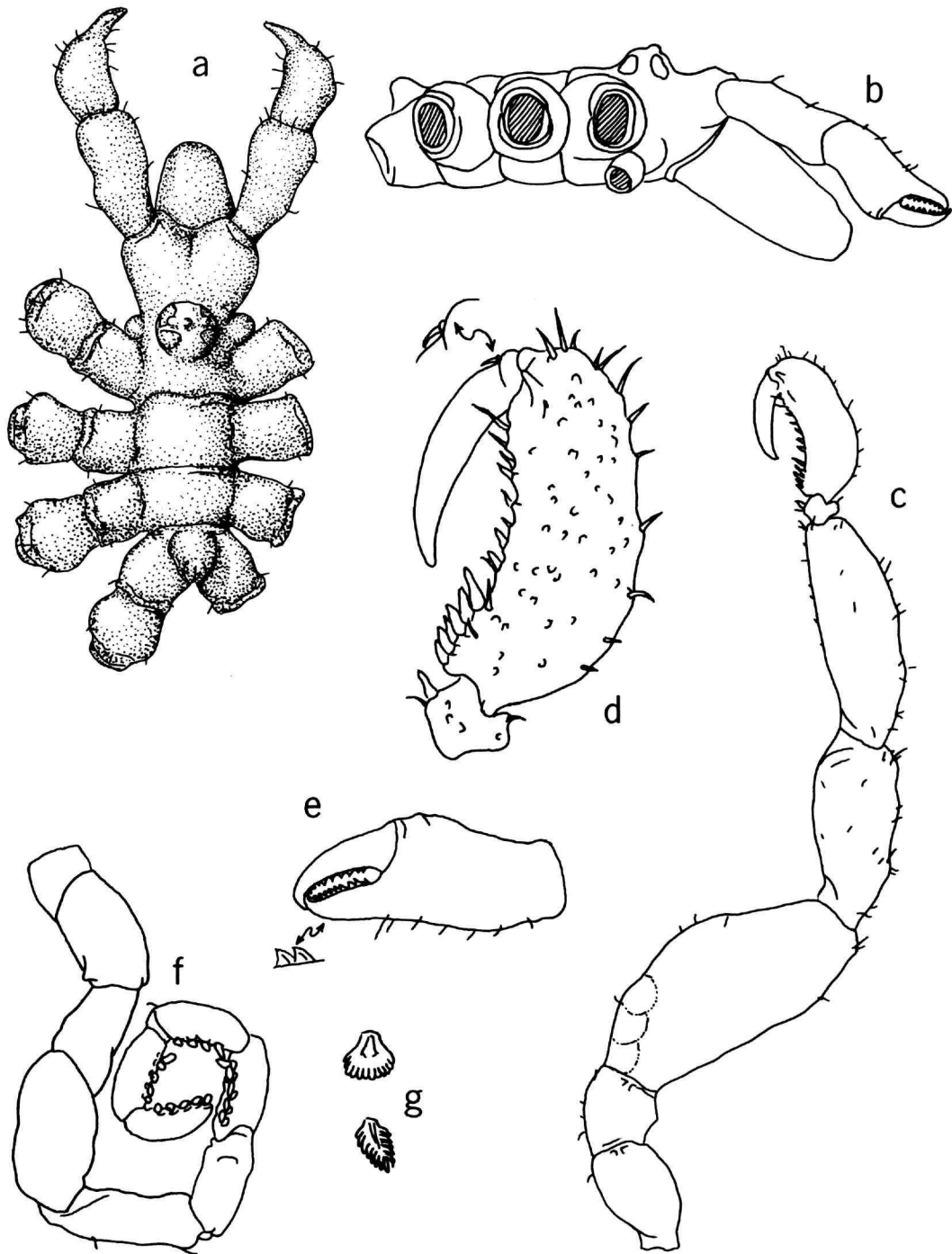


FIGURE 5.—*Callipallene* species A: a, body; b, body, lateral; c, third leg; d, terminal third leg segments, auxiliary claw enlarged; e, chela, teeth enlarged; f, oviger; g, compound spines; distal above, proximal below.

armed with 2-3 median setae and several distally. Chela carried synaxially, with several endal and ectal setae. Fingers armed with 11-12 low triangular teeth.

Palps absent (without knowledge of male).

Oviger 10-segmented, all segments short, fifth armed with 3-4 short setae. Terminal 4 segments subequal, armed with 2 forms of denticulate spines; those proximal of "arrow" shape and those distal of "fan" shape, arranged in the formula 5:4:5:5, without terminal claw.

Leg moderately short, robust, femur of ovigerous female inflated with few egg clusters, tibia 1 two-thirds length of femur, tibia 2 five-sixths femur length. Propodus stout, moderately curved, without marked heel, armed with 2 rows of 3 heel spines and nine to ten sole spines. Claw two-thirds propodus length. Extremely minute auxiliary claws, smaller than sole spines.

MEASUREMENTS (in mm).—Trunk length (chelifore insertion to tip 4th lateral process), 0.97. Trunk width (across 2nd lateral processes), 0.58. Proboscis length, 0.43. Third leg: Coxa 1, 0.33; coxa 2, 0.37; coxa 3, 0.32; femur, 0.96; tibia 1, 0.66; tibia 2, 0.77; tarsus, 0.1; propodus, 0.49; claw, 0.33.

REMARKS.—The muddled generic deck of cards that is found in the callipallenids these days forbids adding another card without knowing the presence or absence of male characters. The two adult females have some characters of the genus *Callipallene*, that is, lack of palp, lack of terminal oviger claw, and the presence of auxiliary claws (however minute), but these characters are shared with at least one other genus, *Anoropallene* (*valida* and *laysani*).

The combination of denticulate chelae, auxiliary claws, lack of oviger claw, and lack of palps (this last shared with most callipallenid genera in the female), places this unnamed species in the genus *Callipallene*. Without a male on which to base a complete description, this probably new species will remain unnamed.

### *Callipallene* species B

MATERIAL EXAMINED.—Four larvae, Perth, Cottesloe Beach, intertidal algal wash, coll. R. A. L. Barnard, 7 September 1968, Sta. JLB 10.

REMARKS.—These specimens have the more typ-

ical *Callipallene* propodus and have auxiliary claws over half the length of the main claw. The chelae fingers have large thin teeth, but the specimens are otherwise unidentifiable.

## Genus *Parapallene* Carpenter, 1892

### *Parapallene australiensis* (Hoek)

*Pallene australiensis* Hoek, 1881:76-78, pl. 11: figs. 1-7 [part].—Haswell, 1884:1022.

*Parapallene australiensis*.—Carpenter, 1892:553.—Loman, 1908:48.—Calman, 1937:530-532 [redescription].—Stock, 1954:50, fig. 24 *d.e.*—Clark, 1963:25-26.—Stock, 1973:119.

MATERIAL EXAMINED.—One male, NW of Cape Naturaliste, 33°40'S, 114°28'E, meter dredge with sponge and bryozoa in 137 meters, 27-28 August 1963, CSIRO Sta. 134.

REMARKS.—This specimen has a tiny tubercle on the dorsodistal tip of each lateral process and a few lateroventral setae on the proboscis. The femoral cement gland is found as a pit on a slight swelling about halfway along the femur. The range is extended from eastern Australia to southwest Australian waters.

### *Parapallene haddoni* Carpenter

FIGURE 6a-c

*Parapallene haddoni* Carpenter, 1892:553-555, pl. 22: figs. 1-6.—Loman, 1908:44.—Clark, 1963:26-28, fig. 13A-J.

MATERIAL EXAMINED.—One male, W of Rottneest Island, 32°03'S, 114°20'E, beam trawl with coral and sponges in 113-139 meters, 15 February 1964, CSIRO Sta. 50.

One male juvenile, NW of Bluff Point, N of Geraldton, 27°40'S, 113°03'E, meter dredge with sponge and bryozoa in 128 meters, 21-22 August 1963, CSIRO Sta. 131.

REMARKS.—This appears to be the first recorded adult male of this species, so illustrations of the leg and oviger are included (Figure 6a-c).

In comparison with Clark's figured female, the legs of this specimen have longer setae, particularly the single lateral setae on the first coxa and femur, and there are small ventral tubercles on the second and third coxae. The dorsodistal tubercles on the femur and tibia 1 are slightly longer than those in Clark's figure  $\epsilon$ , and the propodus

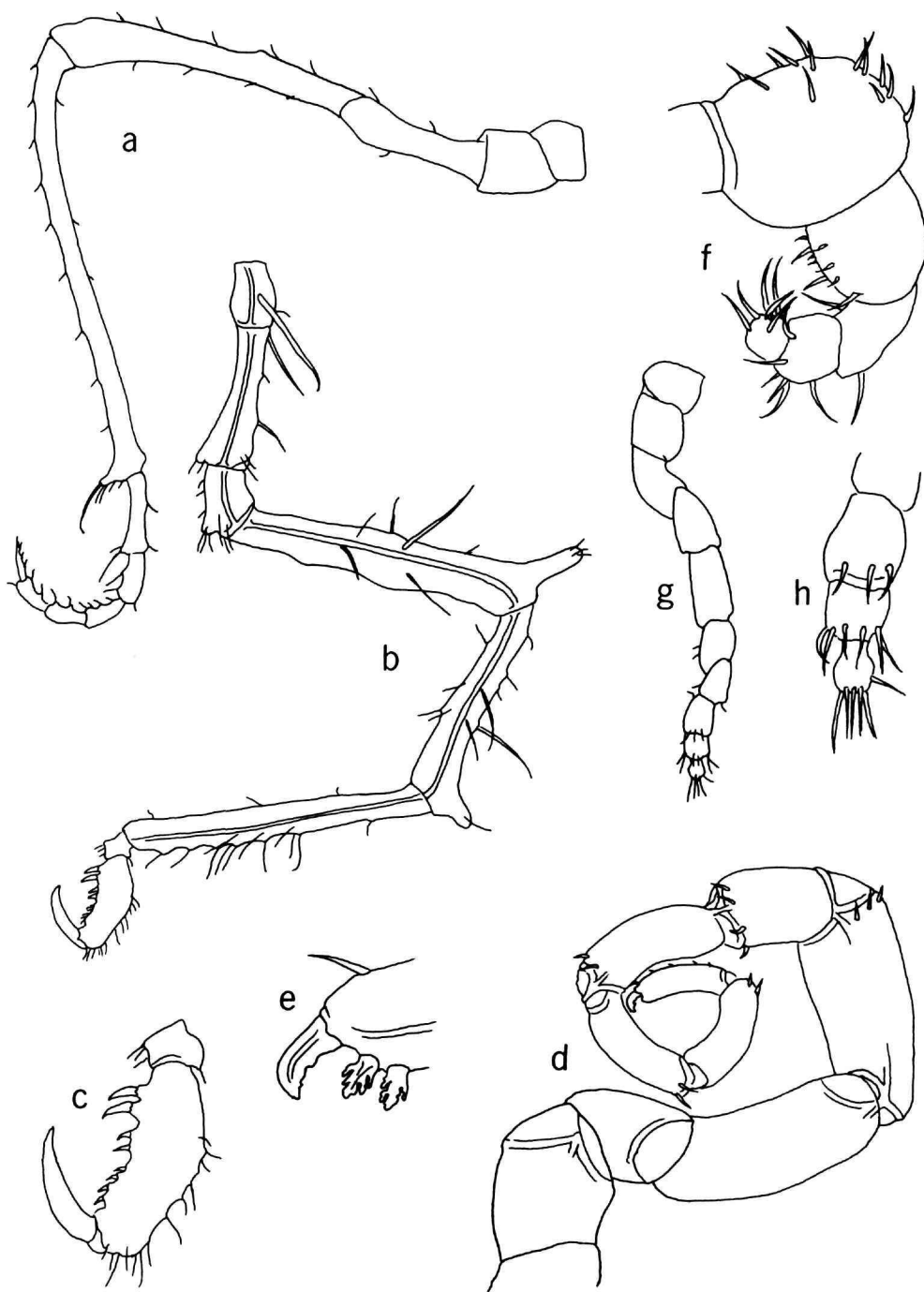


FIGURE 6.—*Parapallene haddoni* Carpenter: *a*, male oviger; *b*, third leg, male; *c*, third leg terminal segments. *Stylopallene tubirostris* Clark: *d*, female oviger; *e*, oviger terminal segment with claw. *Pycnothea flynni* Williams: *f*, male (holotype) terminal oviger segments; *g*, female oviger; *h*, female terminal oviger segments.

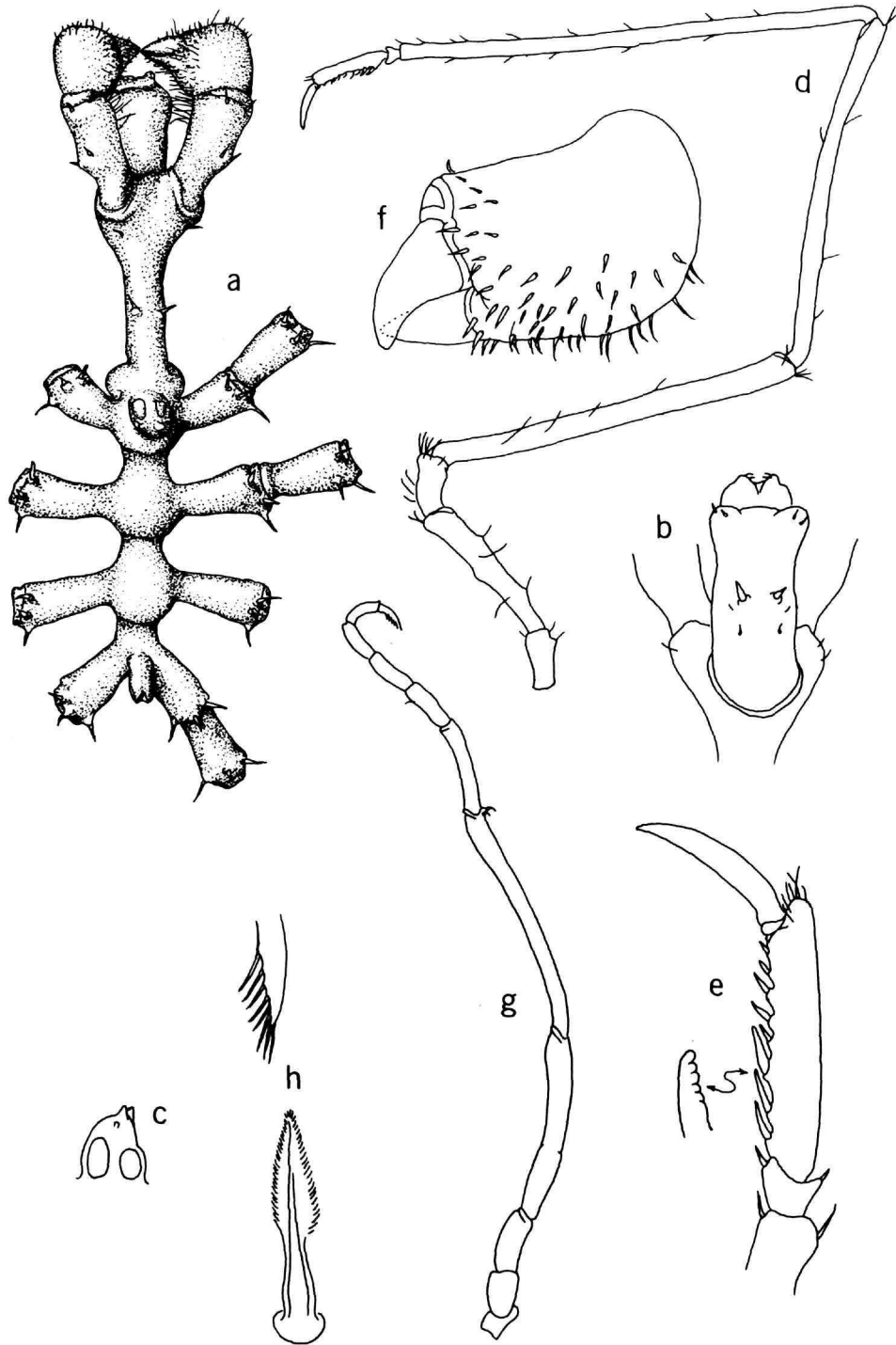


FIGURE 7.—*Parapallene nierstraszi* Loman: a, body; b, proboscis; ventral; c, ocular tubercle, lateral; d, third leg; e, terminal segments of third leg, sole spine enlarged; f, chela; g, oviger; h, compound spine and oviger claw enlarged.

and claw are quite like Clark's figure c. Most of these differences are probably only sexual in nature.

There are two femoral cement glands on each femur. They are simple oval slits centered on slight swellings along the ventral surface. In the male oviger, the fifth segment is longest, twice the third segment length,  $1\frac{1}{2}$  times the fourth, with a sharply pointed tubercle distally, bearing several long setae. The four terminal segments are subequal, and each has two to four curved ventral spines. The terminal claw has four teeth and is equal to the terminal segment length. The fourth segment bears a constriction almost midway in its length, imparting a humped appearance to its dorsal surface. This does not appear to be an artifact.

The species distribution is extended from Torres Straits in the northeast and Holothuria Bank in the north to cooler waters at Bluff Point and Rottneest Island. The three recorded depths, including these, are from 27 to 139 meters.

### *Parapallene nierstraszi* Loman

#### FIGURE 7

*Parapallene nierstraszi* Loman, 1908:44, pl. 9: figs. 122-127.—Flynn, 1928:18.—Calman, 1938:158-159, fig. 7 A,B.—Stock, 1953:297, fig. 3a.—Barnard, 1954:113.—Stock, 1954:52, fig. 24f.—Utinomi, 1955:18-19, fig. 10.

**MATERIAL EXAMINED.**—One male, NW of Bluff Point, N of Geraldton,  $27^{\circ}40'S$ ,  $113^{\circ}03'E$ , meter dredge with sponge and bryozoans in 128 meters, 21-22 August 1963, CSIRO Sta. 131.

One male, W of Rottneest Island,  $32^{\circ}00'S$ ,  $115^{\circ}16'E$ , beam trawl with fish and shells in 137-143 meters, 12 October 1963, CSIRO Sta. 225.

**REMARKS.**—Most of the figured specimens except Calman's are of females and Calman illustrates (fig. 7) one of Loman's syntypes misidentified as a female. In my opinion, none of the figures by Loman or any of the figured parts added by later authors are entirely satisfactory in showing the controversial characters of this variable species, so an additional set is included here to confuse the matter still further. Both of my specimens appear to be males and agree exactly with Calman's figure b of the fifth oviger segment tubercle.

One of the two specimens has the fold of integument around the base of the neck mentioned by

Calman (p. 158), but there is no true suture line evident that would denote articulation. Loman's figures (122, 123) show the constriction clearly and Calman reiterated this peculiarity in examining the syntypes. Flynn (p. 18) noted its presence, but most other authors omit comment. Utinomi (fig. 10) shows a female lacking the constriction. It would therefore seem that this peculiarity is just that and cannot be used as a valid taxonomic character.

Coxa 2 of these specimens disagrees with those shown by Loman in which coxa 2 is well over three times longer than coxa 1. Coxa 2 is less than three times the length of coxa 1 in my specimens. These have other peculiarities in the two lateral spines at the middle of the neck and the two stout ventral spines on the proboscis. This spination is not mentioned in other accounts of the species. The proboscis lips have an oral fringe, although it is not very prominent or easy to see. The female figured by Utinomi has a very different oral configuration.

Some of these variations would appear to be of sufficient magnitude to indicate that all the records do not deal with one species and that the available specimens should be gathered together for comparison and a possible split. The wide variation in depth records and tropical to temperate distribution tends to support this idea, although this variation is far from unique in the pycnogonids. None of the differences is sufficient alone to indicate multiple species, but taken in combination may reveal a second species. The species as now accepted ranges from Japan, the Philippines, Indonesia, and South Africa, with the present record the first for Australian waters.

### Genus *Stylopallene* Clark, 1963

#### *Stylopallene tubirostris* Clark

#### FIGURE 6d,e

*Stylopallene tubirostris* Clark, 1963: 40-42, fig. 21.  
*Siphopallene tubirostris*.—Stock, 1968:44-46, fig. 17a,b.

**MATERIAL EXAMINED.**—One female, Yanchep Reef, near Cape Leschenault,  $31^{\circ}33'S$ ,  $115^{\circ}37'E$ , adrift in current across pool, coll. C. W. Kendrick, 1 January 1964.

REMARKS.—Stock (1968:44) erected a new genus for this species because of the very reduced ovigers of his female. His single specimen had probably lost its ovigers and they were undergoing regeneration when taken. The specimen in hand, which I assign without hesitation to this species, is an adult female with many large clumps of eggs in the legs and has fully developed ovigers, thus making Stock's genus untenable.

The female ovigers are quite large and conform closely to those of the male except for the typical fifth male segment with its greater length and terminal apophysis. The first four segments are alike in both sexes. The fifth is approximately half as long as the male's and lacks the apophysis or "stopper" at the distal end. The terminal segments are oriented anaxially to the fifth as in the male. The female sixth segment has two strong spines in the same plane as the single row of denticulate spines on the terminal segments. The denticulate spines are like those of the male, if slightly more irregular and crenulated, and are arranged in the formula 9:9:7:10. There is a strong terminal claw bearing an irregular inner edge.

The proboscis of this genus and some others in the Callipallenidae should possibly be given more weight in diagnosis. They are composed of three parts: the body, usually cylindrical, the fused part of the lips, and the open lips or oral surface. In this genus, the lips are modified to form a fused tube, often as long as the proboscis itself. In *S. tubirostris*, the lips are set off by a clear, but unarticulated, suture line and terminate in three flaring "petals" around the tiny mouth aperture. Perhaps this extreme modification is in response to a more than usual restriction of food preference for members of the genus.

### Genus *Pycnothea* Loman, 1920

#### *Pycnothea flynni* Williams

FIGURE 6f-h

*Pycnothea flynni* Williams, 1940:202-204, figs. 6-9.—Clark, 1963:46-48, fig. 23.—Arnaud, 1972: 160-161, fig. 2.—Stock, 1973:121.

MATERIAL EXAMINED.—One male, holotype, Bathurst Point, Rottneest Island, coll. L. Glauert.

WAM 135-62.

One female, Cottesloe Reef, N of Fremantle, coll. G. Wilson, 25 April 1957.

One male with eggs, Yanchep Reef, weed washings, coll. Naturalists Club, 20 March 1966.

One female, Woodman Point, S of Fremantle, among *Pinna* on *Posidonia* Bank, near no. 7 pylon, 0.3 meter depth, coll. B. Wilson, 11 December 1957.

One male, Pelsart Islands, W of Geraldton, among algae, 25 March 1964.

Two males, 4 females, Woodman Point, on groyne, W. Australian Naturalists Excursion, 13 December 1959.

One juvenile, Favourite Island, Jurien Bay, coll. R. W. George, 16-18 September 1964.

Four males with eggs, 4 females, Frenchmans Bay, near Whaling Station, under intertidal rocks, coll. R. J. McKay and W. S. S., 3 February 1966.

REMARKS.—This is an easily recognized species, but to make the record complete, details of both male and female ovigers are included here.

There is little difference in the sexes except for the sexual characters and size. The female is typically larger than the male as in most pycnogonids. The female bears a large genital aperture about halfway along the ventral surface of each second coxa and lacks the large genital tubercles of the male coxa 2 on the third and fourth legs. The female oviger is only about half the diameter and two-thirds the length of the male's. The sixth segment is not swollen and the four terminal segments are placed synaxially on the sixth segment rather than anaxially as in the male. This species differs from *P. selkirki* in the blunter shape of the proboscis, the presence of middorsal tubercles on the first and second trunk segments, and the much longer ventrodorsal tubercles on coxa 2 of the male third and fourth legs.

### Genus *Pallenopsis* Wilson, 1881

#### *Pallenopsis cidaribatus*, new species

FIGURE 8

MATERIAL EXAMINED.—One male, holotype, 2 females, paratypes, W of Northwest Cape, 21°50'S, 113°46'E, beam trawl in 128-141 meters, 5 October 1963, CSIRO Sta. 173. WAM 70-3938, 3939, 3940.

Two males, paratypes, NW of Bluff Point, N of

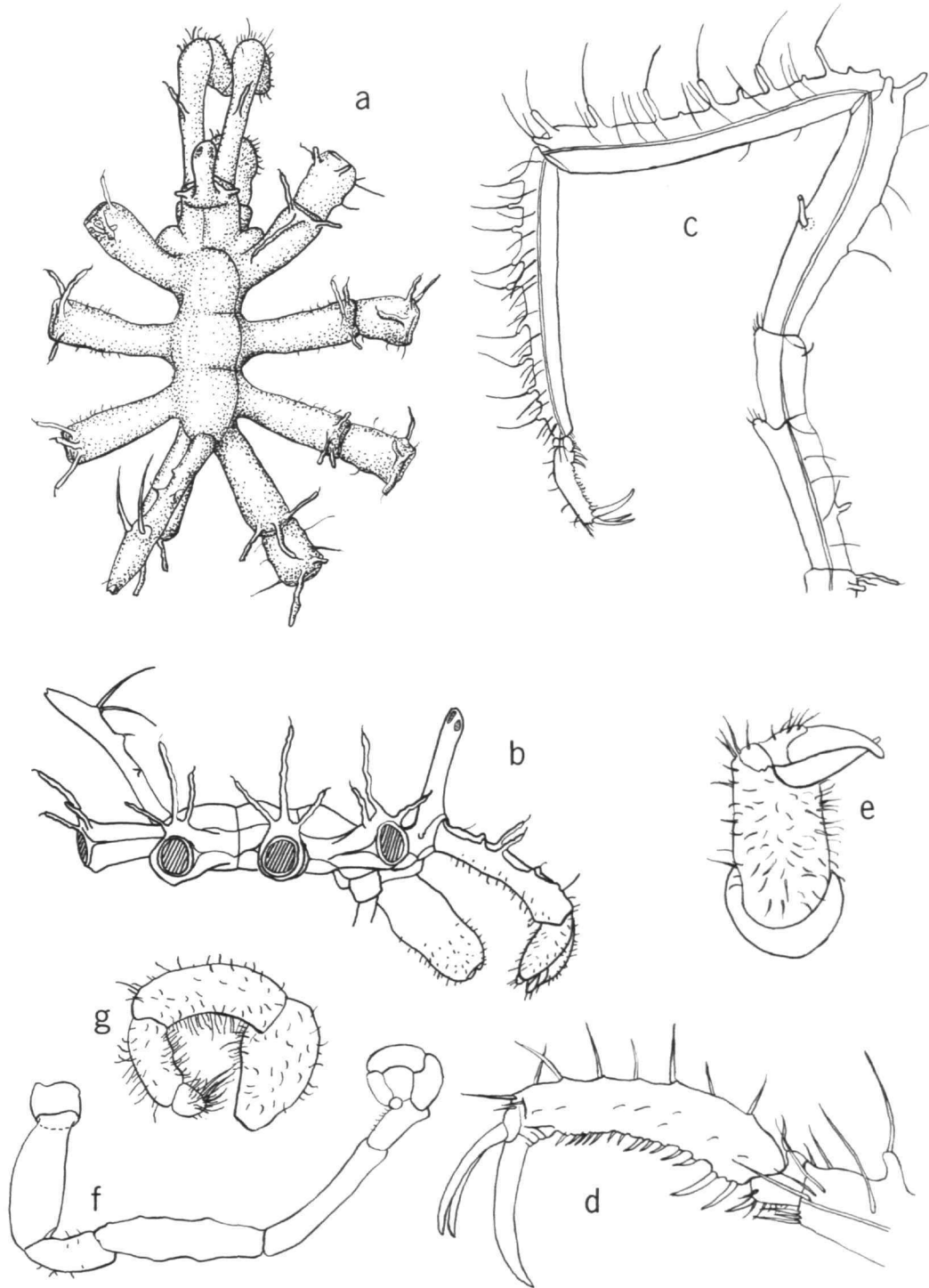


FIGURE 8.—*Pallenopsis cidaribatus*, new species (holotype): a, body; b, body, lateral; c, third leg; d, third leg terminal segments; e, chela; f, oviger; g, oviger terminal segments.

Geraldton, 27°18'S, 113°16'E, dredged with sponge and starfish in 100 meters, 9 October 1963, CSIRO Sta. 204. WAM 70-3964, USNM 149242.

One female, paratype, SW of Point Cloates, 23°39'S, 113°11'E, dredged with small shells in 137 meters, 7 October 1963, CSIRO Sta. 187. WAM 70-3970.

One female, paratype, SW of Jurien Bay, 30°38'S, 114°47'E, 110 meters, 9 December 1970, R. V. *Diamantina*, Sta. 108. WAM 71-1790.

DESCRIPTION.—First 2 trunk segments segmented, third and fourth fused. Strong molt suture, sometimes pigmented, along lateral surfaces of all segments. Lateral processes long, separated by more than their own diameter, armed distally with field of small setae and three long thin dorsal processes, each with single short seta at tip. Ocular segment with short slender tubercle on each side of long thin ocular tubercle. Eyes at tubercle tip, slightly pigmented. Abdomen long, almost straight, armed with 3 sets of dorsolateral bumps or low tubercles, proximal pair unarmed, second pair each with short seta, distal pair each with long stout spine measuring over twice diameter of abdomen.

Chelifores 2-segmented, scape without trace of fusion, armed with 3 median tubercles; middle tubercle as long as diameter of segment and armed with single seta at tip. Scape and chela moderately to heavily setose distally. Chela characteristic, with rectangular palm, fingers anaxial, without denticulations, with small setose cushion on movable finger.

Palp reduced to slightly elevated bud, outlined by strong molt suture.

Proboscis cylindrical, slightly inflated medially, armed with scattered setae distally.

Oviger 10-segmented. Segments 2 and 4 slightly inflated, fourth and fifth segments elongate. Terminal 4 segments increasingly setose with setae longer than terminal segment, which is no longer than wide.

Legs moderately long, increasingly setose distally with setae longer than diameter of their segments. Coxa 1 with 3 long dorsodistal processes corresponding to those on lateral processes. Coxa 2 with single median dorsal process not as long as segment diameter and a moderately long ventrodorsal spur, shorter than segment diameter. Coxa 3 with single dorsal and several ventral setae. Femur with few dorsal long setae, 1 median and 2 lateral tubercles distally, unarmed. Femoral cement

gland a midventral tube on slight elevation. Tube about as long as segment diameter.

Tibia 1 longest segment, armed with 6 long dorsal tubercles alternating proximally with 4-5 short dorsal tubercles. Longer tubercles and lateral molt sutures armed with long setae greater than segment diameter. Tibia 2 with 9-10 dorsal tubercles shorter than segment diameter, tubercles and lateral suture armed with setae longer than segment diameter. Propodus slightly curved, armed with 2 long heel spines, 12-13 short curved sole spines, 8-9 dorsal setae as long as propodus diameter. Main claw half propodus length, with auxiliaries over three-fourths length of main claw.

MEASUREMENTS (in mm, holotype).—Trunk length (chelifore insertion to tip 4th lateral process), 4.58. Trunk width (across 2nd lateral processes), 4.01. Ocular tubercle length, 1.56. Proboscis length, 2.01. Abdomen length, 2.20. Third leg: Coxa 1, 0.92; coxa 2, 2.56; coxa 3, 1.51; femur, 4.63; tibia 1, 5.59; tibia 2, 4.53; tarsus, 0.27; propodus, 1.28; claw, 0.64.

REMARKS.—Few of the Pycnogonida, a group known for its bizarre tubercles among other strange characters, have such lengthy lateral process and first coxa processes as this species. The double ring of three processes per segment gives it a crown-of-thorns appearance, hence the name: *cidaris*, a diadem or tiara, and *batus*, a bramble or thornbush. These processes along with the lateral tubercles on the ocular tubercle and the tall scape tubercles set this species apart from any *Pallenopsis* previously described. There is some small resemblance to *P. alcocki* Calman, also an Indian Ocean species, but this is confined to the armature of the legs. Both species have what Calman (1923:283) called "finger-like processes each bearing a long apical spine." The lateral processes and coxa 1 of *P. alcocki* also bear multiple tubercles or processes, but these are much shorter and with this character, all similarities end.

### *Pallenopsis denticulata* Hedgpeth

*Pallenopsis denticulata* Hedgpeth, 1944:55-58, pls. XI, XII.—Clark, 1963:4 [checklist].

MATERIAL EXAMINED.—One male, paratype, Broome, Northwestern Australia, 9-13 meters, coll. H. L. Clark, June, 1932. USNM 85506.



Three males, 2 female, Broome, 9–13 meters, coll. 1932. MCZ.

One male, 2 miles W of Legewe Island, Dampier Archipelago, dredged with sponge and rubble in 42 meters, coll. *Davena*, 9 June 1960.

One male, 1 female, Port Walcott, dredged with sand, sponge, and coral in 15 meters, coll. Royce on *Davena*, Mary King Expedition, 3 June 1960.

REMARKS.—This species, according to the records, seems to be confined to a relatively small section of Northwestern Australia, but as Hedgpeth pointed out (p. 55), this is “a region from which collections of pycnogonids are few and far between.” Collections from farther east, all the way to Torres Straits, are notably lacking and could possibly shed more light on the distribution of this species. Its known depth range is from 9 to 42 meters.

Coxa I has a large and a small tubercle flanking the median dorsal suture line distally. The large distal tubercle on the femur and tibia I is also flanked by a smaller tubercle on each side. These are not shown in Hedgpeth's figure D, and generally, the specimens appear even more setose than the figures show.

The femoral cement gland arises from a large rounded swelling in the specimens examined and the tube is usually two-thirds the diameter of the segment. The female has one to two long setae arising from the posterior ridge of all three trunk segments.

The five specimens from the Museum of Comparative Zoology collections were possibly examined with the type-material, but are not reported as such by Hedgpeth. They are apparently from the same collection.

### *Pallenopsis hoeki* (Miers)

*Phoxichilidium Hoekii* Miers, 1884:324–326, pl. XXXV: fig. B.—Haswell, 1884:1022 [list].—Loman, 1908: 70–71.

*Pallenopsis Hoekii*.—Carpenter, 1893:23, pl. II: fig. 11.

*Pallenopsis (Rigona) rigens* Loman, 1908:68, pl. IX: figs. 128–133.

*Pallenopsis (Rigona) hoekii*.—Flynn, 1929:257–258.

*Pallenopsis* cf. *hoekii*.—Stock, 1953:288.

*Pallenopsis hoeki*.—Stock, 1954:8[*text*].—Clark, 1963:42, fig. 24E.

MATERIAL EXAMINED.—One male, Shark Bay,

Block 37.1, coll. R. J. McKay on F. R. Vessel *Peron*, 13–15 meters, 27 February 1962.

One female juvenile, NW of Point Cloates, 22°52'S, 113°29'E, dredged with crustaceans and shells in 134 meters, 6 October 1963, CSIRO Sta. 172.

One female, WSW of False Entrance, below Dirk Hartogs Island, 26°30'S, 113°02'E, 110 meters, coll. B. R. Wilson on *Diamantina*, Sta. 94, 7 December 1970.

REMARKS.—In his original description, Miers (p. 326) mentions “a series of minute spinules or protuberances along the upper margin of the fifth joint” (tibia I). The male specimen displays these protuberances or low conical tubercles in large numbers that extend out to the proximal portion of tibia 2. Each is capped by a single seta. They are less pronounced in the female. Loman's figure 133 (*P. rigens*) omits all setae and tubercles except for the prominent dorsodistal ones. Otherwise, these three specimens agree with Loman's figures except for slightly larger propodal heel spines which are not emphasized in Loman's somewhat stylized figures.

These specimens extend the previously known geographic range from the Philippines, Indonesia, and off Cape York, Northern Australia, to the more temperate waters southwest at Dirk Hartogs Island. The depth range presents an enigma for the two females above. The male falls within the previous depth range from 7 to 31 meters, but the females at 110 and 134 meters greatly extend this range.

### *Pallenopsis macneilli* Clark

*Pallenopsis macneilli* Clark, 1963:45–46, fig. 22.—Stock, 1968: 48; 1973:121, fig. 10A.

MATERIAL EXAMINED.—One female, Jurien Bay, from a crayfish pot, coll. B. Bellitho, in May or June 1965.

REMARKS.—This specimen has recently undergone a molt and the posterior two trunk segmentation lines are indistinct. The ventrodistal rim of each coxa is armed with a row of setae, and the legs in general appear more setose than the type-specimen figures.

The species is distributed from New South Wales and South Australia to Western Australia, and is found in sublittoral depths to 6 meters.

Family PHOXICHILIDIIDAE Sars, 1891

Genus *Anoplodactylus* Wilson, 1878

*Anoplodactylus pycnosoma* (Helfer)

*Anoplodactylus pycnosoma*.—Stock, 1954:75–77, fig. 33 [literature, synonymy].

MATERIAL EXAMINED.—One male, Cockburn Sound, Jervis Bay, 1.6 miles SE of Woodman Point, from algae on groin in 1 meter, coll. B. E. Wilson, 10 June 1968.

One female juvenile, Cape Naturaliste, Sugarloaf Rock, washings of intertidal algae, coll. J. L. Barnard, 1 September 1968, JLB 4.

One male with eggs, Cape Naturaliste, W of Bunker Bay, washings of intertidal algae and sponges, coll. J. L. Barnard, 2 September 1968, JLB 6.

Two females, 1 juvenile, Perth, Cottesloe Beach, washings of intertidal algae, coll. R. A. L. Barnard, 7 September 1968, JLB 10.

REMARKS.—This material is inseparable from Stock's (1954:76) figure 33 of *A. pycnosoma*, except for size. All segments are slightly longer, making the lateral processes farther apart, the legs and 6-segmented ovigers longer, and the whole specimen therefore larger. Dorsal trunk segmentation is present, but indistinct. The cement glands appear as ovals rather than slits, but their position and number are exactly as indicated by Stock. Proportions and spination of all other parts agree.

This species' distribution has been confined to Japan: Kobe (Helfer's type) and Misaki (Stock). These records considerably extend this small range into the Indian Ocean, and add another species to the Australian faunal list. It might prove enlightening to find the same species for comparison from the East Indies or the Philippine Islands.

*Anoplodactylus longiceps* Stock

FIGURE 9f

*Anoplodactylus longicollis* Williams, 1941:36–38, figs. 2–5 [preoccupied].

*Anoplodactylus longiceps* Stock, 1951:16 [footnote]; 1954:83 [text]; 1956:97–98, figs. 14 c–d.—Clark, 1963:4 [list], 55 [text].

MATERIAL EXAMINED.—One female, NW of

Point Cloates, 22°52'S, 113°29'E, dredged with crustaceans and shells in 134 meters, 6 October 1963, CSIRO Sta. 172.

REMARKS.—This female is so like Stock's (1956) figures that I have no hesitation in assigning it to this species. The few differences are in the lack of any conical tubercle on top of the ocular tubercle, a longer setose tubercle on the first tibia, and slightly longer lateral processes. This specimen has, instead, a distal pair or tiny lateral papillae on the ocular tubercle and slightly longer second tibia than Stock's specimen. There is evidence of what might be a propodal lamina in this specimen. The distal sole has a row of tiny setae that, although separated at their free ends, touch at their bases.

This record considerably extends the depth range for *A. longiceps*. The depth for Williams' specimens is not given, but the minimum recorded depth is 28 meters and the present record is the maximum known at 134 meters. It is not surprising that this species, along with several others in this report, is found on the opposite coast of Australia from its previously known locations. It ranges as far north as Eastern Indonesia.

*Anoplodactylus* species

FIGURE 9a–e

MATERIAL EXAMINED.—One female, Yanchep Reef, 31°33'S, 115°37'E, in weed washings, coll. Naturalist Club, 20 March 1966.

DESCRIPTION.—Trunk robust, compact, completely segmented, glabrous, with strong lateral suture lines on all segments. Lateral processes separated by less than their diameter. Proboscis short, cylindrical, rounded at tip. Ocular tubercle low truncated cone, capped by short triangular tubercle. Eyes darkly pigmented, appearing black. Abdomen very short, thick, with several tiny setae toward apex.

Chelifore scape 1-segmented, as long as proboscis, glabrous. Chela palm equal to finger length, oval, with few scattered setae distally. Fingers strongly curved, almost directly opposed at tips. Movable finger with tuft of setae halfway along ectal edge. No denticulations.

Third leg robust, segments slightly inflated. Coxa 2 with ventrodorsal genital process not extending beyond length of segment. Femur longest segment,

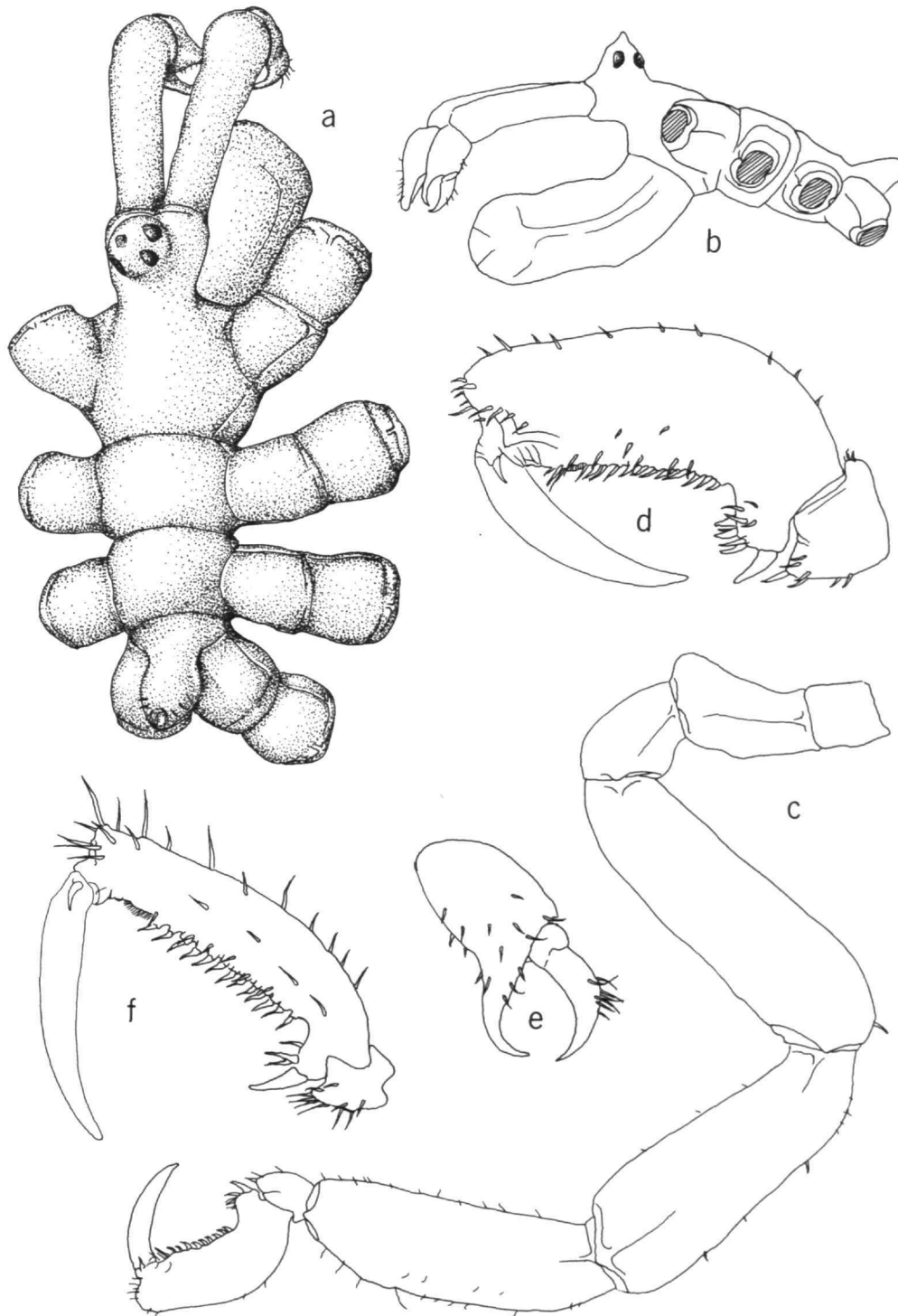


FIGURE 9.—*Anoplodactylus* species: a, body; b, body, lateral; c, third leg; d, third leg terminal segments; e, chela. *Anoplodactylus longiceps* Stock: f, third leg terminal segments.

glabrous except for single dorsodistal short seta. Tibia 1 and 2 subequal, armed with few setae increasing in number distally. Without long dorsal setae. Tarsus triangular, armed with few ventral setae.

Propodus with large heel curved at right angle to sole, armed with single stout spine and 9–10 strong setae in 2 rows flanked by few scattered setae. Sole with 13–14 strong curved setae in single row with scattered lateral setae. Extremely small lamina present toward distal end of sole. Ectal edge of propodus with few very short setae, with a tuft distally. Claw stout, slightly over half propodal length, auxiliaries minute.

REMARKS.—Any “unattached” females in this crowded genus usually circulate without names, and this specimen must also, even though it appears to be a new species. If it were not for the obvious extension of the ocular tubercle over the proboscis, this specimen would have all the appearance of the genus *Phoxichilidium*. The extended neck and minute rather than large auxiliary claws place the specimen in the genus *Anoplodactylus*. No other species quite like this has been recorded from Australian waters, although in some ways it resembles *A. evansi*. The differences between this specimen and *A. evansi* are: lateral processes not as long, chela palm not as long or rectangular, proboscis without the bilobed ventral tubercle, a single large heel spine rather than two, and the presence of a small propodal lamina. The oviger is, of course, unknown. The trunk length is 2.61 mm, making it significantly smaller than *A. evansi*.

### Family AMMOTHEIDAE Dohrn, 1881

#### Genus *Achelia* Hodge, 1864

#### *Achelia shepherdii* Stock\*

FIGURE 10

*Achelia shepherdii* Stock, 1973b:92–95, figs. 1–2.

MATERIAL EXAMINED.—One male, 2 females, 5 juveniles, Cheyne Beach, near East Albany, wash

\*After the manuscript had gone to press, I received a paper from J. H. Stock, in which he describes the above species as *A. shepherdii*. In hopes that my description and figures will contribute toward the recognition of this species, I leave them in this paper.

of littoral rocks and attached algae, coll. S. Slack-Smith, 6 December 1968, Sta. 2.

One female, SW of Garden Island, S of Fremantle, on algae and gorgonian, coll. R. Slack-Smith, diving, 16 December 1964.

DESCRIPTION.—Trunk circular, compact, unsegmented, lateral processes and neck contiguous. Neck with 2 small setae over each palp insertion. Lateral processes with low dorsodistal tubercles, 1 on anterior processes, 2 each on other lateral processes, each armed with short spine. Ocular tubercle low, conical, with small posterior and larger anterior tubercle at tip, both shorter than ocular tubercle. Proboscis extremely large, bulbous or barrel-shaped, tapering to truncate oral surface. Abdomen long, extending beyond first coxa, carried horizontally, armed with 2 dorsal and 2 lateral spines near tip.

Chelifores slender, scape with small dorsodistal tubercle, armed with 1–2 lateral spines. Chela a small angular nub, armed with 2–3 short spines.

Palp 8-segmented, segment 2 longest, armed with 2 dorsodistal setae. Segment 3 almost as wide as long, armed with 1 dorsal seta. Fifth segment only slightly shorter than third, armed with 5 dorsal setae and several small ventral setae. Terminal 4 segments marked by large ventral lobes, longer than twice diameter of segments, armed with strong dorsal, lateral, and ventral spines equal to or greater than segment diameter, and few scattered small setae.

Oviger 10-segmented, fourth and fifth segments subequal and longest. Second segment armed with 4–5 short spines, third armed with 2 reversed spines, and fourth with 1 proximal reversed spine and 1 distal regular spine. Fifth segment without spines. Sixth segment armed with 1 short reversed spine and several longer spines. Seventh with short lateral extension or tubercle, armed with several spines equal to or longer than segment diameter. Terminal 3 segments carried synaxially, but curved in relation to seventh. Eighth segment armed with 1 long endal seta and 1 ectal denticulate spine, ninth with 1 denticulate spine, and tenth, a knob with 2 denticulate spines. Denticulate spines with 6–7 serrations per edge. Female oviger smaller, without seventh segment tubercle. Four terminal segments each armed with 2 denticulate spines.

Legs short, robust, spinose. Coxa 1 with distal rim of 5–6 small tubercles, each bearing single

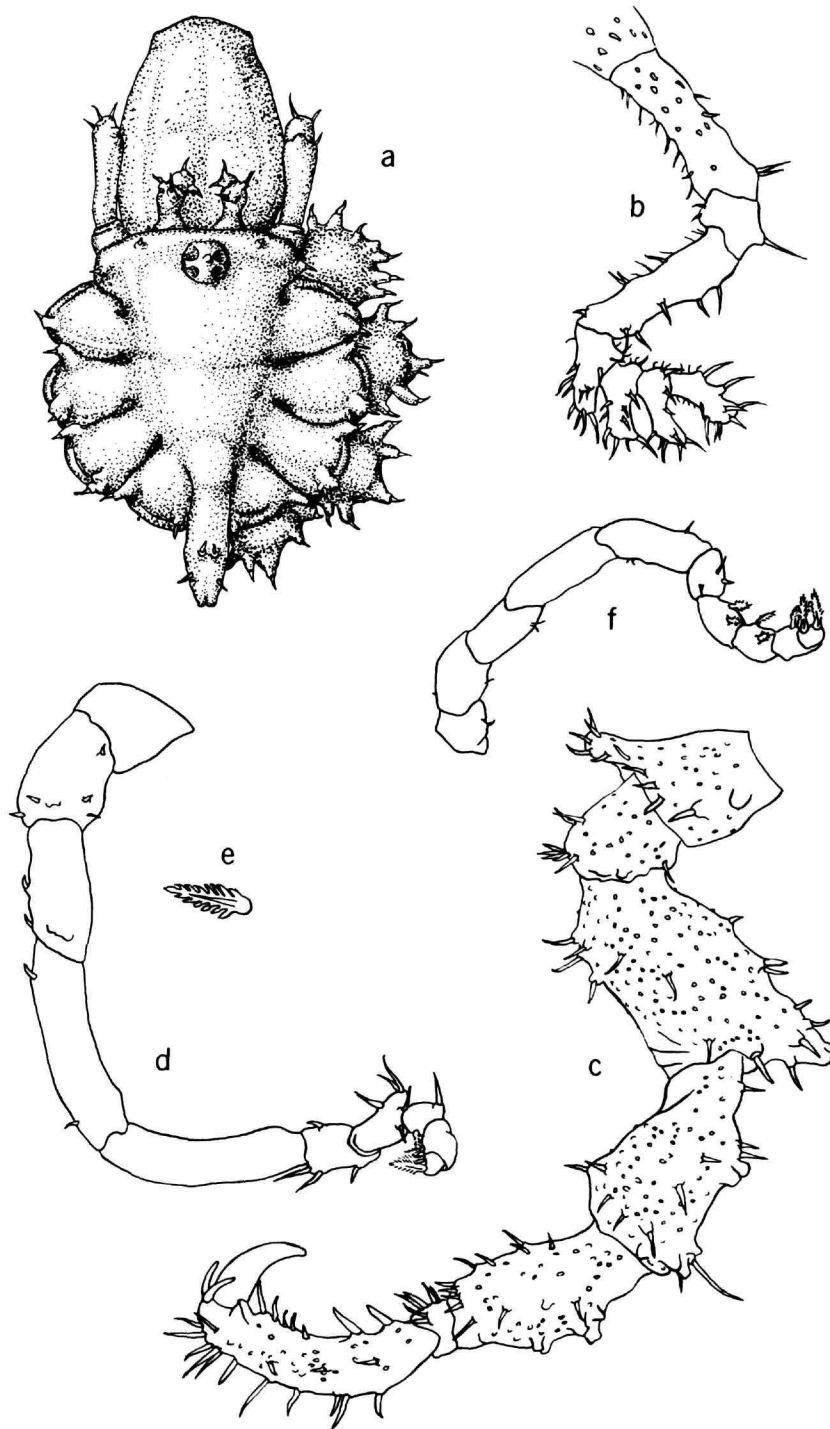


FIGURE 10.—*Achelia shepherdii* Stock: a, body; b, palp; c, third leg; d, oviger; e, oviger terminal segment compound spine; f, female oviger.

short spine. Coxa 2 with genital process, only longer than half diameter of segment, on last 2 pairs of legs, armed with distal tuft of setae. Coxa 3 with 1–2 dorsal setae and several ventral setae. Femur inflated, setose, with large dorsodistal tubercle bearing few setae and femoral cement gland slightly proximal to apex, arising from tiny tube. Tibia 1 inflated distally, sparsely setose, with several dorsal and lateral tubercles, some bearing spines (others broken off?). Tibia 2 with slight median inflation, setose, several dorsal and lateral tubercles, also with and without spines. Tarsus armed with 6 ventral setae. Propodus moderately curved, without pronounced heel, armed with 2 large spines at heel, 5–6 sole spines distally, and several lateral setae, with 12–13 dorsal setae. Claw extremely robust, less than half propodus length. Auxiliary claws small, less than one-third claw length.

MEASUREMENTS (in mm).—Trunk length (rim ocular segment to tip 4th lateral process), 1.09. Trunk width (across 2nd lateral processes), 1.13. Proboscis length (ventral), 1.05. Abdomen length, 0.57. Third leg: Coxa 1, 0.22; coxa 2, 0.36; coxa 3, 0.24; femur, 0.61; tibia 1, 0.49; tibia 2, 0.42; tarsus, 0.09; propodus, 0.54; claw, 0.23.

REMARKS.—This species resembles in some ways *A. harrietae*, *A. spinoseta*, and *A. bituberculata*, members of what is possibly a discrete group within the genus. This group is marked by having a bulbous proboscis rather than the more typical elongate proboscis and ventrally lobed terminal palp segments rather than the usual oval or rectangular shape. The taxonomy of this variable genus is sufficiently difficult that it may be necessary to grasp at such straws in the wind as these in order to create subgeneric or subspecific diagnoses that are workable in conjunction with or perhaps in spite of previously tried statistical methods for *Achelia*.

*Achelia shepherdi* differs from any of the above species by having a shorter scape, a longer proboscis (almost equal to trunk length), longer palp lobes, shorter femur and tibia segments, and a greater number of setose tubercles on the first coxa. It lacks the dorsal trunk tubercles of *A. bituberculata*, the oval trunk shape and large scape of *A. spinoseta*, and the sparse coxa tubercles and large scape of *A. harrietae*. All of these species are heavily spinose.

### *Achelia assimilis* (Haswell)

*Ammothea assimilis* Haswell, 1884:1026–1027, pl. LIV: figs. 5–9.

*Achelia* (*Ignavogriphus*) *assimilis*.—Fry and Hedgpeth, 1969: 106, figs. 152, 153, 156, tables 13, 14 [literature].

MATERIAL EXAMINED.—One male, 2 juveniles, 1 larva, Perth, Cottesloe Beach, intertidal algal wash, coll. R. A. L. Barnard, 7 September 1968, JLB 10.

### Genus *Ammothea* Leach, 1814

#### *Ammothea australiensis* Flynn

*Ammothea australiensis* Flynn, 1919:95–99, pl. XIV: figs. 4–6. *Achelia flynni* Marcus, 1940:84, 128.

*Ammothea australiensis*.—Stock, 1954:105; 1956:43.—Clark, 1963:57–59, fig. A–C.—Stock, 1973:102.

*Ammothea* (*Theammoa*) *magniceps*.—Fry and Hedgpeth, 1969: 81–83, figs. 120–122.

MATERIAL EXAMINED.—One male, SW of Garden Island, S of Fremantle, on algae and gorgonian, coll. R. Slack-Smith, diving, 16 December 1964.

One juvenile, Cape Naturaliste, W of Bunker Bay, intertidal wash of algae and rocks, coll. J. L. Barnard, 2 September 1968, JLB 5.

REMARKS.—According to Clark's (1963:59) table of differences, these two specimens cannot be *A. magniceps*, because they possess spines on the distal ends of the lateral processes and first coxae, and the median trunk eminences are somewhat raised and pointed on this male. The trunk is also shorter than the 3 mm measurement given by Clark for *A. magniceps*. Although these differences appear to be minor, they seem sufficient to warrant continued separation of *A. australiensis* from *A. magniceps*.

The present records suggest that this species is probably confined to the southern coast of Australia.

### Genus *Ammothella* Verrill, 1900

#### *Ammothella biunguiculata australiensis* Williams

FIGURE 11g–h

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

*Ammothella biunguiculata australiensis*.—Clark, 1963:63–66, fig. 31 E–H.

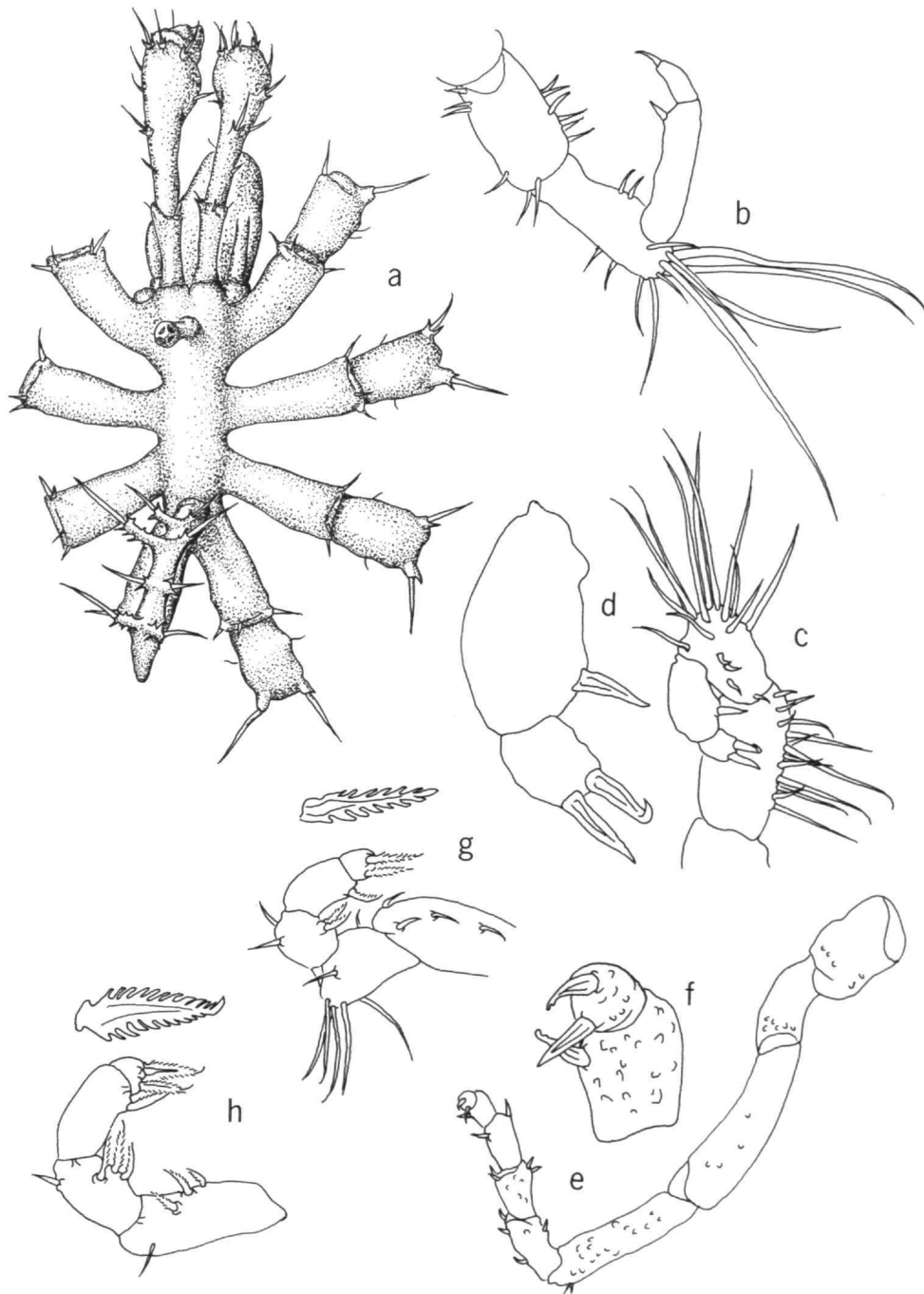


FIGURE 11.—*Nymphopsis korotnewi* Schimkewitsch: a, body; b, male oviger terminal segments. *Nymphopsis acinacispinatus bathursti* Williams: c, male oviger terminal segments; d, two terminal segments enlarged; e, female oviger; f, female oviger terminal segments. *Ammothella biunguiculata australiensis* Williams: g, male (paralectotype) terminal oviger segments with enlarged compound spine; h, female (lectotype) terminal oviger segments with enlarged compound spine.

**MATERIAL EXAMINED.**—One female, lectotype, 1 male, paralectotype, Rottneest Island, Bathurst Point (both are dissected specimens with handwritten labels, probably by Williams). WAM 70-80 (lectotype), WAM 70-81 (para.), WAM 133-62 (8 type slides, 4 of male and 4 of female parts).

Seventy-seven males, females, and juveniles, Rottneest Island, Bathurst Point, Nancy Cove (label in same handwriting as types).

Two females, Rottneest Island, coll. 1935.

Two males (1 with eggs), 1 female, Rottneest Island, Bathurst Point, coll. L. Glauert, 11-18 December 1932 (type series?).

Sixteen males (11 with eggs), 10 females, Rottneest Island, Diving Pool, coll. 1932.

One female, Point Peron, coll. W. H. Butler, 1957.

One male with eggs, Point Peron, littoral, coll. H. Butler, 31 December 1958.

**REMARKS.**—Williams was confused in his terminology, or permitted a typographical error to pass, by designating both a male and a female as holotype. At the end of his remarks, he mentioned the disposition of "the type." It is possible Williams meant the female to be holotype, as he used that term in both the measurements and figure 2 of the female, while using "holotype" only with the male measurements and not the two figures of the male. Thus the term is used only once with the male, but without further specific designation of either specimen, both "holotype" specimens automatically become syntypes according to the *International Code of Zoological Nomenclature*. In keeping with Williams' (possible?) intent, the dissected female is designated as lectotype and the dissected male then becomes a paralectotype. The lot of 77 specimens above, bearing the same handwritten label as the types, is possibly "the whole collection" he mentioned (1940:197), from which he selected the two type-specimens. These are not referred to again in his paper and cannot be designated as the type-series even though it is possible he examined them at the time. One or two other lots listed above, collected in 1932, could just as well be the type-series, but further conjecture is pointless.

Examination of a male and female of *A. biunguiculata californiensis*, collected at Laguna Beach, California (labeled "topotypes" by their collector, W. A. Hilton), substantiates Clark's (p. 66) comparison of material. The female terminal

palp segments are virgually oval in ssp. *californiensis*, and only slightly crenulated ventrally in the male. The above specimens of *A. b. australiensis* all bear deeply crenulated palp segments. It appears as though geographic isolation of the Mediterranean, western American, and Australian varieties or subspecies is contributing toward eventual speciation of these forms of *A. biunguiculata*.

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

#### *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, 1953:305 [key]; 1954:121-124, fig. 57d-h.—Clark, 1963:61.

**MATERIAL EXAMINED.**—One ovigerous female, 1 juvenile, NW of Bluff Point, 32°00'S, 115°16'E, dredged with sponge and starfish in 99 meters, 9 October 1963, CSIRO Sta. 204.

Two juvenile females, on lee side of reef in bay on N side of Point Cloates, below Northwest Cape, 22°41'S, 113°39'E, in 4 meters, 23 August 1968, Nimgalis Expedition.

**REMARKS.**—The adult female carries many minute eggs in the trunk, lateral processes, and coxae. There are none in the legs beyond the coxae.

These specimens agree with the various published figures and also with Stock's (1954:122) comparisons between this species and *A. auchenicus*, a close relation.

The species is known from Indonesia, Queensland and New South Wales, Australia, besides the present records, and from 30 to 100 meters deep.

### Genus *Nymphopsis* Haswell, 1884

#### *Nymphopsis acinacispinatus bathursti* Williams

FIGURE 11c-f

*Nymphopsis acinacispinatus* var. *bathursti* Williams, 1940:200-201, figs. 4-5.

*Nymphopsis acinacispinatus bathursti*.—Clark, 1963:5 [check-list].

**MATERIAL EXAMINED.**—One male, lectotype, 1 male, paralectotype, Rottneest Island, Bathurst Point, coll. L. Glauert, WAM 70-160 (lectotype), WAM



70-161 and 134-62 (paralectotype and 6 slides).

One male, Point Peron, W of Rockingham, on rocks, coll. W. H. Butler, 7 December 1957.

Five females, Cottesloe, Victoria Street Cable Station, coll. W. H. Butler, 16 March 1961.

One larva, Cockburn Sound, Jervois Bay, 1.6 mi SE of Woodman Point, algae on groin, 1 meter, coll. B. E. Wilson, 10 June 1968, JLB 2.

One juvenile, Perth, Cottesloe Beach, intertidal algal wash, coll. R. A. L. Barnard, 7 September 1968, JLB 10.

REMARKS.—Williams examined two male specimens without designating either as the type. The undissected male is designated as the lectotype and the dissected specimen (6 slides with appendages) becomes the paralectotype. Recommendation 74B of the *International Code of Zoological Nomenclature* states that a designated lectotype should be a syntype of which a figure has been published, if such exists. Williams' undissected (unfigured) specimen appears to be more typical of the six other specimens examined. The chelae as shown (1940, fig. 4) appear to be everted, whereas those of the other specimens, including the lectotype, are much more flattened in lateral perspective. In the male examined from Point Peron, they are withdrawn (inverted) and they are either flattened or withdrawn in all five females examined.

Examination of a good series of both subspecies will probably show that the two can be united. Williams listed his reasons for thinking his Bathurst Point specimens different, but all of them do not hold true for the specimens in hand. He listed the trunk as shorter than the abdomen in *N. a. bathursti*, but in the Point Peron male, the trunk is over one-eighth longer than the abdomen measured dorsally, and his figure 4 shows it longer when measured laterally.

The ocular tubercle height shows variation in being shorter in some of the present specimens, although none is as short as the Queensland specimen figured by Williams (1933:175, fig. 2). The presence or absence of a pointed apex on the ocular tubercle is usually of little taxonomic importance. None of the present specimens has the point.

The leg armature of the males examined differs from figures of *N. a. acinacispinatus* in generally appearing stronger and more numerous. The anomaly of the male genital process appearing on the second coxa of the last three legs of the Queensland material and only on the last two legs of the Western Australia specimens must await more material from both places before it can be made clear.

The female differs in having less spinose and shorter lateral process tubercles, a generally narrower and more oval trunk shape, and a smaller oviger, as would be expected. The male oviger terminal segments are inadequately figured by Williams, so enlarged figures of the segments are included here.

### *Nymphopsis korotnewi* Schimkewitsch

FIGURE 11a-b

*Nymphopsis korotnewi* Schimkewitsch, 1887:127-134, table 5, figs. 1-12.—Loman, 1908:50-52, table 13, figs. 179-181.

MATERIAL EXAMINED.—One male, NW of Green Island, 30°30'S, 114°44'E, 144 meters, 22 March 1972, HMAS *Diamantina*, cruise DM1/72, Sta. 68 (5).

REMARKS.—This specimen agrees very nicely with Loman's three figures. Both Schimkewitsch and Loman have illustrated adequately their specimens except for the terminal oviger segments and the rather stylized dorsal trunk aspect, both of which are refigured here.

There is no trace of trunk segmentation. The femoral cement gland is a long tube at the dorsal tip of the femur, as in *Ammothella*. The subcuticular part of the gland forms a long middorsal line for five-sixths the femur length.

This is the third reported specimen of the species, and the female remains unknown. The type-locality is the Sunda Islands of Indonesia. Loman's specimen is from Timor Island, also in the Sundas. The present record greatly increases the known range into the Indian Ocean and more temperate waters, and extends the depth from 34 meters to 144 meters.







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