



The Marine Fauna of New Zealand:

## **Pelagic Calanoid Copepoda:**

Bathypontiidae, Arietellidae, Augaptilidae, Heterorhabdidae,  
Lucicutiidae, Metridinidae, Phyllopodidae, Centropagidae,  
Pseudodiaptomidae, Temoridae, Candaciidae, Pontellidae,  
Sulcanidae, Acartiidae, Tortanidae

J.M. Bradford-Grieve

NIWA Biodiversity Memoir 111

COVER PHOTO:

*Pleuromamma abdominalis* (Lubbock, 1956) reproduced from Giesbrecht (1892) as *Pleuromma abdominale*.

NATIONAL INSTITUTE OF  
WATER AND ATMOSPHERIC RESEARCH (NIWA)

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Acartiidae, Tortanidae**

J.M. Bradford-Grieve

National Institute of Water and Atmospheric Research  
(NIWA)  
P.O. Box 14-901, Kilbirnie, Wellington  
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Lucicutiidae, Metridiidae, Phyllopodidae, Centropagidae,  
Pseudodiaptomidae, Temoridae, Candaciidae, Pontellidae,  
Sulcanidae, Acartiidae, Tortanidae**

J.M. BRADFORD-GRIEVE

National Institute of Water and Atmospheric Research  
(NIWA)  
P.O. Box 14-901, Kilbirnie, Wellington  
NEW ZEALAND

## ABSTRACT

The distribution and taxonomy of calanoid copepods (families Bathypontiidae, Arietellidae, Augaptilidae, Heterorhabdidae, Lucicutiidae, Metridiidae, Phyllopodidae, Centropagidae, Pseudodiaptomidae, Temoridae, Candaciidae, Pontellidae, Sulcanidae, Acartiidae, and Tortanidae from the Southwest Pacific in the vicinity of New Zealand (20-64°S, 146°E-164°W) is recorded. The material reported on comes from the collections of the National Institute of Water and Atmospheric Research, Auckland University Zoology Department, Victoria University of Wellington Zoology Department, and Otago University Portobello Marine Laboratory; also previous records from the area are included.

All genera in the families are defined and a list of their species provided even though no examples of some genera and families have been recorded from the Southwest Pacific. One hundred and fifty species of the following genera are described and figured: *Alloioopodus*, *Temorites*, *Arietellus*, *Campaneria*, *Metacalanus*, *Paraugaptiloides*, *Paraugaptilus*, *Scutogerulus*, *Augaptilus*, *Centraugaptilus*, *Euaugaptilus*, *Haloptylus*, *Pachyptylus*, *Disseta*, *Heterorhabdus*, *Heterostylites*, *Mesorhabdus*, *Lucicutia*, *Gaussia*, *Metridia*, *Pleuromamma*, *Phyllopus*, *Centropages*, *Gippslandia*, *Gladioferens*, *Isias*, *Parathalassius*, *Pseudodiaptomus*, *Temora*, *Temoropia*, *Candacia*, *Paracandacia*, *Calanopia*, *Labidocera*, *Pontella*, *Pontellina*, *Pontellopsis*, *Sulcanus*, *Acartia*, *Tortanus*. New records for the area are: *Temorites elongata*, *Euaugaptilus bullifer*, *E. humilis*, *E. laticeps*, *E. longimanus*, *E. oblongus*, *E. palumbii*, *Haloptylus ornatus*, *H. tenuis*, *Pachyptylus eurygnathus*, *Disseta palumbii*, *Heterorhabdus pacificus*, *H. robustus*, *H. subspinifrons*, *Mesorhabdus gracilis*, *Lucicutia bicornuta*, *L. curta*, *L. longiserrata*, *L. lucida*, *Gaussia princeps*, *Centropages elegans*, *Candacia maxima*, *C. norvegica*, *Labidocera detruncata*, and *Pontellopsis grandis*. *Sulcanus conflictus* is recorded from New Zealand waters for the first time. The genus *Bathypontia* is found to be a junior synonym of *Temorites*. Nevertheless the family name Bathypontiidae is preserved under Article 40(a) of the International Code of Zoological Nomenclature. *Pontellopsis grandis* (Lubbock, 1853) is reinstated for Southwest Pacific *Pontellopsis* related to *P. regalis*.

**Keywords:** Taxonomy, Distribution, Southwest Pacific, Copepoda, Calanoida, Bathypontiidae, Arietellidae, Augaptilidae, Heterorhabdidae, Lucicutiidae, Metridiidae, Phyllopodidae, Centropagidae, Pseudodiaptomidae, Temoridae, Candaciidae, Pontellidae, Sulcanidae, Acartiidae, Tortanidae, New records

## INTRODUCTION

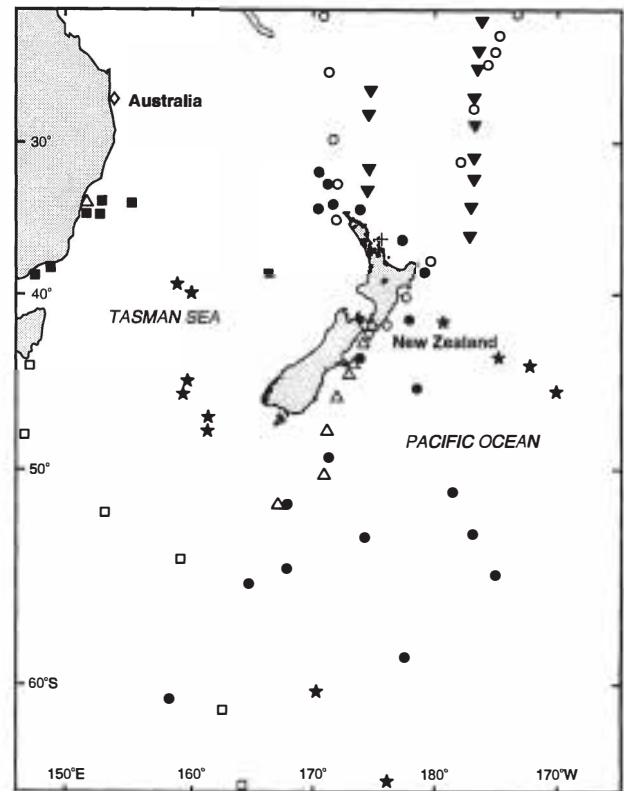
This is the fourth and final monograph in a series on the taxonomy and distribution of pelagic Calanoida Copepoda in the New Zealand region of the Southwest Pacific (see Bradford & Jillett 1980; Bradford *et al.* 1983; Bradford-Grieve 1994). Treatment of the material follows the style used by Bradford *et al.* (1980). I now arrange the genera and families into the superfamilies of Andronov (1974) (see also Bowman & Abele 1982; Park 1986; Mauchline 1988; Andronov 1991). The records of Park (1982, 1983a, b, 1988) are added to the list of previous records of pelagic copepods from the Southwest Pacific compiled by Bradford (1980) (Fig. 1).

This work records species and distributions from recent collections (Figs 2, 3), includes previous records from the region (Fig. 1), and also provides a handbook for those wishing to go a stage further and identify a species not recorded from the region previously. Planktobenthic species are also included as a number are already mentioned in works on pelagic copepods when plankton nets fished near the bottom and there is no other formal vehicle for recording these species. Where appropriate or possible any taxonomic ambiguities which exist have been investigated.

For each family a definition is given and one species in the family, common in the Southwest Pacific, is figured in full as an example of the family. Each genus, treated alphabetically, is also defined even when no example has been taken in the Southwest Pacific. A list of all species in each genus is provided with their junior synonyms noted. Synonyms of each species recorded are generally not given as they have been fully listed by other workers, for example, Vervoort (1957, 1963, 1965). In a few cases where a new synonym has been discovered, usually one particularly relevant to the New Zealand region, it has been included before the description of the species concerned. Text under "Description" refers principally to the original description and appropriate references are listed in brackets at the end of the section. Any differences in the Southwest Pacific specimens are noted under "Remarks". The spine and setal formula of the swimming legs is given in the mode of Sewell (1949). The spines (Roman numerals) and setae (Arabic numerals) are numbered from proximal to distal on each branch of the limb, and from outside to inside on each segment.

The ultimate goal of this work is to provide a knowledge of the fauna of the New Zealand region of the

Southwest Pacific for the analysis of their distribution patterns and relationships to the known physical environment and behaviour of the species when understood.



**Fig. 1.** Map of the Southwest Pacific Ocean indicating the positions of stations from which copepods have been previously recorded in the literature: □ = Vervoort 1957; ▲ = Dakin & Colefax 1949; ■ = Brady 1883; ● = Farran 1929; △ = Bary 1951; ○ = Heinrich 1968; + = Jillett 1971; ▽ = Bradford 1972; ▼ = Chiba & Hirakawa 1972; ★ = Park 1978, 1980, 1988, 1993; ◇ = Greenwood 1976, 1977, 1978, 1979.



## MATERIALS AND METHODS

The material used in this study was collected by the New Zealand Oceanographic Institute (NZOI), Victoria University Zoology Department (VUZ), Auckland University Zoology Department (AUZ), and Otago University Portobello Marine Laboratory (Mu). The stations (Figs 2, 3) were occupied by a variety of vessels using various combinations of sampling gear (see Station Data).

Samples had been preserved in 5% formalin in sea water. Limbs were dissected from the animals and examined in lactic acid or glycerine or were mounted permanently in Euparal, Canada Balsam, or Polyvinyl Alcohol Lactophenol, and drawings were made using a "camera lucida".

**Table 1**  
Details of Gear Used at Stations

Symbol	Net	Closing	Mesh Aperture (µm)	Diam. (m)	Source
B	Bongo Net attached to trawl wire	no	500	0.61	Posgay & Marak 1980
CB	Clarke-Bumpus Sampler	yes	200-130	0.125	Clark & Bumpus 1940
FMMT	Fine Mesh Mid-water Trawl	no	10,000	10	Hislop 1970
IKMT	Isaacs-Kidd Mid-water Trawl	no	12,500	3	Tait <i>et al.</i> 1965 Isaacs & Kidd 1953
N70	Discovery N70 Net	yes	240	0.7	Kemp & Hardy 1929
N50	Discovery N50 Net	no	53	0.5	Kemp & Hardy 1929
N15		no	240	0.15	-
L50	Lachlan 50 Net	no	240	0.5	Bary 1956
MPS	Bé Multiple Plankton Sampler	yes	200	0.7 x 0.7	Bé 1962
MT	Modified Menzies Trawl	no	1,200	1 x 0.15	Menzies 1962
PN	Modified Tucker Trawl	yes	1,000	2	Tucker 1951
Pump	Plankton Pump (hose on output side)	-	60	-	Miller & Judkins 1981
S	Stramin Net	no	1,400	1	Jillett (pers. comm.)
WP2	WP2 Net	no	200	0.57	Heron 1982
WP3	WP3 Net	no	1000	1 m <sup>2</sup>	?
0.5mC	0.5 m Cone Net	no	250	0.5	Jillett 1971
0.6mC	0.6 m Cone Net	no	650	0.61	Roberts 1972
1mC	1 m Cone Net	no	1,225	1	Tait <i>et al.</i> 1965
4m	4 m Conical Net *	no	25,000	4	Records held in Island Bay Marine Laboratory, Victoria University of Wellington

\* Copepods were captured by this net only when it became clogged with medusae, etc.

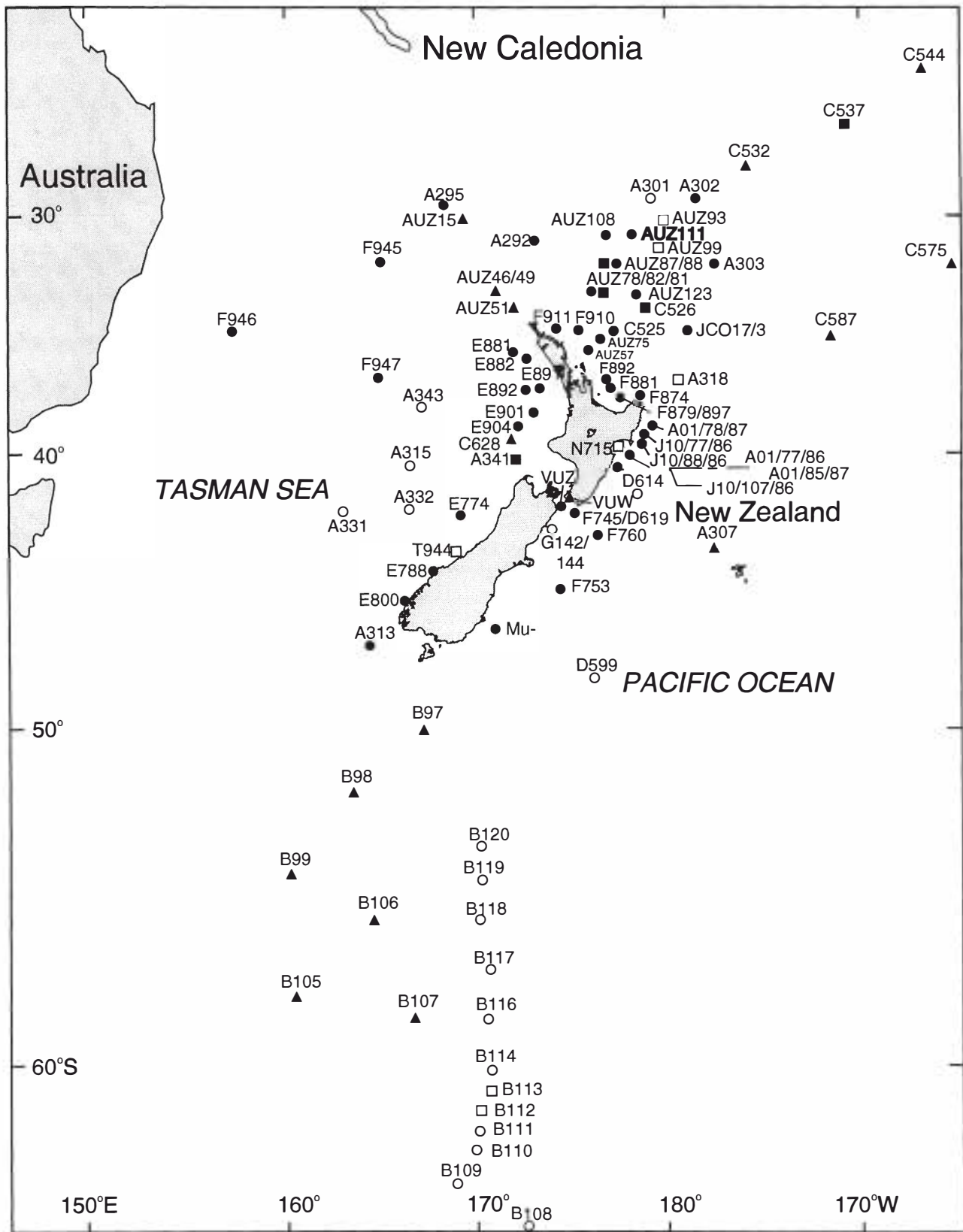


Fig. 2. Map of the Southwest Pacific Ocean indicating the positions of stations from which material was considered, with the maximum sampling depth indicated: ▲ = surface; □ = 0–125 m; ■ = 126–250 m; ○ = 251–500 m; ● = > 501 m.

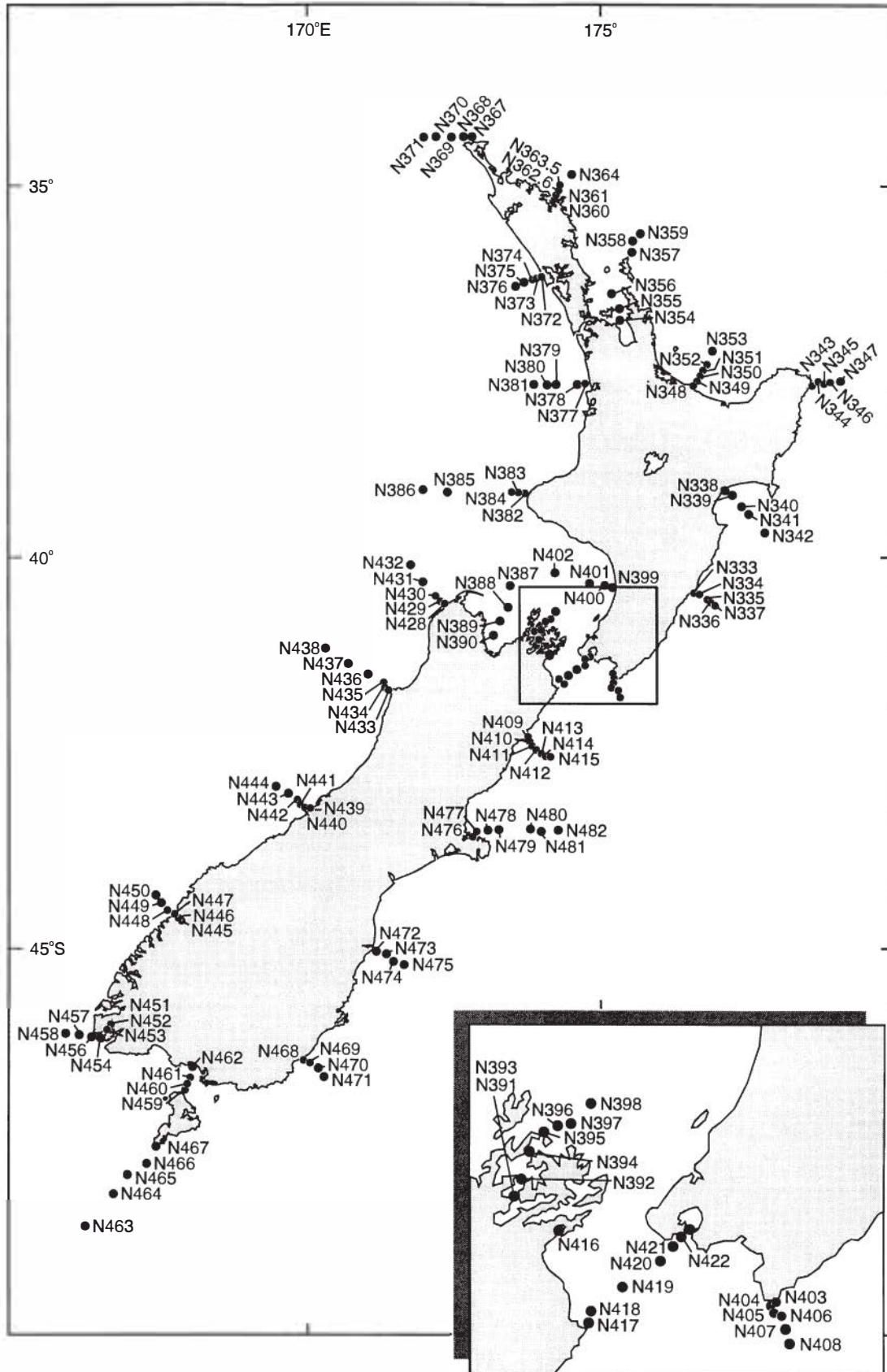


Fig. 3. Map of New Zealand coastal waters indicating the positions of stations from which material was considered. Maximum sampling depth was 200 m or near the seafloor.

## LIST OF STATIONS

Stn No.	Date	Time	Latitude (°S)	Longitude	Gear *	Depth of Haul (m)
<b>New Zealand Oceanographic Institute Stations</b>						
A292	5.6.56	1530	30 45'	173 16'E	N70	500-100
		1050-1150			L50	Surface
A295	7.6.56	2210-2227	29 03.5'	168 36'E	N70	400-1000
		2255-2308			N70	0-500
		2115-2345			L50	Surface
A301	1.7.56	0955-1010	28 56'	179 56'W	N70	0-500
A302	1/2.7.56	2220-2320	28 52'	178 05'W	L50	Surface
		0108-0125			N70	500-1000
		0148-0200			N70	0-500
A303	3.7.56	0920-1025	31 40'	177 33'W	L50	Surface
		1440-1447			N70	450-1000
A307	20.7.56	1630-2000	42 55'	177 26'W	N50	Surface
A313	17.8.56	0245-0606	46 46'	164 45'E	N70	0-914
A315	19.8.56	-	39 56'	167 45'E	N70	0-500
A318	10.1.57	0845-1430	36 36'	179 18'W	N50	Surface
					L50	0-88
A331	1.2.57	0430-0810	41 46'	163 51'E	N70	Surface
A332	1/2.2.57	2300-0225	41 41'	167 03'E	N70	Surface
A341	12.2.57	0912-1012	39 41'	172 06'E	L50	Surface
		1030			N70	0-250
		2230-2400			L50	Surface
A343	13.2.57	1400-1700	37 46'	167 28'E	N70	0-500
		1412-1520			L50	Surface
B97	23.11.58	1630-1650	49 32'	167 22.5'E	N70	Surface
B98	24.11.58	1110-1130	51 41.5'	163 49'E	N70	Surface
B105	26.11.58	1430-1450	57 36'	161 02'E	N70	Surface
B106	27.11.58	1450-1500	55 42.5'	165 23'E	N70	Surface
B107	28.11.58	1015-1025	58 19'	167 18'E	N70	Surface
B108	30.11.58	2245-2255	63 45.65'	172 30'E	N15	Surface
		2300			N15	0-125
		2315			N15	0-500
B109	1.12.58	1500	62 37'	169 51'E	N15	0-125
		1515			N15	0-500
B110	1.12.58	1900	61 55.5'	170 26'E	N15	0-125
		1915			N15	0-500
B111	2.12.58	0830	61 25.5'	170 41'E	N15	0-500
B112	2.12.58	1408	60 47'	170 44'E	N15	0-125
B113	2.12.58	1900	60 22'	170 54'E	N15	0-125
B114	3.12.58	0115	59 39'S	171 02'E	N15	0-125
		0130			N15	0-500
B116	3.12.58	1730	58 20'	171 14'E	N15	0-125
		1745			M15	0-500
B117	4.12.58	0300	57 11'	171 06'E	N15	0-500
B118	4.12.58	1145	55 34.5'	170 27'E	N15	0-125
		1200			N15	0-500
B119	4.12.58	2330	54 31'	170 20'E	N15	0-500
B120	5.12.58	0700	53 26.34'	170 15'E	N15	0-400
		0715			N15	0-150

\* Symbol only, details of the gear used at stations are given in Table 1.

Stn No.	Date	Time	Latitude (°S)	Longitude	Gear *	Depth of Haul (m)
C525	7.9.60	1140-1210 1215-1235	34 40'	177 46'E	N70 N70	Surface 0-250
C526	17.9.60	1139-1148 1125-1155	33 40'	179 09'E	N70 N70	0-250 Surface
C532	20.9.60	2105-2135	27 49'	175 53'W	N70	Surface
C537	22.9.60	2130-2200 2215-2235	25 46'	170 16'W	N70 N70	Surface 0-250
C544	24.9.60	0550-0620	23 01.2'	166 19'W	N70	Surface
C575	13.10.60	1100-1130	31 49'	164 30'W	N70	Surface
C587	15.10.60	1430-1500	35 10'	170 55'W	N70	Surface
C628	25.5.61	1445-1516	39 13'	171 54'E	?	Surface
D599	10.4.67	1732-2240	47 58'	176 10'E	MPS	0-100 100-250 250-500
D614	16.4.67	0318	41 20'	178 48'E	MPS	0-100 100-250 250-500
D619	18.4.67	1030	41 56'	175 17.5'E	MPS	0-100 100-250 250-500
E774	15.10.67	0921-1011	42 00'	169 15'E	MT	0-1165
E788	17.10.67	1620-1748	44 00'	168 11'E	MT	0-1193
E800	20.10.67	1805-1840	45 20'	166 41.5'E	MT	0-700
E881	22.3.68	0954-1308	35 20'	172 15'E	MT	0-1371
E882	22.3.68	2037-2384	36 00'	172 42'E	MT	9-1212
E891	24.3.68	0507-0545	36 40'	173 27'E	MT	0-1245
E892	24.3.68	1458-1543	37 20'	173 35'E	MT	0-1224
E901	25/26.3.68	0107-0150	38 00'	173 19'E	MT	0-1248
E904	28.3.68	0249-0335	38 39'	172 24'E	MT	0-1243
F745	4.4.66	1123-1440	41 47'	175 22'E	MT	0-1170
F753	18.8.66	1857-1932	44 45'	174 30'E	MT	0-790
F760	20.8.66	0949-1030	42 45'	176 30'E	MT	0-710
F874	3.10.68	0703-0848	37 18'	178 11'E	MT	0-1357
F879	4.10.68	0040-1224	37 25.5'	177 30'E	MT	0-1267
F881	4.10.68	1000-1125	37 07.5'	177 14'E	MT	0-1260
F892	5.10.68	1945-2146	36 58.5'	176 41'E	MT	0-1260
F897	6.10.68	0240-0329	37 25'	177 30'E	MT	0-1269
F910	10.10.68	1548-1734	34 56'	175 23'E	MT	0-1397
F911	11.10.68	0147-0321	34 38'	174 36'E	MT	0-1697
F945	22.10.68	1458-1505 1538-1555 1645-1700	31 19.5'	165 19'E	N70	0-200 0-500 500-1000
F946	2/3.11.68	2308-2315 2335-2344 0025-0100	34 32.5'	157 31.5'E	N70	0-200 200-500 0-1000
F947	5.11.68	1350-1355 1446-1500 1529-1540	36 18.5'	165 05.5'E	N70	0-200 0-500 500-1000
G142	20/21.9.67	2100	42 24.5'	174 01.8'E	MPS	0-100 100-250 250-500
		2400	42 24.5'	174 01.8'E	MPS	0-100 100-250 250-500
		0600	42 24.5'	174 01.8'E	MPS	0-100 100-250 250-500

Stn No.	Date	Time	Latitude (°S)	Longitude	Gear *	Depth of Haul (m)
G142	20/21.9.67	1200	42 24.5'	174 01.8'E	MPS	0-100 100-250 250-500
G144	21.9.67	1800	42 24.8'	174 01.6'E	MPS	0-100 100-250 250-500
N333	1.12.74	0920	40 30.25'	176 38.0'E	WP2	0-30
N334	3.12.74	1050	40 31.2'	176 39.0'E	WP2	0-50
N335	3.12.74	1130	40 32.85'	176 41.9'E	WP2	0-100
N336	3.12.74	1305	40 36.4'	175 47.9'E	WP2	0-200
N337	3.12.74	1520	40 42.7'	176 58.3'E	WP2	0-200
N338	4.12.74	0620	39 11.8'	177 13.6'E	WP2	0-25
N339	4.12.74	0739	39 15'	177 18'E	WP2	0-50
N340	4.12.74	1945	39 25.8'	177 30.6'E	WP2	0-100
N341	4.12.74	1330	39 37.8'	177 43.9'E	WP2	0-200
N342	4.12.74	1535	39 45'	177 54.6'E	WP2	0-200
N343	5.12.74	0735	37 34.1'	178 33.3'E	WP2	0-25
N345	5.12.74	0950	37 43.7'	178 41.7'E	WP2	0-100
N346	5.12.74	1140	37 44.2'	178 49.4'E	WP2	0-200
N347	5.12.74	1335	37 44.2'	178 57.0'E	WP2	0-200
N348	6.12.74	0610	37 49.1'	176 38.8'E	WP2	0-25
N349	6.12.74	0717	37 45.7'	176 40.6'E	WP2	0-50
N350	6.12.74	0845	37 40.8'	176 44.1'E	WP2	0-100
N351	6.12.74	0950	37 38.7'	176 45.6'E	WP2	0-200
N352	6.12.74	1235	37 30'	176 50.7'E	WP2	0-200
N353	6.12.74	1430	37 21.3'	176 58'E	WP2	0-200
N354	7.12.74	0534	36 54.1'	175 22.2'E	WP2	0-25
N355	7.12.74	0725	36 44'	175 20.1'E	WP2	0-40
N356	7.12.74	0945	36 31.3'	175 17.6'E	WP2	0-50
N357	7.12.74	1340	35 58.9'	175 34.5'E	WP2	0-100
N358	7.12.74	1555	35 48.9'	175 34.5'E	WP2	0-200
N359	7.12.74	1743	35 44.1'	175 44.2'E	WP2	0-180
N360	8.12.74	0543	35 13.6'	174 06.4'E	WP2	0-24
N361	8.12.74	0650	35 11'	174 10.4'E	WP2	0-50
N364	8.12.74	1220	34 56.4'	174 31.4'E	WP2	0-200
N365	8.12.74	1450	35 16.4'	174 16.4'E	WP2	0-200
N366	8.12.74	1540	35 07.1'	174 17.7'E	WP2	0-100
N367	10.12.74	0623	34 24.5'	172 40.4'E	WP2	0-25
N368	10.12.74	0647	34 23.9'	172 39.0'E	WP2	0-50
N369	10.12.74	0910	34 24.6'	172 26.3'E	WP2	0-100
N370	10.12.74	1215	34 23.5'	172 06'E	WP2	0-200
N371	10.12.74	1445	34 23.4'	171 54.5'E	WP2	0-200
N372	11.12.74	0745	36 19.5'	173 58.8'E	WP2	0-25
N373	11.12.74	0905	36 20.1'	173 56.1'E	WP2	0-50
N374	11.12.74	1030	36 22.1'	173 50.5'E	WP2	0-100
N375	11.12.74	1150	36 23.6'	173 45.5'E	WP2	0-200
N376	11.12.74	1405	36 28.9'	173 33'E	WP2	0-200
N377	12.12.74	0638	37 48'	174 45.8'E	WP2	0-25
N378	12.12.74	0819	37 48.9'	174 39.4'E	WP2	0-50
N379	12.12.74	1105	37 48.9'	174 13.2'E	WP2	0-100
N380	12.12.74	1250	37 48.7'	174 04.9'E	WP2	0-200
N381	12.12.74	1500	37 48.4'	173 49.0'E	WP2	0-200
N382	13.12.74	0945	39 15'	173 42.4'E	WP2	0-25
N383	13.12.74	1017	39 15.7'	173 42.6'E	WP2	0-50
N384	13.12.74	1117	39 15.9'	173 39.4'E	WP2	0-100
N385	13.12.74	1833	39 14.9'	172 22.3'E	WP2	0-200
N386	13.12.74	2150	39 14.9'	171 56.4'E	WP2	0-200

Stn No.	Date	Time	Latitude (°S)	Longitude	Gear *	Depth of Haul (m)
N387	14.12.74	0905	40 28.8'	173 30.2'E	WP2	0-70
N388	14.12.74	1137	40 44.3'	173 22.8'E	WP2	0-50
N389	14.12.74	1334	40 53.2'	173 19.0'E	WP2	0-47
N390	14.12.74	1554	41 04.1'	173 09.6'E	WP2	0-25
N391	15.12.74	0902	41 12.6'	173 51.9'E	WP2	0-30
N392	15.12.74	0958	41 06.5'	173 51.4'E	WP2	0-50
N393	15.12.74	1140	41 05.3'	173 47.1'E	WP2	0-19
N394	15.12.74	1315	41 02.8'	173 55.4'E	WP2	0-50
N395	15.12.74	1430	40 58.2'	173 58.4'E	WP2	0-60
N396	15.12.74	1520	40 55.8'	174 03.5'E	WP2	0-100
N397	15.12.74	1620	40 55.1'	174 08.4'E	WP2	0-40
N398	15.12.74	1825	40 49.5'	174 16'E	WP2	0-100
N399	16.12.74	0630	40 27.3'	175 11.2'E	WP2	0-25
N400	16.12.74	0710	40 26.8'	175 09.2'E	WP2	0-50
N401	16.12.74	0943	40 24'	174 52.0'E	WP2	0-100
N402	16.12.74	1327	40 17.6'	174 13.6'E	WP2	0-100
N403	17.12.74	0610	41 37.2'	175 18.4'E	WP2	0-20
N404	17.12.74	0630	41 38'	175 18.8'E	WP2	0-50
N405	17.12.74	0655	41 38.5'	175 19.3'E	WP2	0-100
N406	17.12.74	0728	41 39.2'	175 20.2'E	WP2	0-200
N407	17.12.74	0853	41 44'	175 22.9'E	WP2	0-200
N408	17.12.74	1005	41 48.6'	175 24.4'E	WP2	0-200
N409	18.12.74	0630	42 26.3'	173 40.1'E	WP2	0-25
N410	18.12.74	0648	42 26.75'	173 41'E	WP2	0-50
N411	18.12.74	0728	42 28'	173 43'E	WP2	0-100
N412	18.12.74	0810	42 29.2'	173 45.2'E	WP2	0-190
N413	18.12.74	0920	42 32.5'	173 49.9'E	WP2	0-200
N414	18.12.74	1040	42 35.4'	173 55.0'E	WP2	0-200
N415	18.12.74	1205	42 39'	173 59.8'E	WP2	0-200
N416	19.12.74	0044	41 18.85'	174 09.6'E	WP2	0-22
N417	19.12.74	1327	41 42.5'	174 16.6'E	WP2	0-24
N418	19.12.74	1347	41 41.85'	174 17.8'E	WP2	0-50
N419	19.12.74	1602	41 35.2'	174 28'E	WP2	0-90
N420	19.12.74	1815	41 38.2'	174 38.2'E	WP2	0-190
N421	19.12.74	1957	41 24.4'	174 45'E	WP2	0-100
N422	19.12.74	2027	41 22.8'	174 46.6'E	WP2	0-50
N423	19.12.74	2100	41 21.5'	174 49.5'E	WP2	0-25
N428	29.1.75	0615	40 41.8'	172 20'E	WP2	0-25
N429	29.1.75	0715	40 40.2'	172 17.7'E	WP2	0-50
N430	29.1.75	0935	40 34.7'	172 11.6'E	WP2	0-100
N431	29.1.75	1215	40 23.8'	171 59.3'E	WP2	0-200
N432	29.1.75	1525	40 11'	171 44.8'E	WP2	0-200
N433	30.1.75	0655	41 46.1'	171 25.9'E	WP2	0-25
N434	30.1.75	0735	41 45.4'	171 24.5'E	WP2	0-50
N435	30.1.75	0825	41 43.6'	171 20.7'E	WP2	0-100
N436	30.1.75	1135	41 34'	170 57.9'E	WP2	0-200
N437	30.1.75	1435	41 24.4'	170 35.7'E	WP2	0-200
N438	30.1.75	1730	41 16.1'	170 18'E	WP2	0-200
N439	31.1.75	0650	43 20'	169 57'E	WP2	0-25
N440	31.1.75	0725	43 19.8'	169 55.1'E	WP2	0-50
N441	31.1.75	0820	43 18.3'	169 52.6'E	WP2	0-100
N442	31.1.75	1000	43 13.9'	169 47.3'E	WP2	0-200
N443	31.1.75	1210	43 07.4'	169 41.8'E	WP2	0-200
N444	31.1.75	1420	43 00.5'	169 25'E	WP2	0-200
N445	1.2.75	1230	44 39.6'	167 54.7'E	WP2	0-176
N446	1.2.75	1350	44 37.2'	167 52.6'E	WP2	0-200
N447	1.2.75	1440	44 35.5'	167 48.9'E	WP2	0-120

Stn No.	Date	Time	Latitude (°S)	Longitude	Gear *	Depth of Haul (m)
N448	1.2.275	1600	44 31.9'	167 44.1'E	WP2	0-80
N449	1.2.75	1750	44 28.9'	167 38.6'E	WP2	0-200
N450	1.2.75	1945	44 22.8'	167 28.6'E	WP2	0-200
N451	2.2.275	0910	45 53.4'	166 42.6'E	WP2	0-40
N452	2.2.75	0955	45 56.8'	166 39.4'E	WP2	0-200
N453	2.2.75	1035	46 00.8'	166 36.4'E	WP2	0-200
N454	2.2.75	1110	46 04'	166 34.5'E	WP2	0-70
N456	3.2.75	1200	46 04.1'	166 17.2'E	WP2	0-170
N457	3.2.75	1405	46 03.8'	166 02.8'E	WP2	0-170
N458	3.2.75	1710	46 05.4'	165 49.8'E	WP2	0-200
N459	4.2.75	0335	46 41.4'	167 55.4'E	WP2	0-40
N460	4.2.75	0452	46 36.8'	167 58.8'E	WP2	0-40
N461	4.2.75	0622	46 32.0'	168 02.0'E	WP2	0-36
N462	4.2.75	0705	46 27.7'	168 04.2'E	WP2	0-25
N463	5.2.75	1250	48 16'	166 22.8'E	WP2	0-160
N464	5.2.75	1545	47 52.1'	166 43.4'E	WP2	0-160
N465	5.2.75	1717	47 40.7'	167 01.2'E	WP2	0-150
N466	5.2.75	1910	47 30.5'	167 15.7'E	WP2	0-150
N467	5.2.75	2045	41 18.7'	167 30.9'E	WP2	0-90
N468	6.2.75	0740	46 24.1'	169 55.8'E	WP2	0-25
N469	6.2.75	0820	46 25.1'	169 57.8'E	WP2	0-55
N470	6.2.75	0930	46 27.8'	170 02.5'E	WP2	0-100
N471	6.2.75	1050	46 30.9'	170 14.6'E	WP2	0-200
N472	6.2.75	2050	45 06.5'	171 09'E	WP2	0-25
N473	6.2.75	2140	45 08.8'	171 14.4'E	WP2	0-50
N474	7.2.75	0645	45 12.2'	171 22.6'E	WP2	0-100
N475	7.2.75	0825	45 15.7'	171 39.2'E	WP2	0-200
N476	8.2.75	0855	43 39.9'	172 54.1'E	WP2	0-7
N477	8.2.75	0920	43 37.7'	172 55.2'E	WP2	0-16
N478	8.2.75	1100	43 35.5'	173 08.3'E	WP2	0-24
N479	8.2.75	1215	4335.2'	173 14.2'E	WP2	0-48
N480	8.2.75	1630	43 33.2'	173 48.7'E	WP2	0-100
N481	8.2.75	1820	43 33.8'	173 59.8'E	WP2	0-200
N482	8.2.275	2130	43 35.8'	174 21.6'E	WP2	0-200
N718	5.9.76	1530-1552	39 21.7'	177 52.9'E	WP2	0-20
T944	30.7.88	0930-1413	43 00.1'	169 45.0'E	Pump	80

#### Auckland University Zoology Department Stations

AUZ15	8.7.62	0932-0946	29 26'	169 49'E	1mC	Surface
AUZ46	14.7.62	0926-1026	32 40'	171 02'E	1mC	Surface
AUZ49	14.7.62	2124-2155	32 40'	171 02'E	1mC	Surface
AUZ51	15.7.62	0750-0823	33 59'	172 06'E	1mC	Surface
AUZ57	21.7.62	0545-0825	35 43'	176 18'E	1KMT	0-690
AUZ75	22.7.62	1938-2010	35 15'	176 15'E	1mC	0-200?
AUZ78	23.7.62	0537-0856	33 09'	176 06'E	1KMT	0-870
AUZ81	23.7.62	1707-1757	33 09'	176 06'E	1mC	0-100?
AUZ82	23.7.62	1903-1945	33 09'	176 06'E	1mC	0-100?
AUZ87	24.7.62	1630-1721	31 57'	177 38'E	1mC	0-100?
AUZ88	24.7.62	1828-1918	31 57'	177 38'E	1mC	0-100?
AUZ93	25.7.62	-	31 24'	179 00'E	1mC	0-100?
AUZ99	26.7.62	-	30 11'	179 52'E	1mC	0-100?
AUZ108	29.7.62	0215-0705	30 14'	176 42'W	1KMT	0-823
AUZ111	30.7.62	0557-0656	30 26'	178 15'W	1mC	0-100?
AUZ123	2.8.62	0730-0823	33 13'	178 24'E	1mC	0-100?
A	15.5.63- 21.5.65	1000-1300	36 49'	174 49'E	0.5mC	0-18



Stn No.	Date	Time	Latitude (°S)	Longitude	Gear *	Depth of Haul (m)
B	1.3.64– 24.4.65	1000–1300	36 16'	174 54'E	CB	0–45
E	25.6.63	1430	36 49'	174 41'E	0.5mC	0–5
F	25.6.63	1515	36 47'	174 40'E	0.5mC	0–3.5

#### Victoria University of Wellington Zoology Department Stations

VUZ293	24.8.57	1515–1815	41 53'	175 14'E	4m	0–1097
VUZ105	28.12.57	1130–1440	41 47'	175 01'E	4m	0–914
VUZ107	28.12.57	1850–2200	41 52'	175 06'E	4m	0–914
VUZ112	29.1.61	1143–1335	41 45'	174 55'E	4m	0–732

#### Portobello Marine Laboratory (Otago University) Stations

Mu66/44	21.10.66	–	45 55'	171 05'E	CB	0–200
Mu66/46	21.10.66	–	45 55'	171 05'E	CB	0–200
Mu66/49A	21.10.66	–	45 55'	171 05'E	CB	0–200
Mu66/56B	2.11.66	–	45 47'	170 57'E	CB	0–80
Mu66/67A	13.11.66	0500	45 51'	171 15'E	CB	0–150
Mu66/68A	13.11.66	0900	45 50'	177 08'E	CB	0–150
Mu66/78	4.12.66	–	45 51'	171 16'E	CB	0–100
Mu67/6	29.1.67	–	45 48'	170 59'E	CB	0–100
Mu67/7	29.1.67	–	45 50'	171 10'E	CB	0–150
Mu67/8	29.1.67	1205	45 52'	171 17'E	CB	0–150
Mu67/43	24.2.67	Daylight	45 50'	171 07'E	CB	0–150
Mu67/44	24.2.67	Daylight	45 52'	171 16'E	CB	0–150
Mu67/45	22.3.67	0700	45 46'	170 47'E	CB	0–150
Mu67/46	22.3.67	–	45 48'	170 57'E	CB	0–150
Mu67/47	22.3.67	–	45 50'	171 06'E	CB	0–150
Mu67/48	22.3.67	1205	45 52'	171 18'E	CB	0–150
Mu67/48s	22.3.67	–	45 52'	171 18'E	S	0–1000
Mu67/49	14.4.67	–	45 46'	170 47'E	CB	0–25
Mu67/50	14.4.67	0830	45 49'	170 57'E	CB	0–150
Mu67/52	14.4.67	1400	45 52'	171 16'E	CB	0–50
Mu67/52s	14.4.67	–	45 55'	171 05'E	S	0–1000
Mu67/55	19.5.67	0920	45 49'	170 57'E	CB	0–80
Mu67/56	19.5.67	–	45 50'	170 48'E	CB	0–150
Mu67/57s	19.5.67	–	45 50'	170 48'E	S	0–1000
Mu67/57	19.5.67	–	45 52'	171 16'E	CB	0–150
Mu67/62s	19.6.67	–	45 50'	170 48'E	S	0–500
Mu67/77	19.6.67	Daylight	45 50'	171 06'E	CB	0–150
Mu67/78	19.6.67	–	45 55'	171 16'E	CB	0–150
Mu67/88	14.7.67	–	45 50'	170 48'E	CB	0–150
Mu67/88s	14.7.67	–	45 50'	170 48'E	S	0–600
Mu67/94s	18.8.67	–	45 50'	170 48'E	S	0–1000
Mu67/104s	18.9.67	–	45 50'	170 48'E	S	0–823
Mu67/106s	19.8.67	–	45 50'	170 48'E	S	0–1000
Mu67/114	24.10.67	–	45 48'	170 57'E	CB	0–80
Mu67/116s	24.10.67	–	45 50'	170 48'E	S	0–1000
Mu67/147s	15.12.67	–	45 50'	170 48'E	S	0–1000
Leigh	23.5.64	Daylight	36 18'	174 56'E	CB	0–45
Leigh	20.6.64	Daylight	36 18'	174 56'E	CB	0–45
Leigh	25.7.64	Daylight	36 18'	174 56'E	CB	0–45
Leigh	22.8.64	Daylight	36 18'	174 56'E	CB	0–45
Leigh	19.9.64	Daylight	36 18'	174 56'E	CB	0–45
Leigh	27.3.65	Daylight	36 18'	174 56'E	CB	0–45

Stn No.	Date	Time	Latitude (°S)	Longitude	Gear *	Depth of Haul (m)
Leigh	24.4.65	Daylight	36 18'	174 56'E	CB	0-45
LB(B) = Leigh	1.3.64	Daylight	36 18'	174 56'E	CB	0-45
L(A&B)=Leigh	23.5.65	Daylight	36 18'	174 56'E	CB	0-45
<b>MAF Fisheries Stations (deposited at Museum of New Zealand, Wellington)</b>						
AO1/78/87	9.7.87	≈ 0900	38 45.6	178 47.7'E	Plankton net on trawl head line	845-877
AO1/85/87	11.7.87	≈ 2200	39 29.2'	178 24.2'E	Plankton net on trawl head line	724-800
AO1/86/87	11.7.87	≈ 1100	39 27.0'	178 25.9'E	Plankton net on trawl head line	718-764
J1/57/72	12.1.72	2030-2100	36 21'	173 54'E	WP3	
J10/77/86	2.9.86	—	39 16.1'	178 26.0'E	2 x 2m net	880
J10/88/86	3.9.86	0400	39 49.9'	178 28.2'E	2 x 2m net	950
J10/107/86	6.9.86	0400	40 54.3'	177 24.7'E	2 x 2m net	1125

## SYSTEMATICS

### SUPERFAMILY BATHYPONTIOIDEA

#### Family BATHYPONTIIDAE Brodsky, 1950

**DEFINITION:** Female: Head and pedigerous segment 1 separate, pedigerous segments 4 and 5 separate, often produced backward with a rounded or acute point. Rostrum usually without filaments, in the form of a blunt or short process. Urosome 4-segmented, genital segment with slightly protruding ventral process; caudal rami short with 4–5 setae. Antenna 1 23-segmented, segments 8–9 and 24–25 fused, 24-segmented (*Temorites discoveryae*) with numerous aesthetascs proximally, may be asymmetrically developed (*Alloiopodus pinguis*). Antenna 2 (based on *Bathypontia*) rami almost equal in length; basipods 1 and 2 with 1 and 2 setae respectively, endopod segment 1 with 1–2 setae just distal to midlength (1 seta small), segment 2 with 7+9 setae; exopod 7-segmented with 0, 1, 1, 1, 1, 1, 1+3 setae; other genera have various reductions in segment numbers and setation (exopod 6-segmented in *Alloiopodus*, *Temorites discoveryae*, and *Zenkevitchiella*). Mandible (based on *Bathypontia*) gnathobase with large tooth often separated by some distance from numerous small teeth; basipod 2 large with 3–4 setae; endopod segments 1 and 2 with 2–3 and 8–11 setae respectively; exopod 5-segmented with 1, 1, 1, 1, 1–2 setae respectively; other genera with reduced setation on endopod (*Alloiopodus* endopod with 0, 3 setae; *Temorites discoveryae* 0, 1 setae). Maxilla 1 (based on *Bathypontia*) inner lobe 1 with 9–10 long straight spines; inner lobes 2 and 3 and basipod reduced in size and setation with 1 seta each; endopod absent, exopod well-developed with 10 setae; outer lobe 2 absent, outer lobe 1 with 3–4 setae; other genera and species with variously reduced setation (*Temorites discoveryae* has the greatest reduction: inner lobe 1 with 4 spines and setae, inner lobes 2–3, basipod, endopod, and outer lobes 1 and 2 devoid of setae, exopod with 6 setae). Maxilla 2 (based on *Bathypontia*) large, lobes 1–5 with 0–1, 1, 2, 3, 3–4 setae respectively (one of them enlarged), endopod with 6 enlarged, sometimes flattened, distally serrate setae; other genera with more or less modified setae and in some genera (e.g., *Alloiopodus*) basipod 2 elongated. Maxilliped (based on *Bathypontia*) with relatively short setae; basipod 1 lobes 1–3 with 1–2, 1–2, 3 setae respectively; basipod 2 with 3 setae at about midlength; endopod 6-segmented, segment 1 almost completely fused to basipod 2 with 1–2 seta, segments 2–5 with 4, 3–4, 2, 2, 2–4 setae respectively. Swimming

leg 1 basipod 1 with 1 inner distal seta. Legs 1–4 with 3-segmented exopod; endopod of leg 1 1–2-segmented, of legs 2–4 3-segmented. Leg 1 exopod segments 1 and 2 with or without outer edge spines; exopod segment 3 of legs 2–4 with 3 outer edge spines. Basipod 2 of leg 3 with long thin gently curving outer spine extending to distal border of exopod segment 1. Seta and spine formula of *Bathypontia* as follows:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0-1	0-1	0-1; 0-1; II, I, 4	0-2-3/4
Leg 2	0-1	0-0	I-1; I-1; III, I, 5	0-1; 0-2; 2, 2, 3
Leg 3	0-1	I-0	I-1; I-1; III, I, 5	0-1; 0-2; 2, 2, 3
Leg 4	0-0	I-0	I-1; I-1; III, I, 5	0-1; 0-2; 2, 2, 3

Leg 5 absent; or uniramous, 3-segmented, with 2 terminal spines, no other armature present (*Bathypontia*, *Temorites*); or biramous with 2–3-segmented exopod and 1-segmented endopod (*Zenkevitchiella*, *Alloiopodus*).

Male: Antenna 1 19–20-segmented, prehensile on right; terminal part composed of 4 narrow elongate segments, proximal segment of which is characteristically curved. Mouthparts similar to those of the female. Swimming leg 2 may be symmetrical or asymmetrically developed on each side with exopod segment 2 outer edge spine greatly elongate on one side. Leg 5 of male 3–5-segmented, endopod may or may not be present. (Brodsky 1950)

An example of this family is *Temorites elongata* (Figs 4, 5).

**REMARKS:** Schulz (1996) analysed species that have been assigned to the Bathypontiidae and Spinocalanidae and now restricts *Alloiopodus* Bradford, 1969; *Bathypontia* Sars, 1905b; *Temorites* Sars, 1900; and *Zenkevitchiella* Brodsky, 1955 to the Bathypontiidae. The type genus for this family is *Bathypontia* Sars, 1905b; this genus is now considered to be a junior synonym of *Temorites* Sars, 1900 (see below). The family name Bathypontiidae is preserved under Article 40(a) of the International Code of Zoological Nomenclature. Little is known of the food and feeding in the Bathypontiidae. Harding (1974) observed that *Bathypontia longicornis* guts contained homogeneous amorphous material and deduced that they are carnivores which grasp their prey.

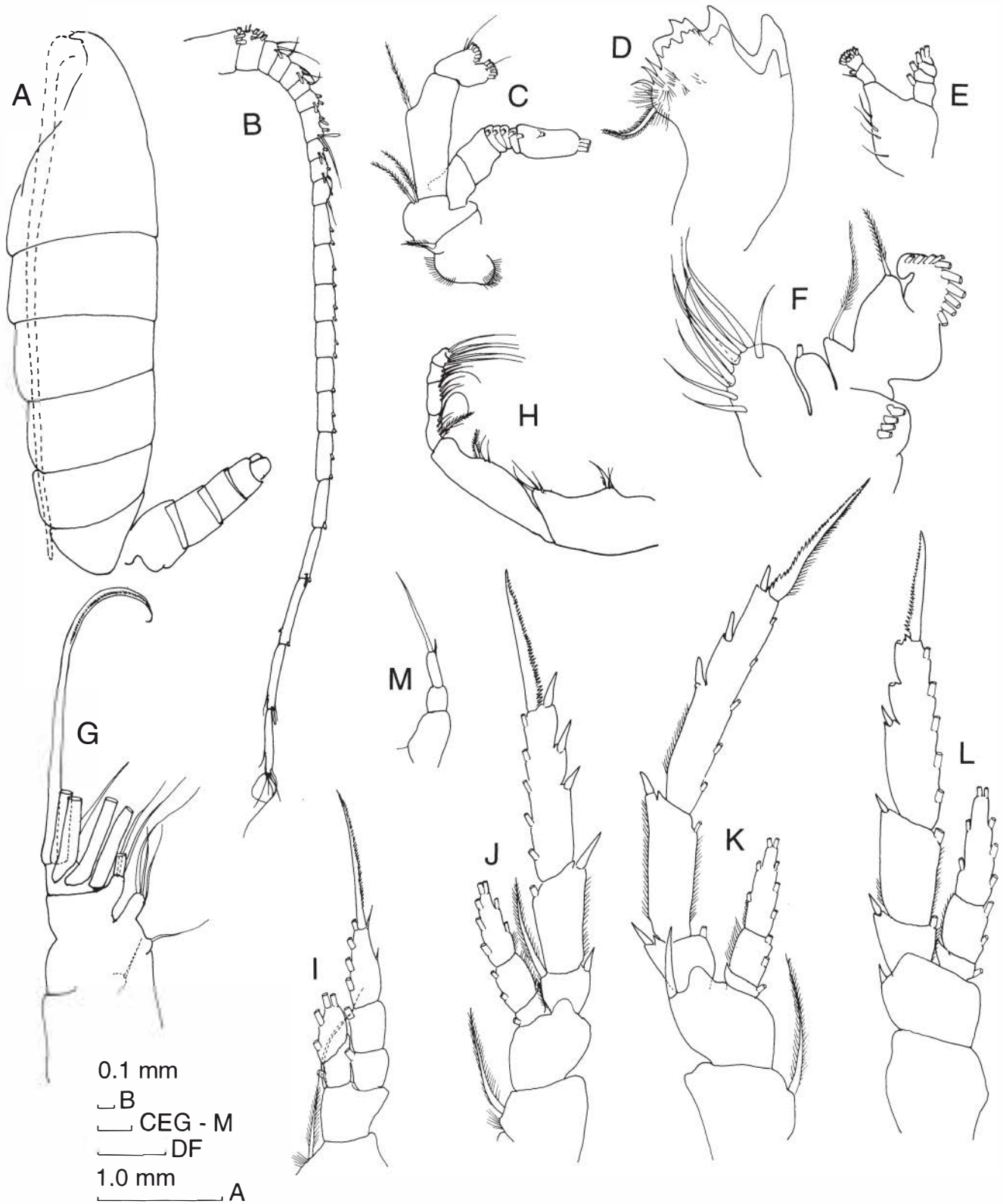
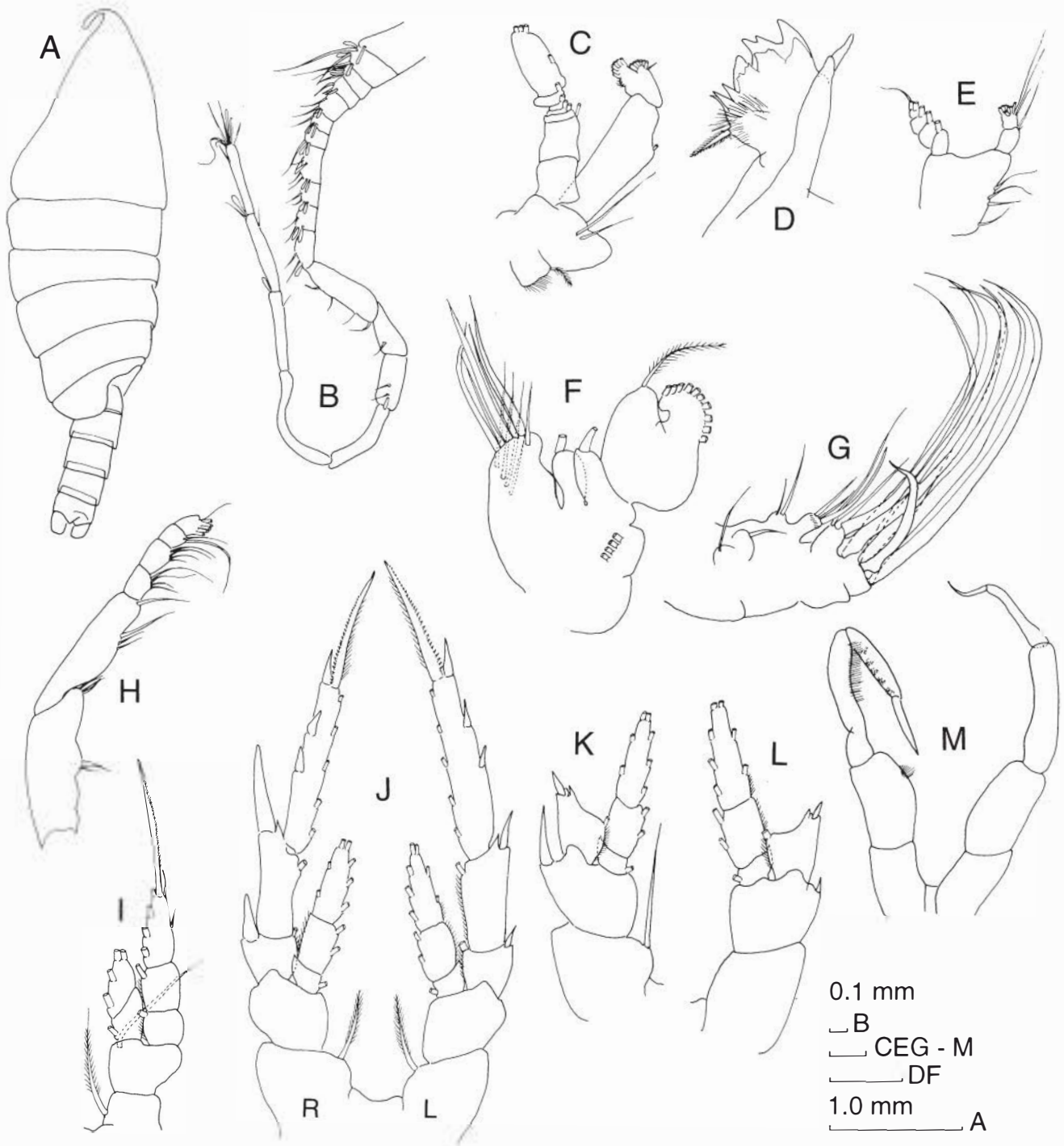


Fig. 4. *Temorites elongata* female from VUZ Stn 112. A, lateral view; B, antenna 1; C, antenna 2; D, mandible blade; E, mandibular palp; F, maxilla 1; G, maxilla 2; H, maxilliped; I, leg 1; J, leg 2; K, leg 3; L, leg 4; M, leg 5.



**Fig. 5.** *Temorites elongata* male (USNM 66965). **A**, dorsolateral view; **B**, right antenna 1; **C**, antenna 2; **D**, mandible blade; **E**, mandibular palp; **F**, maxilla 1; **G**, maxilla 2; **H**, maxilliped; **I**, leg 1; **J**, leg 2; **K**, leg 3; **L**, leg 4; **M**, leg 5.

*Alloiopodus* Bradford, 1969

DEFINITION: As in the family definition with the following additional characters. Body compact. Head and pedigerous segment 1 and pedigerous segments 4 and 5 separate with asymmetrical posterior flaps. Rostrum bifurcate. Antenna 1 short, 23-segmented, unequal. Antenna 2 exopod and endopod equal in length, exopod twice the width of endopod. Mandible with 1 tooth large and set apart from others. Maxilla 1 reduced, without an endopod or setae on outer lobe 1. Maxilla 2 well developed with lobe 4 bearing a strong seta. Maxilliped with a gripping region between basipods 1 and 2. Swimming leg 1 endopod 1-segmented, leg 2 endopod 3-segmented (endopods of legs 3 and 4 unknown). Leg 1 exopod 3-segmented (exopods of other pairs unknown). Basipod 2 of legs 3–5 bearing a stout external spine. Leg 5 endopod 1-segmented, exopod not known although segment 1 is as in other legs. Male unknown. (Bradford 1969)

TYPE SPECIES: *Alloiopodus pinguis* Bradford, 1969

REMARKS: This genus was placed in Bathypontiidae on the basis of the general fit with Brodsky's definition of the family although there are some differences. Of all bathypontiids with a female leg 5 *Alloiopodus* is the only genus where exopod segment 1 is similar to that of the remaining swimming legs; it is also the only genus with a short antenna 1 and with a gripping joint between basipods 1 and 2 of the maxilliped (Bradford 1969). This genus is known only from the type species which was taken in the Southwest Pacific.

*Alloiopodus pinguis* Bradford, 1969  
(Figs 6, 170, 189)

DESCRIPTION: Size: females 3.05 mm, male unknown.  
Female: As in the generic definition with the following additional characters. Prosome deep in lateral view; left posterior flap extends further posteriorly than right. Urosome 0.20–0.25 times the length of prosome; genital segment hardly swollen. Right antenna 1 extends to middle of pedigerous segment 1, longer on left. Antenna 2 exopod 6-segmented. Mandibular palp with 2 setae on basipod 2; terminal segment of endopod with 3 setae. Maxilla 1 with 11–13 spines and setae on inner lobe 1, 1 on inner lobe 2; endopod fused with basipod 2 and with 1 short spine; exopod with 6 setae; no setae on outer lobe 1. Maxilla 2 lobes 1–3 with 4, 2, 1, setae respectively; lobe 4 with a large spine-like seta which lies parallel to following segment for part of its length; segment carrying lobe 5 elongate, bearing 2 spine-like setae; 7 spines and setae on remainder of limb. Maxilliped with distal region of basipod 1 expanded and covered with small spinules as in opposing part of basipod 2; endopod 4-segmented, last segment small. Leg 1 alone complete, the fusion line between 2 segments on the endopod visible. (Bradford 1969)

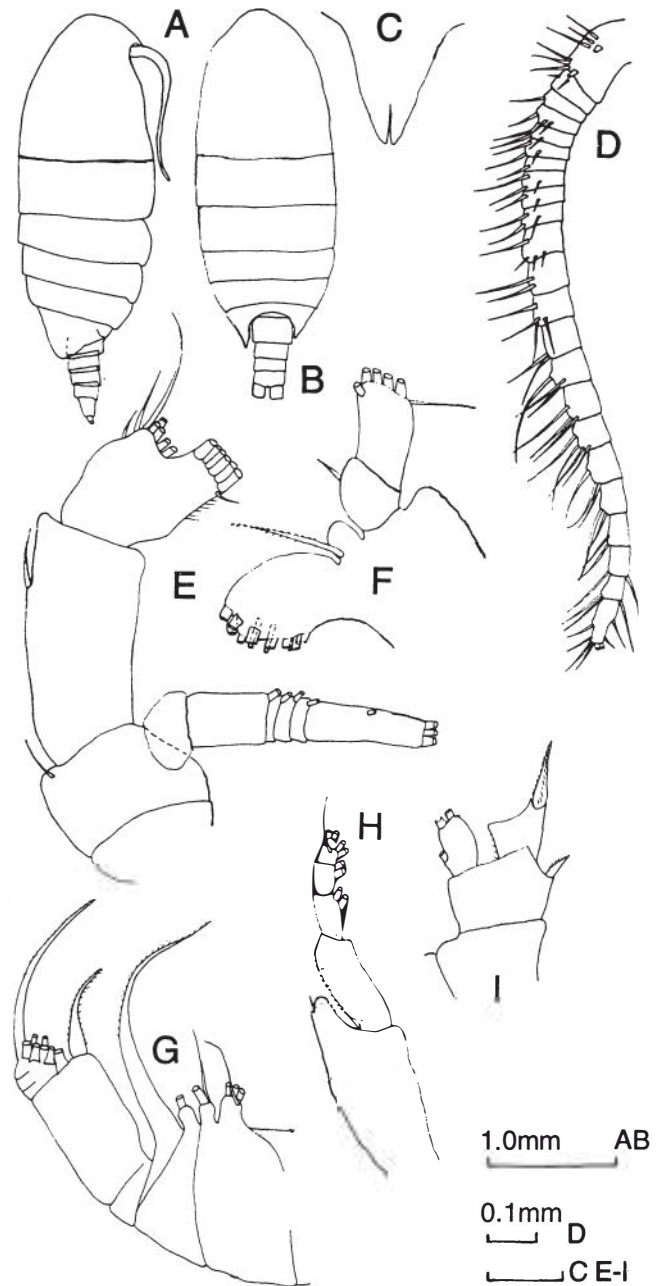


Fig. 6. *Alloiopodus pinguis* female from Bradford (1969). A, lateral view; B, dorsal view; C, rostrum; D, left antenna 1; E, antenna 2; F, maxilla 1; G, maxilla 2; H, maxilliped; I, leg 5.

Male: Unknown

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1969).

NEW RECORDS: Nil.

DISTRIBUTION: Taken at greater than 1200 m on the continental slope off northeastern New Zealand (Bradford 1969) where it is deduced to have a benthic habit.

***Temorites* Sars, 1900**  
(= *Bathypontia* Sars, 1905b)

DEFINITION: As in the family definition with the following additional characters. Body elongate, head separate or partly fused with pedigerous segment 1, and pedigerous segments 4 and 5 usually separate, with the posterior border asymmetrically extended in some species. Rostrum large, formed of a stumpy or rounded plate which is sometimes bifid at its tip, without filaments. Female urosome 4-segmented, 5-segmented in the male, caudal rami usually short. Antenna 1 22–23-segmented; male right antenna 1 modified, 19–20-segmented. Antenna 2 and mandibular palp with equal rami. Maxilla 1 with a well-developed exopod, endopod absent. Maxilla 2 strong, with 6 or more long curved spines, often serrulate distally. Maxillipeds weak. Leg 1 endopod 1–2-segmented, exopod segments 1 and 2 without outer edge spines. Leg 2 with 2–3-segmented endopods, legs 3–4 with 3-segmented endopods. Legs 1–4 with 3-segmented exopods. Leg 2 with outer edge spine of right exopod segment 2 much larger than other spines in some species, especially in males. Marked asymmetry of leg 2, due to enlargement of this spine, occurs most notably in male *B. spinifera*, and to a lesser extent in male *B. elongata*, *B. elegans*, *B. longicornis*, and *B. similis*; leg 2 symmetrical in male *B. minor*. Legs 3 and 4 basipod 2 with an outer spine which is long on leg 3. Female leg 5 3-segmented, usually symmetrical, with an apical spine and usually a small external spine. Male leg 5 of 4–5 segments, in some species almost symmetrical, in others notably asymmetrical, the left leg sometimes with an inner plumose seta on basipod 2. (Deevey 1973)

TYPE SPECIES: *Bathypontia elongata* Sars, 1905b

REMARKS: Brodsky (1950) recognised the relationship between *Bathypontia* and *Temorites* by creating a separate family for them. Vervoort (1957) and Tanaka (1965) further recognised the close relationship. Tanaka (1965) indicates characteristics such as a small bifurcate rostrum ending in points, maxilla 1 and 2 which are the same as in *Bathypontia*, and a male right leg 2 which

has an enlarged spine of exopod segment 2 on what he identifies as *Temorites brevipes* Sars (presumably this is a misprint for *brevis*). There appears to be some ambiguity in the literature about the nature of the rostrum of *Temorites*. Vervoort (1957) says that this species has no trace of a frontal eminence or a rostrum, and Brodsky (1950) says that the rostrum is bifurcate and with filaments but illustrates it as only bifurcate. Vervoort (1957) makes it clear that the male leg 2 is asymmetrically developed and that the enlarged spine on exopod segment 2 is on the right side alone. The definition of *Bathypontia* given by Deevey (1973), which indicates there is a range of rostral forms and degree of asymmetry in the male leg 2, entirely encompasses that of *Temorites* so the two genera are amalgamated here, *Temorites* being the senior synonym.

This genus now contains the following species. *Temorites brevis* Sars, 1900 (= ?*Temoropsis simplex* Wolfenden, 1911); *T. elegans* (Sars, 1920); *T. elongata* (Sars, 1905b); *T. intermedia* (Deevey, 1973) (male unknown); *T. kanaeva* (Bjornberg, 1976); *T. longicornis* (Tanaka, 1965) (female unknown); *T. longiseta* (Brodsky, 1950) (male unknown); *T. michelae* (Deevey, 1979) (male unknown); *T. minor* (Wolfenden, 1906) (male see Park 1970); *T. regalis* (Grice & Hülsemann, 1967) (female unknown); *T. sarsi* (Grice & Hülsemann, 1965); *T. similis* (Tanaka, 1965); *T. spinifera* (A. Scott, 1909); *T. unispina* (Deevey, 1979) (male unknown); *Bathypontia* sp. Wheeler, 1970. *Temorites discoveryae* Grice & Hülsemann, 1965 should probably be removed to another genus in the Bathypontiidae because of further reductions in setation of maxilla 1, the fusion of pedigerous segments 4 and 5, leg 1 with a 2-segmented exopod and legs 1–3 with a 1-segmented endopod, leg 4 with a 2-segmented endopod. The following species has been taken in the Southwest Pacific.

***Temorites elongata* (Sars, 1905a)**

(Figs 4, 5, 170, 189)

DESCRIPTION: Size: females 5.2–5.8 mm, males 3.91–5.53 mm.

Female: As in the generic definition with the following additional characteristics. Body elongate, prosome cylindrical. Rostrum small and briefly split terminally. Lateral lobes of last pedigerous segment projecting backwards but rounded terminally with a small notch in the middle. Urosome quite narrow with a comparatively short genital segment; caudal rami extremely small with setae of medium length. Female leg 5 with the terminal segment quite small and narrow. (Sars, 1925)

Male: As in the generic definition with the following additional characteristics. Male antenna 1 with the

middle section quite swollen. Male leg 5 slightly asymmetrical with a simple structure, each of 4 segments; 2 proximal segments are about the same size; segment 3 on each side is long and narrow; segment 4 is in the form of a curved claw; internal border of left leg is furnished with fine hairs, otherwise the surface of these segments is quite smooth. The right leg is a little thicker than left, but a little longer and of a rather similar structure. (Sars 1925)

REMARKS: The description of Deevey (1973) and the present observation of a specimen from the U.S. National Museum (66965), indicate that the male leg 2 is asymmetrically developed as exopod segments 1 and 2 have unequally developed outer edge spines. This species may be recognised by its size and general proportions of leg 5 in both sexes.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
VUZ112	0-732	1 female 5.8 mm

DISTRIBUTION: This bathypelagic species has been recorded from deep waters of the Atlantic, Pacific and Indian Oceans. (Deevey 1979)

### *Zenkevitchiella* Brodsky, 1955

DEFINITION: As in the family definition with the following additional characters. Head and pedigerous segment 1 fused or separate, pedigerous segments 4 and 5 separate. Rostrum with 2 filaments. Antenna 1 23-segmented in female, male right antenna 1 geniculate and 18- or 19-segmented. Antenna 2 rami of equal length. Maxilla 1 may have all lobes well developed or have inner lobes 2, 3 and endopod reduced. Maxilla 2 with strong, bent setae, not reduced on proximal lobes. Exopod of swimming legs 1-4 3-segmented; endopod of leg 1 1- or 2-segmented, of legs 2-4 3-segmented. Exopod segments 1-3 of leg 1 with 1, 1, 2 outer edge spines respectively. Basipod 2 of legs 3 and 4 with an outer edge spine. Female leg 5 biramous, endopods 1-segmented, exopod 2- or 3-segmented, with an inner distal spine on penultimate segment. Male leg 5 biramous, endopods 1- or 2-segmented or rudimentary, left exopod 1-segmented, right exopod 2- or 3-segmented.

(Brodsky 1955; Grice & Hülsemann 1965, 1967; Wheeler 1970)

TYPE SPECIES: *Zenkevitchiella abyssalis* Brodsky, 1955

REMARKS: This genus now contains the following species: *Zenkevitchiella abyssalis* Brodsky, 1955; *Z. atlantica* Grice & Hülsemann 1965; *Z. crassa* Grice & Hülsemann, 1967 (female unknown); *Z. tridentata* Wheeler, 1970 (male unknown) none of which have been taken in the Southwest Pacific.

## SUPERFAMILY PSEUDOCYCLOPOIDEA

Family **BOHOLINIDAE** Fosshagen  
in Fosshagen & Iliffe, 1989

DEFINITION: As in the definition of the only genus, *Boholina* Fosshagen & Iliffe, 1989.

REMARKS: This family is represented only by one genus, which has not been taken in the Southwest Pacific.

*Boholina* Fosshagen  
in Fosshagen & Iliffe, 1989

DEFINITION: Head and pedigerous segment 1 separate, pedigerous segments 4 and 5 fused. Rostrum downturned and rounded at its tip. Urosome 3-segmented in female and 4-segmented in male; female genital openings widely separated; caudal rami produced into a pointed process distally. Antenna 1 25-segmented, segments 8 and 9 partly fused. Antenna 2 exopod distinctly 8-segmented. Endopod of leg 1 3-segmented, each segment with a pointed outer distal corner, last segment without any outer seta and with a strong sub-apical spine. Leg 4 with slightly modified terminal spines on exopod. Leg 5 of female with a 2-segmented endopod. Leg 5 of male is a complex grasping organ with highly modified exopods and reduced 1-segmented endopods. (Fosshagen & Iliffe 1989)

TYPE SPECIES: *Boholina crassicephala* Fosshagen in Fosshagen & Iliffe, 1989

REMARKS: This genus contains two species *B. crassicephala* Fosshagen, 1989 and *B. purgata* Fosshagen, 1989 both of which were found in low-salinity caves on Bohol Island, Philippines (Fosshagen & Iliffe 1989). None of these species has been taken in the Southwest Pacific.

Family **PSEUDOCYCLOPIDAE**

DEFINITION: As in the definition of the only genus in this family.



REMARKS: There is now only one genus in this family: *Pseudocyclops* which has not been found in the Southwest Pacific.

*Pseudocyclops* Brady, 1872

DEFINITION: Body short and compact, with anterior part considerably swollen. Head strongly vaulted, projecting ventrally in a sharply pointed rostrum, which is moveably connected to the head in male. Head and pedigerous segment 1 separate, segments 4 and 5 fused or separate. Urosome 4-segmented in female, 5-segmented in male with a small anal segment; caudal rami short with outermost seta spiniform. Eye distinctly developed. Antenna 1 hardly longer than head, 15–18-segmented; right antenna 1 in males distinctly geniculate with the terminal part 4-segmented. Antenna 2 somewhat cyclopoid in shape; endopod is 3-segmented and its distal part is articulated to proximal segment at nearly a right angle; exopod about as long as endopod and is 3–6-segmented. Mandibles with distinctly biramous palp. Maxilla 1 with the endopod considerably produced. Maxilla 2 compact, with all finger-like lobes distinct. Maxilliped hardly longer than maxilla 2 with reduced setation. Legs 1–4 powerfully built with strong outer edge spines on exopods. Leg 5 of female with setae reduced in size, endopod short, 2–3-segmented; male leg 5 somewhat asymmetrical, right leg larger and hooked at tip, endopod lamellar.

(Sars 1903; Fosshagen 1968; Huys & Boxshall 1991)

TYPE SPECIES: *Pseudocyclops crassiremis* Brady, 1872

REMARKS: This genus occurs in near-bottom sub-littoral and littoral areas of the ocean. The following species have been described in this genus. *Pseudocyclops australis* Nicholls, 1944; *P. bahamensis* Fosshagen, 1968; *P. bilobatus* Dawson, 1977; *P. cokeri* Bowman & Gonzalez, 1961; *P. crassiremis* Brady, 1872; *P. gohari* Noodt, 1958; *P. kulai* Othman & Greenwood, 1989; *P. latens* Gurney, 1927 (male unknown); *P. latisetosus* Sewell, 1932 (female unknown); *P. lernerii* Fosshagen, 1968; *P. magnus* Esterly, 1911 (male unknown); *P. matthewsoni* Fosshagen, 1968; *P. minya* Othman & Greenwood, 1989; *P. obtusatus* Brady & Robertson, 1873; *P. oliveri* Fosshagen, 1968 (male unknown); *P. pacificus* Vervoort, 1964 (female unknown); *P. paulus* Bowman & Gonzalez, 1961; *P. reductus* Nicholls, 1944a (male unknown); *P. rostratus* Bowman & Gonzalez, 1961; *P. rubrocinctus* Bowman & Gonzalez, 1961; *P. simplex* Sewell, 1932; *P. spinulosus* Fosshagen, 1968 (male unknown); *P. steinitzi* Por, 1968; *P. umbricatus* Giesbrecht, 1893; *P. xyphophorus* Wells, 1967. No species of this genus have been taken in the Southwest Pacific.

Family RIDGEWAYIIDAE Wilson, 1958

DEFINITION: Female: Small, bottom-living copepods, total length between 0.4 and 1.1 mm, from shallow water in tropical and subtropical areas. Body stout, sometimes laterally compressed. Rostrum is downturned, with a broad base, rounded or pointed distally, usually without filaments. Head and pedigerous segment 1 separate, pedigerous segments 4 and 5 fused or separate. Urosome 3–4-segmented; when fourth urosomal segment is present it is always short; genital segment symmetrical or asymmetrical in dorsal view; paired genital openings are closely set; caudal rami short with 6 setae, outermost of which is short and usually spinous, second seta from inner margin is longest or strongest. Antenna 1 23–26-segmented (with an indication of 27 segments in *Exumella*), and with a tendency to elongation of last 3 segments; in *Placocalanus* the first segment is large and posterior margin is extended into a broad, flattened process. Mouthparts usually of normal construction although in *Exumella*, setation is slightly reduced on antenna 2 and mandibular palp, and maxilla 2 and maxilliped are modified. Antenna 2 endopod slightly shorter than exopod; basipods 1 and 2 with 1 and 2 setae respectively; endopod segment 1 with 1–2 setae, segment 2 with 7+4–9 setae; exopod 6–8-segmented with variable numbers of setae. Mandibular blade strong with multiple teeth in varying arrangements; basis with 0–4 setae; endopod segments 1 and 2 with 0–5 and 6–11 setae respectively; exopod 4-segmented with 1, 1, 1, 3 setae respectively. Maxilla 1 inner lobe 1 with 10–13 spines and setae; inner lobes 2 and 3 with 3–5 and 4 setae respectively, basipod with 4–5 setae; endopod with 3–4, 3–4, 5–7 setae (or a total of 10 in *Placocalanus*), exopod well-developed with 9–12 setae; outer lobe 2 with 1 seta or absent, outer lobe 1 with 9 setae. Maxilla 2 lobes 1–5 with 5–6, 2–3, 2–3, 3, 3–4 setae respectively, endopod with 8–10 setae. Maxilliped basipod 1 with lobes 1–3 with 2–3, 2–4, 3–4 setae respectively; basipod 2 with 2+1 or 1 seta towards distal end; endopod 6-segmented, segment 1 almost completely fused to basipod 2 with 2 setae, segments 2–6 with 2–4, 2–4, 2–4, 2–3+1, 2–4 setae respectively. Leg 1 modified in *Placocalanus*, particularly basipod 2 which carries a large process on anterior surface; there is also a slight reduction in the number of setae on other swimming legs in this genus; all exopods of swimming legs usually carry strong outer spines. Seta and spine formula as follows (over).

Leg 5 biramous and similar to other swimming legs, exopod 3-segmented, the last segment articulated at the middle of inner margin of second segment (this is the most characteristic feature of the family); endopods 1–3-segmented.

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0-1	0/1-1/0	I-1/0; I-1; II, I, 3/4	0-1; 0-1/2; 1, 2, 2/3
Leg 2	0-1	0-0	I-1; I-1; II, I, 5	0-1; 0-1/2; 1/2, 2, 4
Leg 3	0-1	0/1-0	I-1; I-1; III, I, 5	0-1; 0-1; 2, 2, 4*
Leg 4	0-1	1-0	I-1; I-1; III, I, 5	0-1; 0-1/2; 1/2, 2, 3*

\* variable

Male: Urosome 4-5-segmented. Antenna 1 geniculate on right, 20-23-segmented. Mouthparts similar to those of female. Male leg 5 asymmetrical, biramous, and a highly complex grasping organ; both basipod 1 may be fused into a common plate or may be separate; endopods usually 1-segmented, but 3-segmented in *Exumella*; right exopod usually 2-segmented and left exopod usually 3-segmented.

(Wilson 1958; Fosshagen 1970)

REMARKS: This family now contains three genera *Exumella* Fosshagen, 1970; *Placocalanus* Fosshagen, 1970; and *Ridgewayia* Thompson & Scott, 1903, none of which has been found in the Southwest Pacific.

### *Exumella* Fosshagen, 1970

DEFINITION: As in the family definition with the following additional characteristics. Head and pedigerous segment 1 and 4 and 5 separate. Urosome 3-segmented in female, 4-segmented in male; genital segments asymmetrical, produced on right side in female, and on left side in male. The rostrum is a downturned, rounded plate with 2 filaments at its tip. Antenna 1 has 26 free segments in female, male right antenna is 20-segmented. Antenna 2 exopod is slightly longer than endopod, endopod segment 2 is elongated with no distinct inner lobe. Mandible bears a well-developed masticatory blade with sharp teeth; endopod is reduced in size with 0, 6 setae on segments 1 and 2 respectively. Maxilla 1 is well developed. Maxilla 2 is short and compact with anterior margin of proximal joints produced into large lappets. Maxilliped strong, with a reflexed terminal part; 2 proximal segments of endopod are elongated and distal segments are short; endopod carries some modified setae, distal ones of which are long. Both rami of legs 1-4 3-segmented, similar in most respects to *Ridgewayia*, but without extra processes on leg 1 outer distal margin of exopod segments 1 and 2. Leg 5 of female with both rami 3-segmented; last segment of exopod arises from the middle of inner margin of preceding segment. Male leg 5 exopod is 2-segmented and elongate, its terminal segment carrying long spines and modified processes.

Basipod 2 of leg 5 in both sexes carries a long seta on its outer margin. (Fosshagen 1970)

TYPE SPECIES: *Exumella polyarthra* Fosshagen, 1970

REMARKS: The following species have been described in this genus. *Exumella polyarthra* Fosshagen, 1970; *E. tuberculata* Grahame, 1979. These species are benthopelagic and have been taken in the Bahamas and Jamaica respectively. No species in this genus have been taken in the Southwest Pacific.

### *Placocalanus* Fosshagen, 1970

DEFINITION: As in the family definition with the following additional characteristics. Small forms with a laterally compressed body; head and pedigerous segment 1 separate, pedigerous segments 4 and 5 fused. Urosome 4-segmented in female, genital openings are situated close together midventrally on genital segment; urosome 5-segmented in male. Rostrum is downturned, blunt, and without filaments. Antenna 1 is unique among calanoids in having the proximal segment strongly developed and extended on posterior margin into a large flattened process; 23-segmented in female, reaching slightly beyond cephalosome, well furnished with setae and a single long aesthetasc; right antenna 1 of male 20-segmented. The other cephalic appendages are unspecialised, well furnished with setae, and without any marked modifications or reductions. Leg 1 modified— inner anterior side of basipod 2 carries an anvil-like process, one part of which is directed along the endopod and the other along basipod 1; exopod bears unequal, mostly long, curved spines on its outer margin; endopod may be 3-segmented or 1-segmented and tapers to a pointed apex. Legs 2-4 have 3-segmented rami; the outer margin of endopod segment 3 has a tendency to reduction in number and size of setae. Leg 5 of females have 3-segmented exopods and a slender, 1-segmented endopod; last segment of exopod arises from a socket on inner margin of preceding segment. Leg 5 of males is modified into a complex grasping organ; the inner anterior margin of right basipod 2 carries an irregular, slender process; right exopod is 2-segmented, left 3-segmented; proximal inner corner of right exopod is extended into a long process reaching towards midline before bending away from body; left exopod segment 3 is long and tapers gradually to a point; endopods of both legs are slender, usually 1-segmented, and armed distally with a few setae or spines.

(Fosshagen 1970)

TYPE SPECIES: *Placocalanus insularis* Fosshagen, 1970

REMARKS: The following species have been described in this genus. *Placocalanus insularis* Fosshagen, 1970; and *P. nannus* Fosshagen, 1970. These bottom-living species have been taken in the Bahamas (Fosshagen 1970). No species in this genus have been taken in the Southwest Pacific.

*Ridgewayia* Thomson & Scott, 1903  
(= *Suezia* Gurney, 1927)

DEFINITION: As in the family definition with the following additional characteristics. Head and pedigerous segment 1 indistinctly separated, pedigerous segments 4 and 5 separate. Urosome 4-5-segmented in female; 4-5-segmented in male; paired genital openings closely set; caudal rami longer than wide with four terminal setae, an outer spine may also be present. Rostrum downturned, broad at its base, rounded or pointed distally, filaments lacking. Cephalic appendages all of primitive calanoid type, without reduction, excessive modification, or sexual differentiation. Antenna 1 extending to end of metasome or to caudal rami; 25-26-segmented in female, the three apical segments elongated; left antenna 1 of male like that of female, that on right 21-24-segmented, with a moderately developed geniculation, segmentation beyond this specialised joint varying from 3 to 4 segments. Antenna 2 exopod 7-8-segmented, with apical segment elongate and slightly longer than endopod. Mandible masticatory blade not conspicuously expanded, without gaps between the 7-10 shallowly incised teeth; basipod with 3-4 lateral setae. Maxilla 1 with outer lobe 1 with 9-10 setae; outer lobe 2 with 0 or 1 seta; inner lobe 1 with about 13 spines and setae, inner lobes 2 and 3 each with 4-5 setae; basipod with about 4-5 setae; endopod segments 1, 2, and 3 with about 4, 4, 5-7 setae respectively, and with varying degrees of fusion between segments; exopod lobed and with about 11 setae. Maxilla 2 lobes 1-6 with 4, 2-3, 2-3, 3, 3-4, 3-4 setae respectively. Maxilliped basipod 1 with 4 lobes or groups of setae; endopod shorter than basipod segments 1 and 2, of 5 well-defined segments with about 4, 4, 3, 4, 4 setae respectively. Leg 1 basipod 2 with an inner seta, often with an outer seta on legs 4 and 5. Endopod segment 2 on legs 1-4 with 2, 2, 2, 1-2 setae respectively, endopod segment 3 on legs 1-4 with 6, 8, 5-8, 6-7 setae respectively. Female leg 5 slender, symmetrical, with a well-developed 3-segmented exopod and reduced 2-segmented endopod; exopod is modified with segment 3 constricted basally and set into a narrowed, well-defined socket of segment 2, the outer spine-bearing portion of segment 2 enlarged and considerably produced beyond this insertion; exopod segment 3 with 4 spines and 4 setae; endopod segment

2 with 6-7 setae. Male leg 5 right and left basipod 1 fused; both rami modified and strongly asymmetrical; right exopod 2-segmented, segment 2 tending to elongation with 2 outer marginal spines, or with 1 proximal spine and more distally placed spinous points; left exopod 3-segmented, segment 3 considerably modified with a short but stout basal portion from which may extend spines, complex ornamented processes, and fragmented membranes of irregular length; endopods unsegmented, right elongate, left much shorter, either endopod entirely unarmed or with setae, spines, or processes. (Wilson 1958; Fosshagen 1970)

TYPE SPECIES: *Ridgewayia typica* Thompson & Scott, 1903

REMARKS: This genus appears to live near the sea floor (Wilson 1958). The following species have been described in this genus. *Ridgewayia canalis* (Gurney, 1927); *R. flemingeri* Othman & Greenwood, 1988; *R. fosshageni* Humes & Smith, 1974; *R. gracilis* Wilson, 1958; *R. krishnaswamyi* Ummerkutty, 1963; *R. marki* (Esterly, 1911) (see Yeatman (1969) for redescription); *R. shoemakeri* Wilson, 1958; *R. typica* Thompson & Scott, 1903 (see Por (1979) for redescription); *R. wilsoni* Fosshagen, 1970; *Ridgewayia* sp. Fosshagen, 1970; *Ridgewayia* sp. Yeatman, 1969. No species in this genus have been taken in the Southwest Pacific.

## SUPERFAMILY EPACTERISCIOIDEA

### Family EPACTERISCIDAE Fosshagen, 1973

DEFINITION: Female: Small, bottom-living copepods, total length between 0.7 and 1.9 mm, from shallow water in tropical and subtropical areas. Body stout, rostrum bilobed and bearing two filaments. Head and pedigerous segment 1 and pedigerous segments 4 and 5 separate. Urosome 3-4-segmented; genital segment produced ventrally, with genital apertures close together; caudal rami short with 5-6 setae. Antenna 1 of female 24-27-segmented. Antenna 2 endopod shorter than exopod; basipods 1 and 2 with 1 and 2 setae respectively; endopod segment 1 with no or 2 setae, segment 2 with 7, 4+6, or 9+7 setae (most reduced in *Epacteriscus*); exopod of 5-8 segments bearing 8-11 setae. Mouthparts with varying degrees of reduction in setation or other modifications (*Erebonectes* is the least modified and *Epacteriscus* the most modified). Mandible basipod with 1-4 setae; endopod vestigial, 1-segmented with 2 setae, 2-segmented with 2+8 setae, or absent and represented by 1 seta; blade with a large ventral tooth and may be produced into a scythe-like process (*Epacteriscus*) with numerous additional teeth. Maxilla 1 inner lobe 1 with 13 or 15 spines and setae;

inner lobes 2 and 3 with 2-3 and 1-4 setae respectively; basipod with 2-4 setae; endopod elongate with 1+4 or 3+3+6 setae; exopod with 7-11 setae; outer lobe 2 absent or with 1 seta; outer lobe 1 with 6-7 setae (in *Epacteriscus* the maxilla 1 is much reduced down to an inner lobe with 4 setae, another inner lobe with 1 seta, an endopod with 4 setae, exopod represented apparently by 1 seta, and with 3 setae on outer lobe 1). Maxilla 2 with setae of endopod with varying degrees of modification into short spines the most shortened and compressed in *Epacteriscus* and least modified in *Erebonectes*; inner lobes 1-5 with 3-6, 1-3, 3, 2-3, 4 setae respectively; endopod with 8-11 spines or setae. Maxilliped with endopod with varying degrees of compression, its setae relatively spine-like; basipod 1 with lobes 1-3 with 1-3, 1-4, 3-4 setae respectively; basipod 2 with 3 setae; endopod 6-segmented, segment almost completely fused to basipod 2 with 2 setae, segments 2-4 with 2-4, 2-3, 2-3, 2-4, 4-5 setae respectively (in *Enantiosis* the endopod is 4-segmented with 4, 4, 3, 7 setae respectively). The swimming legs of *Erebonectes* differ from those of *Epacteriscus* and *Enantiosis* in that basipod 2 of legs 2 and 3 have an outer distal spine and exopod segment 3 of legs 3 and 4 have only 2 outer edge spines instead of the 3 spines. Seta and spine formula as follows:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0-1	0-1	I-1; I-1; II, I, 4	0-1; 0-2; 1, 2, 3
Leg 2	0-1	0/I-0	I-1; I-1; II, I, 5	0-1; 0-2; 2, 2, 4
Leg 3	0-1	0/I-0	I-1; I-1; II/III, I, 5	0-1; 0-2; 2, 2, 4
Leg 4	0-1	1-0	I-1; I-1; II/III, I, 5	0-1; 0-2; 2, 2, 3
Leg 5	0-0	1-0	I-0/1; I-1; II/III, I, 4	0-1; 0-1; 2, 2, 2

Leg 5 similar to the other swimming legs.

Male: Urosome 4-5-segmented. Antenna 1 geniculate on right, 17-23-segmented, with 4-5 free segments distal to joint. Mouthparts and swimming legs as in female. Leg 5 asymmetrical, least modified in *Epacteriscus* and most modified into a complex grasping organ in *Enantiosis*; both basipod 1 without ornamentation and connected by the coupler; basipod 2 each with a posterolateral seta and may have asymmetrical inner projections; both right leg rami 3-segmented, endopod similar to those of female leg 5, exopod may be similar to other swimming legs but without inner edge setae or the terminal segment is short with a long curved terminal spine; left leg endopod 3-segmented, usually similar to female leg 5 although outer border is highly modified in *Enantiosis*, exopods are 2-3-segmented and look most like those of female in *Epacteriscus*, but are greatly modified in the other two genera with an elongate outer distal spine on exopod segment 1.

(Fosshagen 1973; Barr 1984; Fosshagen & Iliffe 1985)

REMARKS: There are now three genera in this family: *Enantiosis* Barr, 1984; *Epacteriscus* Fosshagen, 1973; and *Erebonectes* Fosshagen, 1985, none of which has been taken in the Southwest Pacific.

#### *Enantiosis* Barr, 1984

DEFINITION: As in the family definition with the following additional characteristics. Antenna 1 on left of both female and male 25-segmented extending to posterior border of prosome; male right antenna 1 22-segmented. Rostrum with 2 angular lobes each bearing a filament. Labrum broadly truncate, distomedial margin of oral surface bearing 5 strong teeth; labium bifid, each lobe cuspidate medially. Mandible blade with bicuspid molars, palp with a weakly segmented exopod, endopod vestigial. Maxilla 1 with well-developed lobes but reduced number of setae. Legs of female not reduced; male leg 5 prehensile, all rami 3-segmented.

(Barr 1984)

TYPE SPECIES: *Enantiosis cavernicola* Barr, 1984

REMARKS: This genus contains only the type species which has not been taken in the Southwest Pacific.

#### *Epacteriscus* Fosshagen, 1973

DEFINITION: As in the family definition with the following additional characteristics. Urosome 3-segmented in female and 4-segmented in male; genital openings in female are set close together on ventral surface of genital segment. Rostrum is broad, bilobed and carries filaments. Antenna 1 is about the length of prosome and is 17-segmented on the right in the male. Other cephalic appendages are specialised and have a reduced number of setae; mandibular palp lacks an endopod and the cutting blade bears a strong, ventrally directed serrated process; maxilla 2 and maxillipeds are compressed with relatively strong, modified setae. All legs of female have 3-segmented rami; only exopods of the male leg 5 are slightly modified.

(Fosshagen 1973)

TYPE SPECIES: *Epacteriscus rapax* Fosshagen, 1973

REMARKS: This genus contains only the type species which has not been taken in the Southwest Pacific. It has been taken from benthopelagic habitats in Florida and Colombia (Fosshagen 1973).

#### *Erebonectes* Fosshagen & Iliffe, 1985

DEFINITION: As in the family definition with the follow-

ing additional characteristics. Urosome 4-segmented in female, 5-segmented in male, caudal rami bear 6 plumose setae. Rostrum directed ventrally, bifurcate and with filaments. Antenna 1 27-segmented on the left in both male and female; right male antenna 23-segmented, with a distinct geniculation between segments 18 and 19. Antenna 2 endopod longer than exopod which is 8-segmented. Mandible basipod with 1 seta, endopod 2-segmented, reduced; blade with 4 strong rounded bicuspid teeth. Maxilla 1 well-developed with a shape commonly found among calanoids, but with an elongate, slender endopod. Maxilla 2 lobes 1–6 with 6, 3, 3, 3, 4, 4, setae respectively. Maxilliped endopod with 5 free segments. All swimming legs on female bear 2 outer-edge spines on exopod segment 3; basipod 2 of legs 1–5 with an outer-edge seta or spine. Leg 5 of male in the form of a complex grasping organ; rami 3-segmented, endopods only slightly modified, exopods highly modified.

(Fosshagen & Iliffe 1985)

**TYPE SPECIES:** *Erebonectes nesioticus* Fosshagen in Fosshagen & Iliffe, 1985

**REMARKS:** This genus contains only the type species which has not been taken in the Southwest Pacific.

## SUPERFAMILY ARIETELLOIDEA

### Family ARIETELLIDAE Sars, 1902

**DEFINITION:** Female: Body of variable size (0.8–7 mm), relatively robust, head and pedigerous segment 1 separated or weakly fused, pedigerous segments 4 and 5 fused, sharply or weakly produced, with or without dorsolateral and/or ventrolateral processes. Head rounded or pointed anteriorly, rostrum produced ventrally with a pair of filaments. Urosome relatively short, 4-segmented; genital segment with single paired gonopores and copulatory pores; gonopore(s) located ventrolaterally or ventrally, with or without opercular plate; copulatory pore sharing a common opening with the gonopore or separate with the gonopore located ventromedially or posteriorly, rarely ventrally on the right side; seminal receptacles usually paired, rarely the left receptacle is entirely lacking. Caudal rami symmetrical or slightly asymmetrical, relatively short with up to 7 setae. Antenna 1 symmetrical or asymmetrical, longer on left than on right, 16–22-segmented, sometimes differing in fusion pattern and armature. Antenna 2 basipod 2 with an outer edge seta; exopod and endopod separated from basipod 2; endopod 2-segmented, segment 1 with 0–1 seta at mid-length, segment 2 with 1–3 inner setae medially and 5 or 6

setae terminally; exopod indistinctly 6–10-segmented. Mandible blade well chitinised, with 3 or 4 sharp teeth; endopod rudimentary, 1-segmented with 1 or 2 setae terminally or completely absent; exopod segment 1 with normal or reduced setae, segment 5 carrying 2 setae, one of which is sometimes vestigial. Maxilla 1 inner lobe 1 with 0–6 spines and setae; inner lobe 2 with 1 seta or unarmed; inner lobe 3 represented by a seta which may be vestigial or absent; endopod bulbous, 1-segmented, with 0–3 setae or completely incorporated into basipod 2; exopod lobate, with 3 setae; outer lobe 1 with 5–9 setae. Maxilla 2 well developed; inner lobe 1 with 1–3 setae (1 vestigial), inner lobe 2 with 1–2 setae; inner lobes 3 and 4 with 2 setae each; inner lobe 5 with a stout spine, spinulose or bare; endopod 4-segmented with 1, 3, 2, 2 setae respectively. Maxilliped elongate, basipod 1 with 1 medial and 2 terminal setae; basipod 2 with patches of setules or spinules and 2 setae medially; endopod 6-segmented, segment 1 almost fully incorporated into basipod 2 with 1, 4, 4, 3 (rarely 2), 3 (rarely 2), 4, segment 6 with 2 outermost terminal setae reduced or not. Swimming legs 1–4 distinctly 3-segmented, rarely with endopod segments of leg 1 incompletely fused, seta and spine formula as follows:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0–1	1–1	I-1; I-1; II/I, I, 1/I, 4	0–1; 0–2; 1, 2, 2
Leg 2	0–1	0–0	I-1; I-1; III, I, 5	0–1; 0–2; 2, 2, 4/3
Leg 3	0–1	0–0	I-1; I-1; III, I, 5	0–1; 0–2; 2, 2, 4/3
Leg 4	0–0/1	1–0	I-1; I-1; III, I, 5	0–1; 0–2; 2, 2, 3/2

Leg 5 variable, not natatory, almost symmetrical; basipod 1 and coupler separate or fused; basipod 2 and endopod separate or fused; endopod with 0–4 setae; exopod 1–3-segmented or completely fused with basipod 2, carrying 0–5 spines and setae.

Male: Body similar to female; urosome 5-segmented. Left antenna 1 geniculate, 16–20-segmented, proximal segments often with a row of setules along posterior margins. Mouthparts and legs 1–4 similar to female or with slightly different armature elements of antenna 2 endopod segment 2 and mandibular exopod segment 1. Leg 5 variable, not natatory, almost symmetrical to strongly asymmetrical; basipod 1 and coupler fused to form a common base or separate; right basipod 2 sometimes fused with basipod 1; right endopod 1-segmented, bulbous or absent; right exopod distinctly or indistinctly 3-segmented, segments 1 and 2 each with a seta on the outer margin (rarely segment 1 unarmed), segment 2 with a tuft of setules on inner distal angle of segment 2, segment 3 with 0–3 spines and setae terminally; left endopod 1–2-segmented, un-

armed or completely absent; left exopod distinctly 3-segmented, segments 1 and 2 each with a seta on the outer margin, segment 3 with 1–3 spines and setae terminally. (Ohtsuka *et al.* 1994)

An example of this family is *Arietellus setosus* (Figs 7, 8).

REMARKS: An excellent recent revision of this family describes new genera (some accommodating already-known arietellids), treats character transformations of the genital system and appendages in detail, and includes phylogenetic relationships based on a cladistic analysis (Ohtsuka *et al.* 1994). The above definition excludes *Rhapidophorus* Edwards, 1891 which was inadequately described.

This family now contains eleven genera: *Arietellus* Giesbrecht, 1892; *Campaneria* Ohtsuka, Boxshall & Roe, 1994; *Crassarietellus* Ohtsuka, Boxshall & Roe, 1994; *Metacalanus* Cleve, 1901; *Paramisophria* T. Scott, 1897 (= *Parapseudocyclops* Campaner, 1977); *Paraugatiloides* Ohtsuka, Boxshall & Roe, 1994; *Paraugaptilus* Wolfenden, 1904; *Pilarella* Alvarez, 1985; *Rhapidophorus* Edwards, 1891; *Sarsarietellus* Campaner, 1984; *Scutogerulus* Bradford, 1969. Arietellids are widely distributed from neritic (including cave-dwelling species) to oceanic waters and ranging vertically from the epipelagic to bathypelagic hyperbenthic layers (Ohtsuka *et al.* 1994). Itoh (1970) concluded that *Paraugaptilus buchani* is a carnivore based on the morphology of the cutting edge of the mandible.

#### *Arietellus* Giesbrecht, 1892

DEFINITION: As in the family definition with the following additional characteristics. Head and pedigerous segment 1 separate; posterior metasome with a pair of blunt dorsolateral processes and paired ventrolateral processes, symmetrical or asymmetrical, strongly or weakly produced backwards. Genital segment longer than wide, with a pair of gonopores ventrolaterally and copulatory pore ventromedially; seminal receptacle relatively large, bulbous, located laterally. Anal segment large, operculum not developed. Caudal rami symmetrical, longer than wide, divergent or not, with all 6 terminal setae well developed. Female antenna 1 symmetrical, distinctly 20-segmented; posterior margins of segments 1–10 fringed with long setules; segments 1–4 and 23–28 fused; segments 4, 6, and 12 without aesthetasc. Male left antenna 19-segmented, geniculate; segments 21 and 22 fused; segments 2 and 3 with 1 seta; segment 13 with a seta; segments 1–9 fringed with a row of long setules along posterior margin. Antenna 2 endopod: segment 2 unarmed (in male with 1 long and 1 short seta medially), segment 2

with 2 inner setae (reduced in some species), and 5 setae and a setule terminally; exopod indistinctly 7- or 8-segmented. Mandibular blade lacking a tuft of hairs at midlength; 3 cusped teeth on cutting edge, dorsalmost of which is bifid at tip; mandibular palp with endopod absent; exopod segments of female with reduced or normal seta, outer seta of segment 5 vestigial but in the male exopod segment 1 has normally developed setae. Maxilla 1 inner lobe 1 with 5 spines and 1 process; inner lobe 2 with 1 relatively short, thick seta fringed with long setules; endopod rudimentary, almost fused to basipod 2 or 1-segmented, bulbous, with 1 terminal seta; outer lobe 1 with 8 setae, outer lobe 2 without a seta. Maxilla 2 lobes 1 and 2 with 1 and 2 setae respectively; lobe 5 spine with 2 rows of spinules; endopod setae armed with stout spinules fringed with lamellar structure proximally. Maxilliped with endopod setal formula 1, 4, 4, 3 or 2, 3 or 2, 4 (innermost seta on fourth and fifth segments reduced or completely lacking in some species). Leg 1 exopod segments 1 and 3 bearing 1 and 2 outer spines respectively. Female leg 5 reduced; basipod 1 and the plate between basipod 1 on each side fused to form a common transverse plate; basipod 1 and 2 fused or separate; right basipod 2 longer than left basipod 2; endopod fused with basipod 2, represented by a small knob with 1–3 setae terminally, vestigial in some species; exopod 1-segmented, bulbous, carrying 1 terminal spine or almost fused to basipod 2, unarmed. Male leg 5 with basipod 1 and coupler form a common plate. Right basipods 1 and 2 incompletely fused; basipod 2 inner seta remarkably or normally elongate; endopod 1-segmented and unarmed; exopod indistinctly 3-segmented with distal 2 segments incompletely fused; exopod segment 2 with a stout process on the inner angle; exopod segment 3 spatulate, with 0–2 vestigial elements. Left endopod indistinctly 2-segmented or 1-segmented, unarmed; exopod 3-segmented, segment 2 expanded medially, segment 3 incompletely fused with the preceding segment, bearing 2 terminal spines, with or without an outer minute spinule. (Ohtsuka *et al.* 1994)

TYPE SPECIES: *Arietellus setosus* Giesbrecht, 1892

REMARKS: There is sexual dimorphism in antenna 2 and mandibular palp (Ohtsuka *et al.* 1994). This genus now contains the following species: *Arietellus aculeatus* (T. Scott, 1894b) (= *A. armatus* Wolfenden, 1911; see Vervoort 1965); *A. giesbrechti* Sars, 1905b; *A. minor* Wolfenden, 1911; *A. mohri* (Björnberg, 1975) (male unknown); *A. pacificus* Esterly, 1913; *A. pavoninus* Sars, 1905b; *A. plumifer* Sars, 1905b; *A. setosus* Giesbrecht, 1892; *A. simplex* Sars, 1905b (= *A. major* Esterly, 1906) *A. tripartitus* C.B. Wilson, 1950; *Arietellus* sp. Bradford, 1974; *Arietellus* sp. Ohtsuka *et al.* 1994. The following species have been taken in the Southwest Pacific.

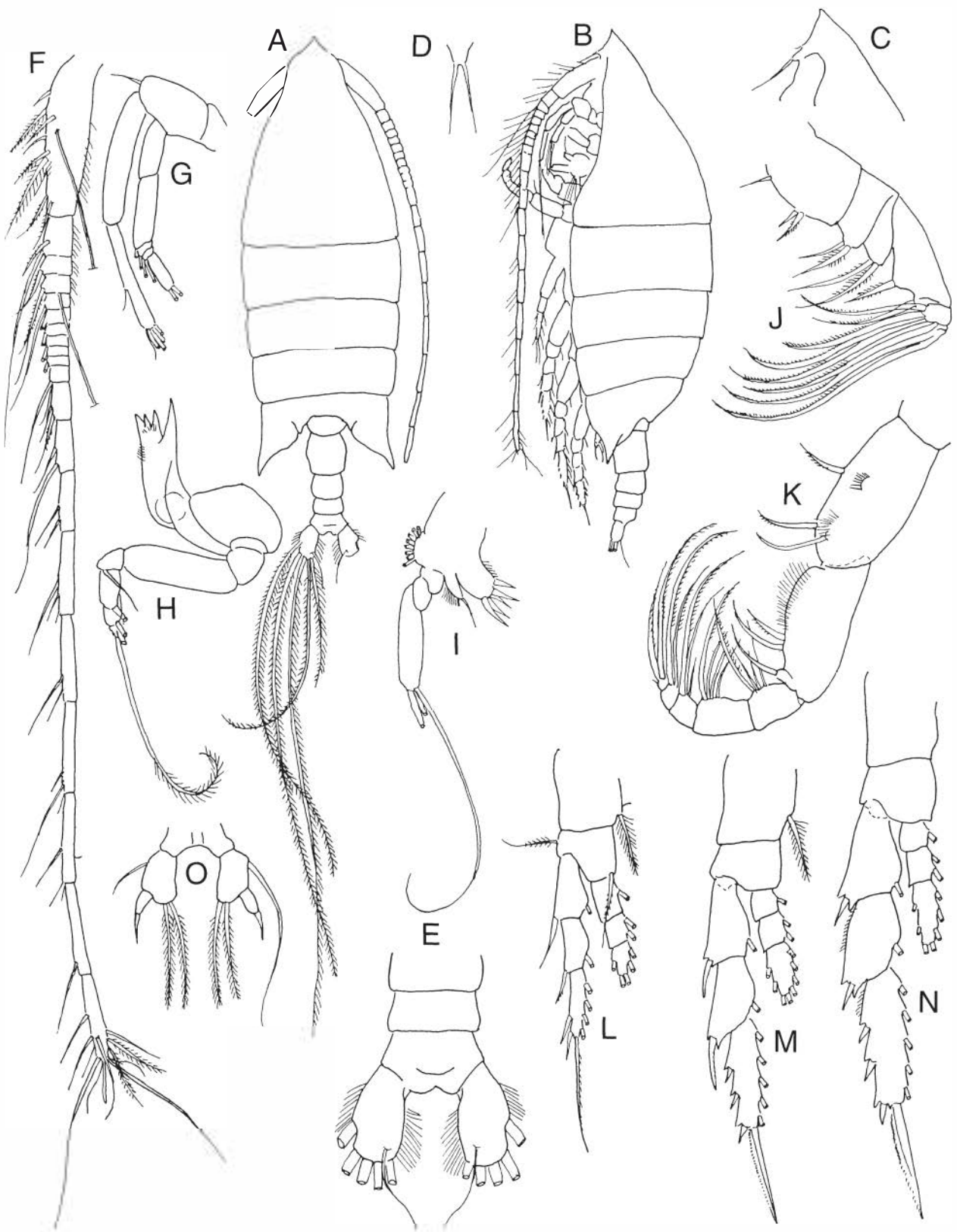


Fig. 7. *Arietellus setosus* female from Sars (1924). A, dorsal view; B, lateral view; C, anterior head, lateral view; D, rostrum; E, posterior urosome, dorsal view; F, antenna 1; G, antenna 2; H, mandible; I, maxilla 1; J, maxilla 2; K, maxilliped; L, leg 1; M, leg 3; N, leg 4; O, leg 5.

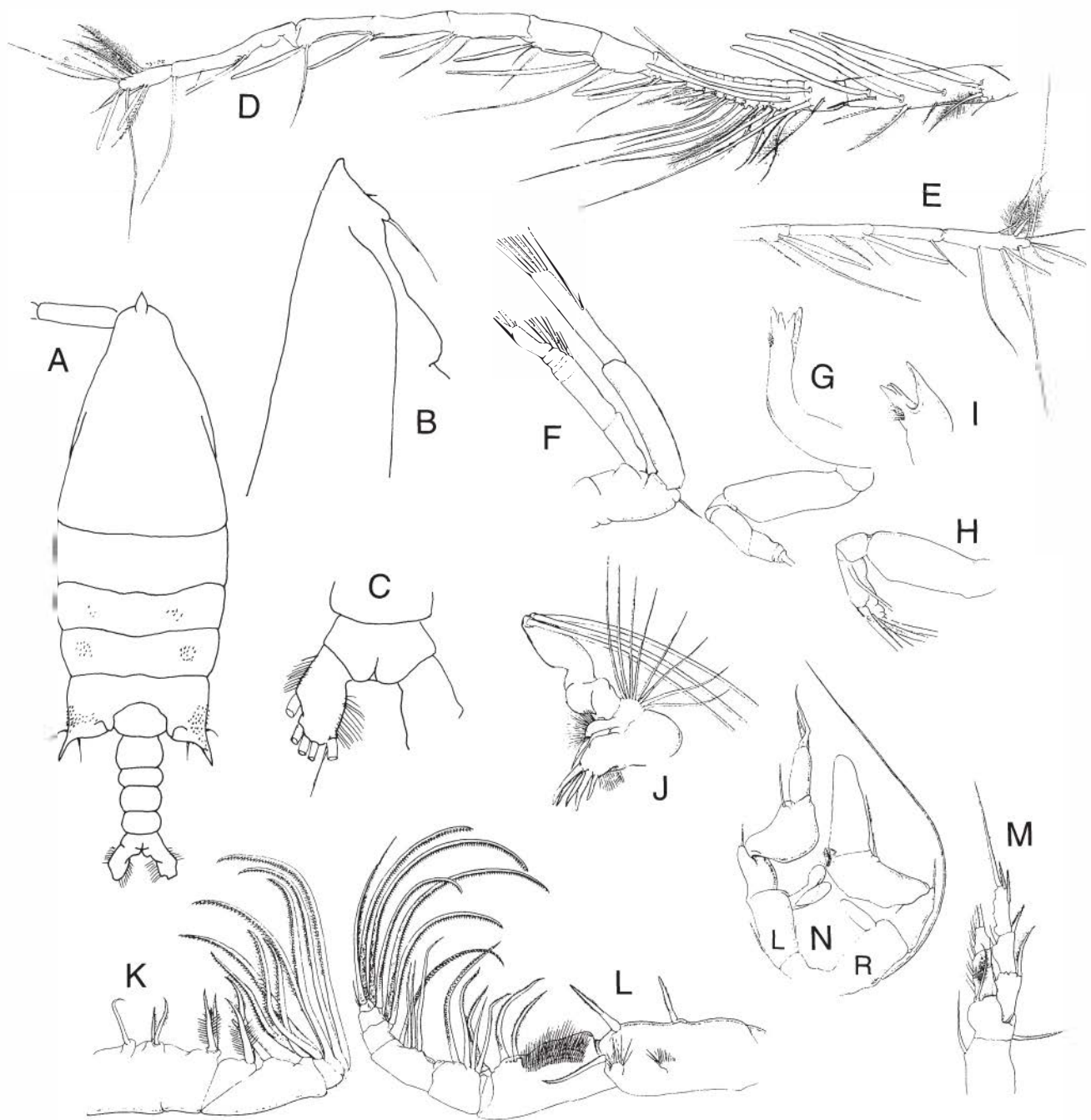


Fig. 8. *Arietellus setosus* male from Giesbrecht (1892). A, dorsal view; B, head, lateral view; C, posterior urosome, dorsal view; D, left antenna 1; E, right antenna 1 terminal part; F, antenna 2; G, mandible; H, mandibular palp; I, distal end of mandible blade; J, maxilla 1; K, maxilla 2; L, maxilliped; M, leg 1; N, leg 5.

*Arietellus aculeatus* (T. Scott, 1894b)  
(Figs 9, 170, 189)

DESCRIPTION: Size: female 3.45–4.27 mm, male 3.82 mm. Female: As in the generic definition with the following additional characters. Head produced into an elongate conical spine pointing straight forward; posterior metasomal corners slightly asymmetrical, broad, rather divergent, and acutely pointed (slightly longer on the right side) and which do not extend as far as the distal end of the genital segment; setae on caudal rami only slightly longer than the urosome. Integumental organs

gate conical spine pointing straight forward; posterior metasomal corners slightly asymmetrical, broad, rather divergent, and acutely pointed (slightly longer on the right side) and which do not extend as far as the distal end of the genital segment; setae on caudal rami only slightly longer than the urosome. Integumental organs



which lie immediately behind the 2 anteriormost pairs are arranged in 3 widely spaced rows; last metasomal segment with a lateral patch of small closely-packed pores which extend in a narrow strip onto the dorsal surface. Leg 5 is asymmetrical; right longer than left; apical spine on exopod of right leg as long as its segment, the segment bearing an indication near the middle of an outer marginal spine; terminal spine on left leg is much longer than its joint.

(Scott 1909; Bradford & Jillett 1974)

Male: As in the generic definition with the following additional characters. Body similar to female and head and pedigerous segment 1 separate. Left antenna 1 with parts of segments 3 and 4, segments 5–11 and part of segments 12 and 17 and segments 18 and 19 darkly

pigmented. Leg 5 left endopod bilobed, small, less than half the length of basipod 2, exopod segment 3 with external spine bilobed at tip; right endopod small, less than half the length of basipod 2, exopod segment 3 bilobed distally with a small outer edge tooth.

(Farran 1929; Bradford 1974)

REMARKS: The identity of the male taken in the Tasman Sea is difficult to work out with certainty because of the few specimens recorded in the literature and it is not clear that the specimens described by T. Scott (1894) and A. Scott (1909) are conspecific. The closest to the present specimen in general shape appear to be *A. aculeatus* and *A. acutus*. *Arietellus aculeatus* was described by T. Scott (1893) from the Gulf of Guinea,

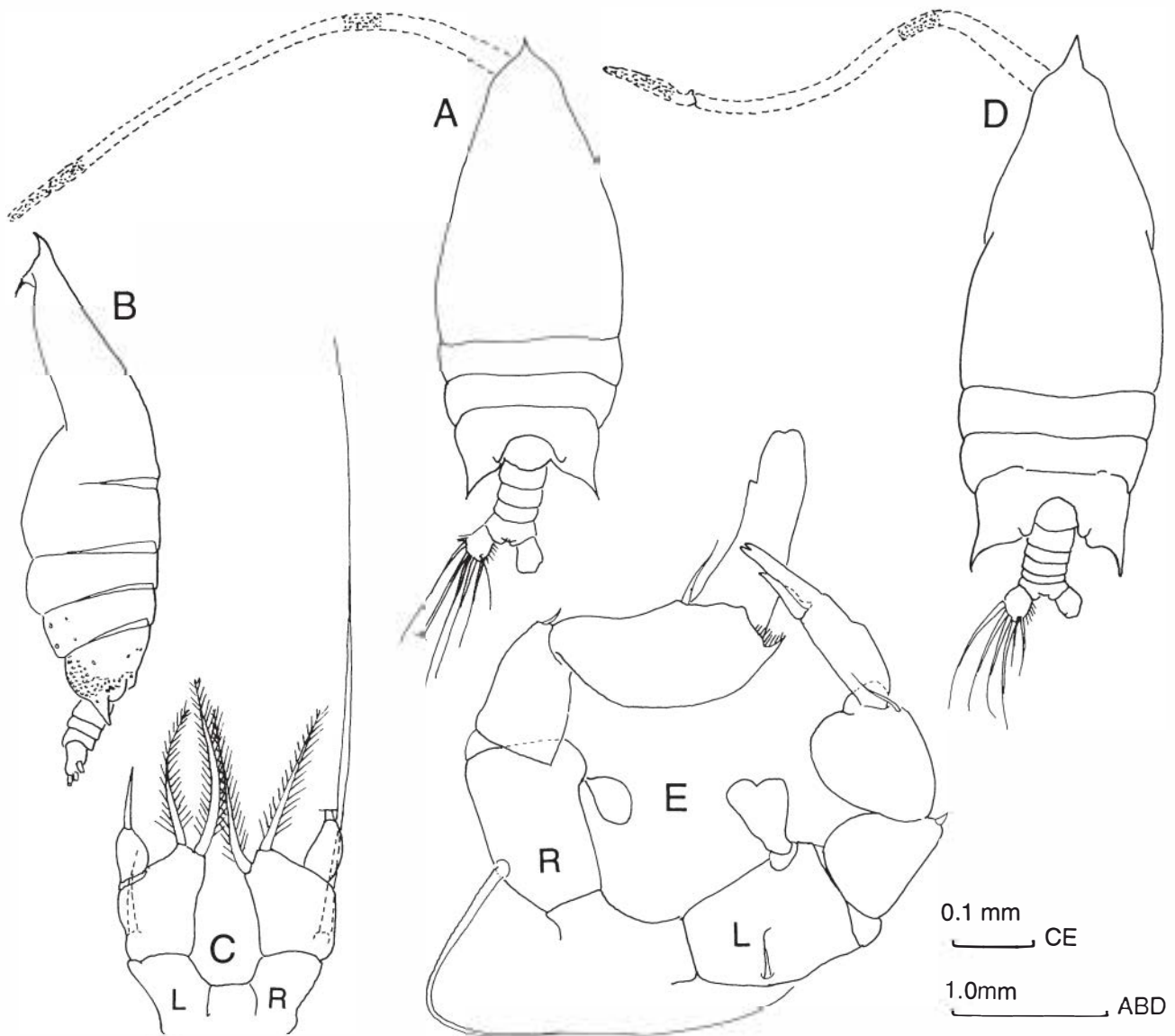


Fig. 9. *Arietellus aculeatus* from Stn F945, 0–500 m. CV female: A, dorsal view; B, lateral view; C, leg 5. Male: D, dorsal view; E, leg 5.

from an immature male which he named *Rhincalanus aculeatus*. Giesbrecht and Schmeil (1898) later assigned this species to *Arietellus*. A. Scott (1909) identified a female from the Malay Archipelago as *A. aculeatus*. Later Farran (1929) mentions one male *A. aculeatus*, saying that the general body shape is similar to that recorded by A. Scott although he did not find anything remarkable about the fifth legs (no figures were given). Subsequent examination of Farran's (1929) male proved that it differed from the male recorded here (see Bradford 1974, and the discussion of *Arietellus* sp. below). Bradford (1974) recorded a male from the Southwest Pacific and was able to match a female to it from collections of the Smithsonian Institution on the basis of similarity of patterns of integumental organs, pigmentation of antenna 1, and general body shape. The Southwest Pacific male has leg 5 with left exopod segment 3 external spine bilobed at the tip in a manner similar to that figured by Paiva (1963). Ohtsuka *et al.* (1994) added further detail on the setation of antenna 1 and mouthparts of a species they identified as *A. aculeatus*. This work was part of an evaluation of phylogenetic relationships among arietellid genera. Unfortunately the characters mentioned by Bradford (1974) were not related to the additional characters mentioned by Ohtsuka *et al.* (1994). The Southwest Pacific male apparently has the first segment of left antenna 1 with the following pattern of setae and aesthetascs: 5 setae and 7 aesthetascs (I-1+1 aesthetasc, II-1+2 aesthetascs, III-1+2 aesthetascs, IV-2+2 aesthetascs). This pattern appears to differ slightly from that recorded by Ohtsuka *et al.* (1994) which had a total of 7 setae and 7 aesthetascs. The stage V female, taken with the male, had leg 5 similar to that described by A. Scott (1909) especially in that the right exopod segment has what seems to be a pore on the outer border (referred to by Scott (1909) as an "indication ... of an outer marginal spine").

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1974) (male).

NEW RECORDS: Nil.

DISTRIBUTION: The distribution of this species is only sketchily known from the Atlantic, Pacific, and Indian Oceans and the Malaysian Archipelago and may be mesopelagic (Paiva 1963; Stephen & Rao 1980).

*Arietellus* sp. Bradford 1974 (Figs 10, 170, 189)

*Arietellus aculeatus* Farran, 1929: 270.

DESCRIPTION: Size: female 4.86–4.95 mm, males 4.29–4.44 mm.

Female: As in the generic definition with the following additional characters. Very like *A. aculeatus* but differing in the following respects— slightly larger; anterior head in lateral view is directed straight forward; integumental organs arranged differently: those immediately behind the 2 anteriormost pair of pores are arranged in 1 row with 1 further pore placed immediately posterior to the central pore, small closely-packed pores on last metasomal segment confined to lateral surface; longest seta on caudal rami almost twice the length of urosome; antenna 1 with a variable number of segments 2–12 pigmented, last 2 segments unpigmented. (Bradford 1974)

Male: As in the generic definition with the following additional characters. Male left leg 5 exopod segment 3 rounded or tapering; endopods large, more than half the length of basipod 2. (Bradford 1974)

REMARKS: This species is very close to *A. aculeatus* (Bradford 1974) and is known in the Southwest Pacific only from the male recorded by Farran (1929). Females and a male matching the male similar to that of Farran (1929) were located in the collections of Smithsonian Institution (see Bradford 1974).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929) male as *A. aculeatus*.

NEW RECORDS: Nil.

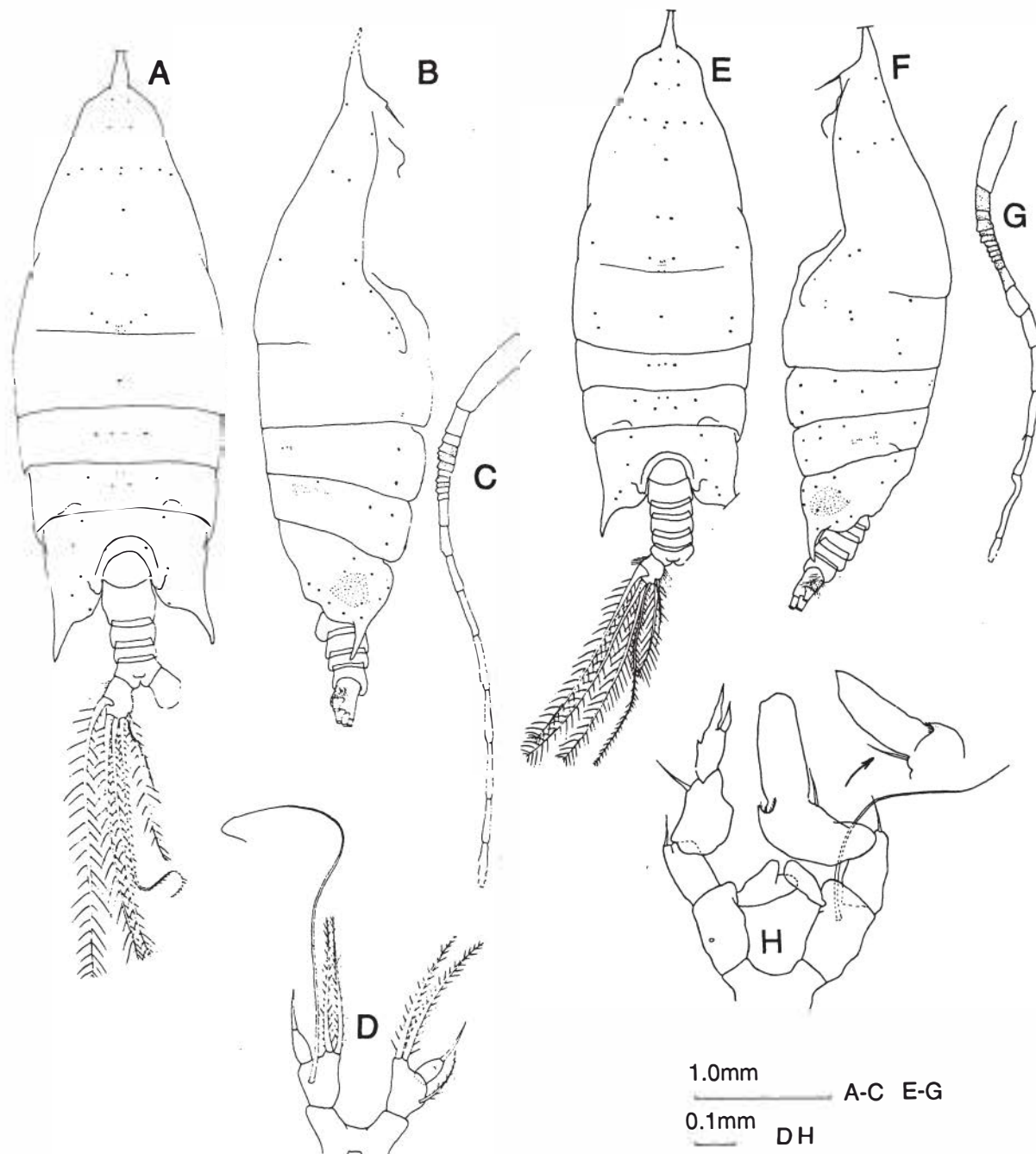
DISTRIBUTION: Apparently taken in the Atlantic and Pacific Oceans (Bradford 1974). It is probably mesopelagic although it was taken at the surface in the Three Kings Islands upwelling region north of New Zealand (Bradford 1969).

*Arietellus setosus* Giesbrecht, 1892

(Figs 7, 8, 170, 189)

DESCRIPTION: Size: female 4.60–5.08 mm, males 3.99–4.70 mm.

Female: As in the generic definition with the following additional characters. Body quite robust with prosome considerably swollen. Anterior part of head narrow terminating in a short conical projection which is pointed at its end. Posterolateral corners of metasome strongly projecting on both sides and terminating in a point which is directed obliquely outwards. Urosome of moderate length with genital segment comparatively short; caudal rami slightly lamelliform with extremely long, slender setae some of which are almost as long as entire body. Antenna 1 extends almost as far as posterior corners of prosome. (Sars 1925)



**Fig. 10.** *Arietellus* sp. from *Albatross* Stns 6 and 7 in the equatorial north Atlantic (Bradford 1974). Female: A, dorsal view; B, lateral view; C, antenna 1; D, leg 5. Male: E, dorsal view; F, lateral view; G, left antenna 1; H, leg 5.

Male: As in the generic definition with the following additional characters. Body shape generally like that of female. Leg 5 slightly asymmetrical; basipod 2 on each side with an outer proximal plumose seta showing the same asymmetry as in female; endopod on right simple, bilobed on left; exopod segment 1 has a similar appearance on both sides with a small terminal seta; exopod segment 2 is a little larger on left with a swol-

len inner border; exopod segment 3 of left leg is quite small and carries 2 short spines, of the right leg is larger and obtusely rounded terminally. (Sars 1925)

REMARKS: This species can be distinguished by the short, pointed anterior head, the long setae on the caudal rami, and the pointed, divergent posterior metasomal corners.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929).

NEW RECORDS: Nil.

DISTRIBUTION: Known from meso- to bathypelagic depths in all oceans (Vervoort 1965) although it is found in the surface 200 m in equatorial regions (Stephen & Rao 1980).

*Campaneria* Ohtsuka, Boxshall & Roe, 1994

DEFINITION: As in the family definition with the following additional characteristics. Anal segment short, anal operculum not developed; caudal rami symmetrical, longer than wide, outer lateral and posterodorsal seta minute. Left antenna 1 of male reaching almost to end of urosome, 20-segmented. Antenna 2 endopod segment 1 with an inner seta, segment 2 with 3 inner subterminal setae and 5 terminal setae; exopod indistinctly 8-segmented. Mandibular blade with a tuft of setules; palp with rudimentary, 1-segmented endopod with 2 setae, exopod segment 1 seta not reduced, outer seta on exopod segment 5 relatively long. Maxilla 1 inner lobe 1 with 5 spines 3 of which are weakly serrate medially, and a process; inner lobe 2 with a long seta; basipod 2 with 1 vestigial seta; endopod bulbous, 1-segmented with 2 setae; exopod with 3 setae; outer lobe 1 with 6 setae. Maxilla 2 lobes 1-4 with 2 setae each, lobe 5 with one stout spine with 3 rows of spinules proximally. Maxilliped endopod setal formula 1, 4, 4, 3, 3, 4; endopod segment 4 with a non-reduced innermost seta, segment 5 with innermost seta shorter than segment 4, segment 6 with 2 large setae, a small seta and a vestigial seta. Leg 1 with 2 outer spines on exopod segment 3. Leg 4 lacking an inner seta on basipod 1. Leg 5 basipod 1 and the common plate between them fused; basipod 1 and 2 separate; right endopod 1-segmented, bulbous, exopod indistinctly 3-segmented, distal 2 segments almost fused, expanded medially, with a rounded process medially and 2 setules and 1 prominence terminally; left endopod indistinctly 2-segmented, unarmed. Exopod 2-segmented, distal segment curved outwards near its tip, with 3 setae terminally and 1 seta medially. Female unknown.

(Ohtsuka *et al.* 1994)

TYPE SPECIES: *Campaneria latipes* Ohtsuka, Boxshall & Roe 1994

REMARKS: This genus and species is based on the male described as *Scutogerulus pelophilus* Bradford, 1969. It was separated by (Ohtsuka, Boxshall *et al.* 1994) from *Scutogerulus* because the male does not have shield-shaped appendages on terminal setae of maxilla 2 and

maxilliped, there is an inner seta on endopod segment 1 of antenna 2, maxilla 1 inner lobe 1 has 6 elements (as opposed to 5 in female), maxilla 1 endopod has 2 setae in male (1 in female), lobes 1 and 2, and endopod segment 6 of maxilla 2 have different setation, exopod segment 3 of leg 1 has 2 outer spines (only 1 in female).

*Campaneria latipes* Ohtsuka, Boxshall & Roe, 1994  
(Figs 11, 170, 189)

DESCRIPTION: Size: female unknown, male 3.9 mm.

Female: Unknown.

Male: As in the generic description.

(Fosshagen 1967; Bradford 1969; Ohtsuka *et al.* 1994)

REMARKS: Ohtsuka *et al.* (1994) have redescribed the male, adding details overlooked in the original description (Bradford 1969).

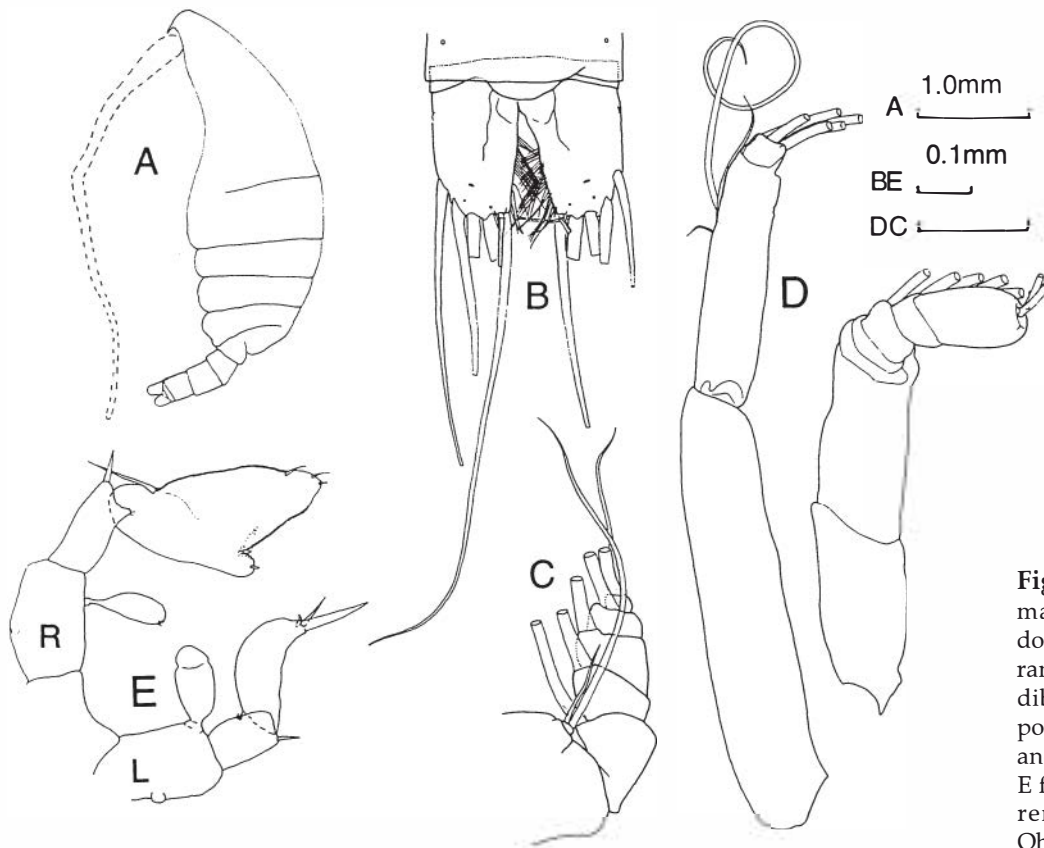
PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1969).

NEW RECORDS: Nil.

DISTRIBUTION: A benthopelagic species from about 1200 m off the Bay of Plenty, New Zealand (Bradford 1969 = male of *Scutogerulus pelophilus* Bradford, 1969).

*Crassarietellus* Ohtsuka, Boxshall & Roe, 1994

DEFINITION: As in the family definition with the following additional characteristics. Body compact, prosome ovoid in dorsal view, posterior corners of prosome produced posteriorly to form a rounded lobe. Urosome short, at most one-third as long as prosome; genital segment wider than long, with a pair of gonopores ventrolaterally and paired copulatory pores each located beneath a ventral projection; anal operculum not developed; caudal rami symmetrical, longer than wide, with vestigial outer seta and a normally developed posterodorsal seta. Female antenna 1 extends to the posterior border of pedigerous segment 2, 22-segmented; male left antenna 1 19-segmented. Antenna 2 endopod segment 1 with a medial, inner seta; segment 2 with 3 midlength and 5 terminal setae; exopod indistinctly 10-segmented. Mandibular blade with a tuft of setules at midlength and 3 teeth on cutting edge; palp with a rudimentary endopod, 1-segmented, with 2 setae; seta on exopod segment 1 not reduced, outer seta on segment 5 relatively long. Maxilla 1 inner lobe 1 with 5 stout, serrate spines and 1 process; inner lobe 2 with a long seta; basipod 2 with a vestigial seta; endopod rudimentary, 1-segmented with 2 setae; exopod with 3 setae; outer lobe 1 with 6 setae. Maxilla



**Fig. 11.** *Campaneria latipes* male from Stn F881: **A**, dorsolateral view; **B**, caudal rami, dorsal view; **C**, mandibular endopod and exopod; **D**, antenna 2 endopod and exopod; **E**, leg 5. **A** and **E** from Bradford (1969), the remaining figures from Ohtsuka *et al.* (1994).

2 lobe 1 with 2 setae and a vestigial element; lobes 2–4 with 2 setae each; lobe 5 with a stout spine with a row of spinules medially. Maxilliped endopod segments 2–6 with 4, 4, 3, 3, and 4 setae, respectively. Leg 1 with 2 outer lateral spines on exopod segment 3. Female leg 5 with a distinctly 1-segmented, rudimentary endopod with 2 setae and an indistinctly 3-segmented exopod with 3 outer lateral and 2 terminal spines. Male leg 5 with basipod 1 and common plate between them incompletely fused; basipods 1 and 2 separate; right leg with endopod lacking, exopod at least 2-segmented, segment 1 with an outer spine on distal corner; left leg endopod incompletely 2-segmented, segment 1 expanded, segment 2 small, semispherical, exopod distinctly 3-segmented, segment 1 with a spine on the outer corner, segment 3 expanded with an outer spine at mid-length, segment 3 small, with 2 small outer setules and a long seta. (Ohtsuka *et al.* 1994)

**TYPE SPECIES:** *Crassarietellus huysi* Ohtsuka, Boxshall & Roe, 1994

**REMARKS:** This genus also contains the male erroneously assigned to *Scottula abyssalis* Sars, 1905b by Sars (1925). No members of the genus have been taken in the Southwest Pacific.

#### *Metacalanus* Cleve, 1901

**DEFINITION:** Body small, compact, about 1 mm in length; prosome oval in dorsal view, not produced frontally, head and pedigerous segment 1 separate or weakly fused, posterior corners of last prosome segment produced to form a ventrolateral lobe, without dorso-lateral processes. Urosome short, less than one-third the length of prosome; genital segment wider than long, with a ventrolateral pair of gonopores or only the right gonopore (left reduced) located posteriorly; paired copulatory pores small, located near the inner corner of genital aperture (in the case of the reduction of the left gonopore, only the right copulatory pore is present); anal operculum either developed, triangular or not; caudal rami symmetrical, longer than wide, with the dorsal lateral seta reduced or completely lacking; the outer distal seta relatively small. Female antenna 1 asymmetrical, left longer than right, different in fusion pattern and armature; male left antenna 1 16-segmented. Antenna 2 endopod segment 1 with 1 inner seta, segment 2 with 2 setae medially and 5 setae terminally; exopod indistinctly 7-segmented. Mandibular blade lacking a tuft of setules, 4 teeth on cutting edge, dorsalmost of which is trifid at its tip; palp with endopod almost fused with basipod 2 represented by

a small knob with 1 or 2 setae terminally; exopod segment 1 not reduced, segment 5 with outer setae relatively long. Maxilla 1 inner lobe 1 with 0–2 spines; endopod absent or 1-segmented, bulbous, with a seta; outer lobe 1 with 5 setae. Maxilla 2 lobe 1 with 1 seta and 1 rudimentary element; lobe 5 spine with 2 rows of minute spinules proximally; endopod setae with a row of spinules along inner margin. Maxilliped setal formula on endopod segments 1–6: 1, 4, 4, 3, 3, 4; the innermost seta on endopod segments 4 and 5 not reduced; only the distalmost setae on these segments long. Leg 1 exopod segment 3 with 1 outer spine. Female leg 5 basipod 1 separated from the common connecting plate; endopod represented by 1 seta or completely absent; exopod and basipod 2 fused or separate; exopod either 1-segmented with 1–3 spines or represented by a small knob bearing 1 seta. Male leg 5 basipod 1 and common plate fused; basipods 1 and 2 separate; endopod absent; exopod 3-segmented, segment 3 with 1 large seta almost fused with the segment. (Ohtsuka *et al.* 1994)

TYPE SPECIES: *Metacalanus aurivilli* Cleve, 1901

REMARKS: *Metacalanus* was recognised as a senior synonym of *Scottula* Sars, 1902 by Campaner (1984). This genus now contains *Metacalanus acutioperculum* Ohtsuka, 1984; *M. aurivilli* Cleve, 1901 (= *Scottula ambariakae* Binet & Dessier, 1968; *M. curvirostris* Ohtsuka, 1985; *M. inaequicornis* (Sars, 1902); and *Metacalanus* species 1 and 2 Ohtsuka *et al.* 1994. The following species has been recorded from the Southwest Pacific.

*Metacalanus aurivilli* Cleve, 1901 (Figs 12, 170 189)

DESCRIPTION: Size: female 0.64 mm, male 0.56 mm.

Female: As in the generic definition with the following additional characters. Head ends in a cylindrically truncate rostrum carrying 2 strong filaments. Antenna 1 extends to pedigerous segment 3, 17–18-segmented. Leg 5 symmetrical, 2-segmented; the basal segment is as long as broad; exopod 1-segmented, 3 times longer than basal segment, with 1 inner distal plumose seta, 1 terminal spine, and 1 outer distal spine. (Cleve 1901; Thompson & Scott 1903)

Male: As in the generic definition with the following additional characters. Left antenna 1 15-segmented, its proximal part thick, 17-segmented on the right. P5 symmetrical, basipod 2 longer than broad, naked; endopod not developed; exopod of 2 almost equal segments: segment 1 with a long outer distal spine, segment 2 with an outer distal spine and a terminal spine with a broad basal part. (Cleve 1901; Thompson & Scott 1903)

REMARKS: The specimens figured by Greenwood (1978) seem to differ slightly from those recorded by Thompson and Scott (1903) in that the outer distal spine on both sides of female leg 5 is not straight, and basipod segment 2 on one side of male leg 5 appears to have an inner distal spine/seta.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1978).

NEW RECORDS: Nil.

DISTRIBUTION: Small epipelagic form known from the Indo-west Pacific (Greenwood 1978b).

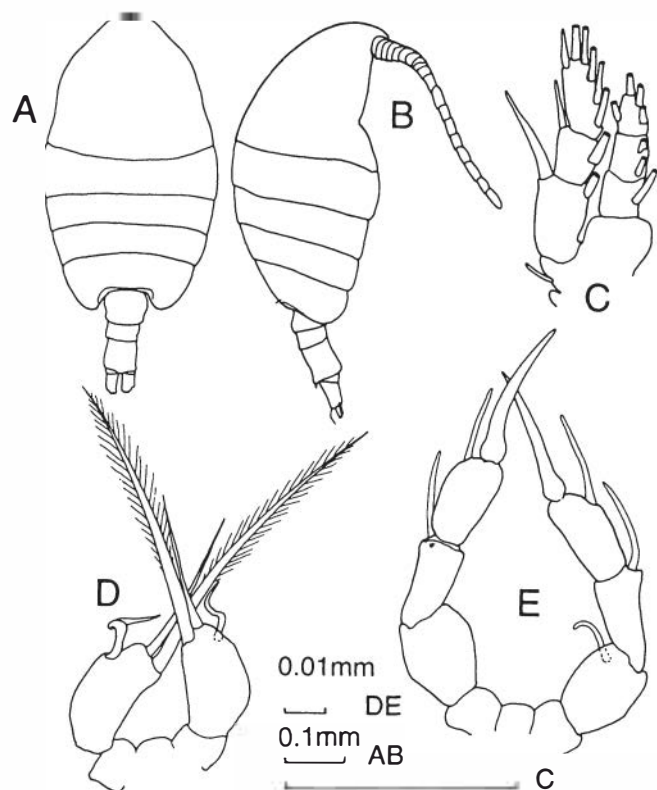


Fig. 12. *Metacalanus aurivilli* from Greenwood (1978). Female: A, dorsal view; B, lateral view; C, leg 1; D, leg 5. Male: E, leg 5.

### *Paramisophria* T. Scott, 1897

DEFINITION: As in the family definition with the following additional characters. Head and pedigerous segment 1 separate, pedigerous segments 4 and 5 fused, with or without dorsolateral processes. Urosome 4-segmented in female, 5-segmented in male; female genital segment with a pair of anterolateral gonopores and a single ventromedial or ventrolateral copulatory pore; anal operculum not well developed, nor pointed posteriorly; outer proximal caudal setae vestigial,

remaining setae well developed. Antenna 1 of female 20–22-segmented, extending at most to distal border of cephalosome; left antenna longer than right; left male antenna 1 geniculate, 19–21-segmented. Antenna 2 exopod indistinctly 8–9-segmented, endopod 2-segmented, segment 1 with an inner medial seta, segment 2 with 3 inner setae at midlength and 5 setae and 1 minute seta terminally. Mandibular blade lacking or having a small tuft of setules medially; with 3 teeth, the dorsalmost of which is bifid at the tip; endopod fused with basipod 2 or consisting of 1 rudimentary segment; exopod segment 1 with a well-developed seta, outer seta on segment 5 relatively long. Maxilla 1 inner lobe 1 with 4–5 spines plus a process; inner lobe 2 with or without a seta; endopod 1-segmented, bulbous, bearing 2–3 setae; outer lobe 1 with 8 setae. Maxilla 2 lobe 1 with 1–2 setae and a vestigial element; lobe 2 with 2 setae; lobe 5 bearing 1 stout spine without spinules along the outer margin. Maxilliped endopod setal formula 1, 4, 4, 3, 3, 4; innermost seta on endopod segments 4 and 5 not rudimentary. Endopod segment 3 of legs 2 and 3 with 7 or 8 setae; of leg 4 with 6 or 7 setae. Leg 5 of the female with basipod 1 and the common plate fused or separate; endopod completely or incompletely fused with basipod 2, with 0–2 terminal setae; basipod 2 and exopod fused or separate, exopod segment 1 fused with or completely or incompletely separated from segment 2, segment 2 and segment 3 completely or incompletely fused, exopod with 2 terminal and 2–3 lateral spines. Leg 5 of the male with the right exopod 3-segmented, the distal 2 segments completely or incompletely separate, segment 2 expanded; left basipod 2 with or without a 1-segmented, rudimentary endopod; left exopod 3-segmented, segment 3 with 1 long spinulose process terminally.

(Ohtsuka *et al.* 1993; Ohtsuka *et al.* 1994)

TYPE SPECIES: *Paramisophris cluthae* T. Scott, 1897

REMARKS: This genus now contains the following species: *Paramisophris ammophila* Fosshagen, 1968; *P. cluthae* T. Scott, 1897; *P. fosshageni* Othman & Greenwood, 1992; *P. galapagensis* Ohtsuka, Fosshagen & Illiffe, 1993; *P. giselae* (Campaner, 1977); *P. itoi* Ohtsuka, 1985; *P. japonica* Ohtsuka, Fosshagen & Go, 1991; *P. platysoma* Ohtsuka & Mitsuzumi, 1990; *P. reducta* Ohtsuka, Fosshagen & Illiffe, 1993; *P. spooneri* Krishnaswamy, 1959; and *P. variabilis* McKinnon & Kimmerer, 1985; none of which has been taken in the Southwest Pacific.

*Paraugaptiloides* Ohtsuka, Boxshall & Roe, 1994

DEFINITION: As in the family definition with the following additional characters. Body shape similar to that of

*Paraugaptilus*, head and pedigerous segment 1 separate; prosome produced posteriorly with a small dorso-lateral prominence and bluntly produced lateral lobe on each side; lateral flap of cephalosome developed to cover bases of mouthparts. Caudal rami symmetrical with setae normally developed. Male left antenna 1 19-segmented, fringed with setules along the anterior margin of segment 1 only. Antenna 2 endopod segment 1 without an inner seta, segment 2 with an inner seta at midlength and 5+1 setae terminally; exopod indistinctly 8-segmented, setal formula 0, 1, 1, 1, 1, 0, 3. Mandibular palp with the endopod rudimentary, 1-segmented, with 2 setae; exopod segment 1 seta not reduced, exopod segment 5 with a relatively long outer seta. Maxilla 1 inner lobe 1 with 5 spines and 1 process; inner lobe 2 with 1 long seta; basipod 1 without setae; endopod 1-segmented with 2 setae; outer lobe 1 with 8 setae. Maxilla 2 lobe 1 with 2 setae; lobe 5 with 1 spine with 2 rows of spinules. Maxilliped endopod setal formula 1, 4, 4, 3, 3, 4; the innermost seta on segments 4 and 5 not vestigial, seta on segment 6 reduced. Leg 1 with 2 outer spines on exopod segment 3. Leg 4 with a vestigial element on inner distal corner of basipod 1. Leg 5 basipod 1 fused with common plate; basipods 1 and 2 separate on left leg and incompletely fused on right. Right endopod 1-segmented, rudimentary, unarmed; exopod segment 2 expanded inwards, almost completely separated from segment 3 which is triangular, tapering distally, with 1 minute outer and 1 terminal setule. Left endopod 2-segmented, unarmed; exopod 3-segmented, distal 2 segments completely separate, segment 2 expanded inwards, segment 3 with 2 stout processes directed laterally. Female unknown.

(Ohtsuka *et al.* 1994)

TYPE SPECIES: *Paraugaptilus magnus* Bradford, 1974

REMARKS: The type species is the only one in the genus.

*Paraugaptiloides magnus* (Bradford, 1974)

(Figs 13, 170, 189)

DESCRIPTION: Size: female unknown, male 4.85 mm.

Female: Unknown.

Male: As in the generic description.

(Bradford 1974; Ohtsuka *et al.* 1994)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1974).

NEW RECORDS: Nil.

DISTRIBUTION: This benthopelagic species has also been

taken from near bottom depths in the southwestern Indian Ocean (Heinrich 1993), so is likely to be widely distributed in deep waters of the Indo-Pacific region near 1000–1700 m depth (Ohtsuka *et al.* 1994).

*Paraugaptilus* Wolfenden, 1904

DEFINITION: As in the family definition with the following additional characters.

Female: Body relatively large, measuring about 3 mm in length. Head and pedigerous segment 1 separated or weakly fused; last pedigerous segment with a

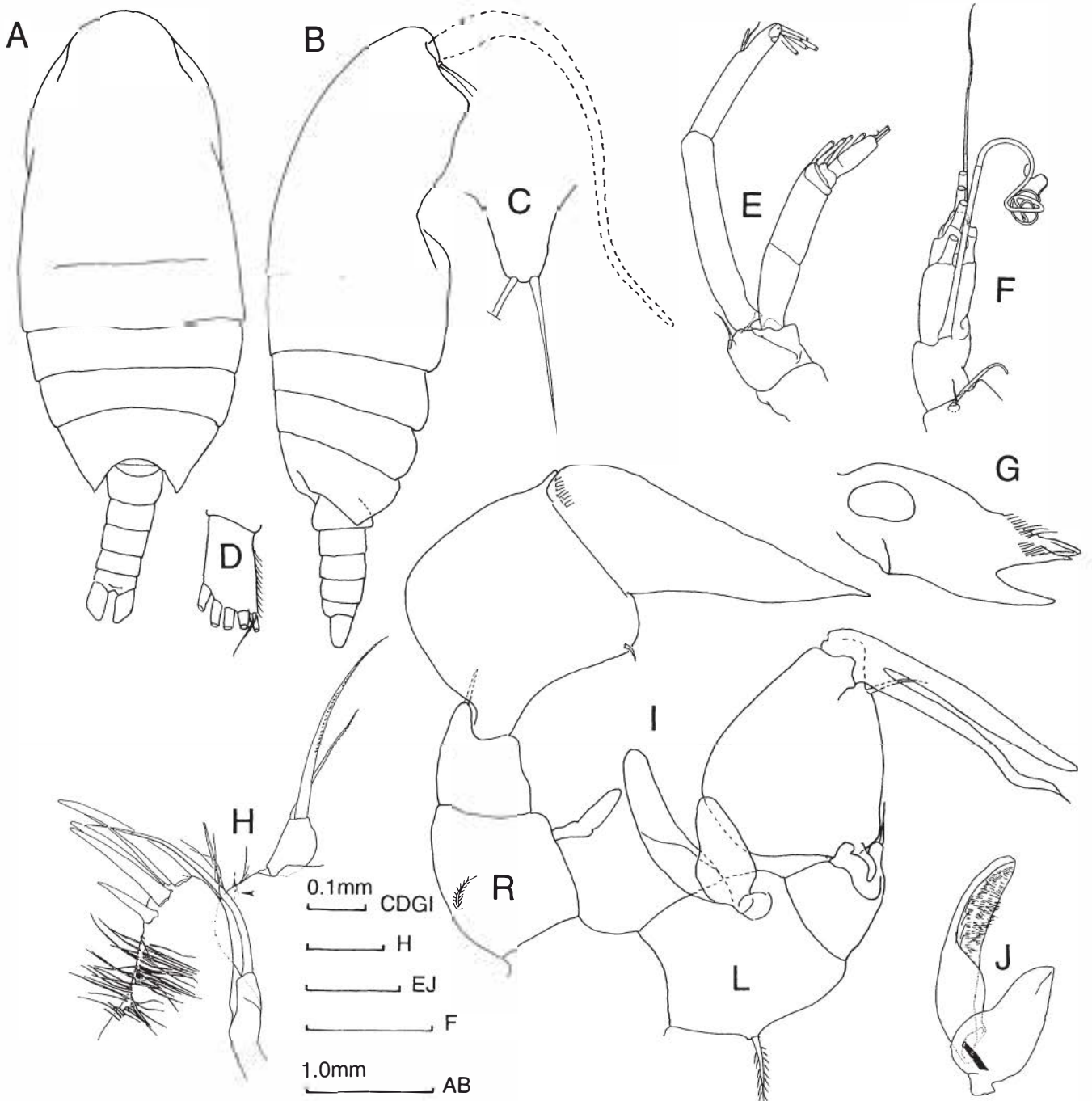


Fig. 13. *Paraugaptiloides magnus* male from Stn F911. A, dorsal view; B, lateral view; C, rostrum; D, caudal ramus; E, antenna 2; F, mandibular exopod and endopod; G, mandible blade; H, maxilla 1 inner lobes 1 and 2, basipod and endopod; I, leg 5; J, leg 5 left endopod. E, F, H, J from Ohtsuka *et al.* (1994), remaining figures from Bradford (1974).



short prominence or curved process dorsally and weakly developed lateral lobes. Genital segment with a pair of anteroventral gonopores; copulatory pores asymmetrically located posteroventrally, each copulatory duct heavily chitinised; seminal receptacle relatively small. Caudal rami symmetrical, longer than wide, with setae normally developed. Female antenna 1 symmetrical or slightly asymmetrical in ornamentation of terminal segments; male left antenna 1 19-segmented. Antenna 2 endopod segment 1 without an inner seta, segment 2 relatively shorter in male than in female with 1–2 setae medially in male, in female bearing 1 medial seta and 5 + 1 vestigial setae terminally; exopod indistinctly 6-segmented, segment 6 rudimentary, unarmed in female, indistinctly 6–7-segmented in male. Mandibular blade with a tuft of setules; 3 teeth on cutting edge, dorsalmost of which is bifid at tip; palp endopod absent; exopod segment 1 with a vestigial seta in female (but with a well-developed seta in the male), segment 5 with a vestigial outer seta. Maxilla 1 inner lobe 1 with 5 spines; inner lobe 2 without setae; endopod absent; outer lobe 1 with 8 setae. Maxilla 2 lobe 1 with 1 seta and 1 rudimentary element, lobe 2 with 1 seta, lobe 5 spine bipinnate; endopodal setae with triangular spinules along inner margin. Maxilliped setal formula of the endopod: 1, 4, 4, 3, 3, 4. Leg 1 exopod segment 3 with 2 outer spines. Leg 4 with a minute inner seta on basipod 1; inner seta on basipod 2. Female leg 5 rudimentary, represented by a plate with a proximal seta and terminal or subterminal seta. Male leg 5 with both basipod 1 fused with common plate; basipods 1 and 2 separated on left leg and incompletely fused on right. Male right endopod 1-segmented, rudimentary, unarmed; exopod segment 2 expanded inwards, almost completely fused with segment 3 to form a compound segment, tapering distally, carrying a proximal seta and subterminal setule along the outer margin. Male left endopod 1-segmented, unarmed; exopod 3-segmented, last 2 segments almost fused, segment 2 swollen medially, segment 3 with 2 stout, long, outwardly-directed processes terminally.

(Ohtsuka *et al.* 1994)

TYPE SPECIES: *Paraugaptilus buchani* Wolfenden, 1904

REMARKS: The following species are now in this genus: *Paraugaptilus archimedi* Gaudy, 1973; *P. bermudensis* Deevey, 1973; *P. buchani* Wolfenden, 1904; *P. meridionalis* Wolfenden, 1911; *P. mozambicus* Gaudy, 1965; and *P. similis* A. Scott, 1909. The following species has been taken in the Southwest Pacific.

*Paraugaptilus ?buchani* Wolfenden, 1904  
(Figs 14, 170, 189)

DESCRIPTION: Size: female unknown, male 2.86 mm.

Female: Unknown.

Male: Body relatively wider than that redescribed by Deevey (1973). Leg 5 left exopod terminal spines taper (one is bifurcate in *P. buchani* described by Deevey (1973)).

REMARKS: This specimen may prove to be an undescribed species.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1974).

NEW RECORDS: Nil.

DISTRIBUTION: Known from mesopelagic depths (Verwoort 1965; Deevey 1973; Bradford 1974).

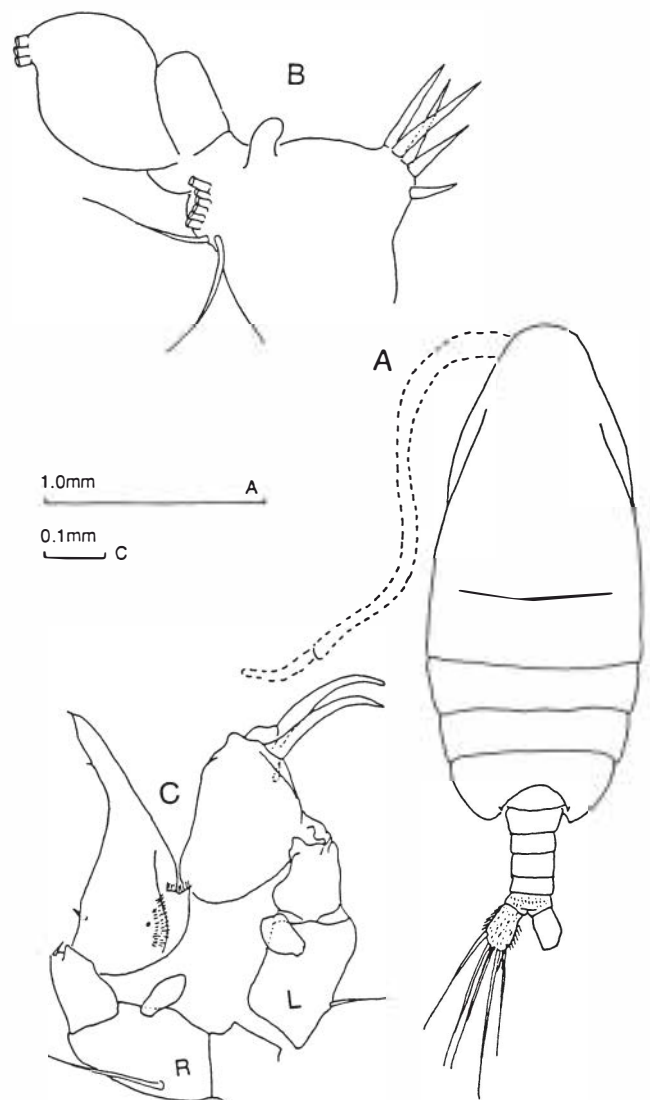


Fig. 14. *Paraugaptilus ?buchani* male from Stn F946, 200–500 m: A, dorsal view; B, maxilla 1; C, leg 5.

*Pilarella* Alvarez, 1985

DEFINITION: As in the family definition with the following additional characters. Body relatively small – 1.5–1.7 mm. Prosome oblong in dorsal view; head and pedigerous segment 1 separate, ventrolateral corners of prosome pointed. Urosome half the length of prosome; genital segment slightly wider than long; entire reproductive system paired, symmetrical; large circular gonopore and small copulatory pore located at outer and inner ends respectively of a slit-like aperture; copulatory duct short, simple; seminal receptacle relatively small, located medial to gonopore; caudal rami slightly asymmetrical, with right ramus narrower and just shorter than left. Antenna 1 longer on left than on right and extending to the end of caudal rami; 21-segmented on both sides; posterior proximal margin lacking long setules. Antenna 2 endopod segment 1 with 1 mid-margin inner seta, segment 2 with 3 setae at midlength and 5 setae terminally; exopod indistinctly 7-segmented. Mandibular blade lacking a tuft of setules, with 4 teeth on cutting edge, dorsalmost of which is tricuspid; endopod rudimentary, 1-segmented with 2 setae; seta on exopod segment 1 not reduced; outer seta on segment 5 relatively long. Maxilla 1 inner lobe 1 with 5 setae and a process, inner lobe 2 with 1 long seta; basipod 2 without setae; endopod with 2 setae; outer lobe 1 with 5 setae. Maxilla 2 lobe 1 with 2 setae and a vestigial element, lobe 2 with 2 setae, lobe 5 spine with 2 rows of spinules. Maxilliped setal formula of endopod: 1, 4, 4, 4, 3, 3, 4. Leg 1 with 1 outer spine on exopod segment 3. Leg 4 with an inner seta on basipod 1. Female leg 5 basipod 1 separated from the common plate between legs, endopod represented by 1 seta, exopod and basipod 2 separate; exopod 1-segmented bearing 1 short spine on outer margin and 1 short and 1 long spine terminally. Male unknown. (Ohtsuka *et al.* 1994)

TYPE SPECIES: *Pilarella longicornis* Alvarez, 1985

REMARKS: This genus is known only from the type species which has not been taken in the Southwest Pacific.

*Scutogerulus* Bradford, 1969

DEFINITION: Body relatively large, more than 3 mm long. Head and pedigerous segment 1 separate. Urosome about one-third the length of prosome; genital segment as long as wide; gonopore and copulatory pore sharing a common slit-like aperture, gonopore located anteriorly, copulatory pore at innermost corner of slit; copulatory duct swollen anteriorly; seminal receptacle

relatively small and simple in shape; caudal rami slightly asymmetrical, left ramus longer than right, longer than wide. Antenna 1 symmetrical, extending almost to the end of prosome; posterior margins of proximal segments bear long setules from segment I–XIII. Antenna 2 endopod segment 1 without an inner seta; exopod indistinctly 8-segmented. Mandibular palp with a rudimentary endopod, 1-segmented with 2 setae; seta on exopod segment 1 not reduced; segment 5 with a relatively long seta. Maxilla 1 inner lobe 1 with 4 spines and a process; inner lobe 2 with 1 long seta; basipod 2 with a short seta; endopod with 1 seta; outer lobe 1 with 6 setae. Maxilla 2 lobe 1 with 1 relatively well-developed seta and 1 vestigial element; lobe 2 with 1 seta; lobe 5 spine with 3 rows of minute spinules; setae on endopod with a row of triangular spines. Maxilliped with the setal formula on the endopod: 1, 4, 4, 3, 3, 4. Leg 1 exopod segment 1 with an outer medial tuft of short setules and a subterminal outer spine. Female leg 5 biramous, with a 1-segmented rudimentary endopod with 1 terminal seta and a 2-segmented exopod with 1 outer spine on segment 1 and 2 terminal setae on segment 2. Male unknown. (Ohtsuka *et al.* 1994)

TYPE SPECIES: *Scutogerulus pelophilus* Bradford, 1969

REMARKS: Ohtsuka *et al.* (1994) recognised that the male originally assigned tentatively to this species should be given separate generic status (as *Campaneria*).

*Scutogerulus pelophilus* Bradford, 1969  
(Figs 15, 170, 189)

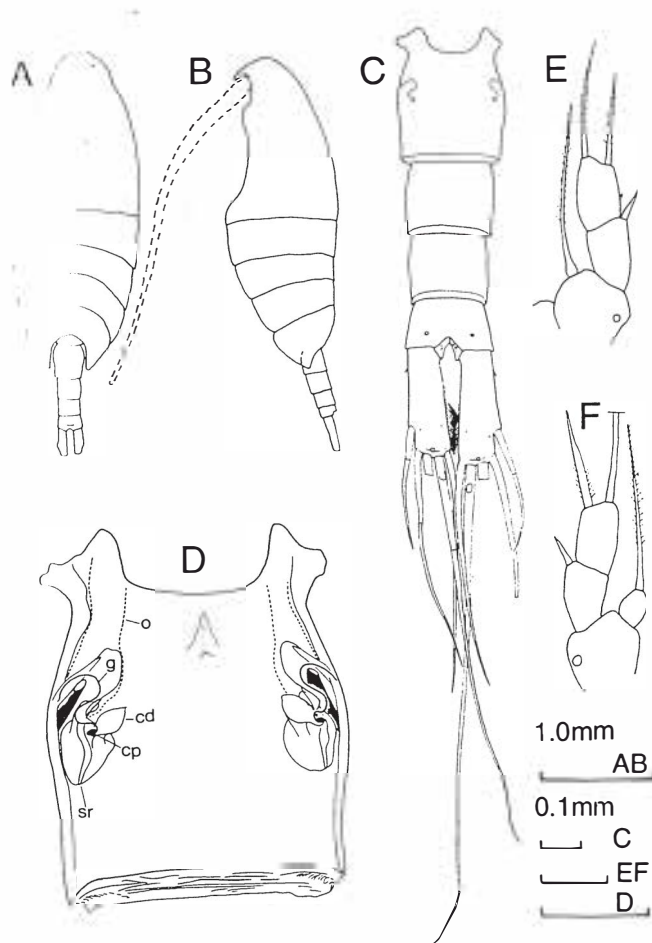
DESCRIPTION: Size: female 3.6 mm, male unknown.  
Female: As in the generic description.  
(Bradford 1969; Ohtsuka *et al.* 1994)  
Male: Unknown.

REMARKS: Ohtsuka *et al.* (1994) suggest that this species is less associated with the bottom than other members of the family, because of its morphology.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1969).

NEW RECORDS: Nil.

DISTRIBUTION: Possibly a benthopelagic species, known only from the northeastern slope of New Zealand at about 1400 m (Bradford 1969).



**Fig. 15.** *Scutogerulus pelophilus* female from Stn F910. **A**, dorsal view; **B**, lateral view; **C**, urosome, ventral view; **D**, genital segment, ventral view; **E**, **F**, leg 5. **C** and **D** from Ohtsuka *et al.* (1994), the remaining figures from Bradford (1969). cd = copulatory duct; cp = copulatory pore; g = gonopore; o = oviduct; sr = seminal receptacle.

#### Family AUGAPTILIDAE Sars, 1905b

**DEFINITION:** Female: Total length 2.1–9.6 mm. Body usually slender, prosome oval, urosome a relatively small proportion of total length, head and pedigerous segment 1 separated, pedigerous segments 4 and 5 fused, posterolateral corners and anterior head usually rounded but sometimes pointed. Rostral filaments slender or absent, rostrum sometimes represented by a small knob. Urosome usually short, 3–4-segmented; genital segment with a ventral swelling, caudal rami symmetrical with 6 setae. Antenna 1 symmetrical, 24–25-segmented. Antenna 2 basipod 1 with 1 outer seta; basipod 2 usually elongate with 1–2 outer edge setae; exopod and endopod separated from basipod 2; endopod 2-segmented, usually but not always much longer than exopod, endopod segment 1 with 1–2 setae placed towards the distal end, endopod segment 2 with

4–7 inner setae medially and 6–7 setae terminally; exopod 5–8-segmented, with varying numbers of setae: from 4 terminal setae, to every segment with at least 1 seta. Mandibular blade more usually symmetrically developed on each side with 2–7 (or more) short or long teeth set either obliquely or more or less at right angles to axis of blade, in *Pachyptilus* and *Heteroptilus* blades asymmetrically developed; endopod usually 2-segmented, sometimes 0- or 1-segmented, with a varying number of setae; exopod usually 4–5-segmented with varying numbers of setae. Maxilla 1 variable, from a full complement of lobes, with reduced setation distally in *Haloptilus*, *Pontoptilus*, *Pachyptilus*, and *Heteroptilus*, to extreme but variable reduction in at least outer and terminal lobes. Maxilla 2 lobes 1–4 small and usually furnished with long setae, carrying characteristic shield-shaped appendages or, in case of *Augaptilina*, lobe 5 and the endopod carries dense elongate bunches of setae resembling a brush. Maxilliped basipod 1 with 3–10 setae; basipod 2 slender or squat with 2 setae medially; endopod 6-segmented, sometimes elongate, endopod 1 almost fully incorporated into basipod 2 with 1–2 setae, endopod segments 2–5 with 3–4, 3–4, 2–4, 1–4 setae respectively, endopod segment 6 with 2–4 setae, the outermost 1–3 of which are reduced. Swimming legs 1–5 with exopods 3-segmented; endopods usually 3-segmented except for leg 5 in *Pontoptilus* and few *Euaugaptilus* where it is 2-segmented and in *Pachyptilus* and *Heteroptilus* where it is 1-segmented; occasionally leg 1 endopod 2-segmented (some *Euaugaptilus*, *Heteroptilus*, *Pachyptilus*, and *Augaptilina*). Spine and seta formula as follows:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0–1	1–0	I-1; 0/I-1; 0/I/II, I, 4	0-1; 0-1/2; 1/2, 2, 1/2
Leg 2	0–1	0–0	I-1; I-1; III, I, 5	0-1; 0-2; 2, 2, 3
Leg 3	0–1	0–0	0/I-1; I-1; III, I, 5	0-1; 0-2; 1/2, 2, 3/4
Leg 4	0–1	0–0	I-1; I-1; III, I, 5	0-1; 0-2; 2, 2, 3/4
Leg 5	0–0	0/1–0	0/I-0; 0/I-0/1; 0/I/II, I, 33/4	0-0/1; 0-1/2; 1/2, 2, 1/2/3

P5 natatory, symmetrical, similar to other swimming legs but smaller than legs 2–4; inner edge seta on exopod segment 2 often spine-like and articulated with its segment.

Male: Body similar to female, but urosome is 5-segmented. Left antenna 1 geniculate, ?21–22-segmented sometimes geniculate on right. Mouthparts and legs 1–4 similar to female although male mouthparts may be atrophied in *Haloptilus*. Leg 5 with 3-segmented endopod and exopod on both left and right, slightly asymmetrical; right exopod segment 2 often with inner expansion of variable shape but usually in the form of a thick spine.

An example of the family is *Euaugaptilus nodifrons* (Figs 16, 17).

REMARKS: The following genera are now in this family: *Augaptilina* Sars, 1920; *Augaptilus* Giesbrecht, 1889; *Centraugaptilus* Sars, 1920; *Euaugaptilus* Sars, 1920; *Haloptilus* Giesbrecht, 1898; *Heteroptilus* Sars, 1920; *Pachyptilus* Sars, 1920 (= *Pseudhaloptilus* Wolfenden, 1911); *Pontoptilus* Sars, 1905b; *Pseudaugaptilus* Sars, 1907. Members of this family are mainly bathypelagic and have luminous glands associated with cuticular pores (e.g., Bannister & Herring 1989). Augaptilidae are generally considered to be carnivores based on mouthpart morphology (Itoh 1970), gut contents (Arashkevich 1969; Harding 1974), and the fact they assimilate no plant food (Arashkevich & Timonin 1970).

#### *Augaptilina* Sars, 1920

DEFINITION: As for the family definition with the following additional characteristics. Urosome of female 3-segmented. Mandibular palp and maxilla 1 very reduced. Distal setae on maxilla 2 and maxilliped form dense, elongate bunches resembling a brush. Leg 1 endopod 2-segmented. Male unknown.

TYPE SPECIES: *Augaptilina scopifera* Sars, 1920

REMARKS: The only species currently placed in this genus has not been taken in the Southwest Pacific.

#### *Augaptilus* Giesbrecht, 1889

DEFINITION: As for the family definition with the following additional characteristics. Rostral filaments fine. Female urosome 3-segmented, genital segment nearly always a little asymmetrical; urosome 5-segmented in male. Female antenna 1 25-segmented, prehensile on the left in male. Antenna 2 exopod rarely extending beyond endopod and with a reduced number of segments. Mandibular palp uniramous. Maxilla 1 very reduced, consisting of a 3-segmented rod. Maxilla 2 with proximal lobes rudimentary and with distal setae bearing characteristic shield-shaped appendages. Maxilliped often with shield-shaped appendages. External spines on swimming legs more or less atrophied. Female leg 5 as in family definition; male leg 5 with both rami 3-segmented, right exopod segment 2 with an internal spine. (Rose 1933)

TYPE SPECIES: *Hemicalanus longicaudatus* Claus, 1863

REMARKS: The following seven species have been

described in this genus (Matthews 1972): *Augaptilus anceps* Farran, 1908; *A. cornutus* Wolfenden, 1911; *A. glacialis* Sars, 1900 (= *A. zetesios* Wolfenden, 1902); *A. lamellifer* Esterly, 1911; *A. longicaudatus* (Claus, 1863); *A. megalurus* Giesbrecht, 1889; *A. spinifrons* Sars, 1907. The following species have been taken in the Southwest Pacific.

#### *Augaptilus longicaudatus* (Claus, 1863) (Figs 18, 171, 190)

DESCRIPTION: Size: females 3.1–4.1 mm, males 3.2–3.8 mm.

Female: As in the generic definition with the following additional characteristics. Body narrow. Urosome slender; genital segment is a little swollen and about equal to the 2 following segments; caudal rami slightly divergent, covered by small spinules distally. Antenna 1 fine and long. Antenna 2 exopod 5-segmented, a little shorter than endopod. Mandible with a uniramous palp. Maxilla 1 inner lobe 1 rudimentary with 1 seta, inner lobes 2 and 3 absent; exopod with 3 setae; outer lobe with 2 setae. (Giesbrecht 1892; Sars 1925)

Male: Antenna 1 geniculate on the left. Leg 5 asymmetrical, terminated on the left by a long spine. (Giesbrecht 1892)

REMARKS: The present specimens agree with Giesbrecht's (1892) description.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929).

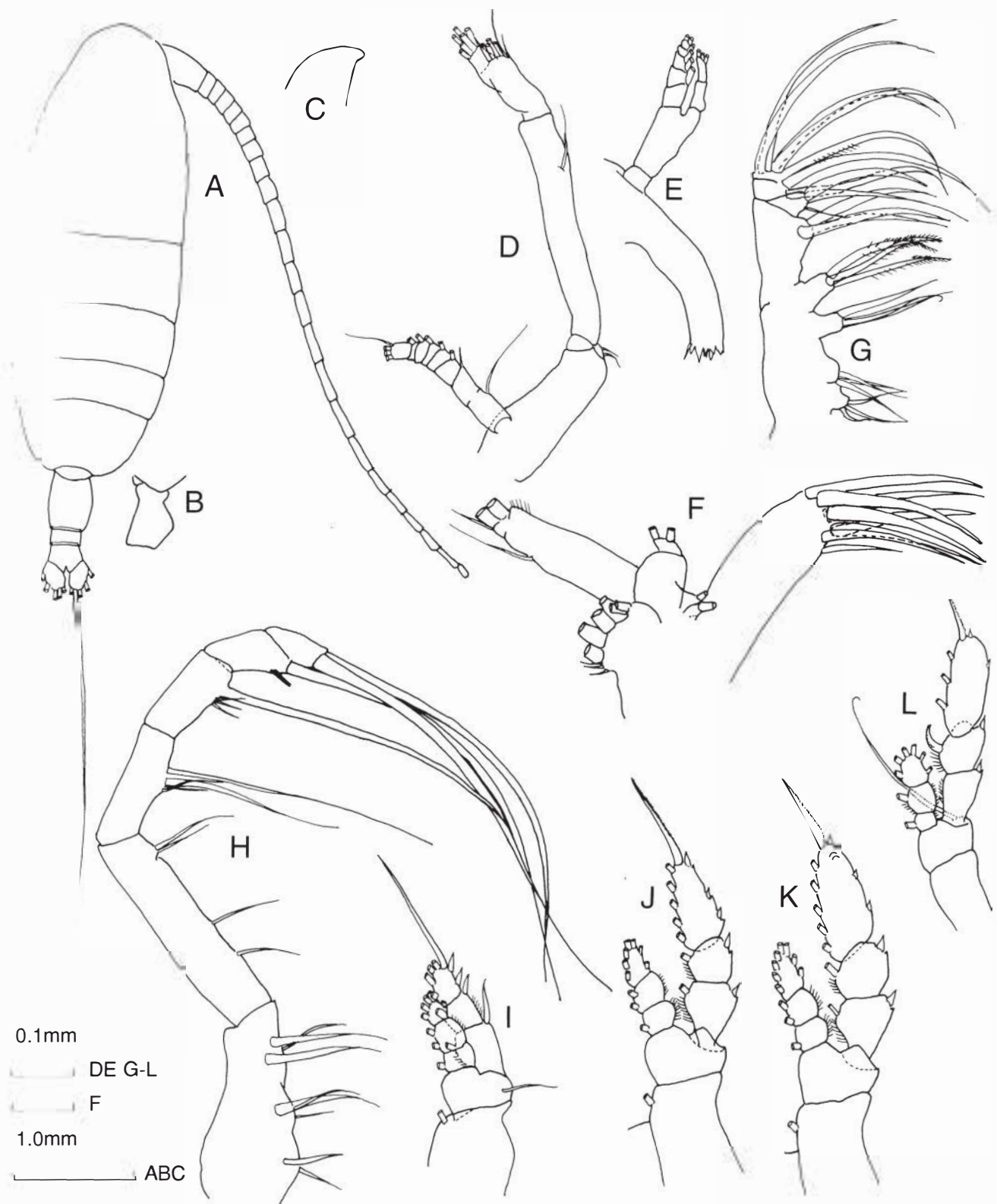
#### NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A295	0–500	1 female
C537	0–250	1 male 3.28 mm
F945	0–200	2 females 3.7, 3.8 mm
F946	200–500	1 female 4.1 mm, 1 male 3.6 mm
	0–1000	1 female 4.1 mm
Mu67/52s	0–1000	1 female 3.1 mm
Mu67/116s	0–1000	1 female 4.1 mm

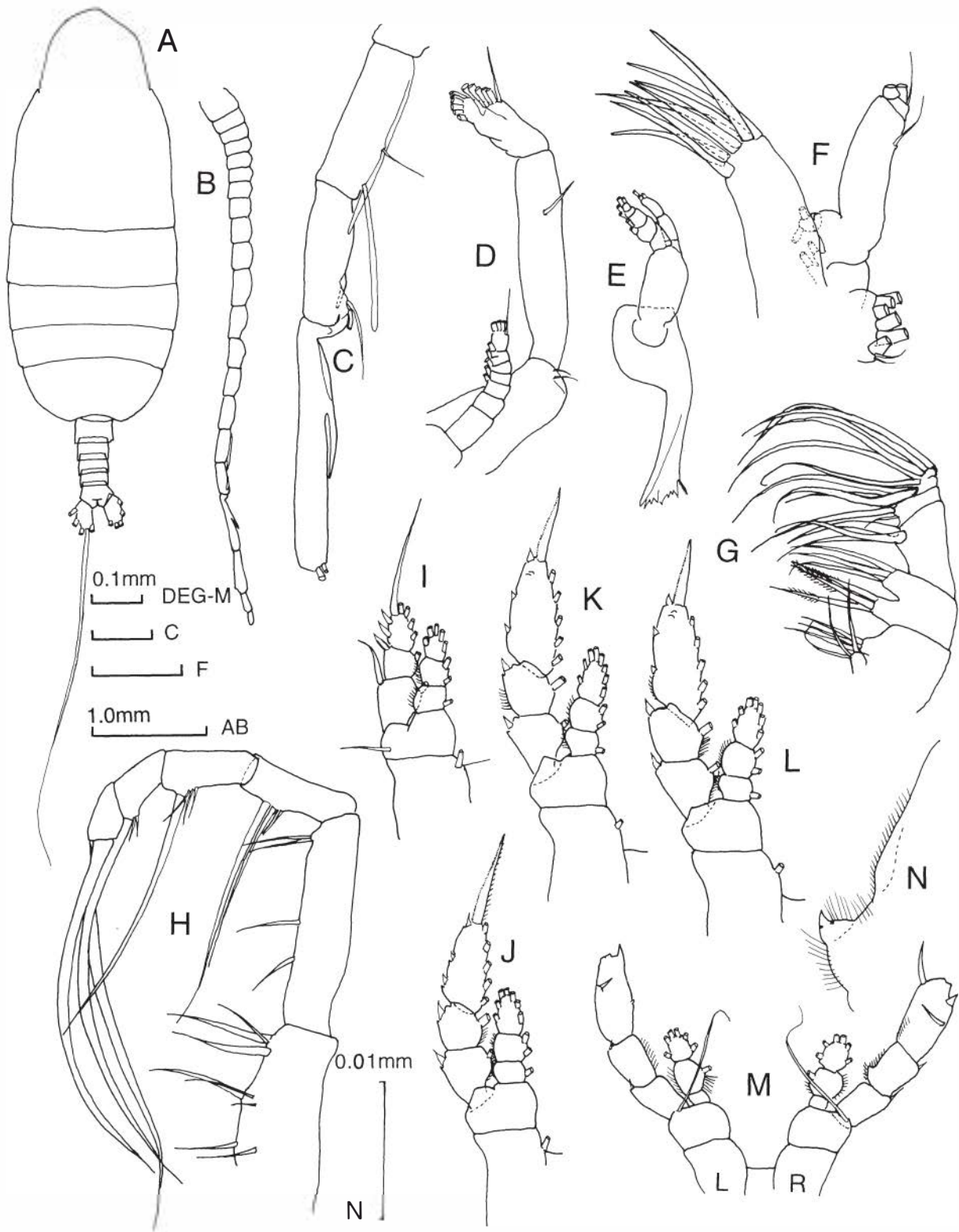
DISTRIBUTION: Mesopelagic species known from warm waters of all oceans (Grice 1962; Vervoort 1965; Park 1970).

#### *Centraugaptilus* Sars, 1920

DEFINITION: As for the family definition with the following additional characteristics. This genus is separated from *Augaptilus* by having a strong bifurcate rostrum projecting forward. Antenna 1 is short, not extending



**Fig. 16.** *Euangaptilus nodifrons* female from Stn Mu67/94s. **A**, dorsal view; **B**, genital segment, lateral view; **C**, anterior head, lateral view; **D**, antenna 2; **E**, mandible; **F**, maxilla 1; **G**, maxilla 2; **H**, maxilliped; **I**, leg 1; **J**, leg 2; **K**, leg 3; **L**, leg 5.



**Fig. 17.** *Euaugaptilus nodifrons* male from Stn Mu67104s. **A**, dorsal view; **B**, left antenna 1; **C**, three segments around the joint on left antenna 1; **D**, antenna 2; **E**, mandible; **F**, maxilla 1; **G**, maxilla 2; **H**, maxilliped; **I**, leg 1; **J**, leg 2; **K**, leg 3; **L**, leg 4; **M**, leg 5; **N**, detail of inner border of right exopod segment 2.

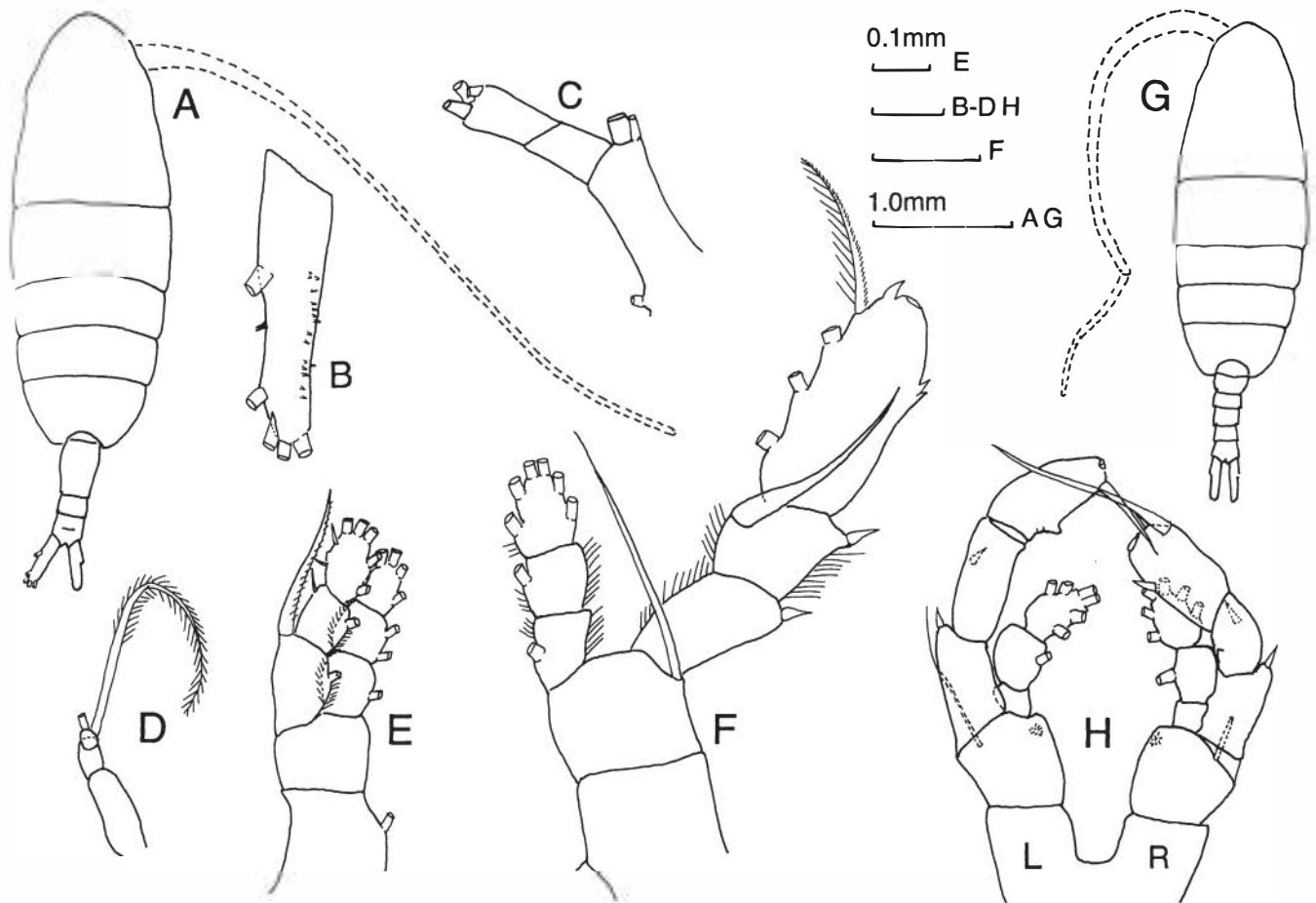


Fig. 18. *Augaptilus longicaudatus*. Female from Stn F946, 0-1000 m: A, dorsal view; B, caudal ramus; C, maxilla 1; D, mandibular palp; E, leg 1. Female from Stn F945, 0-200 m: F, leg 5. Male from Stn F946, 200-500 m: G, dorsal view; H, leg 5.

beyond prosome. Mandible elongate with 2 fine teeth and 1 smaller tooth between them. Maxilla 1 inner lobe 1 with 2 long, hooked spines bearing shield-like appendages and one short seta; inner lobes 2 and 3 absent; endopod with 3 setae; exopod with 3 setae; outer lobe with 5 setae. Maxilla 2 and maxilliped powerful with distal setae strong and rolled up, carrying shield-shaped appendages. Leg 1 exopod segment 2 without an outer distal spine. (Sars, 1925)

TYPE SPECIES: *Augaptilus rattrayi* T. Scott, 1894b

REMARKS: This genus now contains the following species: *Centraugaptilus cucullatus* (Sars, 1905b); *C. horridus* (Farran, 1908) (= *C. pyramidalis* (Esterly, 1911), see Sewell 1947); *C. lucidus* (Esterly, 1911) (female unknown); *C. porcellus* Johnson, 1936; *C. rattrayi* (T. Scott, 1894b) (= *C. macrodus* (Esterly, 1911)). The following species has been taken in the Southwest Pacific.

*Centraugaptilus horridus* (Farran, 1908)

(Figs 19, 171, 190)

Description: Size: females 5.6-10.0 mm, males 7.4-9.0 mm.

Female: As in the generic definition with the following additional characteristics. Body covered in a coating of fine hairs; anterior head hood-like; rostral spines strong and a little divergent, with a swollen base. Urosome very short. (Sars 1925)

Male: As in the generic definition with the following additional characteristics. Head and rostrum as in female. Leg 5 very like that of *C. cucullatus*.

(Sars, 1925)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
Mu67/147s	0-1000	1 male 7.4 mm

DISTRIBUTION: Bathypelagic species known from deep waters of all temperate oceans (Vervoort 1965).

***Euaugaptilus* Sars, 1920**  
(= *Neoaugaptilus* Brodsky, 1950)

DEFINITION: As for the family definition with the following additional characteristics. Rostral filaments may be present or absent. This genus is distinguished from *Augaptilus* by the greater development of mandible and especially the maxilla 1 in having inner lobe 1 well-developed and provided with a number of strong spines terminally. The mandibular palp may be uni- or biramous. Maxilla 1 inner lobes 2 and 3 and basipod 2 with or without setae; endopod present or absent. Maxilliped may be elongated or more squat. Swimming leg 1 exopod and endopods may be 3-segmented or may have some degree of fusion between joints;

basipod 2 seta present or absent; external edge spines on exopod variable. Female swimming leg 5 either with both rami 3-segmented or with some degree of fusion between segments. (Matthews 1972)

TYPE SPECIES: *Augaptilus squamatus* Giesbrecht, 1889

REMARKS: Both Sewell (1932) and Matthews (1972) have investigated the subdivision of this genus. Matthews (1972), using numerical taxonomy, showed that all the species described to that date could be divided into two groups which he named after a typical member (*E. affinis* and *E. squamatus*). He showed that the sequence of species is associated with a tendency towards simplification of the structure and setation of the head appendages, a tendency which seems to have been followed along several different pathways. Thus no single character is sufficient to define the groups. In addition, within-species variability, documented by Matthews (1972), needs to be taken into account when identifying specimens or describing new species. Matthews did not give his groups generic status as several species show affinities with both groups. He

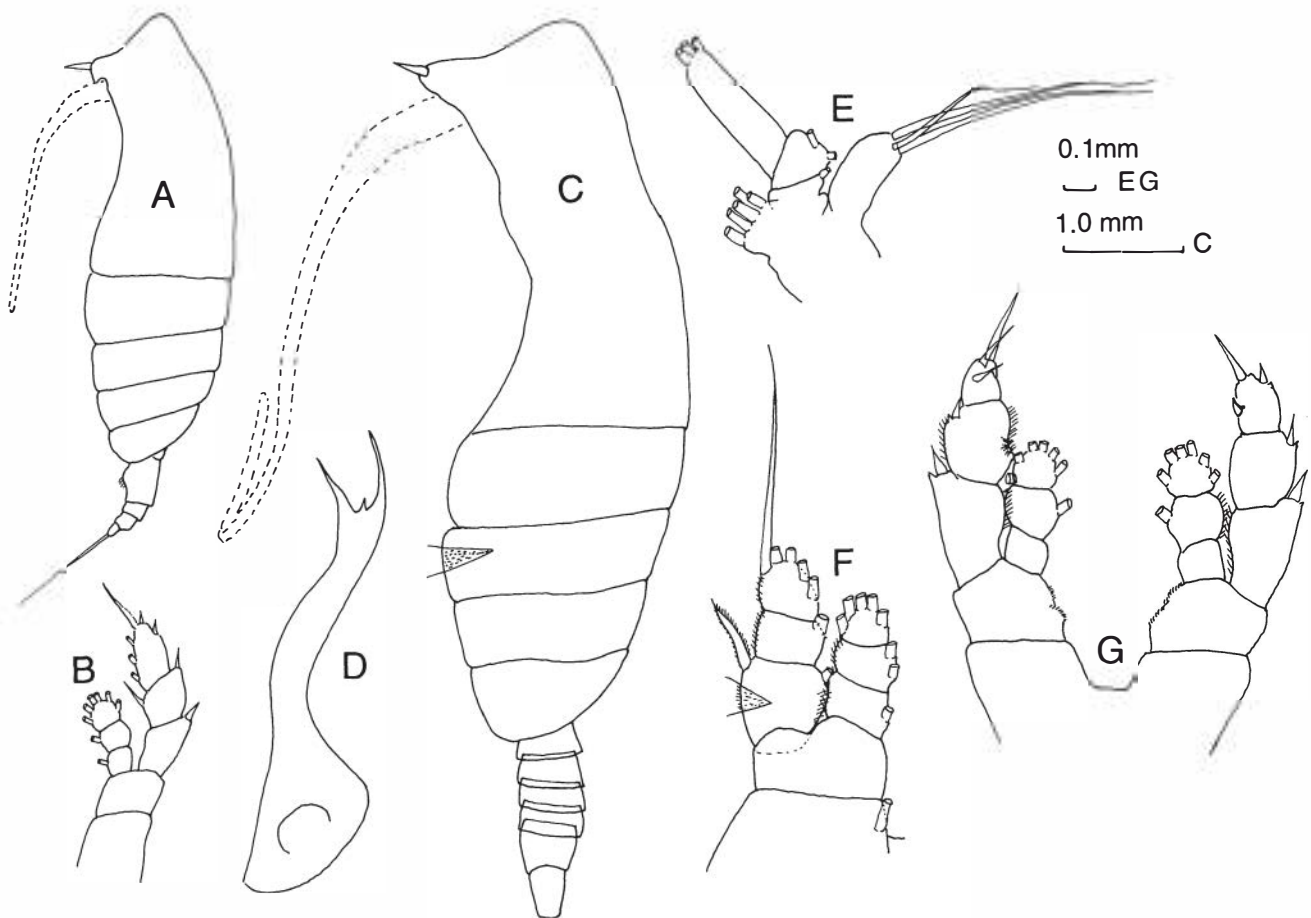


Fig. 19. *Centraugaptilus horridus*. Female from Sars (1924). A, lateral view; B, leg 5. Male from Stn Mu67/147s. C, lateral view; D, mandibular blade; E, maxilla 1; F, leg 1; G, leg 5.



defines the two groups on the basis of the maxilla 1 as follows:

*E. affinis* group: Maxilla 1 reduced to such an extent that there is rarely an endopod and inner lobe 3 usually bears no setae; in no case are the endopod and a setose inner lobe 3 present together. The total number of setae and spines on this mouthpart never exceeds 22 and is usually considerable less. The shield-shaped appendages on certain setae of maxilla 2 and maxilliped are almost always developed.

*E. squamatus* group: Maxilla 1 shows less reduction in setation and an endopod is often present. Three species, *E. angustus*, *E. grandicornis*, and *E. rectus*, lack both an endopod and any setae on inner lobe 3, but in all three species there are at least 26 setae and spines on the whole mouthpart. Generally there is a total of between 24 and 40 setae and spines; only *E. marginatus* and *E. oblongus* have fewer, 21 and 23 respectively. The shield-shaped appendages on certain setae of maxilla 2 and maxilliped are often poorly developed or even absent.

He considers that the genus *Neoaugaptilus* Brodsky, 1950 is a junior synonym of *Euaugaptilus*.

The following species have been described: *Euaugaptilus affinis* Sars, 1920 (male unknown); *E. aliquantus* Park, 1993 (male unknown); *E. angustus* (Sars, 1905b); *E. antarcticus* (Wolfenden, 1911); *E. atlanticus* Roe, 1975; *E. austrinus* Park, 1993; *E. brevirostratus* Park, 1993; *E. brodskyi* Hülsemann, 1967 (= *E. niveus* nom. nud. Tanaka & Omori, 1974); *E. bullifer* (Giesbrecht, 1889) (male see Tanaka 1964b); *E. clavatus* (Sars, 1907) (male unknown); *E. curtus* Grice & Hülsemann, 1967; *E. digitatus* Sars, 1920; *E. diminutus* Park, 1970; *E. distinctus* (Brodsky, 1950); *E. elongatus* (Sars, 1905b); *E. facilis* (Farran, 1908) (male see Matthews 1972); *E. fagettiae* Björnberg, 1975; *E. farrani* Sars, 1920 (male unknown); *E. fecundus* Tanaka & Omori, 1974 (male see *E. sp.* 3 Grice & Hülsemann, 1967); *E. filigerus* (Claus, 1863) (both sexes: see Sars, 1925) (= *A. depressus* Esterly, 1913; *A. romanus* Esterly, 1913); *E. fosaii* Pineda-Polo, 1979; *E. fundatus* Grice & Hülsemann, 1967; *E. gibbus* (Wolfenden, 1904) (male see Sars, 1925) (= *A. gibbus* Sars, 1905b); *E. gracilis* (Sars, 1905b) (male unknown); *E. graciloides* Brodsky, 1950; *E. grandicornis* Sars, 1920 (male unknown); *E. hadrocephalus* Park, 1993 (male unknown); *E. hecticus* (Giesbrecht, 1889); *E. hulsemannae* Matthews, 1972 (male unknown); *E. humilis* Farran, 1926; *E. hyperboreus* Brodsky, 1950 (male see Roe, 1975); *E. indicus* Sewell, 1932; *E. laticeps* (Sars, 1905b) (= *A. placitus* Scott, 1909); *E. latifrons* (Sars, 1907) (male unknown); *E. longicirrhus* (Sars, 1905b) (male see Roe, 1975); *E. longimanus* (Sars, 1905b); *E. longiseta* Grice & Hülsemann, 1965; *E. luxus* Tanaka & Omori, 1974; *E. magnus* (Wolfenden, 1904) (= *A. fungiferus* Steuer, 1904; *A. validus* Scott, 1909) (male see: Sars, 1925; Park, 1993); *E. malacus* Grice & Hülsemann, 1967; *E. marginatus* Tanaka, 1964b (= *E. longiantennalis*

Park, 1970); *E. matsuei* Tanaka & Omori, 1967; *E. maxillaris* Sars, 1920 (male see Roe, 1975); *E. mixtus* (Sars, 1907) (= *E. propinquus* Sars, 1920, see Roe, 1975) (male unknown); *E. modestus* Brodsky, 1950; *E. nodifrons* (Sars, 1905b) (= *A. simplex* Wolfenden, 1911; *A. simplex* Esterly, 1913) (male see Sars, 1925; Park, 1993); *E. nudus* Tanaka, 1964b; *E. oblongus* (Sars, 1905b) (= *A. rostratus* Esterly, 1906) (male see Roe, 1975); *A. subfiligerus* Wolfenden, 1911); *E. pachychaeta* Matthews, 1972 (male unknown); *E. pacificus* Matthews, 1972 (= *E. similis* Brodsky, 1950, non *E. similis* (Farran, 1908)); *E. palumbii* (Giesbrecht, 1889) (see Tanaka 1964b); *E. parabullifer* Brodsky, 1950; *E. paraoblongus* Matthews, 1972 (male unknown); *E. penicillatus* Sars, 1920; *E. perasetosus* Park, 1993 (male unknown); *E. perodiosus* Tanaka & Omori, 1974; *E. propinquus* Sars, 1920 (male unknown); *E. pseudaffinus* Brodsky, 1950; *E. quaestus* Grice & Hülsemann, 1967; *E. rectus* Grice & Hülsemann, 1967; *E. rigidus* (Sars, 1907) (male see Roe 1975); *E. roei* Matthews, 1972 (male unknown); *E. sarsi* Grice & Hülsemann, 1965; *E. similis* (Farran, 1908); *E. squamatus* (Giesbrecht, 1889) (male see Matthews (1972)) (= *A. brevicaudatus* Sars, 1905b; *A. californicus* Esterly, 1913); *E. sublongiseta* Park, 1970; *E. tenuicaudis* (Sars, 1905b) (male unknown); *E. tenuispinus* Sars, 1905b (male unknown); *E. truncatus* (Sars, 1905b) (male unknown); *E. unisetosus* Park, 1970; *E. validus* (Scott, 1909); *E. vesicus* Park, 1970; *E. vicinus* Sars, 1920 (= *E. simulans* Sars, 1924) (male unknown).

This genus is almost exclusively bathypelagic. The following species have been taken in the Southwest Pacific.

#### *Euaugaptilus antarcticus* (Wolfenden, 1911)

(Figs 20, 171, 190)

DESCRIPTION: Size: females 9.16–10.33 mm, males 9.16–9.83 mm

Female: As in the generic definition with the following additional characteristics. Antenna 1 extends beyond caudal rami by 5–6 segments. Mandibular blade with 3 pairs of teeth in addition to 1 relatively small proximal tooth; toothed edge oblique to long axis of blade although the proximal pair of teeth is longer than the 2 more-distal tooth-pairs; palp about 77% length of blade. Maxilla 1 inner lobe 1 with 10 spines, inner lobe 2 with 1 spiniform seta, inner lobe 3 absent; endopod with 3 setae; exopod with 6 setae; outer lobe with 6 setae. Exopod segment 3 of legs 3–4 with 2 sensory pores, exopod segment 2 of leg 5 with 1 sensory pore. (Park 1993)

Male: As in the generic definition with the following additional characteristics. Leg 5 asymmetrical; outer distal spines on exopod segments 1 and 2 on both sides

small, projection on inner border of right exopod segment 2 with 3 distal points; right exopod segment 3 with 3 subequal, long spines; left exopod segment 3 with 1 long terminal spine and 1 small spine on the inner and outer borders. (Park 1993)

REMARKS: Park (1993) believes that this species is distinct from *E. laticeps* (see Remarks under *E. laticeps*). See Park (1993) for figures of this species.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Park (1993).

NEW RECORDS: Nil.

DISTRIBUTION: Bathypelagic species found south of the Antarctic Convergence (Park 1993).

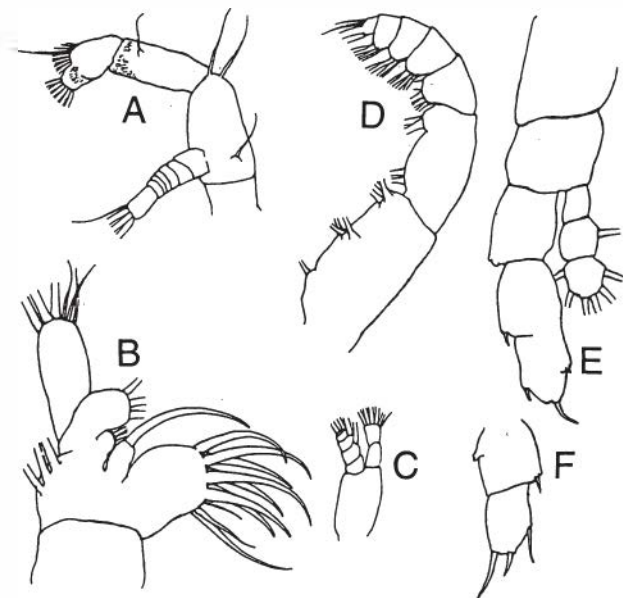


Fig. 20. *Euaugaptilus antarcticus* from Wolfenden (1911). Female. A, antenna 2; B, maxilla 1; C, mandibular palp; D, maxilliped. Male. E, left leg 5; F, terminal part of right leg 5.

*Euaugaptilus bullifer* (Giesbrecht, 1889)  
(Figs 21, 171, 190)

DESCRIPTION: Size: females 4.29–5.3 mm, males 4.70 mm.

Female: As in the generic definition with the following additional characteristics. Anterior head slightly projecting. Rostral filaments long. Genital segment symmetrical, longer than half the length of urosome. Caudal rami twice as long as wide. Antenna 1 extends beyond caudal rami by about 6 segments. Antenna 2 exopod shorter than endopod. Mandibular blade well developed, palp biramous with 4 setae on endopod segment 2, and 3 setae on exopod. Maxilla 1 with only

3 slender spines on inner lobe 1; endopod atrophied, without lobes, and with only 1 small terminal seta; exopod with 2 setae; outer lobe 1 with 4 setae. Maxilla 2 and maxilliped with the distal setae bordered by shield-shaped appendages. Leg 1 exopod and endopod 3-segmented. (Giesbrecht 1892; Rose 1933)

Male: As in the generic definition with the following additional characteristics. Urosome 5-segmented, caudal rami about twice as long as wide. Left antenna 1 exceeds the end of caudal rami by distal 5 segments. Antenna 2 endopod 1.7 times as long as exopod which is composed of 8 free segments. Mandible has 4 teeth on slender cutting edge. Maxilla 1 has 4 setae on outer lobe; 2 setae on exopod; 1 seta on basipod 2; 3 setae on inner lobe 1; the endopod, and inner lobes 2 and 3 absent. Maxilla 2 with setae on lobes 1–6 as follows: 1 short seta and a spine, 1, 2, 3, 2, 1 setae respectively. Maxilliped is robust. Setae on maxilla 2 and maxilliped provided with shield-shaped appendages.

(Tanaka 1964b)

REMARKS: The figured specimen has one less seta on endopod segment 2 of the mandibular palp than described by Giesbrecht (1892). This species belongs to the *affinis* group of Matthew (1972).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F945	500–1000	1 female 5.2 mm
F946	0–1000	1 female 5.2 mm
VUZ105	0–914	1 female 5.3 mm

DISTRIBUTION: This bathypelagic species has been recorded from all oceans (Matthews 1972; Park 1993).

*Euaugaptilus facilis* (Farran, 1908)  
(Figs 22, 171, 190)

DESCRIPTION: Size: females 4.9–5.9 mm, males 5.0 mm.

Female: As in the generic definition with the following additional characteristics. Rostrum with 2 small filaments. Genital segment projecting very little ventrally. Caudal rami as long as anal segment. Antenna 1 long, extending beyond caudal rami by about 5 segments. Antenna 2 endopod and exopod equal. Mandible strong, with a reduced palp. Maxilla 1 with inner lobe 1 prominent; inner lobe 2 with 1 seta; inner lobe 3 absent; endopod reduced and terminated by a short, bent, seta. Leg 1 exopod and endopod 3-segmented, exopod segment 2 without an outer edge spine, and only 1 outer edge spine on exopod segment 3. Exopod

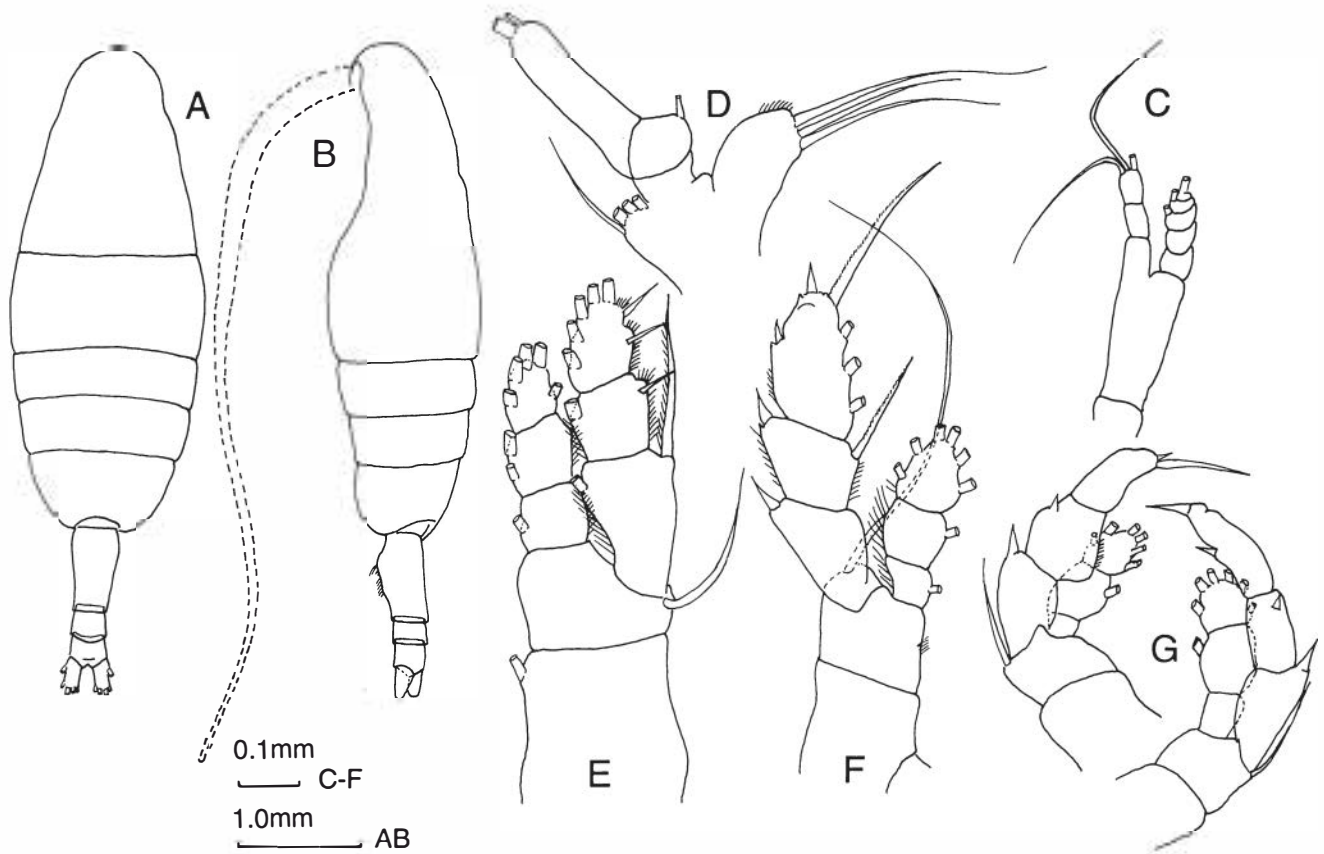


Fig. 21. *Euaugaptilus bullifer*. Female from Stn VUZ105. A, dorsal view; B, lateral view; C, mandibular palp; D, maxilla 1; E, leg 1; F, leg 5. Male from Tanaka (1964). G, leg 5.

segment 2 of legs 3 and 4 with a projecting tubercle at outer distal border; exopod segment 3 with an outer distal tubercle. (Sars 1925)

Male: As in the generic definition with the following additional characteristics. The prosome is more angular, particularly anteriorly, than that of the female, appearing more squat. Urosome is 5-segmented, caudal rami as in female. Antenna 1 are proportionally a little shorter than in female, extending beyond caudal rami by about 3 segments; there is some fusion in the left, geniculate antenna 1 so it consists of 22 free segments. Antenna 2 similar to that of female although a little stouter. Mandibular palp has one less seta on endopod than female and setae are longer than in female. Maxilla 1 as in female except there is a fourth well-developed seta on the exopod. Maxilla 2 and maxilliped as in female. Swimming legs 1-4 as in female. Leg 5 right exopod segment 3 with 2 subequal terminal spines, exopod segment 2 with a recurved spine on inner margin; left exopod segment 3 bears a well-developed terminal spine, a smaller outer-edge spine, and a pointed projection on the inner margin. (Matthews 1972)

REMARKS: This species belongs to the *affinis* group of Matthews (1972).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

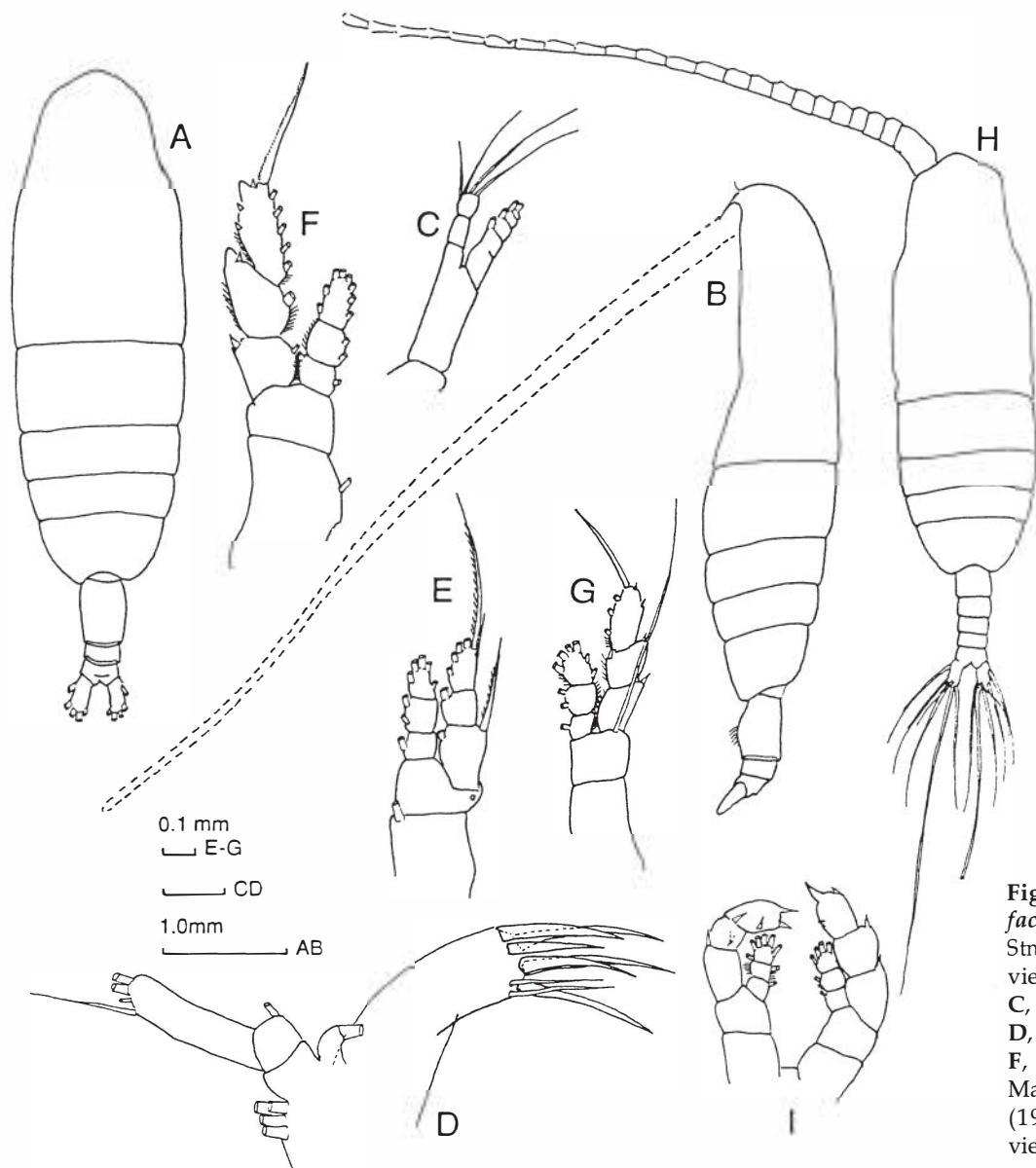
Stn No.	Depth of Haul (m)	Specimens
VUZ93	0-1097	1 female 5.0 mm

DISTRIBUTION: A sparsely distributed bathypelagic species found in all oceans (Matthews 1972).

*Euaugaptilus filigerus* (Claus, 1863)  
(Figs 23, 171, 190)

DESCRIPTION: Size: females 4.5-6.8 mm, males 4.1-5.3 mm.

Female: As in the generic definition with the following additional characteristics. Body elongate. Anterior head rounded, rostrum with 2 fine, curved filaments.



**Fig. 22. *Euaugaptilus facilis*.** Female from Stn VUZ93. **A**, dorsal view; **B**, lateral view; **C**, mandibular palp; **D**, maxilla 1; **E**, leg 1; **F**, leg 3; **G**, leg 5. Male from Matthews (1972). **H**, dorsal view; **I**, leg 5.

Urosome short; genital segment slightly asymmetrical, twice as long as the following two segments; caudal rami with 2 external setae, equal to anal segment. Antenna 1 much longer than body, extending beyond caudal rami by about 5 segments. Exopod of antenna 2 8-segmented; endopod more than twice as long as exopod. Mandible blade narrow and pointed, palp long. Maxilla 1 endopod weakly developed, inner lobe 1 with 8 setae, inner lobe 2 with 1 setae and inner lobe 3 more rudimentary with 1 seta. Leg 1 exopod segment 2 without an external spine. Leg 5 basipod 2 with an external seta twice the length of the endopod.

(Sars 1925)

Male: As in the generic definition with the following additional characteristics. Antenna 1 geniculate

on left. Leg 5 right exopod segment 2 with a distinctive, internal projection. (Sars 1925)

REMARKS: This species belongs to the *squamatus* group.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
Mu67/52s	0-1000	1 female 6.3 mm

DISTRIBUTION: Widely distributed bathypelagic species in all oceans and may be found shallower than 500 m (Matthews 1972).

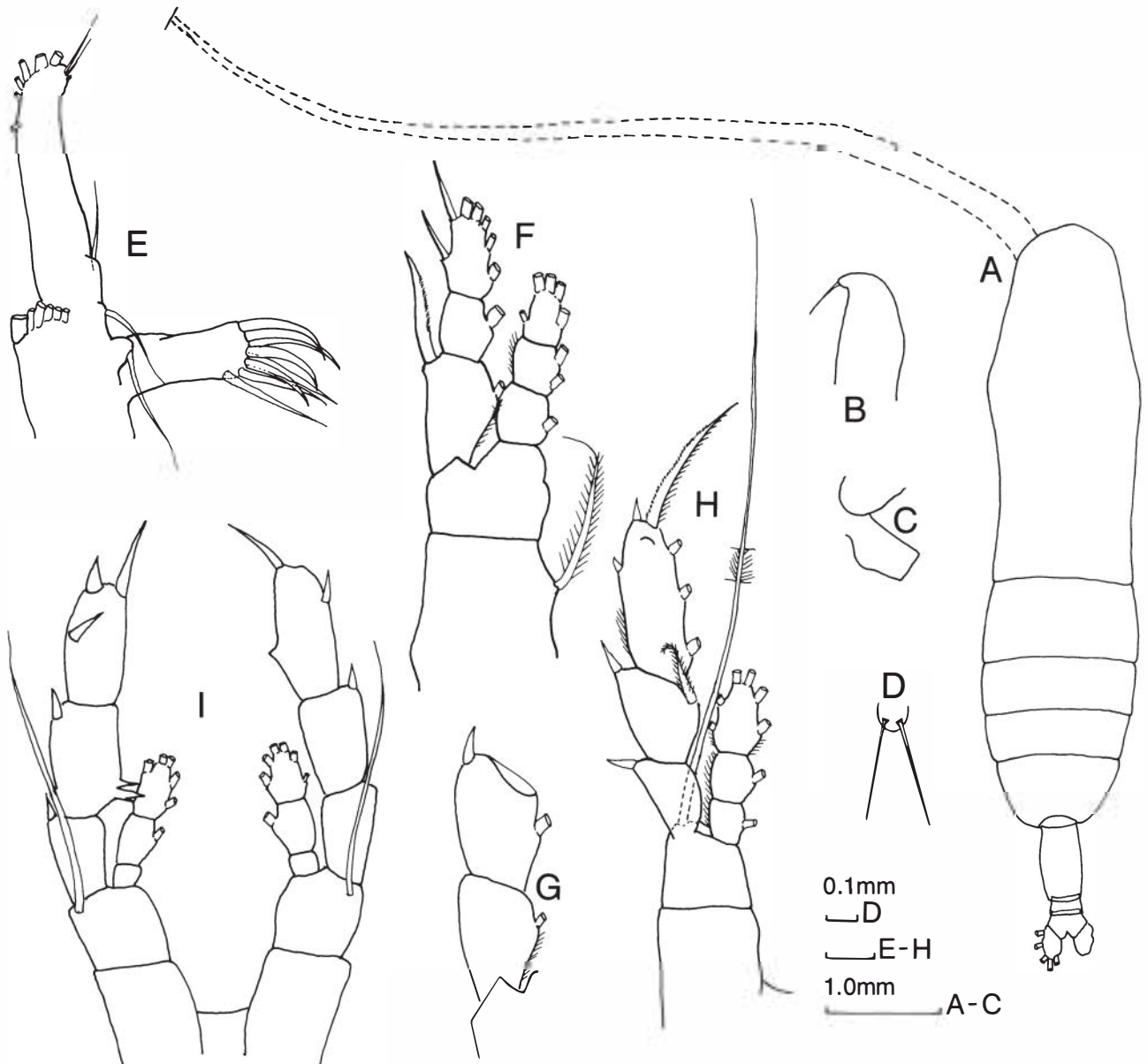


Fig. 23. *Euaugaptilus filigerus*. Female from Stn Mu67/52s. A, dorsal view; B, anterior head, lateral view; C, genital segment, lateral view; D, rostrum; E, maxilla 1; F, leg 1; G, leg 3, exopod segments 1 and 2; H, leg 5. Male from Sars (1924). I, leg 5.

*Euaugaptilus hecticus* (Giesbrecht, 1889)  
(Figs 24, 171, 190)

DESCRIPTION: Size: females 2.45–2.75 mm, males 2.28–2.40 mm.

Female: As in the generic definition with the following additional characteristics. Genital segment symmetrical, twice as long as the following 2 segments together, which are of equal length; caudal rami equal in length to anal segment, about 3 times as long as wide. Antenna 1 extends beyond caudal rami by about 6 segments. Antenna 2 exopod equal to three-quarters

the length of endopod; exopod segment 1 and 2 separated. Mandible in the form of a claw. Maxilla 1 inner lobe 1 with 4 spines, inner lobe 2 absent, inner lobe 3 rudimentary; basipod 2 with 1 seta, endopod rudimentary; exopod with 5 setae; outer lobe 1 with 4 setae. Leg 5 exopods and endopods both 2-segmented.

(Giesbrecht 1892)

Male: As in the generic definition with the following additional characteristics. Antenna 1 prehensile on the right. Leg 5 right exopod segment 2 with 1 internal projection, right exopod segment 3 with a long terminal seta.

(Giesbrecht 1892)

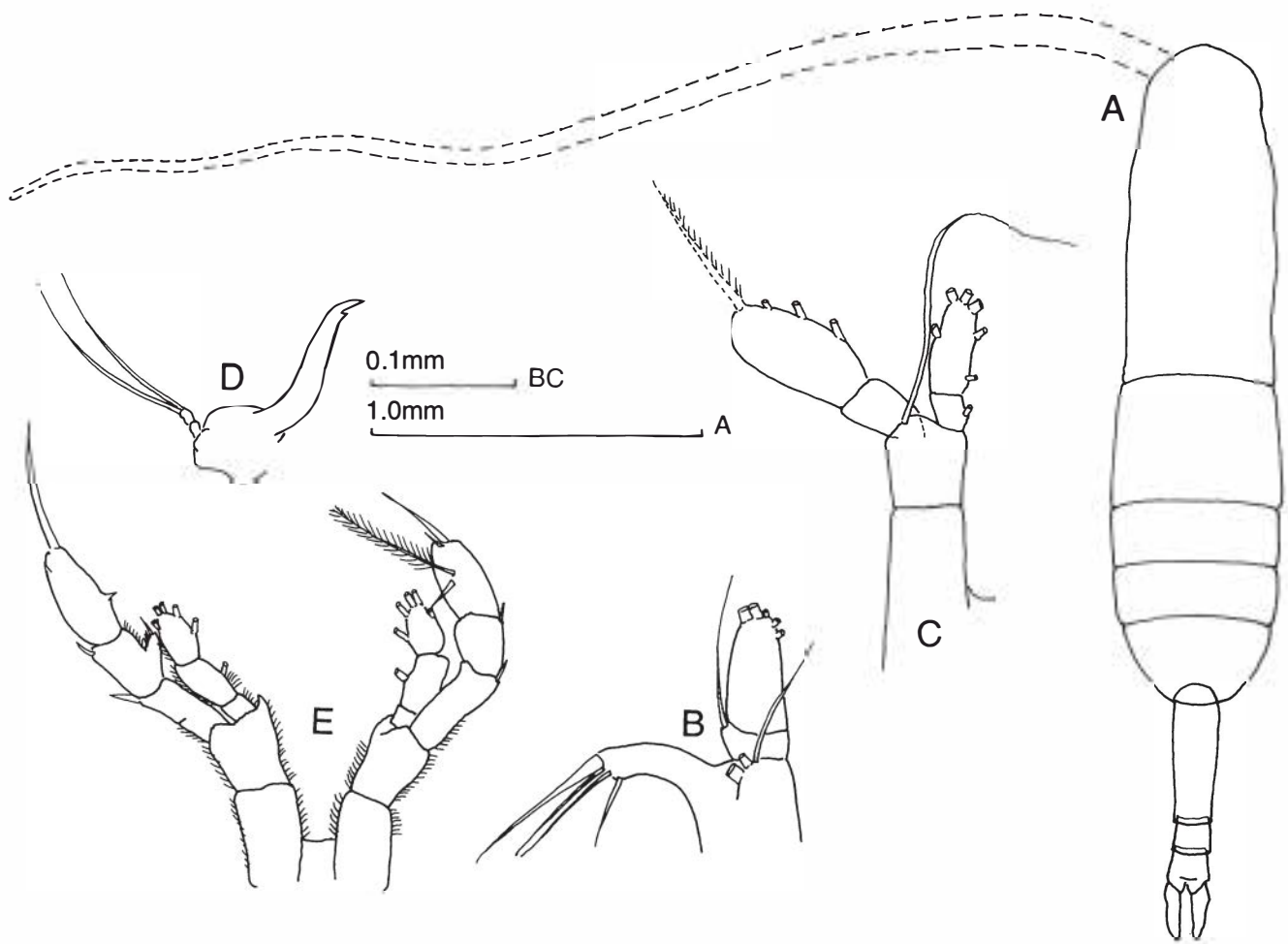


Fig. 24. *Euaugaptilus hecticus*. Female from Stn C537. A, dorsal view; B, maxilla 1; C, leg 5. Male from Giesbrecht (1892). D, mandible; E, leg 5.

REMARKS: The female found at Stn C537 has maxilla 1 without setae on the rudimentary inner lobe 3 (see also Tanaka 1964b). This species belongs to the *affinis* group.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	surface	1 female 2.5 mm
C537	0-250	1 female 2.71 mm

DISTRIBUTION: Widely distributed epi- to mesopelagic species found in all oceans between 30 m and 700 m (Matthews 1972).

*Euaugaptilus humilis* Farran, 1926  
(Figs 25, 171, 190)

DESCRIPTION: Size: females 1.52-1.84 mm, males unknown.

Female: As in the generic definition with the following additional characteristics. Body moderately elongate, oval; head slightly vaulted and uniformly rounded in dorsal and lateral view; without rostral filaments. Genital segment slightly swollen on left side and a little longer than the combined length of the following 2 segments which are about equal in length; caudal rami about as long as anal segment, asymmetrical, longer on right, with rami nearly twice as long as wide, ending squarely, with 4 subequal setae, 1 on outer edge and 3 terminal. Antenna 1 extending beyond caudal rami by about the last 2 or 3 segments. Antenna 2 endopod about half the length of exopod; basipod 2 longer than exopod and longer than endopod segment 1. Mandibular palp biramous; exopod segment 1 with 6 long setae, endopod with 6 short setae; cutting edge of blade with a long distal tooth and a curved median tooth of moderate size and 3 small proximal teeth. Maxilla 1

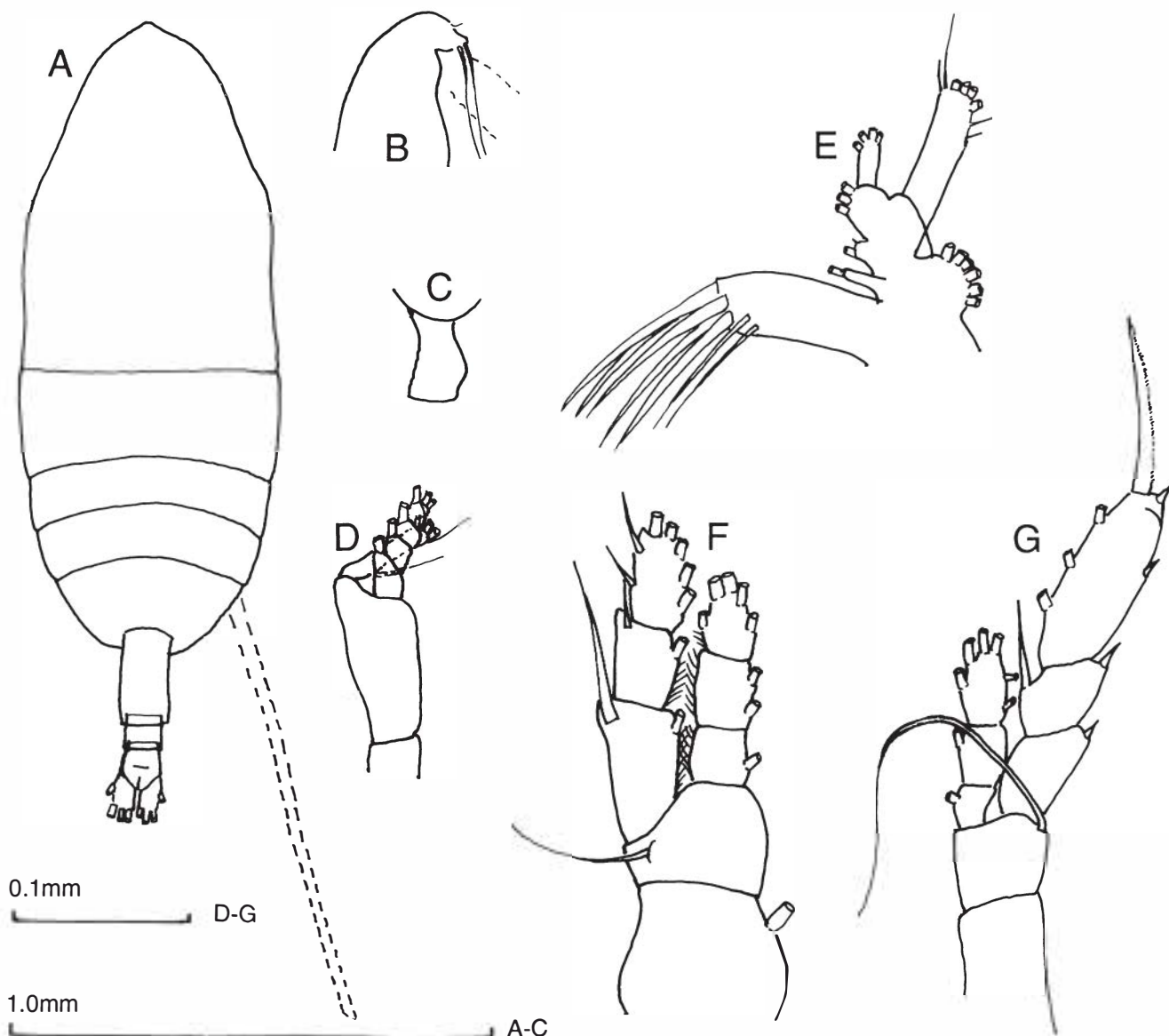


Fig. 25. *Euaugaptilus humilis*. Female from Stn A302, 450–1000 m. A, dorsal view; B, anterior head, lateral view; C, genital segment, lateral view; D, mandibular palp; E, maxilla 1; F, leg 1; G, leg 5.

inner lobe 1 with 8 spines, inner lobe 2 absent, inner lobe 3 with 1 seta; endopod with 3+4 setae; exopod with 4 long and 3 small terminal setae; outer lobe with 6 strong setae. Maxilla 2 short, lobes 1–6 with 3, 2, 2, 3, 2, 2 setae respectively. Maxillipeds of moderate length; there are no shield-shaped appendages on setae of maxilla 2 or the maxilliped. Swimming legs without distinctive characteristics. (Farran 1926)

Male: Unknown.

REMARKS: The Southwest Pacific specimen, like those of Grice and Hülsemann (1967), has rostral filaments, maxilla 1 has an inner lobe 2 bearing 1 seta, the genital segment is not noticeably asymmetrical in dorsal view,

nor are the caudal rami obviously asymmetrical. This species belongs to the *squamatus* group.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A303	450–1000	1.65 mm

DISTRIBUTION: This appears to be the first record from the Pacific Ocean. Otherwise this bathypelagic species is known to occur in the Atlantic and Indian Oceans at around 1000 m (Matthews 1972).

*Euaugaptilus laticeps* (Sars, 1905b)  
(Figs 26, 171, 190)

DESCRIPTION: Size: females 6.9–10.0 mm, males 7.4–9.5 mm.

Female: As in the generic definition with the following additional characteristics. Anterior head rounded, body elongate; rostrum with 2 filaments. Urosome short, caudal rami longer than wide. Antenna 1 extends beyond caudal rami by about 5 segments. Antenna 2 exopod 8-segmented, hardly longer than half endopod and more slender. Mandibular blade drawn out into an acute point, with an oblique, toothed border; palp about 43% of blade. Maxilla 1 inner lobe 1 well developed and with 11 spines, inner lobe 2 with 2 setae, inner lobe 3 apparently absent; endopod with 2 well-defined lobes, the proximal of which has 2 setae, distal lobe with 3 setae; exopod with 7 setae; outer lobe with 9 setae. Maxilla 2 strong. Leg 1 exopod segment 2 with a small outer edge spine. Exopod segment 3 of legs 3–5 with 1 sensory pore, exopod segment 2 of leg 5 without a sensory pore. (Sars 1925; Park 1993)

Male: As in the generic definition with the following additional characteristics. Leg 5 only slightly asymmetrical, exopods being nearly equal in size and little different in structure; exopod segment 2 on right is

distinguished by the tooth-like projection on inner border. (Sars 1925)

REMARKS: This species is similar to *E. squamatus* especially in mouthparts but *E. laticeps* may be distinguished by its more elongate body and differently shaped caudal rami. Male leg 5 is like that of *E. magnus* (Sars 1925). Park (1993) distinguishes *E. antarcticus* from *E. laticeps* on basis of size, form of mandible, maxilla 1, and number of sensory pores on legs 3–5. In most respects the present specimens seem to agree with *E. laticeps* although the number of setae on maxilla 1 exopod and outer lobe tend towards the situation found in *E. antarcticus*. This species belongs to the *squamatus* group.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
E882	0–1212	1 female (damaged)
VUZ105	0–914	2 females 7.4, 7.6 mm

DISTRIBUTION: This bathypelagic species is found in all oceans as far as the Antarctic (Matthews 1972).

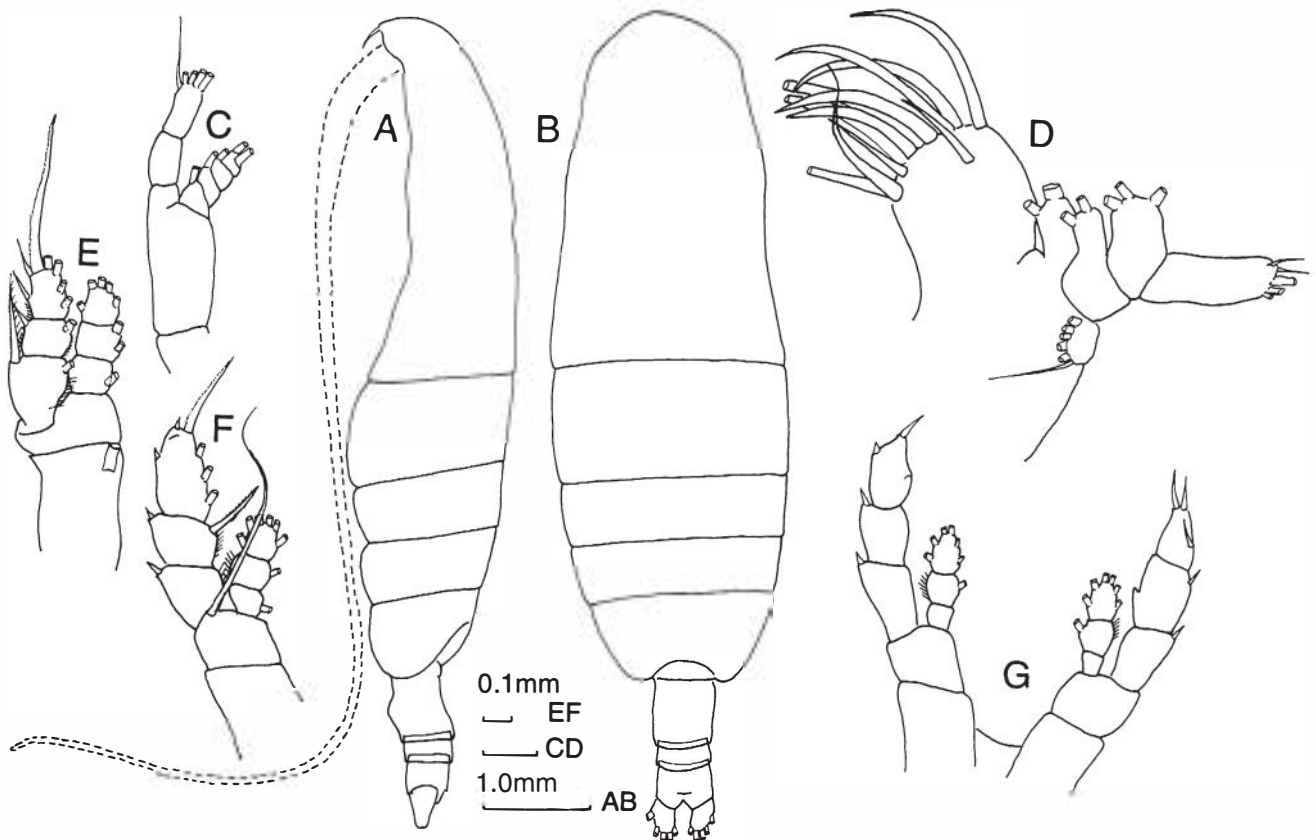


Fig. 26. *Euaugaptilus laticeps*. Female from Stn VUZ105. A, lateral view; B, dorsal view; C, mandibular palp; D, maxilla 1; E, leg 1; F, leg 5. Male from Sars (1924). G, leg 5.



*Euaugaptilus longimanus* (Sars, 1905b)  
(Figs 27, 171, 190)

DESCRIPTION: Size: females 4.3–5.8 mm, males 6.3 mm.

Female: As in the generic definition with the following additional characteristics. Body short and squat, anterior head bluntly shaped with 2 rostral filaments. Antenna 1 extends beyond caudal rami by 5 segments. Antenna 2 with both rami of equal length. Mandible blade strongly toothed at tip, palp with a rudimentary endopod. Maxilla 1 inner lobe 1 with 3 long setae; inner lobes 2 and 3 absent; endopod with 1 seta; exopod with 3 setae; outer lobe with 5 setae. Maxilla 2 normal. Maxilliped is excessively elongate; endopod segment 1 more than twice as long as the four others combined. (Sars 1925)

Male: As in the generic definition with the following additional characteristics. Left antenna 1 geniculate. Antenna 2 with basipod 2 swollen. Leg 5 similar to that of *E. filigerus*. (Sars 1925)

REMARKS: This species belongs to the *affinis* group.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F911	0–1697	1 female 5.7 mm

DISTRIBUTION: This bathypelagic species is found in all oceans from 600 m to 1000 m (Matthews 1972).

*Euaugaptilus magnus* (Wolfenden, 1904)  
(Figs 172, 190)

DESCRIPTION: Size: females 7.33–8.58 mm, males 7.75–8.25 mm.

Female: As in the generic definition with the follow-

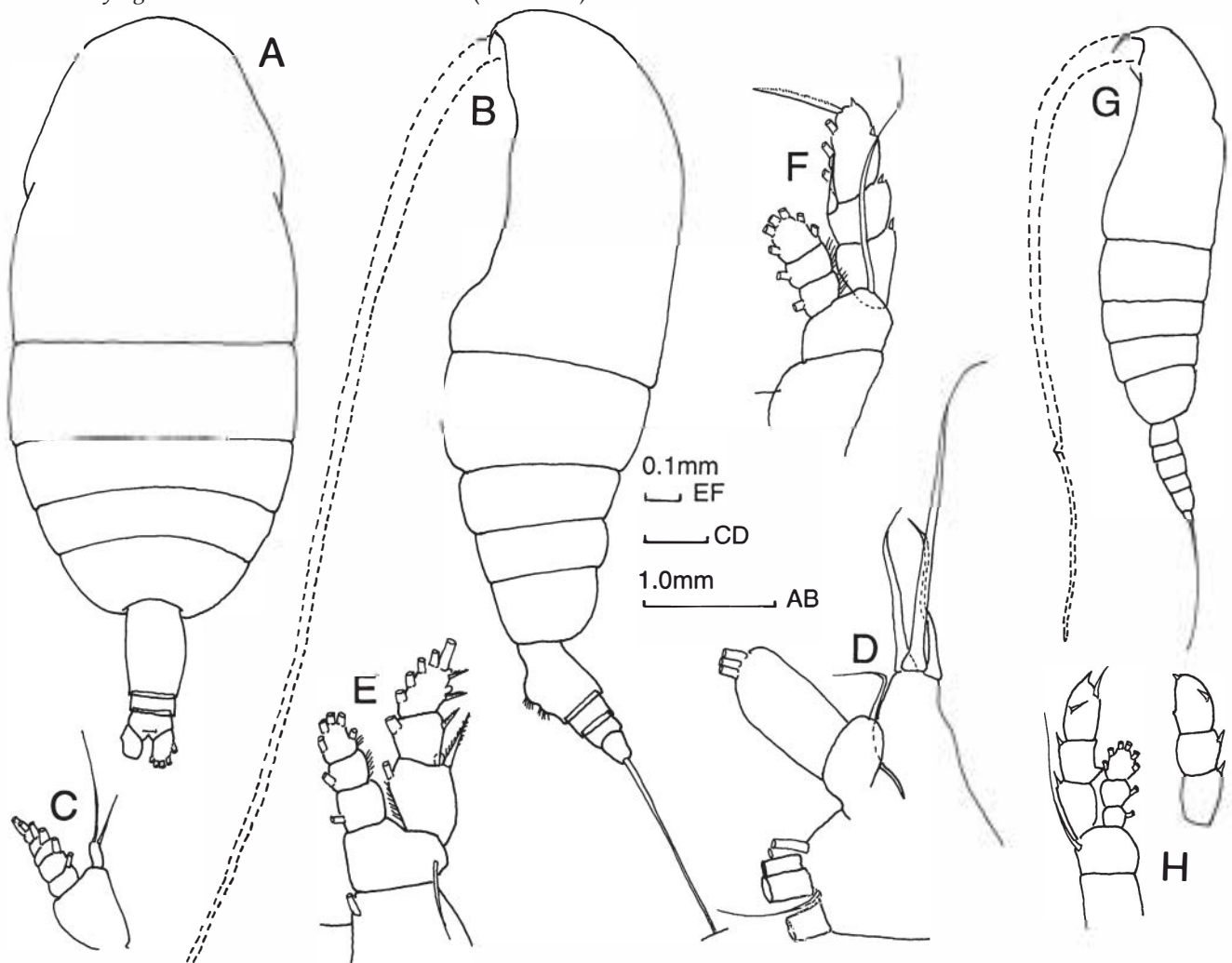


Fig. 27. *Euaugaptilus longimanus*. Female from Stn F911. A, dorsal view; B, lateral view; C, mandibular palp; D, maxilla 1; E, leg 1; F, leg 5. Male from Sars (1924). G, lateral view; H, leg 5.

ing additional characteristics. Body robust and swollen, rostral prominence simple. Genital segment long, almost cylindrical. Antenna 1 longer than body by about 1 segment. Mandible blade with 3 well-defined teeth terminally; palp quite small. Maxilla 1 inner lobe 1 with 10 spines, inner lobes 2 and 3 with 1 seta each; endopod with 1 seta; exopod with 2 setae; outer lobe with 8 setae. (Sars 1925)

Male: As in the generic definition with the following additional characteristics. Left antenna 1 geniculate. Antenna 2 more strongly built than in female. Leg 5 slightly asymmetrical, exopods being nearly equal in size with few differences in structure; right exopod segment 2 has a tooth-like projection on the inner border. (Sars 1925)

REMARKS: This species is closely related to *E. austrinus* from which it can be distinguished by the shape of the mandible and setation of antenna 2, mandibular palp, maxilla 1 and 2 (Park 1993). Of these the mandible is the most reliable character for species identification. See Park (1993) for figures of this species.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Park (1993).

NEW RECORDS: Nil.

DISTRIBUTION: Bathypelagic species found in all oceans to the Antarctic (Matthews 1972; Park 1993).

*Euaugaptilus nodifrons* (Sars, 1905b)  
(Figs 16, 17, 172, 190)

DESCRIPTION: Size: females 4.65–5.60 mm, males 4.80–6.32 mm.

Female: As in the generic definition with the following additional characteristics. Body swollen, rostrum without filaments, Urosome short; genital segment rather large; caudal rami longer than wide, external seta curved and thicker than others. Antenna 1 hardly extends beyond caudal rami. Antenna 2 endopod long. Mandible blade enlarged distally with many well-defined teeth. Maxilla 1 inner lobe 1 with 8 spines, inner lobes 2 and 3 with 1 seta each; endopod with a separate segment bearing 2 setae; exopod with 2 large and 1 small setae; outer lobe with 6 large and 2 small setae. Maxilliped long. Leg 5 exopod segment 2 with a rudimentary inner, distal spine. (Sars 1925)

Male: As in the generic definition with the following additional characteristics. Leg 5 with strongly developed exopods; exopod segment 3 is noticeably larger than in other species. (Sars 1925)

REMARKS: The figured Southwest Pacific specimen had additional spines/setae on inner lobe 1, exopod and

outer lobe (see also Park 1993). The inner projection on right exopod segment 2 of male leg 5 did not discernibly have 3 distal points as described by Park (1993). This species belongs to the *squamatus* group.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Park (1993).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
Mu67/94s	0-1000	1 female 5.45 mm
Mu67/104s	0-1000	1 male 5.3 mm
VUZ112	0-732	1 female 4.65, 1 CV female

DISTRIBUTION: This bathypelagic species is recorded from all oceans (Matthews 1972).

*Euaugaptilus oblongus* (Sars, 1905b)  
(Figs 28, 172, 190)

DESCRIPTION: Size: females 5.4–7.4 mm, males 5.4–7.2 mm.

Female: As in the generic definition with the following additional characteristics. Body narrow; rostrum with 2 short points. Genital segment large, being equal to a little less than half of urosome; anal segment nearly twice the length of preceding segment; caudal rami short. Antenna 1 extends beyond caudal rami by about 4 segments. Antenna 2 short. Mandible rather weak and imperfectly toothed. Maxilla 1 inner lobe 1 with 9 spines, inner lobes 2 and 3 with 1 and 2 setae respectively; endopod with 2 setae, exopod with 2 setae, outer lobe with 5 longer and 2 small setae. (Sars 1925)

Male: As in the generic definition with the following additional characteristics. Antenna 1 geniculate on left. Antenna 2 basipod 2 and endopod large. Leg 5 left exopod segment 3 with the inner edge spine at mid-length; right exopod segment 2 inner process simple, 1-pointed. (Sars 1925)

REMARKS: The illustrated Southwest Pacific specimen has 11 spines on inner lobe 1 of maxilla 1. The species belongs to the *squamatus* group.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F946	0-1000	1 female 6.2 mm
Mu67/116s	0-1000	1 female 6.3 mm
VUZ112	0-732	1 female 6.1 mm

DISTRIBUTION: This bathypelagic species is known from all oceans (Matthews 1972).

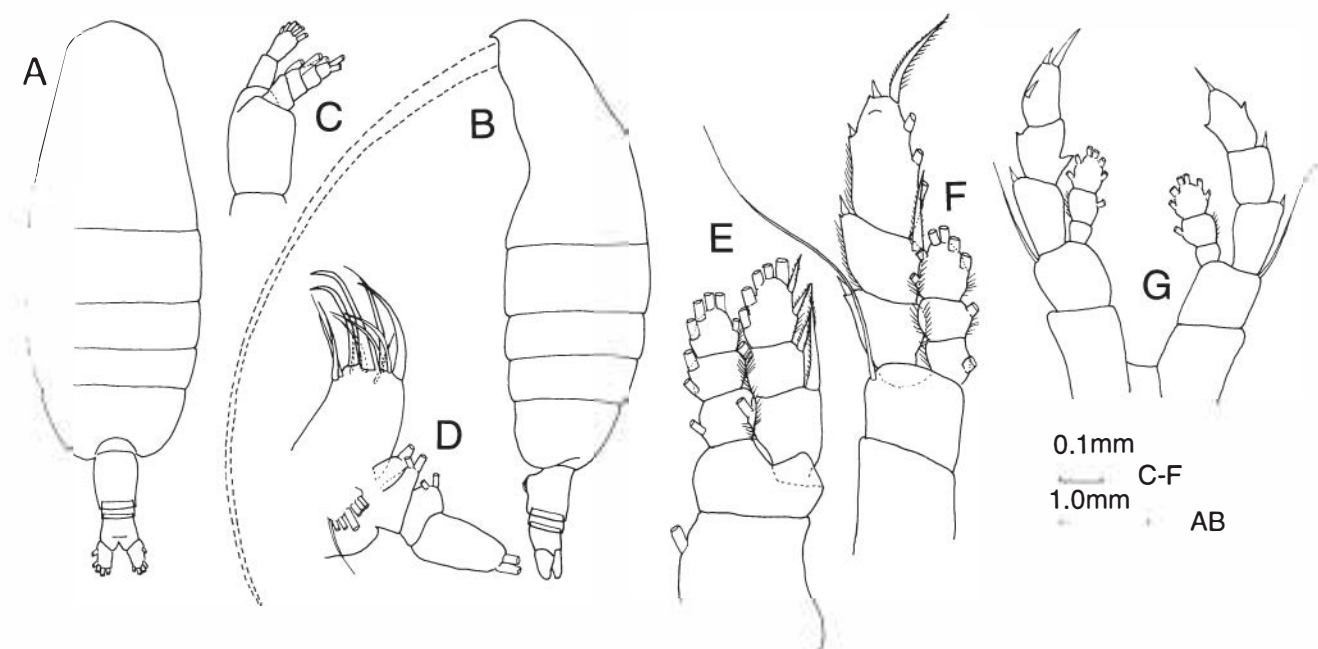


Fig. 28. *Euaugaptilus oblongus*. Female from Stn VUZ112. A, dorsal view; B, lateral view; C, mandibular palp; D, maxilla 1; E, leg 1; F, leg 5. Male from Sars (1924). G, leg 5.

*Euaugaptilus palumbii* (Giesbrecht, 1889)  
(Figs 29, 172, 190)

DESCRIPTION: Size: females 1.90–2.25 mm, males 1.95 mm.

Female: As in the generic definition with the following additional characteristics. Body small, anterior head rounded, rostral filaments thin and elongate. Urosome narrow; anal segment quite long; caudal rami not divergent, twice as long as wide. Antenna 1 extends beyond posterior border of caudal rami by about 2 segments. Antenna 2 exopod is cylindrical and a little shorter than endopod. Mandible well developed, exopod and endopod about equal. Maxilla 1 inner lobe 1 with 9 spines, inner lobes 2 and 3 with 1 and 0 seta respectively; endopod with 1 seta; exopod with 4 setae; outer lobe with 1 seta. Maxilla 2 and maxilliped quite large. Leg 1 endopod 2-segmented. Leg 5 more slender than usual. (Giesbrecht 1892)

Male: As in the generic definition with the following additional characteristics. Antenna 1 geniculate on left. Leg 5 right exopod segments 2 and 3 fused, segment 2 has a process on inner proximal margin; left exopod segment 3 has a distal spine and 2 spines on posterior surface. (Tanaka 1964b)

REMARKS: This species belongs to the *affinis* group.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500-1000	3 females 2.00–2.05 mm
A295	400-1000	1 female 2.0 mm
A302	500-1000	2 females 1.9, 2.1 mm
F945	500-1000	1 female 1.9 mm
F946	200-500	2 females 2.0, 2.1 mm

DISTRIBUTION: This mesopelagic species is known to occur in all oceans from 500 m to 1000 m (Matthews 1972).

*Euaugaptilus perasetosus* Park, 1993 (Figs 172, 190)

DESCRIPTION: Size: females 7.08–7.75 mm, males unknown.

Female: As in the generic definition with the following additional characteristics. Body elongate, 2 rostral filaments well developed. Genital segment just less than half the length of urosome, urosome segment 2 and anal segment about the same length, caudal rami symmetrical and shorter than anal segment. Antenna 1 extends beyond the caudal rami by about 5 segments. Antenna 2 exopod 1.2 times length of endopod segment 1. Mandibular blade about as long as palp; blade with 3 pairs of teeth plus a basal spine, toothed edge of blade nearly perpendicular to axis of blade. Maxilla 1

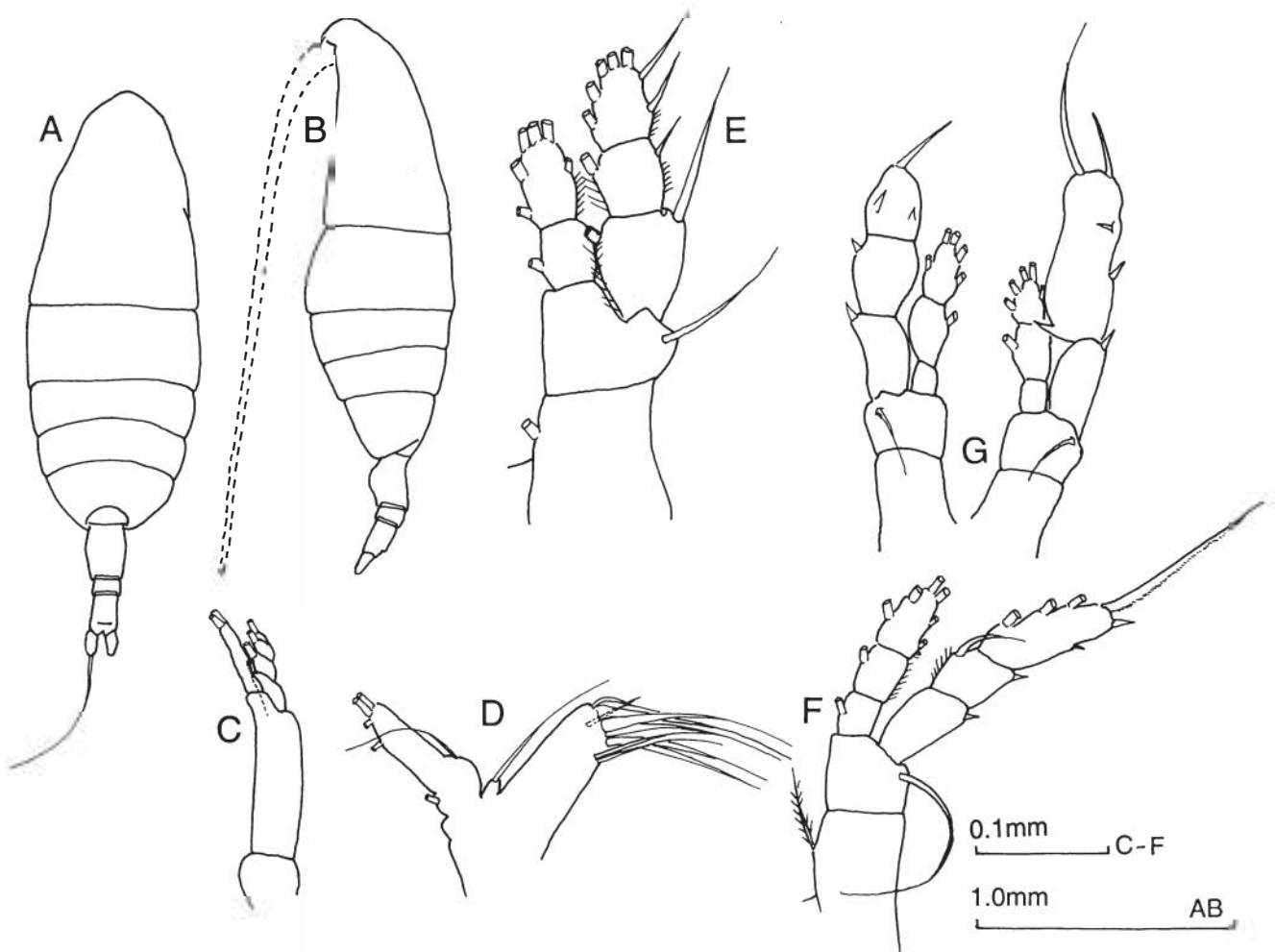


Fig. 29. *Euaugaptilus palumbii*. Female from Stn F946, 200–500 m. A, dorsal view; B, lateral view; C, mandibular palp; D, maxilla 1; E, leg 1; F, leg 5. Male from Tanaka (1964). G, leg 5.

inner lobe 1 with 11 spines, inner lobes 2 and 3 with 2 setae each; basipod 2 with 4 setae; endopod with 2 setae; exopod with 9 setae; outer lobe with 9 setae. Maxilla 2 elongate, endopod with 15 setae; setae of lobes 5 and 6 and endopod armed with hooked spines. Maxilliped with all long setae of basipod 2 and endopod armed with hooked spines. Exopods 2 and 3 of leg 3 with 4 sensory pores at bases of outer edge spines. Leg 5 basipod 2 outer distal seta extending beyond distal end of terminal spine on exopod segment 3; exopod segment 3 with only 1 sensory pore at base of laterodistal spine; inner seta of exopod segment 2 is relatively long. (Park 1993)

Male: Unknown.

REMARKS: This species is nearest to *E. hyperboreus* Brodsky, 1950 and *E. matsuei* Tanaka & Omori, 1967. See Park (1993) for figures of this species.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Park (1993).

NEW RECORDS: Nil.

DISTRIBUTION: This bathypelagic species is described from the Antarctic (Park 1993).

*Haloptilus* Giesbrecht, 1898  
in Giesbrecht & Schmeil 1898

DEFINITION: As in the family definition but with the following additional characteristics. Female urosome 4-segmented, symmetrical; male urosome 5-segmented; caudal rami and female mouthparts with long plumose setae; male mouthparts atrophied. Antenna 1 25-segmented in female; in male it is shorter and well supplied with aesthetascs, geniculate on left and 21-segmented, with a 4-segmented distal part. Antenna 2 endopod much longer than exopod. Mandible blade forked, endopod and exopod elongate. Maxilla 1 well developed with inner lobes 2 and 3 and endopod small;

exopod elongate. Maxilla 2 elongate with reduced lobes, distal setae not much longer than proximal setae. Maxilliped endopod thick. Leg 5 exopod segment 2 with inner seta pointed. Leg 5 of female with last inner seta of exopod segment 3 of usual length; male leg 5 exopod and endopod 3-segmented and with both terminal exopod segments hooked, without a pincer, right and left alike. (Giesbrecht & Schmeil 1898)

TYPE SPECIES: *Hemicalanus plumosus* Claus, 1863

REMARKS: Matthews (1972) reviewed the species in this genus which now contains: *Haloptilus aculeatus* (Brady, 1883); *H. acutifrons* (Giesbrecht, 1892) (male see Stephen & Saraladevi 1973) (= *H. spinifrons* (Sars, 1900)); *H. angusticeps* Sars, 1907 (male see Roe 1975); *H. austini* Grice, 1959 (?= *H. longiceps* Tanaka, 1964b; see Grice 1969); *H. bulliceps* Farran, 1926; *H. caribbeanensis* Park, 1970; *H. chierchiai* (Giesbrecht, 1889) (male see Sewell 1947); *H. fertilis* (Giesbrecht, 1892); *H. fons* Farran, 1908 (male unknown); *H. furcatus* Sars, 1920; *H. longiceps* Tanaka, 1964b; *H. longicirrus* Brodsky, 1950; *H. longicornis* (Claus, 1863) (male see Giesbrecht 1895); *H. major* Wolfenden, 1911 (male unknown); *H. mucronatus* (Claus, 1893) (male see Giesbrecht 1892); *H. ocellatus* Wolfenden, 1905b (male see Bradford 1971a); *H. orientalis* (Brady, 1883); *H. ornatulus* (Giesbrecht, 1892); *H.*

*oxycephalus* (Giesbrecht, 1889) (male see Vervoort 1957; Bradford 1971a); *H. pacificus* Chiba, 1956; *H. paralongicirrus* Park, 1970 (male see Roe 1975); *H. plumosus* (Claus, 1863); *H. pseudoxycephalus* Brodsky, 1950; *H. setuliger* Tanaka, 1964b; *H. spiniceps* (Giesbrecht, 1892); *H. tenuis* Farran, 1908 (male see Sars 1925); *H. validus* Sars, 1920 (male unknown).

*Haloptilus acutifrons* (Giesbrecht, 1892)

(Figs 30, 172, 190)

DESCRIPTION: Size: females 2.5–3.9 mm, males 2.1–2.7 mm.

Female: As in the generic definition with the following additional characteristics. Anterior head with a forward-directed point. Gut without a caecum. Oviduct does not reach the oral region. Antenna 1 extends beyond the caudal rami by 7 segments. Antenna 2 exopod shorter than the proximal segment of the endopod. Right and left mandibles similar. Maxilla 1 endopod 1-segmented with 4 setae. Maxilla 2 lobe 6 with 4 setae, the hooked seta of lobe 6 thinner than that on lobe 5.

(Giesbrecht 1892; Sars 1925)

Male: As in the generic definition with the following additional characteristics. Head triangular. Antenna 1 extends beyond caudal rami by 5 segments;

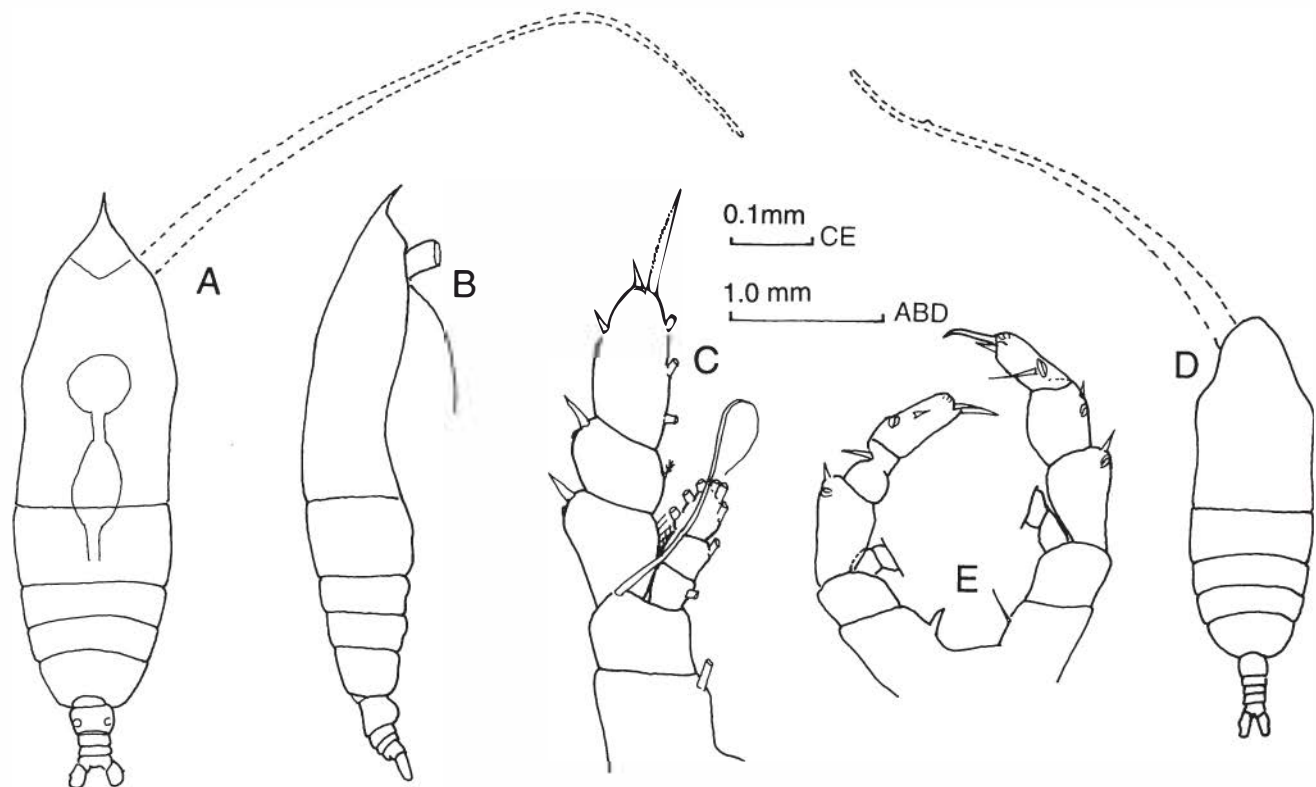


Fig. 30. *Haloptilus acutifrons*. Female from Stn F946, 200–500 m. A, dorsal view; B, lateral view; C, leg 5. Male: D, dorsal view; E, leg 5.

25-segmented on the right, 23-segmented on the left, geniculate on the left. Leg 5 asymmetrical, basipod 1 of left leg with a short stout inner spine, both exopod segment 2 without glandular pores, right exopod segment 2 with an inner conical protrusion proximally, left exopod segment 2 with a serrated inner distal margin. (Stephen & Saraladevi 1973)

REMARKS: Stephen and Saraladevi (1973) describe a male of *H. acutifrons* from the Indian Ocean which differs from *H. oxycephalus* in having the left exopod segment 2 of leg 5 inner distal border serrated. One male was taken in the Southwest Pacific with a female and had a proportionally wider body shape than the Southwest Pacific male assigned to *H. oxycephalus*. No obvious differences could be seen between the males assigned here to *H. acutifrons* and *H. oxycephalus* which could not be attributed to the way the limb was mounted. The male assigned here to *H. acutifrons* and that described by Stephen and Saraladevi (1973) seem to differ so the possibility that there are more species than have been described, has to be considered; these species would make up a closely related group in conjunction with *H. pseudoxycephalus* and *H. ocellatus*.

PREVIOUS SOUTHWEST PACIFIC RECORDS:  
Farran (1929); Vervoort (1957).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A302	500-1000	1 female 3.4 mm
F945	0-200	1 female 3.5 mm
F946	200-500	1 female 3.8 mm, 1 male 2.7 mm
Mu67/48s	0-1000	1 female 3.9 mm

DISTRIBUTION: This mesopelagic species is widespread in all oceans (Matthews 1972). The form of *Haloptilus* with the short pointed head was found in the Southwest Pacific only at a few northern stations and off Otago Peninsula.

*Haloptilus fons* Farran, 1908 (Figs 31, 172, 190)

DESCRIPTION: Size: females 5.7-6.6 mm, male unknown  
Female: As in the generic definition with the following additional characteristics. Body relatively robust;

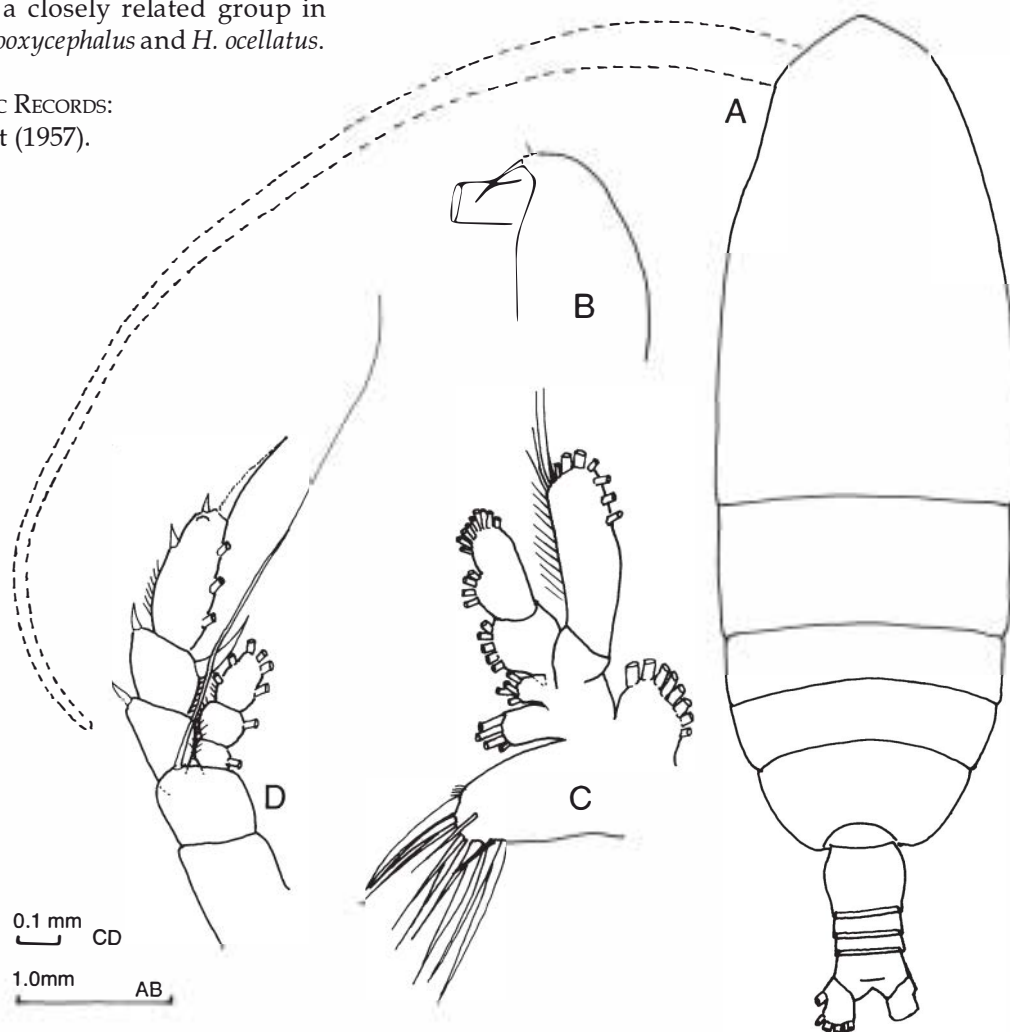


Fig. 31. *Haloptilus fons*. Female from Stn VUZ93. A, dorsal view; B, anterior head, lateral view; C, maxilla 1; D, leg 5.

anterior head rounded. Urosome short; genital segment projecting ventrally; caudal rami short. Antenna 1 only a little longer than body. Mandible quite broad and strongly toothed terminally. Maxilla 1 endopod well developed. (Sars 1925)

Male unknown.

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Park (1988).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
VUZ93	0-1097	1 female 6.15 mm

DISTRIBUTION: Sparingly distributed in all oceans at meso- to bathypelagic depths (Matthews 1972; Park 1988).

*Haloptilus longicornis* (Claus, 1893)  
(Figs 32, 172, 190)

? *Haloptilus setuliger* Tanaka 1964b

DESCRIPTION: Size: females 1.95–2.50 mm, males 1.18–1.24 mm.

Female: As in the generic definition with the following additional characteristics. Anterior head rounded, with a median papilla. Intestine without an anterior caecum, terminated in a caecum posteriorly; oviduct does not reach oral region; spermatophore rather long and thick. Right antenna 1 in female extends beyond caudal rami by 9–10 segments. Maxilla 1 endopod 2-segmented with 5 setae. Maxilla 2 lobe 6 with 3 setae, the hooked setae on lobes 5 and 6 slender.

(Giesbrecht 1892)

Male: As in the generic definition with the following additional characteristics. Right antenna 1 in male extends up to end of caudal rami. Leg 5 spination on both exopod segment 3 weak, except the terminal seta on the right is moderately long and thick.

(Giesbrecht 1892)

REMARKS: This species is closely related to *H. longicirrus*, *H. setuliger*, and *H. paralongicirrus*. These species may be separated by their size and the shape of the anterior head and genital segment. They also appear to live at different preferred depths: *H. longicornis* in the surface 200 m; *H. longicirrus* deeper than 500 m; and *H. paralongicirrus* at intermediate depths. *Haloptilus longicornis* is the smallest. The damaged specimen identified as *H. longicirrus* (Bradford 1970) is in fact *H. longicornis*.

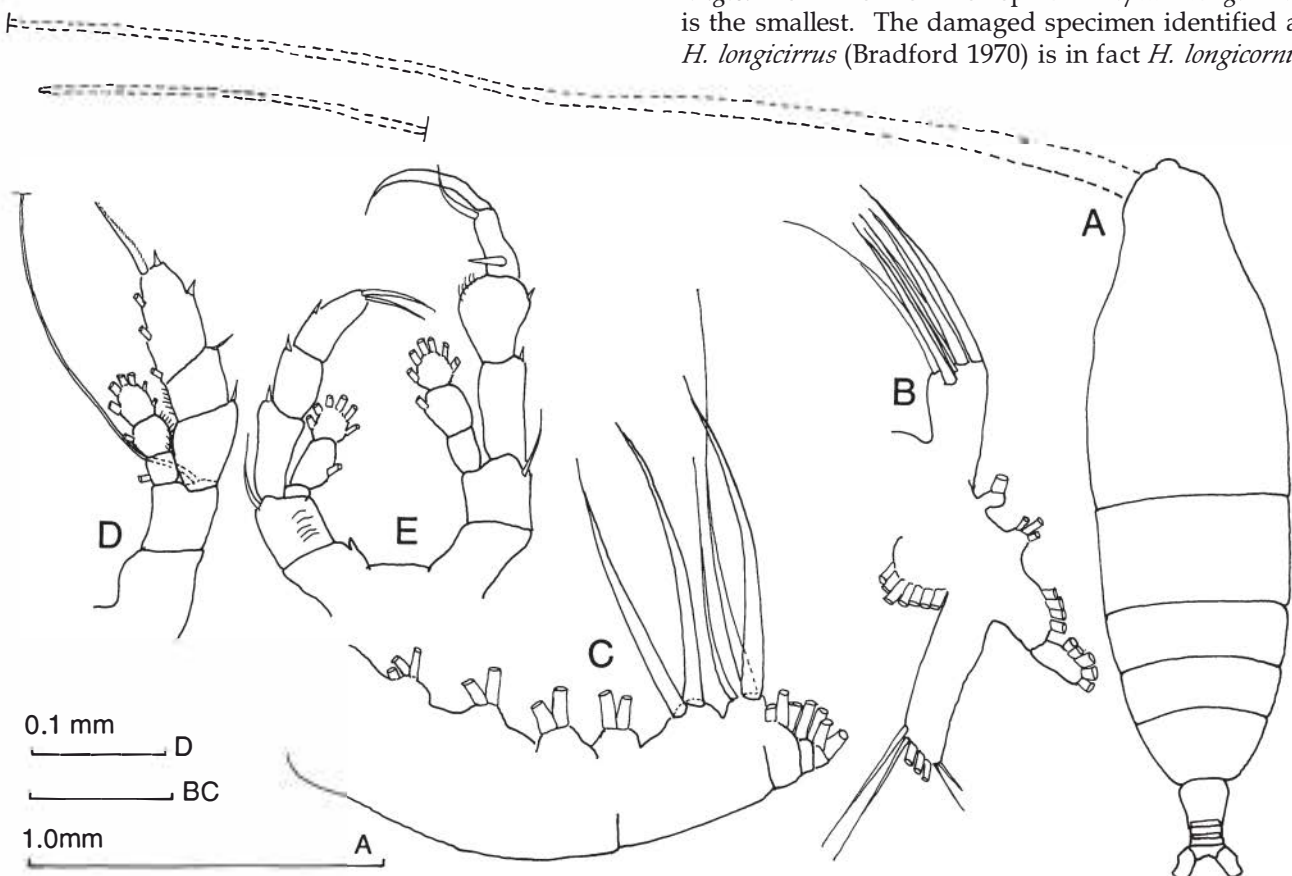


Fig. 32. *Haloptilus longicornis*. Female from Stn F946, 200–500 m: A, dorsal view; B, maxilla 1; C, maxilla 2; D, leg 5. Male from Tanaka (1964): E, leg 5.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Bradford (1970) as both *H. longicirrus* and *H. longicornis*.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500-1000	1 female 2.0 mm
A295	0-500	2 females 2.0, 1.95 mm
A302	0-500	3 females 2.0-2.16 mm
A303	450-1000	2 females 2.0, 2.2 mm
B119	0-500	1 female 2.1 mm
C537	0-250	2 females 2.0 mm
D614	100-250	2 females 2.0 mm
F946	200-500	2 females 2.0, 2.1 mm
F947	0-200	2 females 2.2 mm

DISTRIBUTION: An epi- to mesopelagic species usually found in the upper 200 m of all warm oceans (Park 1970; Matthews 1972).

*Haloptilus mucronatus* (Claus, 1863)  
(Figs 33, 172, 190)

DESCRIPTION: Size: females 3.0-3.6 mm, males 2.17-2.28 mm.

Female: As in the generic definition with the follow-

ing additional characteristics. Body quite slender; head drawn out in front and terminated in a well-defined spine. Urosome short. Antenna 1 a little longer than body. Maxilla 1 terminal endopod segment elongate with 3 setae. Maxilla 2 with 2 claw-like spines, short, and rather weak. (Sars 1925)

Male: As in the generic definition with the following additional characteristics. Anterior head rounded. Maxilla 2 with only 1 seta much thicker than other setae. Leg 5 armature of exopod segment 3 weak. (Giesbrecht, 1892 as *Hemicalanus*)

REMARKS: The shape of the anterior head differs slightly from the shape figured by Sars (1924, 1925).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F947	0-500	1 female 3.5 mm

DISTRIBUTION: An epi- to mesopelagic species distributed in the warmer regions of all oceans, usually in the surface 200 m but also down to 1000 m (Matthews 1972).

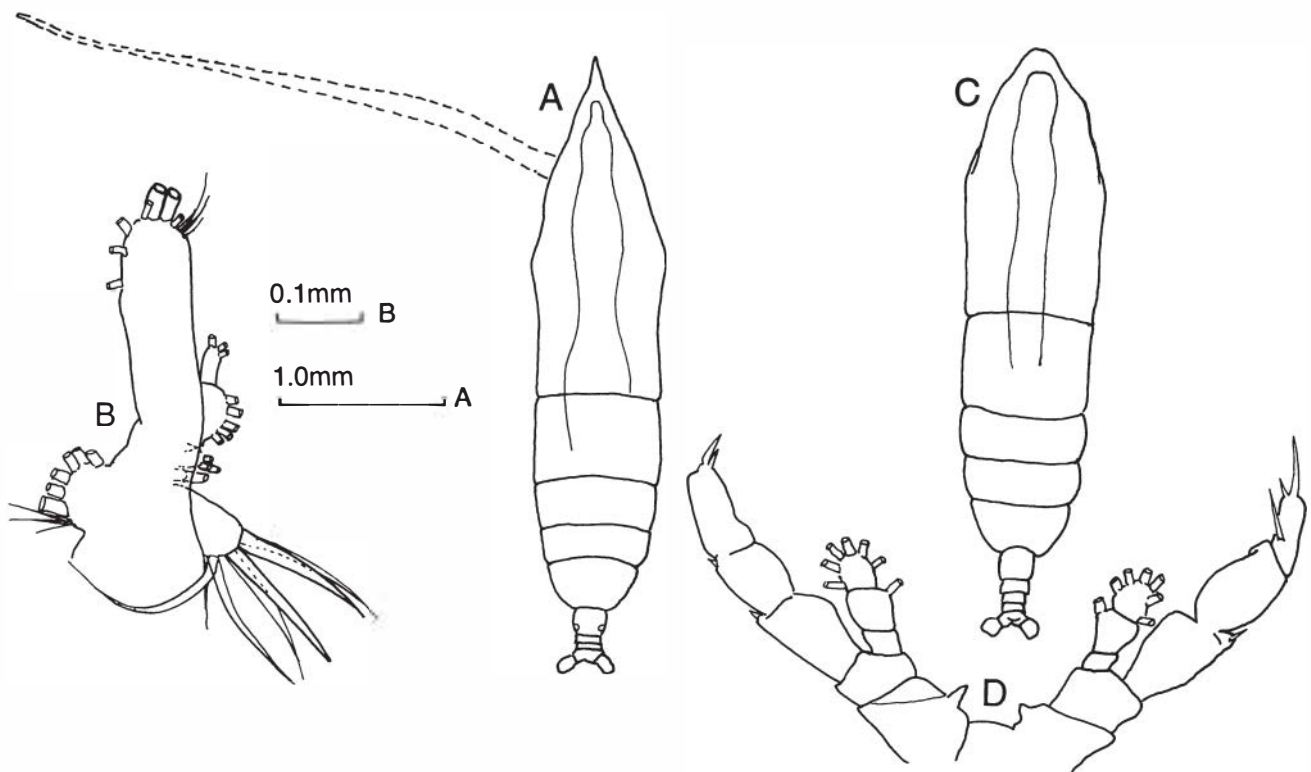


Fig. 33. *Haloptilus mucronatus*. Female from Stn F947, 0-500 m. A, dorsal view; B, maxilla 1. Male from Giesbrecht (1892): C, dorsal view; D, leg 5.



*Haloptilus ornatus* (Giesbrecht 1892)  
(Figs 34, 172, 190)

DESCRIPTION: Size: females 4.3–5.0 mm, males 2.75–3.05 mm.

Female: As in the generic definition with the following additional characteristics. Body moderately slender with the anterior head only a little drawn out and round at the end; rostral filaments absent. Urosome weakly developed; caudal rami short and divergent. Antenna 1 when held straight back, extends beyond the caudal rami by 4–5 segments. Mandibles supplied at the tip with a large tooth connected to a rather prominent, triangular lamella and toothed at its margin. Maxilla 1 with the terminal endopod segment small with 2 setae. Maxilla 2 provided with 2 strong spines in addition to ordinary setae.

(Giesbrecht 1892; Sars 1925)

Male: As in the generic definition with the following additional characteristics. Antenna 1 when held straight back, reaches the end of the caudal rami. Leg 5 right exopod segment 3 with a strong terminal spine and a spiny proximal outer edge spine.

(Giesbrecht 1892)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F945	0–500	1 female 4.95 mm
VUZ112	0–732	1 female 4.75 mm

DISTRIBUTION: A mesopelagic species distributed from the surface to deeper than 150 m in the warm parts of all oceans (Vervoort 1965; Matthews 1972).

*Haloptilus oxycephalus* (Giesbrecht, 1889)  
(Figs 35, 173, 190)

DESCRIPTION: Size: females 3.0–4.1 mm, males 2.40–2.85 mm

Female: As in the generic definition with the following additional characteristics. Body quite slender with anterior part of head terminating in a long, narrow, conical projection directed forward. Urosome relatively short; caudal rami strongly divergent. Antenna 1 about the length of body. Remaining limbs as in *H. acutifrons*.

(Sars 1925)

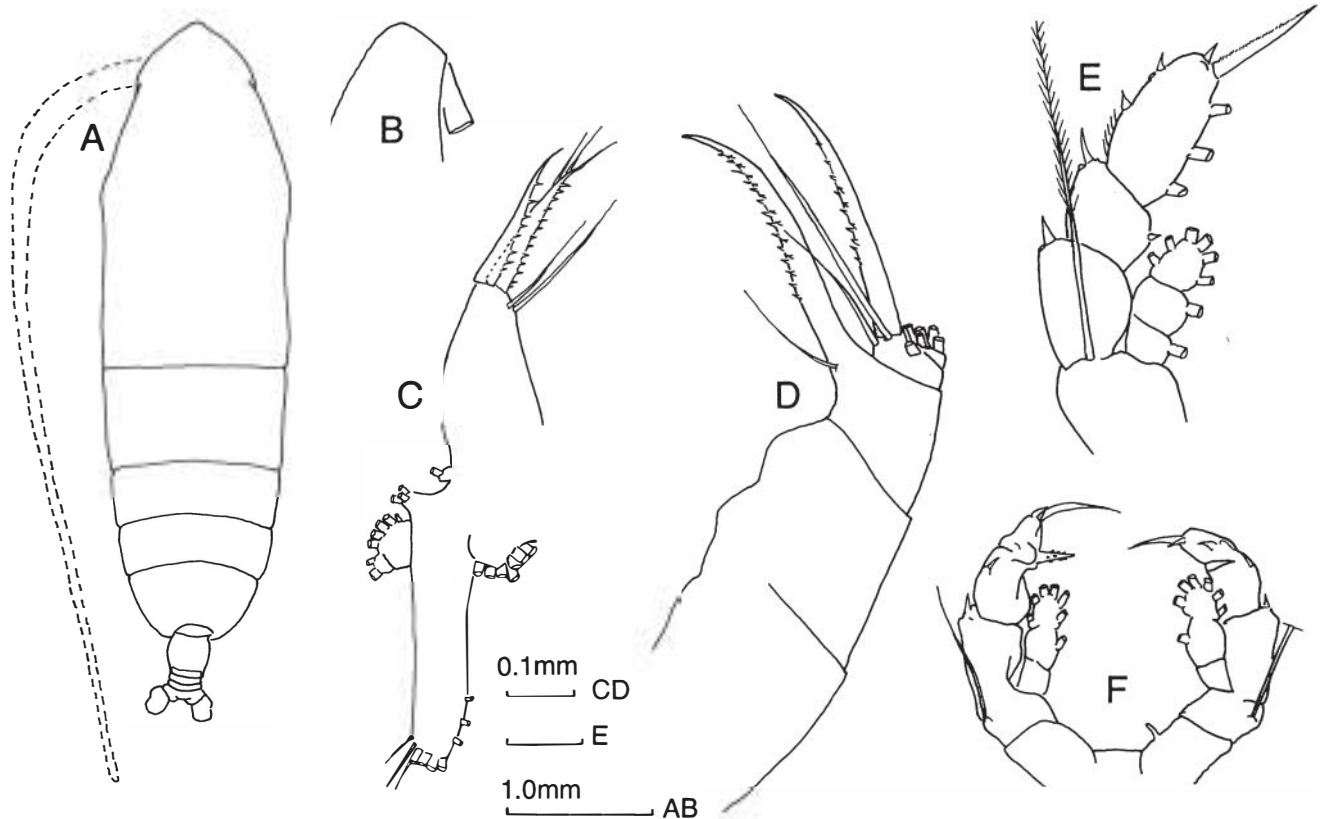


Fig. 34. *Haloptilus ornatus*. Female from Stn VUZ112. A, dorsal view; B, anterior head, lateral view; C, maxilla 1; D, maxilla 2; E, leg 5. Male from Giesbrecht (1892): F, leg 5.

Male: As in the generic definition with the following additional characteristics. Head broadly triangular in dorsal view with apex rounded. Leg 5 with glanular pores at the base of every spine on exopod.  
(Vervoort 1957; Bradford 1971a)

REMARKS: See remarks on *H. acutifrons*.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Bradford (1970, 1972); Park (1988).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A295	0-500	1 female 3.3 mm
B109	0-125	1 female 4.1 mm, 1 male ≈ 2.4 mm
B112	0-500	1 female (damaged)
B114	0-500	1 female 4.1 mm
B116	0-125	1 male 2.4 mm
B120	0-500	1 male 2.6 mm
F947	0-200	1 female
Mu66/68B	0-150?	1 female 4.1 mm
Mu67/116s	0-1000	9 females, 2 males
VUZ105	0-914	1 female 3.7 mm
VUZ112	0-732	1 male 2.4 mm

DISTRIBUTION: This epi- to mesopelagic species appears to have a wide distribution near the surface and down to 600 m (Matthews 1972), although in the Southwest Pacific it was taken mainly in the southern part of the area studied.

*Haloptilus spiniceps* (Giesbrecht, 1892)  
(Figs 36, 173, 190)

DESCRIPTION: Size: females 3.70-5.45 mm, males 2.30-2.55 mm

Female: As in the generic definition with the following additional characteristics. Body a little robust with the anterior head rather drawn out and terminated by a slightly curved, spiniform projection; rostral filaments well developed. Mouthparts and limbs as in type species.  
(Sars 1925)

Male: As in the generic definition with the following additional characteristics. Anterior head rounded. Leg 5 right exopod segment 3 moderately well armed; proximal outer spine smooth.  
(Giesbrecht 1892)

REMARKS: The specimen taken at Stn F945 has maxilla 1 with 2 setae on the endopod compared with 3 on Sars' (1925) specimen, but agrees fairly well with Gies-

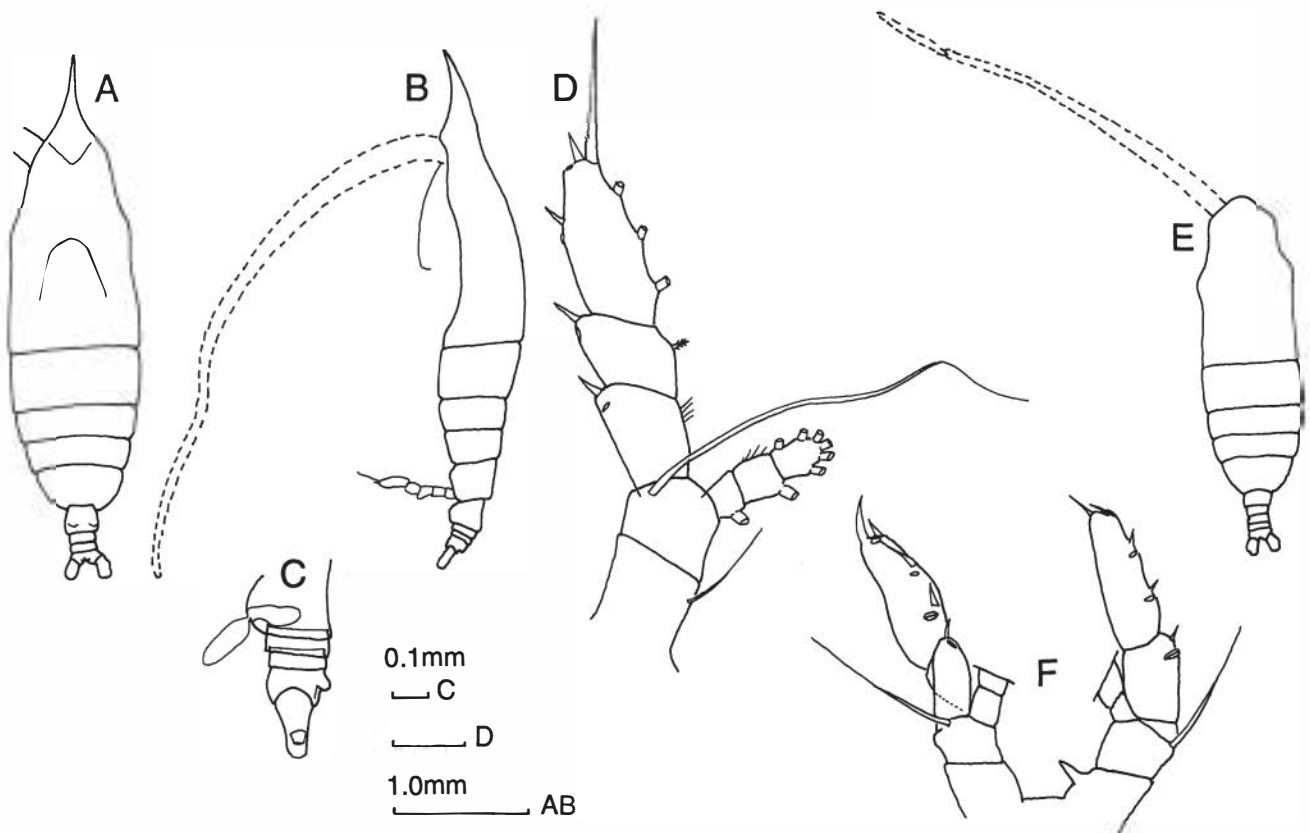


Fig. 35. *Haloptilus oxycephalus*. Female from Stn VUZ105. A, dorsal view; B, lateral view; C, urosome, lateral view from Stn F947, 0-200 m; D, leg 5 from Stn G142, 25-500 m. Male. E, dorsal view; F, leg 5.

brecht's (1892) description although the body seems slightly proportionally wider (length/width = 3.24) than his specimens. The specimen from Stn F945 has maxilla 2 with the spine on lobe 5 with 2 rows of about 19 teeth each, and on lobe 6 with 2 rows of about 14 teeth each. The specimens from Stns A302 and F946 have a more slender body (length/width = 3.62), maxilla 1 endopod has 3 setae, and the spines on lobes 5 and 6 of maxilla 2 with 2 rows of 23–25 teeth each (Fig. 36). These two specimens agree more closely with Sars's (1925) figures. Park (1993) points out that *H. fertilis* may be the male of *H. spiniceps* and the male described as *H. spiniceps* by Giesbrecht (1892) may be that of another species.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Dakin and Colefax (1940).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A302	0–500	1 female 4.5 mm
F945	0–500	1 female 4.3 mm
F946	200–500	1 female 4.5 mm

DISTRIBUTION: This epi- to mesopelagic species is distributed mostly in the upper 300 m in all oceans (Matthews 1972; Park 1993).

*Haloptilus tenuis* Farran, 1908 (Figs 37, 173, 190)

DESCRIPTION: Size: females 4.30–4.4 mm, males 4.2 mm.

Female: As in the generic definition with the following additional characteristics. Body quite robust with the anterior part of head extending forwards, but rounded at the end and having only a weak trace of a projection; rostral protuberance with 2 small filaments. Urosome with caudal rami hardly divergent. Antenna 1 extends beyond caudal rami by about 3–4 segments. Mandible blade narrow. Maxilla 1 endopod with terminal segment large and carrying 4 setae. Maxilla 2 without any claw-like spines. (Sars 1925)

Male: As in the generic definition with the following additional characteristics. About the same size and general shape as female. The anterior head similarly rounded anteriorly but without a trace of a projection. Leg 5 is only a little asymmetrical with exopods modified, being similar in size and structure. (Sars 1925)

REMARKS: The present specimen agrees with Farran's (1908) species.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

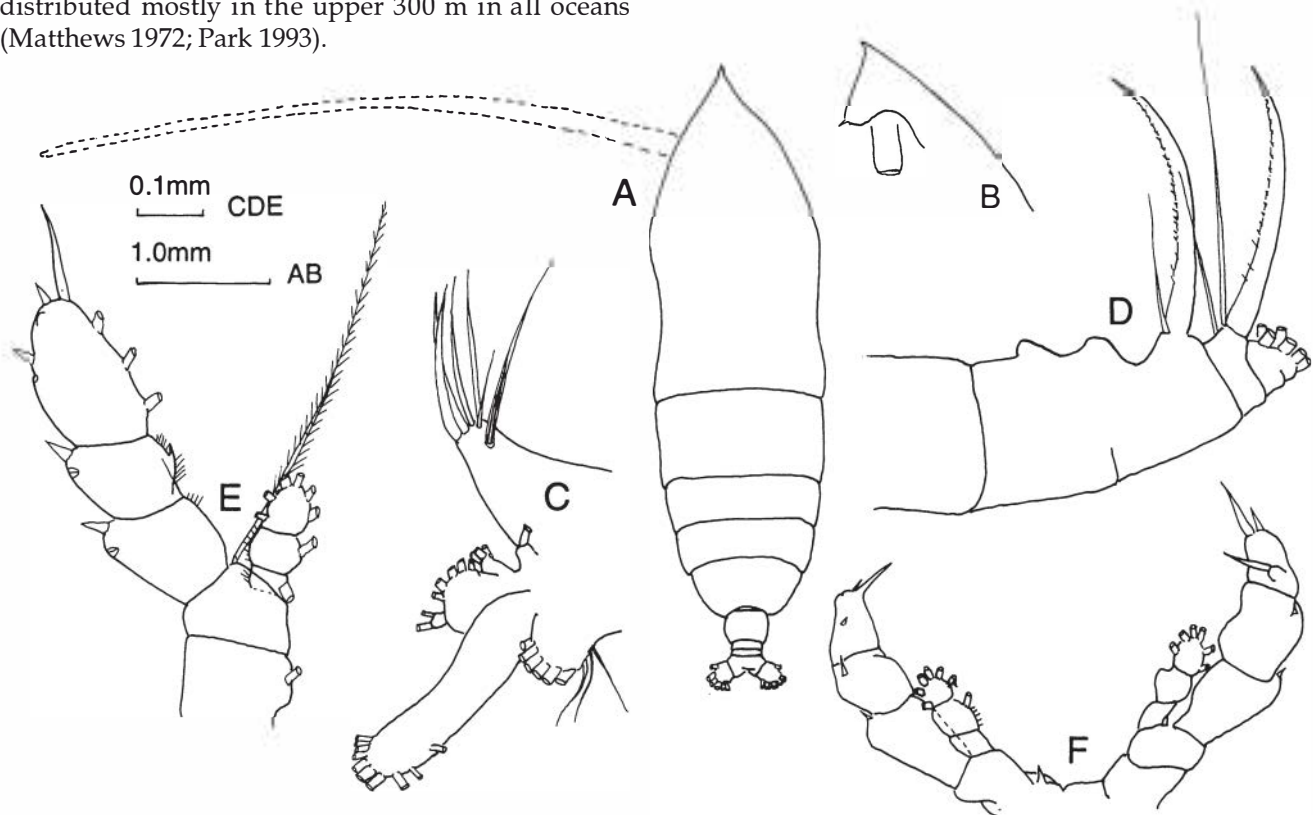


Fig. 36. *Haloptilus spiniceps*. Female from Stn F945, 0–500 m. A, dorsal view; B, anterior head, lateral view; C, maxilla 1; D, maxilla 2; E, leg 5. Male from Giesbrecht (1892). F, leg 5.

Stn No.	Depth of Haul (m)	Specimens
F945	0-500	1 female 4.3 mm

DISTRIBUTION: This epi- to meso- to bathypelagic species is distributed over a wide depth range from the surface 200 m to 1000-2000 m. Mainly in warm waters but extending to 65°N in the North Atlantic (Matthews 1972).

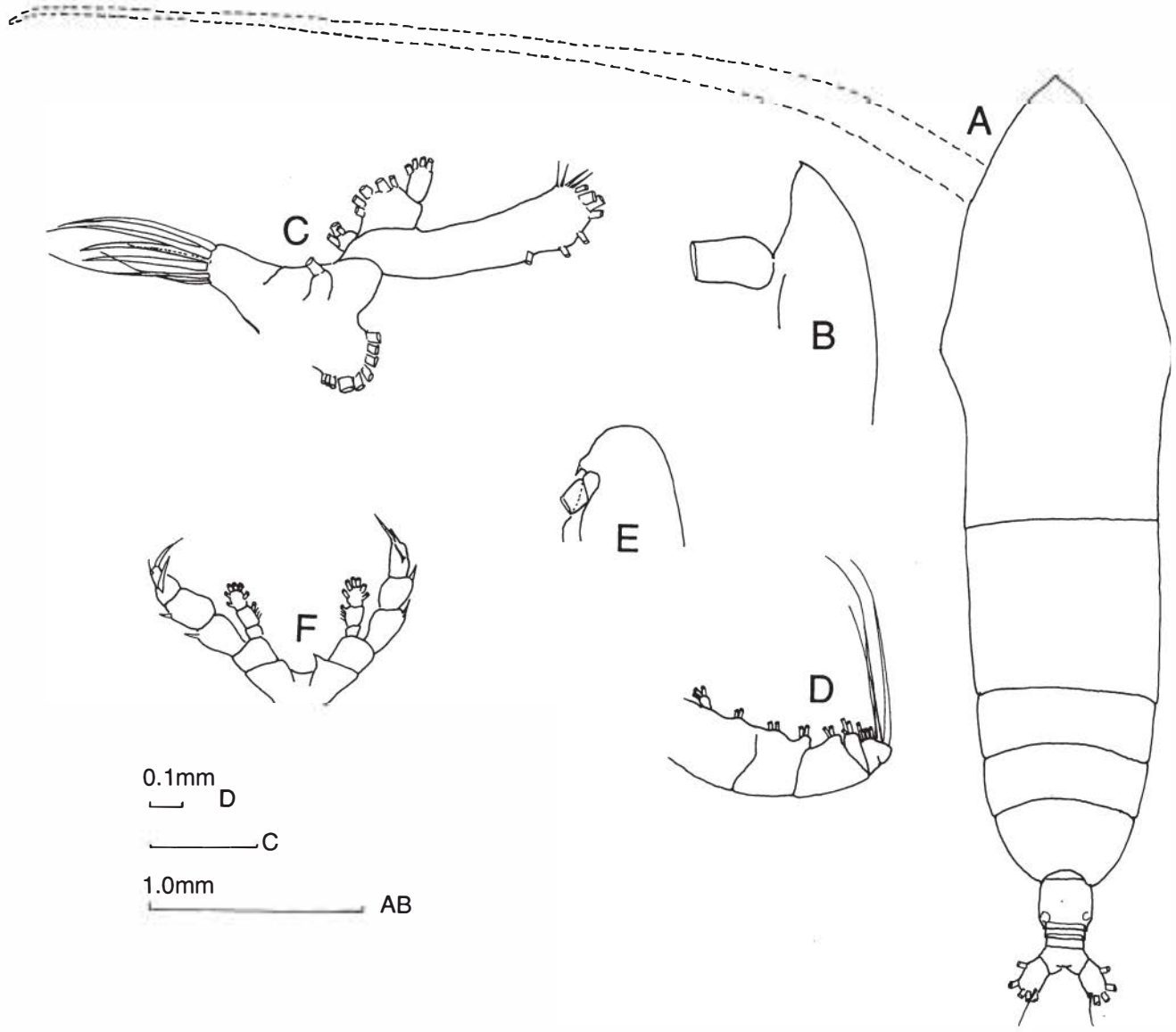


Fig. 37. *Haloptilus tenuis*. Female from Stn F945, 0-500 m. A, dorsal view; B, anterior head, lateral view; C, maxilla 1; D, maxilla 2. Male from Sars (1924). E, anterior head, lateral view; F, leg 5.

***Heteroptilus* Sars, 1920**

DEFINITION: As in the family definition with the following additional characters. This genus is distinguished by the structure of the mandibles which resemble those of *Heterorhabdus* with right mandibular blade much larger than left and carrying an extremely large scythe-like hook. Urosome of female 4-segmented. Leg 1 with a 2-segmented endopod. Female leg 5 with a 1-segmented

endopod; male leg 5 with 3-segmented endopods. (Sars 1925)

TYPE SPECIES: *Pontoptilus attenuatus* Sars, 1905b

REMARKS: The following species have been described in this genus: *Heteroptilus attenuatus* (Sars, 1905b) and *H. acutilobus* (Sars, 1905b). No species of this genus have been taken in the Southwest Pacific.



*Pachyptilus* Sars, 1920

DEFINITION: As in the family definition with the following additional characters. This genus is distinguished from *Pontoptilus* by the markedly compact body; the presence of a well-developed, bifurcate rostrum; the extraordinary development of the anterior lip; the mandibular blade, which is enlarged and axe-shaped; and the 1-segmented endopods of the female leg 5. Males unknown. (Sars 1925)

TYPE SPECIES: *Pontoptilus abbreviatus* Sars, 1905b

REMARKS: The following species have been described in this genus: *Pachyptilus abbreviatus* (Sars, 1905b); *P. eurygnathus* (Sars, 1905b); *P. lobatus* Sars, 1920; *P. longimanus* (Wolfenden, 1906); and *P. pacificus* Johnson, 1936. The following species has been taken in the Southwest Pacific.

*Pachyptilus eurygnathus* (Sars, 1905b)  
(Figs 38, 173, 190)

DESCRIPTION: Size: females 4.8–4.9 mm, male unknown.  
Female: As in the generic definition with the follow-

ing additional characters. Rostral spines elongate and slender. Posterior lobes of pedigerous segment 4+5 projecting slightly backwards. Caudal rami longer than wide; second terminal seta on the left is elongated. Antenna 1 extends beyond the body by about 5 segments. Mandibular blade strongly enlarged and axe-like; external angle extends in a prominent projection and the cutting edge is in the form of an acute point; inner expansion is rather large and carries 2 strong, curved teeth inside and, in addition, the number of teeth differs slightly on each blade. Maxilla 2 with lobe 5 carrying a strong claw-like spine and 3 fine setae. (Sars 1925)

Male: Unknown.

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
VUZ112	0-732	1 female 4.9 mm

DISTRIBUTION: Found at bathypelagic depths in all oceans (Rose 1933; Grice & Hülsemann 1967).

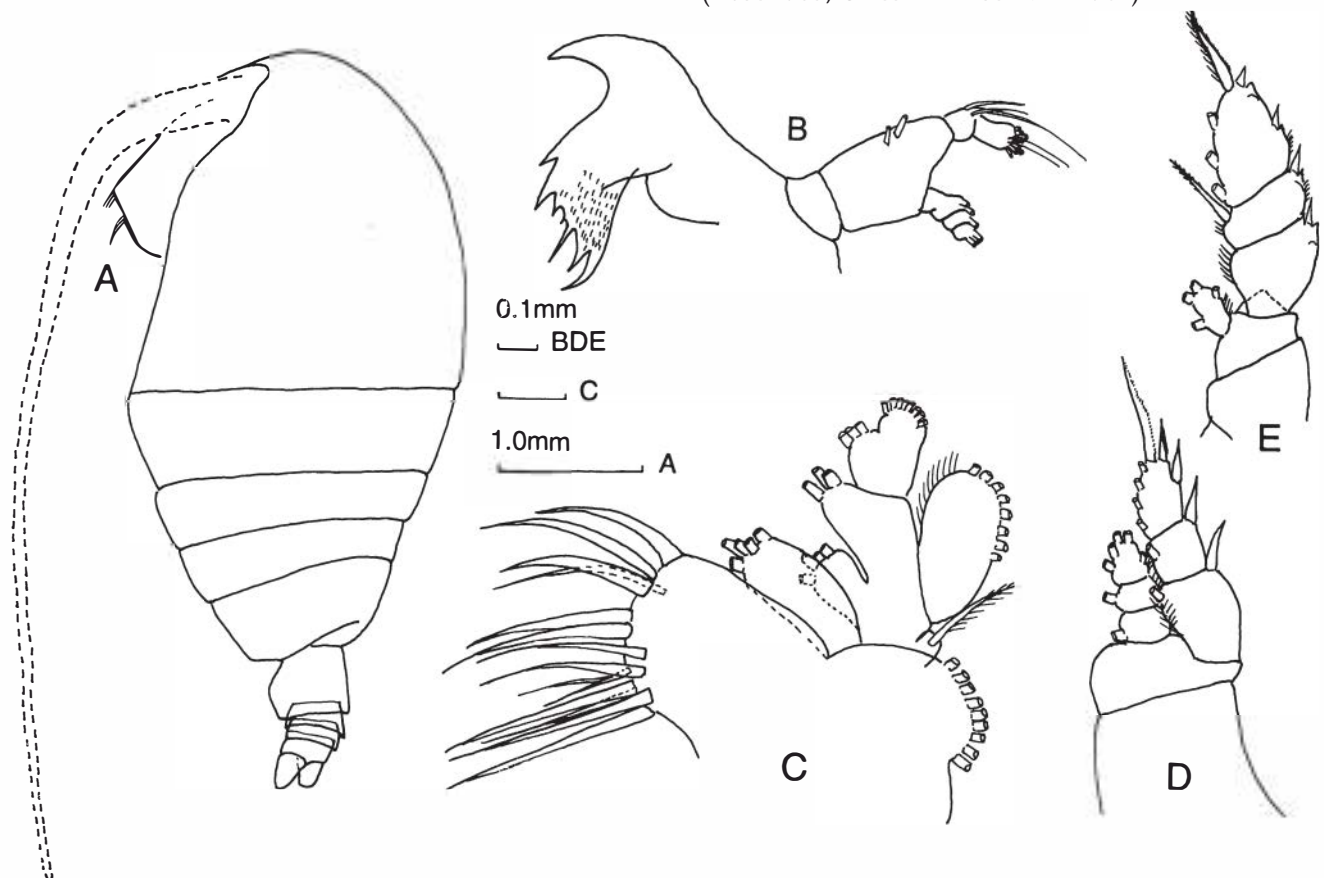


Fig. 38. *Pachyptilus eurygnathus*. Female from Stn VUZ112. A, lateral view; B, left mandible; C, maxilla 1; D, leg 1; E, leg 5.

*Pontoptilus* Sars, 1905b

DEFINITION: As in the family definition with the following additional characters. Urosome of female 4-segmented. Antenna 2 exopod longer than endopod. Maxilla 1 with a large inner lobe 1 and all parts present with slender, curved setae. Female leg 5 endopod 2-segmented. (Sars 1925)

TYPE SPECIES: *Pontoptilus muticus* Sars, 1905b

REMARKS: This genus contains the following species: *Pontoptilus lacertosus* Grice & Hülsemann, 1967; *P. mucronatus* Sars, 1905b (male see Sars, 1925); *P. muticus* Sars, 1905b (male unknown); *P. ovalis* Sars, 1907 (male unknown); *P. pertenuis* Sars, 1907; *P. robustus* Sars, 1905b (female see Grice & Hülsemann 1967). No members of this genus have been taken in the Southwest Pacific.

*Pseudaugaptilus* Sars, 1907

DEFINITION: Differs from the genus *Euaugaptilus* by a 4-segmented urosome in female. Rostral filaments long and thin. Mandibular blade long and thin and denticulate distally. Leg 5 in both sexes with exopod without outer edge spines; and differing little between the sexes. (Brodsky 1950)

TYPE SPECIES: *Pseudaugaptilus longiremis* Sars, 1907

REMARKS: This genus contains the following species: *Pseudaugaptilus longiremis* Sars, 1907; *P. orientalis* Tanaka, 1964b; and *P. polaris* Brodsky, 1950. No species of this genus has been taken in the Southwest Pacific.

Family DISCOIDAE Gordeyeva, 1975a

DEFINITION: Female: Small forms 0.3–1.2 mm total length, from deep water. Prosome an elongate-oval, anterior head rounded. Rostrum in the form of a simple plate, rounded or weakly incised terminally or completely absent. Head and pedigerous segment 1 separate, sometimes not entirely, pedigerous segments 4 and 5 fused. Posterior metasomal corners rounded, in a few species directed ventrally. Urosome 4-segmented, its length equal to at least half the length of prosome; genital segment of various forms, in *Prodisco* it has sac-like outgrowths laterally; anal segment is longer than (only sometimes almost equal to) caudal rami; caudal rami long or short, symmetrical, with 4 terminal equal setae or of various lengths and thicknesses. Antenna 1 shorter than body, consisting of 17–26 free segments, furnished along whole length with

simple and sensory setae. Antenna 2 endopod is shorter than exopod; basipod 2 with 0–1 seta; endopod segment 1 with 0–1 seta, segment 2 with 6–14 setae; exopod variable, 5–9-segmented with 4–10 setae. Mouthparts considerably reduced, their ventral expression weak. Mandibular blade with 2 or more strong teeth; basipod usually without setae; endopod segment 1 with 0–2 setae, segment 2 with 2–8 setae; exopod with 5–6 setae. Maxilla 1 variable with reduced number of setae and lobes; inner lobe 1 with 2–6 spines and setae; inner lobe 2 absent or with 1–2 setae; inner lobe 3 absent or with 1–3 setae; basipod absent or with 0–2 seta; endopod absent or with 3–8 setae; exopod absent or with 2–7 setae; outer lobe 2 absent or with 1 seta; outer lobe 1 with 2–6 setae. Maxilla 2 lobes 1–5 with 2–4, 1–2, 2, 1–2, 1–2 setae respectively, endopod with 3–4 setae or reduced to a simple 1–2-segment lobe with 3–8 setae. Maxilliped basipod 1 with 2–6 setae; basipod 2 with 0–2 setae; endopod 5-segmented with 1–2, 1–2, 1–2, 0–3, 1–4 setae respectively or reduced to a 6-segment rod with 1–4 terminal setae. Swimming legs with varying degrees of fusion between endopod segments; leg 1 endopod 1–3-segmented, more usually 2-segmented, legs 2–4 endopods usually 3-segmented although may be 1-segmented. Spine and seta formula as follows:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0–0	0–0	I-0; I-1; II, I, 4	0–0/1; 0, 3, 0/1 or 0–0; 0–0; 0, 3, 1
Leg 2	0–0/1	0–0	I-0; I-1; II, I, 4	0–0/1; 0–0/1; 0, 2/3, 1
Leg 3	0–1	0–0	I-0; I-1; II/III, I, 5	0–0/1; 0/1–0/1; 0, 2/3, 1
Leg 4	0–0/1	0–0	I-0; I-1; II/III, I, 5	0–1; 0–1; 0, 3, 1

Leg 5 of female is strongly reduced or absent.

Male: Urosome 5-segmented; in *Prodisco* the genital segment has slightly asymmetrical lateral extensions. Antenna 1 setae particularly abundant in male, which has its left antenna 1 geniculate; 3 or more free segments distal to joint. Mouthparts reduced relative to female. Leg 5 of male strongly modified and variable; right and left legs uniramous or biramous, asymmetrical, little different in length; endopods, if present, 1–3 segmented; exopods 3-segmented with terminal setae, segments 1 and 2 usually without setae, segment 2 sometimes has an inner projection.

(Fosshagen 1967; Gordeyeva 1975a)

REMARKS: The morphological details of this family need more attention. This family contains three genera: *Disco* Grice & Hülsemann, 1965; *Paradisco* Gordeyeva, 1975a; *Prodisco* Gordeyeva, 1975a, none of which has yet been taken in the Southwest Pacific.



*Disco* Grice & Hülsemann, 1965

DEFINITION: As in the family definition with the following additional characteristics. Small copepods generally less than 1 mm in length. Rostrum large and obtusely rounded or absent. Anal segment longer than the preceding segment. Antenna 1 17–26-segmented; of a reduced number of segments in male left geniculate antenna. Antenna 2 endopod about two-thirds the length of exopod which is 6–8-segmented; distal segment of exopod equals approximately half the length of entire exopod. Mandibular endopod usually longer than exopod; blade with spine-like teeth. Maxilla 1, maxilla 2, and maxilliped with varying degrees of reduction. Male maxilla 1, maxilla 2, and maxilliped slightly reduced compared with female. Swimming leg 1 endopods usually 2-segmented, sometimes 1-segmented; legs 2–3 endopod usually 3-segmented but may have all segments fused. Leg 5 of the female rudimentary or absent; of the male uniramous or biramous. (Grice & Hülsemann 1965, 1967; Fosshagen 1967; Gordeyeva 1974a; 1974b; 1974c; 1975; 1975; 1976)

TYPE SPECIES: *Disco inflatus* Grice & Hülsemann, 1965

REMARKS: This genus now contains the following species. *Disco atlanticus* Gordeyeva, 1974a; *D. caribbeanensis* Gordeyeva, 1974c (male unknown); *D. creatus* Gordeyeva, 1975b (male unknown); *D. curtirostris* Gordeyeva, 1975b; *D. elephantus* Gordeyeva, 1975b (male unknown); *D. erythraeus* Gordeyeva, 1974b (male unknown); *D. fiordicus* Fosshagen, 1967; *D. inflatus* Grice & Hülsemann, 1965 (male Grice & Hülsemann 1965); *D. intermedius* Gordeyeva, 1976; *D. longus* Grice & Hülsemann, 1965 (male unknown); *D. marinus* Gordeyeva, 1974a (male unknown); *D. minutus* Grice & Hülsemann, 1965 (male unknown); *D. oceanicus* Gordeyeva, 1974a (male unknown); *D. oviformis* Park, 1970 (male unknown); *D. peltatus* Gordeyeva, 1974c (male unknown); *D. populosus* Gordeyeva, 1976 (male unknown); *D. robustipes* Gordeyeva, 1974b (male unknown); *D. tropicus* Gordeyeva, 1974a (male unknown); *D. vulgaris* Gordeyeva, 1974b (male unknown); *Disco* sp. Grice & Hülsemann, 1967 (female unknown) none of which has been taken in the Southwest Pacific.

*Paradisco* Gordeyeva, 1975a

DEFINITION: As in the family definition with the following additional characteristics. Small copepods measuring 0.46–0.57 mm. Rostrum 1-branched, tapering, rounded at tip or with a small excavation. Anal segment slightly longer than previous segment or nearly equal to it. Antenna 1 comparatively long, 26-segment-

ed, extending to the middle of genital segment. Antenna 2 endopod length about two-thirds the length of exopod; exopod is unusually built — the 2-segmented distal part is articulated and movable with the proximal part, the terminal segment is short, equal to only one-third the length of the whole exopod. Mandible with thorn-like teeth; endopod of palp nearly equal to length of exopod, its terminal segment in the form of a wide lobe. Maxilla 1 with 3–5 setae on first inner lobe. Maxilla 2 with 5 lobes on basipod, carrying long flatly lying setae, and a reduced endopod with smooth setae. Maxilliped with a reduced number of setae on the inner border, setae normal, low-lying. All swimming legs with endopods 3-segmented. Leg 5 of female is rudimentary, symmetrical, 1–3-segmented; of the male strongly modified, biramous asymmetrical, right and left legs slightly different in length.

(Gordeyeva 1975a)

TYPE SPECIES: *Paradisco gracilis* Gordeyeva, 1975

REMARKS: This genus contains the following species *Paradisco gracilis* Gordeyeva, 1975a; *P. grandis* Gordeyeva, 1976; *Paradisco mediterraneus* (Gordeyeva, 1974b) none of which has been taken in the Southwest Pacific.

*Prodisco* Gordeyeva, 1975a

DEFINITION: As in the family definition with the following additional characteristics. Length smaller than 0.5 mm. Body compact, similar to some representatives of the Cyclopoida. Close to genus *Disco* Grice & Hülsemann, 1965, but differs in the form of genital segment, small number of exopod segments in antenna 2, and the strongly extended posterior corners of the last metasomal segment. Head and pedigerous segment 1 separate, pedigerous segments 4 and 5 fused. Rostrum in the form of a plate, rounded at its tip, or absent. Urosome of female 4-segmented; genital segment large, long, with lateral sac-like outgrowths extending ventrally, in which the genital products are stored; anal segment longer than preceding segment and caudal rami; caudal rami carry 4 terminal setae of different lengths. Antenna 2 endopod equal to two-thirds the length of exopod, made from 4 segments, distal segment a little less than half the length of whole exopod. Mandibular palp endopod not much longer than exopod. Mouthparts and their ventral expression strongly reduced. Swimming legs with their exopods 3-segmented; endopod on leg 1 2-segmented, on other legs 3-segmented; inner border of exopod segment 3 of leg 1 with 4 setae, of legs 2–4 with 5 setae. Leg 5 in the female absent; rudimentary in the male.

(Gordeyeva 1975a)

TYPE SPECIES: *Prodisco princeps* Gordeyeva, 1975a

REMARKS: The following species have been described in this genus. *Prodisco princeps* Gordeyeva, 1975a (male unknown); *P. secundus* Gordeyeva, 1975a (female unknown) neither of which has been taken in the Southwest Pacific.

Family **HYPERBIONYCHIDAE** Ohtsuka, Roe & Boxshall, 1993

DEFINITION: As for the genus *Hyperbionyx*.

REMARKS: This is a monotypic family represented at the moment by one species and genus, *Hyperbionyx pluto*.

*Hyperbionyx* Ohtsuka, Roe & Boxshall, 1993

DEFINITION: Body widest midway along head; body tapering posteriorly; head and pedigerous segment 1 separate, pedigerous segments 4 and 5 fused with their posterolateral corners slightly produced outwards. Genital segment of female with ventrolateral functional left, and non-functional right gonopores; caudal rami asymmetrical, right longer than left. Rostrum triangular with a pair of long filaments. Right antenna 1 of female indistinctly 27-segmented, shorter than left. Antenna 2 with an indistinctly 3-segmented endopod and incompletely 9-segmented exopod. Mandible blade with 2 strong teeth and a palp comprising a 2-segmented endopod and indistinctly 5-segmented exopod. Maxilla 1 with 7 spines and 6 setae on inner lobe 1; 3 setae on inner lobe 2; and 2 setae on outer lobe 1; endopod is elongate, 1-segmented with 5 setae; exopod is incompletely fused with basipod and bears 2 setae. Maxilla 2 well-developed; lobe 4 with a stout serrate spine; lobe 5 considerably produced anteriorly, bearing a chitinised spine; endopod segment 1 produced, with a chitinised spine; terminal endopod segments relatively reduced. Maxilliped with basipods 1 and 2 with 4 and 3 setae respectively; terminal endopod segment with relatively well-developed, serrate setae. Swimming leg 1 basipod 2 lacks an outer edge seta; distal 2 endopod segments completely or incompletely separate; exopod segment 1 with a long spiniform outer seta; exopod segment 2 lacking an outer spine; exopod segment 3 with 2 lateral and 1 terminal spine. Leg 3 with 1 small outer seta on posterior surface of basipod 2. Leg 4 with inner seta on basipod 1. Leg 5 of female uniramous, nearly symmetrical, lacking endopod; exopod 1-segmented with 2 lateral spines and 1 terminal and 2 inner setae. Leg 5 of male uniramous,

asymmetrical; right basipod 2 with an inner projection derived from endopod; distal 2 exopod segments of right leg expanded, lamellar. (Ohtsuka *et al.* 1993)

TYPE SPECIES: *Hyperbionyx pluto* Ohtsuka, Roe & Boxshall, 1993

REMARKS: This genus is known only from the type species which has not been taken in the Southwest Pacific.

Family **HETERORHABDIDAE** Sars, 1903

DEFINITION: Female: Total length 2.0–8.0 mm. Body usually slender, prosome oval, head and pedigerous segment 1 separated, pedigerous segments 4 and 5 usually fused, posterolateral corners rounded. Head rounded anteriorly; rostral filaments slender. Urosome elongate, 4-segmented; genital segment with ventral process sometimes protruding greatly and sometimes occupying the whole length of segment; caudal rami usually asymmetrical (largest on left) with varying degrees of fusion between them and anal segment, with 7 setae, one of the terminal setae often slightly or extraordinarily elongate on left side. Antenna 1 symmetrical, 25-segmented. Antenna 2 basipod 2 with 2 outer edge setae; exopod and endopod separated from basipod; endopod 2-segmented, segment 1 with 2 distally placed setae, segment 2 with 6–8 inner setae medially and 6–7 setae terminally; exopod 7–9-segmented, proximal 2 segments sometimes without setae. Mandibular blade usually asymmetrically developed on each side with 3–5 (or more) long, sharp teeth; in *Heterorhabdus*, *Hemirhabdus*, and *Neorhabdus* one tooth is set far apart from remaining teeth; endopod 2-segmented, segment 1 with 2–4 setae, segment 2 with 6–9 setae terminally; exopod segments 1–4 with 1 seta each, segment 5 carrying 2 setae. Maxilla 1 tends to have inner lobes 1–3 and endopod reduced; inner lobe 1 with 5–13 spines and setae (most reduced setation in *Hemirhabdus*, least reduced in *Disseta*); inner lobe 2 small or absent with 0–2 setae; inner lobe 3 small or absent with 0–2 setae, basipod with 1–4 setae; endopod small, 1-segmented, with 4–11 setae; exopod large, with 5–11 setae (least reduced setation in *Disseta* and *Mesorhabdus*); outer lobe 1 with 3–8 setae. Maxilla 2 usually modified as a grasping, piercing limb (least modified in *Disseta* and most modified in *Hemirhabdus*); lobes 1 and 2 with 3–5 and 0–3 reduced setae respectively; lobes 3 and 4 with 2–3 and 2–3 usually small setae respectively; lobe 5 with 1–3 setae 1 or 2 of which may be greatly enlarged and spine-like; endopod segment 1 usually with an enlarged spine-like seta; the remainder of the endopod with greatly reduced setae. Maxilli-



ped basipod 1 with 3–7 setae the proximal one of which is greatly enlarged and spine-like in *Heterorhabdus*; basipod 2 slender with 3 small setae medially; endopod 6-segmented, segment 1 almost fully incorporated into basis with 2 setae, segments 2–5 with 3, 3, 2–3, 2–3 setae respectively, segment 6 with 3–4 setae the outermost 1–2 of which are reduced. Swimming legs 1–4 distinctly 3-segmented, exopods of legs 2–4 flattened and leaf-like. Spine and seta formula as follows:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0-1	1/0-1	I-1; I-1; II-III, I, 3/4	0-1; 0-2; 1, 2, 2
Leg 2	0-1	0-0	I-1; I-1; III, I, 5	0-1; 0-2; 2, 2, 3
Leg 3	0-1	0-0	I-1; I-1; III, I, 5	0-1; 0-2; 2, 2, 3/4
Leg 4	0-1	1-0	I-1; I-1; III, I, 5	0-1; 0-2; 2, 2, 3
Leg 5	0-0	1-0	I-0; I-1; II, I, 4	0-1; 0-1; 2, 2, 2

Leg 5 natatory, symmetrical, similar to other swimming legs but smaller than legs 2–4; inner edge seta on exopod segment 2 is modified into a long slender spine articulated with its segment; exopod segment 2 posterior distal border expanded into a toothed flange.

Male: Body similar to female, but urosome 5-segmented. Left antenna 1 geniculate, 21–23-segmented. Mouthparts and legs 1–4 similar to female. Leg 5 with a 3-segmented endopod and exopod on left and right, right basipod 2 usually with inner extensions of variable shape and usually fringed by hairs or spinules, sometimes with an inner extension on the left; right exopod segment 2 with an inner expansion of variable shape but usually in the form of a thick spine; left exopod segment 3 often but not always terminated by an elongate spine. (Rose 1933; Brodsky 1950)

An example of this family is *Heterorhabdus spinosus* (Figs 39, 40).

REMARKS: This family was revised by Heptner (1972) and the genera redefined based on the structure of the mouthparts which are related to feeding type. Later Grice (1973) added a further genus, although it has been only provisionally placed in this family pending discovery of the male. As currently defined the family includes the following genera: *Alrhabdus* Grice, 1973; *Disseta* Giesbrecht, 1892; *Hemirhabdus* Wolfenden, 1911; *Heterorhabdus* Giesbrecht, 1892; *Heterostylites* Sars, 1920; *Mesorhabdus* Sars, 1905b; *Microdisseta* Heptner, 1972b; and *Neorhabdus* Heptner 1972b. Heterorhabdidae are considered to be carnivores based on mouthpart morphology (Itoh 1970; Nishida & Ohtsuka 1996) and gut contents (Harding 1974), and are deduced by Arashkevich (1969) to be suctorial predators. Copepods of this family are usually luminescent (Herring 1988).

### *Alrhabdus* Grice, 1973

DEFINITION: As for the family definition with the following additional characteristics. Relatively large copepods with head and pedigerous segment 1 separate, pedigerous segments 4 and 5 separate, posterior corners bifurcate. Urosome 4-segmented. Rostral plate with 2 strong spines. Labrum with a cluster of ventrally projecting spines. Caudal rami asymmetrical, right ramus slightly longer than left and bearing an elongate seta. Mandible with a small palp, blade with 4 large, approximately evenly spaced teeth. Maxilla 1 with a well-developed inner lobe 1, remainder of limb relatively small; outer lobe 1 with 5 setae, exopod with 6 setae, basipod 2 with one seta, and endopod with 3 setae. Maxilla 2 with all lobes present, with setae and spines becoming thicker and stronger progressing from proximal to distal, including the terminal-most spine-like setae. Maxilliped basipod with 8 spines and setae, basipod 2 with 3 marginal spines. Legs 3–5 basipod 2 with a seta on outer distolateral corner. Leg 5 exopod segment 2 with a short spine, endopod segments 1 and 2 with inner edge setae modified into a lobate form with a sensory filament terminally. Male unknown.

(Grice 1973)

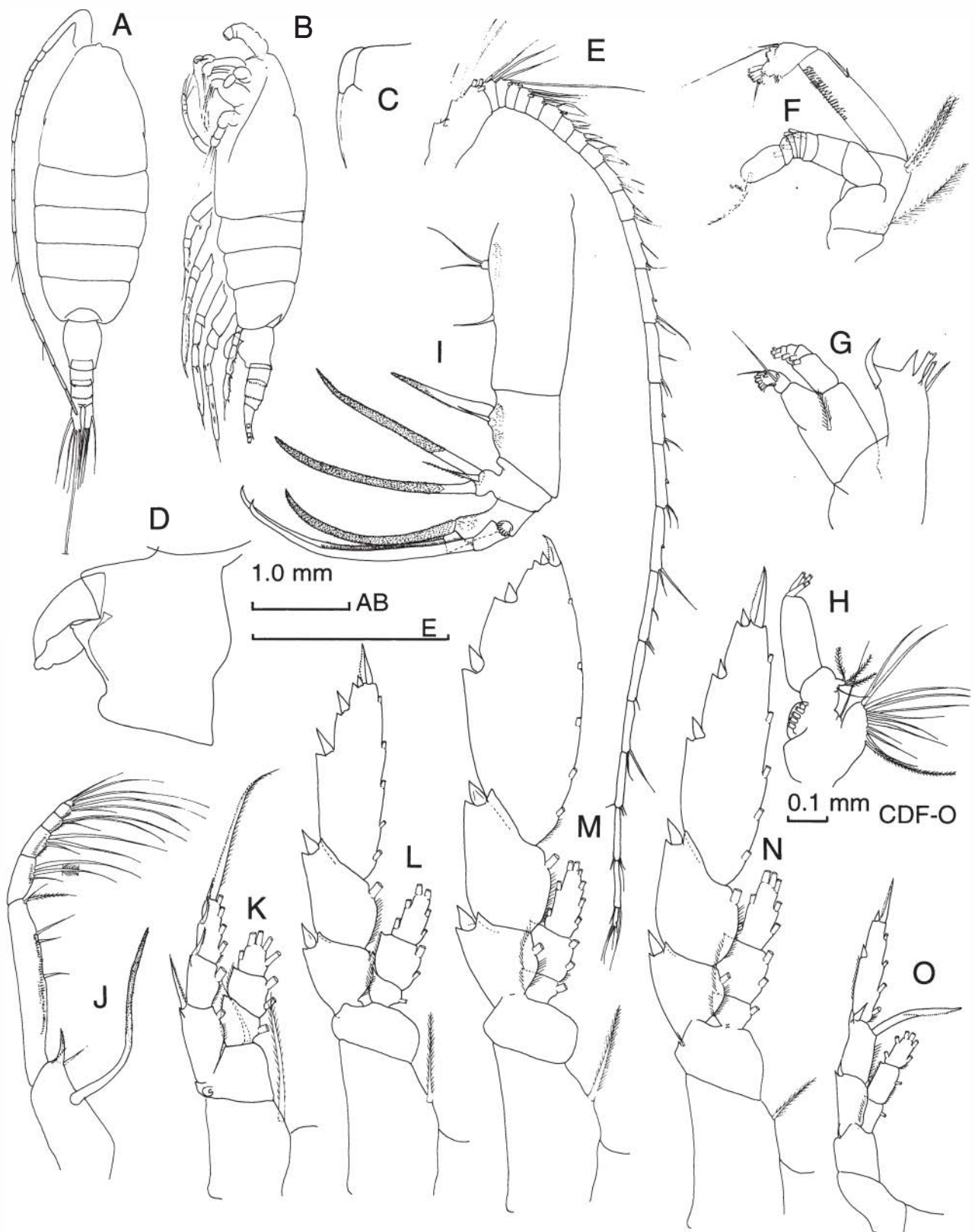
TYPE SPECIES: *Alrhabdus johrdeae* Grice, 1973

REMARKS: This genus is known only from the one species found at benthopelagic depths in 1733 m. This species has been placed tentatively in the Heterorhabdidae pending discovery of the male. No example of this genus has been found in the Southwest Pacific.

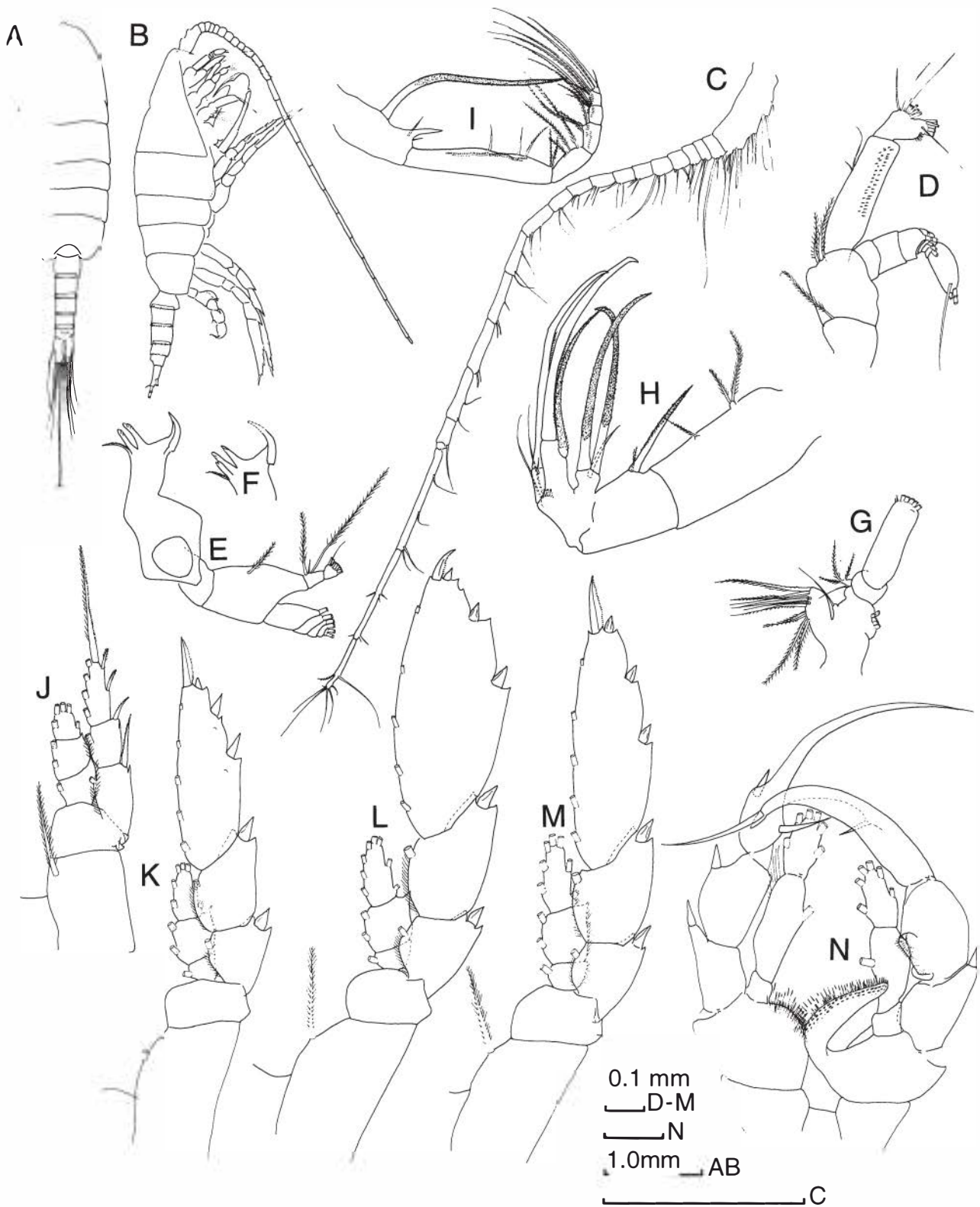
### *Disseta* Giesbrecht, 1892

DEFINITION: As for the family definition with the following additional characteristics. Female genital segment usually with a greatly protruding ventral process. Antenna 1 exceeding the body in length. Antenna 2 with subequal rami. Masticatory edge of mandible is without a large space between some teeth; there are 4 wide ventral teeth, and remaining dorsal teeth are small. Maxilla 1 in the form of a fan with long plumose setae; distally exopod and endopod are arranged together at one level; outer lobe 1 with 9 setae, the exopod with 10 setae, and endopod with 11–12 setae. Maxilla 2 with distal part greatly reduced, setae long, plumose, and of almost equal size. Maxilliped basipod 1 shorter than basipod 2 by one-fifth of its length and without large naked curved spines; endopod segments 1 and 2 not more than 1.5 times as long as wide. Male leg 5 with right exopod segment 2 with its inner edge swollen and with an inner edge protuberance.

(Brodsky 1950; Heptner 1972b)



**Fig. 39. *Heterorhabdus spinosus*.** Female from Stn Mu67/94s. **A**, dorsal view; **B**, lateral view; **C**, rostrum, lateral view; **D**, genital segment, lateral view; **E**, antenna 1; **F**, antenna 2; **G**, mandible; **H**, maxilla 1; **I**, maxilla 2; **J**, maxilliped; **K**, leg 1; **L**, leg 2; **M**, leg 3; **N**, leg 4; **O**, leg 5.



**Fig. 40.** *Heterorhabdus spinosus*. Male from Stn Mu67/94s. **A**, dorsal view; **B**, lateral view; **C**, left antenna 1; **D**, antenna 2; **E**, left mandible; **F**, terminal part of right mandible blade; **G**, maxilla 1; **H**, maxilla 2; **I**, maxilliped; **J**, leg 1; **K**, leg 2; **L**, leg 3; **M**, leg 4; **N**, leg 5.

TYPE SPECIES: *Disseta palumbii* Giesbrecht, 1889

REMARKS: This genus of suspension feeders (Heptner 1972b) contains the following species: *D. coelebs* Heptner, 1972a (female unknown); *D. grandis* Esterly, 1906; *D. magna* Bradford, 1971b (male unknown); *D. palumbii* Giesbrecht, 1889 (= *D. atlantica* Wolfenden, 1911; = *Heterorhabdus grandis* Wolfenden, 1904); *D. scopularis* (Brady, 1883) (= *D. maxima* Esterly, 1911) (female and male see Tanaka 1964a). There is still a lot of doubt about the exact boundaries of some of the species and their synonyms. *Disseta minuta* Grice & Hülsemann, 1965 has been removed to *Microdisseta* Heptner, 1972b. The following species have been taken in the Southwest Pacific.

*Disseta magna* Bradford, 1971b (Figs 41, 173, 191)

DESCRIPTION: Size: females: 8.0 mm, male unknown.  
Female: As in the family and generic definitions with the following additional characteristics. Genital

segment in dorsal view with the widest part anteriorly, in lateral view genital swelling covers most of the segment; genital segment and urosome segment 2 are covered with spinules. Antenna 1 extends beyond caudal rami by 5 segments. Legs 2 and 3 with 7 and 8 setae respectively on endopod segment 3. Leg 5 exopod segment 2 with its outer spine not reaching base of first outer spine of segment 3, inner seta just longer than exopod segment 3 and decorated with fine hairs and some weak spinules. (Bradford 1971b)

Males: Unknown.

REMARKS: Leg 5 is like that of *D. palumbii* but the genital swelling distinguishes this species. *Disseta magna* is like *D. grandis* Esterly, 1906 in total length and leg 5 shape but the genital segment differs in that its lateral borders are smoothly curved and are without conspicuous projections.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1971).

NEW RECORDS: Nil.

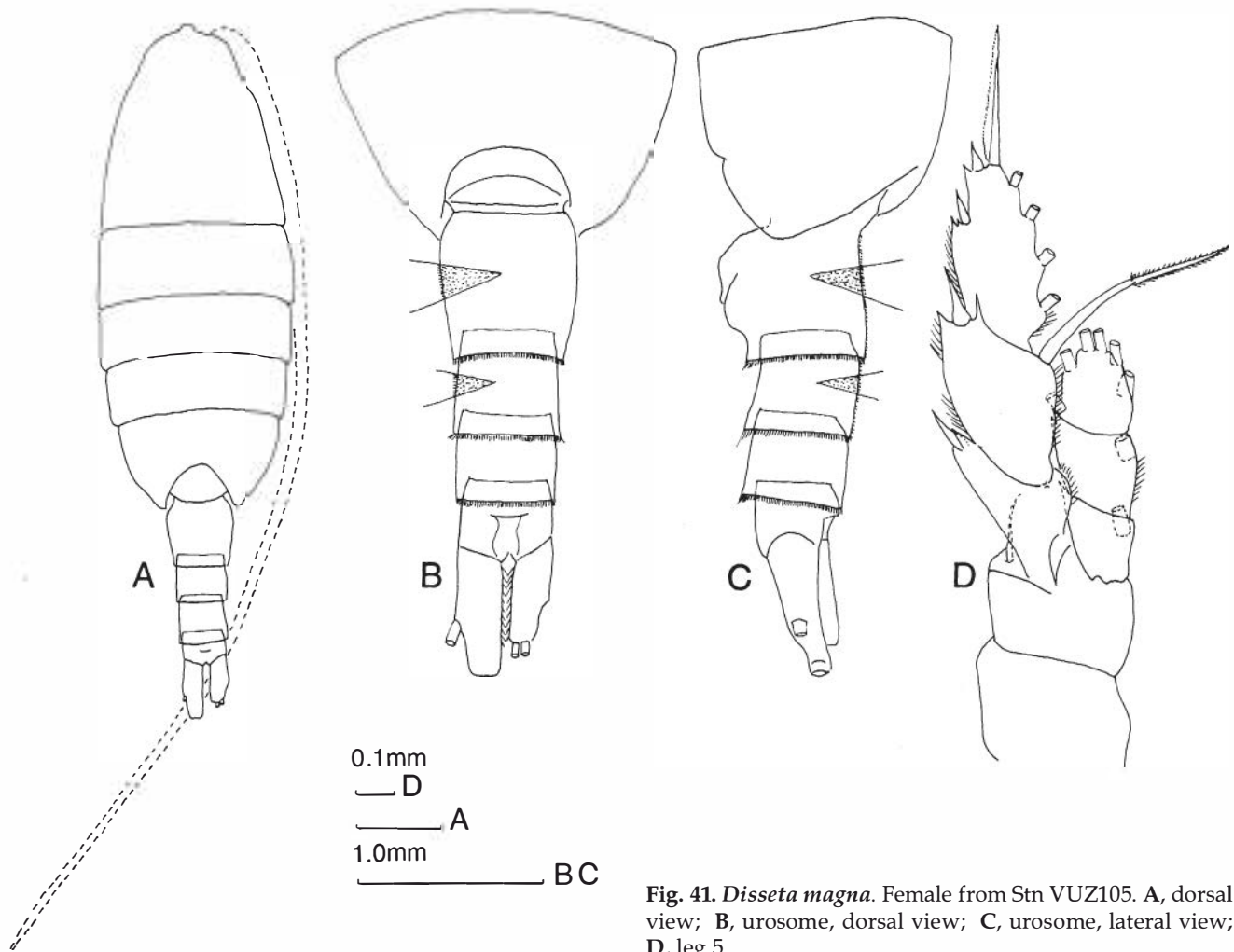


Fig. 41. *Disseta magna*. Female from Stn VUZ105. A, dorsal view; B, urosome, dorsal view; C, urosome, lateral view; D, leg 5.

DISTRIBUTION: Bathypelagic species known only from 0 to 914 m in the Southwest Pacific (Bradford 1971b).

*Disseta palumbii* Giesbrecht, 1889 (Figs 42, 173, 191)

DESCRIPTION Size: females: 5.70–8.00 mm, males 5.8–7.75 mm.

Female: As in the family and generic descriptions with the following additional characteristics. Genital segment hairy, slightly asymmetrical, genital swelling slight and situated anteriorly; there is a dorsolateral swelling on each side of the anterior part of the segment. Antenna 1 extends beyond caudal rami by 6 segments. Leg 5 exopod segment 2 outer spine extends half way to the first outer spine on exopod segment 3, inner seta slightly longer than exopod segment 3.

(Giesbrecht 1892)

Male: As in the family and generic descriptions with the following additional characteristics. Generally like female. Left antenna 1 21-segmented. Leg 5 left exopod segment 3 with 1 long, fine, terminal spine and 2 shorter spines, 1 of them half the length of the other; right exopod segment 2 swollen with 2 moderately large spines and 1 smaller spine.

(Scott 1909)

REMARKS: Vervoort (1965) suggested that either *D. palumbii* is a very variable species or several closely allied species have been lumped together. The Southwest Pacific females agree with the details described by Giesbrecht (1892), although the shape of lateral swellings on female genital segment differ (in Giesbrecht's figure the segment is broad anteriorly giving a squarish appearance to lateral swellings). The male leg 5 of the present specimens seems more like those of A. Scott (1909), Esterly (1911) (*Disseta* sp.), and possibly Rose (1929) but differs from those of Sewell (1932, 1947). It should be noted that the female genital segment of Southwest Pacific specimens, if not viewed directly from the dorsal surface, can appear to be quite asymmetrical because the lateral swelling is more dorsally placed on the left side, which may account for some of the variability between descriptions. The right posterior metasomal border extends further posteriorly than that on the left side.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

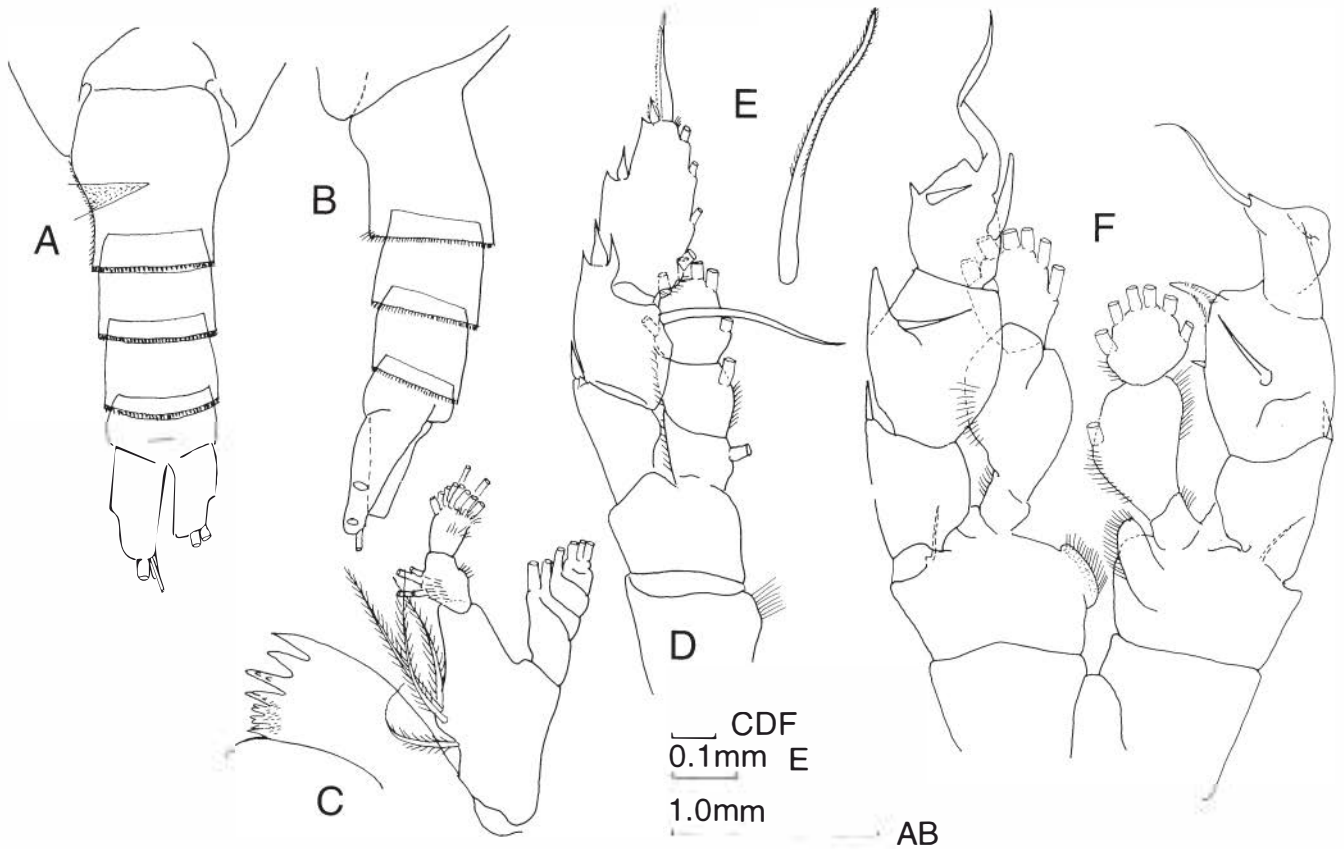


Fig. 42. *Disseta palumbii*. Female from Stn VUZ105. A, urosome, dorsal view; B, urosome, lateral view; C, mandible; D, leg 5; E, spine from inner distal corner of exopod segment 2 of leg 5. Male. F, leg 5.

Stn No.	Depth of Haul (m)	Specimens
E882	0–1212	1 male 5.8 mm
E901	0–1248	1 male (damaged)
F879	0–1267	1 female 6.5 mm
F892	0–1260	2 females (damaged)
F910	0–1397	1 female 6.8 mm
F945	500–1000	2 males 6.5, 6.6 mm
F946	0–1000	2 females 7.3 mm, 1 male 6.7 mm
VUZ105	0–914	5 females 6.9–7.2 mm, 3 males 6.2–6.6 mm

DISTRIBUTION: Bathypelagic species found in deep waters of all oceans (Vervoort 1965).

### *Hemirhabdus* Wolfenden, 1911

DEFINITION: As for the family definition with the following additional characteristics. Left mandible with 4 teeth, right with 5 teeth; with ventral capped teeth separated from the remaining tooth by a gap. Maxilla 1 outer lobe 1 with 4 setae, and the endopod with 6 setae. Maxilla 2 lobe 1 with 4 fine setae, lobe 2 atrophied, lobes 3 and 4 with 2 setae each, lobes 5 and 6 each with a strong claw-like spine clothed on its concave surface with short, widely spaced spinules. Maxilliped basipod 1 1.5 times shorter than basipod 2. (Heptner 1972b)

TYPE SPECIES: *Heterochaeta grimaldi* Richard, 1893

REMARKS: Since Heptner's (1972) revision of this predatory genus, it is monospecific, the remaining species having been removed to another genus *Neorhabdus*. The type species has not been taken in the Southwest Pacific.

### *Heterorhabdus* Giesbrecht in Giesbrecht & Schmeil, 1898

DEFINITION: As for the family definition with the following additional characteristics. Left mandible with 3 teeth, right with 4 teeth. Maxilla 1 is drawn out, the axis of exopod is of equal height to the remaining part which is aligned with exopod; endopod is reduced with 1–5 setae and is sometimes atrophied. Maxilla 2 lobe 1 with 2 setae, lobe 2 atrophied and replaced by a seta or spine, lobe 3 with 2 setae, lobe 4 with 3 long claw-like setae, lobe 5 with 2 long, strong, claw-like setae, the proximal parts of which have a partial comb of secondary spines or teeth, the distal part is smooth and sometimes flexed relative to proximal part. Maxilliped basipod 1 1.5 times shorter than basipod 2, proximal seta is often thickened, stronger, and noticeably longer than its segment (subgenus *Heterorhabdus*, see Brodsky

(1950) as *Euheterorhabdus*, and see below), or the proximal seta is thin, plumose, and not longer than its segment (subgenus *Paraheterorhabdus* Brodsky, 1950). In some species leg 1 basipod 2 with a relatively large posteriorly-directed hook, visible in lateral view of whole copepod. (Heptner 1972b)

TYPE SPECIES: *Heterochaeta spinifrons* Claus, 1863

REMARKS: Brodsky (1950) divided this genus into two subgenera *Euheterorhabdus* and *Paraheterorhabdus*. As the first of these subgenera contains the type species the correct name for it is *Heterorhabdus*, therefore *Euheterorhabdus* is a junior objective synonym and should not be used (Vervoort 1965). The following species have been described in this genus: *H. abyssalis* (Giesbrecht, 1889) (= *H. devius* Tanaka, 1953; =? *H. dubius* Tanaka, 1953); *H. austrinus* Giesbrecht, 1902; *H. brevicornis* (Dahl, 1894); *H. caribbeanensis* Park, 1970; *H. clausii* (Giesbrecht, 1889); *H. compactoides* Heptner, 1971; *H. compactus* Sars, 1900; *H. egregius* Heptner, 1972a; *H. farrani* Brady, 1918; *H. fistulosus* Tanaka, 1964a; *H. lobatus* Bradford, 1971b; *H. longispinus* Davis, 1949; *H. medianus* Park, 1970; *H. norvegicus* (Boeck, 1872) (= *H. profunda* (Dahl, 1894)); *H. pacificus* Brodsky, 1950 (= *H. vincinus* Tanaka, 1953); *H. papilliger* (Claus, 1863); *H. proximus* Davis, 1949; *H. pustulifer* Farran, 1929; *H. robustoides* Brodsky, 1950 (=? *H. farrani* Brady, 1918) *H. robustus* Farran, 1908; *H. spinifrons* (Claus, 1863); *H. spinifer* Park, 1970; *H. spinosus* Bradford, 1971b; *H. subspinifrons* Tanaka, 1964a; *H. tanneri* (Giesbrecht, 1895); *H. tenuis* Tanaka, 1964a; *H. tropicus* (Dahl, 1894); *H. vipera* (Giesbrecht, 1889). Of these species *H. brevicornis* and *H. tropicus* are badly described and their relationships to other species are unknown. The differences between *H. robustus*, *H. robustoides*, *H. tenuis*, and *H. longispinus*, especially the males are not clear.

### *Heterorhabdus (Heterorhabdus) abyssalis* (Giesbrecht, 1889) (Figs 43, 174, 191)

DESCRIPTION: Size: females: 2.5–3.4 mm, males 2.7–3.4 mm

Female: As in the family and generic definitions with the following additional characteristics. Anterior head rounded in dorsal view. Genital segment with a straight ventroposterior profile, genital flap small. Antenna 1 extends beyond caudal rami by about the last 3 segments. Maxilla 2 lobe 4 longest seta 1.96–2.85 times the length of shortest seta. Maxilliped basipod 1 median seta long and thick.

(Sewell 1947; Bradford 1971b)

Male: As in the family and generic definitions with

the following additional characteristics. Generally as in female. Right leg 5 inner projection on basipod 2 is directed into the midline, not constricted at its base, but is twisted; right exopod segment 3 with subterminal seta half the length of its segment.

(Sewell 1947; Bradford 1971b)

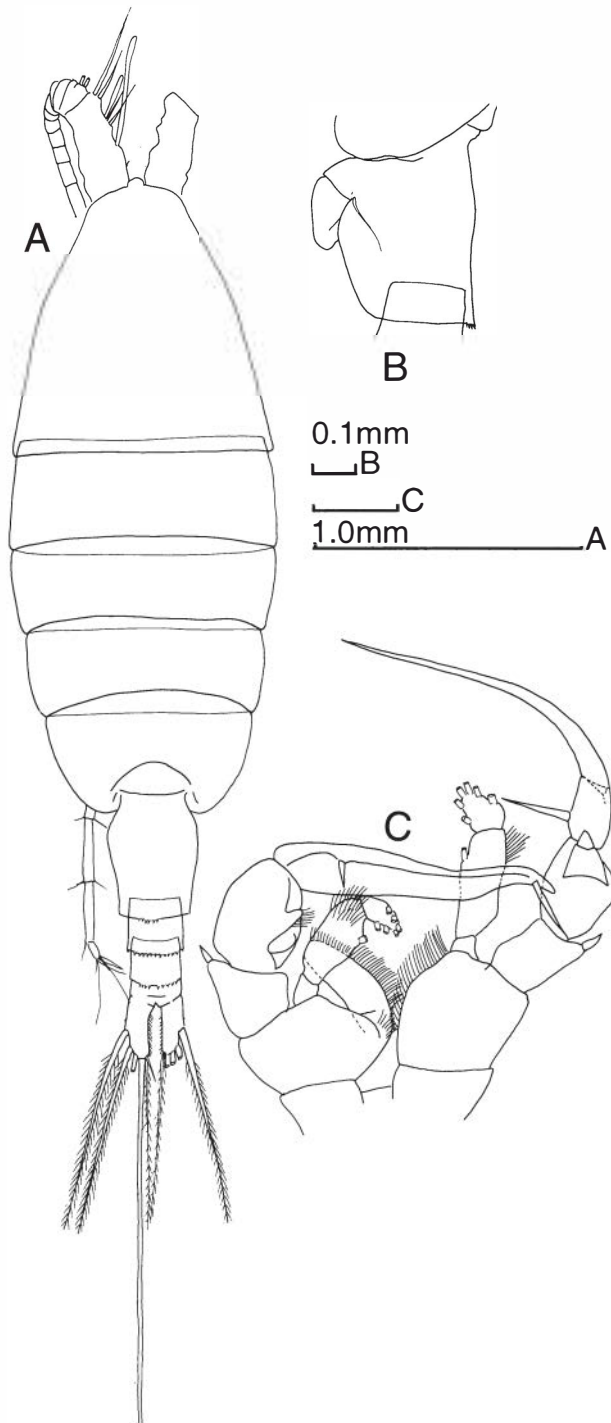


Fig. 43. *Heterorhabdus abyssalis*. Female from Stn VUZ112. A, dorsal view; B, genital segment, lateral view. Male from Bradford (1971). C, leg 5.

REMARKS: It is difficult to tell whether Giesbrecht's (1892) male is the same as the species described by Sewell (1947). The Southwest Pacific males differ slightly in having a much shorter subterminal seta on right exopod segment 3 of leg 5.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1971).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500-1000	1 male 2.6 mm
A295	400-1000	1 female 3.0 mm
A302	500-1000	1 female 2.9 mm
F946	200-500	2 females 2.9, 3.0 mm, 1 male 2.8 mm
	0-1000	1 female 2.7 mm, 1 male 2.7 mm
Mu 67/52s	0-1000	1 female 3.55 mm
Mu 67/94s	0-1000	3 females 3.1-3.3 mm, 1 male 3.4 mm
Mu 67/104s	0-823	2 females 3.4 mm
VUZ105	0-914	1 female 3.25 mm, 1 male 2.9 mm
VUZ112	0-732	4 females 2.8-3.4 mm, 1 male 2.7 mm

DISTRIBUTION: As it is often impossible to verify the identity of this species from existing records, its distribution on a worldwide scale is not known. In the Southwest Pacific this apparently meso- to bathypelagic species was not taken in the surface 200 m and more usually in hauls deeper than 500 m except at night. No records are from south of New Zealand.

*Heterorhabdus (Heterorhabdus) austrinus* Giesbrecht, 1902 (Figs 44, 174, 191)

DESCRIPTION: Size: females: 2.8-3.8 mm, males 2.5-3.2 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head rounded in dorsal view. Genital segment with a large genital flap which extends almost to the posterior border of the segment; in dorsal view the segment is slightly asymmetrical with both sides undulating but more pronounced on the left; in lateral view the dorsal swelling is centrally placed; on left side just posterior to origin of genital flap, there is a triangular flap. Antenna 1 does not exceed caudal rami. Maxilla 2 lobe 4 with longest seta about 2.0-2.3 times the length of shortest seta. Maxilliped basipod 1 with median seta long, thick, and extending slightly beyond distal part of basipod 2.

(Giesbrecht 1902; Farran 1929; Bradford 1971b)

Male: As in the family and generic definitions with

the following additional characteristics. Generally as in female. Leg 5 basipod 2 inner edge spinules are fine and long; right basipod 2 inner lobe arises from a narrow proximal stalk constricted at its base; right exopod segment 3 with a short subterminal spine less than half the length of its segment.

(Giesbrecht 1902; Farran 1929; Bradford 1971b)

REMARKS: The shape of the female genital segment and male leg 5 distinguishes this species from all others.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Bary (1951); Vervoort (1957); Bradford (1970, 1971).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
B111	0-500	1 male 2.95 mm
B113	0-500	1 female 3.3 mm
B118	0-500	1 male 2.85 mm
Mu 67/48s	0-1000	2 females 3.0, 3.1 mm
Mu 67/52s	0-1000	1 female 2.9 mm, 2 males 2.9 mm
Mu 67/57s	0-1000	8 females 2.85-3.25 mm, 2 males 2.8 mm
Mu 67/94s	0-1000	4 females 2.8-2.9 mm
Mu 67/104s	0-823	1 male 2.9 mm
Mu 67/147s	0-1000	3 females 3.0 mm, 8 males 2.7-3.0 mm
VUZ105	0-914	1 male 2.7 mm
VUZ112	0-732	1 female 3.05 mm

DISTRIBUTION: This meso- to bathypelagic Antarctic species has been taken as far north as the Subtropical Convergence in Antarctic Intermediate Water (Vervoort 1957).

*Heterorhabdus (Heterorhabdus) caribbeanensis* Park, 1970 (Figs 45, 174, 191)

DESCRIPTION: Size: females: 1.74-2.1 mm, males 1.95-2.0 mm

Female: As in the family and generic definitions with the following additional characteristics. Anterior head rounded in dorsal view. Genital segment in lateral view inflated posterior to a short genital flap. Antenna 1 extends further than genital segment. Maxilla 2 with distinctively spinulose setae on lobes 3-5, the shortest seta on lobes 4 and 5 are short; proximal part of limb has small spines near lobes 1 and 2. Maxilliped basipod 1 with median seta thick and long but only slightly curved, not extending further than distal part of basipod 2. (Park 1970; Bradford 1971b)

Male: As in the family and generic definitions with the following additional characteristics. Generally as in female. Leg 5 right basipod 2 with a fairly large inner lobe bordered by fine hairs which continue round distal end, right exopod segment 2 with inner process like that of *H. spinifrons*; left basipod 2 border with hairs internally, without a projection.

(Bradford 1971b)

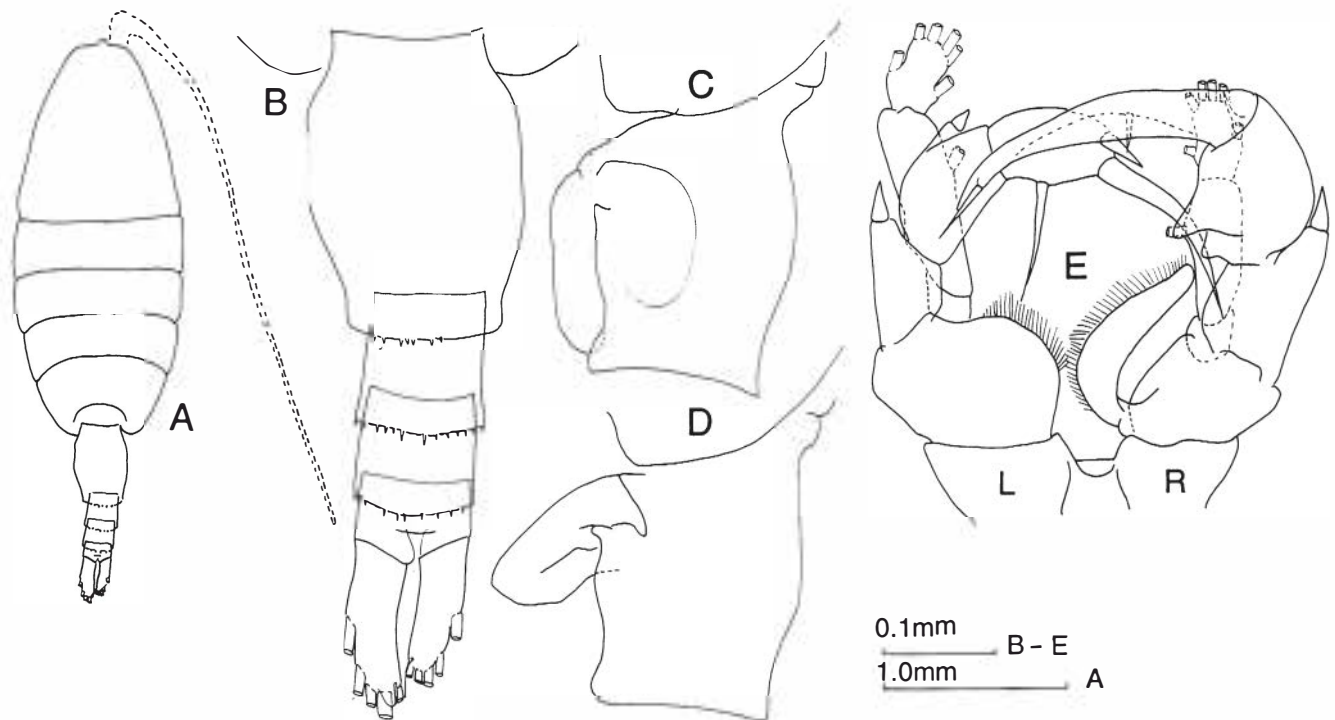


Fig. 44. *Heterorhabdus austrinus*. Female from Stn Mu67/57s. A, dorsal view; B, urosome, dorsal view; C, D, genital segment, left side. Male. E, leg 5.



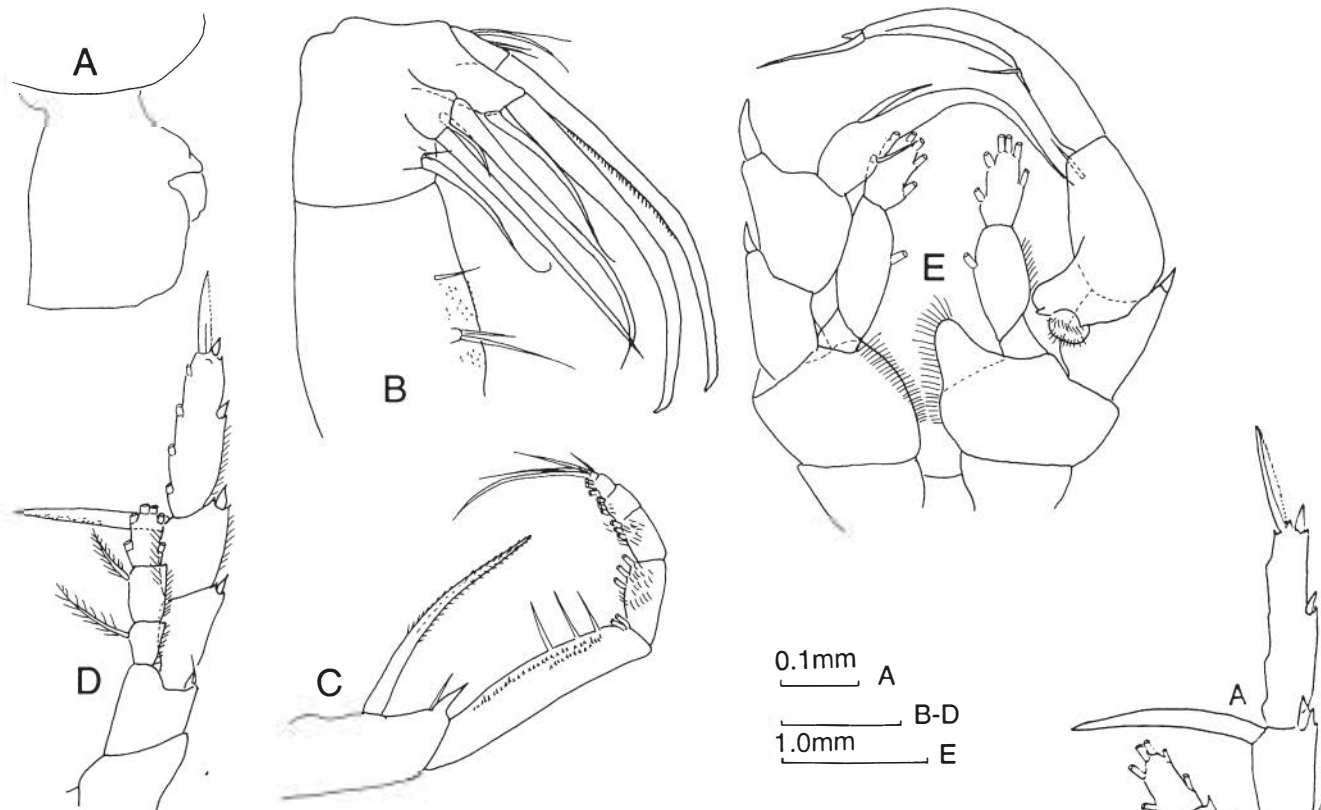


Fig. 45. *Heterorhabdus caribbeanensis* from Bradford (1971). Female. A, genital segment; B, maxilla 2; C, maxilliped; D, leg 5. Male. E, leg 5.

REMARKS: This species is closely related to *H. spinifrons* but the anterior head is not pointed.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1971).

NEW RECORDS: Nil.

DISTRIBUTION: This species is apparently mesopelagic and has so far only been taken in the Caribbean Sea and the tropical part of the Southwest Pacific (Bradford 1971b).

***Heterorhabdus (Heterorhabdus) clausii*** (Giesbrecht, 1889) (Figs 46, 174, 191)

DESCRIPTION: Size: females: 2.4 mm, males 2.2–2.4 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head rounded in dorsal view. Antenna 1 extends further than caudal rami. Maxilla 2 endopod with long setae. Maxilliped basipod 1 with median seta thick and long. Leg 5 endopod segments 1 and 2 inner setae fine and short, exopod segment 1 inner seta strong and hooked. (Giesbrecht 1892)

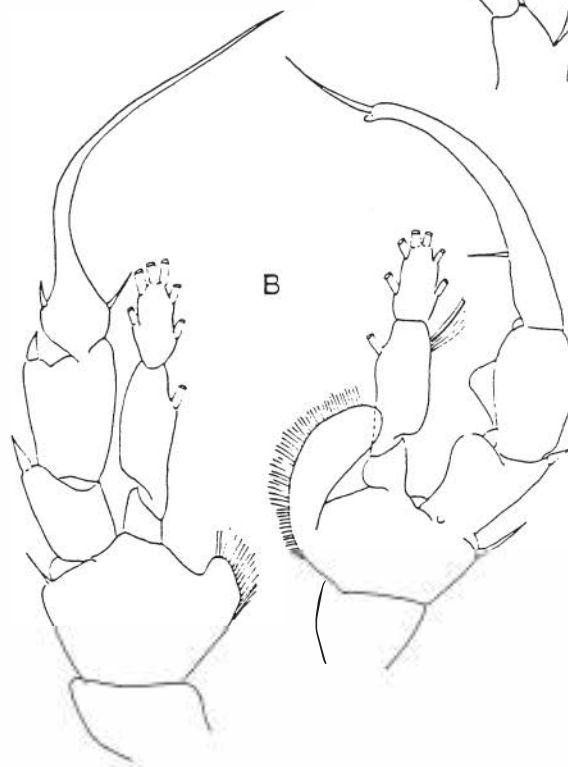


Fig. 46. *Heterorhabdus clausii* from Giesbrecht (1892). Female. A, leg 5. Male. B, leg 5.

Male: As in the family and generic definitions with the following additional characteristics. Right leg 5 basipod 2 with a large inner lobe, left basipod 2 with a projection provided with hairs at tip only.  
(Giesbrecht 1892)

REMARKS: This species does not appear to have been fully figured anywhere.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Vervoort (1957).

NEW RECORDS: Nil.

DISTRIBUTION: Tropical and temperate parts of the Atlantic, Pacific, and Indian Oceans where it occurs in small numbers and usually inhabits mesopelagic depths (Vervoort 1957).

*Heterorhabdus (Paraheterorhabdus) farrani* Brady,  
1918 (Figs 47, 174, 191)

DESCRIPTION: Size: females: 3.60–4.28 mm, males 3.51–3.96 mm.

Female: As in the family and generic definitions with the following additional characters. Anterior head rounded in dorsal view. Genital segment with a large genital swelling, abdominal segments distally bordered by spinules. Antenna 1, when fully extended, reaches the distal border of genital segment. Maxilliped basipod 1 with median seta short and fine, the longest of the terminal setae on basipod 1 is almost twice the length of terminal spine-like seta. Leg 5 exopod segment 3 of leg 5 with its greatest width more than half its length.  
(Vervoort 1951, 1965)

Male: As in the family and generic definitions with the following additional characters. Right leg 5 exopod segment 3 shorter than segment 2, usually with a long terminal spine about half the length of the segment; right exopod segment 2 with inner process bifurcate distally.  
(Vervoort 1951, 1965)

REMARKS: This species is closely related to *H. robustus* from which it differs in the proportions of female leg 5, distal setae on basipod 1 of maxilliped, and shape and spinulation of genital segment and urosome. Male leg 5 of *H. farrani* is more heavily built than that of *H. robustus* and has more squat segments and a bifurcate tip to right exopod segment 2 (Vervoort 1957).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Vervoort (1957).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
B118	0–125	1 male 3.5 mm
Mu 67/116s	0–1000	1 male 3.6 mm

DISTRIBUTION: This mesopelagic species is characteristic of the Southern Ocean and inhabits the Deep Warm Current (Vervoort 1965) but also occurs north of the Antarctic Convergence in small numbers (Vervoort 1957).

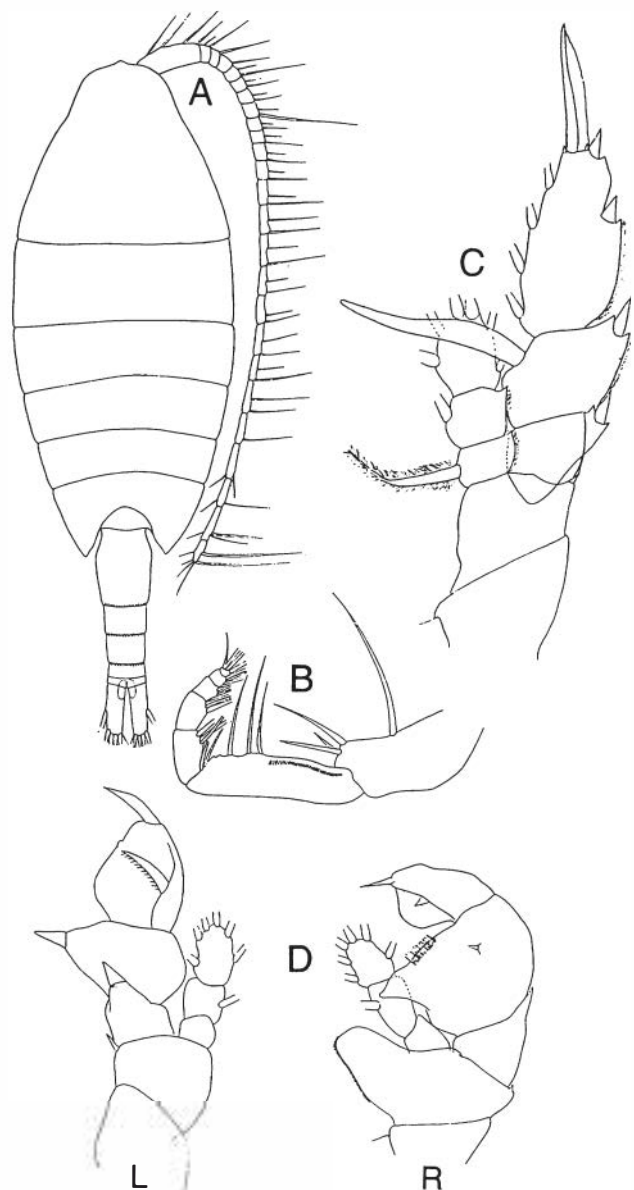


Fig. 47. *Heterorhabdus farrani* from Vervoort (1951). Female. A, dorsal view; B, maxilliped; C, leg 5. Male. D, Leg 5.

*Heterorhabdus (Heterorhabdus) lobatus* Bradford,  
1971b (Figs 48, 174, 191)

DESCRIPTION: Size: females: 2.10–2.60 mm, males 2.00–2.50 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head rounded in dorsal view. Genital segment in lateral view with profile posterior to genital flap distinctly stepped. Antenna 1 extends to posterior border of genital segment or urosome segment 3. Maxilla 2 lobe 5 with both setae of equal length. Maxilliped basipod 1 with median seta thick and long. Leg 5 with terminal spine of exopod nearly always shorter than half exopod segment 3 except in large specimens (2.5 mm); inner seta on endopod segment 2 is the same length as setae on endopod segment 3. (Bradford 1971b)

Males: As in the family and generic definitions with the following additional characteristics. Generally as in female. Leg 5 right exopod segment 2 internal projection with an apical tooth joined to a serrated ridge; distal to serrated ridge is a lobe of similar size to lobe proximal to serrated ridge; terminal spine on left endopod segment 3 tapers finely. (Bradford 1971b)

REMARKS: This species is closely related to *H. papilliger*. The male is easily distinguished by the differences in the right leg 5 exopod segment 2 but the differences in the female are more subtle: the step in the profile of the genital segment in lateral view and the proportions of leg 5 (Bradford 1971b).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1971).

NEW RECORDS: Nil.

DISTRIBUTION: In the Southwest Pacific this mesopelagic species appears to prefer warm subantarctic and cool subtropical waters and is taken in surface waters at night (Bradford 1971b).

*Heterorhabdus (Heterorhabdus) pacificus* Brodsky,  
1950 (Figs 49, 174, 191)

DESCRIPTION: Size: females: 3.20–3.73 mm, males 2.90–3.35 mm

Female: As in the family and generic definitions with the following additional characteristics. Anterior head rounded in dorsal view. Urosome segment 2 in

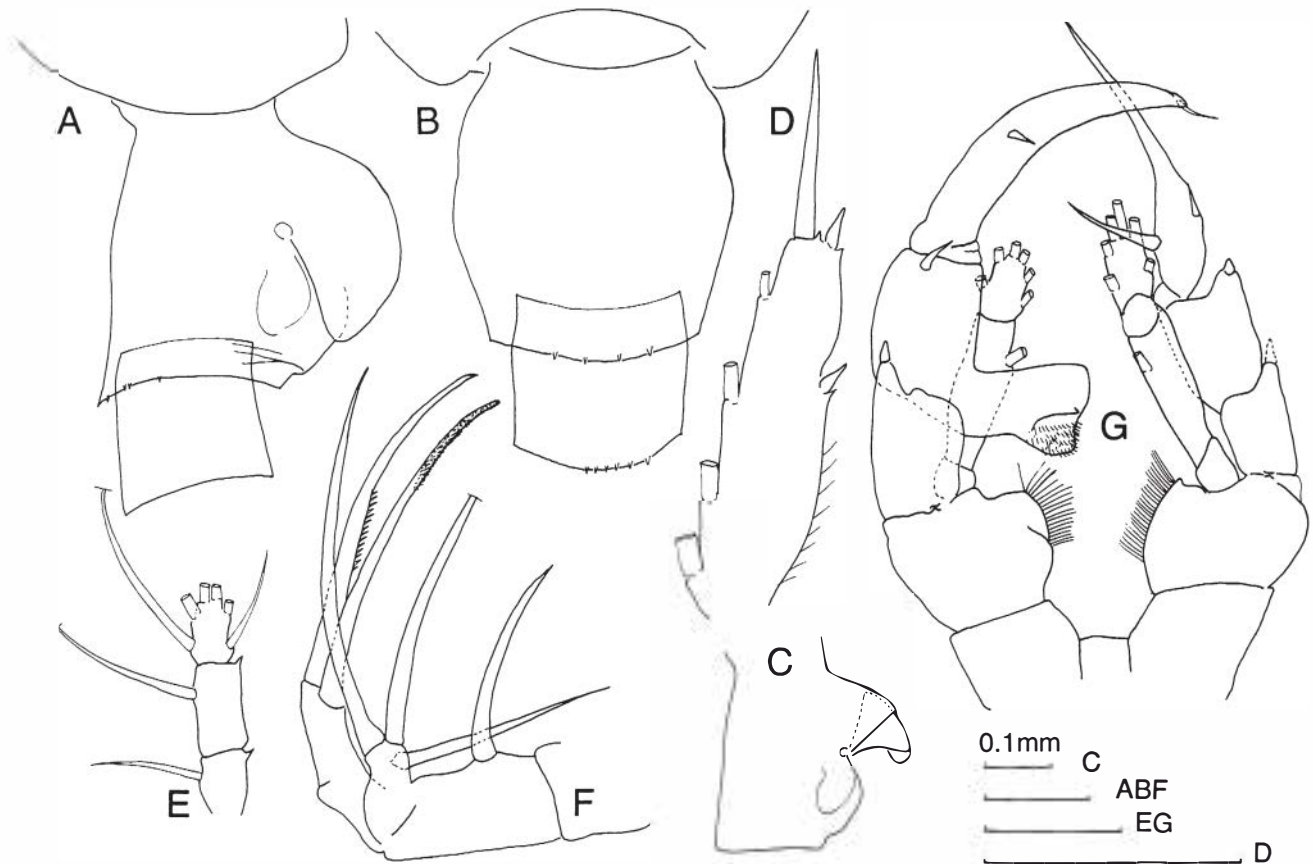


Fig. 48. *Heterorhabdus lobatus* from Stn A313, 0–914 m. Female. A, genital segment, lateral view; B, genital segment, dorsal view; C, genital segment, lateral view; D, leg 5 exopod segment 3; E, leg 5 endopod; F, maxilliped. Male. G, leg 5.

dorsal view obviously dilated posteriorly. Antenna 1 extends to tip of caudal rami. Maxilla 2 lobe 4 with longest seta about 2.2 times the length of the shorter seta. Maxilliped basipod 1 with median seta thick and long. (Brodsky 1950; Tanaka 1964a)

Male: As in the family and generic definitions with the following additional characteristics. Generally as in female. Right leg 5 basipod 2 inner lobe directed almost entirely to midline so that when mounted, this appendix appears neither twisted nor constricted at its base, exopod segment 3 subterminal seta over half the length of the segment. (Brodsky 1950; Tanaka 1964a)

REMARKS: The Southwest Pacific specimens appear to be identical with Tanaka's (1964) description of Brodsky's species. It is closely related to *H. proximus* with which it shares the same ventral profile of the female genital segment seen in lateral view, although *H. proxi-*

*mus* does not have the unusually shaped urosome segment 2 of *H. pacificus*. The male leg 5 is similar to *H. spinosus* but differs from it by the longer terminal seta/spines on right and left exopod segment 3.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A302	500-1000	1 male 3.0 mm
A303	450-1000	1 female 3.2 mm
F911	0-1697	1 female 3.3 mm
F945	500-1000	1 male 3.0 mm
Mu 67/57s	0-1000	1 male 2.9 mm
Mu 67/94s	0-1000	1 female 3.5 mm, 1 male 3.15 mm
VUZ105	0-914	1 female 3.25 mm, 3 males 3.0 mm
VUZ112	0-732	1 female 3.2 mm

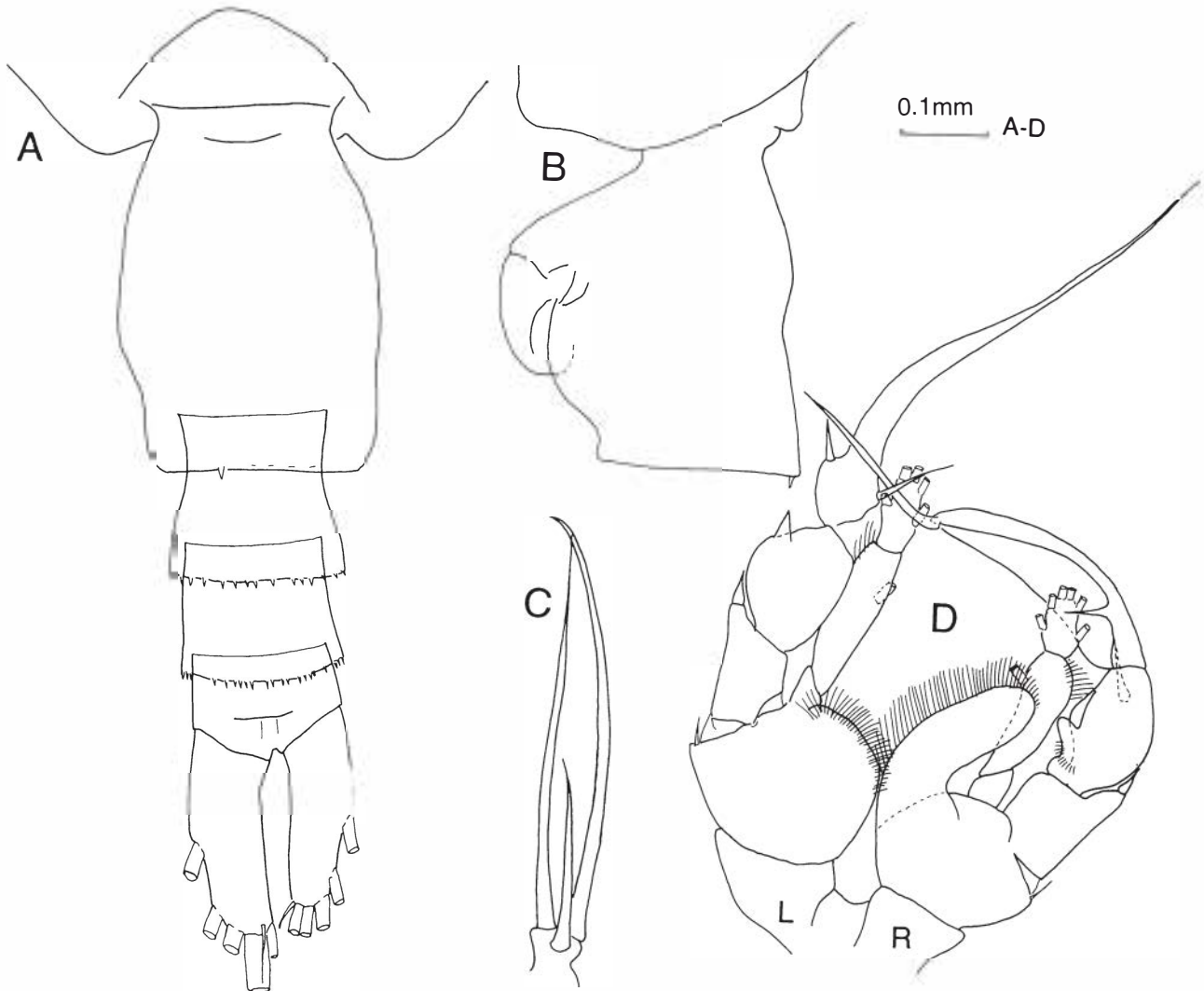


Fig. 49. *Heterorhabdus pacificus*. Female from Stn A303, 450-1000 m. A, urosome, dorsal view; B, genital segment, lateral view; C, maxilla 2 lobe 4. Male from Stn Mu67/94s. D, leg 5.

DISTRIBUTION: Previously this species was taken at bathypelagic depths in the northwest Pacific (Brodsky 1950; Tanaka 1964a) but it appears to be distributed over the whole tropical and temperate Pacific Ocean.

*Heterorhabdus (Heterorhabdus) papilliger* (Claus, 1863) (Figs 50, 175, 191)

DESCRIPTION: Size: females: 1.80–2.15 mm, males 1.70–2.00 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head rounded in dorsal view. Genital segment in lateral view without an obvious step posterior to genital flap. Antenna 1 about the same length as whole body.

Maxilla 2 lobe 5 with setae of equal length. Maxilliped basipod 1 with median seta thick and long. Leg 5 with a terminal exopod spine which is nearly always half the length of exopod segment 3 except in some small specimens; inner seta on endopod segment 2 is the same length as setae on endopod segment 3.

(Giesbrecht 1892)

Male: As in the family and generic definitions with the following additional characteristics. Generally as in female. Leg 5 right exopod segment 2 internal projection with an apicodistal tooth joined to an oblique ridge; proximal to the ridge is a large rounded lobe.

(Giesbrecht 1892)

REMARKS: This species is closely related to *H. lobatus*. The male is easily distinguished by the right leg 5 exo-

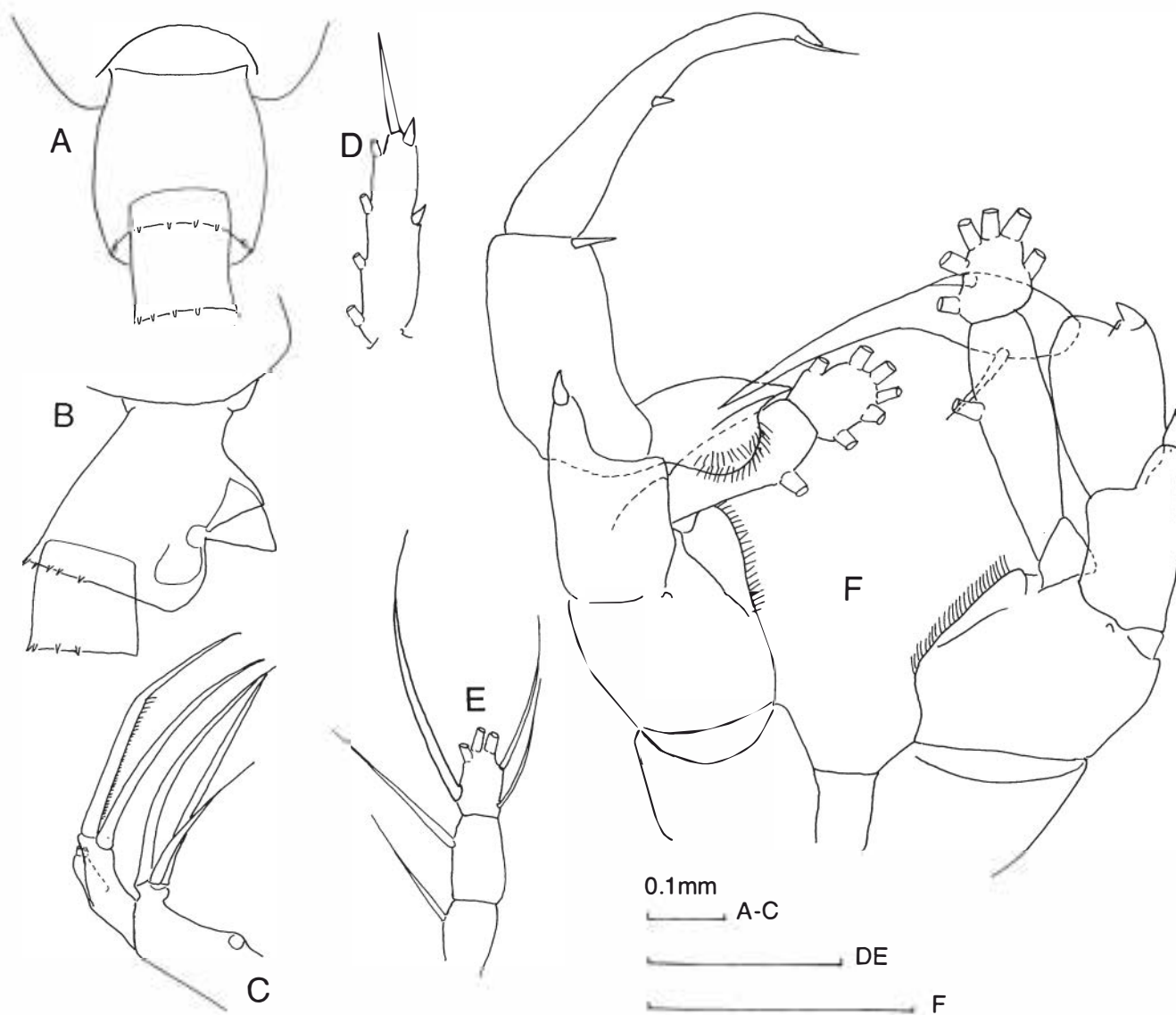


Fig. 50. *Heterorhabdus papilliger* from Stn A302, 0–200 m. Female. A, genital segment, dorsal view; B, genital segment, lateral view; C, maxilla 2; D, leg 5 exopod segment 3; E, leg 5 endopod. Male. F, leg 5.

pod segment 2 but the differences in the female are more subtle – the unstepped profile of the genital segment in lateral view and the proportions of leg 5 (Bradford 1971b).

PREVIOUS SOUTHWEST PACIFIC RECORDS: ?Brady (1883) (as *Heterochaeta spinifrons*); Farran (1929); Dakin & Colefax (1940); not Bradford (1970) – see Bradford (1971).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500-1000	1 males 1.8, 1.9 mm
A295	surface	1 male
A302	surface	3 females 1.8 mm, 8 males 1.7-1.85mm
	0-500	1 female 1.8 mm
	500-1000	1 male 1.8 mm
C537	0-250	5 males 1.7-1.8 mm
F945	0-200	3 females 1.95-2.15 mm
F946	200-500	1 male 1.9 mm

DISTRIBUTION: This epi- to mesopelagic species was found in warm subtropical waters usually to the north of New Zealand.

*Heterorhabdus (Heterorhabdus) proximus* Davis, 1949 (Figs 51, 175, 191)

DESCRIPTION: Size: females: 2.30-2.75 mm, males 2.20-2.50 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head rounded in dorsal view. Genital segment in lateral view with ventral profile posterior to genital flap concave. Antenna 1 extends to caudal rami. Maxilla 2 lobe 4 with shortest seta always greater than half the length of longest seta. Maxilliped basipod 1 with median seta thick and long. (Bradford 1971b)

Male: Generally like female. Leg 5 right basipod 2 internal projection does not protrude into midline but is directed anteriorly so that when the limb is mounted, the projection always lies across basipod 2. (Bradford 1971b)

REMARKS: Even though Davis's (1949) specimens are larger (female 3.2-3.7 mm, male 3.2-3.4 mm) there is little doubt that these and Park's (1968, as *H. abyssalis*) smaller specimens are the same species. Morris (1970) thought this species to be a synonym of *H. tanneri* Giesbrecht (1895), but the present specimens differ in a number of respects from Giesbrecht's (1895) figure of the male leg 5 – in *H. tanneri* the inner proximal spine on left exopod segment 3 and terminal spine on right

exopod segment 3 are much shorter than in the present specimens and the inner lobe on right basipod 2 apparently protrudes more into the midline unlike the present specimens where this lobe is directed anteriorly. There is still some doubt about the identity of these specimens. The original specimens could not be checked as they were loaned and appear to have been lost by the borrower.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1971).

NEW RECORDS: Nil.

DISTRIBUTION: This mesopelagic species was found in deep waters in the New Zealand region and appears to be a Pacific species (Davis 1949; Park 1968; Bradford 1971b).

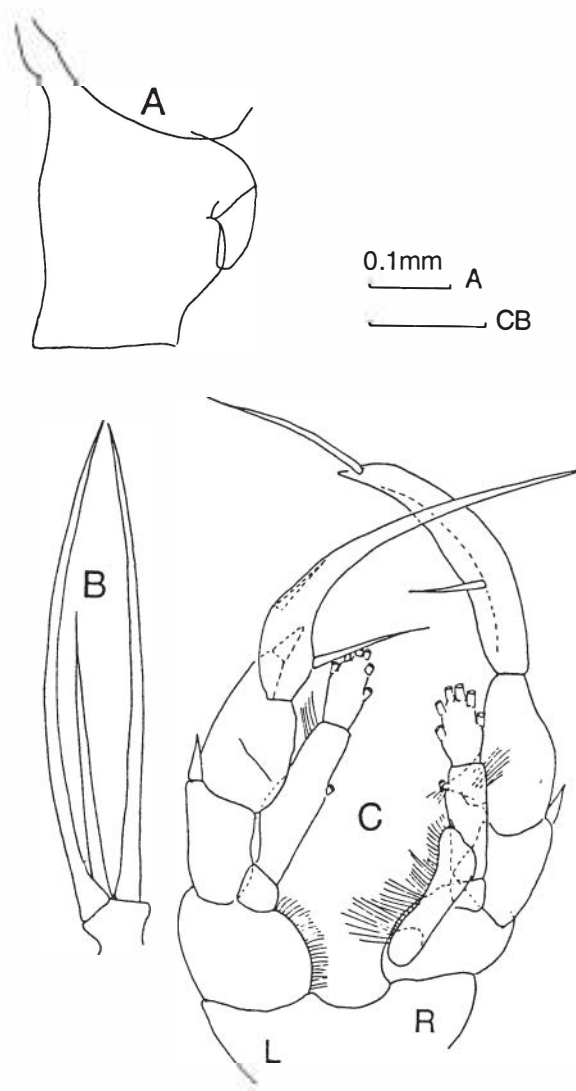


Fig. 51. *Heterorhabdus proximus* from Bradford (1971). Female. A, genital segment, lateral view. Male. B, maxilla 2, lobe 4; C, leg 5.

*Heterorhabdus (Heterorhabdus) pustilifer* Farran, 1929  
(Figs 52, 175, 191)

DESCRIPTION: Size: females: 2.70–3.20 mm, males 2.80–3.20 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head rounded in dorsal view. Genital segment barrel-shaped in dorsal view, bulging slightly more on left side; in lateral view with a conspicuous dorsal papilla. Antenna 1 extends beyond genital segment. Maxilliped basipod 1 with median seta thick and long. Leg 5 with inner edge spine of exopod segment 2 equal in length to exopod segment 3. (Farran 1929)

Male: As in the family and generic definitions with the following additional characteristics. Generally like female. Right leg 5 basipod 2 inner lobe directed almost entirely into midline so that, when mounted, this appendix appears neither twisted nor constricted at its base, exopod segment 3 with subterminal seta about half the length of exopod segment 3. (Bradford 1971b)

REMARKS: Vervoort (1957) recorded several males of this species but found them to be "not noticeably

different from *H. austrinus*". Bradford (1971) found a male among Ross Sea *Heterorhabdus* and several males in waters to the south of New Zealand and distinguished them from other *Heterorhabdus*. This species is distinguished from other *Heterorhabdus* by the presence of a dorsal papilla on the female genital segment. Male leg 5 differs from that of *H. pacificus*, which has the right exopod segment 3 terminal spine more than three-quarters the length of its segment, in having this spine only half the length of exopod segment 3.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Vervoort (1957); Bradford (1971).

NEW RECORDS: Nil.

DISTRIBUTION: This mesopelagic species appears to be primarily an Antarctic form (Farran 1929; Vervoort 1951, 1957) although 3 males were taken as far north as off Otago Peninsula well north of the Antarctic Convergence.

*Heterorhabdus (Paraheterorhabdus) robustus* Farran, 1908  
(Figs 53, 175, 191)

DESCRIPTION: Size: females: 3.20–3.70 mm, males 3.20–3.60 mm.

Female: As in the family and generic definition with the following additional characteristics. Anterior head rounded in dorsal view. Genital segment with genital swelling moderately developed, urosome segments almost completely nude. Antenna 1 extends as far as the posterior border of genital segment. Maxilliped with the longest distal seta of basipod 1 not much longer than the thick seta. Leg 5 exopod segment 3 width less than half its length. (Vervoort 1965)

Male: As in the family and generic definition with the following additional characteristics. Generally like female. Right leg 5 exopod segment 3 longer than exopod segment 2, terminal seta small; left exopod segment 3 with a pegged spine on the inner proximal surface. (Vervoort 1965)

REMARKS: This species is closely related to *H. farrani* from which it differs in the proportions of the female leg 5, the distal setae on basipod 1 of the maxilliped, and the shape and spinulation of the genital segment and urosome. Male leg 5 of *H. robustus* is less heavily built than that of *H. farrani* and has less squat segments and is without a bifurcate tip to the right exopod segment 2. Tanaka (1964) described a row of small denticles on the periphery of the female genital opening when viewed laterally; these were not observed in the Southwest Pacific specimens.

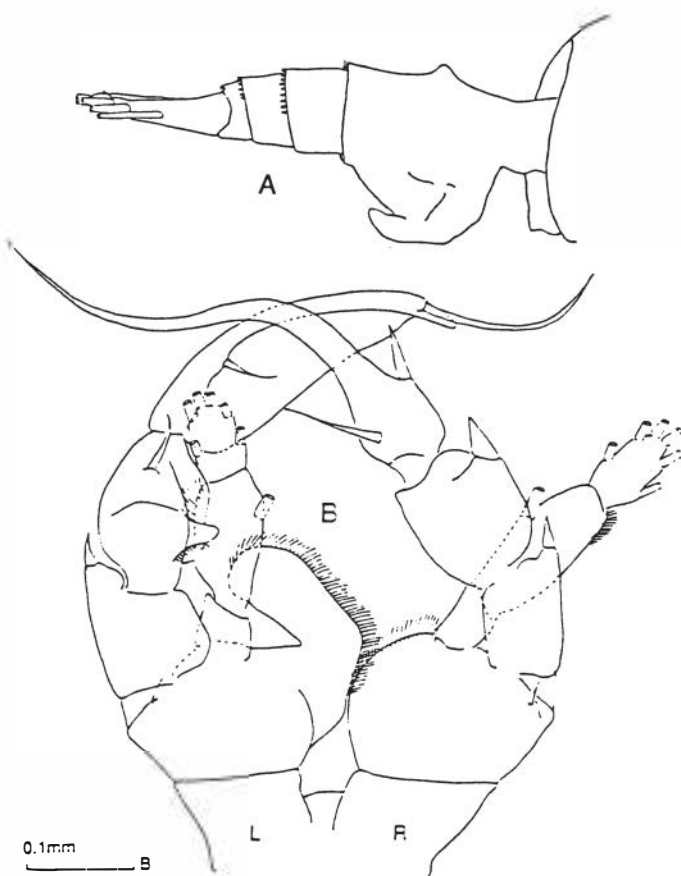
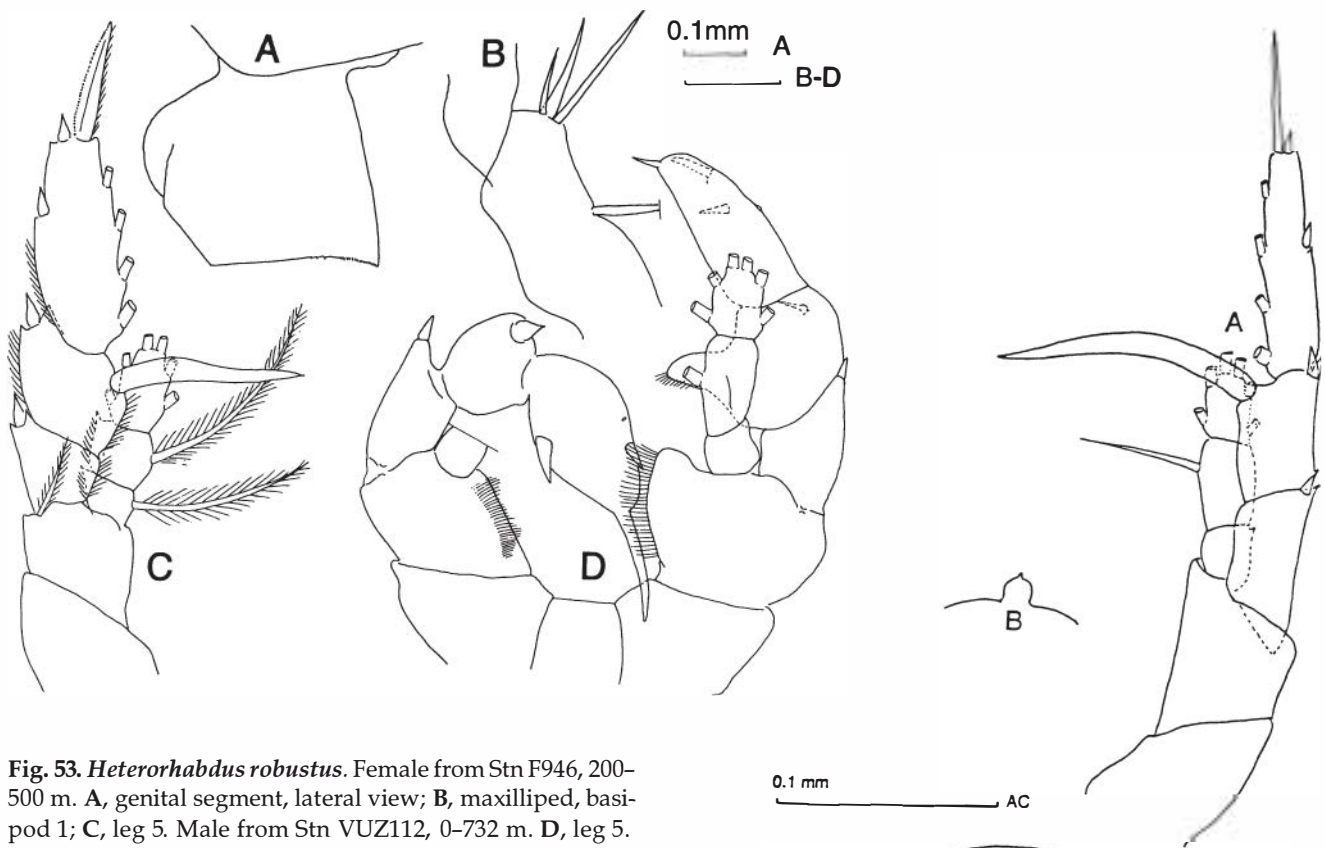


Fig. 52. *Heterorhabdus pustilifer*. Female from Vervoort (1957). A, urosome, lateral view. Male from Stn B110, 0–500 m. B, leg 5.



**Fig. 53. *Heterorhabdus robustus*.** Female from Stn F946, 200–500 m. **A**, genital segment, lateral view; **B**, maxilliped, basipod 1; **C**, leg 5. Male from Stn VUZ112, 0–732 m. **D**, leg 5.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F946	200–500	1 female 3.2 mm
	0–1000	1 male 3.2 mm
VUZ112	0–732	1 female 3.4 mm, 2 males 3.2 mm

DISTRIBUTION: Found at meso- to bathypelagic depths in all oceans (Vervoort 1965) but was not taken south of New Zealand in the Southwest Pacific.

***Heterorhabdus (Heterorhabdus) spinifer* Park, 1970**  
(Figs 54, 175, 191)

DESCRIPTION: Size: females: 1.58–1.72 mm, males 1.60–1.72 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head pointed in dorsal view. Genital segment in dorsal view with large lateral swellings, posterior borders of urosome segments lined with large spines. Antenna 1 extends to caudal rami. Leg 5 endopod segment 1 without an inner edge seta. (Park 1970)

Male: As in the family and generic definitions with



**Fig. 54. *Heterorhabdus spinifer* from Stn C537.** Female. **A**, leg 5. Male. **B**, anterior head, dorsal view; **C**, leg 5.

the following additional characteristics. Generally like female. Leg 5 similar to that of *H. papilliger* but left basipod 2 also has an inner lobe, and lobe on right basipod 2 is obliquely terminated; right exopod segment 2 internal projection is wider than in *H. papilliger* and



does not extend further than basipod 2 lobe in midline.  
(Park 1970)

REMARKS: This species is most easily distinguished by its pointed head and lack of inner seta on female leg 5 endopod segment 1 and the inner lobe on basipod 2 of male left leg 5.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1971).

NEW RECORDS: Nil.

DISTRIBUTION: This mesopelagic species is found in tropical waters of the Atlantic and Pacific Oceans; taken at the surface at night (Park 1970; Bradford 1971b).

*Heterorhabdus (Heterorhabdus) spinifrons* (Claus, 1863)  
(Figs 55, 175, 191)

DESCRIPTION: Size: females: 3.00–3.90 mm, males 2.6–3.5 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head pointed in dorsal view. Genital segment without ventral ornamentation. Antenna 1 extends further than caudal rami by at least 3 segments. Maxilla 2 lobe 4 with short seta one-quarter the length of longest. Maxilliped basipod 1 with median seta thick and long.  
(Giesbrecht 1892)

Male: As in the family and generic definitions with the following additional characteristics. Generally like female. Right leg 5 exopod segment 2 internal projection bears a strong tooth with round lobes each side distally, but the internal projection does not extend as far into the midline as the basipod 2 inner lobe.  
(Giesbrecht 1892)

REMARKS: This species is distinguished by its pointed head, lack of ornamentation on female genital segment, a short third seta on lobe 4 of maxilla 2, and male leg 5.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Vervoort (1957).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A295	0–500	1 female 3.4 mm
A302	0–500	1 male 3.1 mm
A313	0–914	1 female, 2 males 3.4, 3.5 mm
F910	0–1397	1 male 2.6 mm
F945	0–200	1 male 2.8 mm
	0–500	1 male 2.8 mm
Mu 67/62s	0–500	1 female 3.8 mm, 1 male 3.5 mm
VUZ105	0–914	1 female 3.9 mm
VUZ112	0–732	2 females 3.8 mm

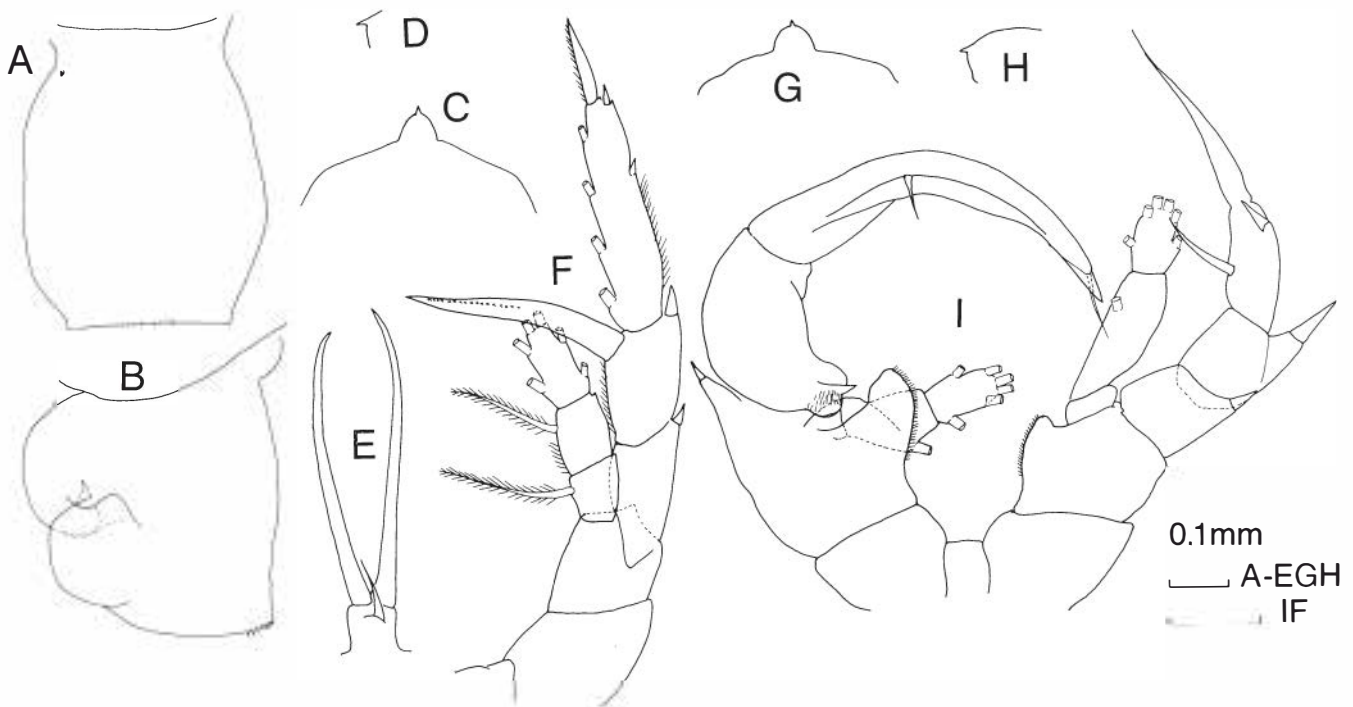


Fig. 55. *Heterorhabdus spinifrons* from Stn Mu67/62s. female. A, genital segments, dorsal view; B, genital segment, lateral view; C, anterior head, dorsal view; D, anterior head, lateral view; E, maxilla 2 lobe 4; F, leg 5. Male. G, anterior head, dorsal view; H, anterior head, lateral view; I, leg 5.

DISTRIBUTION: This mesopelagic species is taken in all oceans, inhabiting moderately deep waters (Vervoort 1957) in tropical and subtropical localities.

*Heterorhabdus (Heterorhabdus) spinosus* Bradford, 1971b (Figs 39, 40, 175, 191)

DESCRIPTION: Size: females: 3.30–4.20 mm, males 3.10–3.70 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head rounded in dorsal view. Genital segment in dorsal view with smoothly rounded sides in uncontracted specimens, left side straighter than right side; in longitudinally contracted specimens the right side undulates; in lateral view the dorsal surface of uncontracted specimens is strongly curved but contracted specimens have a posterior hump; the ventral left side, posterior to genital flap, projects as a triangular knob which varies slightly from specimen to specimen; dorsoposterior spinules on genital segment are variable. Antenna 1 extends further than caudal rami. Maxilla 1 endopod with 3 setae. Maxilla 2 lobe 4 has its shortest seta about one-third the length of the longest seta. Maxilliped basipod 1 with median seta thick and long.

(Bradford 1971b)

Male: As in the family and generic definitions with the following additional characteristics. Generally like female. Leg 5 with both basipod 2 segments with stout spinules bordering inner edge; right basipod 2 extends internally as a tongue-like lobe constricted at its base, arising from the proximal part of basipod 2, spines along inner border form an elongate patch; subterminal spine on right exopod segment 3 is over half the length of segment.

(Bradford 1971b)

REMARKS: This species is closely related to *H. norvegicus*, *H. austrinus*, and *H. tanneri* but is distinguished by the female genital segment and male leg 5. Additional characters not previously described are the large, lightly sclerotised hook on the lateroposterior surface of leg 1 basipod 2; and exopod segments 1 and 2 of leg 1 each with a non-articulated spine at the base of the distolateral articulated spine.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1971).

NEW RECORDS: Nil.

DISTRIBUTION: This mesopelagic species has been taken in deep water of subtropical origin in the Southwest Pacific (Bradford 1971b).

*Heterorhabdus (Heterorhabdus) subspinifrons* Tanaka, 1964a (Figs 56, 175, 191)

DESCRIPTION: Size: females: 2.27–2.80 mm, males 2.11 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head pointed in dorsal view. Genital segment has a small ventral process on each side, anterior to genital swelling; a row of small denticles extends each side of genital flap on ventral surface. Antenna 1 extends beyond caudal rami by 2 segments. Maxilliped basipod 1 with median seta thick and long. (Tanaka 1964a)

Males: As in the family and generic definitions with the following additional characteristics. Generally as in female. Right leg 5 basipod 2 without a remarkable protuberance, exopod segment 2 with a long internal projection, exopod segment 3 with a small subterminal seta; left exopod segment 3 terminates in a small spine. (Tanaka 1964a)

REMARKS: The distinctive markings on the ventral surface of the female genital segment distinguishes the Southwest Pacific specimens of this species. Female leg 5 terminal exopod spine appears to be slightly longer than in Tanaka's (1964) description.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A295	0–500	1 female 2.4 mm
F945	0–1000	1 female 2.8 mm

DISTRIBUTION: A mesopelagic species taken previously in the northwest Pacific in the deep waters of Sagami Bay (Tanaka 1964a).

### *Heterostylites* Sars, 1920

DEFINITION: As for the family definition with the following additional characteristics. Genital segment with a protruding ventral process with a large genital valve. Antenna 1 much longer than the body. Masticatory edge of the mandible with 3 teeth on the left and 4 teeth on the right; without a wide space between 1 tooth and the rest. Maxilla 1 with 1 thick plumose spine on the proximal border of inner lobe 1 some distance from the terminal group of finer spines; endopod with 5 setae. Maxilla 2 lobes 5 and 6 each with 1 smooth, thickened hook-like seta; lobe 4 is the largest; the distal part of the limb is reduced, without large spines.

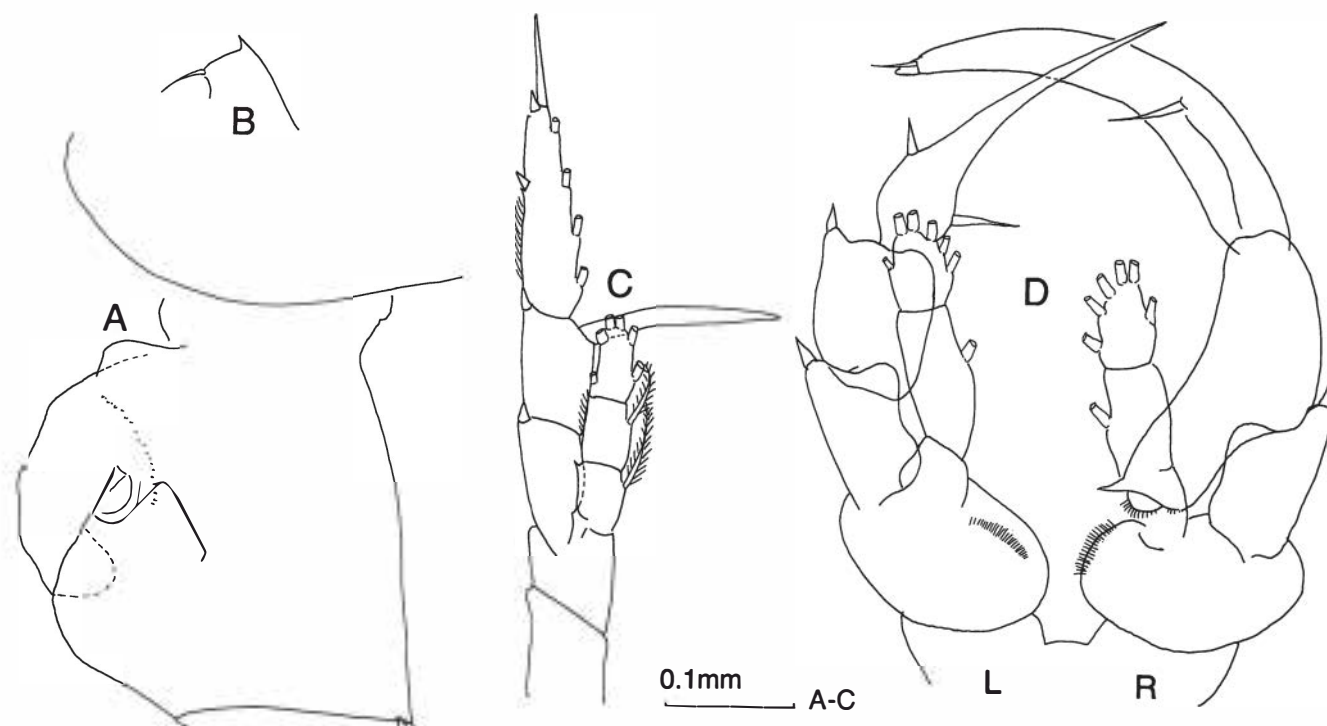


Fig. 56. *Heterorhabdus subspiniifrons*. Female from Stn A295, 0–500 m. A, genital segment, lateral view; B, anterior head, lateral view; C, leg 5. Male from Tanaka (1964). D, leg 5.

Maxilliped basipod 1 is 1.5 times shorter than basipod 2. Female leg 5 with a complex crest of fused spines near the base of outer spine of exopod segment 2. Male leg 5 right exopod segment 2 inflated on inner border but without a definite process.

(Brodsky 1950; Heptner 1972b)

TYPE SPECIES: *Heterochaeta longicornis* Giesbrecht, 1889

REMARKS: Two species are known in this genus: *H. longicornis* (Giesbrecht, 1889) and *H. major* (F. Dahl, 1894) (male, see Tanaka 1964a) of which the following species has been taken in the Southwest Pacific.

*Heterostylites longicornis* (Giesbrecht, 1889)  
(Figs 57, 176, 191)

DESCRIPTION: Size: females: 2.30–3.50 mm, males 2.70–3.68 mm.

Female: As in the family and generic definitions with the following additional characteristics. Body comparatively short with anterior part swollen. Genital segment rather large with a prominent ventral valve. Caudal rami unequal, the left imperfectly separated from anal segment. Antenna 1 extends beyond caudal rami by one-quarter its length. (Sars 1925)

Male: As in the family and generic definitions with the following additional characteristics. Right leg 5 basipod 2 with a long narrow inner lobe, the same lobe on left side is small, both are bordered by short spinules; right exopod segment 2 is considerably enlarged and bluntly bulging. (Sars 1925)

REMARKS: Vervoort (1957) can find no structural differences between this species and *H. major* which may be a deep- or cold-water form of *H. longicornis*. Brodsky (1950) described the female antenna of *H. major* as slightly longer than that of *H. longicornis* extending beyond the caudal rami by 7–9 segments. Sars (1925) distinguished *H. major* from *H. longicornis* by the length of antenna 1 which passes the caudal rami by one-third of its total length. Southwest Pacific males have a horizontal row of relatively coarse teeth at the innermost extremity of right exopod segment 2 on leg 5 which appears to differ from that of *H. major* figured by Tanaka (1964) which has small spinules and hairs in this position. The Southwest Pacific male leg 5 differs slightly from that figured by Sars (1925) in that the spine on left exopod segment 2 is smaller and more proximally placed.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1970).

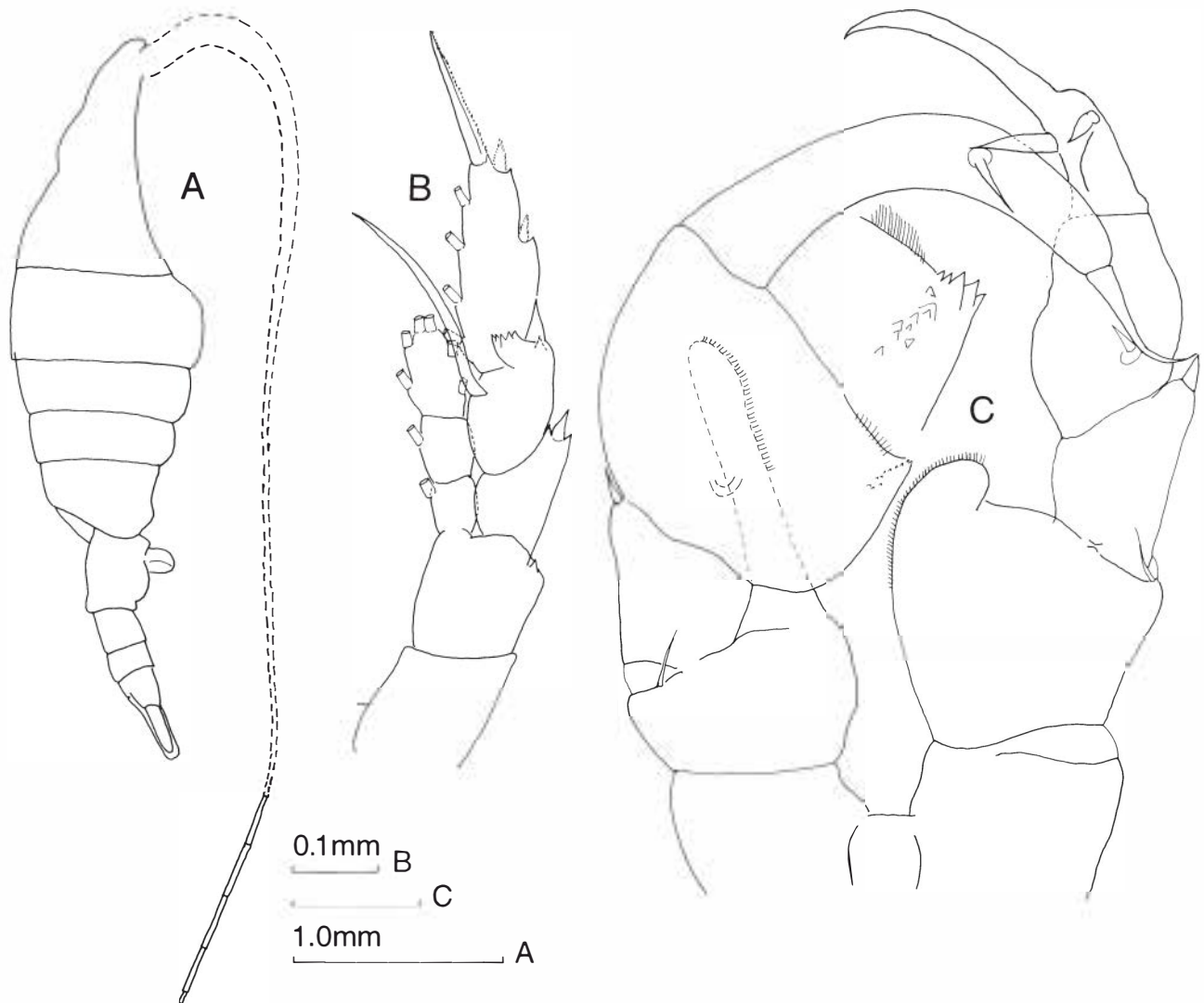


Fig. 57. *Heterostylites longicornis* from Stn VUZ105. Female. A, lateral view; B, leg 5. Male. C, leg 5.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A313	0-914	2 females 3.1, 3.2 mm
F946	200-500	2 females 2.9, 3.25 mm
Mu 67/52s	0-1000	1 female 3.15 mm
VUZ105	0-914	3 females 2.9-3.4 mm, 3 males 3.1 mm
VUZ112	0-732	1 female 3.4 mm

DISTRIBUTION: A mesopelagic species distributed over a large area of the tropical and temperate parts of the Atlantic, Pacific, and Indian Oceans (Vervoort 1957).

*Mesorhabdus* Sars, 1905b

DEFINITION: As for the family definition with the following additional characteristics. Left mandibular blade with 6 teeth, right blade with 7 teeth; teeth are distributed in two groups not separated by a space, there are 3 wide teeth on left and 4 wide teeth on right; remaining teeth are small and merge together. Maxilla 1 outer lobe 1 and endopod with 5-6 and 3-4 setae respectively; exopod with 5-11 setae. Maxilla 2 with 2 proximal endopod segments each with a strong claw-like spine bordered on all sides with fine difficult-to-observe hairs; proximal spine is longer, distal spine is stronger. Maxilliped basipod 1 more than 1.5 times (up to 2 times) shorter than basipod 2.

(Heptner 1971)

TYPE SPECIES: *Heterorhabdus brevicaudatus* Wolfenden, 1905b

REMARKS: This genus contains three omnivorous species (Heptner 1972b): *M. angustus* Sars, 1907; *M. brevicaudatus* (Wolfenden, 1905b); *M. gracilis* Sars, 1907. The following species has been taken in the Southwest Pacific.

*Mesorhabdus gracilis* Sars, 1907 (Figs 58, 176, 191)

DESCRIPTION: Size: females: 3.9–4.45 mm; male ?

Female: As in the family and generic definition with the following additional characteristics. Body rather slender with the anterior part only a little swollen and urosome a little more narrow than in type species. Caudal rami clearly unequal, left almost twice as long as anal segment with second seta quite long. Antenna 1 hardly exceeds body in length; when held straight posteriorly they extend as far as the end of caudal rami. (Sars 1925)

Males: As in the family and generic definition with the following additional characteristics. Leg 5 similar to that of *M. brevicaudatus* but differs in that the left exopod is less strongly developed. (Sars 1925)

REMARKS: The Southwest Pacific specimen is provisionally identified as *M. gracilis* because of the length of antenna 1, although this damaged female appears not to be as slender as that figured by Sars (1925). That is, the prosome length/width of Sars's (1925) female is 3.02 and of the Southwest Pacific female is 2.42; and urosome length/genital segment width is 4.22 for Sars's (1925) female, and 3.15 for the Southwest Pacific female.

The sole Southwest Pacific female appears to be more like the specimen that Tanaka (1964) identified as *M. brevicaudatus*; both specimens have a long antenna 1 and a relatively wide body. Accurate identity of this specimen awaits the discovery of further material.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F945	500-1000	1 female 3.7 mm

DISTRIBUTION: Sars (1925) recorded this species from bathypelagic depths in the temperate Atlantic Ocean.

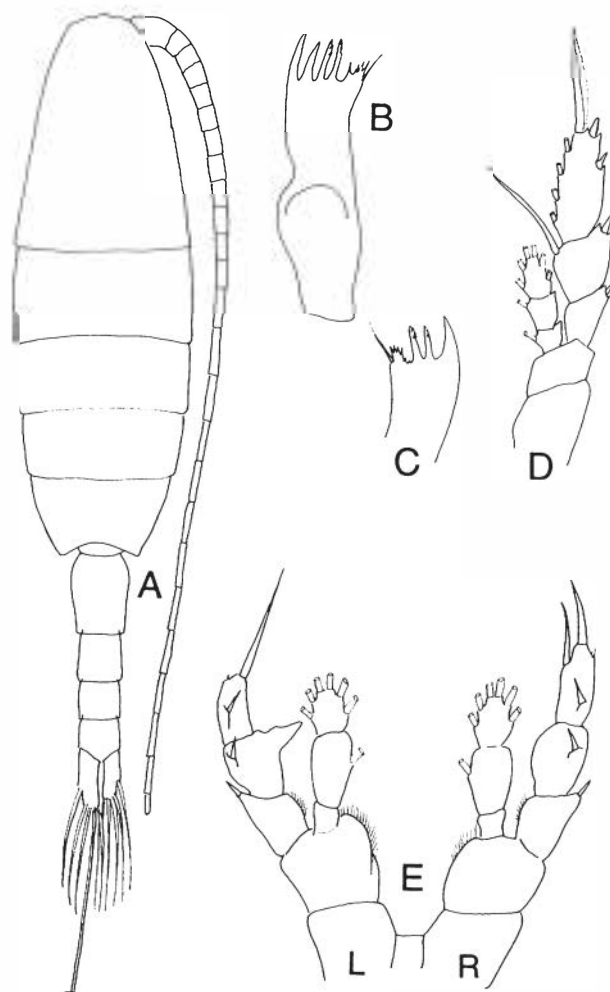


Fig. 58. *Mesorhabdus gracilis* from Sars (1924). Female. A, dorsal view; B, right mandible blade; C, left mandible blade; D, leg 5. Male. E, leg 5.

#### *Microdisseta* Heptner, 1972b

DEFINITION: As for the family definition with the following additional characteristics. Mandible with 6 conical, ungrouped teeth of one type. The body of maxilla 1 is drawn out so that the distal part of the exopod only extends as far as the proximal part of the endopod; outer lobe 1 with 6 setae, exopod with 7 setae, endopod with 9 setae. Maxilla 2 lobes 1–4 with one type of long plumose setae; lobe 5 with a strong, slightly shorter, crescent-shaped spine. Maxilliped basipod 1 noticeably longer than basipod 2; endopod segment 1 equal to segment 2, twice as long as wide and more than half the length of basipod 2. (Heptner 1972b)

TYPE SPECIES: *Disseta minuta* Grice & Hülsemann, 1965

REMARKS: This monotypic genus has not been taken in the Southwest Pacific.

### *Neorhabdus* Heptner, 1972b

DEFINITION: As for the family definition with the following additional characteristics. Left mandible blade with 4 teeth, right blade with 5 teeth. Ventral capped teeth separated from remaining tooth by a gap. Maxilla 1 outer lobe 1 with 3 setae. Maxilla 2 with lobes 1–4 developed, with setae, part of which is thickened basally, sometimes they are claw-like, abruptly tapering distally, densely covered in fine hairs; 1–2 of these setae on every lobe is curved in the direction of the distal part of limb; lobes 5 and 6 relatively short, each with a strong claw-like spine with a row of spinules on the concave border. Maxilliped basipods 1 and 2 are more or less equal equal. (Heptner 1972b)

TYPE SPECIES: *Heterorhabdus latus* Sars, 1905b

REMARKS: This genus contains the following species: *Neorhabdus falciiformis* (Wolfenden, 1911); *N. latus* (Sars, 1905b); *N. truncatus* (A. Scott, 1909), none of which has been taken in the Southwest Pacific.

### Family LUCICUTIIDAE Sars, 1902

DEFINITION: Female: Total length 1.3–9.8 mm. Body slender, prosome oval, head and pedigerous segment 1 separated, pedigerous segments 4 and 5 fused, posterolateral corners rounded. Head rounded anteriorly, sometimes with anterolateral horns; rostral filaments slender. Urosome elongate, 4-segmented. Caudal rami symmetrical, relatively long, with 7 setae. Antenna 1 symmetrical, 25-segmented. Antenna 2 basipod 2 with 1–2 outer edge setae; exopod and endopod separated from basipod 2; endopod 2-segmented, segment 1 with 2 setae at about midlength, segment 2 with 7 inner setae medially and 6 or 7 setae terminally; exopod 8-segmented. Mandible blade with 9 sharp teeth; endopod 2-segmented, segment 1 with 4 setae, segment 2 with 8 setae terminally; exopod segments 1–4 with 1 seta each, segment 5 carrying 2 setae. Maxilla 1 inner lobe 1 with 13 spines and setae; inner lobes 2 and 3 with 3 setae each; basipod 2 with 4 setae; endopod 1-segmented, with 4+5 setae; exopod large, with 11 setae; outer lobe 1 with 5–6 setae. Maxilla 2 lobes 1–5 with 3–4, 3, 3, 3, 3 setae, one of the setae on lobe 5 stouter than the other two, spinulose; endopod with 7 setae. Maxilliped basipod 1 with 3–5 setae; basipod 2 with patches of setules or spinules and 3 setae medially; endopod 6-segmented, segment 1 almost fully incorporated into basipod 2 with 2 setae; segments 2–5 with 2 setae each, segment 6 with 4 setae the outermost 3 of which are reduced. Swimming legs 1–4 distinctly 3-segmented, endopod segments of legs 1 and

5 2–3-segmented, inner distal seta on basis of leg 1 inserted on a conical projection, seta and spine formula as follows:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0–0	0–1	I-1; I-1; II, I, 4	0–1; 0–2; 1, 2, 2
Leg 2	0–1	0–0	I-1; I-1; III, I, 5	0–1; 0–2; 1, 3, 2
Leg 3	0–1	0–0	I-1; I-1; III, I, 5	0–1; 0–2; 1, 3, 2
Leg 4	0–1	1–0	I-1; I-1; III, I, 5	0–1; 0–2; 1, 3, 2
Leg 5	0–0	1–0	I-0; I-1; II, I, 3	0–1; 0–1; 1, 3, 1

Leg 5 natatory, symmetrical, similar to other swimming legs; the inner edge seta on exopod segment 2 is modified into a long slender spine articulated with its segment.

Male: Total length 1.2–8.6 mm. Body similar to female, but urosome 5-segmented. Left antenna 1 geniculate, 21-segmented. Mouthparts and legs 1–4 similar to female. Leg 5 with a 3-segmented endopod and exopod on left, basipod 2 usually modified with one or more inner extensions which may bear spines; exopod and endopod usually 2-segmented on right, last exopod segment recurved; basipod 1 on either side may sometimes be modified with extensions.

(Hülsemann 1966)

An example of this family is *Lucicutia flavicornis* (Figs 59, 60).

REMARKS: Hülsemann (1966) revised the genus *Lucicutia*, recognising 37 species and providing a key to these species. She also applied to the International Commission on Zoological Nomenclature (Hülsemann 1989) to conserve the widely used generic name *Lucicutia* Giesbrecht in Giesbrecht & Schmeil (1898) which was threatened by the unused senior subjective synonym *Isochaeta*. This proposal was accepted in 1990 as Opinion 1613 in the Bulletin of Zoological Nomenclature 47(3): 226–227. Lucicutiidae are luminescent (Herring 1988) and are considered to be omnivorous based on mouthpart morphology (Arashkevich 1969; Itoh 1970) and gut contents (Arashkevich 1969; Harding 1974).

*Lucicutia* Giesbrecht, 1898  
in Giesbrecht & Schmeil 1898

The family Lucicutiidae is represented by a single genus *Lucicutia*, therefore the generic definition is taken here to be the family definition.

TYPE SPECIES: *Leuckartia flavicornis* Claus, 1863

REMARKS: Since Hülsemann's (1966) revision several

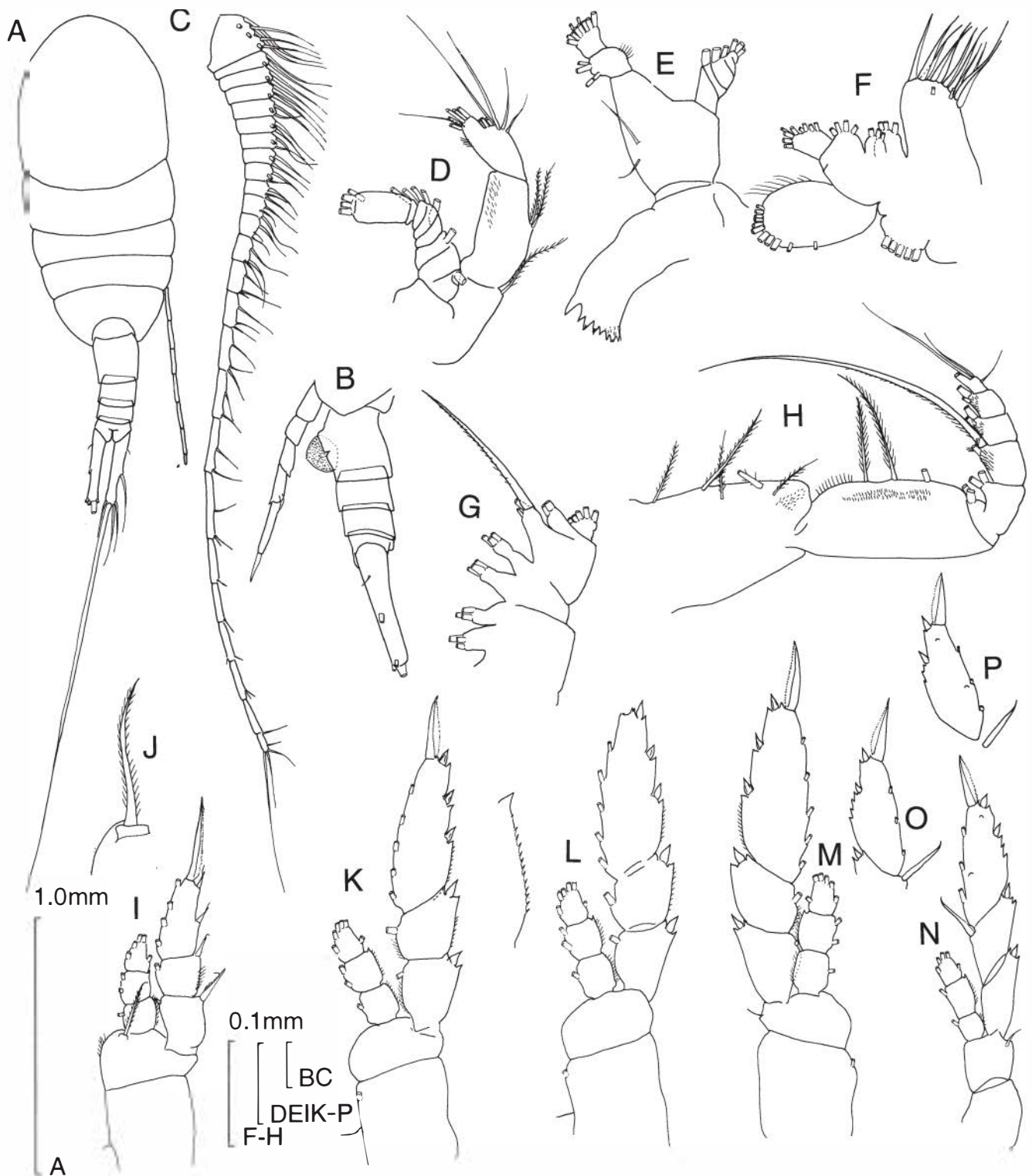


Fig. 59. *Lucicutia flavicornis*. Female from Stn F945, 0–500 m. A, dorsal view; B, urosome, lateral view; C, antenna 1; D, antenna 2; E, mandible; F, maxilla 1; G, maxilla 2; H, maxilliped; I, leg 1; J, inner distal seta on basipod 2 of leg 1; K, leg 2; L, leg 3; M, leg 4; N, leg 5; O, leg 5 exopod segment 3 from another specimen; P, leg 5 exopod segment 3 from Stn G142, 0–200 m.

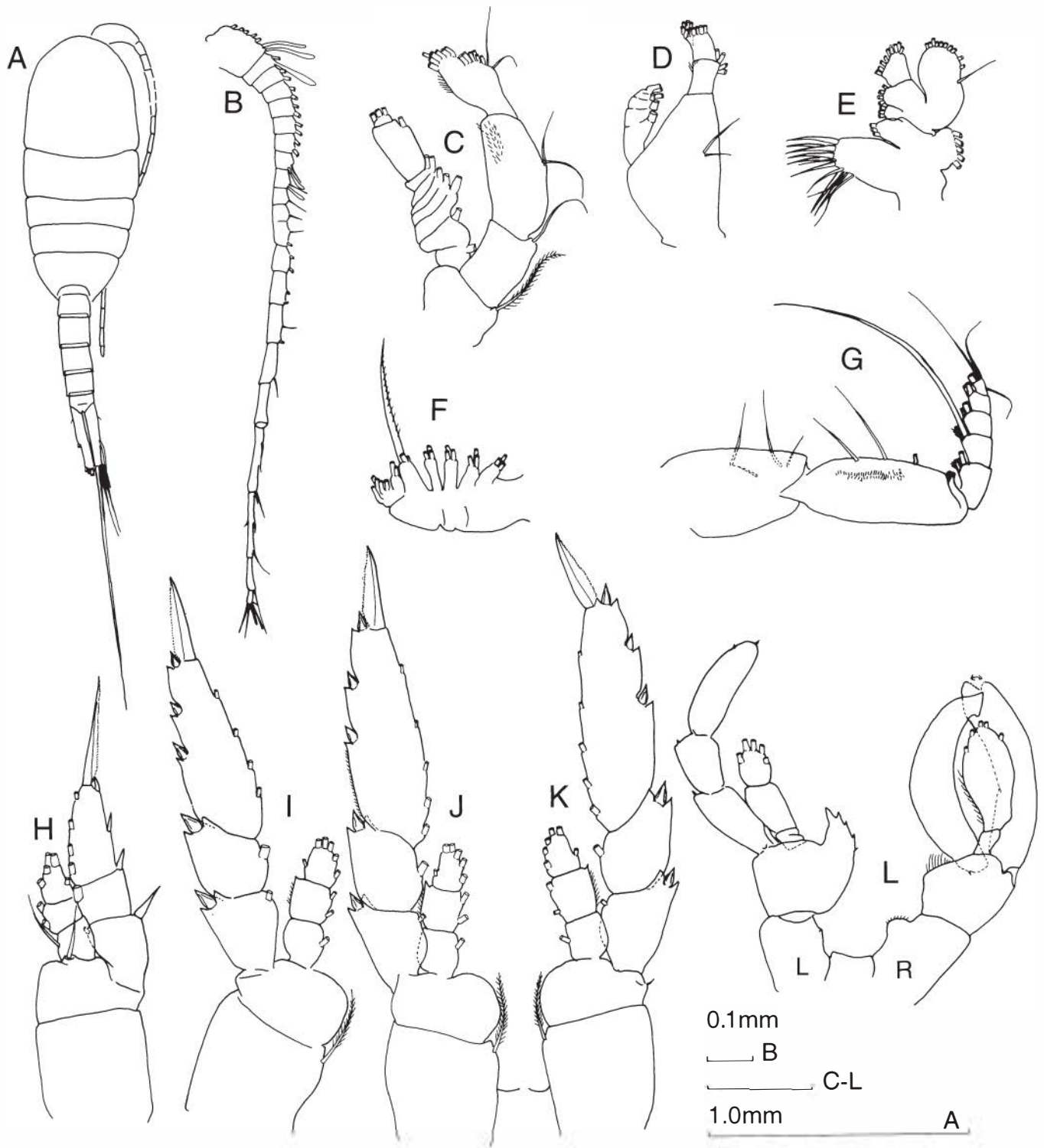


Fig. 60. *Lucicutia flavicornis*. Male from Stn A332. A, dorsal view; B, left antenna 1; C, antenna 2; D, mandibular palp; E, maxilla 1; F, maxilla 2; G, maxilliped; H, leg 1; I, leg 2; J, leg 3; K, leg 4; L, leg 5.

other species have been added to this genus by Park (1970) and Heptner (1971). The genus now contains the following species: *Lucicutia anisofurcata* Heptner, 1971; *L. anomala* Brodsky, 1950 (male unknown); *L. aurita* Cleve, 1904; *L. bella* Hülsemann 1966; *L. bicornuta*

Wolfenden, 1905b; *L. biuncata* Heptner, 1971; *L. cinerea* Heptner, 1971; *L. clausi* (Giesbrecht, 1889); *L. curta* Farran, 1905; *L. curvifurcata* Heptner, 1971; *L. flavicornis* (Claus, 1863); *L. formosa* Hülsemann, 1966 (female see Heptner, 1971 as *L. gigantissima*); *L. gaussae* Grice, 1963a;



*L. gemina* Farran, 1926; *L. grandis* (Giesbrecht, 1895); *L. intermedia* Sars, 1905bb; *L. longicornis* (Giesbrecht, 1889); *L. longifurca* Brodsky, 1950 (female unknown); *L. longiserrata* (Giesbrecht, 1889); *L. longispina* Tanaka, 1963 (male unknown); *L. lucida* Farran, 1908; *L. macrocera* Sars, 1920; *L. magna* Wolfenden in Fowler, 1903; *L. major* Wolfenden, 1911 (male unknown); *L. maxima* Steuer, 1904; *L. oblonga* Brodsky, 1950 (female unknown); *L. orientalis* Brodsky, 1950 (female unknown); *L. ovalis* (Giesbrecht, 1889); *L. pacifica* Brodsky, 1950; *L. pallida* Hülsemann 1966 (female unknown); *L. paraclausi* Park, 1970; *L. parva* Grice & Hülsemann, 1965; *L. pellucida* Hülsemann, 1966 (male unknown); *L. pera* A. Scott, 1909; *L. polaris* Brodsky, 1950; *L. profunda* Brodsky, 1950 (female unknown); *L. rara* Hülsemann 1966; *L. sarsi* Hülsemann, 1966 (male see Sewell 1932 as *L. maxima*); *L. sewelli* Tanaka, 1963; *L. tenuicauda* Sars, 1907; *L. ushakovi* Brodsky, 1955 (female unknown); *L. wolfendeni* Sewell, 1932.

The following species have been taken in the Southwest Pacific.

***Lucicutia bicornuta* Wolfenden, 1905b**  
(Figs 61, 176, 191)

DESCRIPTION: Size: females: 6.80–8.40 mm, males: 6.90–7.70 mm.

Female: Frontal margin of head with two spines; lateral margins with a hook on each side. Urosome segments and caudal rami with proportional lengths 19: 8: 8: 12: 53 = 100; the genital segment has, as well as genital protuberance, a moderately large tubercle near the posterior margin of the ventral surface; caudal rami are 22 times as long as distal width or 11 times as long as proximal width. Antenna 1 exceeds the end of caudal rami by the last 2 segments. (Tanaka 1963)

Male: Prosome as long as urosome. Genuiculate antenna 1 extends to end of caudal rami. Leg 5 right basipod 2 with a relatively straight inner border; left basipod 2 with 4 terminal spines (1 large and 3 small) on the inner distal expansion.

(Wolfenden 1911; Tanaka 1963)

REMARKS: The two males leg 5 that were examined in detail differed slightly from Wolfenden's (1911) figure. The left basipod inner expansion was composed, at its inner distal end, of two sharp points and a wide rounded extension, all of the same length.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

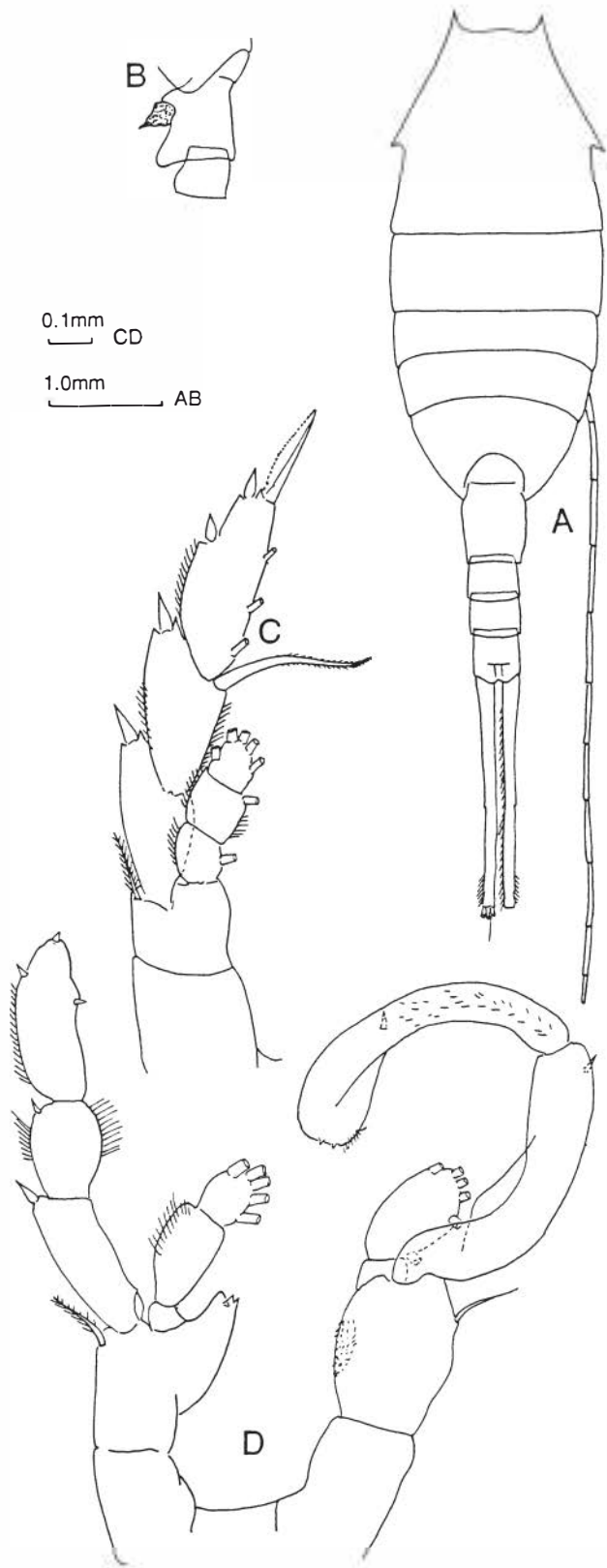


Fig. 61. *Lucicutia bicornuta* from Stn VUZ105. Female. A, dorsal view; B, genital segment, lateral view; C, leg 5. Male. D, leg 5.

Stn No.	Depth of Haul (m)	Specimens
E904	0-1243	1 male 6.5 mm
VUZ93	0-1097	1 female 7.4 mm
VUZ105	0-914	3 females 7.5 mm; 4 males 6.80-7.25 mm

DISTRIBUTION: This species appears to be distributed at bathypelagic depths in all oceans (Hülsemann 1966 and the present records).

*Lucicutia clausi* (Giesbrecht, 1889)  
(Figs 62, 176, 191)

DESCRIPTION: Size: females: 1.60-2.10 mm, males: 1.60-1.90 mm.

Female: Head with lateral hooks. Anal segment longer than preceding segment; second terminal setae on caudal rami are shorter than urosome. Antenna 1 extends as far as the end of caudal rami; aesthetascs slender; segment 19 shorter than segments 10-12. Basipod 2 of maxilla 1 with 3 setae. Leg 1 endopod 2-segmented, with 7 setae. Leg 5 endopod reaches the distal border of exopod segment 2; exopod segment 1 is at least as long as exopod segment 3 which is at least three times the length of its terminal spine.

(Giesbrecht 1892)

Male: Segments 19-23 of the prehensile antenna 1 are a little shorter than segments 14-18. Leg 5 right endopod lamelliform with 6 setae. (Giesbrecht 1892)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Bradford (1970).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A295	0-500	1 female 1.7 mm, 1 male 1.7 mm
A302	0-500	1 male 1.7 mm
D614	100-250	1 male 1.8 mm
F945	0-500	1 female 1.9 mm
F946	200-500	2 females 1.6, 1.7 mm, 1 male 1.7 mm
F947	0-500	2 females 1.8, 1.9 mm

DISTRIBUTION: This mesopelagic species has been taken in all oceans (Hülsemann 1966).

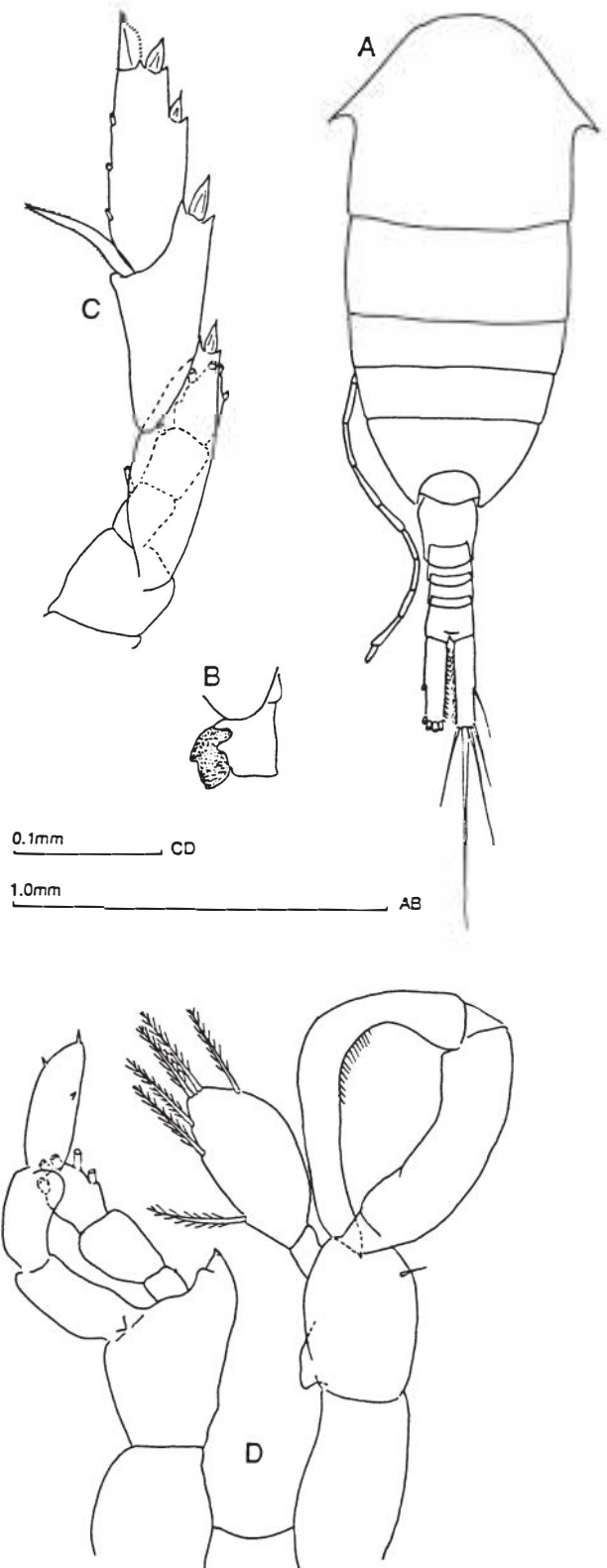


Fig. 62. *Lucicutia clausi*. Female from Stn F947, 0-500 m. A, dorsal view; B, genital segment, lateral view; C, leg 5. Male from Stn D614, 100-250 m. D, leg 5.

*Lucicutia curta* Farran, 1905 (Figs 63, 176, 191)

DESCRIPTION: Size: females: 1.90–2.60 mm, males: 1.80–2.40 mm.

Female: Body robust ovate, slightly tapering anteriorly, head without lateral protrusions. Rostrum not visible in dorsal view. Genital segment equal to the 2 following segments and strongly swollen ventrally; caudal rami 4 times as long as wide. Antenna 1 slightly longer than body. Leg 1 endopod 3-segmented. Leg 5 with terminal spine on exopod segment 3 1.33 times as long as its segment; endopod 3-segmented.

(Farran 1905; Hülsemann 1966)

Male: Cephalothorax in dorsal view more slender than female, head without lateral protrusions. Anal segment and urosome segment 4 about the same length; caudal rami as in female. Geniculate antenna 1 on left, both antenna 1 about the same length and extending to middle of caudal rami. Leg 1 endopod 3-segmented. Leg 5 inner margin of right basipod 1 smooth; inner margin of both basipod 2 without pointed projections; right endopod 2-segmented.

(Vervoort 1957; Hülsemann 1966)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500–1000	1 male 1.9 mm

DISTRIBUTION: This mesopelagic species has been taken in the North Atlantic, eastern and northwestern Pacific, Indian ocean, and Antarctic seas (Hülsemann 1966; Vervoort 1957).

*Lucicutia flavicornis* (Claus, 1863)  
(Figs 59, 60, 176, 191)

DESCRIPTION: Size: females: 1.75–2.00 mm, males: 1.55–1.70 mm.

Female: Head without lateral protrusions. Genital boss large (0.56 times the length of genital segment), placed centrally on the segment, genital segment symmetrical in dorsal view; anal segment as long as urosome segment 3; caudal rami divergent or parallel and not touching, slightly more than 5 times as long as wide, innermost terminal seta small and slender. Antenna 1 extends to middle of caudal rami. Leg 1 basipod 2 with a low cylindrical process, endopod 3-segmented. Leg 5 endopod 3-segmented; inner spine

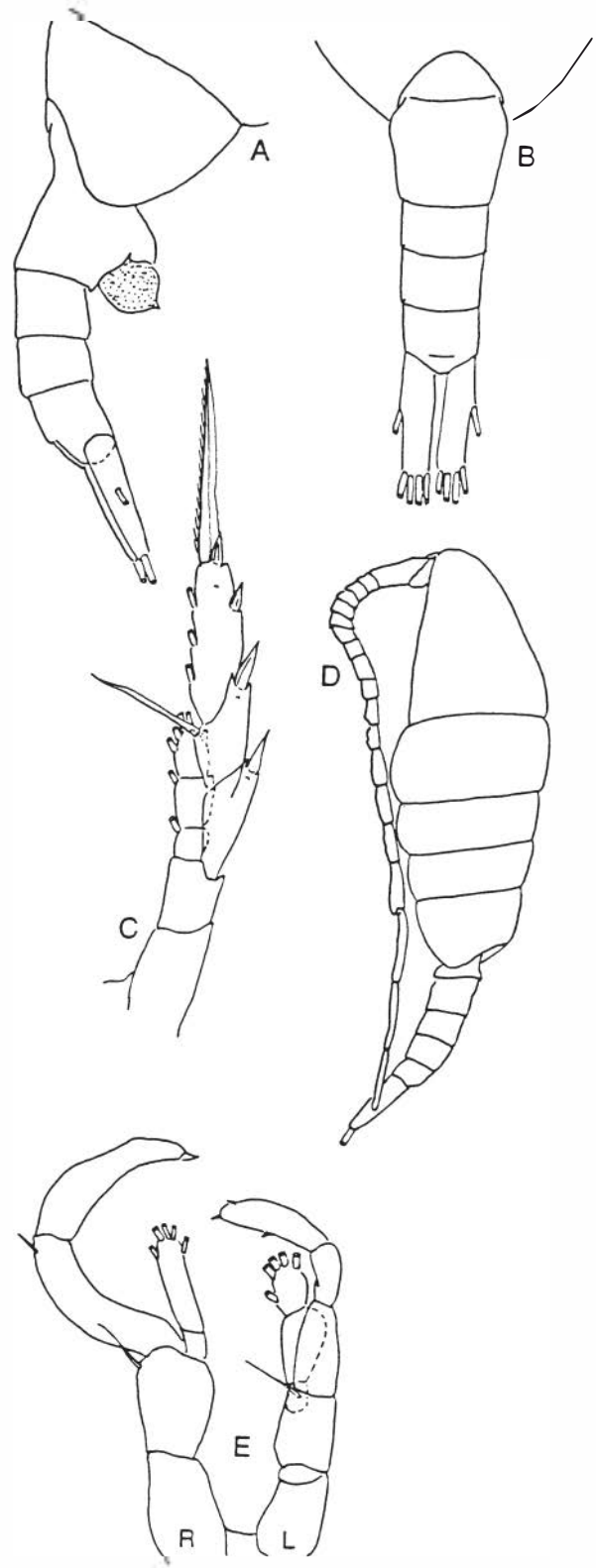


Fig. 63. *Lucicutia curta* from Vervoort (1957). Female. A, urosome, lateral view; B, urosome, dorsal view; C, leg 5. Male. D, lateral view; E, leg 5.

on exopod segment 2 long and straight except for a slight bend at tip, reaching beyond base of first inner seta on exopod segment 3; terminal spine on exopod segment 3 less than half the length of its segment, outer margin of exopod segment 3 with several teeth.

Male: Head without lateral protrusions. Anal segment almost as long as urosome segment 4. Caudal rami are slightly more than 5 times longer than wide, innermost terminal seta small and slender. Antenna 1 extends as far as middle of caudal rami. Leg 1 endopod 3-segmented. Leg 5 right basipod 1 inner margin with a conspicuous rounded protrusion, right basipod 2 with a triangular inner border bearing hairs distally; left basipod 1 with a ridge on the inner margin, left basipod 2 inner distal corner protruding and ending in one point and with 3–5 extra teeth and sometimes a proximal spinule, inner margins of both basipod 2 without pointed projections.

REMARKS: When Giesbrecht (1892: 365) described *L. flavicornis* (Claus, 1863) he noted that there was striking variation of several characters: "In fact when one sees together a larger number of individuals of the species, such differences in body size and form attracts attention, one positively believes one has at least 2 species before oneself." Since this was written, *L. gemina* was described by Farran (1926) which accounts for some of the variation Giesbrecht (1892) noted.

More recently, others have noted that *L. flavicornis* falls into two size groups: females 1.46–1.53 mm and 1.87–1.90 mm; males 1.39–1.53 mm and 1.77 mm from the equatorial Pacific (Grice 1962), and females 1.30–1.70 mm and 1.90–2.00 mm; males 1.25–1.53 mm and 1.55–1.70 mm from the Southwest Pacific (personal observation), and females 1.40–1.50 mm and 1.96 mm; males 1.8 mm (Farran 1929).

Of all the forms mentioned by various workers, the large form is the most conservative and examination of Claus's (1863) original description of *Leuckartia flavicornis* convinces me it is the large form, which should retain the name *Lucicutia flavicornis*. The reason for this opinion is the large size of Claus's (1863) specimens, the fact that the male right basipod 1 has a conspicuous rounded bump on the inner margin, and the female leg 5 has a long inner edge spine on the inner distal corner of exopod segment 2. Giesbrecht (1892) has figured this species in Plate 19, Figs 17, 19, and 29.

Examination of smaller forms from different oceans, which have been given the name *L. flavicornis*, brings me to the conclusion that one or two undescribed species are involved at each locality and that these species may have much narrower geographic ranges than *L. flavicornis* s. str. The small related Southwest Pacific species is described in the following section.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929)?

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500–1000	1 male 1.60 mm
A313	0–914	1 male 1.60 mm
A332	surface	3 males 1.70 mm
C537	surface	2 males 1.60, 1.65 mm
D614	0–100	4 males 1.55–1.60 mm
	100–250	7 males 1.60 mm
F945	0–200	1 female 1.90 mm
	0–500	2 females 1.95, 1.90 mm, 1 male 1.55 mm
F946	0–200	1 male 1.70 mm
F947	0–200	1 female 1.90 mm
G142 2400	0–100	1 female 2.0 mm

DISTRIBUTION: This epi- to mesopelagic species is found in the Mediterranean (Claus 1863; Giesbrecht 1892), and equatorial Pacific (Grice 1962) and is recorded here from the Southwest Pacific.

*Lucicutia* cf. *flavicornis* (Figs 64, 176, 191)

DESCRIPTION: Size: females: 1.20–1.70 mm, males: 1.25–1.60 mm.

Female: Head without lateral protrusions. Genital boss large (0.61 times the length of genital segment), placed centrally on segment, genital segment symmetrical in dorsal view; anal segment as long as urosome segment 3; caudal rami divergent or parallel and not touching, slightly more than 5 times as long as wide, innermost terminal seta small and slender. Antenna 1 extends to posterior border of anal segment or beyond. Leg 1 basipod 2 with a low cylindrical process, endopod 3-segmented. Leg 5 endopod 3-segmented; inner spine on exopod segment 2 curved and relatively thick, reaching beyond base of first inner seta on exopod segment 3; terminal spine on exopod segment 3 about half the length of its segment, outer margin of exopod segment 3 with several teeth.

Male: Head without lateral protrusions. Anal segment almost as long as urosome segment 4. Caudal rami are slightly more than 5 times longer than wide, innermost terminal seta small and slender. Antenna 1 extends as far as posterior border of anal segment. Leg 1 endopod 3-segmented. Leg 5 right basipod 1 inner margin straight, right basipod 2 with a rounded inner border bearing hairs; left basipod 1 straight, left basipod 2 inner distal corner protruding and ending in one point and with 4–6 extra teeth, inner margins of both basipod 2 without pointed projections.

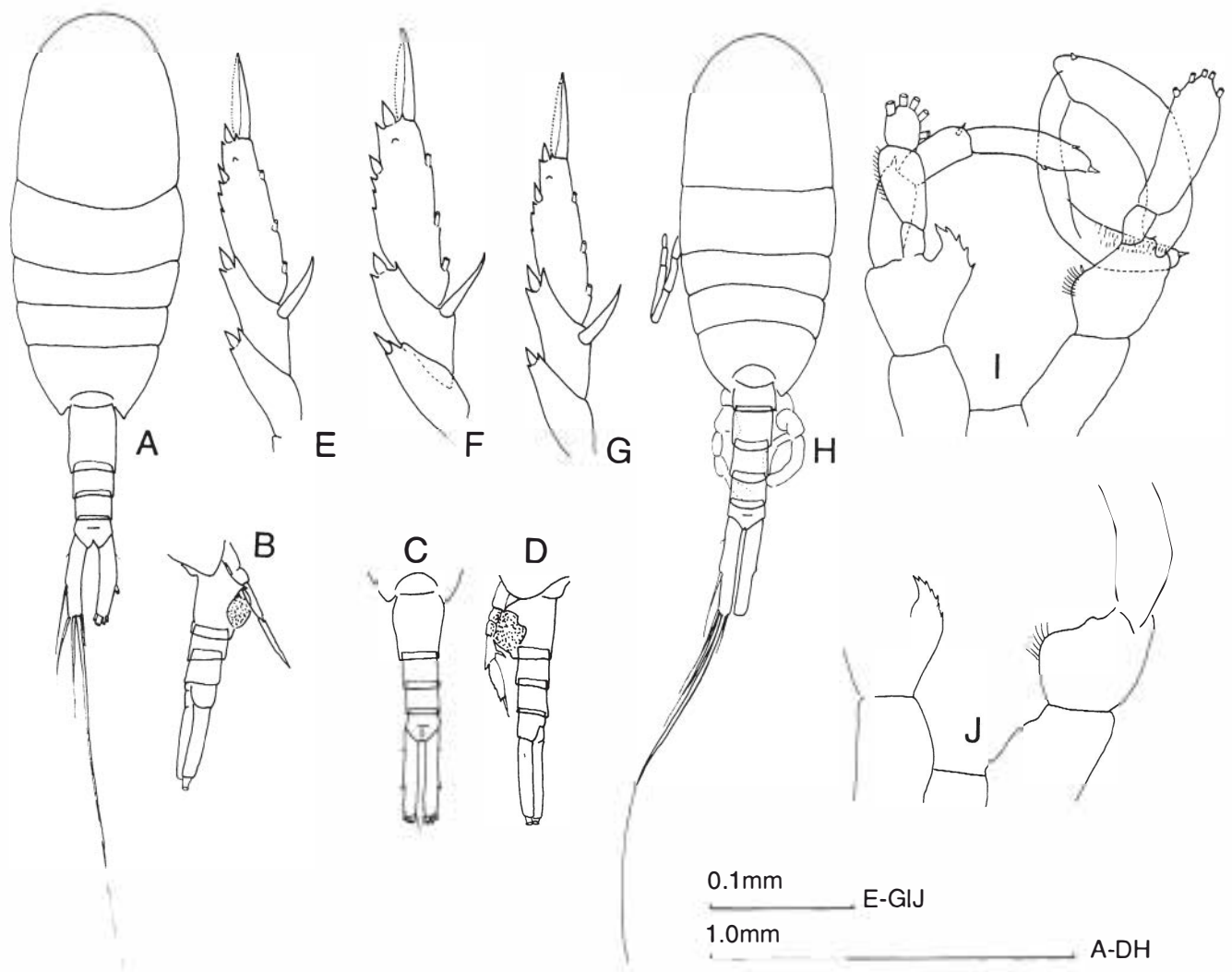


Fig. 64. *Lucicutia* cf. *flavicornis* from Stn A332. Female. A, dorsal view; B, urosome, lateral view; C, urosome, dorsal view (another specimen); D, urosome, lateral view (another specimen); E, F, G, leg 5 exopod of three different specimens. Male. H, dorsal view; I, leg 5; J, leg 5 of another specimen.

REMARKS: These specimens differ from *L. flavicornis* s. str. in that they are smaller, the male right basipod 1 on leg 5 does not have the conspicuous rounded inner border, the left basipod 1 has a straight inner border, and the right basipod 2 has a rounded inner border. The female is not so easily distinguished: it is smaller, leg 5 inner distal spine on exopod segment 2 tends to be shorter, thicker, and curved (it can also tend towards the type found in *L. flavicornis* s.str.), and the terminal spine on leg 5 exopod segment 3 is relatively longer. Giesbrecht (1892) appears to have figured specimens very like those from the Southwest Pacific in Plate 19, Figs 15, and 38.

This form has not been described as new here because there is a great deal of variability among the Southwest Pacific specimens and related specimens

from other localities. The identity of these specimens awaits a more detailed understanding of their variability.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929)?; Dakin and Colefax (1940)?

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500-1000	1 female 1.55 mm
A295	surface	1 female 1.3 mm
A302	surface	10 females 1.3-1.5 mm; 1 male 1.4 mm
	0-500	1 females 1.4-1.6 mm; 1 male 1.4 mm

Stn No.	Depth of Haul (m)	Specimens
A303	450-1000	1 female 1.4 mm 1 male 1.55 mm
A313	0-914	2 females 1.50, 1.55 mm
A332	surface	12 females 1.4-1.7 mm; 4 males 1.4-1.6 mm
B116	0-125	1 female 1.5 mm
B120	0-150	1 male 1.5 mm
C537	surface	10 females 1.3-1.5 mm; 3 males 1.25-1.4 mm
	0-250	8 females 1.2-1.6 mm; 2 males 1.35 mm
D614	0-100	1 male 1.3 mm
	100-250	4 females 1.5-1.6 mm
F945	0-200	1 female 1.55 mm
F946	0-200	2 males 1.4, 1.5 mm
	200-500	1 female 1.5 mm
	0-1000	1 female 1.6 mm
F947	0-500	2 females 1.5, 1.6 mm
G142	1200 250-500	1 female 1.5 mm
	2400 0-100	2 females 1.7 mm
Mu67/88	0-150	1 male 1.5 mm?
Mu67/94	0-150	1 male

DISTRIBUTION: This apparently epi- to mesopelagic species has been taken in the Mediterranean (Giesbrecht 1892), and Southwest Pacific Ocean.

*Lucicutia gemina* Farran, 1926 (Figs 65, 176, 191)

DESCRIPTION: Size: females: 1.40-1.90 mm, males: 1.30-1.72 mm.

Female: Head without lateral protrusions. Genital boss small (0.4 times the length of genital segment), placed almost entirely on anterior half of segment, genital segment symmetrical in dorsal view; anal segment as long as urosome segment 3; caudal rami parallel and touching, slightly more than 5 times long as wide, innermost terminal seta small and slender. Antenna 1 extends to middle of caudal rami. Leg 1 basipod 2 with a low cylindrical process, endopod 3-segmented. Leg 5 endopod 3-segmented; inner spine on exopod segment 2 short, not reaching base of first inner seta on exopod segment 3; terminal spine on exopod segment 3 about half the length of its segment, outer margin of exopod segment 3 smooth.

(Farran 1926; Hülsemann 1966)

Male: Head without lateral protrusions. Anal segment almost as long as urosome segment 4. Caudal rami are slightly more than 5 times longer than wide, innermost terminal seta small and slender. Antenna 1 extends as far as middle of caudal rami. Leg 1 endopod 3-segmented. Leg 5 right basipod 1 inner margin smooth; left basipod 2 inner distal corner protruding and ending in one point and without teeth.

(Farran 1926; Hülsemann 1966)

REMARKS: Antenna 1, when held straight posteriorly, extends to posterior border of caudal rami on some Southwest Pacific females.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500-1000	2 males 1.3, 1.4 mm
A295	0-500	1 female 1.35 mm
A302	0-500	1 female 1.6 mm
	500-1000	1 male 1.25 mm
C537	0-250	1 male
F946	200-500	3 females 1.7 mm, 1 male 1.7 mm
F947	0-500	1 male 1.5 mm

DISTRIBUTION: This epi- to mesopelagic species has been taken in the Atlantic, western Pacific, and Indian Ocean (Hülsemann 1966). The present records suggest it is found well north of the Subtropical Convergence.

*Lucicutia grandis* (Giesbrecht, 1895)

(Figs 66, 177, 191)

DESCRIPTION: Size: females: 4.40-6.50 mm, males: 3.90-4.90 mm.

Female: Head with 1 pair of lateral protrusions or without protrusions. In dorsal view genital segment symmetrical; anal segment swollen, almost as long as caudal rami; caudal rami just over 5 times as long as wide. Antenna 1 extends to end of caudal rami. Leg 1 endopod 3-segmented.

(Wolfenden 1911 as *L. maxima*; Hülsemann, 1966)

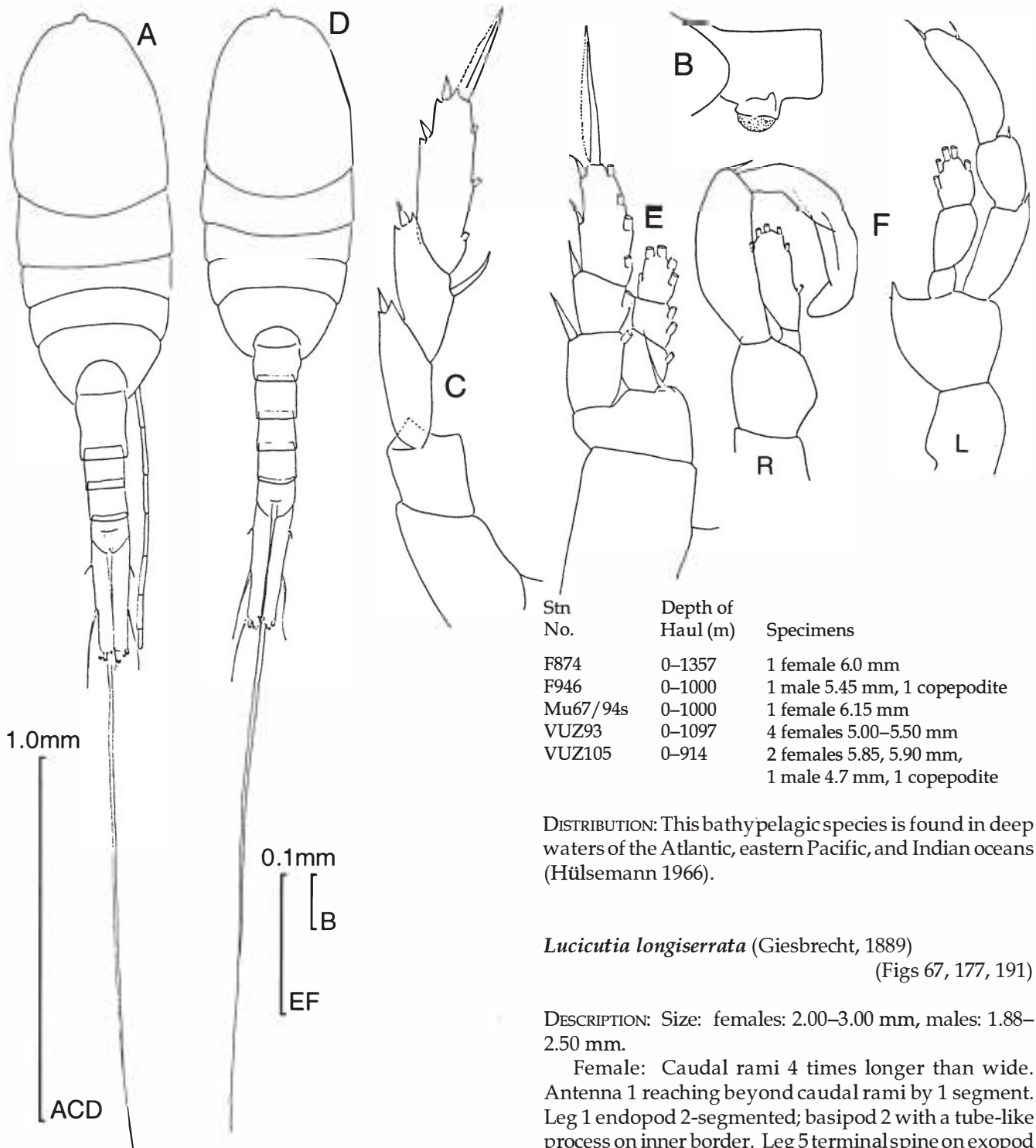
Male: Each side of head with 1 strong spine-like point or only with swellings in this position. Caudal rami much shorter than urosome, 5 times as long as wide. Antenna 1 reaches almost to end of caudal rami if held against body. Leg 1 endopod 3-segmented. Leg 5 inner margin of left basipod 2 protruding, bearing teeth; inner margin of right basipod 2 protruding at proximal half, without teeth.

(Giesbrecht 1895; Hülsemann 1966)

REMARKS: Nearly all Southwest Pacific specimens had blunt protrusions on the head; the copepodite from Stn F946 had pointed processes on the blunt protrusion. Antenna 1 exceed the end of the caudal rami if they are held straight posteriorly.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Brady (1883) off Port Jackson, Australia, as *Leuckartia flavicornis*.

NEW RECORDS:



Stn No.	Depth of Haul (m)	Specimens
F874	0-1357	1 female 6.0 mm
F946	0-1000	1 male 5.45 mm, 1 copepodite
Mu67/94s	0-1000	1 female 6.15 mm
VUZ93	0-1097	4 females 5.00-5.50 mm
VUZ105	0-914	2 females 5.85, 5.90 mm, 1 male 4.7 mm, 1 copepodite

**DISTRIBUTION:** This bathypelagic species is found in deep waters of the Atlantic, eastern Pacific, and Indian oceans (Hülsemann 1966).

*Lucicutia longiserrata* (Giesbrecht, 1889)  
(Figs 67, 177, 191)

**DESCRIPTION:** Size: females: 2.00-3.00 mm, males: 1.88-2.50 mm.

**Female:** Caudal rami 4 times longer than wide. Antenna 1 reaching beyond caudal rami by 1 segment. Leg 1 endopod 2-segmented; basipod 2 with a tube-like process on inner border. Leg 5 terminal spine on exopod segment 3 a little shorter than its segment.

(Giesbrecht 1892; Hülsemann 1966)

**Male:** Caudal rami 4.6 times longer than its width distally. Antenna 1 extends beyond caudal rami by 1-2 segments. Leg 1 endopod 2-segmented. Leg 5 left inner distal corner of basipod 1 without a strong spine; left inner distal corner of basipod 2 produced, carrying 2 or 3 teeth, 1 small seta and a rounded process.

(Tanaka 1963; Hülsemann 1966)

**Fig. 65.** *Lucicutia gemina*. Female from Stn F946, 200-500 m. A, dorsal view; B, genital segment, lateral view; C, leg 5. Male from Stn F946, 200-500 m. D, dorsal view. Male from Stn C537. E, leg 1; F, leg 5.

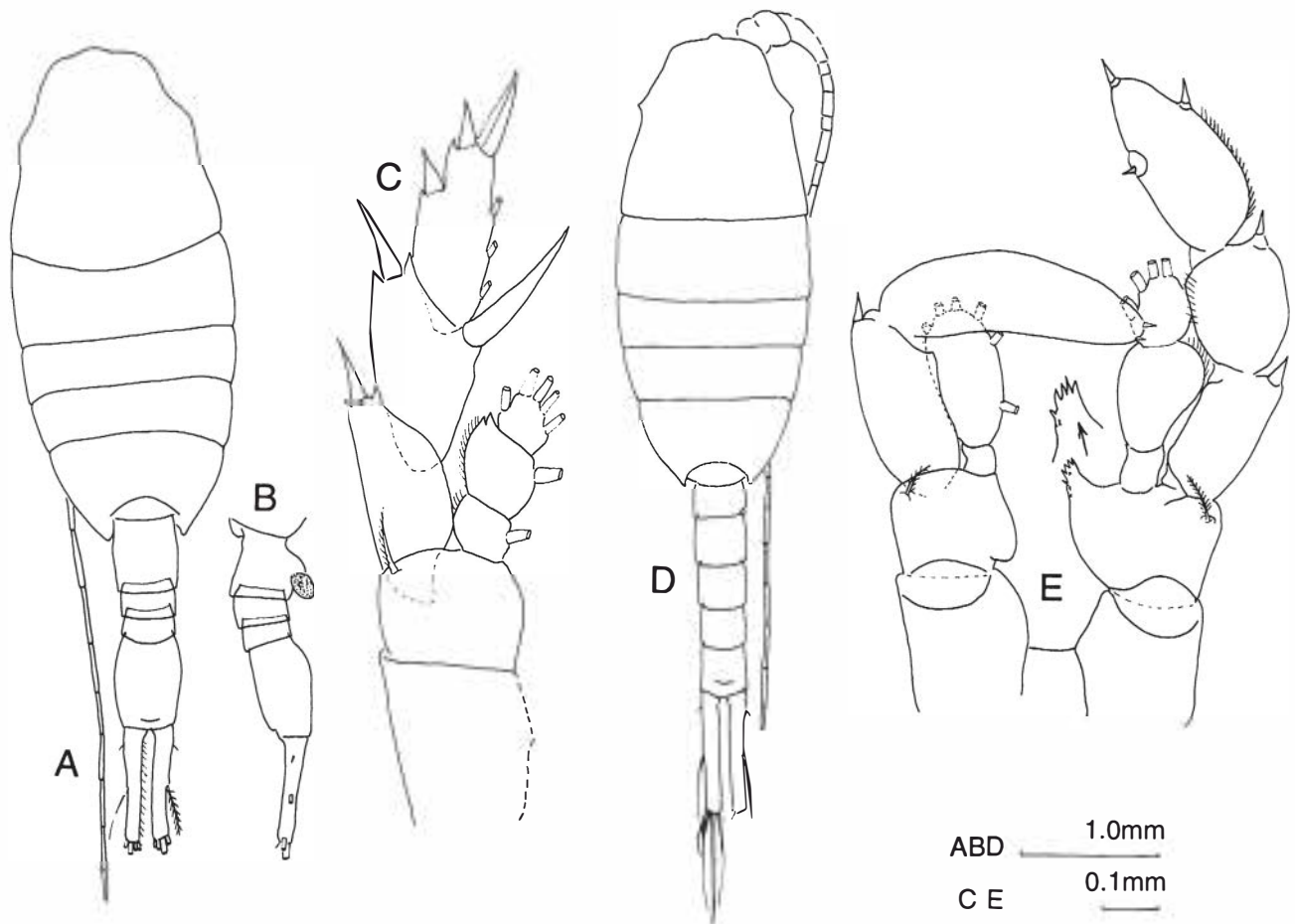


Fig. 66. *Lucicutia grandis* from Stn VUZ105. Female. A, dorsal view; B, urosome, lateral view; C, leg 5. Male. D, dorsal view; E, leg 5.

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500-1000	1 female 2.5 mm
A302	500-1000	1 female 2.5 mm
A303	450-1000	1 female 2.2 mm, 1 male 1.9 mm
F945	500-1000	1 female 2.6 mm

DISTRIBUTION: This bathypelagic species has been taken in the Atlantic, eastern and western Pacific, and Indian oceans (Hülsemann 1966).

*Lucicutia lucida* Farran, 1908 (Figs 68, 177, 191)

DESCRIPTION: Size: females: 3.50 mm, males: 3.25-3.50 mm.

Female: Head without lateral protrusions. Genital segment symmetrical in dorsal view; anal segment slender and 0.75 the length of genital segment; almost as long as caudal rami; caudal rami 4.5 times as long as wide. Leg 1 endopod 3-segmented. Leg 5 exopod 2.5 times the length of its terminal spine.

(Farran 1908; Hülsemann 1966)

Male: Head without lateral protrusions. Anal segment 0.75 times the length of caudal rami; caudal rami 4.5 times longer than wide. Antenna 1 extending as far as distal end of anal segment. Leg 1 endopod 3-segmented. Leg 5 right basipod 1 inner margin with a spiny process; left basipod 2 with a large rounded process, bearing a few spines.

(Farran 1908; Hülsemann 1966)



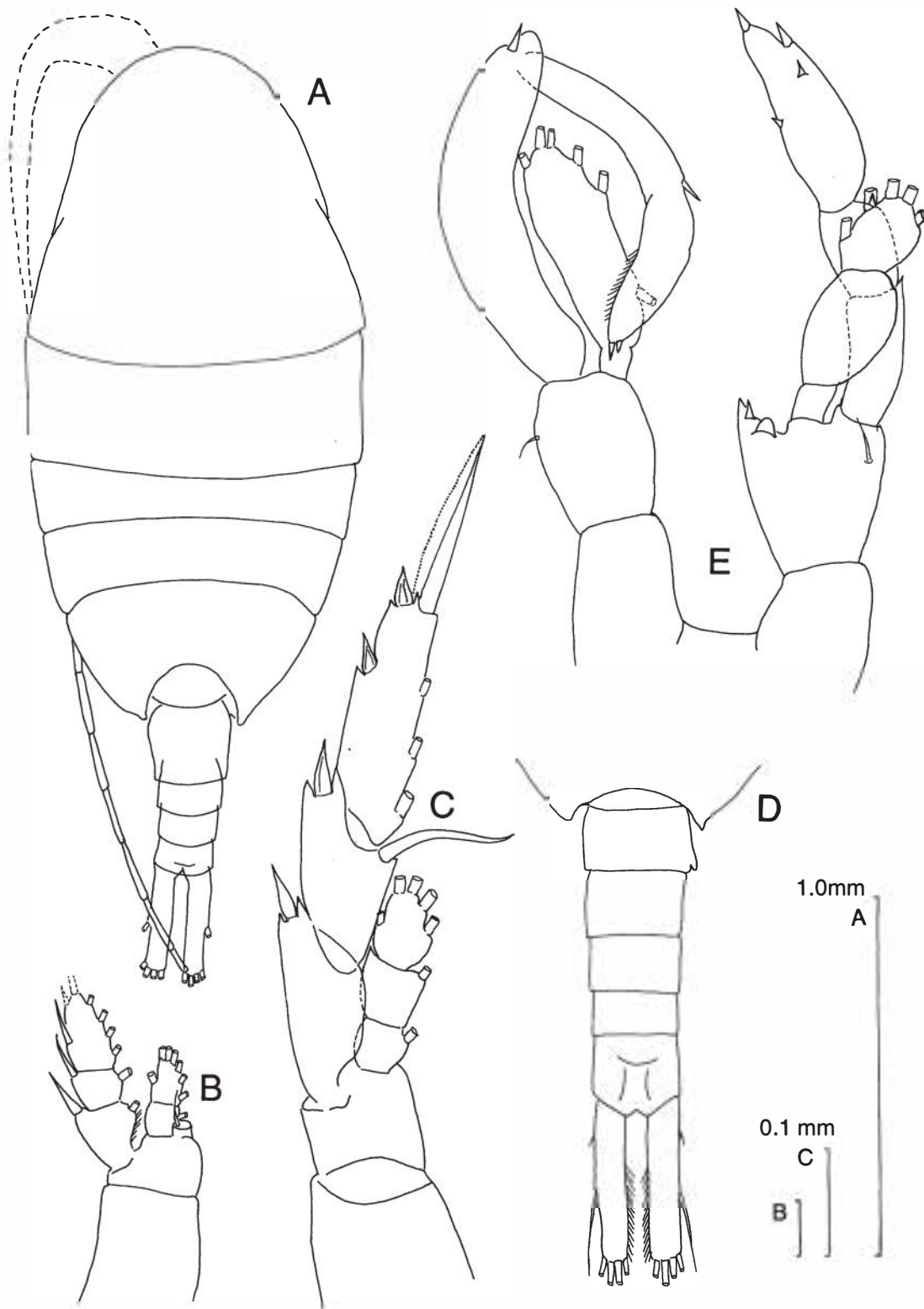
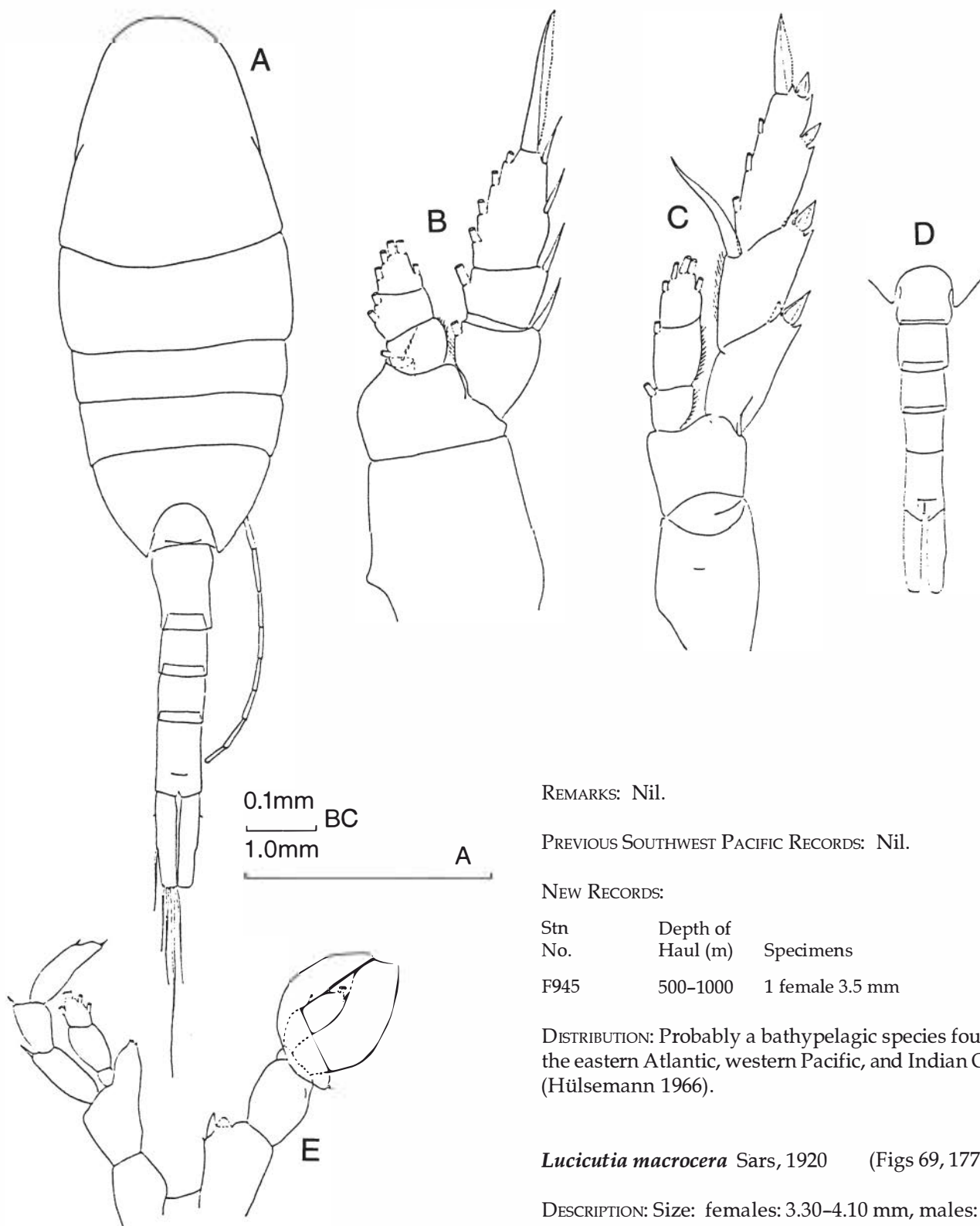


Fig. 67. *Lucicutia longiserrata*. Female from Stn A302, 500–1000 m. A, dorsal view; B, leg 1; C, leg 5. Male from Tanaka (1963). D, urosome, dorsal view; E, leg 5.



**Fig. 68.** *Lucicutia lucida*. Female from Stn F945, 500–1000 m. A, dorsal view; B, leg 1; C, leg 5. Male from Hülsemann (1966). D, urosome, dorsal view; E, leg 5.

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F945	500–1000	1 female 3.5 mm

DISTRIBUTION: Probably a bathypelagic species found in the eastern Atlantic, western Pacific, and Indian Ocean (Hülsemann 1966).

*Lucicutia macrocera* Sars, 1920 (Figs 69, 177, 191)

DESCRIPTION: Size: females: 3.30–4.10 mm, males: 3.60–4.30 mm.

Female: Head obtusely rounded, without lateral projections. Genital segment well developed, anal segment a little longer than wide. Antenna 1 extends beyond end of caudal rami by 6–7 segments. Leg 1 endopod 2-segmented. Leg 5 is slender and exopod

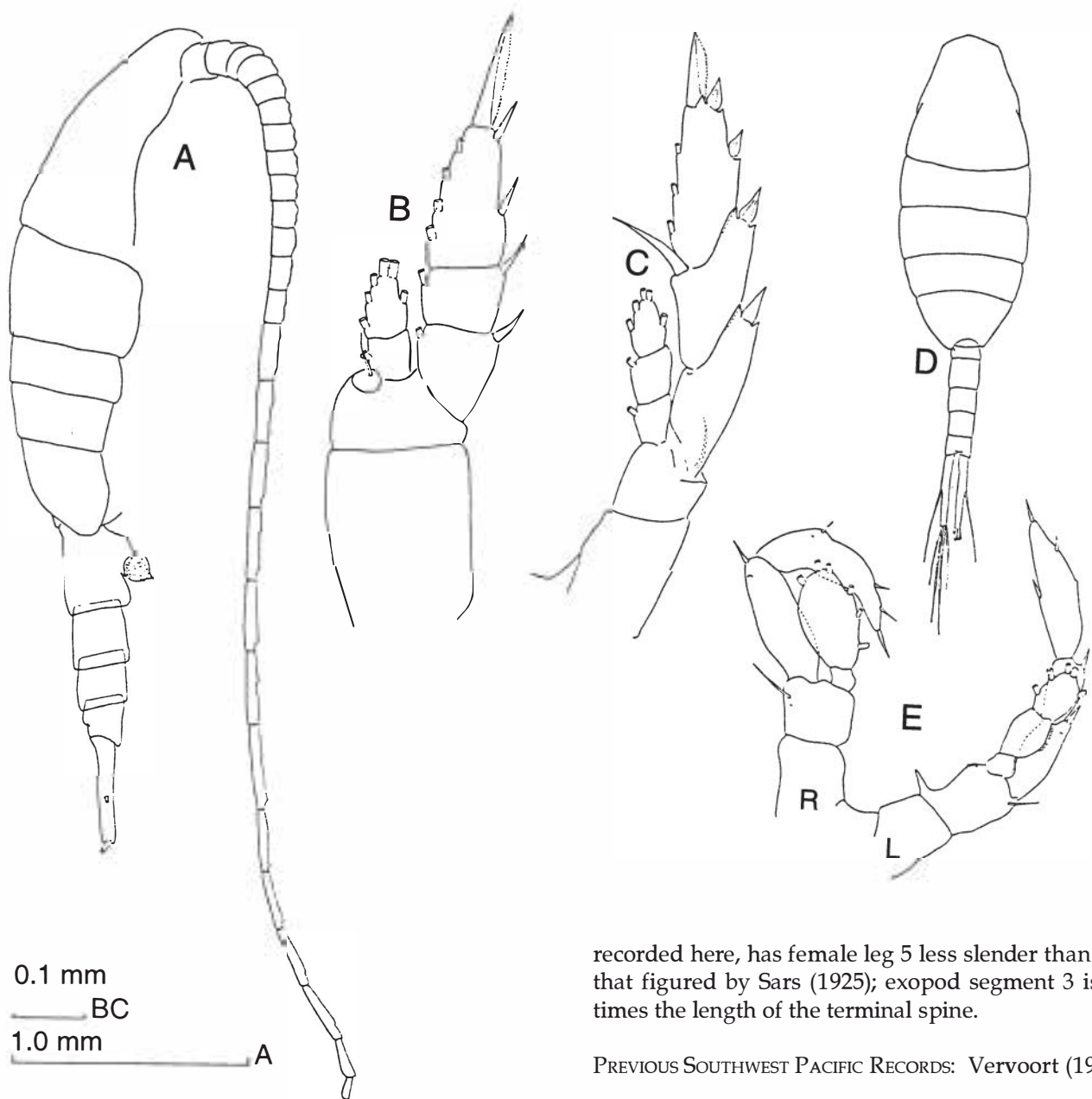


Fig. 69. *Lucicutia macrocera*. Female from Stn F946, 0-1000 m. A, lateral view; B, leg 1; C, leg 5. Male from Vervoort (1957). D, dorsal view; E, leg 5.

segment 3 is 1.5 times the length of terminal spine.

(Sars 1925; Hülsemann 1966)

Male: Caudal rami slightly more than 7 times longer than wide. Leg 1 endopod 2-segmented. Leg 5 left basipod 1 inner distal corner without a strong spine; left basipod 2 inner proximal corner with 1 spine-like protrusion; inner distal corner of same segment with small teeth. (Vervoort 1957; Hülsemann 1966)

REMARKS: The single Southwest Pacific specimen,

recorded here, has female leg 5 less slender than that that figured by Sars (1925); exopod segment 3 is 2.1 times the length of the terminal spine.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Vervoort (1957).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F946	0-1000	1 female 3.4 mm

DISTRIBUTION: This bathypelagic species is found in the Atlantic, western and southwestern Pacific, and India Ocean (Hülsemann 1966).

*Lucicutia magna* Wolfenden *in* Fowler, 1903

(Figs 70, 177, 191)

DESCRIPTION: Size: females: 3.40-3.90 mm, males: 3.10-3.40 mm.

Female: Caudal rami slightly longer than genital segment, 5 times longer than wide. Antenna 1 extends beyond caudal rami by 4–5 segments. Leg 1 endopod 2-segmented. Leg 5 terminal spine equal to, or just less than, half exopod segment 3.

(Tanaka 1963; Hülsemann 1966)

Male: Caudal rami 5 times as long as wide. Leg 1 endopod 2-segmented. Leg 5 left basipod 1 inner distal corner without a strong spine; left basipod 2 with 2 pointed projections at midlength on inner margin, right basipod 2 with 1 spine-like projection.

(Tanaka 1963; Hülsemann 1966)

REMARKS: The Southwest Pacific specimens agree with the above description.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1970).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500–1000	1 male 3.25 mm
A302	0–500	1 male 3.3 mm
	500–1000	1 male 3.2 mm
F874	0–1357	1 female 3.5 mm
F945	500–1000	1 female 3.4 mm
Mu67/48s	0–1000	1 female 3.9 mm
Mu67/147s	0–1000	1 female 3.55 mm
VUZ93	0–1097	1 female 3.3 mm

DISTRIBUTION: Probably a bathypelagic species taken in deep waters of the Atlantic, Pacific and Indian Oceans (Hülsemann 1966).

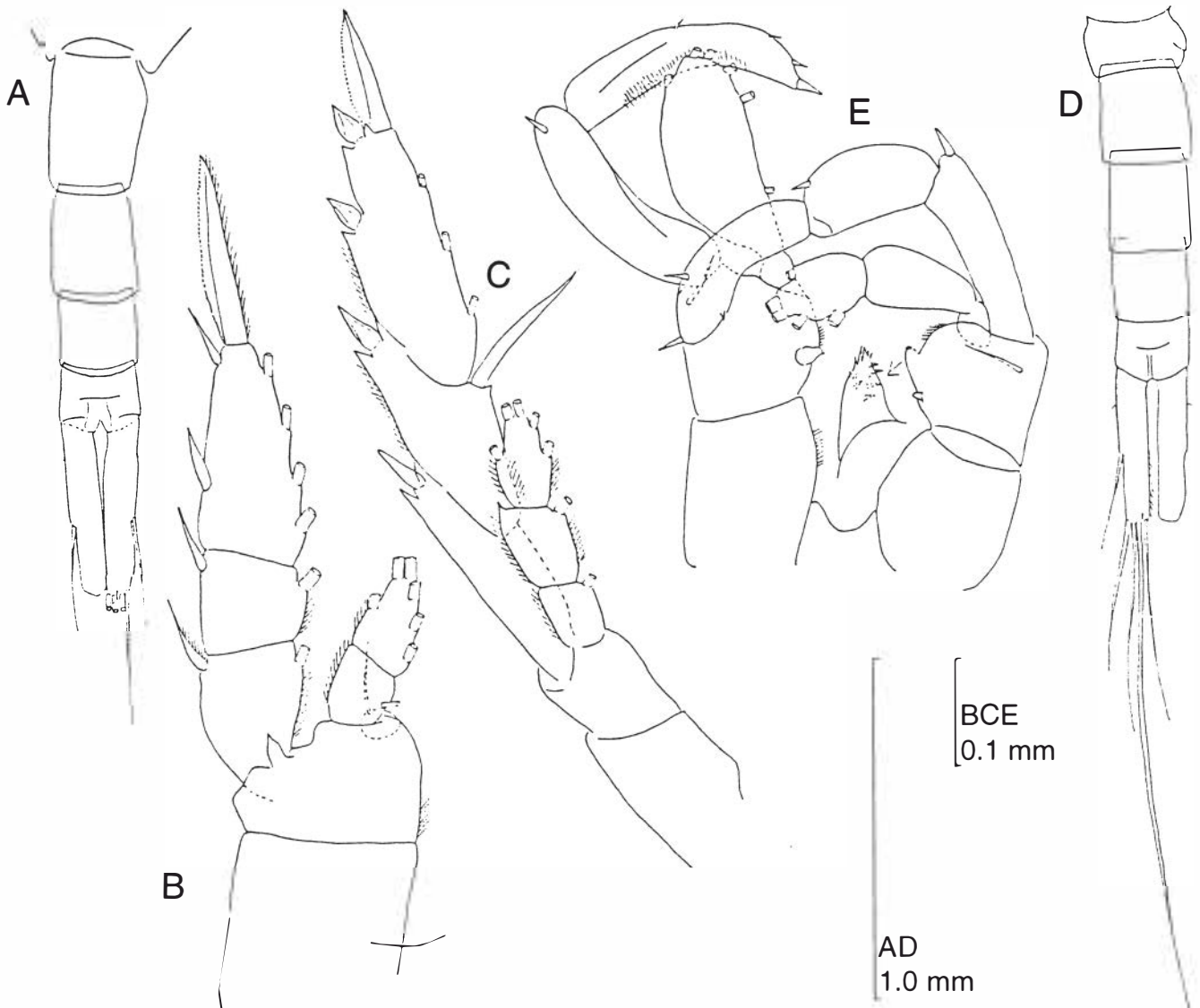


Fig. 70. *Lucicutia magna*. Female from Stn Mu67/48s. A, urosome, dorsolateral view; B, leg 1; C, leg 5. Male from Stn G142, 0–100 m. D, urosome, dorsal view; E, leg 5.

*Lucicutia ovalis* (Giesbrecht, 1889) (Figs 71, 177, 191)

DESCRIPTION: Size: females: 1.50–1.80 mm, males: 1.20–1.50 mm.

Female: Head without lateral protrusions. Anal segment equal in length to urosome segment 3; caudal rami about 4 times longer than wide; in lateral view genital segment with a ventral protrusion on posterior half of segment, in dorsal view symmetrical. Antenna 1 extends to posterior border of anal segment. Leg 1 endopod 3-segmented. Leg 5 endopod 2-segmented.

(Giesbrecht 1892 as *Isochaeta*; Hülsemann, 1966)

Male: Head without lateral protrusions. Caudal rami 1.4 times longer than wide; second caudal seta about as long as urosome. Right antenna extends to posterior border of anal segment. Leg 1 endopod 3-segmented. Leg 5 right basipod 1 smooth; proximal part of inner margin of both basipod 2 with a pointed projection; right endopod 3-segmented.

(Tanaka 1963 as *Isochaeta*; Hülsemann 1966)

REMARKS: Antenna 1 on the figured Southwest Pacific female extends as far as the posterior border of the caudal rami when held straight posteriorly. None of the Southwest Pacific specimens was in good enough condition to figure all the selected parts.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A295	400–1000	1 female 1.4 mm
A302	500–1000	1 female 1.5 mm
A303	450–1000	1 male 1.3 mm

DISTRIBUTION: This epi- to mesopelagic species has been taken in deep waters of the Atlantic, eastern and western Pacific, and Indian Ocean (Hülsemann 1966).

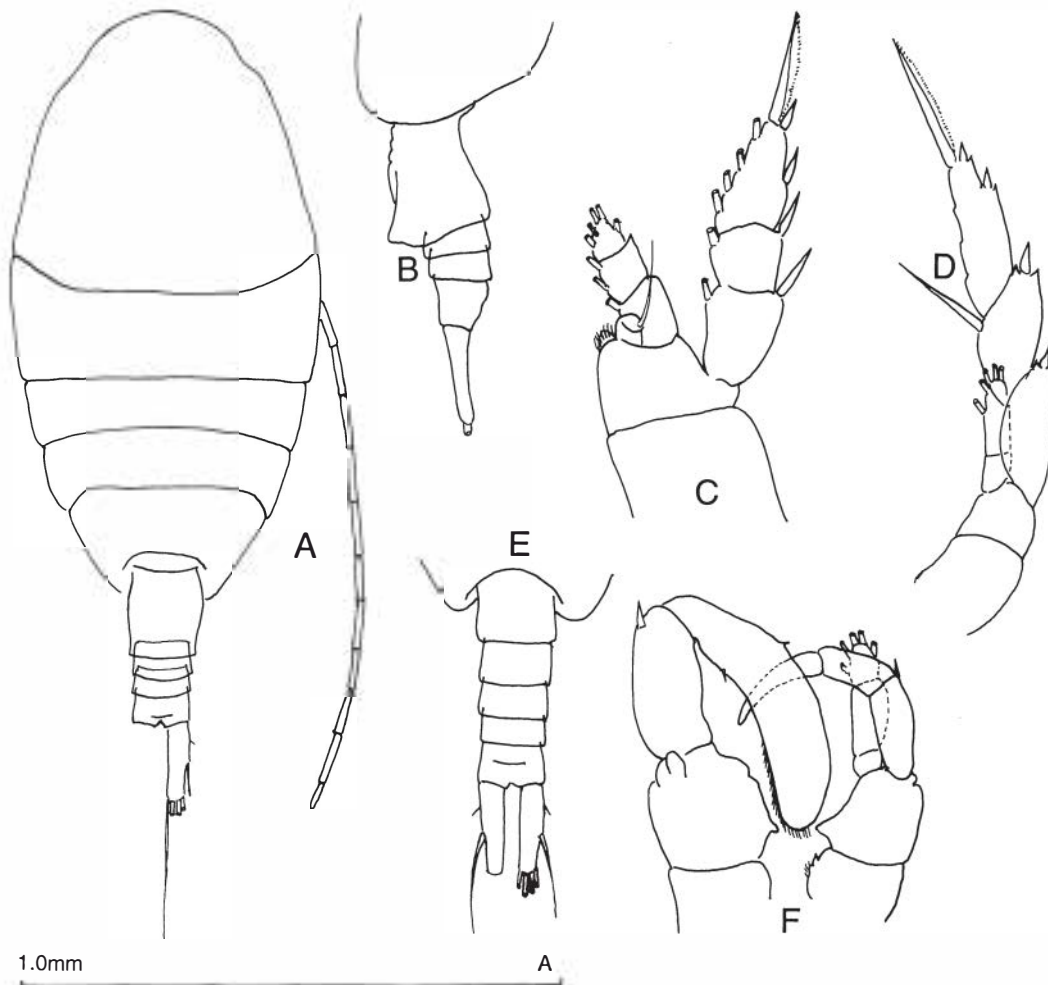
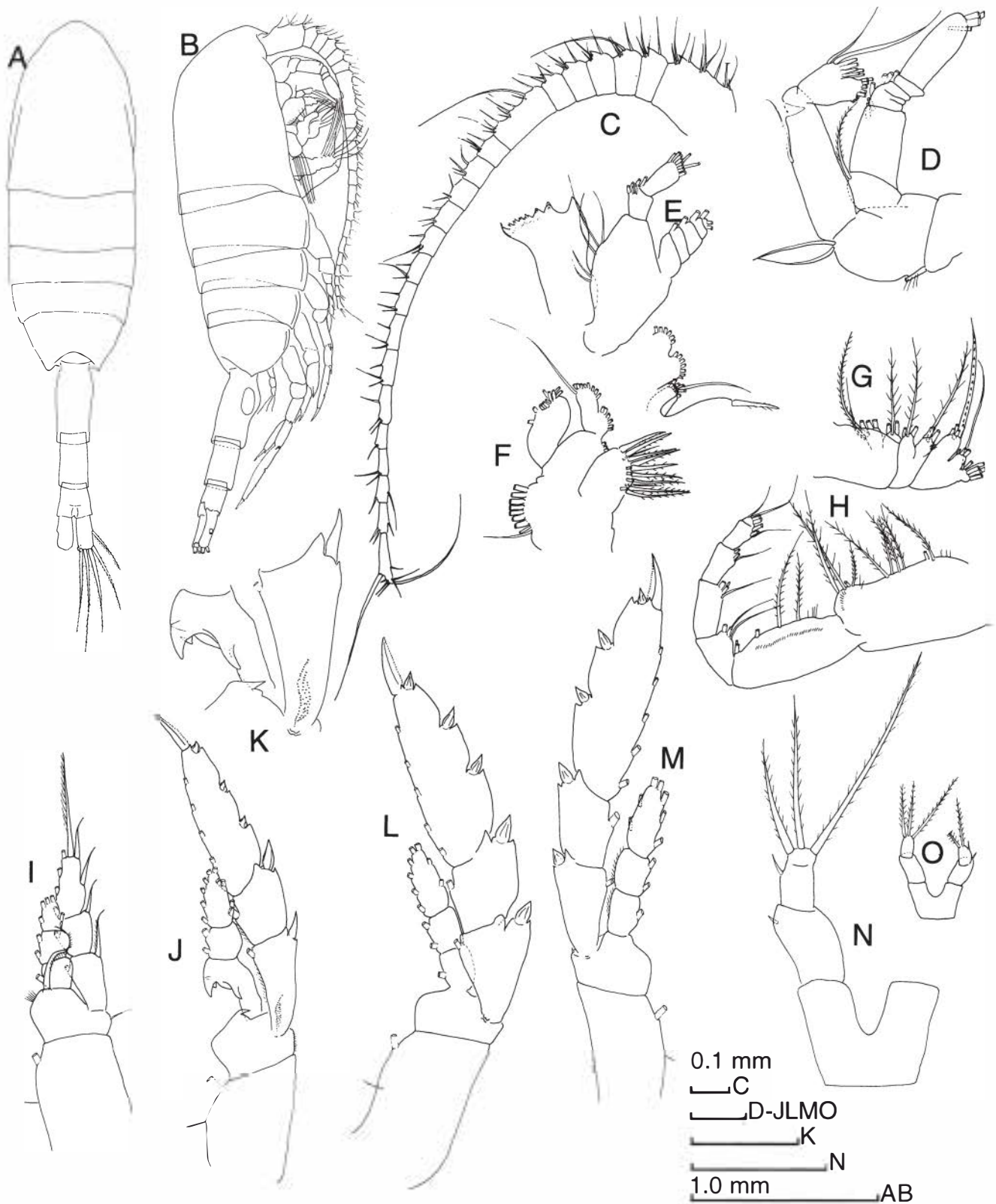
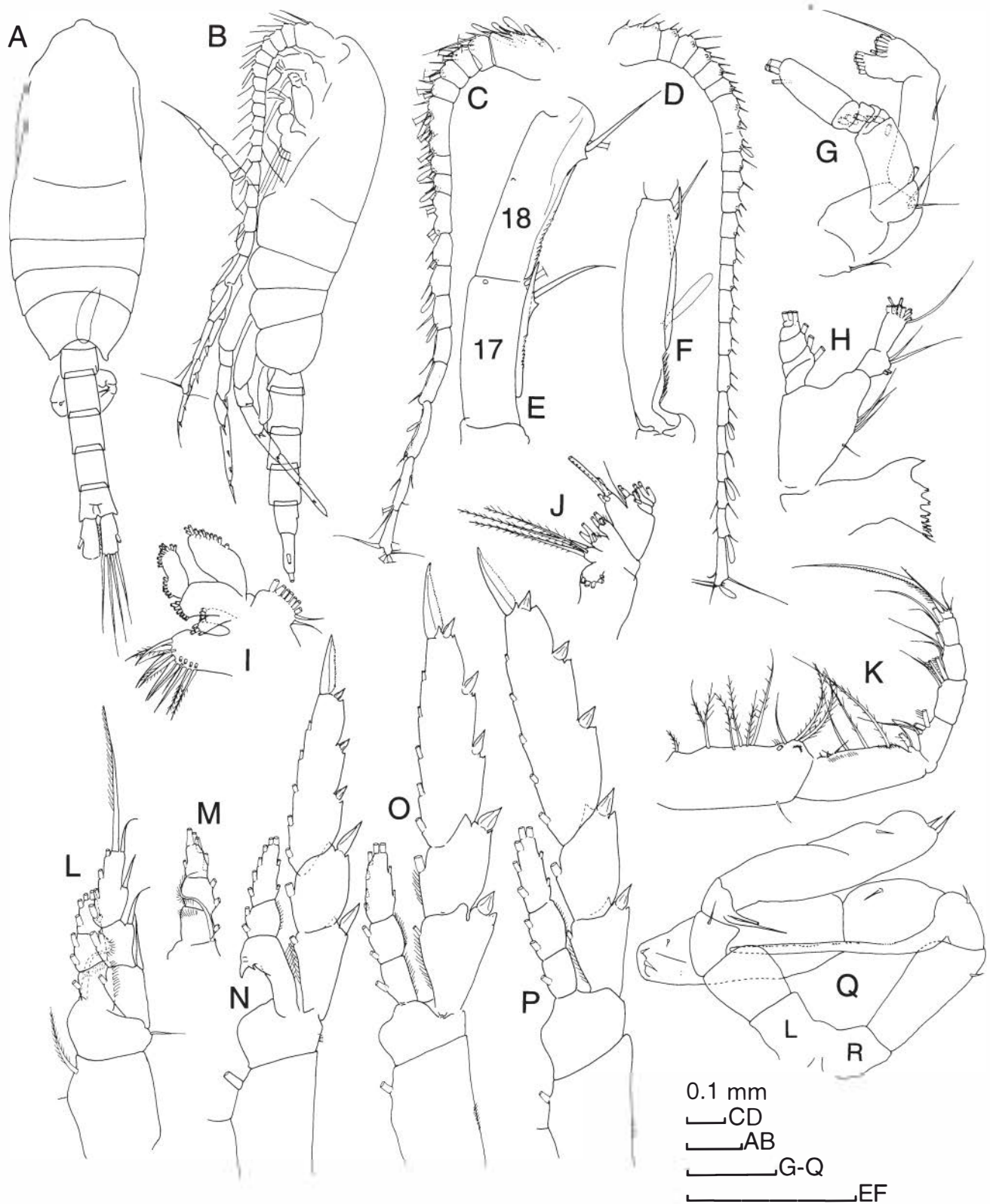


Fig. 71. *Lucicutia ovalis*. Female from Stn A302, 500–1000 m. A, dorsal view. Female from Tanaka (1963). B, urosome, lateral view; C, leg 1; D, leg 5. Male from Tanaka (1963). E, urosome, dorsal view; F, leg 5.



**Fig. 72. *Metridia lucens*.** Female from Stn B120, 0–400 m. **A**, dorsal view; **B**, lateral view; **C**, antenna 1; **D**, antenna 2; **E**, mandible; **F**, maxilla 1; **G**, maxilla 2; **H**, maxilliped; **I**, leg 1; **J**, leg 2; **K**, segment 1 of endopod and exopod of leg 2; **L**, leg 3; **M**, leg 4; **N**, leg 5; **O**, leg 5.



**Fig. 73.** *Metridia lucens*. Male from Stn B120, 0–400 m. A, dorsal view; B, lateral view; C, left antenna 1; D, right antenna 1; E, segments 17 and 18 of left antenna 1; F, segments 19–21 of left antenna 1; G, antenna 2; H, mandible; I, maxilla 1; J, maxilla 2; K, maxilliped; L, leg 1, posterior surface; M, endopod of leg 1, anterior surface; N, leg 2; O, leg 3; P, leg 4; Q, leg 5.

Family METRIDINIDAE Sars, 1902

DEFINITION: Female: Body elongate. Head and pedigerous segment 1 separate, pedigerous segments 4 and 5 fused, posterolateral corners of the prosome usually rounded, expanded in *Gaussia*; pedigerous segment 1 with a dark-pigmented spot on one side in *Pleuromamma*. Urosome 3-segmented caudal rami often asymmetrical with up to 6 setae; genital segment with copulatory pores and seminal receptacles paired in *Gaussia* and *Metridia*, unpaired in *Pleuromamma*; gonopores and egg laying ducts paired. Rostrum with paired filaments. Antenna 1 23- or 24-segmented (segments 1 and 2 fused, segments 3–7 separate, segments 8 and 9 fused, segments 10–22 separate, apical segment double). Antenna 2 with basipods 1 and 2 separate with 1 and 2 setae respectively; endopod 2-segmented, bilobed distal segment with 1–2, 8–9 + 6–7 setae; exopod 7-segmented with 1, 2, 1, 1, 1, 1, 4 setae respectively. Mandible with well-developed blade, palp basipod 2 with 4 setae; endopod 2-segmented with 4 and 10 setae respectively; exopod 5-segmented with 1, 1, 1, 1, 2 setae respectively. Maxilla 1 inner lobe 1 with about 15 spines and setae, inner lobes 2 and 3 with 4–5 and 4 setae, basipod 2 with 5–7 setae; endopod 2-segmented with 6, 9–12 setae; exopod with 11 setae; outer lobes 1 and 2 with 9 and 1 setae. Maxilla 2 with lobes 1–5 with 5 (9 in *P. xiphias*), 3, 3, 3, 4 setae respectively; endopod 4-segmented with 3–4, 3, 2, 2 setae or reduced. Maxilliped 7-segmented, basipod 1 with 1, 2, 4, 4 setae; basipod 2 with 3 setae plus 2 setae on the incorporated first endopod segment; free endopod 5-segmented with 4, 4, 3, 3, 4 setae respectively. Swimming legs with both rami 3-segmented; exopods of legs 2–4 large, and flat, outer edge spines small. Leg 1 basipod 2 inner seta situated on its anterior surface and passing across the face of endopod segment 1. Endopod segment 1 of leg 2 typically incised and ornamented with 1 or more hook-like spinous processes; endopods typically small, cylindrical. Spine and seta formula typically as follows but sometimes reduced.

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0–1	1–1	I-1; I-1; II, I, 4	0–1; 0–2; 1, 2, 2
Leg 2	0–1	0–0	I-1; I-1; III, I, 5	0–0; 0–2; 2, 2, 4
Leg 3	0–1	0–0	I-1; I-1; III, I, 5	0–1; 0–2; 2, 2, 4
Leg 4	0–1	1–0	I-1; I-1; III, I, 5	0–1; 0–2; 2, 2, 3

Female leg 5 uniramous, small, symmetrical 2–4-segmented, basipod 1 and coupler fused; basipod 2 and exopod segment 1 usually with an outer setae and spine respectively; exopod segment 2 with 2–4 setae, terminal exopod segments may be fused.

Male: Urosome 5-segmented, sometimes strongly asymmetrical. Antenna 1 usually prehensile on the left.

Mouthparts similar to those of female. Leg 5 asymmetrical, attached to a plate formed from fusion of basipod 1 and -coupler; right leg (or left) comprising basipod 2 with an outer seta and a 2?–3-segmented exopod, exopod segment 2 with an inner spinous process in some genera, exopod segment 3 with 1 or 2 minute distal setae; left leg (or right) comprising basipod 2 with an outer seta and a 2- or 3-segment exopod; exopod segment 1 bearing a curved inner process, distal segment swollen, often curved or claw-like. (Rose 1933; Cuoc *et al.* 1997; Boxshall in prep.)

An example of this family is *Metridia lucens* (Figs 72, 73).

REMARKS: The family name represents a replacement for the name Metridiidae Sars, 1902 which is a homonym for Metridiidae Carlgen derived from the genus name *Metridium* (Anthozoa) (Opinion 1269 1984: *Bull. Zool. Nomencl.* 41(1) : 19–21; Metridiidae Carlgen, 1893 (Anthozoa) and Metridiidae Sars, 1902 (Copepoda): a ruling to eliminate the homonymy). This family contains three genera *Gaussia*, *Metridia*, and *Pleuromamma*. Metridinidae are luminescent (Herring 1988). This family appears to be omnivorous based on mouthpart morphology and gut contents (Arashkevich 1969; Itoh 1970; Harding 1974; Metz & Schnack-Schiel 1995) and dietary preferences of laboratory reared specimens (Haq 1967). Details of different sensory structures on antenna 1 have been described (Lenz *et al.* 1996) and the mixed-modality mechano-/chemoreceptive setae are hypothesised to be involved with the acceptance and/or rejection of potential food particles.

*Gaussia* Wolfenden, 1905b

DEFINITION: As for the family definition with the following additional characteristics. Head with a small conical knob anteriorly. Metasome without a differentiated luminous organ. Posterolateral corners of metasome produced into spines which are more prominent in female than male. Genital segment of female symmetrically or asymmetrically inflated, sometimes with a black mass ventrally. Urosome segment 2 with distolateral borders produced into small flaps. Anal segment in both sexes produced into large pterygoid processes terminated with a pore and with fine hairs on both sides of segment which arise from ventral surface. Caudal rami with a blunt process on distal border. Right antenna 1 of male geniculate, segment 12 with a small rounded glandular structure in addition to an aesthetasc and a seta. Maxilla 1 with a small but distinct outer lobe 2 bearing a single plumose seta. Endopod segment 1 of leg 2 with 2 inner hooks. Female



leg 5 3–4-segmented, segment 3 with a long plumose seta, segment 4 with 2 shorter plumose setae. Male leg 5 3-segmented; left segment 3 with 2 strong processes, 1 directed distally and the other proximally; right segment 3 with 4 setae, distal half of segment with an undulating inner margin. (Saraswathy 1973)

TYPE SPECIES: *Pleuromma princeps* T. Scott, 1894a

REMARKS: There are four species in this genus *G. asymmetrica* Bjornberg & Campaner, 1988, *G. intermedia* Defaye, 1998, *G. princeps* T. Scott, 1894b, and *G. sewelli* Saraswathy, 1973. [Opinion 1590, 1990: *Pleuromma princeps* Scott, 1894a; the specific name, *Gaussia princeps*, Crustacea (Copepoda) is conserved: *Bull. Zool. Nomencl.* 47(2): 145-146.] The following species has been taken in the Southwest Pacific.

*Gaussia princeps* T. Scott, 1894a (Figs 74, 177, 192)

DESCRIPTION: Size: females: 10.00–11.6 mm, males: 9.1–11.1 mm.

Female: As in the family and generic definitions with the following additional characteristics. Spinous prolongations of posterolateral corners of last metasome segment divergent. Proximal part of genital segment asymmetrically inflated, with a prominent curved process usually on right side. Blunt processes on caudal rami are prominent. Penultimate segment of leg 5 as broad as long. (Saraswathy 1973)

Male: As in the family and generic definitions with the following additional characteristics. Processes on caudal rami as in female. Proximally directed spine on segment 3 of left leg 5 blunt, short and stumpy; terminal segment of right leg with a prominent undulating border, and 4 setae; the distance between setae 1 and 2 and 2 and 3 almost equal. (Saraswathy 1973)

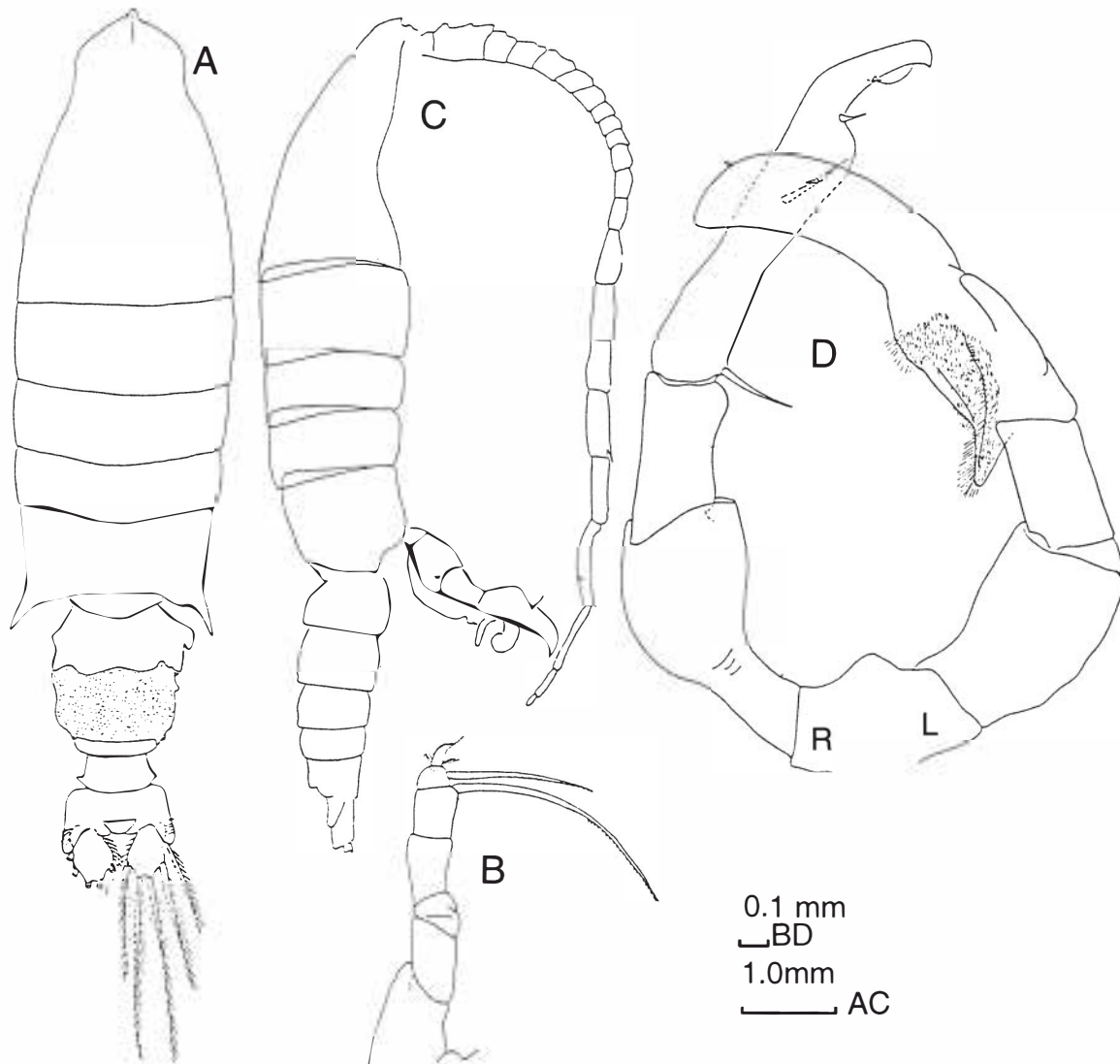


Fig. 74. *Gaussia princeps* from Stn J10/88/86. Female. A, dorsal view; B, leg 5. Male. C, lateral view; D, leg 5.

REMARKS: In the Southwest Pacific males right leg 5 terminal segment with the distance between spines 1 and 2 (numbering from proximal part of segment) is almost twice that of the distance between spines 2 and 3; spines 3 and 4 much shorter than spines 1 and 2.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A01/78/87	845–877	1 male 9.39 mm
A01/85/87	724–800	1 female 10.45 mm
A01/86/87	718–764	1 female 10.98 mm
J10/77/86	0–880	2 females 10.61, 11.06 mm
J10/88/86	0–950	1 male 10.30 mm
J10/107/86	0–1125	1 male 9.85 mm, 1 copepodite

DISTRIBUTION: This bathypelagic species has been taken in deep waters of the Indian, Atlantic, and Pacific Oceans; in the Indian Ocean this species does not extend to the very north but is replaced by *G. sewelli* (Saraswathy 1973).

*Metridia* Boeck, 1865

DEFINITION: As in the family definition with the following additional characteristics. Urosome narrow. Body without a differentiated luminous organ. Antenna 2 with exopod a little longer than endopod, 6-segmented. Leg 2 endopod segment 1 with a strong pair of internal hooks one larger than the other. Female leg 5 3- or 4-segmented with 2 or 3 long plumose terminal setae. Male leg 5 5-segmented, more or less curved; on right (or left) the last segment is slightly widened, the antepenultimate segment with a long curved inner appendage. (Sars 1902; Brodsky 1950)

TYPE SPECIES: *Calanus longus* Lubbock, 1854

REMARKS: This genus contains the following species many of which have been taken in the Southwest Pacific: *M. alata* Roe, 1975; *M. asymmetrica* Brodsky, 1950; *M. bicornuta* Davis, 1949 (male unknown); *M. boeckii* Giesbrecht, 1889 (male, Grice & Hülsemann 1967); *M. brevicauda* Giesbrecht, 1889; *M. calypsoi* Gaudy, 1963 (female unknown); *M. curticauda* Giesbrecht, 1892; *M. discreta* Farran, 1946; *M. effusa* Grice & Hülsemann, 1967; *M. gerlachei* Giesbrecht, 1902; *M. gurganovae* Brodsky, 1950; *M. ignota* Esterly, 1906; *M. longa* (Lubbock, 1854); *M. lucens* Boeck, 1865; *M. macrura* Sars, 1905b; *M. okhotensis* Brodsky, 1950 (male, Szabo 1986); *M. ornata* Brodsky, 1950; *M. pacifica* Brodsky, 1950; *M. princeps* Giesbrecht, 1892; *M. similis* Brodsky, 1950; *M. venusta* Giesbrecht, 1892.

*Metridia brevicauda* Giesbrecht, 1889

(Figs 75, 177, 192)

DESCRIPTION: Size: females: 1.58–2.20 mm, males: 1.31–1.65 mm.

Female: As in the family and generic definitions with the following additional characteristics. Genital segment a little shorter than 2 following segments together which are equal in length. Caudal rami as long as anal segment and a little more than twice as long as wide. Antenna 1 extends to caudal rami. Terminal spine on leg 4 exopod segment 3 equal to half of segment. Leg 5 3-segmented, distal joint small with 2 long terminal setae, penultimate segment with a spine. (Giesbrecht 1892)

Male: As in the family and generic definitions with the following additional characteristics. Left antenna 1 geniculate. Right leg 5 exopod segment 2 with a short spine, exopod segment 1 of left leg with a long spine. (Giesbrecht 1892)

REMARKS: Generally the Southwest Pacific specimens agree with Giesbrecht's description, but with some small differences. Female leg 5 in specimens examined had a rather globular second segment; an outer edge spine was not observed. Male leg 5 was observed to have more spines on joints, right basipod 2 bears long inner edge hairs (not exopod segment 2 as in Giesbrecht's (1892) figure) and right exopod segment 2 has a small seta arising near base of short spine; outer distal border of left exopod segment 1 with a spine and inner long spine of this segment is decorated with small raised prickles which are denser towards base of spine.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Vervoort (1957).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500–1000	3 males 1.31–1.44 mm
A295	0–500	1 female 1.5 mm, 1 male 1.3 mm
A302	400–1000	6 females 1.69–1.88 mm
	0–500	2 females 1.58, 1.63 mm
A303	500–1000	3 females 1.69–1.75 mm, 2 males 1.50 mm
	450–1000	1 male 1.34 mm
E904	0–1243	1 female
F945	500–1000	1 female 1.7 mm, 1 male 1.65 mm
	0–1000	1 female 1.85 mm, 1 male 1.4 mm

DISTRIBUTION: This meso- to bathypelagic species has been taken in intermediate and deep water layers in the Atlantic and Pacific Oceans (Vervoort 1957).

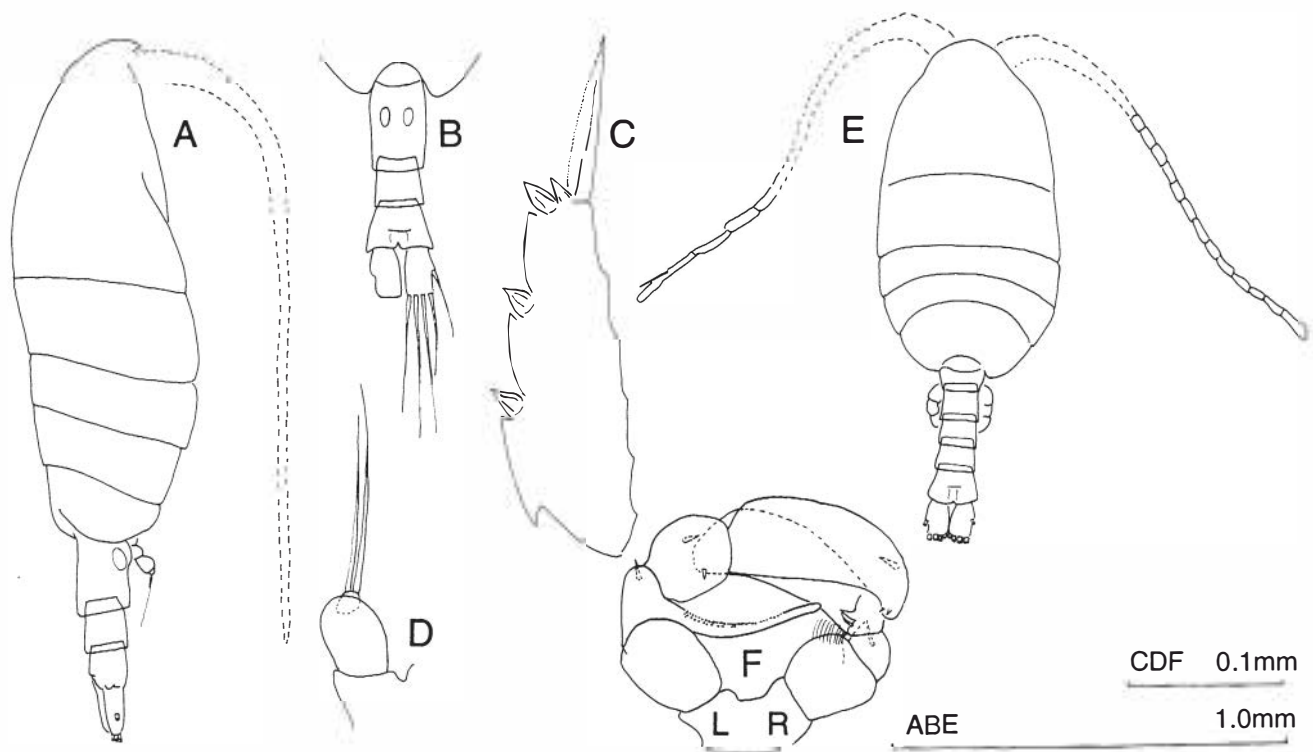


Fig. 75. *Metridia brevicauda*. Female from Stn A295, 400–1000 m. A, lateral view; B, urosome, dorsal view; C, exopod segment 3 of leg 4; D, leg 5. Male from Stn A292, 500–1000 m. E, dorsal view; F, leg 5.

*Metridia curticauda* Giesbrecht, 1889  
(Figs 76, 178, 192)

DESCRIPTION: Size: females: 2.52–3.6 mm, males: 1.92–2.30 mm.

Female: As for the family and generic definition with the following additional characteristics. Differs from *M. lucens* in the following respects. Head not as vaulted as in *M. lucens*. Posterior metasomal corners not smoothly rounded but produced into a minor knob, visible both dorsally and laterally. Genital segment is slightly longer than combined length of urosome segment 2 and anal segment which are of equal length. Caudal rami are slightly longer than anal segment and about twice as long as wide. Antenna 1 reaching the middle of urosome with segments 8 and 9 completely fused and these segments partly fused with segment 10. Exopod segment 3 of leg 4 with terminal spine one-third the length of its segment. Leg 5 symmetrical and 4-segmented; basipod 2 with a hairy outer distal spine; segment 1 with a naked outer distal spine; terminal segment small with 3 subapical, long, nude setae. (Vervoort 1951)

Male: As for the family and generic definition with the following additional characteristics. Posterior metasomal corners carry a small knob. Antenna 1 extends to urosome segment 4; geniculate antenna on left, 21-

segmented. Leg 5 resembles that of *M. brevicauda* but differs in proportional length of joints; left exopod segment 1 has a long slender internal prolongation, exopod segment 3 is large and curved with apical teeth; right distal segment with a strong, acute internal spine at the base and some small teeth at the apex.

(Vervoort 1951)

REMARKS: The Southwest Pacific specimens appear to differ slightly from the above description because the "minor" knob on the posterior metasomal corners is inconspicuous (in one specimen there seemed to be more than one "knob" on each side), and no outer distal spine was observed of the third segment of the female leg 5.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Vervoort (1957).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
B110	0–500	1 female 2.5 mm
A295	400–1000	1 female 3.0 mm, 2 copepodites
E904	0–1243	1 female 2.8 mm
F945	500–1000	1 male 2.8 mm
F946	0–1000	1 female 2.8 mm

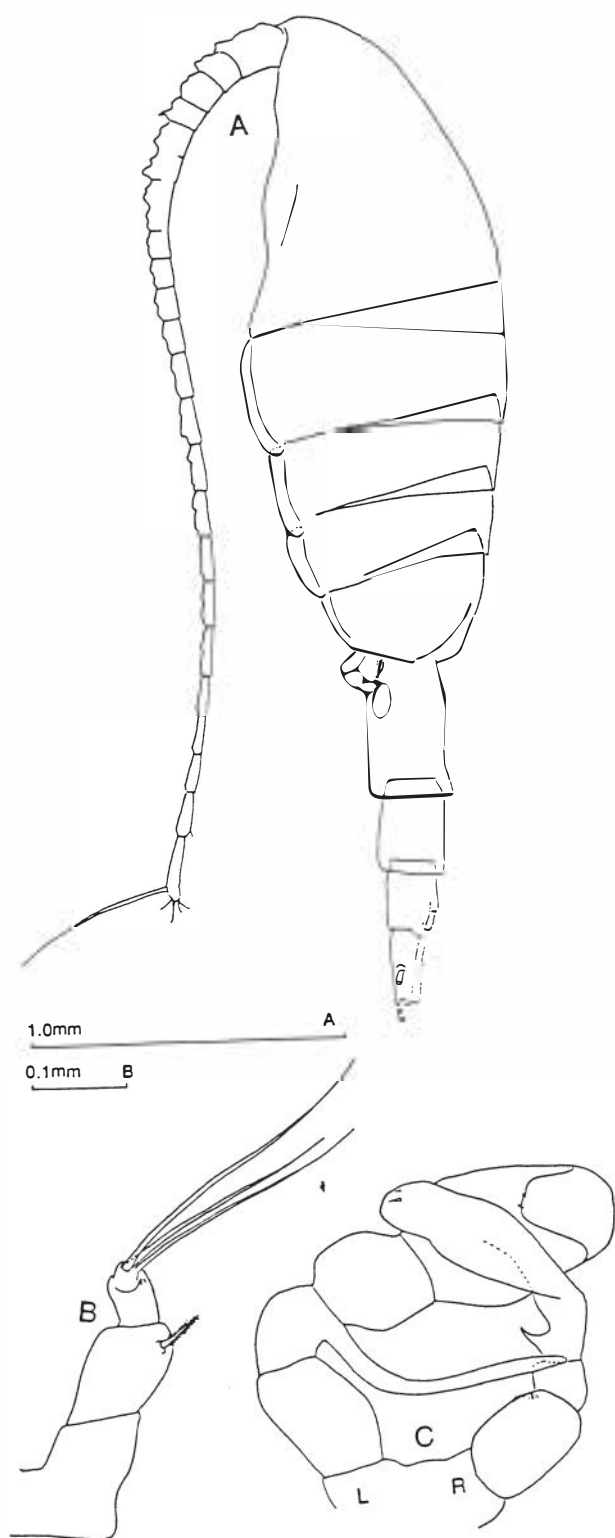


Fig. 76. *Metridia curticauda*. Female from Stn F946, 0–1000 m. A, lateral view; B, leg 5. Male from Vervoort (1951). C, leg 5.

Stn No.	Depth of Haul (m)	Specimens
Mu67/48s	0–1000	1 female 3.0 mm
Mu67/57s	0–1000	2 females 2.95 mm
Mu67/88	0–150	2 females
Mu67/94s	0–1000	1 female 3.15 mm
Mu76/147s	0–1000	1 female

DISTRIBUTION: Possibly a meso- to bathypelagic species found in all oceans, especially characteristic of Deep and Intermediate Antarctic Waters (Vervoort 1951; 1957).

*Metridia gerlachei* Giesbrecht, 1902

(Figs 77, 178, 192)

DESCRIPTION: Size: females: 3.38–4.25 mm, males: 2.16–3.00 mm

Female: As in the family and generic definition with the following additional characteristics. Posterior metasomal corners rounded. Caudal rami longer than anal segment and 3–3.5 times as long as wide. Leg 5 is 3-segmented; last 2 segments are fused, 3.5 times as long as wide, with fusion indicated only by undulating borders of last segment; carrying a short outer edge spine and 3 long terminal setae. (Giesbrecht 1902)

Male: As in the family and generic definition with the following additional characteristics. Right leg 5 has a strongly curved inner spine on exopod segment 1 and left exopod segment 2 has 3 inner edge spines. (Giesbrecht 1902)

REMARKS: Vervoort (1957) figures the inner edge spine on exopod segment 1 on male right leg 5 with small teeth on its outer border which is similar to *M. lucens/pacifica*. Vervoort (1957) says that males of *M. gerlachei* can be separated from *M. lucens* by the vaulted cephalothorax which resembles that of the female; the geniculate antenna 1 may be on the right or left.

The Southwest Pacific male leg 5 has small teeth on the terminal outer border of the long spine on right exopod segment 1. At the northern part of their range this species is quite difficult to tell apart from *M. lucens/pacifica*, especially where the female leg 5 is tending towards the *M. gerlachei* type; the rounded posterior metasome corners appear to be the main character distinguishing the species.

In Ross Sea specimens the male leg 5 of *M. gerlachei* appears to differ from that of *M. lucens/pacifica* in the decoration, on the inner spine on right exopod segment 1 which is confined to near the tip, whereas in *M. lucens/pacifica* there are very small "teeth" along almost all of this border. The variability in male leg 5 needs to be described in more detail for the differences between *M. gerlachei* and *M. lucens/pacifica* to be clearer.

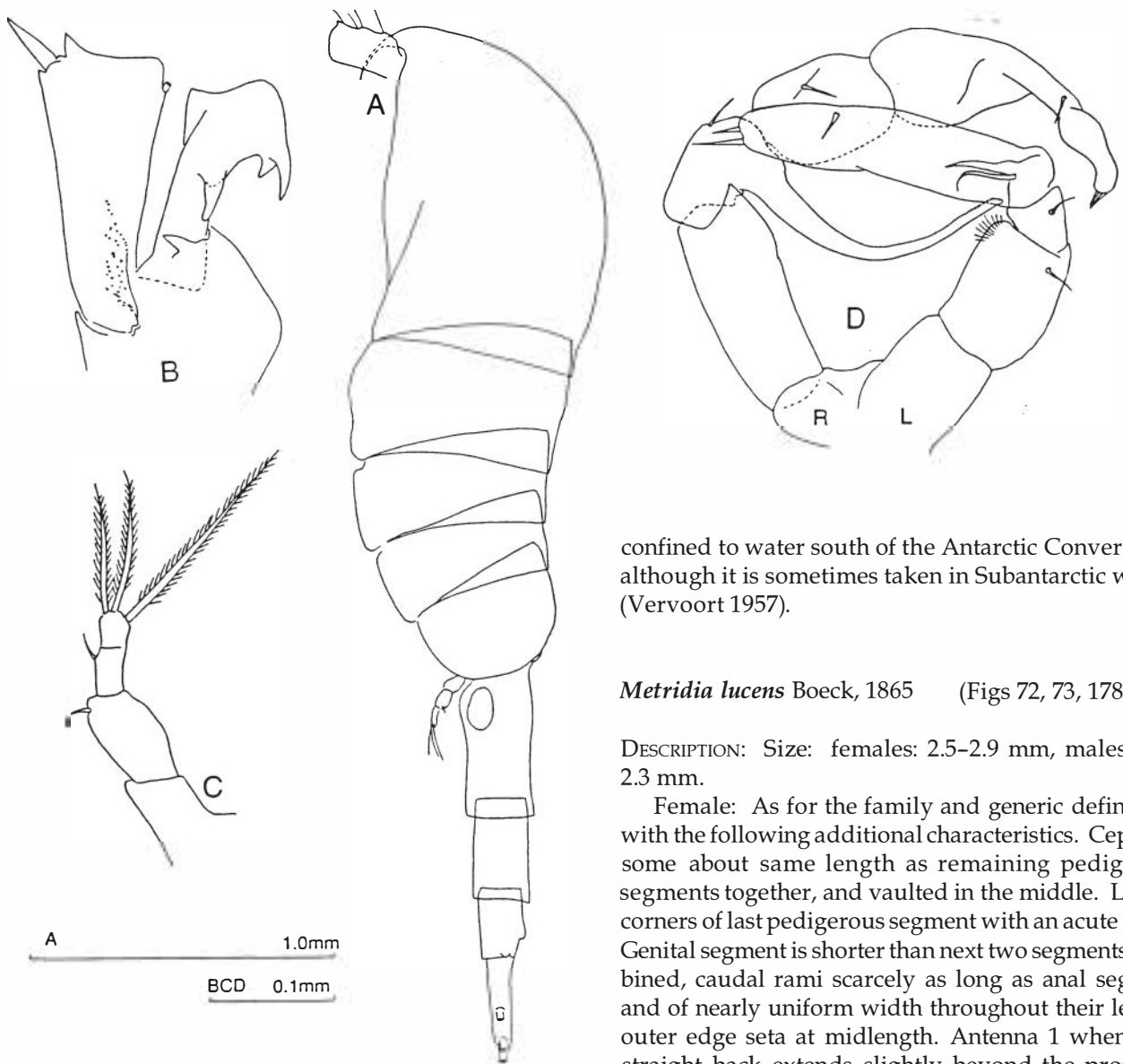


Fig. 77. *Metridia gerlachei*. Female from Stn B109, 0-125 m. A, lateral view; B, segment 1 of exopod and endopod of leg 2; C, leg 5. Male from the Ross Sea, Stn A545, 0-700 m (Bradford 1971). D, leg 5.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Vervoort (1957).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
B108	0-500	3 females 3.23-3.83 mm
B109	0-125	2 females 3.22, 3.3 mm

DISTRIBUTION: This epi- to mesopelagic species is mostly

confined to water south of the Antarctic Convergence although it is sometimes taken in Subantarctic waters (Vervoort 1957).

*Metridia lucens* Boeck, 1865 (Figs 72, 73, 178, 192)

DESCRIPTION: Size: females: 2.5-2.9 mm, males: 2.0-2.3 mm.

Female: As for the family and generic definitions with the following additional characteristics. Cephalosome about same length as remaining pedigerous segments together, and vaulted in the middle. Lateral corners of last pedigerous segment with an acute point. Genital segment is shorter than next two segments combined, caudal rami scarcely as long as anal segment and of nearly uniform width throughout their length, outer edge seta at midlength. Antenna 1 when held straight back extends slightly beyond the prosome, there is no toothed projection on segment 10. Leg 5 is composed of 3 segments, the last 2 being fused.

(Sars 1903)

Male: As for the family and generic definitions with the following additional characteristics. Left antenna (rarely right) is geniculate. Leg 5 with terminal segment on both sides of oblong form, spiniform process on segment 3 of right leg is elongate, slightly sigmoid and finely denticulated on one side distally. (Sars 1903)

REMARKS: This species is like *M. pacifica* Brodsky, 1950. Dr E.L. Markhaseva (Zoological Institute, St Petersburg) kindly examined specimens of *M. pacifica* from the type series (no holotype had been designated), and specimens identified as *M. lucens* from the North Atlantic and South Atlantic. She found that there was some variability in female leg 5 of *M. pacifica* but that all specimens examined had the last two segments

distinctly separated; the length of the inner terminal seta relative to other terminal setae was variable. She also reported that in some specimens the shape of the head in lateral view was like Brodsky's figure (1950) but that other specimens in the type series looked more like *M. lucens*. *Metridia lucens* examined by her from the Norwegian Sea had variable legs 5 and also exhibited a separation between the last two segments. Specimens of *M. lucens* from Ob material taken at 45°51' S, 20°06' E exhibited varying degrees of fusion between the last two segments of female leg 5.

The Southwest Pacific specimens have the last pedigerous segment pointed with the point extending straight backwards; a variable female leg 5 with some specimens looking like those of *M. gerlachei*, and others with the terminal 2 segments more squat and fused although all specimens have the inner terminal plumose seta obviously longer than the other two; female leg 2 basipod 2 has an anterodistal spine, directed laterally, at base of endopod segment 1, endopod segment 1 with 2 stumpy inner edge spines and an anterior surface proximally-directed spine which extends half the distance from its point of insertion to the anterodistal hook on basipod 2. Male leg 5 right exopod segment 1 inner long spine with small raised areas along the inner border, left exopod segment 2 with a stiff inner edge spine and a seta of about the same length arising from its base.

The Southwest Pacific specimens differ from *M. pacifica* in that the inner distal seta of female leg 5 is longest; it also differs from the description of *M. lucens* in the male left leg exopod segment 2 has 2 inner edge spines/setae; the male of North Atlantic specimen of *M. lucens* that Dr Markhaseva examined had the same arrangement of spines/setae as the Southwest Pacific specimens, so Sars' (1903) observation must not be correct. Until further work is done on the relationships of specimens that have been identified as *M. pacifica* and *M. lucens*, I will continue to use the name *M. lucens* for the Southwest Pacific specimens.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Bary (1951); Vervoort (1957); Nyan Taw (1978); Bradford (1970, 1972).

#### NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A302	500–1000	1 male 2.6 mm?
B109	0–125	9 females 2.2–2.8 mm, 2 males 1.85, 1.9 mm
B110	0–500	10 females 2.07–2.8 mm
B111	0–500	9 females 2.19–2.88 mm, 1 male 2.22 mm

B112	0–500	7 females 2.25–2.75 mm
B113	0–500	4 females 2.38–2.81 mm, 3 copepodites
B114	0–500	6 females 2.71–3.00 mm, 1 copepodite
B116	0–125	4 females 2.50–2.69 mm, 4 copepodites
B117	0–500	5 females 2.59–2.88 mm
B118	0–500	4 females 2.50–2.75 mm
B119	0–500	11 females 2.41–2.81 mm, 1 copepodite
B120	0–150 0–400	9 females, 3 males, 3 copepodites 35 females 2.38–2.81 mm, 4 males 1.88–1.94 mm, 2 copepodites
Mu67/104s	0–823	1 female, 1 male

DISTRIBUTION: This epi- to mesopelagic species apparently has an almost worldwide distribution (Vervoort 1957) but this conclusion may need to be reassessed once a careful re-examination of variability in this and closely related species has been carried out.

#### *Metridia princeps* Giesbrecht, 1892

(Figs 78, 178, 192)

DESCRIPTION: Size: females: 8.1–8.5 mm, males: 7.0–8.0 mm.

Female: As in the family and generic definitions with the following additional characteristics. Metasome oval. Rostrum in the form of a bifid lamella with 2 slender filaments. Posterior metasomal corners short and rounded. Urosome large, almost equal in length to metasome, genital segment exceeding length of remaining urosome. Anal segment widened posteriorly, half as long as preceding segment. Caudal rami long and narrow, more than 5 times as long as wide, twice the length of anal segment. Antenna 1 longer than body, proximal segments toothed anteriorly. Leg 5 3-segmented with long hairs on basal segment, distal segment short and terminated by 3 subequal plumose setae. (Rose 1933)

Male: As in the family and generic definitions with the following additional characteristics. Left antenna 1 shorter than right and prehensile. Leg 5 asymmetrical, stronger on right, 4-segmented, segment 2 with a long gently curving inner process, distal segment with a long parallel outer plate separated from the segment, segment terminated by 2 spinules; left leg shorter, second segment without spines on inner side, 2 distal joints are fused. (Rose 1933; Brodsky 1950)

REMARKS: The Southwest Pacific specimens agree generally with the above description although male leg 5 has some extra detail not mentioned by Sars (1925).

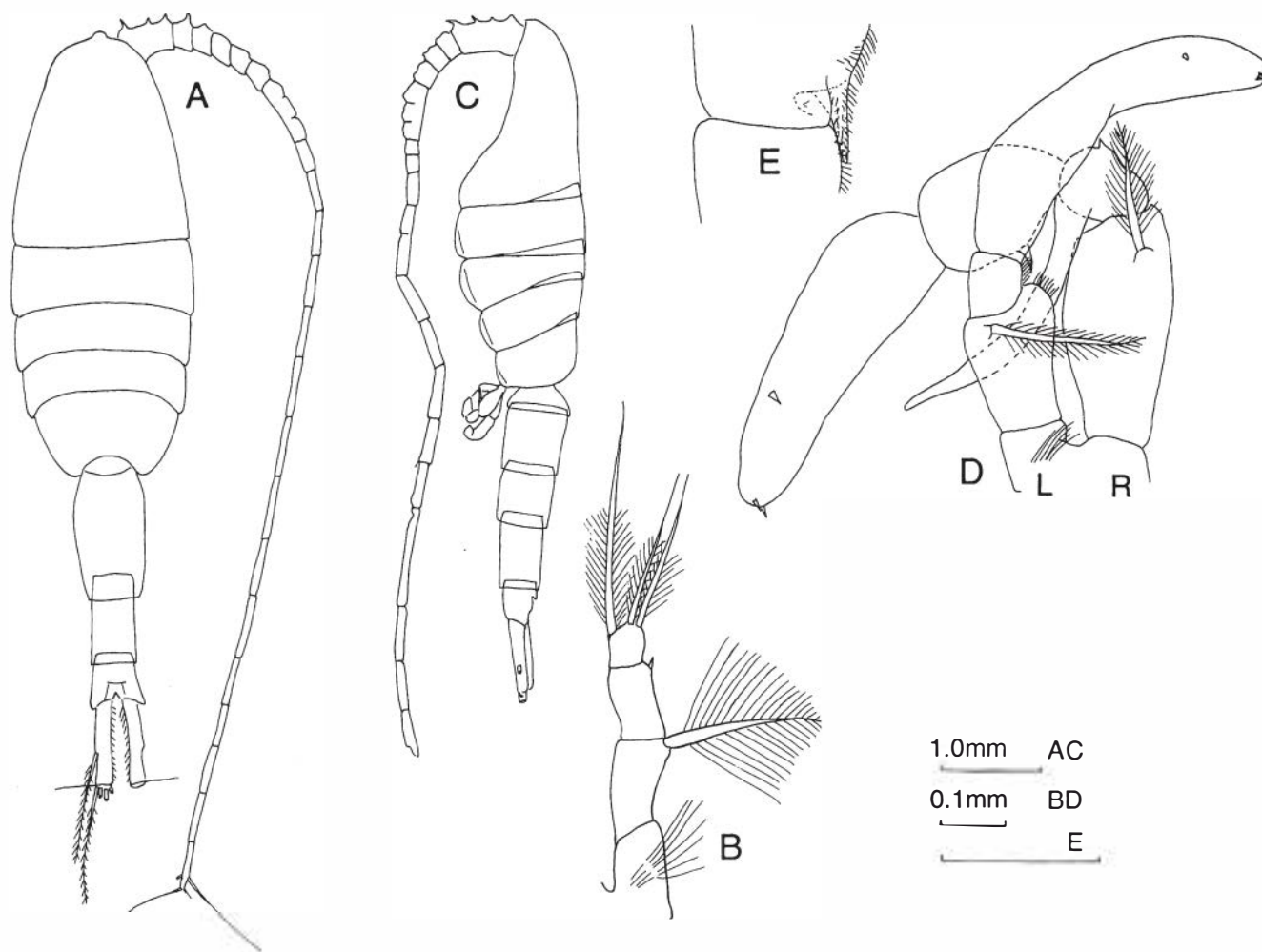


Fig. 78. *Metridia princeps*. Female from Stn VUZ93. A, dorsal view; B, leg 5. Male from Stn VUZ105. C, lateral view; D, leg 5; E, detail of joint between left exopod segment 1 and exopod segments 2 + 3.

On Southwest Pacific specimens right exopod segment 2 is relatively short; exopod segment 3 does not appear to have an outer edge lobe but is constructed as in other *Metridia*; left basipod 1 has a tuft of long hairs on the posterior surface; left exopod segment 2+3 has large, hairy spine near its base, directed proximally, in a hairy depression.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Vervoort (1957).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
E892	0-1224	1 copepodite 5.5 mm
E901	0-1248	1 male 7.0 mm (damaged)
E904	0-1243	1 female 7.1 mm (damaged)
F874	0-1357	1 female 7.5 mm
F892	0-1260	1 female 7.4 mm

F910	0-1397	1 female 6.9 mm
F945	500-1000	1 female 7.1 mm
VUZ93	0-1097	4 females 7.2-7.8 mm
VUZ105	0-914	4 females 7.3-7.8 mm, 5 males 6.75-7.6 mm, 2 copepodites
Mu67/94s	0-1000	1 female 6.1 mm

DISTRIBUTION: This species is probably bathypelagic, having been taken in deep waters of the Atlantic, Pacific, and Indian Oceans (Vervoort 1957).

*Metridia venusta* Giesbrecht, 1892 (Figs 79, 178, 192)

DESCRIPTION: Size: females: 2.9-3.3 mm, males: 2.5-2.6 mm.

Female: As in the family and generic definitions with the following additional characteristics. Head

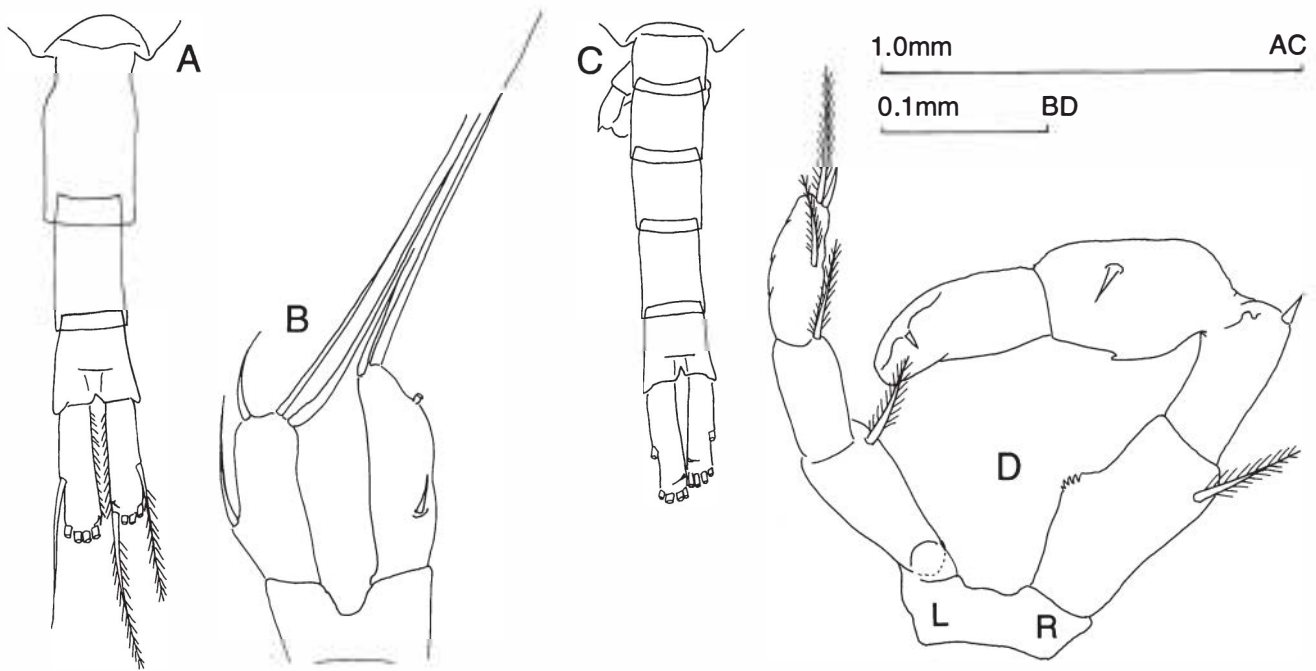


Fig. 79. *Metridia venusta*. Female from Stn F946, 0-1000 m. A, urosome, dorsal view. Female from Stn A292, 500-1000 m. B, leg 5. Male from Stn A292, 500-1000 m. C, urosome, dorsal view; D, leg 5.

narrows anteriorly in dorsal view. Posterior metasomal corners angular. Caudal rami asymmetrical, left ramus longest. Antenna 1 shorter than the body. Leg 5 with 1 free segment, asymmetrical, shorter on right, carrying 4 setae, 3 of them apical (median one longest), and 1 external. (Rose 1933)

Male: As in the family and generic definitions with the following additional characteristics. Leg 5 asymmetrical, 3-segmented; on right segment 1 with an inner tubercle and 1 distolateral seta; segment 2 with 2 distal setae, 1 internal, 1 external; segment 3 elongate and curved with 4 flutes on inner border; left leg is shorter with last 2 segments hairy on inner border and with some simple setae. (Rose 1933)

REMARKS: On a Southwest Pacific male the right leg 5 has a 3-segmented exopod with segment 2 with an outer edge spine and inner edge pointed projection; right basipod 2 with an inner -toothed process and with an outer distal plumose seta similar to those on left basipod 2 and exopod segments 1 and 2+3.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Vervoort (1957); Bradford (1970).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500-1000	1 female 2.7 mm, 2 males 2.6 mm, 1 copepodite
A295	400-1000	1 female 2.8 mm
A302	500-1000	2 females 2.75, 2.80 mm
A303	450-1000	1 female 2.9 mm
F945	500-1000	3 females 2.7-2.8 mm
F946	0-1000	1 female 3.0 mm, 1 male 2.8 mm
Mu67/57s	0-1000	2 females 2.9, 3.0 mm, 1 male
Mu67/94s	0-1000	1 female 3.0 mm

DISTRIBUTION: This species is probably meso- to bathypelagic, having been taken in deep waters of all oceans (Vervoort 1957).

*Pleuromamma* Giesbrecht, 1898  
in Giesbrecht & Schmeil

DEFINITION: As in the family definition with the following additional characteristics. Urosome shorter than in *Metridia*, often asymmetrical, with curved segments and setal bundles. Head with a short acute apical process. Rostrum massive with 2 hairy filaments. Proximal part of antenna 1 with large outer denticles. Asymmetrically situated circular, convex black spot on right or left side of cephalothorax (probably a luminous organ). Endopod segment 1 of leg 2 with an uncinat



inner border as in *Metridia*, but right and left legs often differ in size; only one leg uncinata in some cases. Outer spine on exopod segment 1 of leg 3 with an elongate base, marked off by a deep notch. Leg 5 of two types in female— with 3 free segments and 3 long setae on distal joint; or with 1 free segment and 3 short spines on distal segment. Right leg 5 of male distal segment strongly curved, round; preceding segment of same leg with a long curved inner spine. (Brodsky 1950)

TYPE SPECIES: *Diaptomus abdominalis* Lubbock, 1856

REMARKS: This genus was reviewed by Steuer (1932) who provided an excellent key. This genus contains the following species, most of which have been taken in the Southwest Pacific: *P. abdominalis* (Lubbock, 1856); *P. borealis* (Dahl, 1893); *P. gracilis* (Claus, 1863); *P. indica* Wolfenden, 1905a; *P. piseki* Farran, 1929; *P. quadrangulata* (Dahl, 1893); *P. robusta* (Dahl, 1893); *P. scutullata* Brodsky, 1950; *P. xiphias* (Giesbrecht, 1889).

***Pleuromamma abdominalis*** (Lubbock, 1856)  
(Figs 80, 178, 192)

DESCRIPTION: Size: females: 2.4–4.36 mm, males: 2.68–4.3 mm.

Female: As in the family and generic definitions with the following additional characteristics. Genital swelling centrally placed on genital segment. Pigment spot usually on left side, rarely on right side. Antenna 1 proximal segments with several small and 2 large denticles (on segments 1 and 2), 1 is straight and the other is incurved; these denticles often vary in size and direction. Leg 5 4-segmented with 3 free segments; distal segments with 3 apical setae of unequal length. (Rose 1933; Brodsky 1950)

Male: As in the family and generic definitions with the following additional characteristics. Pigment spot, genital aperture, and denticles on the inner margin of endopod segment 1 of leg 2 situated on the left. Right antenna 1 geniculate, proximal segments denticulate. Urosome asymmetrical, with long thick bundles of bristles. Left leg 5 with a wide distal segment. (Rose 1933; Brodsky 1950)

REMARKS: The Southwest Pacific specimens agree with the above description.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Brady (1883); Farran (1929); Dakin and Colefax (1940); Bary (1951); Vervoort (1957); Nyan Taw (1978); Bradford (1970, 1972).

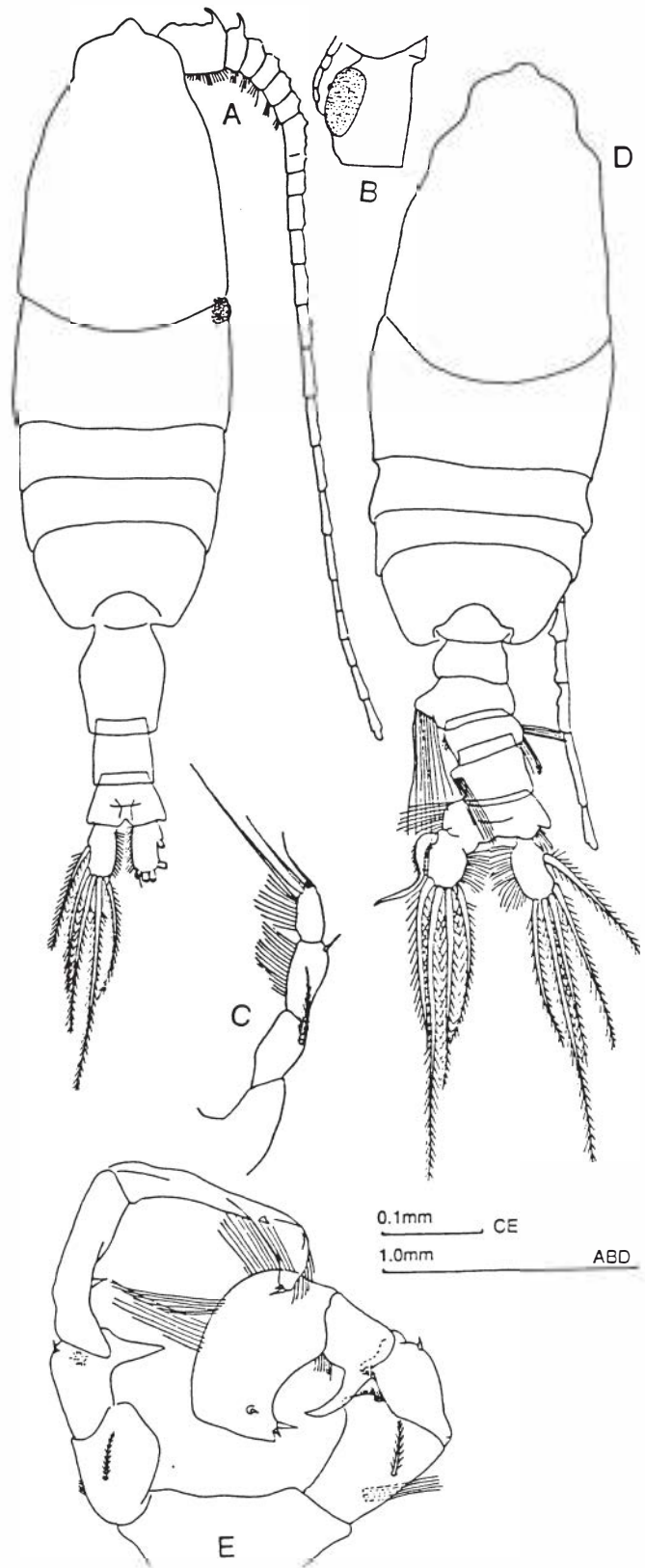


Fig. 80. *Pleuromamma abdominalis* from Stn A302, 0–500m. Female. A, dorsal view; B, genital segment, lateral view; C, leg 5. Male. D, dorsal view; E, leg 5.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500-1000	17 females 2.8-3.2 mm, 6 males 2.9-3.1 mm
A295	surface 0-500	11 females 2.6-3.1 mm, 12 females
A302	surface 0-500	7 females
	500-1000	9 females, 11 males
A303	surface 450-1000	1 female 2.7 mm, 11 females 2.8-3.4 mm, 12 males 2.9-3.3 mm
A313	0-914	8 females 3.0-3.2 mm, 15 males 2.9-3.2 mm
A332	surface	10 females 3.2-4.1 mm
B119	0-500	1 female 3.5 mm
E788	0-1193	2 females
E882	0-1212	1 female, 1 male
E892	0-1224	7 females
E901	0-1248	2 females 3.33, 3.80 mm
E904	0-1243	1 female
F874	0-1357	12 females, 11 males
F879	0-1267	5 females, 2 males
F881	0-1260	3 females, 3 males (damaged)
F892	0-1260	4 females, 6 males
F897	0-1269	1 female, 2 males
F910	0-1397	9 females, 6 males
F911	0-1697	2 females, 5 males
F945	0-500	12 females, 7 males
	500-1000	3 males
F946	0-200	17 females, 15 males
	200-500	6 females, 3 males
	0-1000	15 females, 9 males
VUZ93	0-1097	2 females
VUZ105	0-914	6 females
VUZ107	0-914	2 females, 1 male
Mu67/22/3?	0-1000	1 female

DISTRIBUTION: This mesopelagic species is widespread in the tropical and subtropical Atlantic, Indian and Pacific Oceans (Steuer 1932; Brodsky 1950).

*Pleuromamma borealis* (Dahl, 1893)  
(Figs 81, 179, 192)

DESCRIPTION: Size: females: 1.67-2.46 mm, males: 1.47-2.13 mm

Female: As in the family and generic definitions with the following additional characteristics. Pigment spot is on the right side. Very similar to *P. gracilis*. Genital boss is flattened in lateral view. Leg 5 3-segmented with 2 free segments, terminated by 3 long spines, the outer spine the longest.

(Farran 1929; Steuer 1932)

Male: As in the family and generic definitions with the following additional characteristics. Pigment spot

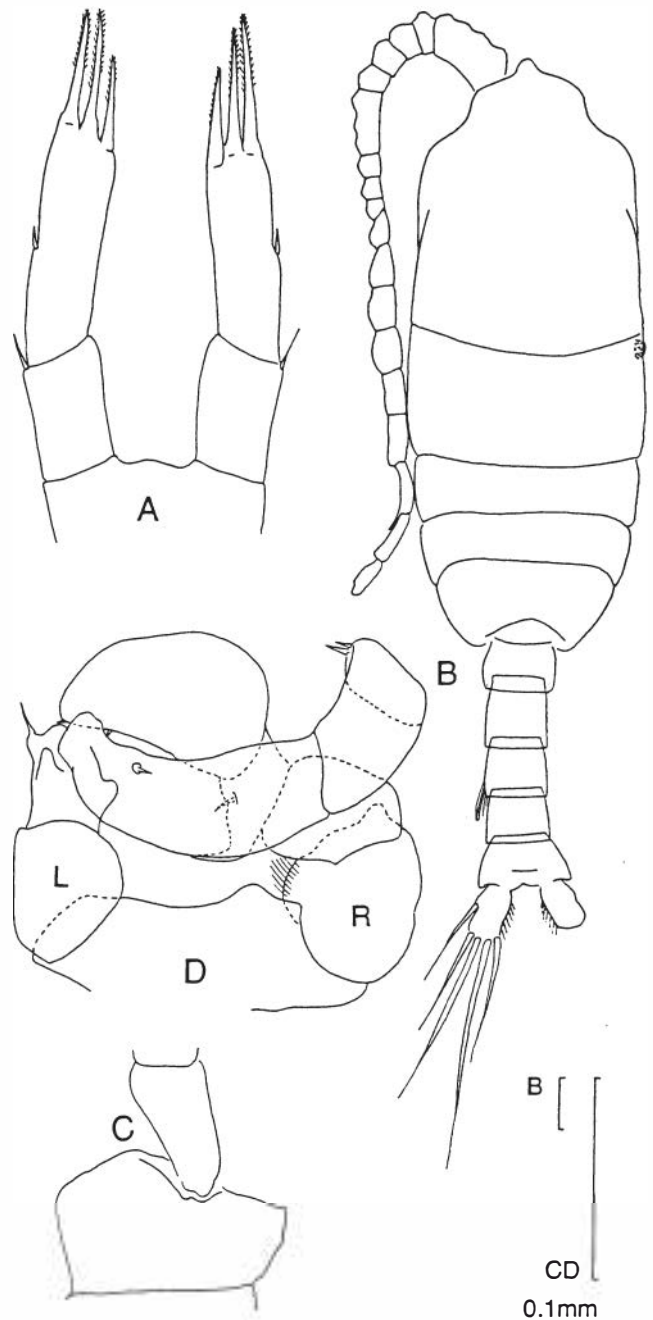


Fig. 81. *Pleuromamma borealis*. Female from Steuer (1932). A, leg 5. male from Stn A332. B, dorsal view; C, basipod 2 and endopod segment 1 of left leg 2; D, leg 5.

on right side. Differs from *P. gracilis* in the following respects – exopod segment 1 of left leg 5 bearing a shorter appendage without a knob; distal segment of right leg is shorter and wider. (Steuer 1932)

REMARKS: The Southwest Pacific specimens appear to agree with the above description. The identity of the Southwest Pacific males of this and related species is

not always clear, therefore there is a possibility that *P. gracilis*, *P. piseki*, and *P. borealis* have been confused when they have not been dissected.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Bary (1951).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A332	surface	1 male 1.72 mm
B119	0-500	1 female 2.3 mm, 1 male 1.8 mm
F946	200-500	1 male 1.72 mm

DISTRIBUTION: This mesopelagic species has been taken in tropical and subtropical waters of the Atlantic, Indian, and Pacific Oceans (Steuer 1932); it has been taken in surface waters at night.

*Pleuromamma gracilis* (Claus, 1893)  
(Figs 82, 179, 192)

DESCRIPTION: Size: females: 1.60-2.55 mm, males: 1.51-2.25 mm.

Female: As in the family and generic definitions with the following additional characteristics. Pigment spot on right side. Proximal segments of antenna 1 with small low denticles. Leg 5 2-segmented (with 1 free segment); distal segment with 3 terminal spines and 2 thin outer spines. (Steuer 1923; Brodsky 1950)

Male: As in the family and generic definitions with the following additional characteristics. Pigment spot on right side. Urosome almost completely symmetrical except that segment 3 has a patch of hairs on left distolateral border. Left antenna 1 geniculate; toothed ridges on segments 17, 18 and 19-21; serrations are variable, teeth can be pointed or more or less blunt, long and thin, or short and thick. Endopod segment 1 of leg 2 with denticles on right side only. Distal segment of right leg 5 elongate, slightly less wide than in other related forms; penultimate segment of same leg has a curved process with a double row of blunt tubercles. (Steuer 1923; Brodsky 1950)

REMARKS: The Southwest Pacific specimens agree with the above description. The identity of the Southwest Pacific males is not always clear, therefore there is a possibility that *P. gracilis*, *P. piseki*, and *P. borealis* have been confused when they have not been dissected.

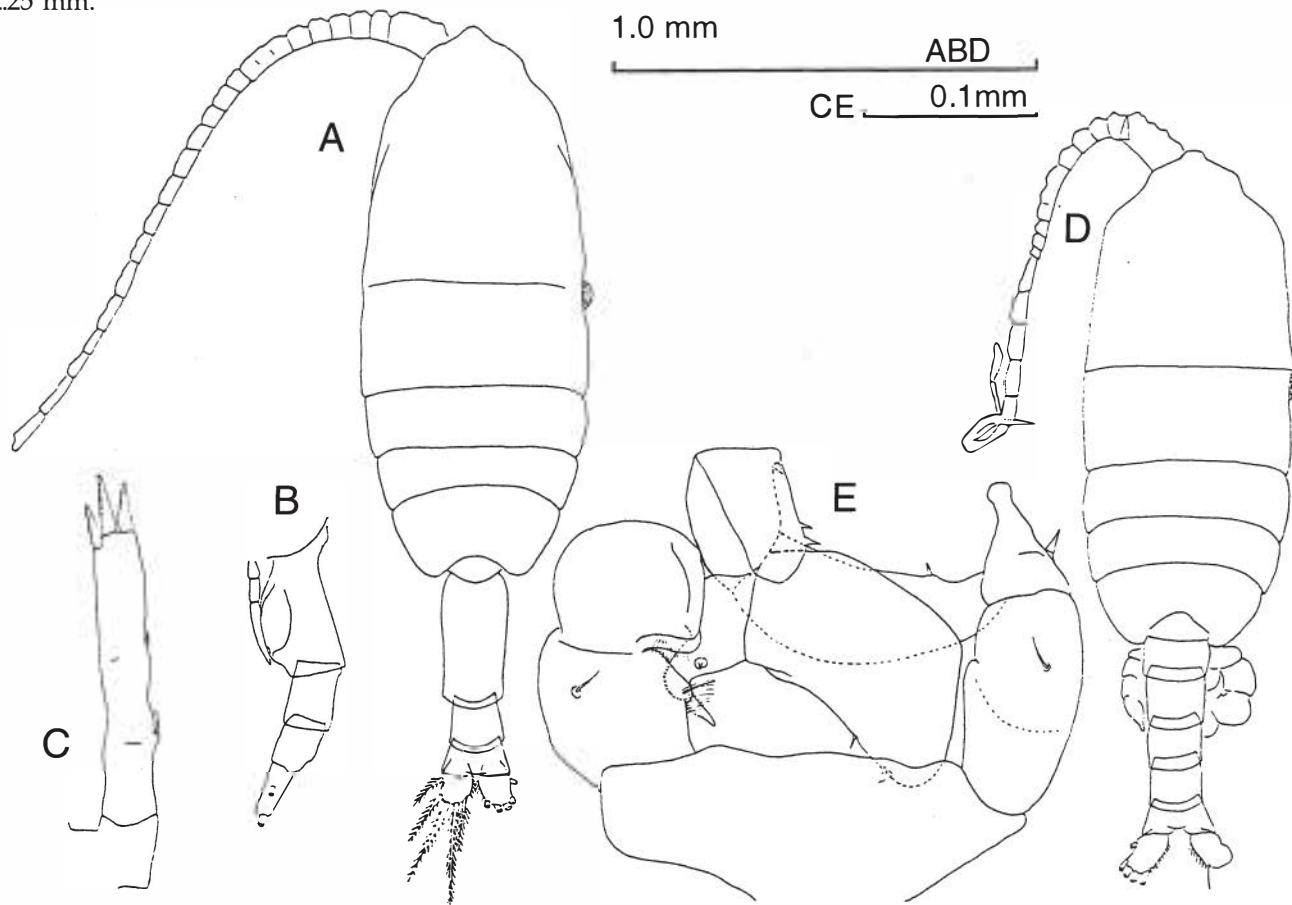


Fig. 82. *Pleuromamma gracilis* from Stn A332. Female. A, dorsal view; B, urosome, lateral view; C, leg 5. Male. D, dorsal view; E, leg 5.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Dakin and Colefax (1940); Bary (1951); Nyan Taw (1978); Bradford (1972).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500-1000	1 female, 2 males
A295	0-500	2 females, 1 male
A302	surface	1 female
A303	450-1000	2 males
A313	0-914	33 females, 7 males
A332	surface	27 females 1.9-2.2 mm, 7 males 1.7-1.8 mm
F945	0-500	1 female 2.1 mm
F946	0-200	3 females 2.15-2.3 mm, 1 male 1.8 mm
	200-500	1 female 2.2 mm, 2 males 1.7, 1.85 mm
	0-1000	9 females 2.3-2.4 mm, 3 males 1.7-1.9 mm
F947	0-500	1 female 2.3 mm

DISTRIBUTION: This mesopelagic species has been taken in tropical and subtropical waters of the Atlantic, Indian and Pacific oceans (Steuer 1932); it tends to come into surface layers at night.

*Pleuromamma piseki* Farran, 1929 (Figs 83, 179, 192)

DESCRIPTION: Size: females: 1.70-2.02 mm, males: 1.70-1.96 mm.

Female: As in the family and generic definitions with the following additional characteristics. This species is distinguished from *P. gracilis* by its slightly larger average size, its genital segment which has a marked groove or constriction on the left side parallel to, and close to, the posterior margin of the segment and a large black pigmented area around the genital pore. Anal segment with parallel lateral margins. Leg 5 is imperfectly segmented 4.5-5 times as long as wide, terminating in 3 short stout spines, shorter than the width of the segment. (Farran 1929)

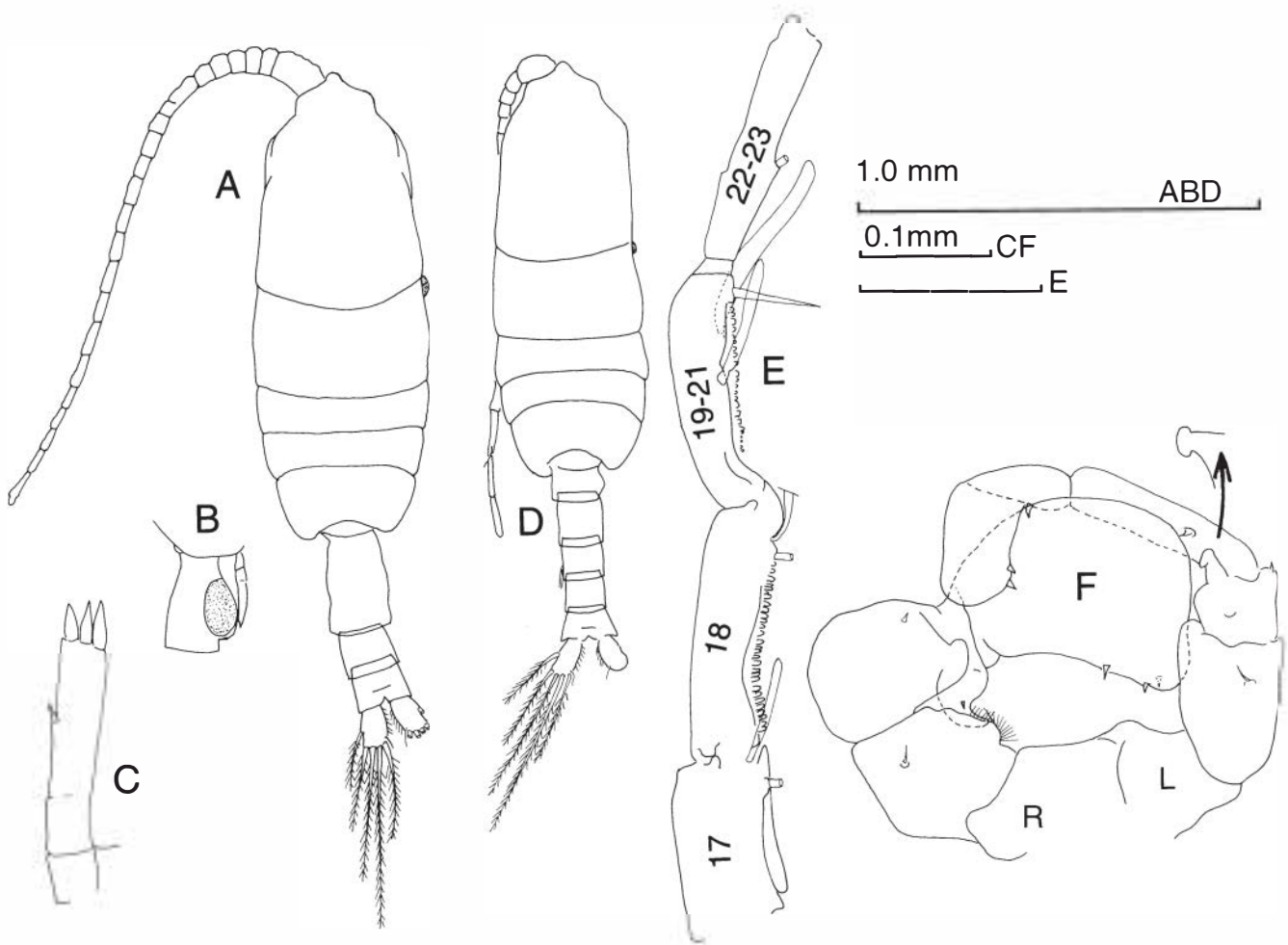


Fig. 83. *Pleuromamma piseki*. Female from Stn A302, 0-500 m. A, dorsal view; B, genital segment, lateral view; C, leg 5. Male from Stn A302, surface. D, dorsal view; E, segments 17-23 of geniculate antenna 1; F, leg 5.

Male: As in the family and generic definitions with the following additional characteristics. Geniculate antenna 1 with a double tooth row on segment 18 as well as on proximal part of segments 19–21; segment 17 is naked. Left leg 5 segment 3 process with a knob separated from the process by slight notch.

(Steuer 1932)

REMARKS: The Southwest Pacific specimens agree with the above description. The identity of the Southwest Pacific males is not always clear, therefore there is a possibility that *P. gracilis*, *P. piseki*, and *P. borealis* have been confused when they have not been dissected.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Dakin and Colefax (1940); Vervoort (1957).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500–1000	2 females 1.7 mm
A295	surface	2 females 1.80, 1.85 mm
A295	0–500	4 females 1.78–1.90 mm,

		2 males 1.70–1.72 mm
		1 female
A302	400–1000 surface	8 females 1.90–2.02 mm
	0–500	8 females 1.90–2.00 mm, 8 males 1.70–1.80 mm
F874	0–1357	1 female
F881	0–1260	1 female
F945	0–500	9 females 1.8–2.0 mm, 3 males 1.7–1.8 mm
F946	0–200	3 females 2.0–2.1 mm, 2 males 1.7, 1.8 mm
	0–1000	3 females 1.9–2.1 mm, 1 male 1.7 mm
F947	0–500	3 females 2.0–2.15 mm, 1 male 1.9 mm

DISTRIBUTION: This mesopelagic species is widely distributed in tropical and subtropical parts of the Atlantic, Indian and Pacific oceans (Steuer 1932).

*Pleuromamma quadrungulata* (Dahl, 1893)

(Figs 84, 179, 192)

DESCRIPTION: Size: females: 3.32–5.0 mm, males: 3.08–4.45 mm.

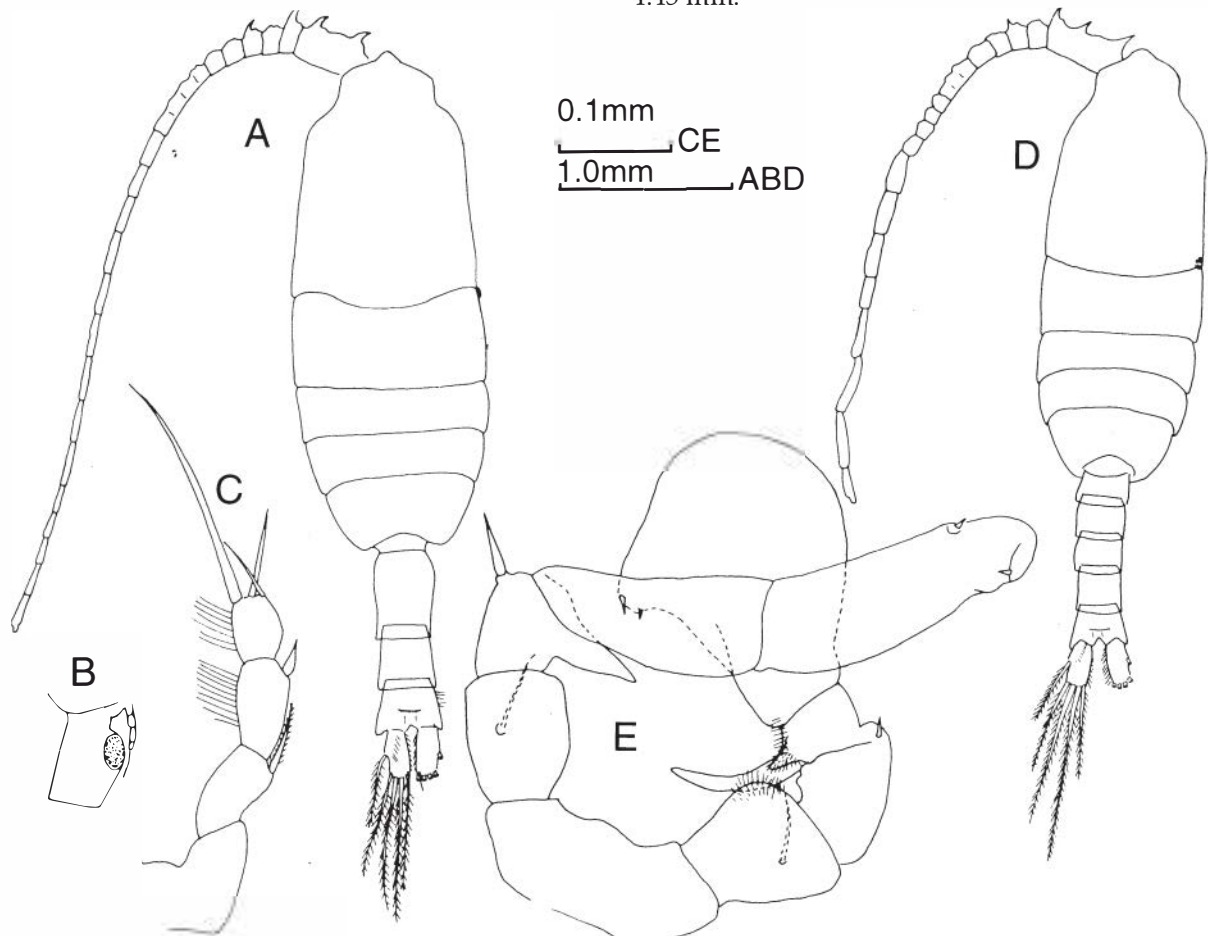


Fig. 84. *Pleuromamma quadrungulata* from Stn A313, 0–914 m. Female. A, dorsal view; B, genital segment, lateral view; C, leg 5. Male. D, dorsal view; E, leg 5.

Female: As in the family and generic definitions with the following additional characteristics. Genital swelling placed anteriorly on genital segment. Pigment spot on right side. Antenna 1 proximal segments with 4 large incurved teeth; 2 on segment 1, 1 on segment 2, and 1 on segment 4. Leg 5 4-segmented, distal segment with 3 apical bristles. (Steuer 1932)

Male: As in the family and generic definitions with the following additional characteristics. Urosome almost symmetrical. Pigment spot on right side. Left antenna 1 geniculate, proximal segments with 4 teeth, segment 17 without a tooth, segment 18 rasp with small, oblique teeth. Denticles on endopod segment 1 of leg 2 on both sides. Right leg 5 distal segment obviously widened; preceding segment with a large process. (Steuer 1932)

REMARKS: The Southwest Pacific specimens agree with the above description.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Vervoort (1957); Bradford (1970).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A313	0-914	14 females 3.90-4.40 mm, 7 males 3.90-4.15 mm
B119	0-500	1 female 4.4 mm
E904	0-1243	1 male
F753	0-790	1 male
F946	200-500	1 female 4.4 mm
	0-1000	1 female 4.2 mm
VUZ105	0-914	4 females 3.9-4.6 mm, 1 male 4.1 mm
VUZ112	0-732	1 female 4.45 mm, f. <i>typica</i> 4 females 4.2-4.5 mm f. <i>psychrophila</i>
Mu67/48s	0-1000	1 specimen
Mu67/57s	0-1000	2 females
Mu67/62s	0-500	2 specimens
Mu67/94s	0-1000	7 specimens
Mu67/104s	0-823	1 male
Mu67/116s	0-1000	5 specimens

DISTRIBUTION: Probably a mesopelagic species found in deep tropical and subtropical waters of the southern hemisphere (Steuer 1932).

*Pleuromamma robusta* (Dahl, 1893)  
(Figs 85, 179, 192)

DESCRIPTION: Size: females: 3.0-4.7 mm, males: 3.00-4.00 mm

Female: As in the family and generic definitions with the following additional characteristics. Genital swelling on anterior part of genital segment. Antenna

1 denticles small. Endopod segment 1 of leg 2 with a notch and hooks on both sides. Leg 5 4-segmented with 3 apical setae. (Steuer 1932)

Male: As in the family and generic definitions with the following additional characteristics. Urosome almost symmetrical. Geniculate antenna 1 with proximal segments with degenerate teeth, segment 17 without a tooth, segment 18 has a rasp with small, oblique teeth. Endopod segment 1 of leg 2 with a notch and hooks on both sides. (Steuer 1932)

REMARKS: The Southwest Pacific specimens agree with the above description although the inner extensions on male leg 5 left exopod segment 1 and right exopod segment 2 appear to be longer than those figured by Steuer (1932).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Vervoort (1957); Bradford (1972).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A313	0-914	1 female
B110	0-500	7 females 3.5-4.3 mm
B111	0-500	2 females 4.1 mm, 1 male 3.5 mm, 2 copepodites
B113	0-500	4 females
B114	0-125	8 females, 1 copepodite
	0-500	7 females 3.6-4.5 mm, 1 male 3.35 mm
B117	0-500	6 females 4.05-4.3 mm
F753	0-790	1 female
VUZ105	0-914	18 females 3.6-4.1 mm
VUZ107	0-914	5 females 3.5-4.0 mm f. <i>typica</i> 3 females 3.9-4.1 f. <i>antarctica</i>
VUZ112	0-732	18 females 3.-4.0 mm, 2 males 3.1, 3.9 mm
Mu67/48s	0-1000	31 specimens
Mu67/52s	0-1000	5 specimens
Mu67/57s	0-1000	39 specimens
Mu67/62s	0-500	6 specimens
Mu67/88s	0-600	23 specimens
Mu67/94s	0-1000	60 specimens
Mu67/104s	0-823	12 specimens
Mu67/116s	0-1000 m	12 specimens

DISTRIBUTION: Probably a mesopelagic species widespread in tropical, subtropical, and subantarctic waters of all oceans (Steuer 1932).

*Pleuromamma xiphias* (Giesbrecht, 1889)  
(Figs 86, 179, 192)

DESCRIPTION: Size: females: 3.5-5.87 mm, males: 4.0-6.42 mm

Female: As in the family and generic definitions with the following additional characteristics. Re-

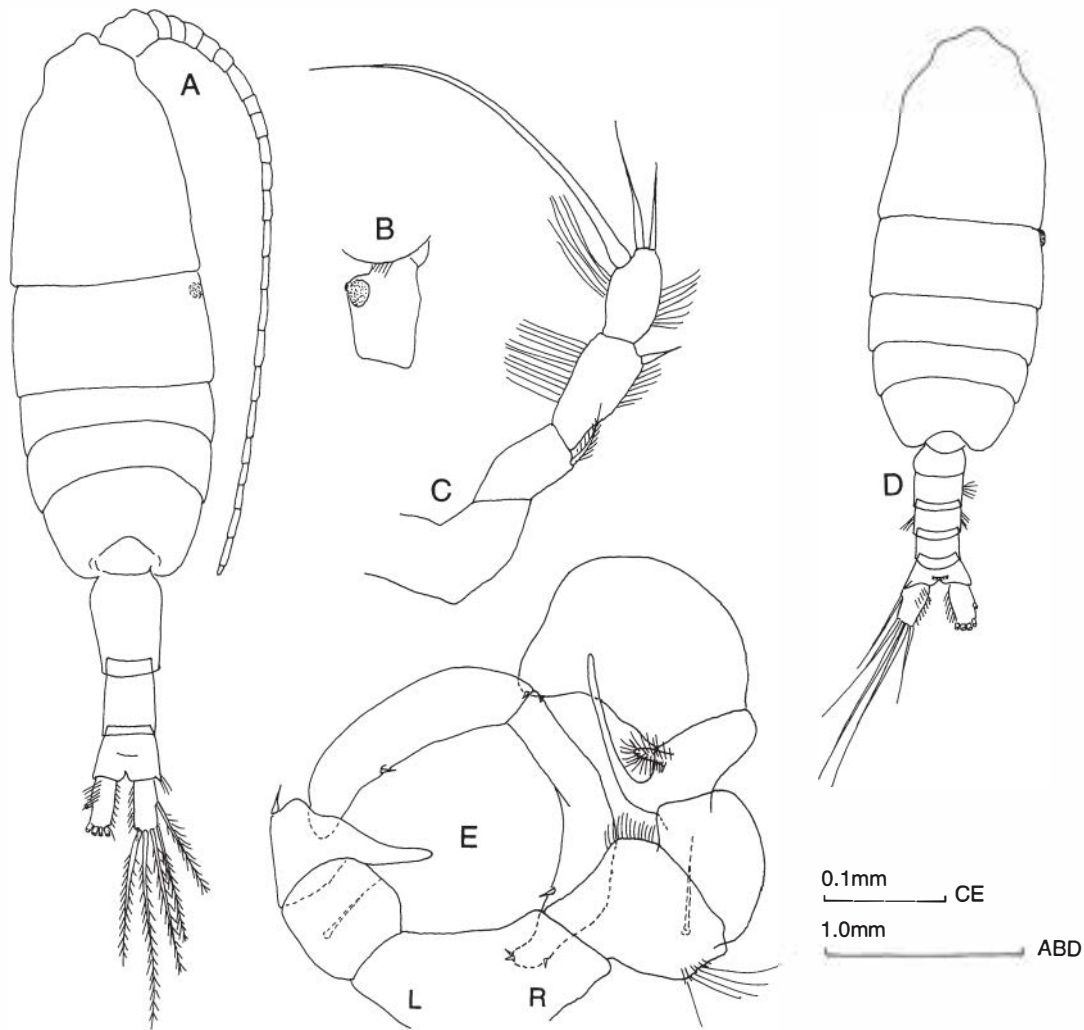


Fig. 85. *Pleuromamma robusta* from Stn VUZ112. Female. A, dorsal view; B, genital segment, lateral view; C, leg 5. Male. D, dorsal view; E, leg 5.

sembles *P. abdominalis* but differs in outline of anterior head which continues forwards into a pointed process which is bent slightly downwards.

(Steuer 1932; Brodsky 1950)

Male: As in the family and generic definitions with the following additional characteristics. Anterior head as in female except it is directed forwards not downwards.

(Steuer 1932; Brodsky 1950)

REMARKS: The Southwest Pacific specimens agree with the above description.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Vervoort (1957); Nyan Taw (1978); Bradford (1972).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
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A292	500-1000	4 females, 2 males
A302	0-500	10 females, 1 male
	500-1000	2 females, 1 male
A303	450-1000	13 females, 2 males
A313	0-914	2 females, 3 males
E774	0-1165	1 female
E788	0-1193	1 male
E892	0-1224	5 females, 4 males
E901	0-1248	4 females
E904	0-1243	6 females, 4 males
F874	0-1357	7 females, 15 males
F879	0-1267	11 females, 1 male
F881	0-1260	3 females, 4 males
F892	0-1260	12 females, 12 males
F897	0-1269	4 females, 4 males
F910	0-1397	18 females, 7 males
F911	0-1697	18 females, 3 males
F945	0-500	1 female, 1 male, 3 copepodites
	500-1000	3 females 4.5-4.65 mm
F946	0-200	9 females 4.5-5.0 mm, 2 males, 4.5, 4.7 mm

Stn No.	Depth of Haul (m)	Specimens	VUZ105	0-914	1 male 4.7 mm
			VUZ107	0-914	3 females 4.8-5.1 mm, 2 males 4.6, 5.1 mm
F946	200-500	1 female 4.6 mm, 2 males, 4.6, 4.75 mm			
	0-1000	5 females 4.6-5.0 mm, 2 males, 4.5, 4.8 mm			
VUZ93	0-1097	8 females 4.55-4.8 mm, 4 males 4.7-4.95 mm			

DISTRIBUTION: This mesopelagic species has been taken in tropical and subtropical parts of the Atlantic, Indian, and Pacific Oceans (Steuer 1932).

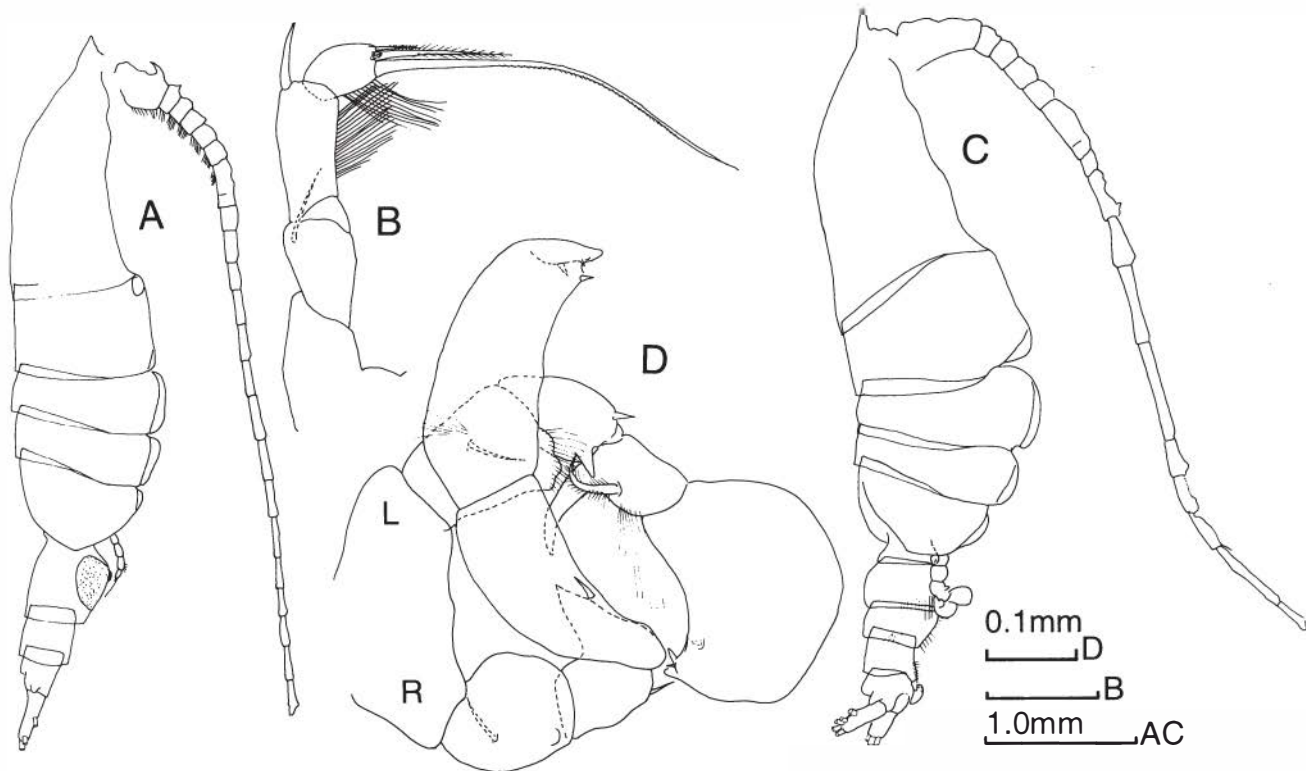


Fig. 86. *Pleuromamma xiphias* from Stn VUZ93. Female. A, lateral view; B, leg 5. Male. C, lateral view; D, leg 5.

#### Family PHYLLOPODIDAE Brodsky, 1950

DEFINITION: Female: Total length 2-3 mm. Body relatively robust, head and pedigerous segment 1 separated, pedigerous segments 4 and 5 fused with posterolateral borders of different shapes, sometimes asymmetrical. Head rounded anteriorly, rostrum short and bifurcate; labrum large and greatly produced. Urosome relatively long, 4-segmented; genital segment usually asymmetrical with a single genital aperture located ventrolaterally on the posterior right border. Caudal rami symmetrical, relatively short, with up to 6 setae. Antenna 1 symmetrical, not extending beyond posterior border of prosome, 24-segmented. Antenna 2 basipod 2 with 2 outer edge setae; exopod and endopod separated from basipod 2; endopod 2-segmented, segment 1 with 1 seta distal to midlength, segment 2 with 7-8 inner setae and 6 setae terminally; exopod 8-segmented, proximal 2 segments without setae and

partially fused with exopod segment 3. Mandible gnathobase longer than palp, with numerous teeth and one inner seta; endopod 2-segmented with 2 and 6 setae respectively; exopod 5-segmented, segments 1-4 with 1 setae each, segment 5 carrying 2 setae. Maxilla 1 inner lobe 1 large, remainder of limb reduced; inner lobe 1 with 15 spines and setae; inner lobes 2-4 with 2, 1, 1 setae respectively; endopod 1-segmented, with 4 setae; exopod small with 7 setae; outer lobe 1 in the form of a small lobe, without setae; outer lobe 2 absent. Maxilla 2 well developed; lobes 1-5 with 3, 2, 3, 3, 4 setae respectively; endopod 4-segmented with 10-11 setae. Maxilliped basipod 1 short with 2 proximal, 2 medial and 1 distal setae; basipod 2 with 3 setae distally; endopod 5-6-segmented, segment 1 almost fully incorporated into basipod 2, with 2, 4, 4, 3, 1+2 setae respectively, each segment with one of the setae small or vestigial. Swimming legs 1-4 distinctly 3-segmented, seta and spine formula as follows:



	basipod 1	basipod 2	exopod segments	endopod segments
leg 1	0-1	1-1	I-1; I-1; II, I, 4	0-1; 0-2; 1, 2, 2
leg 2	0-1	0-0	I-1; I-1; III, I, 5	0-1; 0-2; 2, 2, 4
leg 3	0-1	0-0	I-1; I-1; III, I, 5	0-1; 0-2; 2, 2, 4
leg 4	0-1	0-0	I-1; I-1; III, I, 5	0-1; 0-2; 2, 2, 3

Female leg 5 uniramous, not natatory, basipod 1 and coupler fused; basipod 2 with an outer edge seta; exopod 3-segmented with I-0; 0-1; 0, 0, I spines and setae; outer and distal borders of exopod segments 2 and 3 expanded and toothed.

Male: Urosome 5-segmented. Antenna 1 geniculate on left, 20-segmented. Mouthparts similar to those of female. Leg 5 basipod 1 and coupler fused, basipod 2 with a long outer edge seta on each side; left leg with a 1-segmented, foliaceous endopod, exopod 3-segmented with last 2 segments in the form of a chela; right leg without an endopod, exopod 3-segmented, segments 2 and 3 more or less fused, segment 3 expanded and truncate distally. (Campaner 1977)

An example of this family is *Phyllopus helgae* (Figs 87, 88).

REMARKS: Brodsky (1950) separated *Phyllopus* from the remaining Arietellidae by placing it in a separate subfamily; later Campaner (1977) removed it from the Arietellidae and placed it in a family of its own. Only one genus is placed in this family.

### *Phyllopus* Brady, 1883

DEFINITION: As in the family definition.

TYPE SPECIES: *Phyllopus bidentatus* Brady, 1883

REMARKS: The following species have been described in this genus: *Phyllopus aequalis* Sars, 1920 (male, see Wilson 1950); *P. bidentatus* Brady, 1883 (male, see Tanaka 1964c); *P. giesbrechti* A. Scott, 1909 (male, see Wilson 1950); *P. helgae* Farran, 1908; *P. impar* Farran, 1908; *P. integer* Esterly 1911; *P. mutatus* Tanaka, 1964c (male unknown); *P. muticus* Sars, 1907 (male, see Sewell 1947). The following species have been taken in the Southwest Pacific.

### *Phyllopus bidentatus* Brady, 1883 (Figs 89, 180, 192)

DESCRIPTION: Size: females 2.80–3.60 mm, males 2.75–3.00 mm.

Female: As in the family definition with the follow-

ing additional characteristics. Antenna 1 extends to posterior border of pedigerous segment 2; posterior corners of pedigerous segments 4+5 asymmetrical, longer on right, in lateral view the corners are cut off obliquely with an uneven border. Genital segment almost symmetrical with an indentation on right dorso-lateral surface. Leg 5 basipod 2 with a long outer distal seta extending further than whole leg.

(Giesbrecht 1892)

Male: As in the family definition with the following additional characteristics. Posterior corners of pedigerous segments 4+5 extend as far as posterior border of urosome segment 1, rounded in lateral view. Leg 5 right exopod segment 2 with a proximal peg-like extension; left leg terminal spine-like segment, short.

(Tanaka 1964c)

REMARKS: The present specimens do not agree with Brady's (1883) drawing of this species in that the right extension of pedigerous segments 4+5 is shown by him to have a ventral protrusion which is sharply pointed rather than rounded. The present specimens agree with those of A. Scott (1909) in this respect.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Vervoort (1957).

#### NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A295	400–1000	1 male 2.75 mm
E892	0–1224	1 female 2.84 mm
F945	500–1000	1 female 2.80 mm, 1 male 2.90 mm
VUZ112	0–732	1 female 2.95 mm
Mu67/48s	0–1000	1 male

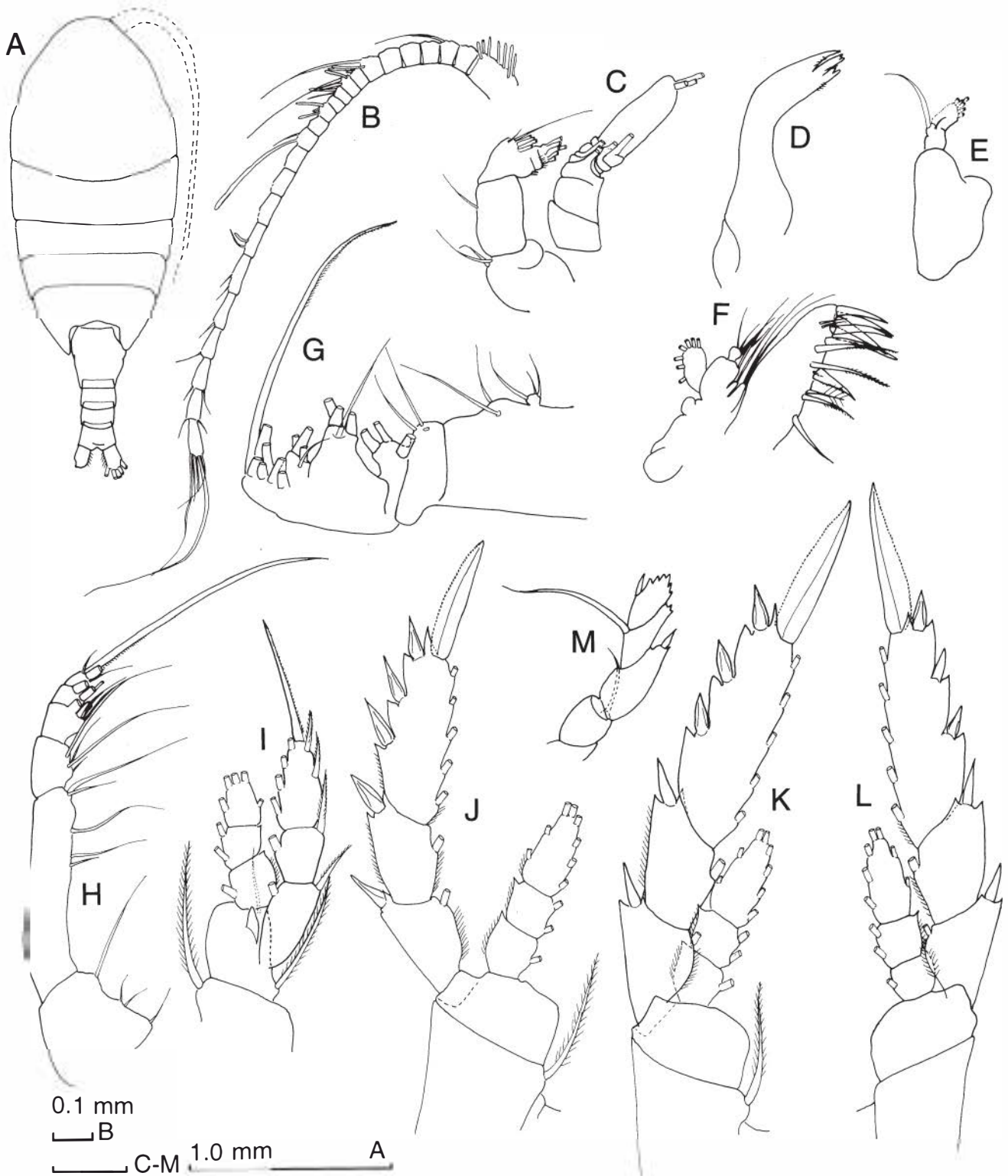
DISTRIBUTION: This mesopelagic species is known from the deep waters of the Pacific, Atlantic, and Indian Oceans (Vervoort 1957; Grice & Hulsemann 1967) although it is found in the surface 200 m in equatorial regions (Stephen & Rao 1980).

### *Phyllopus helgae* Farran, 1908 (Figs 87, 88, 180, 192)

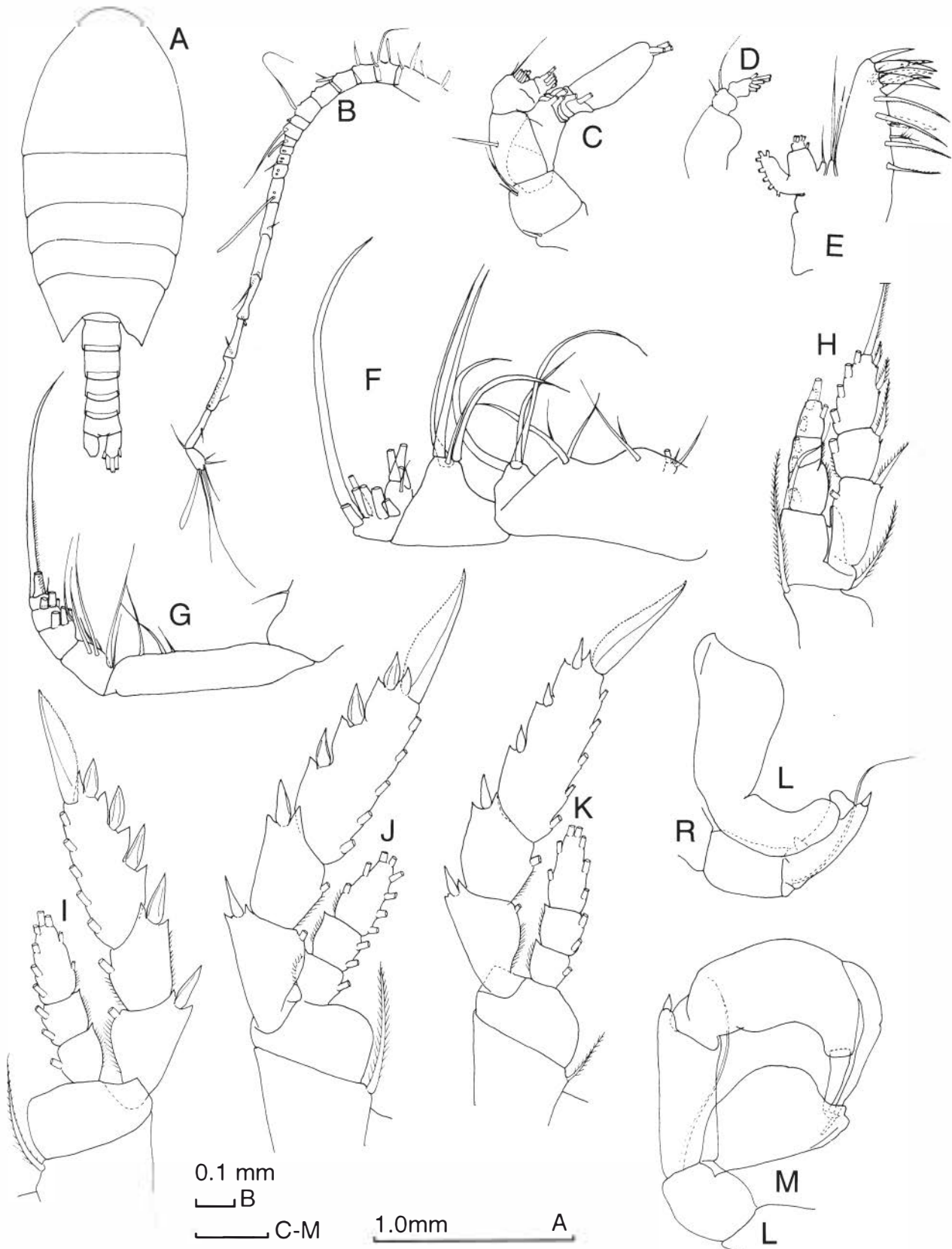
Description: Size: females 2.23–2.60 mm, males 2.10–2.45 mm.

Female: As in the family definition with the following additional characteristics. Posterior borders of pedigerous segments 4+5 almost equal. Genital segment quite large, asymmetrical with a swelling on the right; caudal rami divergent. Antenna 1 much shorter than body. Leg 5 narrow with oblique articulations between exopod segments.

(Farran 1908; Sars 1925)



**Fig. 87.** *Phyllopus helgae*. Female from Stn A292, 500–1000 m. **A**, dorsal view; **B**, antenna 1; **C**, antenna 2; **D**, mandibular blade; **E**, mandible palp; **F**, maxilla 1; **G**, maxilla 2; **H**, maxilliped; **I**, leg 1; **J**, leg 2; **K**, leg 3; **L**, leg 4; **M**, leg 5.



**Fig. 88.** *Phyllopus helgae*. Male from Stn A292, 500–1000 m. **A**, dorsal view; **B**, left antenna 1; **C**, antenna 2; **D**, mandibular palp; **E**, maxilla 1; **F**, maxilla 2; **G**, maxilliped; **H**, leg 1; **I**, leg 2; **J**, leg 3; **K**, leg 4; **L**, right leg 5; **M**, left leg 5.

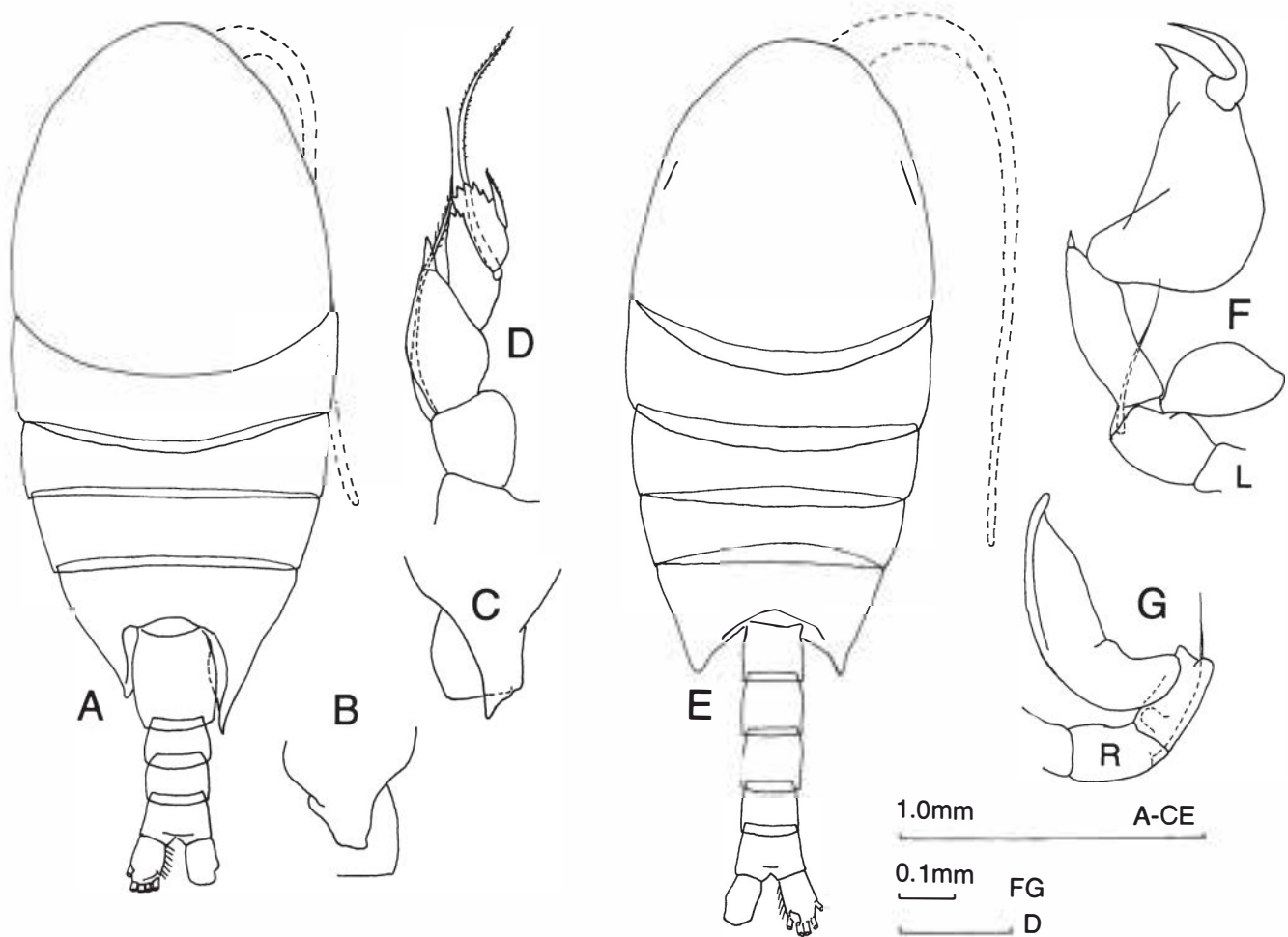


Fig. 89. *Phyllopus bidentatus* from Stn F945, 500–1000 m. Female. A, dorsal view; B, left posterior border of pedigerous segments 4 and 5; C, right posterior border of pedigerous segments 4 and 5; D, leg 5. Male. E, dorsal view; F, left leg 5; G, right leg 5.

Male: As in the family definition with the following additional characteristics. Caudal rami divergent. Leg 5 left endopod large and triangular.  
(Farran 1905 as *P. bidentatus*; Sars 1925)

REMARKS: It seems that *P. helgae* also has an extension of the right male leg 5 exopod segment 2 although neither Farran (1905 as *P. bidentatus*) nor Sars (1925) figures this character. Also the conspicuous constriction dividing the distal part of male left leg 5 exopod segment 2 from the rest of the limb is not figured by Farran (1905).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1970).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500–1000	1 female 2.3 mm, 2 males 2.30, 2.35 mm
A295	400–1000	1 female 2.27 mm
A302	0–500	1 female 2.32 mm, 1 male 2.36 mm
A303	450–1000	1 female 2.23 mm
F946	0–1000	2 females 2.45, 2.50 mm, 2 males 2.2, 2.1 mm
Mu67/57s	0–1000	1 female 2.9 mm
Mu67/94s	0–1000	1 male 2.8 mm

DISTRIBUTION This meso- to bathypelagic species is distributed in the deep water of the Atlantic, Pacific, and Indian Oceans (Farran 1908; Grice & Hülsemann 1965; Vervoort 1965, 1967) although it is found in the surface 200 m in equatorial regions (Stephen & Rao 1980).

## SUPERFAMILY DIAPTOMOIDEA

### Family CENTROPAGIDAE Giesbrecht, 1892

**DEFINITION:** Female: Rostrum always present, with 2 filaments. Head and pedigerous segment 1 and pedigerous segments 4 and 5 separate, the latter rounded or often with asymmetrical spiniform posterior corners. Urosome usually 3-segmented, genital segment often with asymmetrical spine armature, without seminal receptacles; urosome segment 2 may also bear processes. Antenna 1 24–25-segmented. Antenna 2 exopod and endopod almost equal in size; basipod 1 with 1 seta, basipod 2 with 2 setae; endopod 2-segmented carrying 2 and 13–15 setae respectively; exopod 7-segmented carrying 1, 3, 1, 1, 1, 1, and 4 setae respectively, although further fusion of proximal segments may take place in some genera so that the exopod is 5-segmented. Mandibular blade with well-developed teeth, basipod 2 with 4 setae, endopod 2-segmented with 3–4, and 6–8 setae respectively; exopod 4-segmented with 1, 1, 1, and 2–3 setae respectively. Maxilla 1 variable, inner lobe 1 with 14–15 spines and setae, inner lobes 2 and 3 with 1–4, and 2–4 setae respectively, basipod 2 with 2–5 setae, endopod with 2–4 + 4–13 setae, exopod with 7–11 setae, outer lobe 2 with 1 small seta, outer lobe 1 with 8–9 setae, 2 of them short. Maxilla 2 well developed, lobes 1–5 with 4–5, 3, 3, 3, and 3–4 setae respectively, terminal part with 6–8 setae. Maxilliped relatively small, basipod 1 usually with 3 pronounced lobes bearing 2, 3, and 3–4 setae respectively; basipod 2 with 5 distal setae and sometimes with proximal row of inner-edge spinules, endopod 5-segmented with 2–4, 1–4, 1–3, 2–4 (1 usually on outer edge), and 3–4 setae respectively. Legs 1–5 exopods and endopods 3-segmented; apical spine of exopod strongly serrate; sometimes endopod segments 1 and 2 fused. Seta and spine formula as follows:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0–1	0–1	I/0–1; I/0–1; II/0, I, 3/4	0–1; 0–1/2; 0/1, 2, 2/3
Leg 2	0–1	0–0	I-1; I-1; II/III, I, 5	0–1; 0–2; 0/2, 2, 3/4
Leg 3	0–1	0–0	I-1; I-1; III, I, 5	0–1; 0–2; 0/2, 2, 3/4
Leg 4	0–1	0–0	I-1; I-1; III, I, 5	0–1; 0–2; 0/2, 2, 2/3

Female leg 5 biramous, natatory, basipods 1 and 2 without setae, exopod segments 1 and 2 with or without 1 outer edge spine, segment 2 with a strong inner spine-like process, exopod segment 3 with or without 2 outer edge spines, 1 terminal serrate spine and 2 or 4 inner edge setae; endopod segments 1 and 2

with 0–1 and 1 inner-edge setae respectively, endopod segment 3 with 4–6 setae.

Male: Urosome 4–5-segmented. Antenna 1 prehensile on right. Mouthparts and legs 1–4 usually identical to those of female. Leg 5 asymmetrical, usually resembling other swimming legs, rami 2 or 3-segmented, right exopod variously transformed into a grasping organ, sometimes endopod is atrophied.

(Gurney 1931; Bayly 1969; Barthélémy *et al.* 1998)

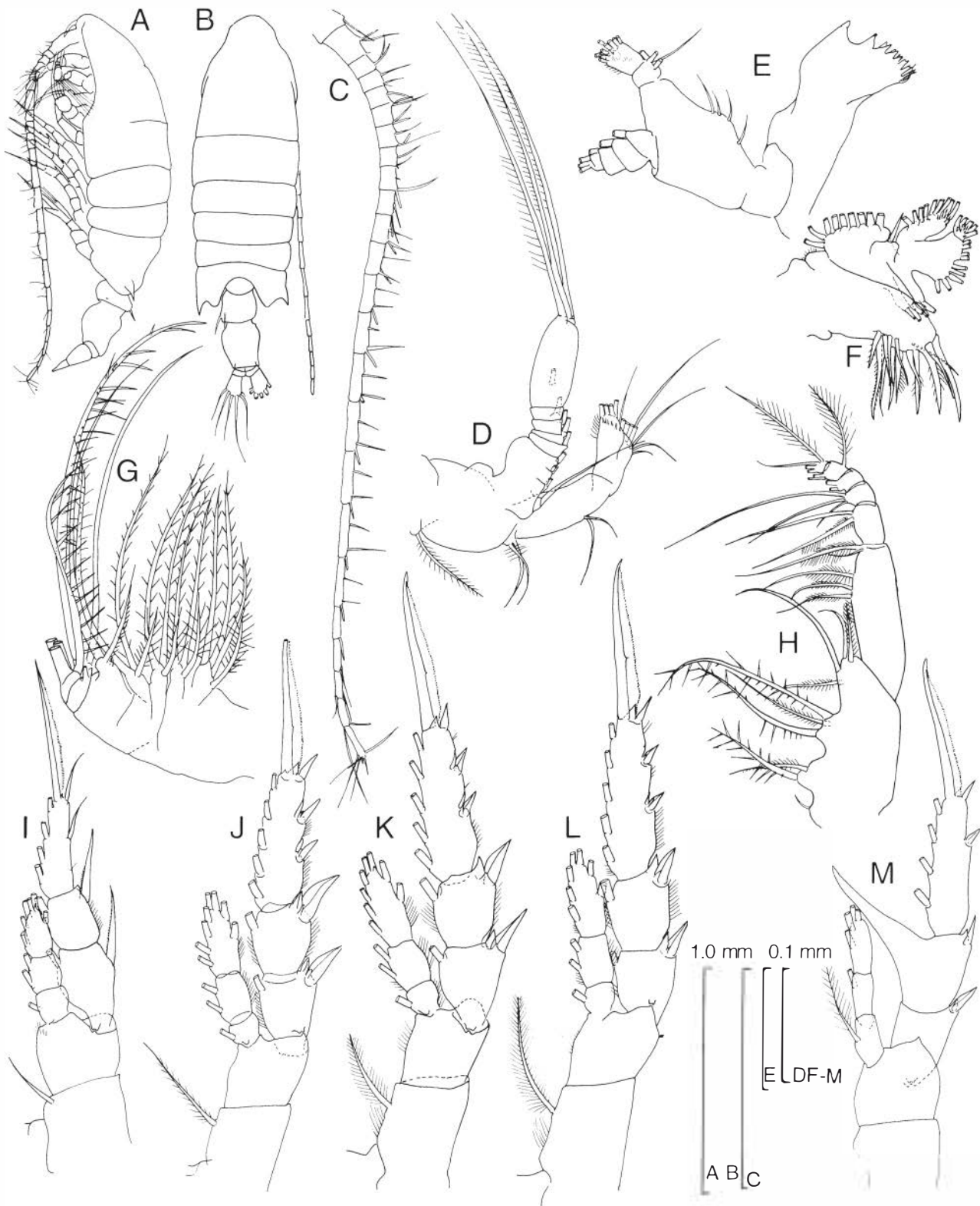
An example of this family is *Centropages aucklandicus* (Figs 90, 91).

**REMARKS:** There are a number of genera in this family many of which live in fresh water. *Centropages* Kroyer, 1848 lives in marine habitats, *Gippslandia* Bayly & Arnott, 1969, lives in estuarine environments in south-eastern Australia, *Gladioferens* Henry, 1919 which lives in brackish, nearshore habitats in Australia and New Zealand, *Isias* Boeck, 1864 lives in nearshore marine habitats and is possibly benthopelagic, *Parathalassius* Dussart, 1986 lives in brackish water near the mouth of the La Foa River, New Caledonia, and *Sinocalanus* Burckhardt, 1913 and *Limnocalanus* Sars, 1863 live in northern hemisphere brackish habitats. The remaining genera are found in freshwater habitats. The genera dealt with here are those with southern hemisphere representatives.

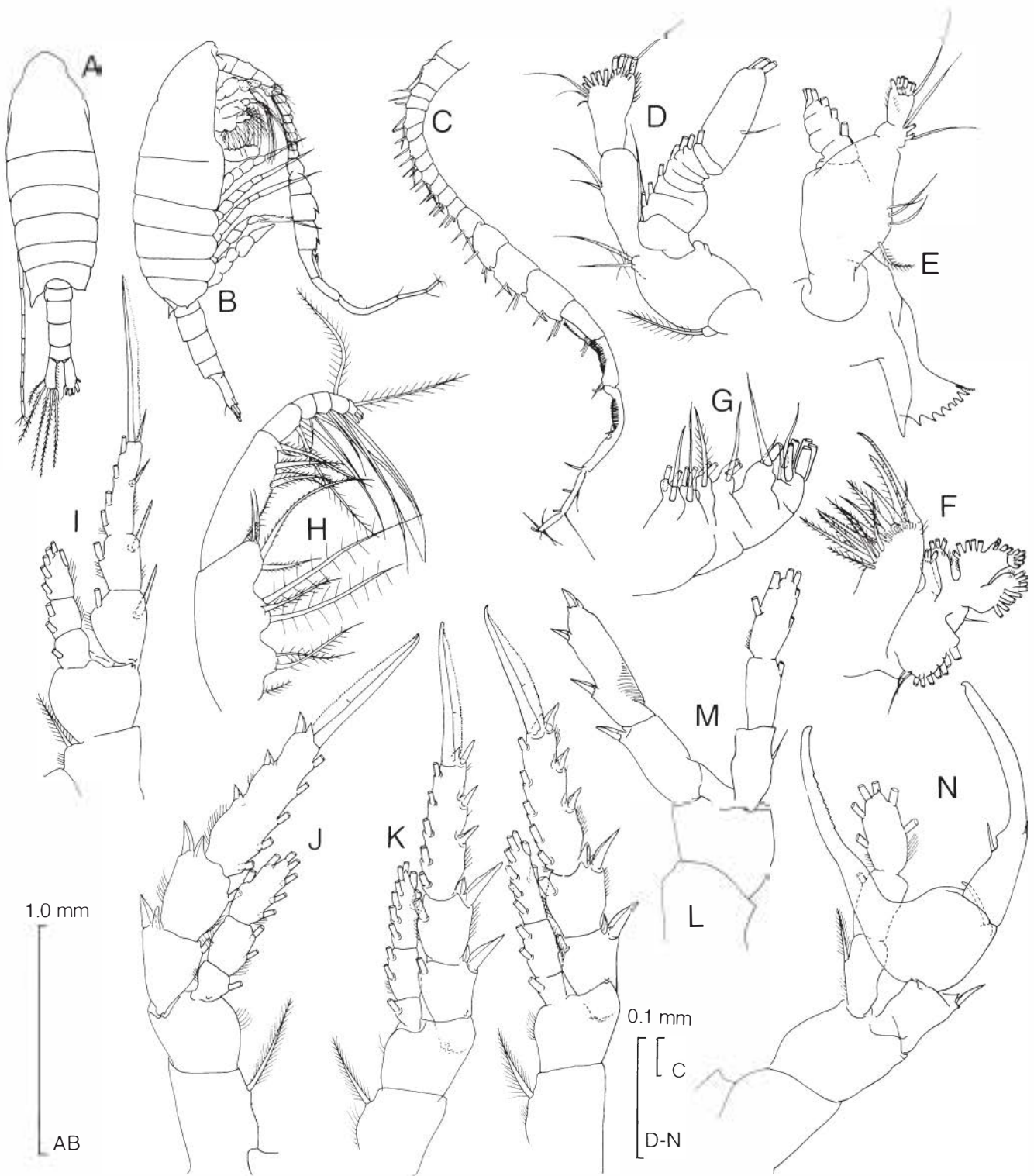
Centropagidae are omnivorous, with a strong tendency towards carnivory in some species, based on mouthpart morphology (Itoh 1970; Ohtsuka *et al.* 1996), gut contents (Harding 1974; Davis & Alatolo 1992; Kleppel 1993), assimilation of plant food (Arashkevich & Timonin 1970), and feeding in the laboratory (Gaudy 1974; Dagg & Grill 1980; Paffenhöfer & Knowles 1980). Details of the behaviour of *Centropages* have been worked out using various photographic techniques (Bundy *et al.* 1991; Hwang *et al.* 1993, 1994).

### *Centropages* Kroyer, 1848

**DEFINITION:** As for the family with the following additional characters. Urosome 3-segmented in female, genital segment usually asymmetrical; 5-segmented in male. Maxilla 1 inner lobe 1 with 15 spines and setae, inner lobe 2 with 3 seta, inner lobe 3 with 3 setae, basipod 1 with 5 setae, endopod with 4+5 setae, segments 1 and 2 fused to basis, exopod with 9 setae, outer lobe 2 with 1 small seta, outer lobe 1 with 9 setae, 7 of them long. Exopod segment 3 of legs 2–4 with 3 outer-edge spines. Female leg 5 basipod 2 not ornamented, exopod segment 2 with a large, straight inner-edge spine. Male leg 5 with basipod 2 unornamented; left exopod 2-segmented, segment 1 with 1 outer edge spine; segment 2



**Fig. 90.** *Centropages aucklandicus*. Female from Stn N434. **A**, lateral view; **B**, dorsal view; **C**, antenna 1; **D**, antenna 2; **E**, mandible; **F**, maxilla 1; **G**, maxilla 2; **H**, maxilliped; **I**, leg 1; **J**, leg 2; **K**, leg 3; **L**, leg 4; **M**, leg 5.



**Fig. 91.** *Centropages aucklandicus*. Male from Stn G142, 250–500 m. **A**, dorsal view; **B**, lateral view; **C**, right antenna 1; **D**, antenna 2; **E**, mandible; **F**, maxilla 1; **G**, maxilla 2; **H**, maxilliped; **I**, leg 1; **J**, leg 2; **K**, leg 3; **L**, leg 4; **M**, left leg 5; **N**, right leg 5.

with 3 outer edge spines and 1 small terminal spine; both endopods as in female; right exopod 3-segmented, in the form of a chela. (Vervoort 1964)

TYPE SPECIES: *Centropages typicus* Kroyer 1949

REMARKS: The following species have been described in this genus: *C. abdominalis* Sato, 1913; *C. alcocki* Sewell, 1912; *C. aucklandicus* Kramer, 1895 (see Vervoort 1964); *C. australiensis* Fairbridge, 1944 (see Vervoort 1964); *C. brachiatus* (Dana, 1849) (= *C. chilensis* Krøyer, 1849); *C. bradyi* Wheeler, 1900; *C. brevifurcus* Shen & Lee, 1963; *C. calaninus* (Dana, 1849) (= ?*Centropages tenuicornis* (Dana, 1849)); *C. caribbeanensis* Park, 1970; *C. chierchiai* Giesbrecht, 1889; *C. dorsispinatus* Thompson & Scott, 1903 (= *C. notoceras* Cleve, 1904); *C. elegans* Giesbrecht, 189; *C. elongatus* Giesbrecht, 1889; *C. furcatus* (Dana, 1849); *C. gracilis* (Dana, 1849); *C. halinus* McKinnon & Kimmerer, 1988; *C. hamatus* (Lilljeborg, 1853b); *C. karachiensis* Haq & Fazal-Ur-Rehman, 1973; *C. kroyeri* Giesbrecht, 1892; *C. longicornis* Mori, 1932; *C. lenunculari* Oliveira, 1946; *C. mcmurrici* Willey, 1920; *C. natalensis* Connell, 1981; *C. orsinii* Giesbrecht, 1889 *C. pacifica* Chiba, 1956; *C. ponticus* Karavaev, 1895 (see Sazhina & Kovalev 1971); *C. sinensis* Chen & Zhang, 1965 *C. tenuiremis* Thompson & Scott, 1903 (juvenile); *C. trispinosus* Sewell, 1914; *C. typicus* Kroyer, 1849; *C. velificatus* de Oliviera, 1947 (?= *C. furcatus*); *C. violaceus* (Claus, 1863); *C. yamadai* Mori, 1934.

Vervoort (1964) concludes that this genus is in need of a thorough revision and as a preliminary step he arranged the species provisionally into five groups with some suggested synonyms. The following species have been taken in the Southwest Pacific.

*Centropages aucklandicus* Kramer, 1895  
(Figs 90, 91, 180, 192)

DESCRIPTION: Size: females: 1.25–2.05 mm, males: 1.25–1.85 mm.

Female: As in the family and generic definitions with the following additional characteristics. Spine of left metasomal corner is short, points straight backwards, and reaches middle of genital segment; part of metasomal border between spine and insertion of urosome is produced and rounded. Spine on right side of posterior metasomal border is directed obliquely laterally and backward. Genital segment and second urosome segment are asymmetrically developed. Genital segment is flat on right side and is slightly produced on left side, carrying 2 backward-directed hairy spines. Urosome segment 2 is slightly swollen on right side, left side is produced into a round swelling. Caudal rami symmetrical and only slightly longer than wide.

Antenna 1 extends beyond caudal rami by the last 3 segments. Leg 5 inner extension on exopod segment 2 is short and bluntly pointed, with a broad base. (Vervoort 1964)

Male: As in the family and generic definitions with the following additional characteristics. Caudal rami almost 3 times as long as wide and are partially fused to anal segment. Right antenna 1 with serrated lamella on segments 17 and 18 not continuous but interrupted at joint between these two segments; segments 19 and 20 are fused but are separate from segment 21; serrated lamella exclusively occurs on segment 19–20 and terminates in a hyaline spur; spines of laminae, proximal and distal to clasping joint, are large and occur in a reduced number compared with *C. australiensis*. Right leg 5 has spur on inner margin of exopod segment 2 straight, curved exopod segment 3 has 2 small teeth and a seta at inner margin, outer margin has a small spiniform seta. (Vervoort 1964)

REMARKS: The left female posterior metasomal border appears to have a larger spine than illustrated by Vervoort (1964).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Kramer (1895); Farran (1929); Bary (1951); Vervoort (1964); Bradford (1972, 1978, 1979, 1980, 1985, 1988 1993); Jillett (1971, 1976).

NEW RECORDS: Nil.

DISTRIBUTION: An epipelagic species distributed in almost all of New Zealand mainland nearshore coastal waters apart from the region north of Hauraki Gulf where temperatures were warmer than 19°C (Bradford 1978).

*Centropages australiensis* Fairbridge, 1944  
(Figs 92, 180, 192)

DESCRIPTION: Size: females: 1.43 mm, males: 1.32 mm.

Female: As in the family and generic definitions with the following additional characteristics. Spine of left metasomal corner almost reaches the end of genital segment; spine on right side of posterior metasomal border extends to middle of genital segment. Genital segment, apart from 2 spines, is almost symmetrical; second urosome segment asymmetrically developed, left side being slightly swollen, right side with a squat proximal spine. Caudal rami are symmetrical and are twice as long as wide. Antenna 1 extends beyond caudal rami by last 2 segments. Leg 5 inner extension on exopod segment 2 is short and bluntly pointed, with a slightly less broad base compared with *C. aucklandicus*. (Vervoort 1964)



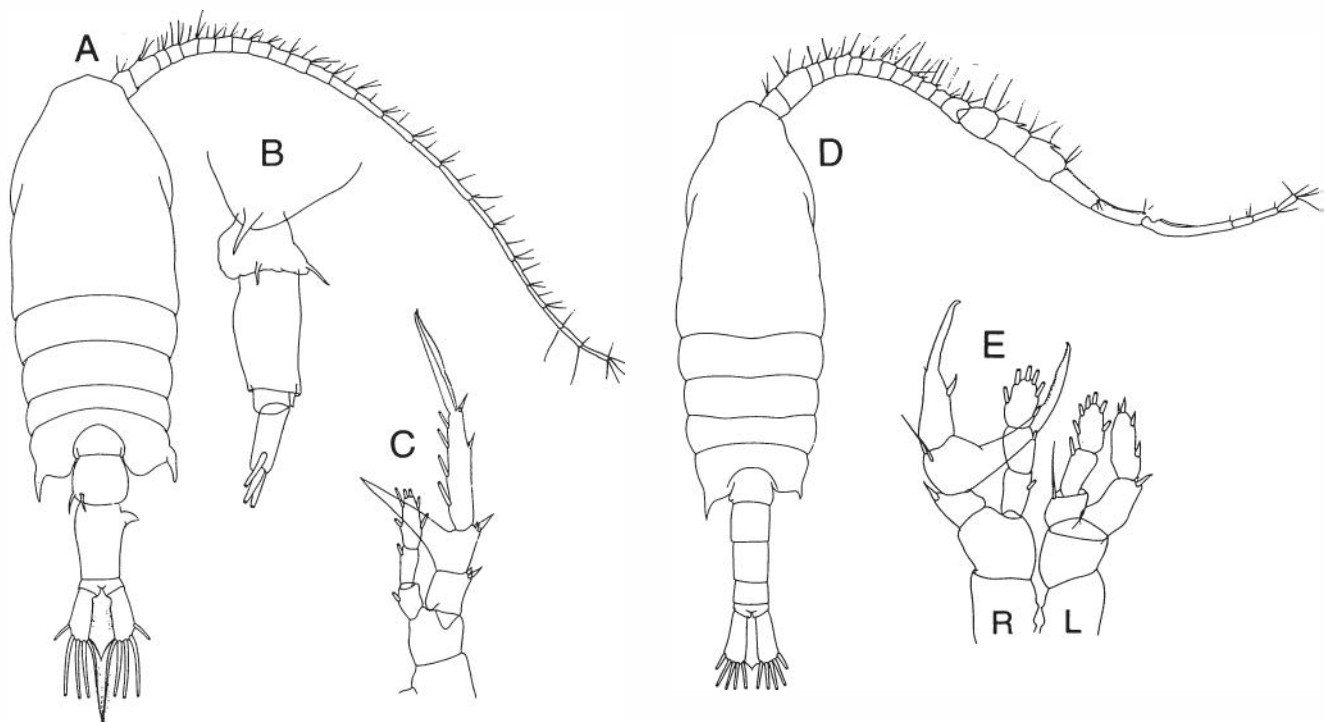


Fig. 92. *Centropages australiensis* from Vervoort (1964). Female. A, dorsal view; B, urosome, lateral view; C, leg 5. Male. D, dorsal view; E, leg 5.

Male: As in the family and generic definitions with the following additional characteristics. Caudal rami slightly more than twice as long as wide. Right antenna 1 with serrated lamella on segments 17 and 18 continuously denticulate; segments 19 and 21 are fused and there is a denticulate lamella continuous until middle of fused segment; apical part bears a small hyaline tooth. Right leg 5 has a slightly curved spur on inner margin of exopod segment 2 while outer apical margin is furrowed, exopod segment 3 is drawn out into a point with a furrowed inner margin, there is a distinct spine on inner margin and a minute spinule on outer margin. (Vervoort 1964)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Dakin and Colefax (1940); Vervoort (1964); Nyan Taw (1978).

NEW RECORDS: Nil.

DISTRIBUTION: Southeastern Australia (Dakin & Colefax 1940; Vervoort 1964; Nyan Taw 1978).

*Centropages bradyi* Wheeler, 1900  
(Figs 93, 180, 192)

DESCRIPTION: Size: females: 1.91–2.5 mm, males: 1.74–2.4 mm.

Female: As in the family and generic definitions with the following additional characteristics. Body inflated, being widest in dorsal view at about pedigerous segments 1 or 2, posterior metasomal corners rounded, sides of inflated genital segment without spines or knobs. Caudal rami large, symmetrical with a peculiar, short, truncated, peg-shaped projection between the insertions of two outer terminal setae. Antenna 1 extends beyond caudal rami by its last 3 or 4 segments. Leg 5 exopod segment 2 inner edge spine stout and smooth. (Wheeler 1900)

Male: As in the family and generic definitions with the following additional characteristics. Caudal rami with a peculiar, short, truncated, peg-shaped projection between the insertions of two outer terminal setae. Antenna 1 extends beyond caudal rami by its last 3 or 4 segments; right antenna 1 segment 17 with a smooth anterior border; segments 19 and 20 fused and separated from segment 21; segment 18 with an accessory series of teeth on the lower surface. Leg 5 right chela formed from blunt-tipped inner extension of exopod segment 2 and slender, curving, terminally tapering exopod segment 3 which are nearly equal in length; left exopod 2-segmented, exopod segments 2+3 tapering and bearing four long spines. (Wheeler 1900)

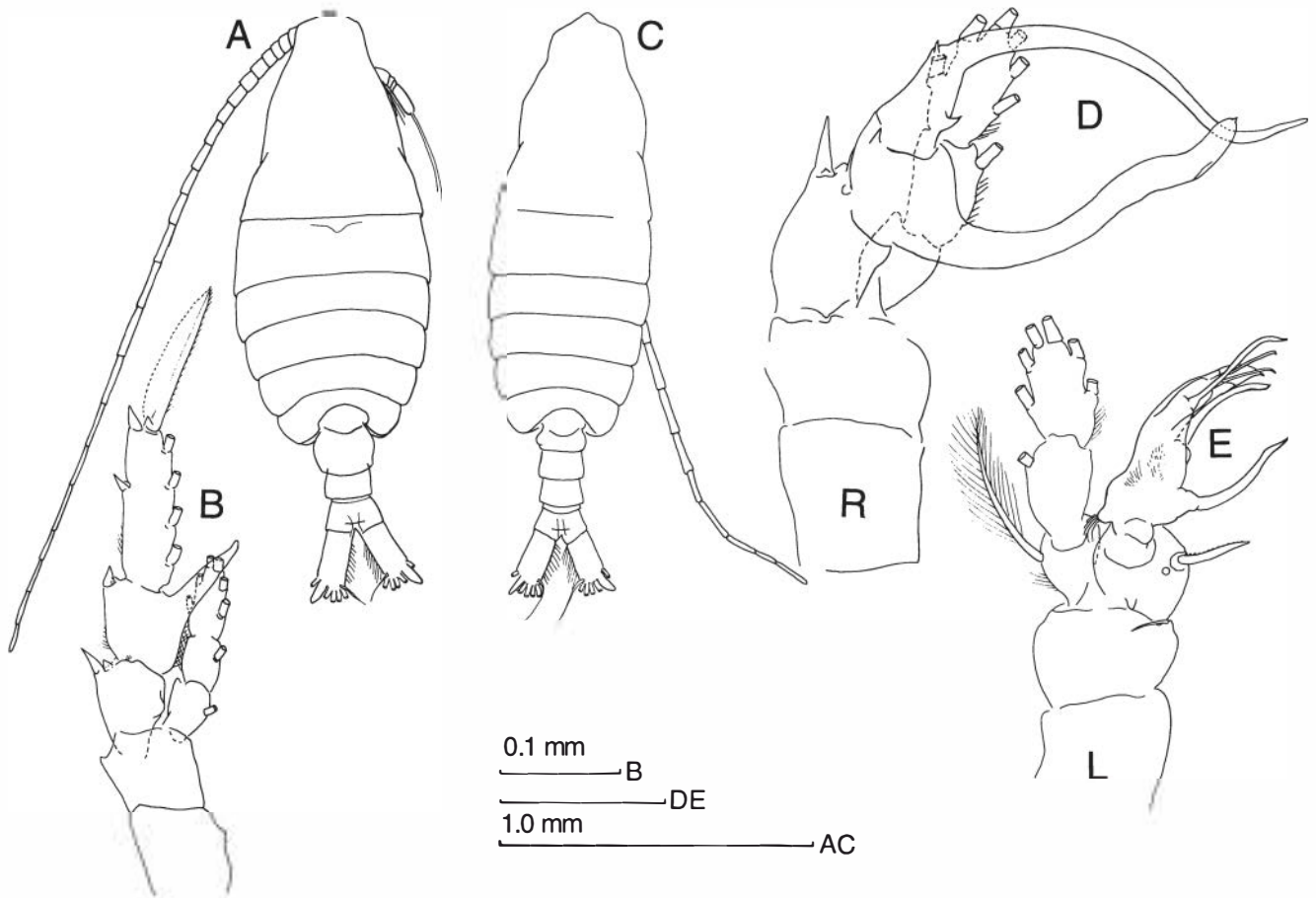


Fig. 93. *Centropages bradyi* from Stn F946, 0–200 m. Female. A, dorsal view; B, leg 5. Male. C, dorsal view; D, right leg 5; E, left leg 5.

REMARKS: This species was created by Wheeler (1900) to take a specimen erroneously identified by Brady (1883) as *C. violaceus*. In the Southwest Pacific males the left exopod segments 2+3 of leg 5 with one of the 4 long spines bifurcate, the segment itself terminating in a claw-like extension.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Dakin and Colefax (1940); Bary (1951); Vervoort (1957); Nyan Taw (1978); Bradford (1972).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A313	0–914	1 female, 2 males
A332	surface	15 females 1.7–1.9 mm, 3 males 1.7–1.8 mm
F945	0–500	1 male 1.7 mm
F946	200–500	1 female 1.3 mm
	0–1000	3 females 1.7 mm
F947	0–200	1 female 1.75 mm
Mu67/6	0–100	2 males

DISTRIBUTION: This species appears to be mesopelagic although it may also be taken in surface waters at night in temperate Atlantic, Pacific and Mediterranean seas (Rose 1933).

*Centropages calaninus* (Dana, 1849) (Figs 94, 180, 192)

DESCRIPTION: Size: females: 1.90–2.00 mm, males: 1.8 mm.

Female: As in the family and generic definitions with the following additional characteristics. In dorsal view posterior metasomal corners rounded. Genital segment symmetrical and with lateral swellings. Anal segment is more than twice as long as urosome segment 2. Caudal rami large and asymmetrical. Antenna 1 extends beyond caudal rami by its last 2 segments. Leg 5 exopod segment 2 inner edge spine is straight and longer than exopod segment 3; there is a notch on the proximal inner margin of exopod segment 1.

(Giesbrecht 1892; Mori 1937)

Male: As in the family and generic definitions with the following additional characteristics. Right leg 5 exopod segment 3 claw is longer than inner extension of exopod segment 2 and is sharply bent.  
(Giesbrecht 1892; Mori 1937)

REMARKS: This species is similar to *C. violaceus* but is distinguished by the proportions of the anal segment, caudal rami, and antenna 1 in the female and the form of the right leg 5 exopod segment 3 in the male.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Dakin and Colefax (1940); Greenwood (1977).

NEW RECORDS: Nil.

DISTRIBUTION: An Indo-Pacific warm coastal water epipelagic species (Greenwood 1977).

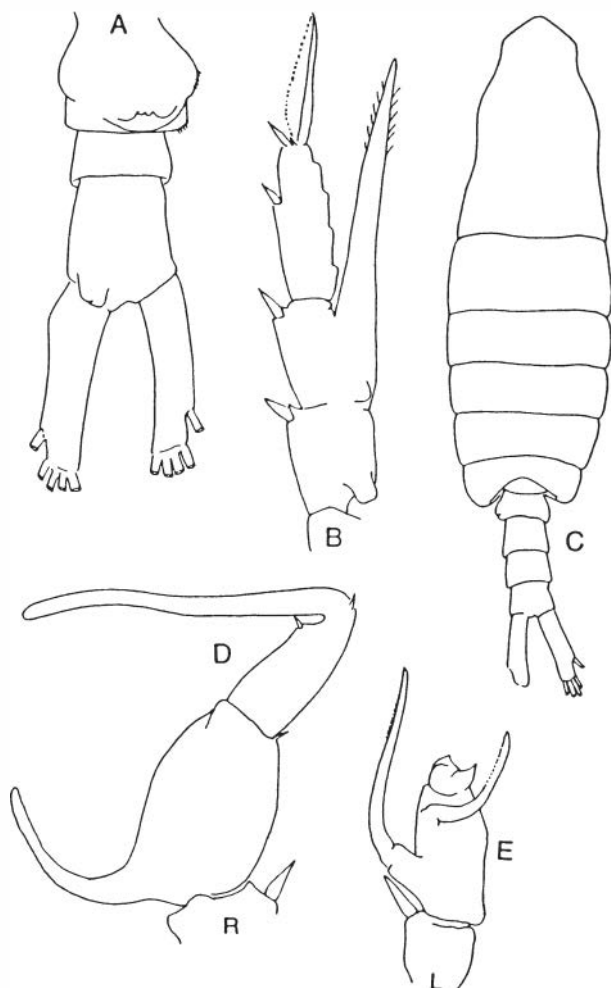


Fig. 94. *Centropages calaninus* from Giesbrecht (1892). Female. A, urosome, ventral view; B, exopod of leg 5. Male. C, dorsal view; D, right exopod of leg 5; E, left exopod of leg 5.

*Centropages elegans* Giesbrecht, 1895  
(Figs 95, 180, 192)

DESCRIPTION: Size: females: 1.86–2.14 mm, males: 1.84–2.05 mm.

Female: As in the family and generic definitions with the following additional characteristics. Pedigerous segment 1 incompletely separated from head, posterior margins of metasome rounded. Genital segment is symmetrical and wider than long with a posterodorsal row of spinules; urosome segment 2 has a ventral knob-like projection and 2 posterodorsal rows of small spinules; caudal rami long, symmetrical. Antenna 1 24-segmented, extending beyond caudal rami by last 5 segments. Maxilla 1 is small, inner lobes 1–3 with 14, 1, and 4 spines and/or setae respectively, basipod 2 with 3 setae, endopod with 9 setae, exopod with 7 setae and outer lobe 1 with 9 setae. Leg 5 exopod segment 1 has a round projection on inner margin, exopod segment 2 with a strong spiniform projection directed distally, with distal inner margin hairs.

(Park 1968)

Male: As in the family and generic definitions with the following additional characteristics. Left antenna 1 extends beyond caudal rami by last two segments; right antenna 1 with external margins of segments 17–19 fringed with rows of acute teeth, segments 18 and 19 are articulated by a "knee joint". Leg 5 right exopod segment 2 extends internally into a long, bluntly rounded extension, exopod segment 3 in the form of a long, tapering spine, much longer than exopod segment 2 extension; left exopod 2-segmented, exopod segments 2+3 bearing two spines which do not taper much and which have densely pitted tips.

(Park 1968)

REMARKS: This species was described by Giesbrecht (1895) from a single male. Subsequently Park (1968) redescribed both sexes from the central North Pacific. In Southwest Pacific males the inner extension of right leg 5 exopod segment 2 is terminated by a small spinule; the tips of the two spines on the left exopod segments 2+3 are actually covered in small spinules (not pitted).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	surface	5 females 1.8–1.9 mm, 1 male 1.7 mm
A295	surface	2 females, 1 male
A302	surface	1 female
	0–500	1 female, 1 male, 1 copepodite
A303	450–1000	1 male

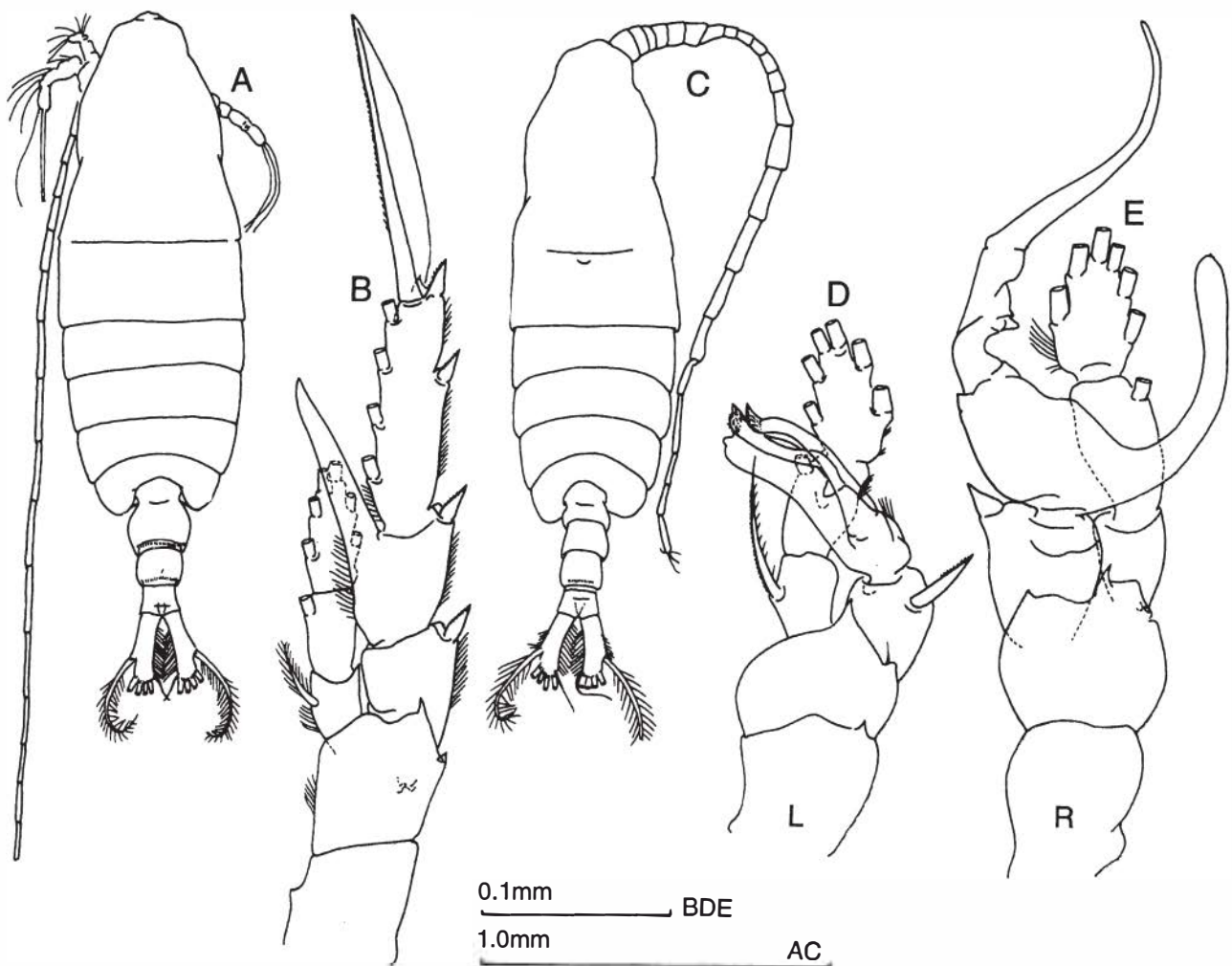


Fig. 95. *Centropages elegans* from Stn A295, surface. Female. A, dorsal view; B, leg 5. Male. C, dorsal view; D, left leg 5; E, right leg 5.

**DISTRIBUTION:** This epipelagic species is found in the Pacific Ocean (Park 1968). The present record appears to be the first for the south Pacific Ocean.

*Centropages furcatus* (Dana, 1849)  
(Figs 96, 180, 192)

**DESCRIPTION:** Size: females: 1.60–1.70 mm, males: 1.55–1.65 mm.

Female: As in the family and generic definitions with the following additional characteristics. Head has a ventral ball-like eye. Posterior borders of metasome are pointed and have an accessory spine on the interior border of this spine. Genital segment without spines on ventral surface; anal segment is not quite symmetrical and more than twice the length of urosome segment 2; caudal rami relatively slender. Antenna 1 has spines on segments 1, 2, and 5. Leg 5 exopod segment 2 inner edge spine does not reach distal border

of exopod segment 3. (Giesbrecht 1892; Mori 1937)

Male: As in the family and generic definitions with the following additional characteristics. The posterior border of metasome is slightly asymmetrical; left side is more protruding than right. Caudal rami are slender. Right leg 5 extension on exopod segment 2 has a rounded protrusion on the proximal portion; exopod segment 3 claw is stout and has a spine on inner margin and 2 spines on outer margin; left exopod segments 2+3 with long terminal fixed appendages.

(Giesbrecht 1892; Mori 1937)

**REMARKS:** This species is related to *C. typicus*. Greenwood (1977) noted that there are 2 large tubercles at the base of the inner projection of the male right exopod segment 2 claw of leg 5.

**PREVIOUS SOUTHWEST PACIFIC RECORDS:** Brady (1883); Dakin and Colefax (1940); Greenwood (1977).

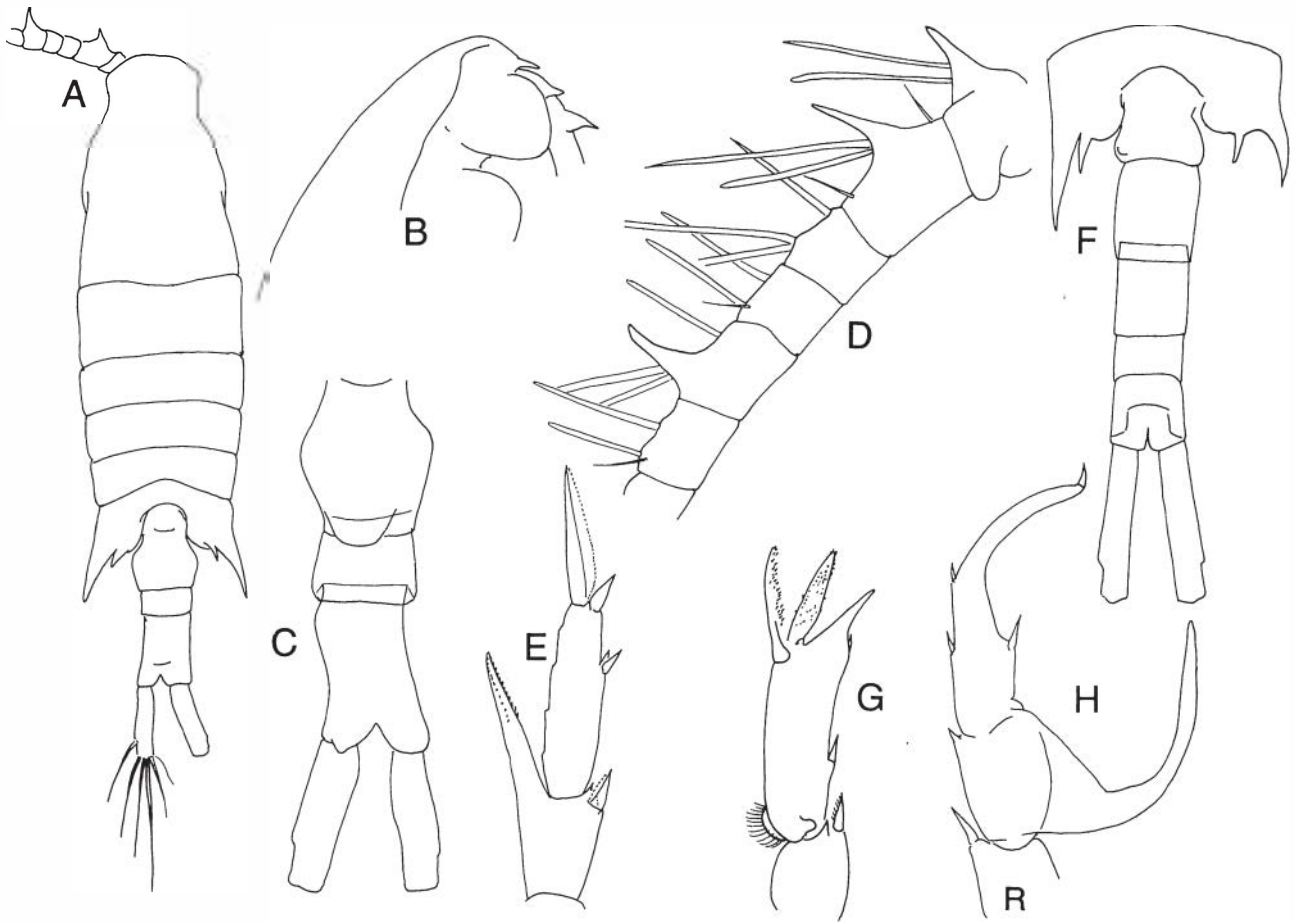


Fig. 96. *Centropages furcatus* from Giesbrecht (1892). Female. A, dorsal view; B, head, lateral view; C, urosome, ventral view; D, anterior part of antenna 1; E, exopod segments 2 and 3 of leg 5. Male. F, urosome, dorsal view; G, left exopod segments 2+3 of leg 5; H, right exopod segments 2 and 3 of leg 5.

NEW RECORDS: Nil.

DISTRIBUTION: Widely distributed epiplanktonic species in the tropics and subtropics of all oceans (Greenwood 1977).

*Centropages orsinii* (Brady, 1899) (Figs 97, 180, 192)

DESCRIPTION: Size: females: 1.50–1.60 mm, males: 1.25–1.30 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior borders of metasome are weakly pointed. Caudal rami are about twice as long as wide. Genital segment is symmetrical and has a spine on the ventral surface. Antenna 1 without spines on segments 1, 2, and 5 and when held straight back does not extend beyond the caudal rami. Leg 5 exopod segment 2 inner spine curved, usually bordered by small spines.

(Giesbrecht 1892; Mori 1937)

Male: As in the family and generic definitions with the following additional characteristics. Posterior borders of metasome are hardly pointed. Right leg 5 terminal claw of exopod segment 3 longer than the appendage on exopod segment 2; left exopod segment 3 with the terminal part projecting into a spine distally bordered by spinules. (Giesbrecht 1892; Mori 1937)

REMARKS: Related to *C. kroyeri*.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Dakin & Colefax (1940); Greenwood (1977).

NEW RECORDS: Nil.

DISTRIBUTION: Warm water epiplanktonic species found in neritic and oceanic waters of the Indo-West Pacific (Greenwood 1977).

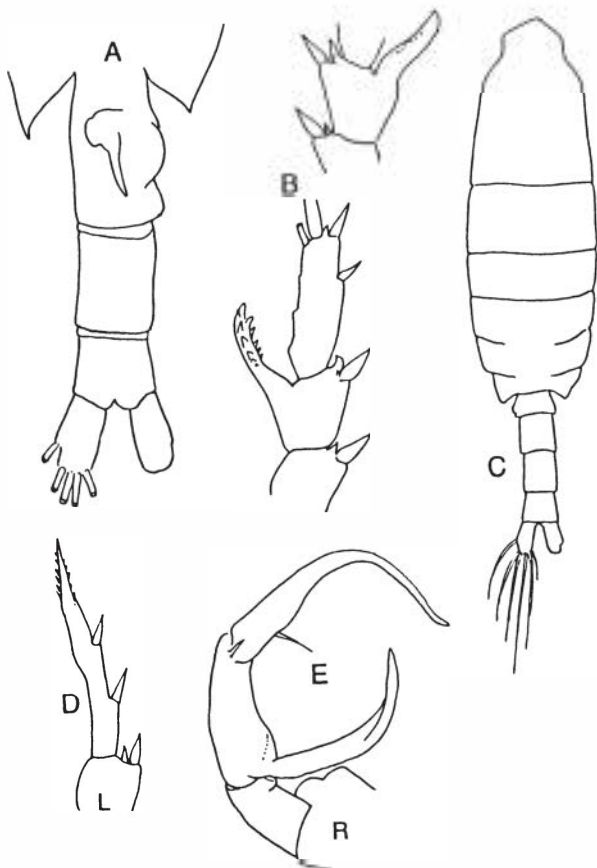


Fig. 97. *Centropages orsinii* from Giesbrecht (1892). Female. A, urosome, ventral view; B, exopod segments 2 and 3 of leg 5. Male. C, dorsal view; D, left exopod segments 2+3 of leg 5; E, right exopod of leg 5.

*Centropages violaceus* (Claus, 1863)  
(Figs 98, 180, 192)

DESCRIPTION Size: females: 1.88–2.04 mm; males: 1.92 mm.

Female: As for the family and generic definitions with the following additional characters. Posterior metasome corners rounded. Genital segment without setae or spines, with a patch of spinules on right side; urosome segment 2 with a centrally placed ventral protrusion. Antenna 1 without large spines on proximal segments. Leg 5 exopod segment 2 inner spine-like process does not extend as far as distal border of exopod segment 3. (Giesbrecht 1892)

Male: As for the family and generic definitions with the following additional characters. Right geniculate antenna 1 segments 15 and 16 without spines. Right leg 5 exopod segment 2 bulbous with a narrowly based inner process which arises at midlength; exopod segment 3 long and S-shaped, three times the length of the inner process on exopod segment 2. (Giesbrecht 1892)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in tropical and subtropical waters of all oceans (Razouls 1995).

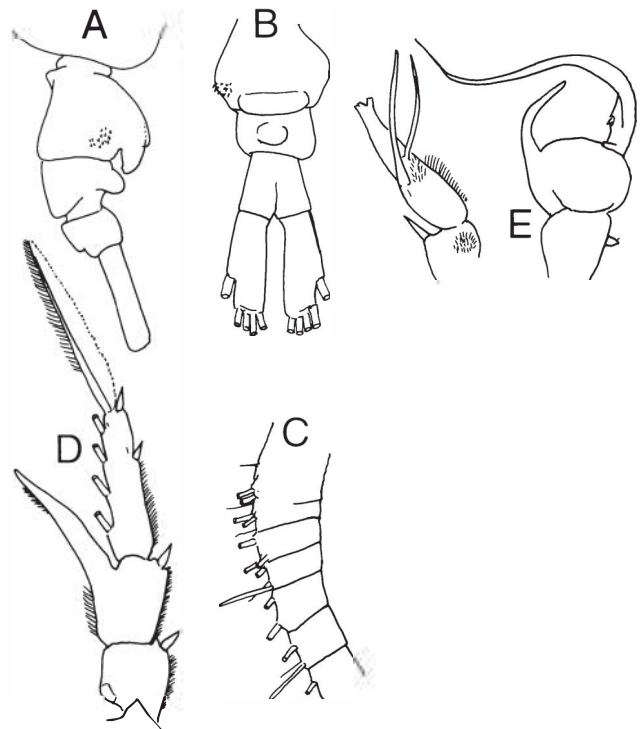


Fig. 98. *Centropages violaceus* from Giesbrecht (1892). Female. A, urosome, lateral view; B, urosome, ventral view; C, anterior segments of antenna 1; D, exopod of leg 5. Male. E, exopods of leg 5.

*Gippslandia* Bayly & Arnott, 1969

DEFINITION: As for the type species.

TYPE SPECIES: *Gippslandia estuarina* Bayly & Arnott, 1969

REMARKS: This is a monotypic genus.

*Gippslandia estuarina* Bayly & Arnott, 1969  
(Figs 99, 181, 192)

DESCRIPTION: Size: females: 0.74 mm, males: 0.66 mm.

Female: Urosome 3-segmented, genital segment 1.4 times longer than wide, smooth and completely lacking ventral armature; caudal rami 4.4 times longer than

wide. Antenna 1 25-segmented. Antenna 2 exopod 6-segmented. Mouthparts similar to *Centropages* except for some reduction in the number of setae on distal parts of maxilla 1 and maxilliped. Maxilla 1 with 7 setae on exopod, endopod with 9 setae and basipod 2 with 5 setae. Maxilliped with 3 setae on distal swelling on basipod 1, endopod segments 1-5 with 2, 1, 1, 2 (1 of these on outer edge), and 4 setae respectively. Swimming legs generally as for family with the following specific details – legs 1-4 with both rami 3-segmented; long terminal exopod spines serrated along outer edge. Leg 1 with inner borders of basipods 1 and 2 naked; exopod segments 1 and 2 outer edges naked, segment 3 with 1 outer distal spinule; endopod segments 2 and 3 with 1 and 4 inner edge setae respectively. Exopod segment 3 of legs 2-4 with 2 outer-edge spines, endopod segment 3 of legs 2 and 3 with 5 setae and 4 setae on leg 4. Leg 5 exopod segments 1 and 2 outer borders naked, exopod segment 3 without outer-edge spines but with a non-articulated distolateral pointed extension to the segment; endopod segment 3 with 5 setae. (Bayly & Arnott 1969)

Male: Urosome 5-segmented. Antenna 1 25-segmented on the left, 22-segmented on the right with a hinge between segments 18 and 19. Mouthparts and legs 1-4 similar to those of the female. Leg 5 left exo-pod 2-segmented, distal segment elongate; left endopod 3-segmented with similar arrangement of setae to that of female; right basipod 1 with a small blunt inner edge projection, basipod 2 with 2 or 3 small pimple-like projections on inner edge; right exopod 2-segmented, proximal segment produced at outer distal corner into a long pointed process extending almost to distal extremity of segment 2, segment 2 produced at outer and inner corners into pointed processes with outer process largest; right endopod 1-segmented, extending beyond the exopod and with 6 setae. (Bayly & Arnott 1969)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bayly & Arnott (1969).

NEW RECORDS: Nil.

DISTRIBUTION: This species has been taken in brackish water in the Gippsland lakes of Victoria (Bayly & Arnott 1969).

*Gladioferens* Henry, 1919

DEFINITION: As for the family with the following additional characters. Antenna 1 relatively short, not exceeding metasome in length, 24-segmented; male right antenna 1 18-segmented, segments 7-9 each with a stout spine, hinged between segments 15 and 16. Female urosome 4-segmented, eggs carried in a sac attached to a specially differentiated plate, fused mid-ventrally to anterior end of urosome segment 3. Leg 1 basipod 1 with 1 inner seta; exopod segment 1 with an outer edge spine and inner seta, segment 2 without an outer edge spine and with 1 inner edge seta, segment 3 with 2 outer edge spines, a long terminal spine and 3 inner edge setae; endopod segments 1-3 with 1, 2 and 6 setae respectively. Legs 2-4 exopod segment 3 with 2 outer edge spines; endopod segment 3 of legs 2 and 3 with 8 setae, of leg 4 with 7 setae. Generally basipod 1 inner edge seta is asymmetrically developed on female left leg 4. Left endopod segment 3 of male leg 2 has asymmetrically developed inner edge setae with the proximal inner seta in the form of a non-articulated, long triangular spine, and next setae short and relatively broad. Left male leg 3 in one species has endopod segment 1 inner edge setae modified into a short moderately wide form. Female leg 5 exopod segments 1 and

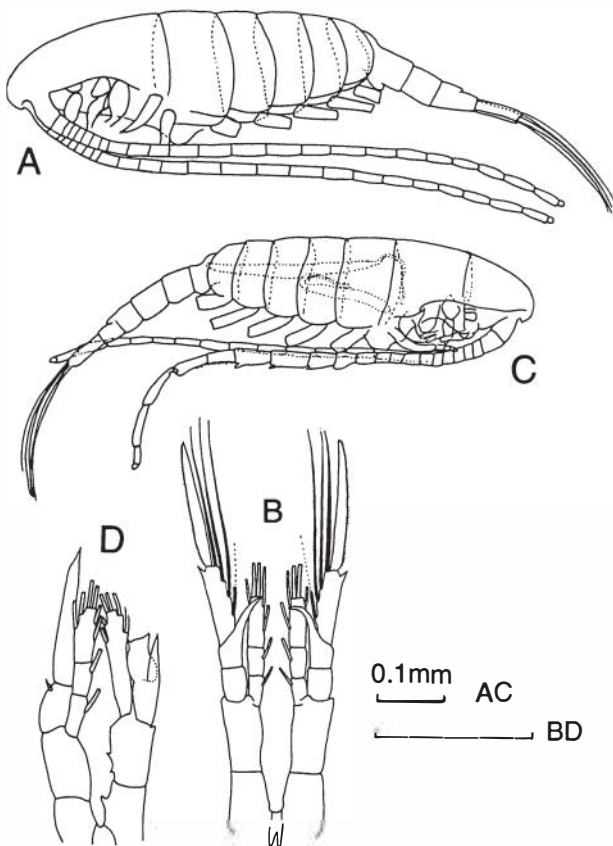


Fig. 99. *Gippislandia estuarina* from Bayly & Arnott (1969). Female. A, lateral view; B, leg 5. Male. C, lateral view; D, leg 5.

2 each with 1 outer edge spine, exopod segment 3 with 2 inner-edge setae; endopod segment 1 without an inner-edge seta, endopod segment 3 with 4 setae. Male leg 5 right exopod 3-segmented, terminating in a claw approximately twice as long as its segment; left exopod shorter than right exopod, 2-segmented, terminal segment with 4 spine; both endopods are well developed with varying degrees of fusion between segments. (Bayly 1963)

TYPE SPECIES: *Gladioferens spinosus* Henry, 1919 (designated by Bayly 1963).

REMARKS: Bayly (1963) has divided this genus into two subgenera on the basis of symmetry in the legs. Subgenus *Protogladioferens* Bayly, 1963 was created to take *G. (P.) symmetricus* which does not have any asymmetry

in swimming legs 2-4 of male or female. All remaining species are assigned to the subgenus *Gladioferens*. The following species have been described in this genus: *Gladioferens antarcticus* Bayly, 1994; *G. inermis* Nicholls, 1944; *G. imparipes* Thomson, 1946; *G. pectinatus* (Brady, 1899); *G. spinosus* Henry, 1919; *G. symmetricus* Bayly, 1963. The following species have been taken in the Southwest Pacific.

*Gladioferens pectinatus* (Brady, 1899)  
(Figs 100, 181, 192)

DESCRIPTION: Size: female 1.60 mm, male 1.45 mm.  
Female: Genital segment with 2 curved rows of ventral spines anterior to operculum, separated by a distinct gap near midline; in each row longest spines are near the middle and their length diminishes

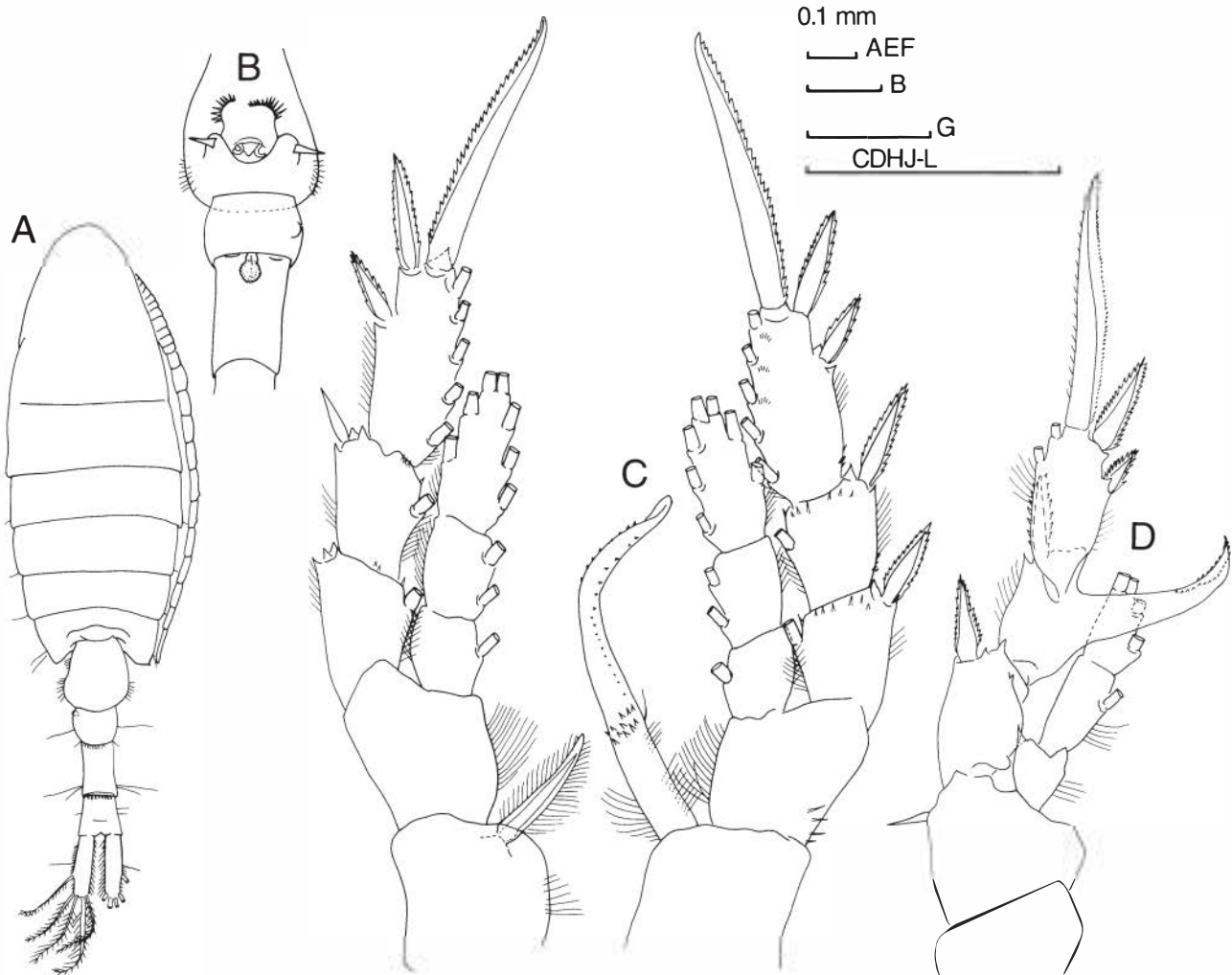
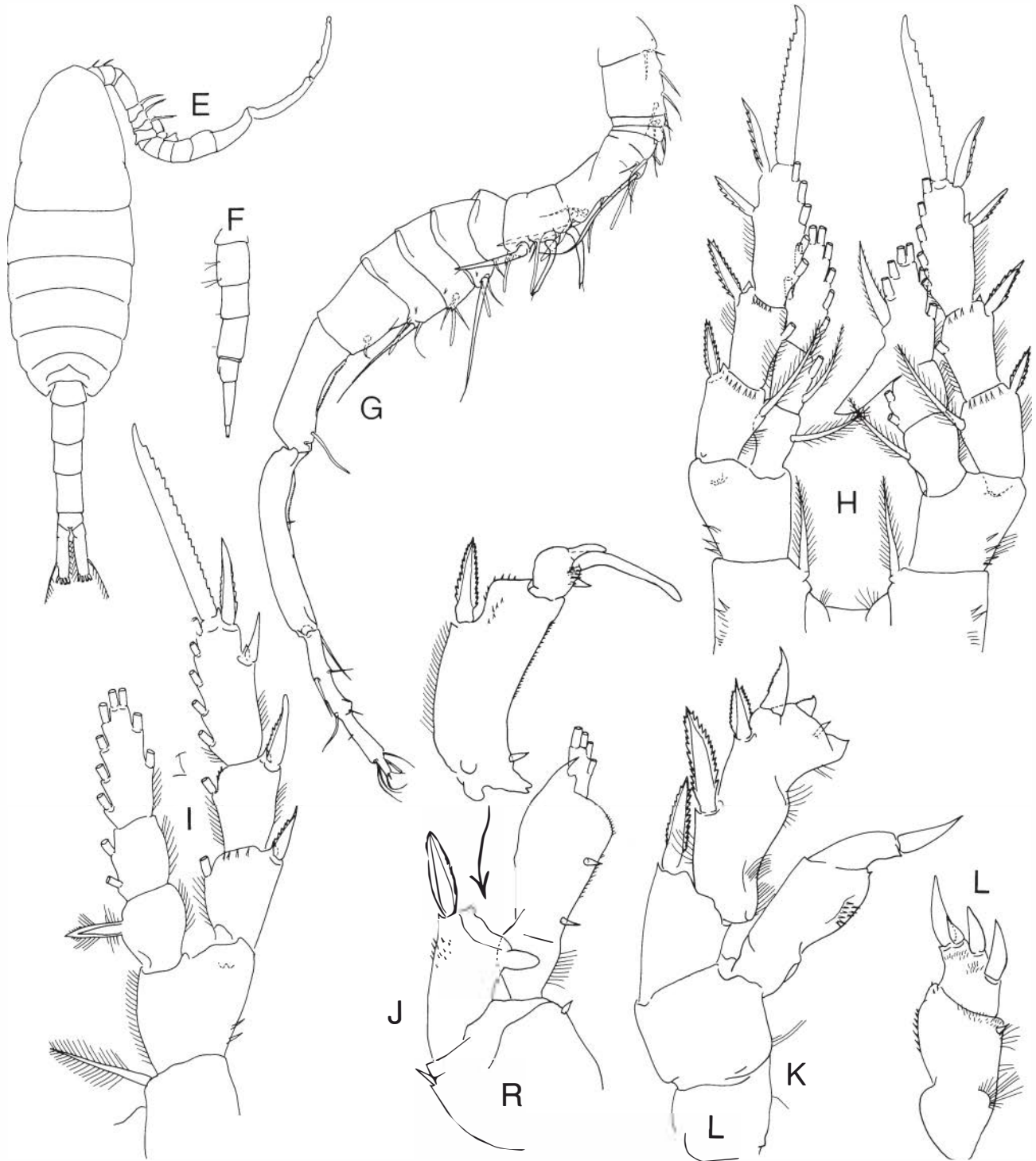


Fig. 100. *Gladioferens pectinatus* from Stn A25.6.63. Female. A, dorsal view; B, anterior urosome, ventral view; C, leg 4; D, leg 5. Male (facing page). E, dorsal view; F, urosome, lateral view; G, right antenna 1; H, leg 2; I, leg 3; J, right leg 5; K, left leg 5; L, left leg 5 endopod.



towards the ends of the series; on any one specimen there are more spines in left row (mean of 12) than in right row (mean of 10); also on ventral surface of genital segment, posterior to 2 curved rows of spines, there are 2 large spines, one on each side of genital operculum, left spine is longer than right spine. Urosome segment 2 has a curved ventral slit on left side only, and

lacks ventral spines. Urosome segments 2 and 3 both bear a row of dorsal spines along their posterior margins; also segment 3 has 2 curved ventral slits on anterior margin, one on either side of median line in front of egg-sac attachment plate. Caudal rami are approximately 3 times as long as their maximum width, and only two-thirds as long as urosome segments 3



and 4 combined. Leg 4 basipod 1 with inner spines unequally developed; on the left it is smooth, strongly developed, with fine teeth, bent outwards at one-fifth of its length from its distal extremity, reaching beyond distal extremity of endopod segment 2; right spine short, straight, with a cluster of spinules confined to its distal extremity. Leg 5 exopod segment 2 inner edge spine curved, bearing teeth. (Bayly 1963)

Male: Proportions of caudal rami similar to female. Leg 2 with a large spine on proximal inner edge of left endopod segment 3, inclined at an angle of about 60° to long axis of endopod, so as to point proximally; this, and the spine-like seta immediately distal to it and approximately equal in length, are at right angles to each other; there is a third spine-like seta on the inner edge of this segment similar to the second seta; remaining setae normal. Leg 3 asymmetrical with respect to inner-edge seta on left endopod segment 1; this is a stout spine less than half as long as normal seta on right. Leg 4 also has a variable degree of asymmetry in left endopod segment 1 inner-edge seta. Leg 5 with 2 jaw-like projections on inner edge of right exopod at junction of segments 1 and 2; extremity of distal projection is variable in form, usually tapering to a single point, but quite often bifid (a 3-pronged specimen has been observed); there is a single spine immediately distal to this projection; right exopod segment 3 has a single outer spine extending about one-third of length along claw, this spine is stout and close to claw, and sometimes difficult to see as a separate entity; to the inside of the claw is a variable number of small spines. Right leg 5 endopod is indistinctly 2-segmented, extending almost to end of exopod segment 2, and terminating in 4 setae; the broadest part of segment 1 is almost at its distal extremity. Distal segment of leg 5 left exopod has 3 spines on its outer edge, and a short spine at the outer distal corner, the inner distal corner is squarish and tooth-like. Left leg 5 endopod distinctly or indistinctly 2-segmented with 4 conspicuous terminal spines, spines 1 and 4 numbered from outside, of subequal size and length, spine 2 is the smallest of the 4 spines. (Bayly 1963)

REMARKS: Bayly (1963) revised the description of this species and determined that Brady's (1899) species is the senior synonym of *G. brevicornis* Henry, 1919 and *G. subsalaria* Percival, 1937. A few differences were noted between Bayly's revised description and the New Zealand specimens. The present specimens have long conspicuous lateral fine hairs on urosome segments 2 and 3 and additional smaller hairs on lateral borders of metasome, anal segment, and caudal rami. The structures referred to as "slits" on female urosome segments 2 and 3 appear to be thickened, raised ridges on segment 3, and on segment 2, the outline of a raised

bump. Female right leg 4 inner edge spine on basipod 1 is plumose along its whole length.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Brady (1899) (as *Centropages*); Henry (1919); Dakin and Colefax (1940) (both as *G. brevicornis*); Percival (1937) (as *G. subsalaria*); Jillett (1971).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
AUZ E	0-5	2 males
AUZ F	0-3.5	6 females, 4 males

DISTRIBUTION: This species has been taken only in open water euryhaline situations in New Zealand and the east coast of Australia from Tasmania to Queensland in the Brisbane River (Bayly 1963; Jillett 1971).

*Gladioferens symmetricus* Bayly, 1963  
(Figs 101, 181, 192)

DESCRIPTION: Size: female 1.65 mm, male 1.19 mm.

Female: Genital segment swollen halfway along its length, subcircular in dorsal view, generally smooth and lacking prominent spines; there is a row of approximately 15 short spines on right side only, just anterior to region of maximum width; there are 2 rows and 2 patches of small spines on ventral side of genital segment, anterior to operculum, and close to slight bulges. Urosome segment 2 with 2 ventral ridges slightly anterior to midlength; segment 3 approximately as long as segment 2, distinctly shorter than anal segment and with the egg-sac attachment plate situated mid-ventrally immediately behind anterior margin, plate is lobed around periphery and finely sculptured as in other species. All urosome segments are smooth dorsally. Caudal rami are approximately 2.5 times as long as their maximum width. Leg 4 fully symmetrical with inner edge seta on basipod 1 not thicker than endopod setae. Leg 5 exopod segment 2 with proximal part of inner distal spine closely adpressed to inner border of exopod segment 3 as far as insertion of proximal inner seta; beyond this the spine curves inwards and tapers to a sharp point. (Bayly 1963)

Male: Urosome segment 2 with a curved latero-ventral slit anteriorly on left; segment 3 with a prominent ventrolateral outgrowth anteriorly on right side, this outgrowth is subcylindrical proximally and tapers distally to terminate in an axial spine at the base of which is a fine spine. Caudal rami are of a similar proportion to the female. Legs 1-4 completely symmetrical. Leg 5 with right basipod 2 broad and pro-

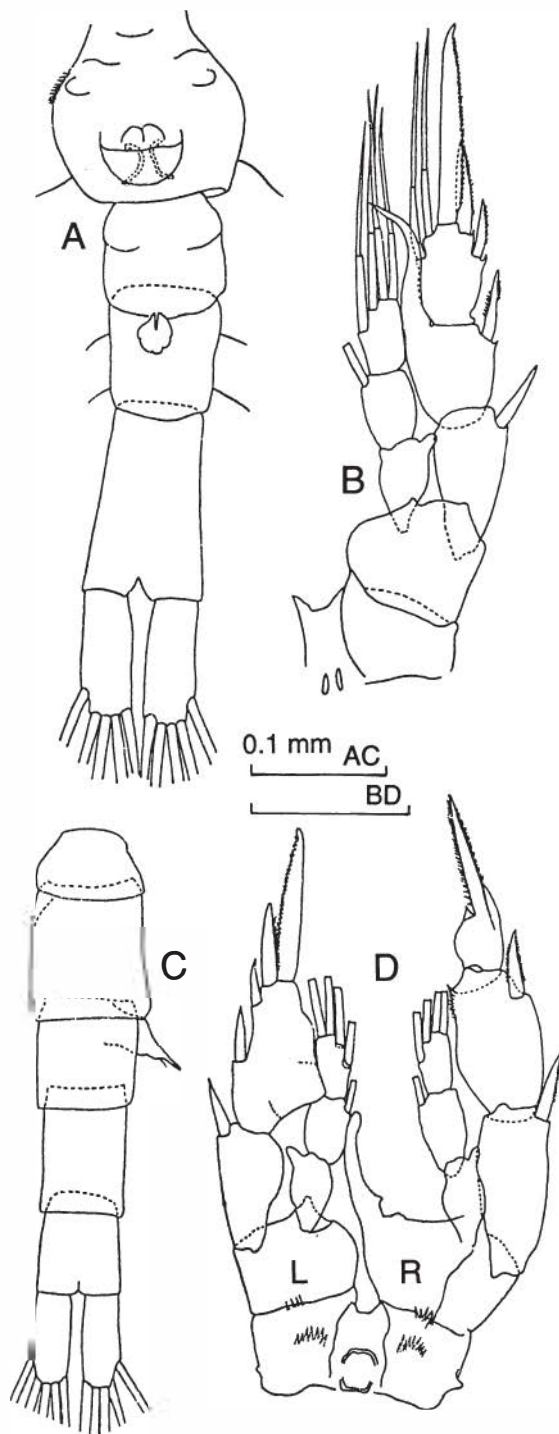


Fig. 101. *Gladioferens symmetricus* from Bayly (1963). Female. A, urosome, ventral view; B, leg 5. Male. C, urosome, dorsal view; D, leg 5.

duced at inner distal corner into a long process extending almost to distal border of left endopod segment 2. Right exopod segment 1 without an inner distal projection; segment 3 with a single outer spine which is closely adpressed to the long claw along which it

extends for one-quarter of its length, and a short stout inner distal spine. Both endopods of leg 5 are 3-segmented and almost identical to those of female leg 5. Left exopod segment 2 of leg 5 with a long terminal spine, proximal inner half of this segment with a blunt outgrowth close to junction of endopod segments 2 and 3. (Bayly 1963)

REMARKS: This species has a number of primitive features and is placed in its own subgenus by Bayly (1963).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bayly (1963); Nyan Taw (1978).

NEW RECORDS: Nil.

DISTRIBUTION: Euryhaline species in Queensland, New South Wales, and Victorian (Australia) coastal waters (Bayly 1963). In Australia this species was nearly always taken with *G. pectinatus*.

#### *Isias* Boeck, 1865

DEFINITION: As for the family with the following additional characters. Exopod segment 3 of legs 2–4 with 3 outer edge spines. Female leg 5 basipod 2 ornamented with a large distal spine, exopod segment 2 with a medium, curved inner edge spine, exopod segments 2 and 3 may be fused; endopods 1-segmented, with a variable number of setae. Male leg 5 with basipod 2 usually ornamented asymmetrically with large spines or projections; left exopod 2-segmented, segment 1 with 1 outer edge spine, segment 2 with a variable number of spines; endopods reduced or absent; right exopod 2-segmented, segment 1 with 1 outer edge spine, segment 2 may or may not be expanded with 3 outer edge spines and 1 terminal spine.

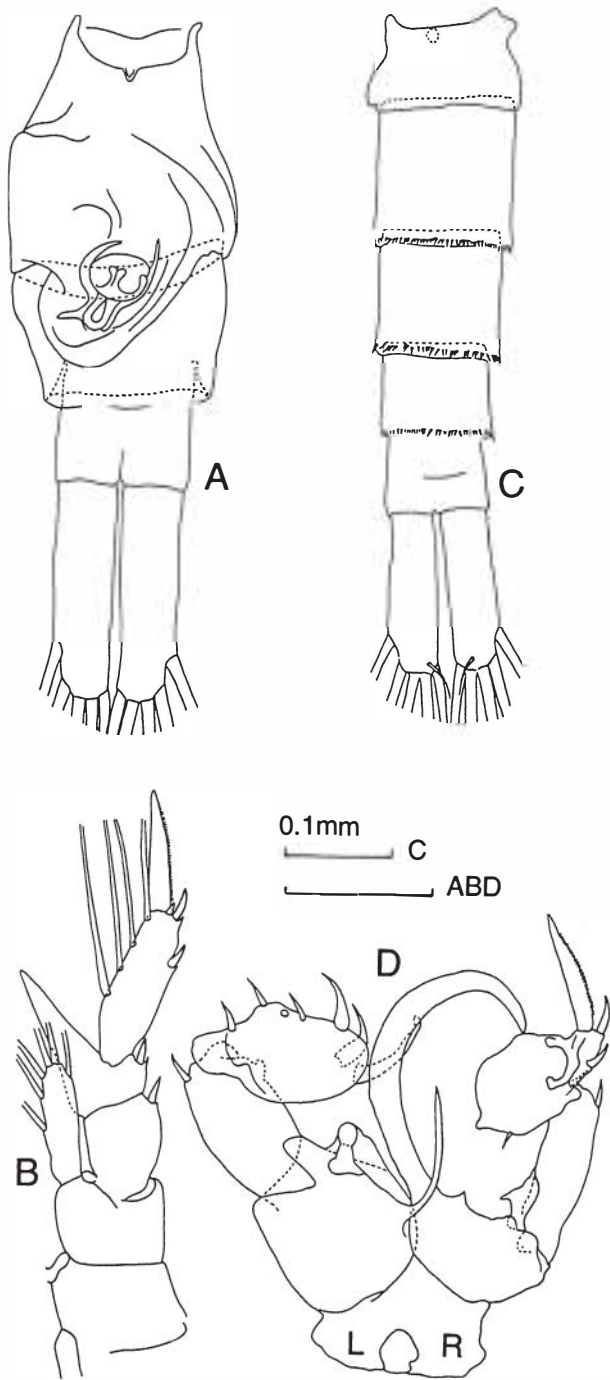
(Sars 1903; Bayly 1964; Pillai 1975)

TYPE SPECIES: *Isias clavipes* Boeck, 1865

REMARKS: Four species have been described: *I. clavipes* from the north Atlantic, *I. tropica* Sewell, 1924 from Chilka Lake, Bay of Bengal, *I. uncipes* Bayly, 1964 from the Brisbane River mouth, Australia, and *I. cochinchensis* Pillai, 1975 from Cochin Backwater, India. The following species has been taken in the Southwest Pacific.

*Isias uncipes* Bayly, 1964 (Figs 102, 181, 192)

DESCRIPTION: Size: females: 1.53 mm, males: 1.57 mm.



**Fig. 102.** *Isias uncipes* from Bayly (1963). Female. **A**, urosome, ventral view; **B**, leg 5. Male. **C**, urosome, dorsal view; **D**, leg 5.

Female: Genital segment about as long as segments 2 and 3 combined, produced posteriorly into a broad tongue-like flap, twisted to right, extending 0.7 times the distance from anterior to posterior edge of segment 2 and overlying much of its ventral surface; posterior margins of segments 2 and 3 smooth; caudal rami about 3.5 times as long as wide. Leg 5 exopod typical of the

family in general structure, inner process from segment 2 larger than in type species, segment 3 with 4 inner setae, 2 terminal spines, and 1 outer spine as in type species and genus. Endopod 1-segmented but with a slight constriction on inner edge at about one-quarter the length from proximal attachment of exopod segment 3, usually bearing a total of 6 setae (3 inner, 2 terminal, 1 outer) but sometimes an additional inner seta is present proximal to the slight constriction.

(Bayly 1964)

Male: Urosome segments 2–4 with a row of irregular spines along posterior margin, those of segments 3 and 4 down to ventrolateral region but leaving midventral region smooth, those of segment 2 terminating laterally; caudal rami about 3.5 times as long as wide. Right antenna 1 21-segmented, hinged between segments 18 and 19, segments 17–21 armed with rows of small teeth. Leg 5 left and right basipod 1 segments fused. The right basipod 2 is produced at the inner distal corner into a huge recurved hook which is curved outwards. A vestigial endopod in the form of a small unsegmented structure with a proximally pointing hook is present at base of exopod. Right exopod is 2-segmented; segment 1 about 3 times as long as wide and with a single spine near outer distal corner; segment 2 of complex shape, its long axis inclined at an angle of 30° to that of segment 1 and apparently attached to the inner distal corner of the segment 1 half-way along its outer edge, distal half of segment with 2 outer spines and 2 terminal spines of unequal size, larger terminal spine is serrated along outer edge. Left basipod 2 with a long styliiform process arising from inner anterior proximal corner. Left exopod is 2-segmented; segment 1 with a single spine at outer distal corner; segment 2 is bent back on to inner edge of segment 1, with 6 spines, 4 on outer edge, 1 subterminal and 1 on posterior face just short of distal extremity, distal outer spine is much stouter than the remaining 3, subterminal claw-like spine has a sharp angular bend, posterior spine has a right-angle bend. A vestigial left endopod is present near inner junction of exopod and basipod 2 on its anterior face; it is constricted or segmented about half-way along its length, with its distal half forming a small subspherical knob.

(Bayly 1964)

**REMARKS:** This species is found in brackish waters at lower latitudes (mouth of the Brisbane River) and appears to be more plentiful close to the bottom (Bayly 1964).

**PREVIOUS SOUTHWEST PACIFIC RECORDS:** Bayly (1964), Greenwood (1977).

**NEW RECORDS:** Nil.

DISTRIBUTION: This species is an estuarine form taken at the mouth of the Brisbane River (Bayly 1964).

*Parathalassius* Dussart, 1986

DEFINITION: As for the family with the following additional characters. Urosome 4-segmented in female, 5-segmented in male. Antenna 1 24-segmented in female and on the left in male; on the right male antenna 1 is 22-segmented. Legs 1–4 have a 3-segmented endopod with segment 3 supplied with external setae. Leg 5 of male and female biramous and each ramus is 3-segmented; male legs 5 is hardly modified compared with other swimming legs. (Dussart 1986)

TYPE SPECIES: *Parathalassius fagesi* Dussart, 1986

REMARKS: This genus is nearest to the freshwater genera *Pseudoboeckella* and *Hemiboeckella* but the primitive character of leg 5 seems to make this genus the most primitive of all known Centropagidae (Dussart 1986). The only known species is *P. fagesi* Dussart, 1986 which is found in brackish water near the mouth of the La Foa river in New Caledonia.

*Parathalassius fagesi* Dussart, 1986  
(Figs 103, 181, 192)

DESCRIPTION: Size: females: 0.7–0.78 mm, male: 0.62 mm.

Female: As for the family and generic descriptions with the following additional characters. Genital segment is slightly swollen and pear-shaped, with dorsal and lateral hairs. Urosome segments 2 and 3 with spinules along the posterior borders, dorsally and laterally. Caudal rami 5 times as long as wide, lateral setae placed approximately at midlength. Antenna 1 extends to the middle of pedigerous segment 5; its last segment is relatively long. Maxillipeds slender and long. Leg 1 basipod 2 without a seta, exopod segments 1–3 with 1, 0, 1 outer edge spines respectively, exopod segment 3 with 1 terminal spine and 3 inner edge setae. Exopod segment 3 of legs 2–4 with 2 outer edge spines. Endopod segment 3 of legs 2–4 with 7 setae. Female leg 5 basipod 2 with inner distal spinules; exopod segment 1 with an outer edge spine, segment 2 with an outer edge spine and inner distal spiniform process which is directed distally, segment 3 with 2 outer edge spines, a long terminal spine and 2 inner edge setae; endopod segment 3 with 4 setae. (Dussart 1986)

Male: As for the family and generic descriptions with the following additional characters. Pedigerous segments 4 and 5 partially fused dorsally. Urosome segments 2–4 with their posterior borders decorated

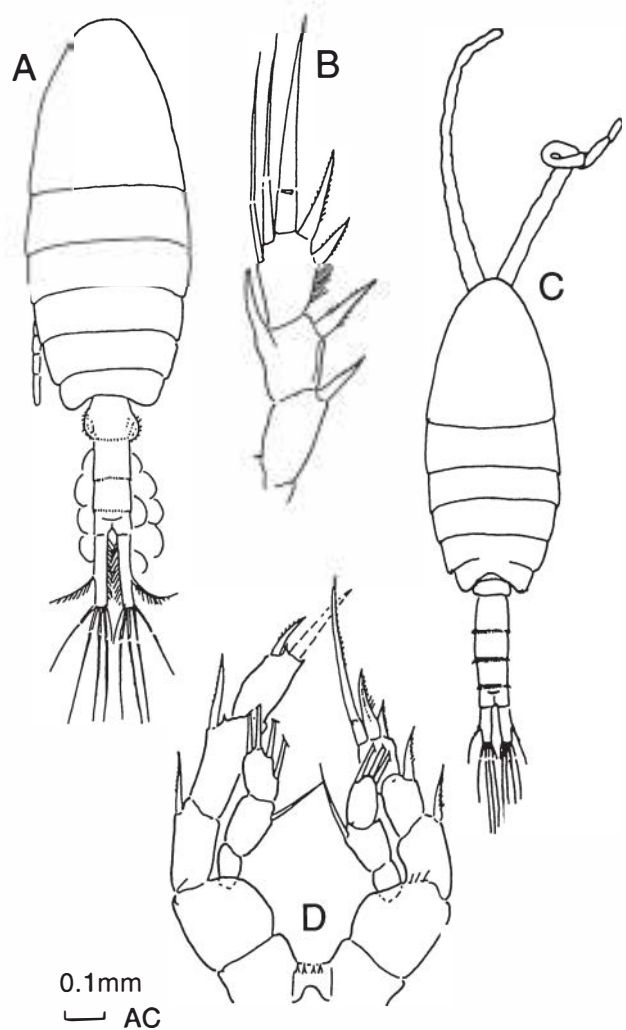


Fig. 103. *Parathalassius fagesi* from Dussart (1986). Female. A, dorsal view; B, exopod of leg 5. Male. C, dorsal view; D, leg 5.

with spinules. Caudal rami about 3 times as long as wide. Right antenna 1 appears to be 22-segmented, geniculated between segments 18 and 19. Leg 5 slightly asymmetrical, a little more developed on right than on left. (Dussart 1986)

REMARKS: The mouthparts of this species have not been described in detail.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Dussart (1986).

NEW RECORDS: Nil.

DISTRIBUTION: Known only from brackish water near the mouth of the La Foa River in New Caledonia (Dussart 1986).

Family PSEUDODIAPTOMIDAE Sars, 1902

DEFINITION: Female: Small copepods slightly over 1 mm. Usually with a characteristic eye composed of a pigmented spot surrounded by a refractile lens. Head and pedigerous segment 1 fused or separate, pedigerous segments 4 and 5 fused or separate; posterior metasomal corners may be rounded or variously decorated with large posterior spines or rows of spinules. Head with a pair of rostral filaments. Urosome 2-4-segmented, may be asymmetrical; genital segment variable (symmetrical, asymmetrical, ornamented with spines and/or spinules, or undecorated); caudal rami tend to be elongate and may be asymmetrical. Antenna 1 symmetrical, usually 22-segmented (24-segmented in *Archidiaptomus*, 21-segmented in the *hyalinus* group of Pseudodiaptomidae). Antenna 2 exopod slightly longer than endopod, endopod with fusion between segments and with basipod 2. Mandible blade with numerous small teeth. Maxilla 1 usually with inner lobe 1 with 15 spines and setae, inner lobes 2 and 3 with 3 setae each, basipod 2 with 5 setae, endopod segments 1-3 with 4, 4, 5 setae respectively, exopod with 10 setae, outer lobe 1 with 10 setae. Maxilla 2 inner lobes 1-5 with 4, 3, 3, 3, 3 setae respectively. Maxilliped squat, basipod 1 with 2, 3, 4 setae, one of the terminal group enlarged into a spine; basipod 2 bordered by spinules and 3 setae; endopod 4-segmented carrying 2-4 characteristic setiform bristles (2 on segment 1 and 1 each on segments 2 and 3). Swimming legs biramous, with 3-segmented rami; basipods 1 and 2 often decorated with spinules on anterior, posterior and lateral surfaces, also sometimes on anterior surfaces of endopods and exopods. Spine and setae formula as follows:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0-1	0-0	I-1; 0-1; 0/II, I, 3	0-1; 0-1; 1, 2, 2/3
Leg 2	0-1	0-0	I-1; I-1; II, I, 5	0-1; 0-2; 2, 2, 4
Leg 3	0-1	0-0	I-1; I-1; II, I, 5	0-1; 0-2; 2, 2, 4
Leg 4	0-1	0-0	I-1; I-1; II, I, 5	0-1; 0-2; 1/2, 2, 4

Female leg 5 uniramous or biramous (*Archidiaptomus*), may be slightly asymmetrical; basipods 1 and 2 separate, basipod 2 usually with a posterolateral seta; exopod 3-segmented (the terminal 2 segments are fused in *Archidiaptomus*). Ovisacs present.

Male: Body of similar form to female, urosome 5-segmented. Antenna 1 asymmetrical; left 22- or 24-segmented; right with 20-21 segments, geniculate between segments 18 and 19; terminal part beyond the joint can have from 2 to 4 segments. Mouthparts similar to those of female. Leg 5 uniramous or biramous, asymmetrical; exopods 2- or 3-segmented; spines, exo-

pod segments, and endopods, if present, variously modified into organs which appear to be adapted for clasping. (Madhupratap & Haridas 1978; Nishida 1985; Walter 1986)

REMARKS: Sars (1902) proposed the family Pseudodiaptomidae to include *Pseudodiaptomus* Herrick and *Poppella* Richard but did not define it. The above definition has been created from a definition of *Pseudodiaptomus* (Walter 1986), and of *Archidiaptomus* (Madhupratap & Haridas 1978). This family contains the genera: *Archidiaptomus* Madhupratap & Haridas, 1978; *Calanipeda* Krichagin, 1873; and *Pseudodiaptomus* Herrick, 1884. Pseudodiaptomidae are probably herbivores; *P. marinus* are able to graze on particles 2.8-63.3 µm diameter (Uye & Kasahara 1983).

*Archidiaptomus* Madhupratap & Haridas, 1978

DEFINITION: As for the family definition with the following additional characters. Head and pedigerous segments 1 and 2, and pedigerous segments 4 and 5 fused. Female urosome 4-segmented, genital segment symmetrical, with small anterolateral swellings, decorated with spinules. Antenna 1 24-segmented. Swimming leg 1 exopod segment 3 without outer edge spines, endopod segment 3 with 6 setae. Female leg 5 biramous, symmetrical; endopod 1-segmented with a terminal claw-like process at the tip; exopod segment 1 with a single long outer spine, exopod segment 2 with 4 spines, terminal one the longest. Male leg 5 biramous, asymmetrical; endopods on both sides extending to middle of exopod segment 2; left exopod segment 1 with an outer distal spine and a longer curved inner spine, exopod segment 2 with a long proximal spine and the segment terminates in 2 claw-like spines; right leg exopod segment 2 with an inner spinule and an outer spine, segmentation between exopod segments 2 and 3 indistinct, the latter forms a long spine with a proximal inner spinule.

(Madhupratap & Haridas 1978)

TYPE SPECIES: *Archidiaptomus aroorus* Madhupratap, 1978

REMARKS: The only species in this genus is found in brackish water on the western coast of India.

*Calanipeda* Krichagin, 1873

*Poppella* Richard, 1888

DEFINITION: As for the family with the following



additional characters. Anterior body slender and elongate, head and pedigerous segment 1 separate, pedigerous segments 4 and 5 fused with posterior border rounded. Urosome 4-segmented in female, 5-segmented in male, caudal rami 6–7 times as long as wide with 5 well-developed setae; female genital segment swollen anteriorly with left side extended into a curved hook directed posteriorly and carrying a sensory spine. Antenna 1 25-segmented, segment 25 is small, and extends to posterior border of urosome segment 2. Male antenna 1 prehensile on right without either a hook nor hyaline lamella on three last segments. Antenna 2 exopod 6-segmented. Swimming legs 1–4 with 3-segmented exopods and endopods. Female leg 5 slightly asymmetrical, without endopods; exopod 3-segmented, exopod segment 2 with a strong inner spine, a strong, distal, spiniform extension, and at its base a small strong spine; exopod segment 3 in the form of a powerful hook, curved inwards with a strong internal spine and a small spiniform extension at its base. Male leg 5 basipod 2 large on right with a short seta at postero-internal angle; exopod 3-segmented, exopod segment 1 slightly elongate with a moderate spine on postero-external angle; the two last segments of exopod form a powerful hook; exopod segment 2 strongly curved towards exterior and with a long extension and with a short slender marginal seta at midlength; exopod segment 3 thin, long, and pointed terminally with a fine seta on its external border; endopod 1-segmented extending to distal border of exopod segment 1 and armed with small spines and some terminal hairs. Left leg 5 much shorter than right; exopod 2-segmented; exopod segment 1 with an elongate spiniform extension at antero-external angle reaching the distal end of exopod segment 2 which is large, conical, and terminated by two subequal points; endopod 1-segmented, enlarged distally, reaching the base of exopod segment 2, carrying at its extremity small unequal spines. (Dussart 1967)

TYPE SPECIES: *Calanipeda aquaedulcis* Krichagin, 1873

REMARKS: This is a monotypic genus. *Poppella guernei* Richard, 1888 is a junior synonym of the type species. Generally a freshwater form but may be found in brackish water in the Mediterranean region (Dussart 1967).

### *Pseudodiaptomus* Herrick, 1884

*Heterocalanus* T. Scott, 1894b  
*Weismannella* F. Dahl, 1894  
*Schmackeria* Poppe & Richard, 1890  
*Mazellina* Rose, 1957

DEFINITION: As in the family definition but with the following additional characters. Head and pedigerous segment 1 fused or separate, pedigerous segments 4 and 5 fused, posterior prosomal corners often extended into points. Female urosome 2–4-segmented, genital segment variously ornamented, may be asymmetrical. Female leg 5 uniramous with 3-segmented exopods; in posterior view— basipod 2 with one large and one small surface seta; exopod segment 1 with a distal outer spine and two surface setae; exopod segment 2 with one medial seta produced into a spiniform process which is plumose or spinulose along both margins, and an outer small naked or plumose spine; exopod segment 3 spiniform, distally produced, usually equal in length or longer than exopod segment 2 spiniform process, with both margins hairy, also with a proximo-medial, spiniform process. Male leg 5 uniramous or biramous; posterior view— right leg basipod 1 with a subapical spinule row; basipod 2 with one large plumose seta and at least one small surface seta; exopod segments 1–3 each with at least one small surface seta, exopod segment 1 with an outer spine, exopod segment 3 proximally thickened with a medial basal swelling or process, concavely produced, and distal half of medial margin hairy, with 1–2 setae; left leg basipods 1 and 2 as on right leg; with or without an endopod; exopod segment 1 with at least one surface seta and variably shaped; exopod segment 2 with several surface setae, outer spine near midlength, and typically with a terminal spine; in anterior view: right leg basipod 1 with a hair or spinule row; basipod 2 possesses lateral spinule row that continues onto surface at midlength, and usually with an endopod; exopod segment 2 with variably shaped outer spine; left leg basipods 1 and 2 ornamented as on the right.

(Walter 1986)

TYPE SPECIES: *Pseudodiaptomus pelagicus* Herrick, 1884

REMARKS: The following species have been described: *Pseudodiaptomus acutus* (F. Dahl, 1894 as *Weismannella*); *P. andamanensis* Pillai, 1980; *P. annandalei* Sewell, 1919 (= *P. dubius* Kiefer, 1936, = *P. nostradamus* Brehm, 1934); *P. ardjuna* Brehm, 1953b; *P. aurivilli* Cleve, 1901; *P. australiensis* Walter, 1987; *P. batillipes* Brehm, 1954; *P. baylyi* Walter, 1984; *P. binghami* Sewell, 1912; *P. bispinosus* Walter, 1984; *P. bowmani* Walter, 1984; *P. brehmi* Kiefer, 1938; *P. bulbosus* (Shen & Tai, 1964); *P. bulbiferus* (Rose, 1957b as *Mazellina*) (male unknown); *P. burckhardti* Sewell, 1932; *P. caritus* Walter, 1986; *P. charteri* Grindley, 1963; *P. clevei* A. Scott, 1909; *P. cokeri* Gonzalez & Bowman, 1965; *P. colefaxi* Bayly, 1966; *P. compactus* Walter, 1984; *P. cornutus* Nicholls, 1944; *P. cristobalensis* Marsh, 1913; *P. culebrensis* Marsh, 1913; *P. daughlishi* Sewell, 1932 (= *P. beieri* Brehm, 1951b);

*P. diadelus* Walter, 1986; *P. euryhalinus* Johnson, 1939; *P. forbesi* (Poppe & Richard, 1890 as *Schmackeria*); *P. galapagensis* Grice, 1964; *P. galletti* (Rose, 1957a as *Mazellina*); *P. gracilis* (F. Dahl, 1894 as *Weismannella*); *P. griggae* Walter, 1987; *P. hessei* (Mrázek, 1894); *P. heterothrix* Brehm, 1953a; *P. hickmani* Sewell, 1912; *P. hypersalinus* Walter, 1987; *P. incicus* Shen & Lee, 1963; *P. inflatus* (Shen & Tai, 1964); *P. inflexus* Walter, 1987; *P. inopinus* Burckhardt, 1913; var. *saccupodus* (Shen & Tai, 1962) (= *P. japonicus* Kikuchi, 1928); *P. ishigakiensis* Nishida, 1985; *P. jonesi* Pillai, 1970 (see also Madhupratap, 1989); *P. lobipes* Gurney, 1907; *P. longispinosus* Walter, 1989; *P. malayalus* Wellershaus, 1969; *P. marinus* Sato, 1913 (see also Grindley 1969); *P. marshi* Wright, 1936; *P. masoni* Sewell, 1932; *P. mertoni* Früchtl, 1923; *P. mixtus* Walter, T.C. 1994; *P. nankauriensis* Roy, 1977; *P. nihonkaiensis* Hirakawa, 1983; *P. nudus* Tanaka, 1960; *P. occidentalis* Walter, 1987; *P. ornatus* (Rose, 1957b as *Mazellina*) (male unknown); *P. pacificus* Walter, 1986; *P. panamensis* Walter, 1989; *P. pankajus* Madhupratap & Haridas, 1992; *P. pauliani* Brehm, 1951a; *P. pelagicus* Herrick 1884 (= *P. americanus* Wright, 1937, = *P. coronatus* Williams, 1906); *P. penicillus* Li Shaojing & Hiang Jiaqi, 1984; *P. philippinensis* Walter, 1986; *P. poplesia* (Shen, 1955) (as *Schmackeria*); *P. poppei* Stingelin, 1900; *P. richardi* (F. Dahl, 1894 as *Weismannella*); *P. salinus* (Giesbrecht, 1896) (as *Schmackeria*); *P. serricaudatus* (T. Scott, 1894b as *Heterocalanus*); *P. sewelli* Walter, 1984; *P. smithi* Wright, 1928; *P. spatulatus* (Shen & Tai, 1964); *P. stuhlmanni* Poppe & Mrázek, 1895 (= *P. charteri* Grindley, 1963); *P. tollingeriae* Sewell, 1919; *P. trihamatus* Wright, 1937; *P. trispinosus* Walter, 1986; *P. wrighti* Johnson, 1964.

Most of these species are epibenthic rising into the water column at night (Madhupratap & Haridas 1989) in brackish to saltwater to saline environments. The following species have been taken in the Southwest Pacific. It appears that Australian species belong to the *hyalinus* and *ramosus* groups of Walter (1986).

***Pseudodiaptomus baylyi* Walter, 1984**

(Figs 104, 181, 193)

DESCRIPTION: Size: females: 1.17 mm, males: 0.94 mm.

Female: As in the family and generic definitions with the following additional characters. Head and pedigerous segment 1 fused, pedigerous segments 4 and 5 fused with an additional pair of small postero-dorsal spines. Urosome genital segment with a small process on each posteroventral corner and genital boss is guarded by a pair of long stout spines; caudal rami about 6 times longer than wide. Antenna 1 21-segmented. Leg 1 basipod 2 with a lateral spinule row. Leg 5 basipod 2 and exopod segment 1 with lateral spinule rows; exopod segment 2 more than half the

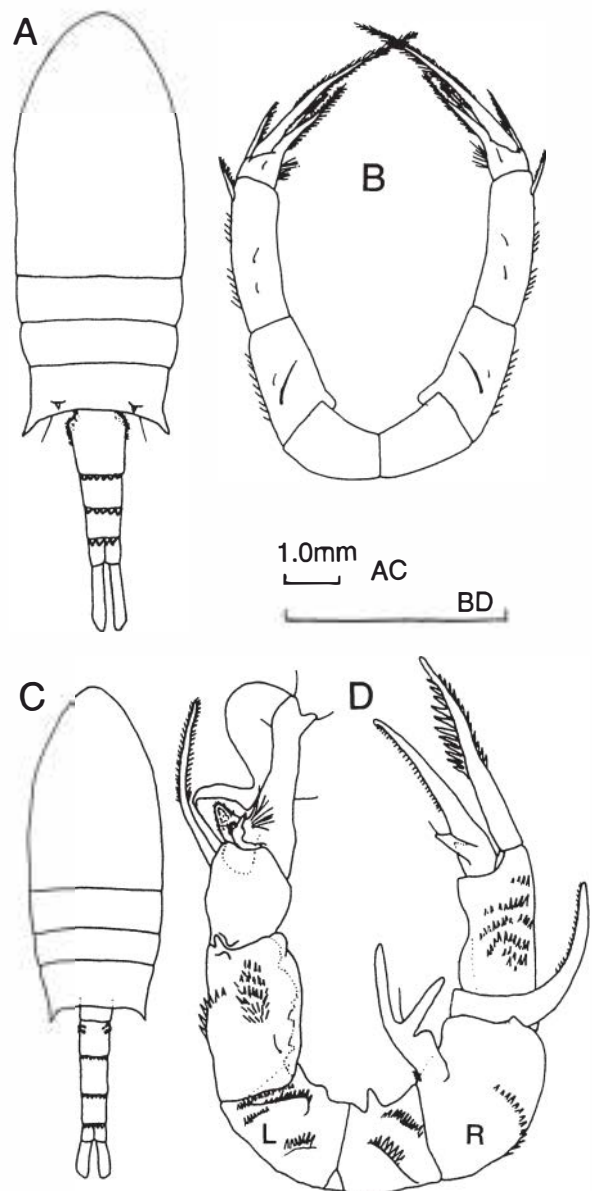


Fig. 104. *Pseudodiaptomus baylyi* from Walter (1987). Female. A, dorsal view; B, leg 5. Male. C, dorsal view; D, leg 5, anterior view.

length of exopod segment 3 with medial tuft of fine hairs. (Walter 1987)

Male: As in the family and generic definitions with the following additional characters. Head and pedigerous segment 1 fused, pedigerous segments 4 and 5 fused. Caudal rami 3 times longer than wide. Leg 5 posterior view— right leg basipod 1 with a small projection; exopod segment 1 produced into 2 spiniform processes: the smaller medially directed process (not visible in anterior view: Fig. 104D) with a seta is shorter than the medially hirsute distolateral process; exopod segment 2 with a large outer spine strongly serrate on



medial margin and weakly serrate on outer margin. Left leg 5 basipod 2 medially sculptured with fine hairs along a groove; exopod segment 2 proximolateral lobe overlaps exopod segment 1, lateral hyaline plate deeply incised. Leg 5 anterior view— right leg endopod distally bifid at midlength, with terminal point the longest. Left leg exopod segment 2 with an irregularly shaped hirsute spiniform process at the proximolateral corner. (Walter 1987)

REMARKS: Walter (1984) placed this species in the *hyalinus* group and the *trihamatus* subgroup.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bayly (1966); Greenwood (1977) (as *P. aurivilli*).

NEW RECORDS: Nil.

DISTRIBUTION: Apparently confined to neritic waters of the northeastern coasts of Australia from the Northern Territory south to Moreton Bay (Walter 1987).

*Pseudodiaptomus colefaxi* Bayly, 1967  
(Figs 105, 181, 193)

DESCRIPTION: Size: females: 1.28–1.38 mm, males: 1.12–1.16 mm.

Female: As in the family and generic definitions with the following additional characteristics. Head and pedigerous segment 1 separate, pedigerous segments 4 and 5 fused and extended into divergent points. Urosome segments 1–3 with large areas of fine spinules on dorsal and lateral surfaces; urosome segment 3 longer than segment 2. Antenna 1 with spinules on ventral surface of segment 1. Leg 5 exopod segment 1, 3 times as long as wide; exopod segment 2 longer than exopod segment 3. (Bayly 1966)

Male: As in the family and generic definitions with the following additional characters. Urosome segments 2–4 with large areas of fine spinules on dorsal and lateral surfaces, caudal rami about 3 times as long as maximum width. Leg 5 generally well-ornamented with spines and hairs; right leg: basipod 2 with an inner bifurcate process (endopod), each branch may be bifurcate; exopod segment 1 with a small and large spine distolaterally, long spine extends as far as the distal border of exopod segment 2, posterior surface with patch of spinules; exopod segment 2 elongate with a distolateral plumose seta and patch of spinules; exopod segment 3 claw-shaped with an inner spine on a protuberance, 2 small setae, and a row of inner distal hairs. Left leg: endopod extends two-thirds the length of exopod segments 2+3, with an inner proximal patch of hairs; exopod segment 1 produced into a long curved

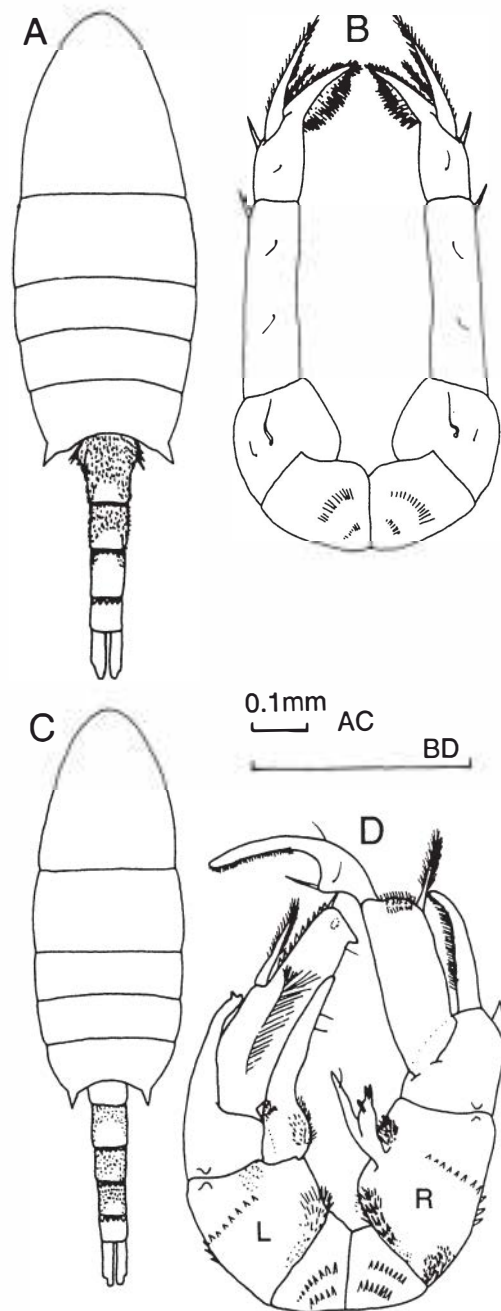


Fig. 105. *Pseudodiaptomus colefaxi* from Walter (1987). Female. A, dorsal view; B, leg 5. Male. C, dorsal view; D, leg 5, anterior view.

distolateral process which extends just short of the midlength plumose seta on exopod segments 2+3; exopod segments 2+3 subrectangular in shape with an outer plumose seta at midlength, a row of outer edge distal spines, inner distal corner notched, surface with fine setae and a row of hairs on anterior surface.

(Bayly 1966)

PREVIOUS SOUTHWEST PACIFIC RECORDS Greenwood (1977); Walter (1987).

NEW RECORDS: Nil.

DISTRIBUTION: This species appears to be confined to estuarine waters of southeastern Australia from the Brisbane River, Queensland to Western Port Bay, Victoria (Walter 1987).

*Pseudodiaptomus cornutus* Nicholls, 1944  
(Figs 106, 181, 193)

DESCRIPTION: Size: females: 1.13–1.24 mm, males: 0.93–1.10 mm.

Female: As in the family and generic definitions with the following additional characters. Body symmetrical, head and pedigerous segment 1 separate, the latter with a pair of rounded dorsolateral knobs on posterior margin; posterior prosomal corners produced into spine-like processes which extend beyond the middle of genital segment. Urosome 4-segmented; genital segment with lateral swellings, with a group of spinules on the left side; caudal rami 3 times as long as wide. Antenna 1 extends to posterior margin of genital segment. Leg 5 with exopod segment 1 elongate, exopod segment 2 has a triangular inner distal projection; the outer of the two large terminal spines on exopod segment 3 has a small middle spine fused with it at its base. (Nicholls 1944)

Male: As in the family and generic definitions with the following additional characters. Body as in the female but the dorsolateral knobs on pedigerous segment 1 less pronounced. Caudal rami of similar proportions to that of female. Right antenna 1 18-segmented and extends to posterior margin of urosome segment 2. Leg 5, when directed posteriorly, extends to middle of urosome segment 4; right basipod 1 bears two bifid spines set on small prominences at inner distal corner, endopod has the outer lamelliform plate wider than in *P. salinus*, exopod segment 3 in the form of a long, curved claw extending beyond end of left leg; left distal exopod segment is more slender than in *P. salinus* and has a rounded proximal extension directed towards the base of leg, outer spine is inserted at about midlength and segment is rounded terminally, bearing a short terminal spine. (Nicholls 1944)

REMARKS: This species is apparently related to *P. salinus*.

PREVIOUS SOUTHWEST PACIFIC RECORDS Nyan Taw (1978); Walter (1987).

NEW RECORDS: Nil.

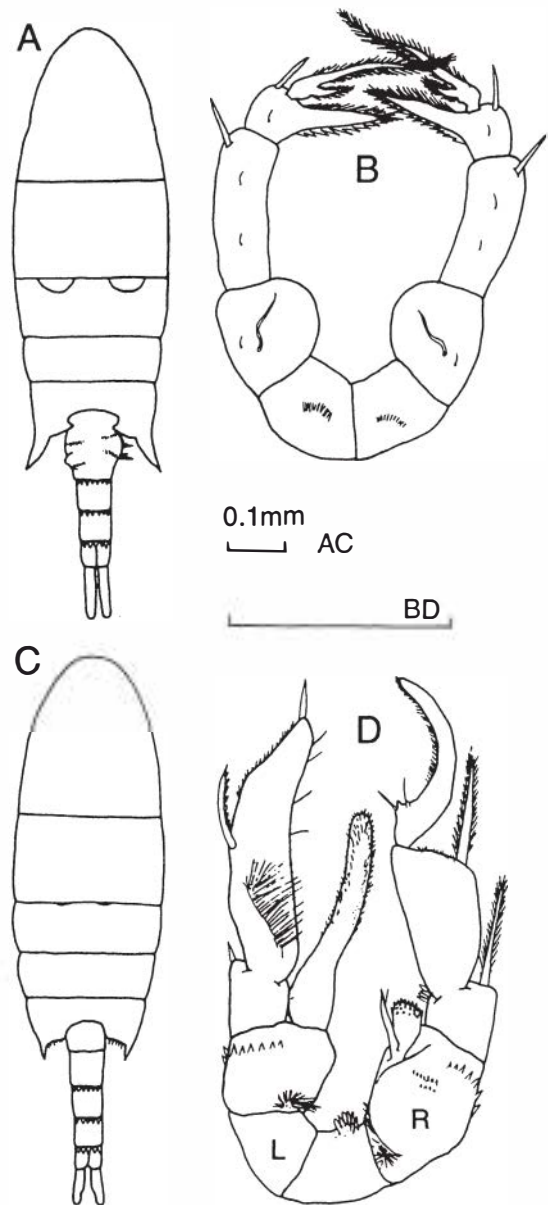


Fig. 106. *Pseudodiaptomus cornutus* from Walter (1987). Female. A, dorsal view; B, leg 5. Male. C, dorsal view; D, leg 5.

DISTRIBUTION: This neritic species is confined to cooler Australian waters from Victoria east to South Australia (Walter 1987).

*Pseudodiaptomus marinus* Sato, 1913  
(Figs 107, 181, 193)

DESCRIPTION: Size: females: 1.08–1.60 mm, males: 0.94–1.30 mm.

Female: As in the family and generic definitions with the following additional characters. Head and pedigerous segment 1 separate; posterior border of

prosome produced into sharp outwardly directed spines. Urosome 4-segmented; genital segment slightly asymmetrical with slight swellings laterally and a prominent ventral boss, a small patch of fine setae is present on each side of the segment and a fringe of stiff setae runs across the ventral surface, genital flaps prominent and there is a single seta on each side near their distal ends; urosome segments 1–3 with rows of dorsoposterior coarse teeth; caudal rami symmetrical, divergent, four times as long as wide. Antenna 1 21-segmented, extending to posterior margin of genital segment; a specialised seta armed with recurved, comb-like teeth at midlength is found on third from last segment. Antenna 2 with endopod segment 1 and basipod 2 fused, exopod 4-segmented. Maxilliped endopod segment 1 with 2 setiform bristles. Swimming legs 1–4 exopod segment 3 with 2 outer edge spines. Leg 5 symmetrical; basipod 2 with 2 small outer distal spinules and a posterior surface seta; exopod segment 1 with a distal outer spine; exopod segment 2 with an outer distal spine and segment is produced distally on inner border into a curved spiniform process, serrated medially, reaching almost to tip of terminal spine. Exopod segment 3 is spine-like and is less than half the length of third segment and bears a short serrated spine near its base. Ovisac is single.

(Grindley & Grice 1969)

Male: As in the family and generic definitions with the following additional characters. Prosome similar to that of female but tapering more posteriorly, posterior spines directed more posteriorly. Postero-dorsal margins of urosome segments 1–4 fringed with rows of coarse teeth, extending laterally on segment 2–4; caudal rami three times as long as wide. Right antenna 1 geniculate, 21-segmented; 3 free segments distal to articulation; there is a hooked spine on segment 10 and a serrated margin to segment 18. Leg 5 biramous, exopods 2-segmented, endopods 1-segmented. Right basipod 1 naked; basipod 2 larger bearing three small spinules on outer margin and posterior seta and a characteristic forked endopod; endopod with one slender, pointed ramus and one shorter, stouter ramus ending in two points; exopod segment 1 bears a few spinules on inner and margins, and on outer distal corner a "Y"-shaped bifurcate spine with a subsidiary spinule in the fork, a stout blunt spine of about half its length is at its base, the forked spine reaching beyond the base of the spine on next segment; exopod segment 2 bears a long straight partly plumose spine on distal part of outer margin and a small spinule near mid-length; terminal hook has a thickened basal portion and bears 2 small spinules. Left basipod 1 naked; basipod 2 bears a few spinules on outer margin, a posterior seta and a long, naked endopod; exopod segment 1 with a straight plumose spine on its outer

distal angle; exopod segment 2 is elongate and truncate distally bearing a short terminal spine and an outer marginal spine opposite the tip of endopod, between these two spines the margin is fringed with numerous tiny spinules, medial margins are straight and bear two small spinules. (Grindley & Grice 1969)

REMARKS: This species was redescribed by Grindley and Grice (1969) from Mauritius.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1977).

NEW RECORDS: Nil.

DISTRIBUTION: This estuarine species is recorded from Moreton Bay (Greenwood 1977). It is known from Japan and Hawaii. The possibility that this species has been transport by ship was considered by Grindley and Grice (1969).

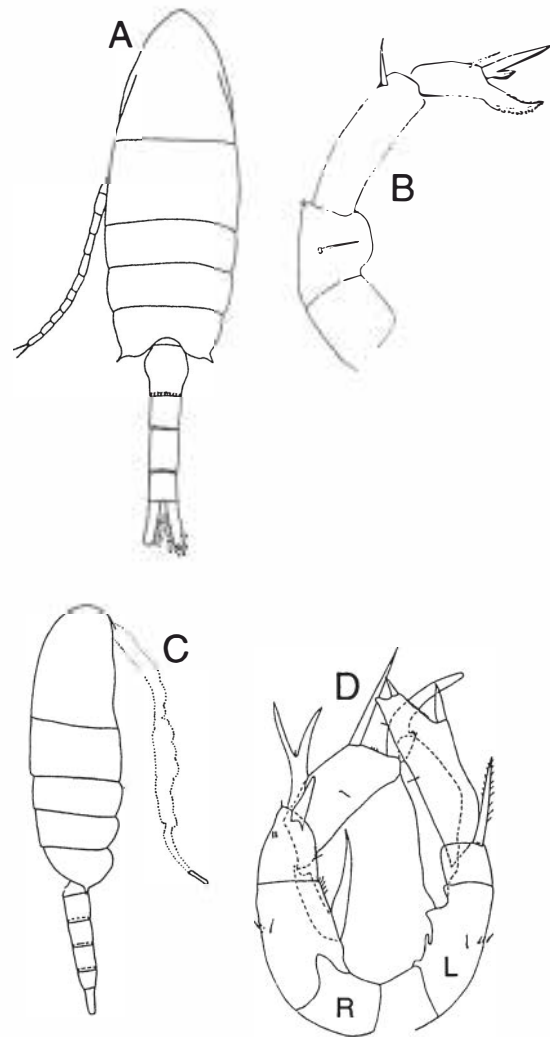


Fig. 107. *Pseudodiaptomus marinus* from Grindley & Grice (1969). female. A, dorsal view; B, leg 5. Male. C, lateral view; D, leg 5.

*Pseudodiaptomus mertonii* Fruchtl, 1923  
(Figs 108, 181, 193)

DESCRIPTION: Size: females: 1.10–1.30 mm, males: 0.91–0.93 mm.

Female: As in the family and generic definitions with the following additional characters. Head and pedigerous segment 1 fused, pedigerous segments 4 and 5 partly fused with divergent posterior wings. Urosome 4-segmented, genital segment dorsally indented near midlength with a fine anterolateral spinule patch, genital boss small with small genital flaps (no spines); caudal rami 6 times longer than wide. Antenna 1 21-segmented, lacking modified barbed seta on penultimate segment. Leg 1 basipod 1 with a lateral spinule row. Leg 5 basipod 2 with flared proximomedial corners; basipod 2 and exopod segment 1 with spinule rows on lateral margins; exopod segment 2 with a proximomedial tuft of hairs; exopod segment 3 more than twice the length of exopod segment 2.

(Walter 1987)

Male: As in the family and generic definitions with the following additional characters. Head and pedigerous segment 1 fused, pedigerous segments 4 and 5 partly fused with divergent posterior wings. Urosome segment 2 with a ventral spinule row, caudal rami 2.5 times longer than wide. Right antenna 1 20-segmented. Leg 5 posterior view — right leg basipod 1 distomedial corner bifid, medial point longer than lateral point; basipod 2 with a seta at distolateral corner; exopod segment 1 laterally produced into two processes, the more lateral process with a seta at midlength, the more medial process longer with a small seta and a proximomedial spine; exopod segment 2 with a plumose outer spine; exopod segment 3 with a small rounded basal knob. Left leg basipod 1 distomedial corner with a long spiniform process; basipod 2 with a medially raised surface, fine hairs lining groove and one large seta; exopod segment 1 with two surface setae and a long plumose outer spine; exopod segment 2 proximolateral corner swollen and circular, hyaline plate rounded along lateral margin and 5 surface setae. Anterior view — right leg basipod 1 with surface spinules; basipod 2 endopod laterally compressed with 3 points, 1 at midlength and 2 at the apex; exopod segment 2 with a surface spinule arrangement that extends to medial margin. Left leg basipod 1 with surface spinules; basipod 2 with a short spinule row near the proximomedial corner; exopod segment 2 with scattered fine hairs on hyaline process and a small circular patch of hairs near two proximolateral spines—1 long, hirsute, and posterolaterally directed, the other short and medially directed.

(Walter 1987)

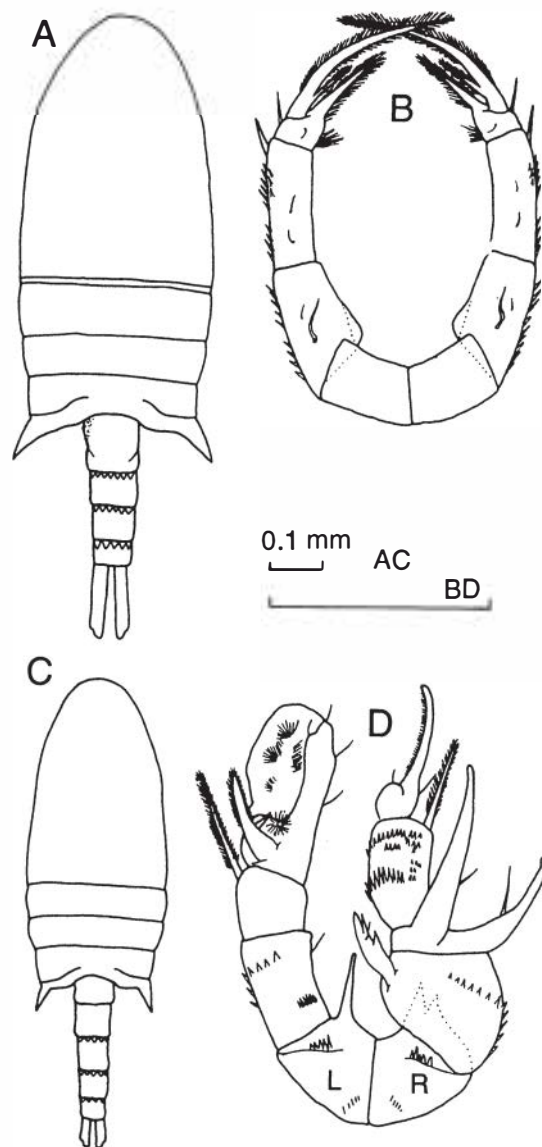


Fig. 108. *Pseudodiaptomus mertonii* from Walter (1987). Female. A, dorsal view; B, leg 5. Male. C, dorsal view; D, leg 5.

REMARKS: Walter (1987) clarifies the relationship between this species and *P. aurivilli*.

PREVIOUS SOUTHWEST PACIFIC RECORDS Greenwood (1977).

NEW RECORDS: Nil.

DISTRIBUTION: This neritic species is probably confined to the eastern regions of Indonesia, Papua New Guinea, and northern Australia as far south as Brisbane (Walter 1987).

Family TEMORIDAE Giesbrecht, 1892

DEFINITION: Female: Body of varying form, in some cases rather short and stout, in other cases comparatively slender; there is tendency for anterior head to be widest part of body. Head separate from pedigerous segment 1, anterior head unarmed or provided with 2 soft rostral filaments or 1-2-pointed (*Temoropia*); pedigerous segments 4 and 5 fused, partly fused or separate. Urosome 3-4 segmented; genital segment without seminal receptacles; caudal rami of different structure in different genera, sometimes elongate, with 6 setae. Antenna 1 24- or 25-segmented. Antenna 2 endopod more or less equal in length to exopod which is 6-7-segmented. Mandible has a broad blade with 1 large tooth set slightly apart from remaining teeth, endopod segment 1 often fused to basipod 2. Maxilla 1 inner lobe 1 with 12-15 spines and setae, inner lobes 2 and 3 usually with 4 and 3 setae respectively (with 2 and 4 setae respectively in *Temoropia setosa*), basipod 2 and proximal endopod segment often fused, exopod with 8-10 setae, outer lobe 2 with 1 or no setae, outer lobe 1 with 8-9 setae. Maxilla 2 with lobes 1-5 with 4-5, 2-3, 3, 3, 2-4 setae respectively. Maxilliped of moderate size, may be slightly modified with recurved endopod or with fusion between endopod segments; basipod 1 with 2, 2-3, 2-3, setae, basipod 2 with 0-3+2 setae, endopod with 2-4, 1-4, 1-3, 0-3+1, 4 setae respectively. Legs 1-4 with the endopods 1-, 2- or 3-segmented; exopod segments 1 and 2 may be fused. Spine and setal formula typically:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0-0/1	0-0/1	I-1; I-1; I/II, I, 3/4	various
Leg 2	0-1	0-0	I-1; I-1; II/III, I, 4/5	various
Leg 3	0-1	0-0	I-1; I-1; II/III, I, 4/5	various
Leg 4	0-1	0-0	I-1; I-1; II/III, I, 4/5	various

Female leg 5 simple, not natatory, usually without an endopod; 2-3-segmented with common basal segment. Ovisac present in some cases.

Male: Urosome of the male 5-segmented. Antenna 1 distinctly geniculate on the right, 20-23-segmented. Segmentation of the body and the form of the mouthparts and swimming legs similar to those of the female. Leg 5 simple, not natatory, usually without an endopod; larger than those of the female and prehensile, often pincer-like on one side, 2-4-segmented with common basal segment.

An example of this family is *Temora turbinata* (Figs 109, 110).

REMARKS: This genus now contains *Temora* Baird, 1850; *Temoropia* T. Scott, 1894b; *Eurytemora* Giesbrecht, 1881; *Heterocope* Sars, 1863; *Epischura* S. Forbes, 1882; and

*Lamellipodia* Schmeil, 1897. *Temorites* has been removed to the Bathypontiidae. Of these the first two genera are exclusively marine, the third is a brackish-habitat genus, whereas the last three genera are found in lakes and their references are not included here. Temoridae appear to be omnivorous based on mouthpart morphology (Itoh 1970; Ohtsuka *et al.* 1996), gut contents (Berner 1962; Arashkevich & Timonin 1969; Itoh 1970; Kleppel 1993; Ohtsuka *et al.* 1996), and laboratory feeding studies (Gaudy 1974; Paffenhöfer *et al.* 1980; Peterson & Dam 1996).

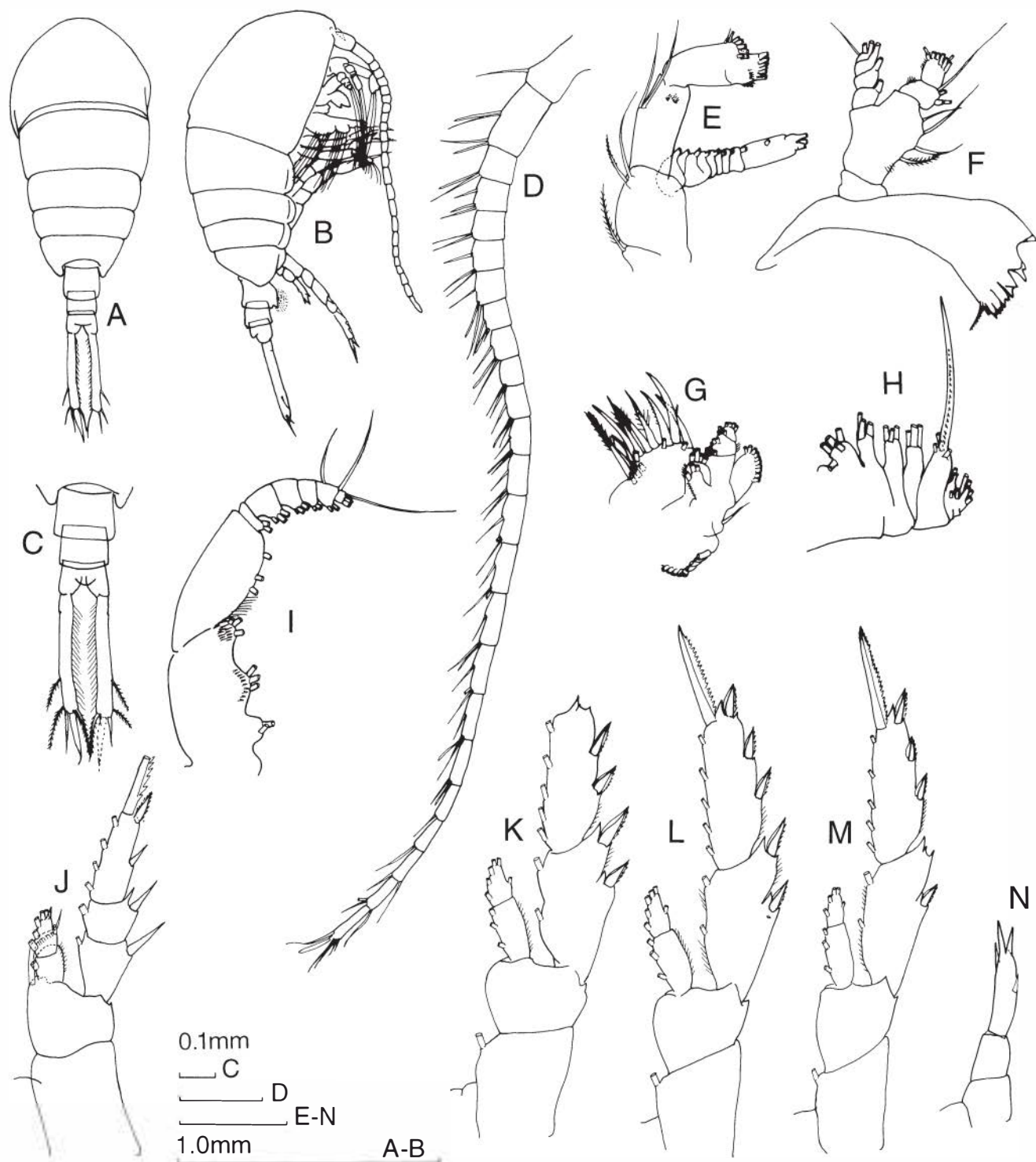
*Eurytemora* Giesbrecht, 1881

DEFINITION: As for the family with the following additional characters. Body comparatively slender in form, head less swollen than in *Temora*. Head with a posterodorsal prominence similar to that in *Temora*, anterior head only slightly prominent and with 2 soft rostral filaments. Pedigerous segment 5 separated from pedigerous segment 4 by a distinct suture, sometimes greatly expanded laterally. Urosome slender with female genital segment somewhat protuberant below. Caudal rami elongated and slightly divergent, setae normal in number. Eye of moderate size. Antenna 1 comparatively short, scarcely exceeding the prosome in length, 24-segmented in the female; right antenna 1 in male distinctly geniculate. Antenna 2 with the exopod 7-segmented, longer than the endopod. Anterior lip rather prominent ventrally. Mandibles, maxilla 1, and maxilla 2 similar to *Temora*. Maxillipeds shorter and stouter than in *Temora*, basipod 2 dilated and the endopod is recurved and carries delicate plumose setae. Endopod of leg 1 1-segmented, of legs 2-4 2-segmented; exopod segment 3 of legs 2-4 with 2 outer edge spines, terminal spine finely toothed on the outer edge. Leg 5 4-segmented in female, penultimate segment with the inner edge produced into a strong, pointed process; last segment small, with 2 unequal spines terminally; male leg 5 large and less asymmetrical than in *Temora*, both legs nearly the same size, 4-segmented, more or less incurved, right terminal segment claw-shaped, that of the left spatulate terminally. Ovisac present in the female. (Sars, 1903)

TYPE SPECIES: *Temora affinis* Poppe, 1880

REMARKS: This genus contains the following species (this list is probably not exhaustive) all of which are found in the northern hemisphere, mostly in brackish or fresh waters: *E. affinis* (Poppe, 1880); *E. americana* Williams, 1906; *E. arctica* Wilson & Tash, 1966; *E. asymmetrica* Smironov, 1935; *E. bilobata* Akatova, 1949 (= *E. yukonensis* Wilson, 1953; *E. brodskyi* Kos, 1993; *E.*





**Fig. 109.** *Temora turbinata*. Female from Stn 27/3/65 Leigh. **A**, dorsal view; **B**, lateral view; **C**, urosome, dorsal view; **D**, antenna 1; **E**, antenna 2; **F**, mandible; **G**, maxilla 1; **H**, maxilla 2; **I**, maxilliped; **J**, leg 1; **K**, leg 2; **L**, leg 3; **M**, leg 4; **N**, leg 5.

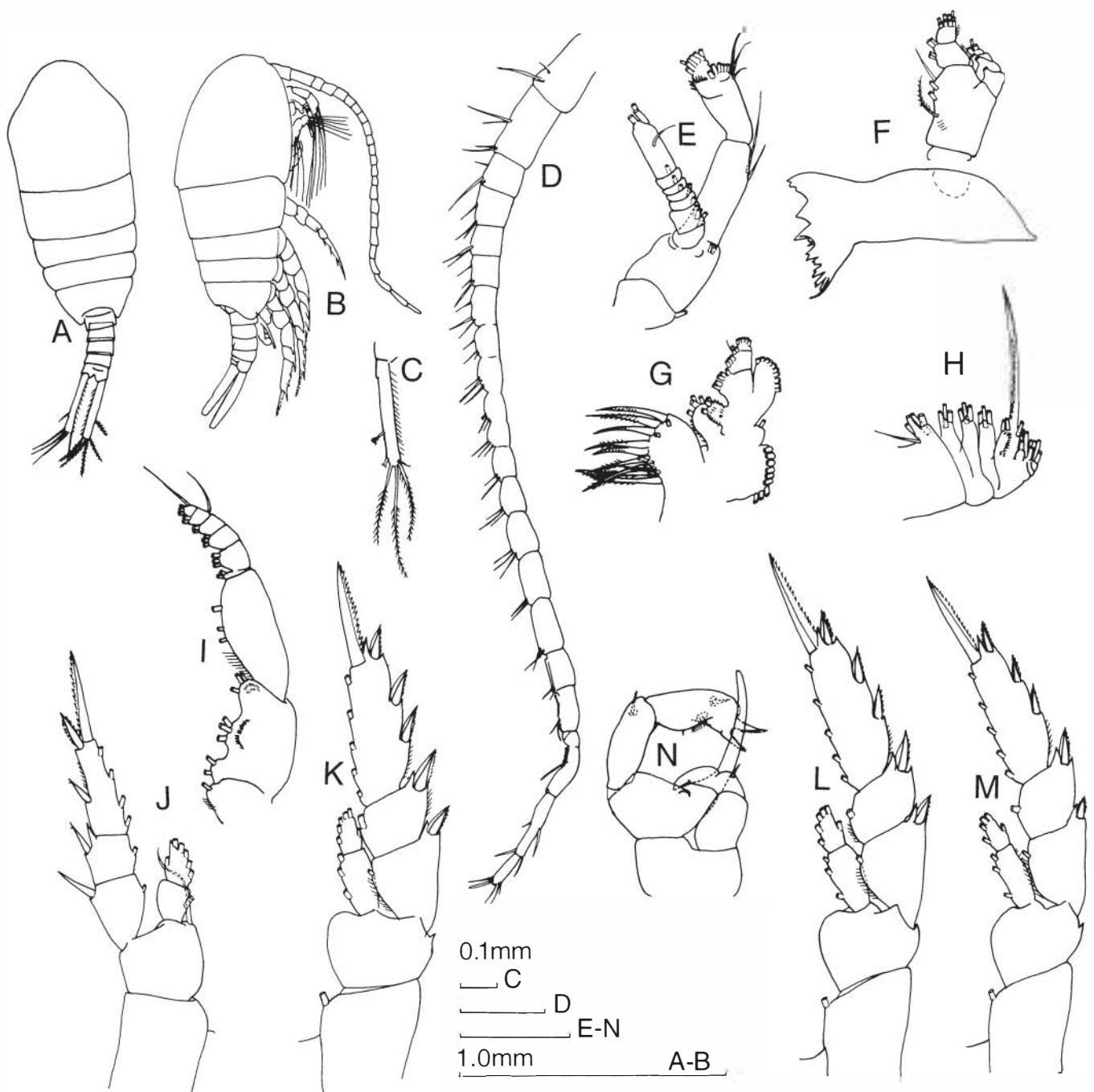


Fig. 110. *Temora turbinata*. Male from Stn 27/3/65 Leigh. A, dorsal view; B, dorsolateral view; C, left caudal ramus; D, right antenna 1; E, antenna 2; F, mandible; G, maxilla 1; H, maxilla 2; I, maxilliped; J, leg 1; K, leg 2; L, leg 3; M, leg 4; N, leg 5.

*canadensis* Marsh, 1920; *E. composita* Keiser, 1929; *E. faveola* Johnson, 1961; *E. gracilicauda* Akatova, 1949 (= *E. kurenkovi* Borutsky, 1961); *E. gracilis* (Sars, 1898) (= *E. anadyrensis* Borutsky, 1961); *E. grimmii* (Sars, 1897); *E. herdmanni* I.C. Thompson & A. Scott, 1897; *E. lacustris* (Poppe, 1887); *E. pacifica* Sato, 1913; *E. raboti* Richard, 1897; *E. richingsi* Heron & Damkaer, 1976; *E. velox* (Lilljeborg, 1853a); *E. wolterecki* Mann, 1940. Some of

these species have been reviewed (Borutskii *et al.* 1991).

*Temora* Baird, 1850

DEFINITION: As in the family definition with the following additional characters. Body short and compact,

head vaulted dorsally. Head remarkably dilated with a posterodorsal prominence, anterior head with 2 slender rostral filaments. Pedigerous segments 4 and 5 fused. Urosome with female genital segment comparatively short and hardly protuberant ventrally; caudal rami narrow and elongate, sometimes asymmetrical, setae comparatively short and of the usual number, one is on the outer border some distance from others. Eye small. Antenna 1 slender and elongate, 24-segmented in female, last 2 segments fused; geniculate on right in male. Antenna 2 exopod 7-segmented, scarcely longer than endopod. Anterior lip not prominent. Mouthparts of a normal structure. Swimming legs with endopods small and 2-segmented; exopod segments 1 and 2 of legs 2–4 partly fused in female; exopod segment 3 with 3 outer edge spines and a terminal coarsely toothed spine. Leg 5 of female small, 3-segmented, first two simple, last segment dentate terminally; male leg 5 asymmetrical, left leg much larger, 4-segmented, segment 2 produced on inner edge into a long curved thumb-like process, which opposes the 2 terminal segments; right leg 3-segmented, terminal segment incurved, claw-like. No ovisac present in the female.

TYPE SPECIES: *Cyclops longicornis* Müller, 1785

REMARKS: The following species have been described in this genus: *Temora curta* (Dana, 1849); *T. discaudata* Giesbrecht, 1889; *T. kerguelensis* Wolfenden, 1911; *T. longicornis* (Müller, 1785); *T. stylifera* (Dana, 1849); *T. turbinata* (Dana, 1849). The following species have been taken in the Southwest Pacific.

***Temora discaudata* Giesbrecht, 1889**  
(Figs 111, 182, 193)

DESCRIPTION: Size: females: 1.70–2.00 mm, males: 1.70–1.90 mm.

Female: As in the family and generic definition with the following additional characters. Similar to *T. stylifera*; but anal segment and caudal rami asymmetrical. (Giesbrecht 1892)

Male: As in the family and generic definition with the following additional characters. Similar to *T. stylifera* but segments 15 and 16 of geniculate antenna 1 wider, and segments 19–21 more strongly curved; terminal spine of exopod segment 3 of left leg 2 with a row of spines terminally and subterminal outer spine more than two-thirds the length of terminal spine; leg 5 with a wider process on left basipod 2 and a much longer terminal hook on the right leg. (Giesbrecht 1892)

REMARKS: This species appears to have been confused with *T. stylifera* (Greenwood 1978a).

PREVIOUS SOUTHWEST PACIFIC RECORDS Dakin and Colefax (1940) also as *T. stylifera*; Greenwood (1978), Brady (1883) as *T. dubia*.

NEW RECORDS: Nil.

DISTRIBUTION: Widely spread epipelagic species distributed in the temperate to tropical Indo-Pacific, Red Sea, and North Indian Ocean (Greenwood 1978a).

***Temora turbinata* (Dana, 1849)**  
(Figs 109, 110, 182, 193)

DESCRIPTION: Size: females: 1.05–1.61 mm, males: 0.93–1.56 mm.

Female: As in the family and generic definition with the following additional characters. Similar to *T. longicornis* but terminal seta 2 of the caudal rami is thicker and asymmetrical; endopod segment 3 and 4 of the maxilliped with only 2 setae; swimming legs compact, terminal exopod spine shorter, outer spine 2 on exopod segment 3 of leg 1 with a denticulate margin; leg 5 with the inner spine on the terminal segment considerably shorter and thinner than the 2 terminal spines. (Giesbrecht 1892)

Male: As in the family and generic definition with the following additional characters. Similar to *T. longicornis* but urosome segment 4 is longer than the anal segment; endopod segments 3 and 4 of the maxilliped with only 2 inner setae; and left leg 5 terminal segment relatively longer, and terminally rather broader. (Giesbrecht, 1892)

REMARKS: This species is much larger at the cooler end of its range but appears not to differ morphologically from those from tropical waters (Bradford 1977).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Kramer (1895); Farran (1929); Dakin & Colefax (1940); Cassie (1959); Jillett (1971); Bradford (1977); Greenwood (1978); Nyan Taw (1978); Brady (1899) as *T. tenuicauda*; ?Thomson & Anderton (1921).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F874	0–1267	1 female
F946	0–200	13 females, 1 copepodite
	200–500	4 females, 2 males
	0–1000	5 females, 8 males
Leigh 27/3/65	0–45	numerous females, males, and copepodites



DISTRIBUTION: This epipelagic species has been recorded from tropical, subtropical, and temperate coastal areas of the Indian Ocean, west Pacific and Atlantic Oceans but not in the Eastern Pacific (Vervoort 1965).

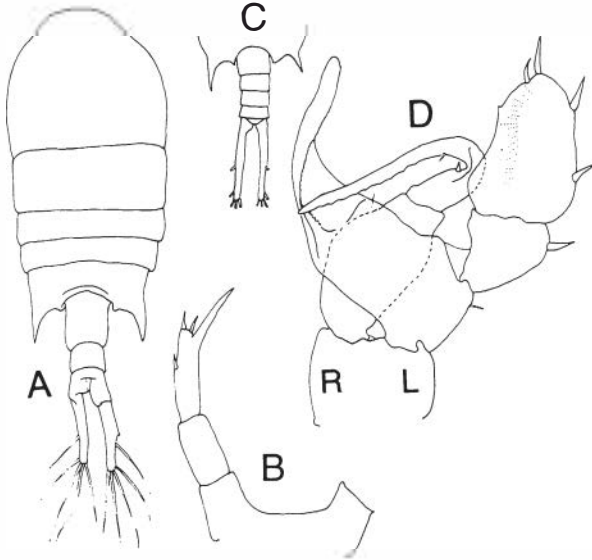


Fig. 111. *Temora discaudata*. A, dorsal view from Giesbrecht (1892); B, leg 5 from Greenwood (1978). Male from Greenwood (1978). C, urosome, dorsal view; D, leg 5.

*Temoropia* T. Scott, 1894b

DEFINITION: As for the family with the following additional characters. Very small copepods. Head and pedigerous segment 1 and pedigerous segments 4 and 5 separate, posterior corners of the prosome rounded. Rostral filaments paired, of variable thickness. Urosome 4-segmented in female, 5-segmented in male; female genital segment large and protruding ventrally by about the same amount as depth of urosome itself; caudal rami small with 3 terminal setae (2 for *T. minor*). Antenna 1 24-segmented (segments 24 and 25 fused), male right antenna geniculate, joint between free segments 16 and 17. Antenna 2 with both rami of about equal length, exopod 7-segmented. Maxilla 1 inner lobe 1 with 15 spines and setae, inner lobes 2 and 3 with 2 and 4 setae respectively, basipod 2 with 2 setae, endopod with 2, 2, 5 setae, exopod with 9 setae, outer lobe 1 with 9 setae. Maxilla 2 with lobes 1-6 with 5, 3, 3, 3, 4, 3 setae respectively. Maxilliped basipod 1 distally broadened. Leg 1 endopod 2-segmented, of legs 2-4 3-segmented. Exopod segment 3 of leg 1 with 2 outer edge spines, of legs 2-4 with 3 outer edge spines. Posterior surfaces of some of the segments of the swimming legs 1-4 bearing patches of spinules. Leg 5 of female 3-segmented with a seta-like endopod; exopod with inner and distal tooth-like processes. Male

leg 5 2-segmented on right, 3-segmented on left; right segment 2 has a long, strong terminal spine; left segment 1 has a long distal spine and a smaller inner bulb tapering to a point, segment 2 with an inner distal, hairy flap. (Schulz 1986)

TYPE SPECIES: *Temoropia mayumbaensis* T. Scott, 1894b

REMARKS: The following species have been described in this genus: *Temoropia mayumbaensis* T. Scott, 1894b; *T. minor* Deevey, 1972; *T. setosa* Schulz, 1986. The following species has been taken in the Southwest Pacific.

*Temoropia minor* Deevey, 1972 (Figs 112, 182, 193)

DESCRIPTION: Size: females: 0.67-0.78 mm, males: 0.60-0.62 mm.

Female: As in the generic definition with the following additional characters. Rostral filaments short and fat. Genital segment symmetrical. Leg 5 endopod filament longer than third segment and forked.

(Deevey 1972)

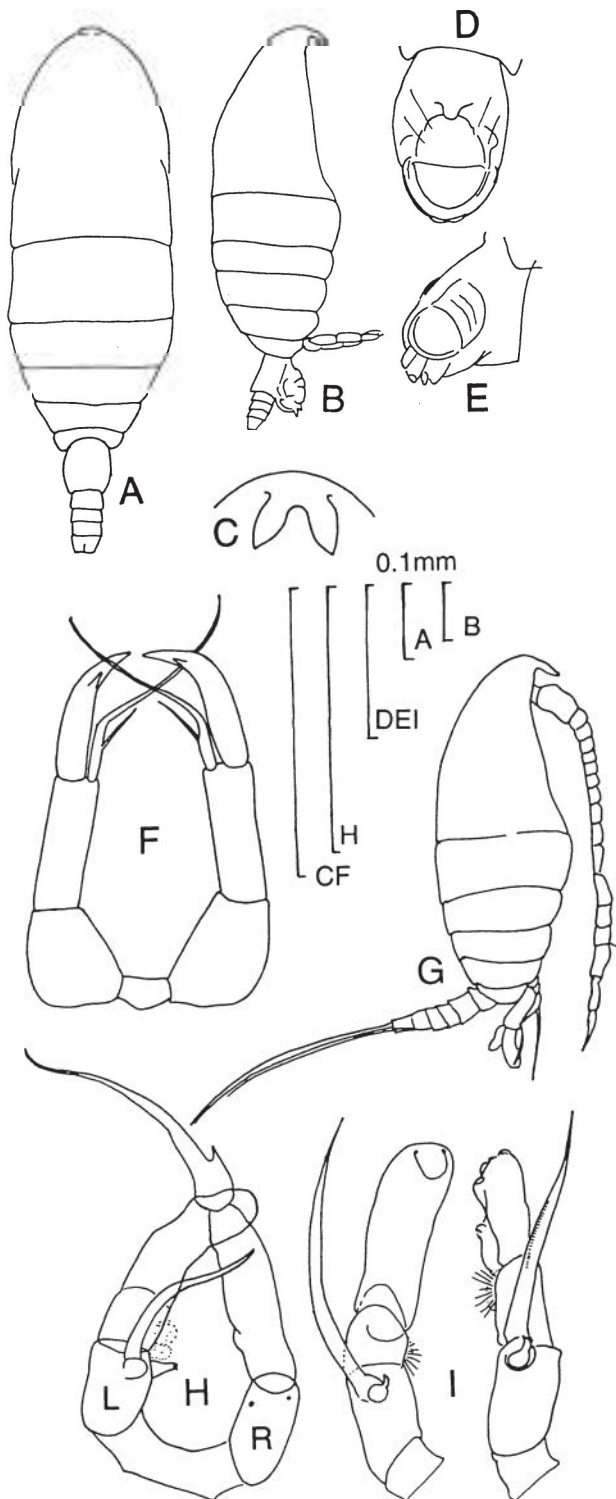
Male: As in the generic definition with the following additional characters. Rostral filaments short and fat. Right leg 5 segment 1 with a fat inner distal spine visible in lateral view, segment 2 long, with a long curved distal spine, notched near base with a small secondary spine; left leg 5 3-segmented with segments 2 and 3 indistinctly separated in some views, segment 1 has an inner distal, fat, curved spine and an anterodistal long curved spine which in some views is seen to have a clear break near the tip and to be finely toothed over the centre third of its length; segment 3 is relatively long and slim in most views, ending bluntly distally, in some views a transparent swelling protrudes from segment 3. (Deevey 1972)

REMARKS: Deevey (1972) believed that the species that Farran (1929) took off northern New Zealand was referable to her species although the endopod filament appeared not to be very long.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929) as *T. mayumbaensis*.

NEW RECORDS: Nil.

DISTRIBUTION: This bathypelagic species is known from the North Atlantic and Southwest Pacific (Deevey 1972) where it is usually found deeper than 500 m.



**Fig. 112.** *Temoropia minor* from Deevey (1972). Female. **A**, dorsal view; **B**, lateral view; **C**, rostrum; **D**, genital segment, ventral view; **E**, genital segment, lateral view; **F**, leg 5. Male. **G**, lateral view; **H**, leg 5; **I**, different views of left leg 5.

**DEFINITION:** Female: Total length 2-4 mm. Body relatively robust, head rectangular in dorsal view with a conspicuous lateral constriction anteriorly, many species possess a dark pigment which gives a dark brown or black colour to some parts of body. Head and pedigerous segment 1 separated, pedigerous segments 4 and 5 fused and extended into pointed, often asymmetrical processes, rarely rounded. Rostrum atrophied. Urosome 3-segmented; genital segment often spinose or asymmetrically swollen, without seminal receptacles; urosome segment 2 is sometimes asymmetrical; caudal rami short with 6 setae. Antenna 1 symmetrical, 24-segmented, segments 24 and 25 fused. Antenna 2 basipod 1 with 1 seta; basipod 2 and endopod segment 1 fused; endopod segment 1 with 1 distal seta, endopod segment 2 with 8+7 setae; exopod 6-segmented, separated from basipod 2, narrow and short, with a long segment 2 and short distal segments with 0, 2, 1, 1, 1, 2 setae respectively. Mandibular blade narrow with few teeth, basal tooth is usually divided into one or more pointed cusps or may be simple; basipod 2 large; endopod 2-segmented with 0 and 6 setae respectively; exopod 4-segmented with 1, 1, 1, 2 setae respectively. Maxilla 1 with most lobes small except for an elongate inner lobe 2; inner lobe 1 with 6-10 spines and setae; inner lobes 2 and 3 with 3 setae each; basipod 2 with 2 setae; endopod 2-segmented, with 0 and 5 setae respectively; exopod small, with 7 setae; outer lobes 1 and 2 without setae. Maxilla 2 large; lobes 1 and 2 rudimentary with 3 and 2 setae respectively; lobes 3 and 4 with 2 setae each; lobe 5 with 2 stout spines of variable length and thickness and a small spinule or the proximal spine may be half the length and considerably thinner than distal spine; endopod with 3 stout spines and 4 small setae. Maxilliped small, basipod 1 with 1 medial and 2 terminal setae; basipod 2 with patches of setules and 3 setae medially; endopod 6-segmented, segment 1 almost fully incorporated into basipod 2, with 1, 2, 2, 2, 2, 2, setae respectively. Swimming legs 1-4 with 3-segmented exopods with serrated outer margins, especially exopod segments 2 and 3, and 2-segmented endopods (segments 1 and 2 fused); seta and spine formula as follows:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0-1	0-0	I-1; I-1; II, I, 4	0-3; 1, 2, 3
Leg 2	0-1	0-0	I-1; I-1; III, I, 5	0-3; 2, 2, 3
Leg 3	0-1	0-0	I-1; I-1; III, I, 5	0-3; 2, 2, 4
Leg 4	0-0	I-0	I-1; I-1; III, I, 5	0-3; 2, 2, 3

Leg 5 uniramous, not natatory, usually symmetrical; basipod 1 and coupler fused; basipod 2 and 1-segmented exopod separate, basipod 2 with 1 distolateral

spinule; terminal segment longest, either may end in one or more spine-like processes, a finger-like process, or a single long seta; setae may or may not be present on the inner margins.

Male: Urosome 5-segmented; posterior margin of prosome always asymmetrical; genital segment is almost always asymmetrical, bearing a process on the right side sometimes with a complex apex. Antenna 1 geniculate on right, 23-segmented, segments 17–18 and 19–20 fused, with or without denticulate segments at bend. Mouthparts and legs 1–4 similar to those of female. Leg 5 not natatory, 4-segmented on left and 3-segmented on right; may be chelate on right or ending in a long feather-like seta; basipods 1, not counted in segmental complement, are small and fused with the coupler.

An example of this family is *Candacia cheirura* (Figs 113, 114).

REMARKS: Grice (1963) reviewed this family and gave an excellent key to the species known at the time; he also described the genus *Paracandacia* which with *Candacia* brought the known genera in this family to two. Species in this family can usually be identified from the structure of the urosome segments, leg 5, and the teeth and protuberances in the geniculate region of the male right antenna 1. Candaciidae are carnivores based on mouthpart morphology (Itoh 1970), and gut contents (Arashkevich 1969; Itoh 1970; Ohtsuka & Onbe 1989; Ohtsuka & Kubo 1991).

### *Candacia* Dana, 1846

DEFINITION: As in the family definition with the following additional characteristics. Right antenna 1 of the male with teeth present on one or more segments in the geniculate region. In both sexes the basal tooth of the mandible is usually divided into one or more pointed cusps. The two spines on the second basal segment of maxilla 2 are variable in length and thickness. Female leg 5 terminal segments may end in one or more spine-like processes, a finger-like process, or a single long seta; setae may or may not be present on the inner lateral margins. Right male leg 5 is chelate. (Grice 1963b)

TYPE SPECIES: *Candace pachydactyla* Dana, 1849 (see Grice 1963b).

REMARKS: The following species have been described in this genus (for synonyms, *nomina dubia*, and *nomina nuda* see Grice (1963)): *C. armata* (Boeck, 1872) *C. bipinnata* (Giesbrecht, 1889); *C. bradyi* Scott, 1902; *C.*

*catula* (Giesbrecht, 1889); *C. cheirura* Cleve, 1904; *C. columbiae* Campbell, 1929; *C. curta* (Dana, 1849); *C. discaudata* Scott, 1909; *C. elongata* (Boeck, 1872) *C. ethiopica* (Dana, 1849); *C. falcifera* Farran, 1929; *C. giesbrechti* Grice & Lawson, 1978; *C. grandis* Tanaka, 1964c; *C. guggenheimi* Grice & Jones, 1960; *C. guinensis* Chahsavar-Archard & Razouls, 1982 [1983]; *C. ketchumi* Grice, 1961; *C. longimana* (Claus, 1863); *C. magna* Sewell, 1932; *C. maxima* Vervoort, 1957; *C. norvegica* (Boeck, 1865); *C. pachydactyla* (Dana, 1849); *C. paenelongimana* Fleminger & Bowman, 1956; *C. parafalcifera* Brodsky, 1950; *C. pofi* Grice & Jones, 1960; *C. samassae* Pesta, 1941 (male see Pillai 1967); *C. tenuimana* (Giesbrecht, 1889); *C. varicans* (Giesbrecht, 1892). The following species have been taken in the Southwest Pacific.

*Candacia bipinnata* (Giesbrecht, 1888)  
(Figs 115, 182, 193)

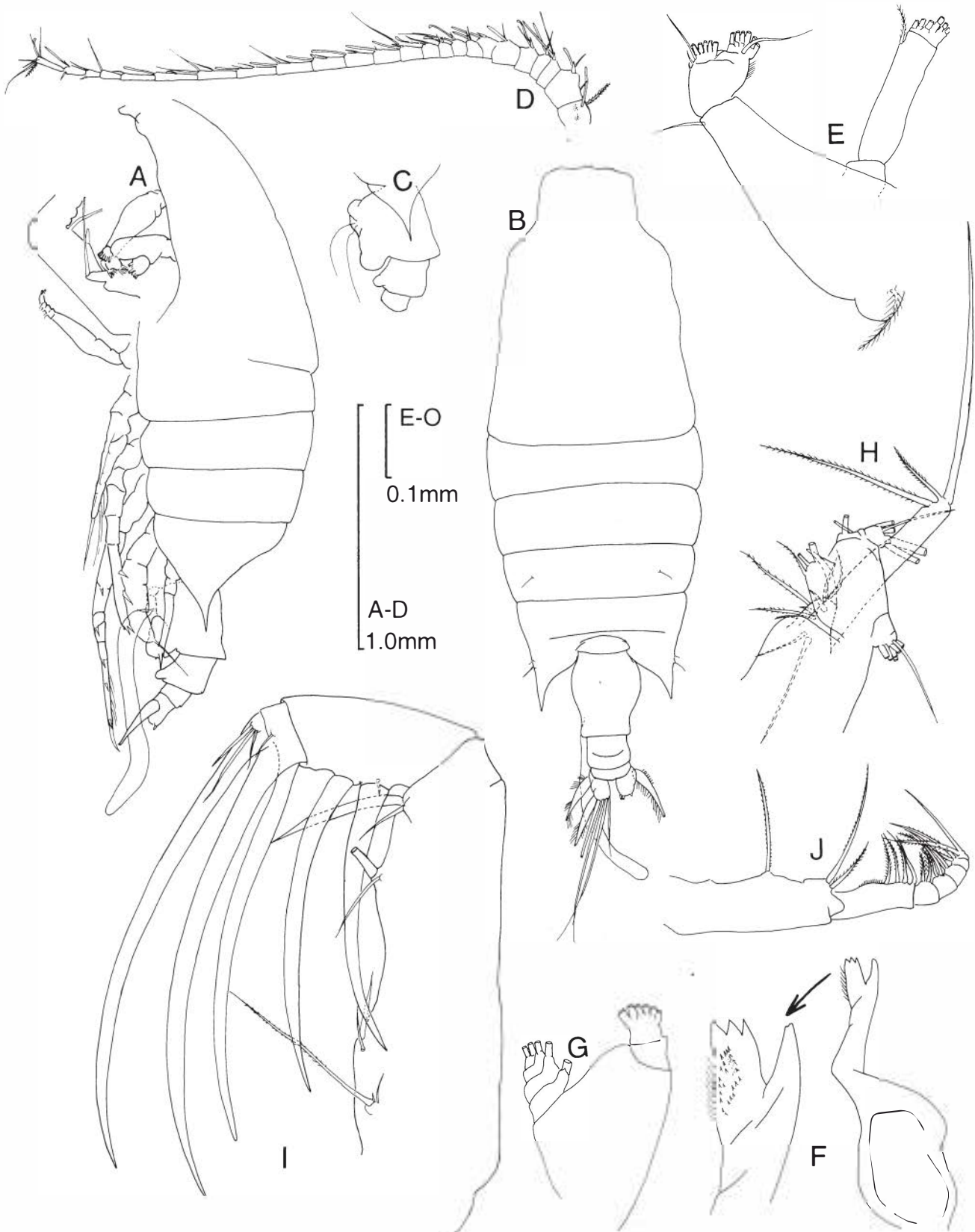
DESCRIPTION: Size: females: 2.35–2.5 mm, males: 2.35 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior metasome corners extended into symmetrical points. Genital segment large with a large triangular extension on each side. Urosome segment 2 with a lamella on ventral surface. Leg 5 asymmetrical and terminated in an obtuse point and some miniscule outer edge spines. (Rose 1933; Grice 1963b)

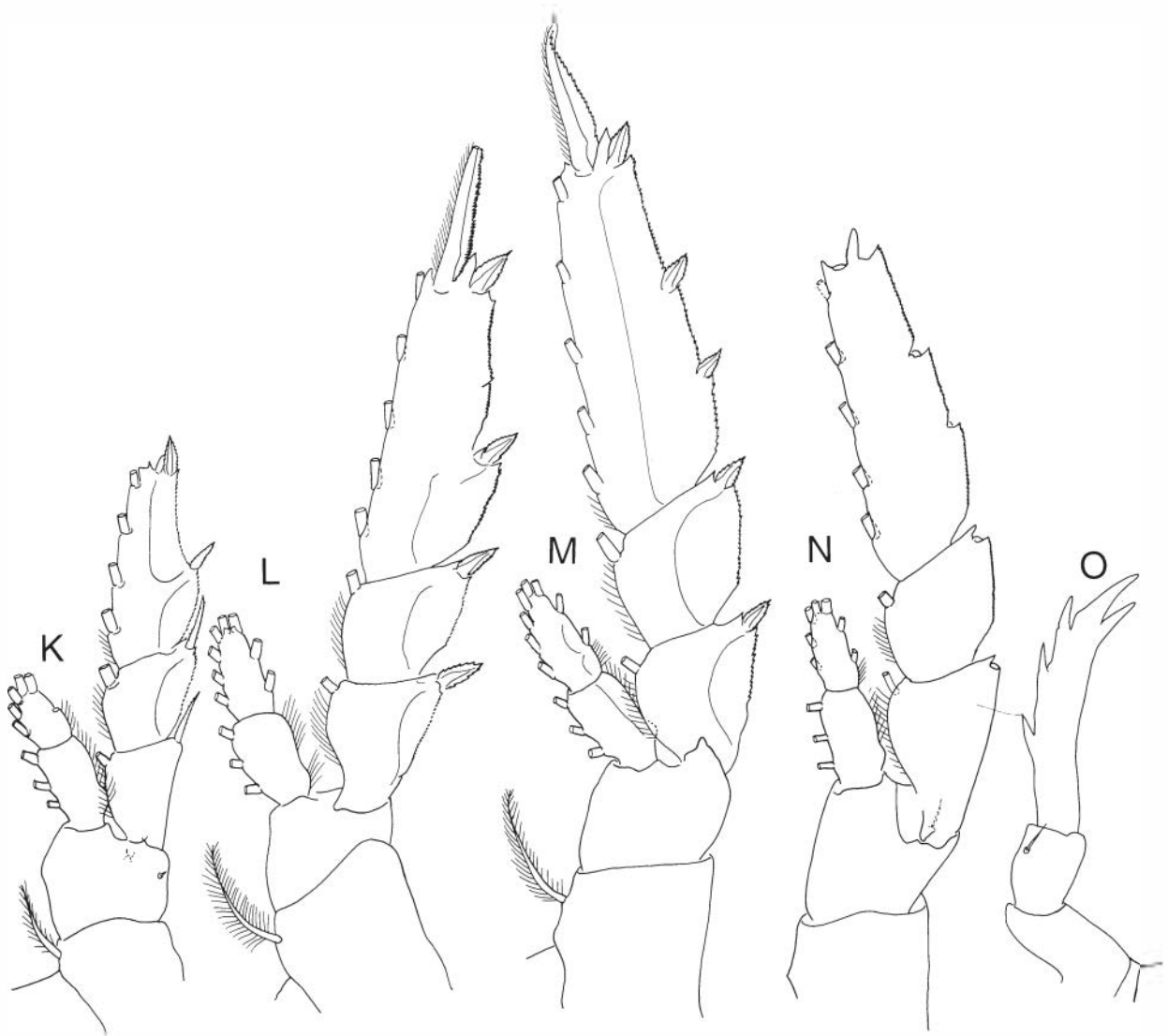
Male: As in the family and generic definitions with the following additional characteristics. Rostrum plate-like and strong with rounded points. Posterior metasome and genital segment asymmetrical with pointed extensions on the right, both extending posteriorly; in lateral view distal end of posterior metasome process is truncate, the tip of the process reaching beyond posterior end of genital segment. Right antenna 1 segments 2 and 3 fused, segments 17 and 18 separate, segments 19 and 20 fused. Maxilla 2 basipod 2 proximal spine not notably thicker than the distal spine. (Rose 1933; Grice 1963b)

REMARKS: The Southwest Pacific specimens appear to more or less agree with the original descriptions. The projection on the right side of the genital segment of the Southwest Pacific male appears to originate from a more posterior position than in the specimen figured by Mori (1937).

PREVIOUS SOUTHWEST PACIFIC RECORDS: ?Brady(1883); Dakin and Colefax (1940) (as *C. pectinata*); Farran (1929); Nyan Taw (1978), possibly also specimens identified as *C. armata*, the male figured as *C. bipinnata* does not appear to be this species.



**Fig. 113.** *Candacia cheirura*. Female from Stn VUZ105. **A**, lateral view; **B**, dorsal view; **C**, genital segment, lateral view; **D**, antenna 1; **E**, antenna 2; **F**, mandibular blade; **G**, mandibular palp; **H**, maxilla 1; **I**, maxilla 2; **J**, maxilliped; (Facing page). **K**, leg 1; **L**, leg 2 (the illustrated leg has exopod segment 3 deformed as one of the outer edge spines is missing); **M**, leg 3; **N**, leg 4; **O**, leg 5.



NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F874	0-1357	5 females, 3 males
F879	0-1267	1 male
F897	0-1269	2 females
F945	500-1000	1 female 2.4 mm
F946	0-200	11 females 2.2-2.6 mm, 6 males 2.1-2.4 mm
	200-500	6 females 2.3-2.5 mm, 4 males 2.1-2.35 mm
	0-1000	7 females 2.15-2.50 mm, 1 male 2.2 mm
F947	0-200	2 females 2.2-2.5 mm, 1 male 2.4 mm
AUZ111	0-100?	2 females
VUZ93	0-1097	1 female 2.4 mm
Leigh 22/5/64	0-45	1 male

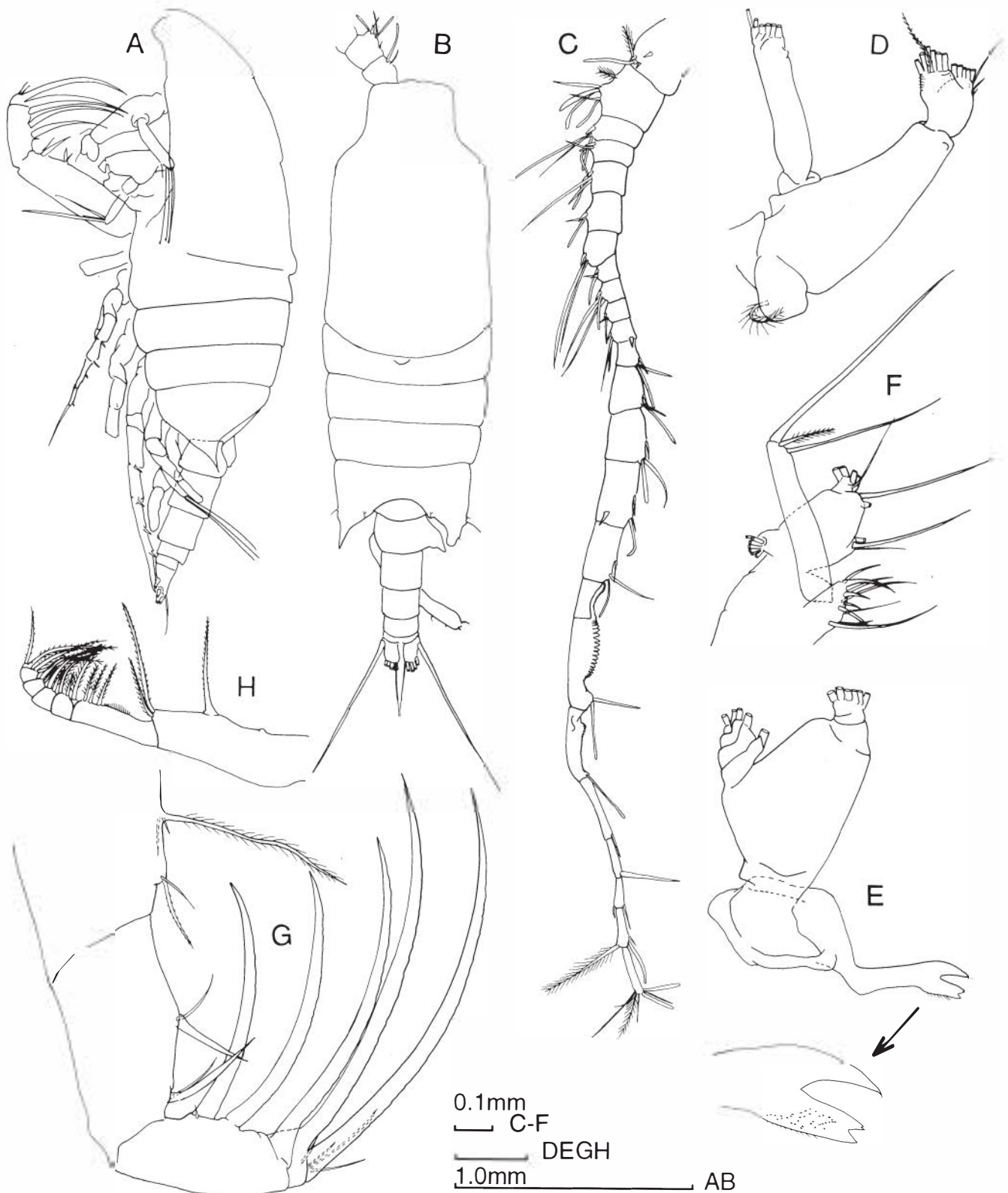
Leigh 23/5/64 0-45 1 male 2.7 mm  
 Leigh 30/6/64 0-45 1 female 3.1 mm

DISTRIBUTION: This epi- to mesopelagic species has been taken in tropical and subtropical regions of all oceans (Grice 1963b).

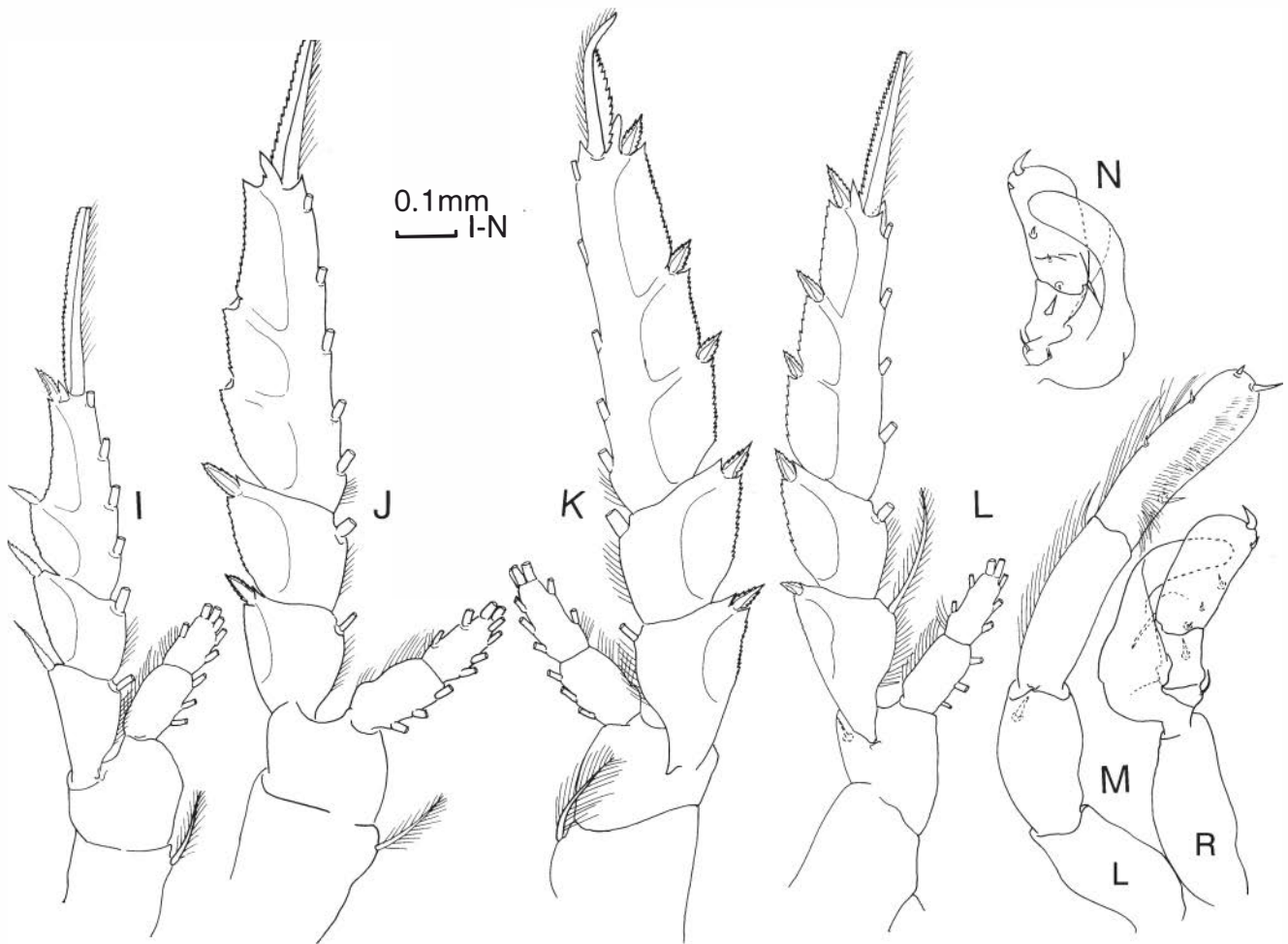
*Candacia bradyi* (Scott, 1902) (Figs 116, 182, 193)

DESCRIPTION: Size: females: 1.8 mm, males: 2 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior metasome corners each terminate in a short spine. Genital segment symmetrical in dorsal view and globular in shape, with a well-marked genital swelling. Urosome segment 2 is produced ventrally in midline



**Fig. 114.** *Candacia cheirura*. Male. C, G, H, K, L from Stn G142, 250–500 m, the remaining parts from Stn VUZ105. A, lateral view; B, dorsal view; C, right antenna 1; D, antenna 2; E, mandible; F, maxilla 1; G, maxilla 2; H, maxilliped; Facing page: I, leg 1; J, leg 2; K, leg 3; L, leg 4 (exopod segment 3 inner edge with 4 setae on one side and 5 on the other); M, leg 5; N, terminal part of right leg 5.



into a short spine which is half the length of genital segment. Caudal rami about twice as long as broad, slightly asymmetrical, that on right being slightly broader than on left. Antenna 1 23-segmented. Maxilla 2 basipod 2 with proximal spine longer and much stouter than distal spine. Leg 1 with 1-segmented endopod. Leg 5 segment 3 slightly curved inwards with 2 setae on inner margin, with 3 outer edge spines on distal half of segment; these external spines are blunt and pigmented on left side and sharp and devoid of pigment on the right. (Sewell 1912; Grice 1963b)

Male: As in the family and generic definitions with the following additional characteristics. Posterior metasome symmetrical, tip of right process does not reach beyond midpoint of genital segment. Genital segment produced into a toothed tubercle on right side. Urosome segment 2 with a patch of small spines near posterior end. Left antenna 1 23-segmented and extends to posterior border of metasome. Maxilla 2 segment 2 with 3 short spines. Leg 1 endopod 1-segmented, basipod 2 without a seta. Legs 2-4 terminal exopod spines are more than half the length on its

segment. Left leg 5 segment 3 is produced at outer distal angle into a short stout pigmented tooth-like process which is divided into 3 blunt points, segment 4 is elongate and narrow with 3 terminal small spines. (Scott 1909; Grice 1963b)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1978).

NEW RECORDS: Nil.

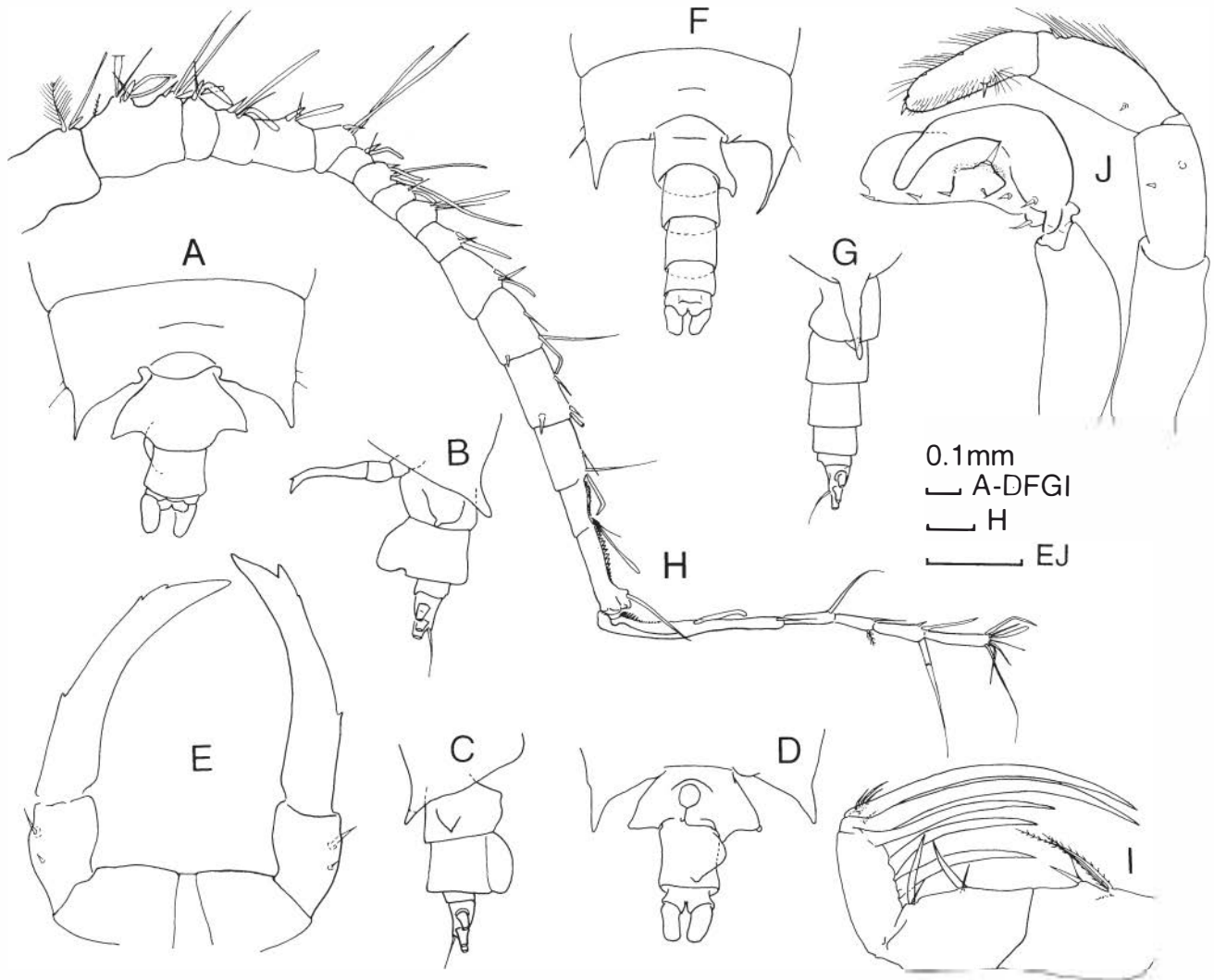
DISTRIBUTION: This epipelagic species has been taken in the western Pacific and Indian Ocean (Grice 1963b).

*Candacia catula* (Giesbrecht, 1889)

(Figs 117, 182, 193)

DESCRIPTION: Size: females: 1.4-1.65 mm, males: 1.3-1.6 mm.

Female: As in the family and generic definitions



**Fig. 115.** *Candacia bipinnata* from Stn F946, 200–500 m. Female. **A**, urosome, dorsal view, **B**, urosome, left side, **C**, urosome, right side, **D**, urosome, ventral view; **E**, leg 5. Male. **F**, urosome, dorsal view; **G**, urosome, right side; **H**, right antenna 1; **I**, maxilla 1; **J**, leg 5.

with the following additional characteristics. Posterior metasome symmetrical and pointed. Genital segment symmetrical, both sides swollen, without spines or spine-like processes; in lateral view with a ventral knob-like protrusion directed posteriad. Caudal rami nearly twice as long as wide. Antenna 1 23-segmented, with proximal 6 segments swollen. Maxilla 2 basipod 2 proximal spine considerably thicker than the distal spine. Leg 1 endopod 2-segmented. Legs 2–4 exopod segment 3 terminal spine more than half the length of the segment. Leg 5 symmetrical segment 3 long with 2 outer marginal spines and 3 inner marginal setae, apex with 3 teeth. (Mori 1937; Grice 1963b)

Male: As in the family and generic definitions with the following additional characteristics. Genital segment in dorsal view without a process or protrusion. Urosome segment 2 symmetrical. Maxilla 2 basipod 2 proximal spine considerably thicker than the distal

spine. Right prehensile antenna 1 with 6 terminal segments. Leg 5 chelate on the left with segment 3 terminal spine long and curved.

(Mori 1937; Grice 1963b)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Dakin and Colefax (1940); Greenwood (1978).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in tropical and subtropical zones of Pacific and Indian ocean (Grice 1963b).

*Candacia cheirura* Cleve, 1904

(Figs 113, 114, 182, 193)



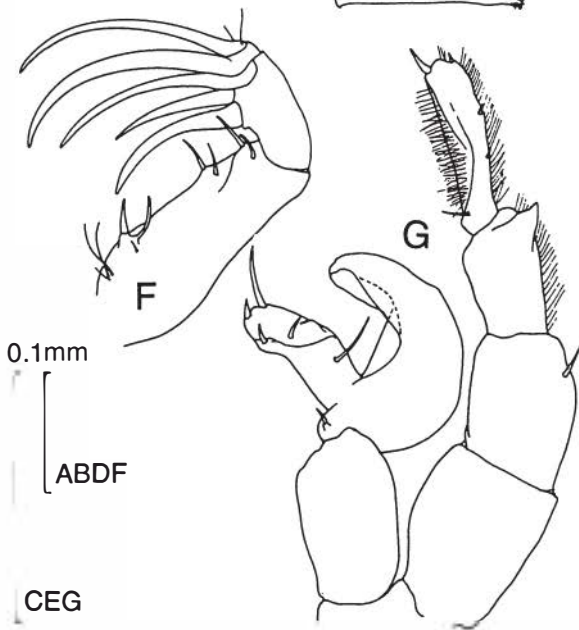
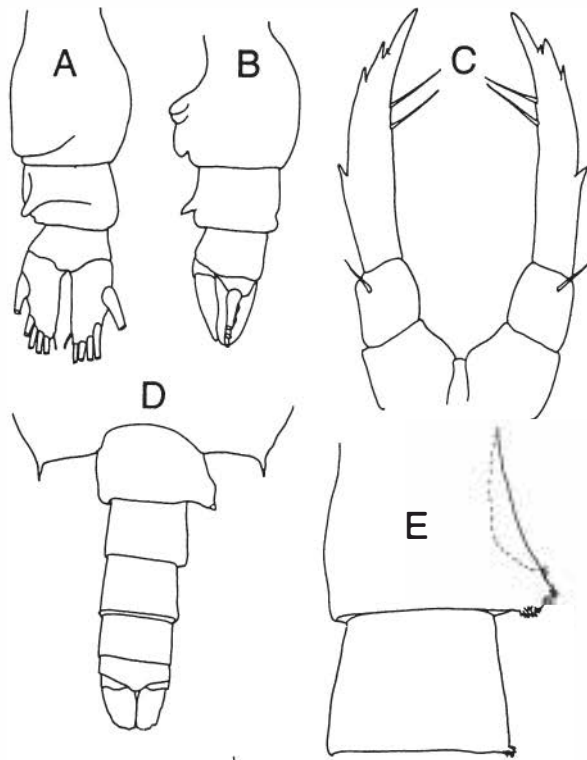


Fig. 116. *Candacia bradyi* from Greenwood (1978). Female. A, urosome, ventral view; B, urosome, left view; C, leg 5. Male. D, urosome, dorsal view; E, urosome segments 1 and 2; F, maxilla 2; G, leg 5.

DESCRIPTION: Size: females: 2.25–2.70 mm, males: 2.20–2.40 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior metasome corners pointed. Genital segment with a large ventral projection, urosome segment 2 with a ven-

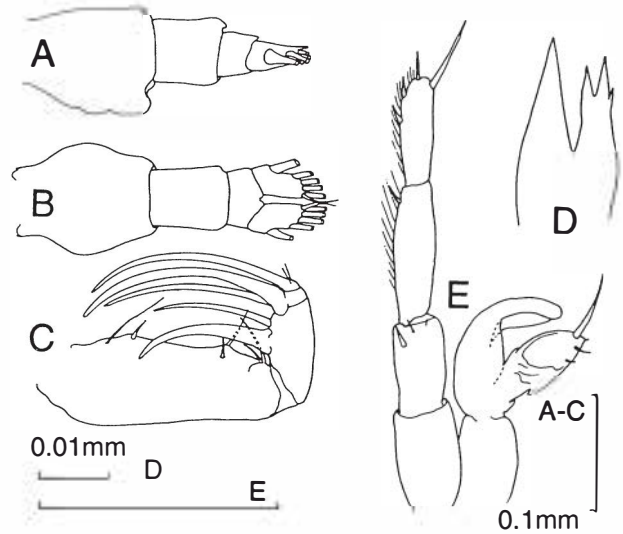


Fig. 117. *Candacia catula* from Greenwood (1978). Female. A, urosome, lateral view; B, urosome, dorsal view; C, maxilla 2. Male. D, end of mandible blade; E, leg 5.

tral projection directed obliquely posteriad. Caudal setae with proximal part broad. Leg 3 exopod segment 3 with terminal spine turned outwards at its apex and as long as one-third of segment. Leg 5 segment 3 with 3 spine-like points distally, the middle one is longest, and with 2 outer edge spines. (Cleve 1904; Grice 1963b)

Male: As in the family and generic definitions with the following additional characteristics. Posterior metasome asymmetrical, pointed extensions pigmented. Genital segment with a posterolateral narrow extension on right. Right prehensile antenna 1 with segments 2 and 3 separate, segment 15 with a small distal upper spine, segments 15+16 are five-sixths of segments 17+18, segments 17 and 18 separate, segment 18 with a strong transverse ridges, and segment 19 with small close ridges on its entire margin. Leg 3 exopod segment 3 with terminal spine as in female. Leg 5 on left with its distal segment longer than penultimate segment. (Cleve 1904; Grice 1963b)

REMARKS: Male leg 4 figured here (Fig. 114L) has only 4 inner edge setae on exopod segment 3; there are more usually 5 setae in this position.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Bary (1951); Vervoort (1957); Bradford (1972).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A313	0–914	2 males
A332	surface	1 male 2.2 mm
B120	0–150	1 female 2.6 mm



F946	200-500	1 female 2.25 mm
	0-1000	1 female 2.4 mm
VUZ105	0-914	7 females 2.5-2.7 mm, 1 male 2.35 mm
Mu67/46	1-150	3 copepodites
Mu67/48s	0-1000	1 male
Mu67/62s	0-500	1 male
Mu67/88s	0-600	1 female

DISTRIBUTION: This epi- to mesopelagic species has been taken in the Southern Hemisphere in the West Wind Drift (Vervoort 1957; Grice 1963b).

*Candacia discaudata* (Scott, 1909)  
(Figs 118, 182, 193)

DESCRIPTION: Size: females: 1.94 mm, males: 1.8 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior metasome points symmetrical, directed ventrally. Genital segment is slightly asymmetrical viewed dorsally, without lateral projections, but with a short seta on each side; without any knob-like protrusions

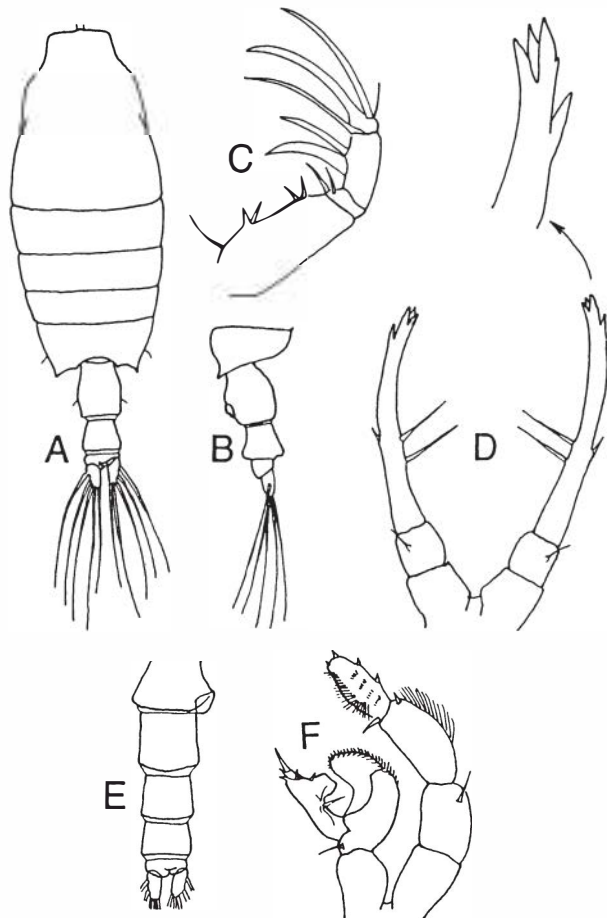


Fig. 118. *Candacia discaudata* from Scott (1909). Female. A, dorsal view; B, urosome, lateral view; C, maxilla 2; D, leg 5. Male. E, urosome, dorsal view; F, leg 5.

on the ventral side. Urosome segment 2 in lateral view is considerably expanded. Anal segment distinctly asymmetrical. Antenna 1 23-segmented and extends to the middle of the genital segment. Maxilla 2 basipod 2 with 2 spines, the proximal spine slightly longer and thicker than the distal spine. Leg 1 endopod 1-segmented, basipod 2 without a seta. Legs 2-4 exopod segment 3 terminal spine more half the length of its segment. Leg 5 asymmetrical, apex of segment 3 produced into 3 closely set teeth, outer margin with 2 small spines, 2 moderately long setae on inner margin.

(Scott 1909; Grice 1963b)

Male: As in the family and generic definitions with the following additional characteristics. Genital segment is asymmetrical, viewed dorsally the distal end right side is much inflated, viewed from right the inflated region bears a small tooth at each end. Anal segment asymmetrical as in female. Right antenna 1 23-segmented, segments 2 and 3 fused, hinge between segments 18 and 19, segments 17 and 18 separate, segments 19 and 20 fused, outer margin of segments 16-18 are provided with rows of pigmented teeth as in *C. bradyi*. Maxilla 2 basipod 2 proximal spine considerably thicker than distal spine. Leg 5 left segments moderately long and broad, segment 4 with 2 small outer edge spines and 2 small apical spines; segment 3 of right leg has a large projection near distal end of inner margin.

(Scott 1909; Grice 1963b)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1978).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in the western Pacific and Indian Ocean (Grice 1963b; Greenwood 1978a) and is particularly plentiful in inshore waters (Farran 1936).

*Candacia elongata* (Boeck, 1872) (Figs 119, 182, 193)

DESCRIPTION: Size: females: 3.4-3.5 mm, males: 3.5 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior metasomal corners rounded. Genital segment symmetrical, without lateral spines and slightly dilated in middle. Caudal rami as long as anal segment and hardly divergent. Antenna 1 24-segmented, a little longer than metasome. Leg 5 3-segmented, segment 3 straight, with a long apical spine; with 3 short external spines, inner border smooth. (Rose 1933; Grice 1963b)

Male: As in the family and generic definitions with the following additional characteristics. Right posterior metasome corner with 1 chitinised spine, left posterior

corner rounded. Urosome segments 1 and 2 asymmetrical. Right antenna 1 prehensile, a little swollen in middle. Leg 5 asymmetrical, shorter on the right and forming a chela; left leg 5 elongate and terminated by a triangular segment. (Rose 1933; Grice 1963b)

REMARKS: See Grice (1963) for a discussion of status of *C. inermis* Cleve, 1904 which he considered to be a synonym of *C. elongata*.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1970).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F945	500-1000	1 male 3.15 mm (damaged)
F946	200-500	1 female 3.35 mm

DISTRIBUTION: This mesopelagic species is widespread in the deep waters of the Atlantic, Pacific and Indian oceans (Grice 1963b; Vervoort 1965).

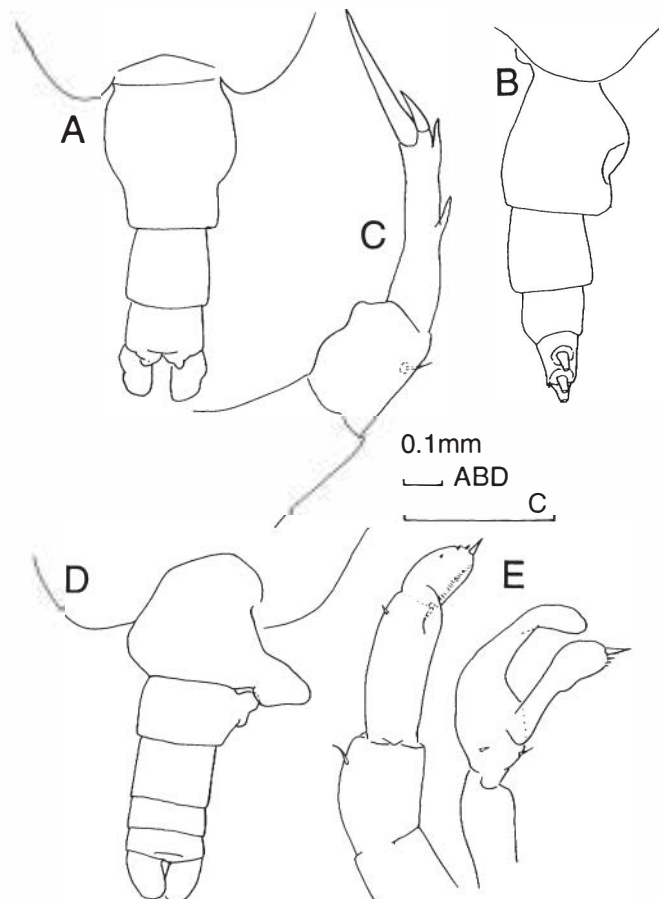


Fig. 119. *Candacia elongata*. Female from Stn F946, 200-500 m. A, urosome, dorsal view; B, urosome, lateral view; C, leg 5. Male from Stn F945, 500-1000 m. D, urosome, dorsal view; E, leg 5.

*Candacia ethiopica* (Dana, 1849) (Figs 120, 182, 193)

DESCRIPTION: Size: females: 2.15-2.8 mm, males: 2.0-2.25 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior metasome corners pointed. Genital segment a little asymmetrical, prolonged on left; in lateral view a small protuberance arises from the ventral side of genital segment near posterior margin. Antenna 1 23-segmented. Maxilla 1 with 5th setae on exopod thick. Maxilla 2 basipod 2 with proximal seta also thick and almost as long as distal seta. Leg 5 segment 3 with 3 inner-edge setae; distal 2 setae are coarse and of unequal length. (Rose 1933; Grice 1963b)

Male: As in the family and generic definitions with the following additional characteristics. Posterior metasome asymmetrical. Genital segment with a small process on right consisting of a rounded knob in front of which is a pointed projection. Right prehensile antenna 1 segment 2 and 3 fused, segments 17 and 18 fused. Left leg 5 with a chela. (Rose 1933; Grice 1963b)

REMARKS: The Southwest Pacific females and males were decorated on the dorsal surface of pedigerous segments 1-4 with small spinules arranged in patterns as in figure 120E.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Dakin and Colefax (1940).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	surface	4 females 2.2-2.35 mm, 3 males 2.0-2.4 mm
A295	surface	12 females, 7 males, 4 copepodites
A302	0-500	1 female
A030??	surface	6 females, 8 males
AUZ46	0-10	6 females, 6 males
AUZ49	surface	1 female
		1 female 2.65 mm, 1 male 2.21 mm
AUZ51	surface	1 male 2.5 mm
AUZ111	0-100?	1 female

DISTRIBUTION: This epi- to mesopelagic species has been taken in tropical and subtropical regions of all oceans (Grice 1963b).

*Candacia longimana* (Claus, 1863) (Figs 121, 183, 193)

DESCRIPTION: Size: females: 2.86-3.90 mm, males: 3.10-3.50 mm.

Female: As in the family and generic definitions

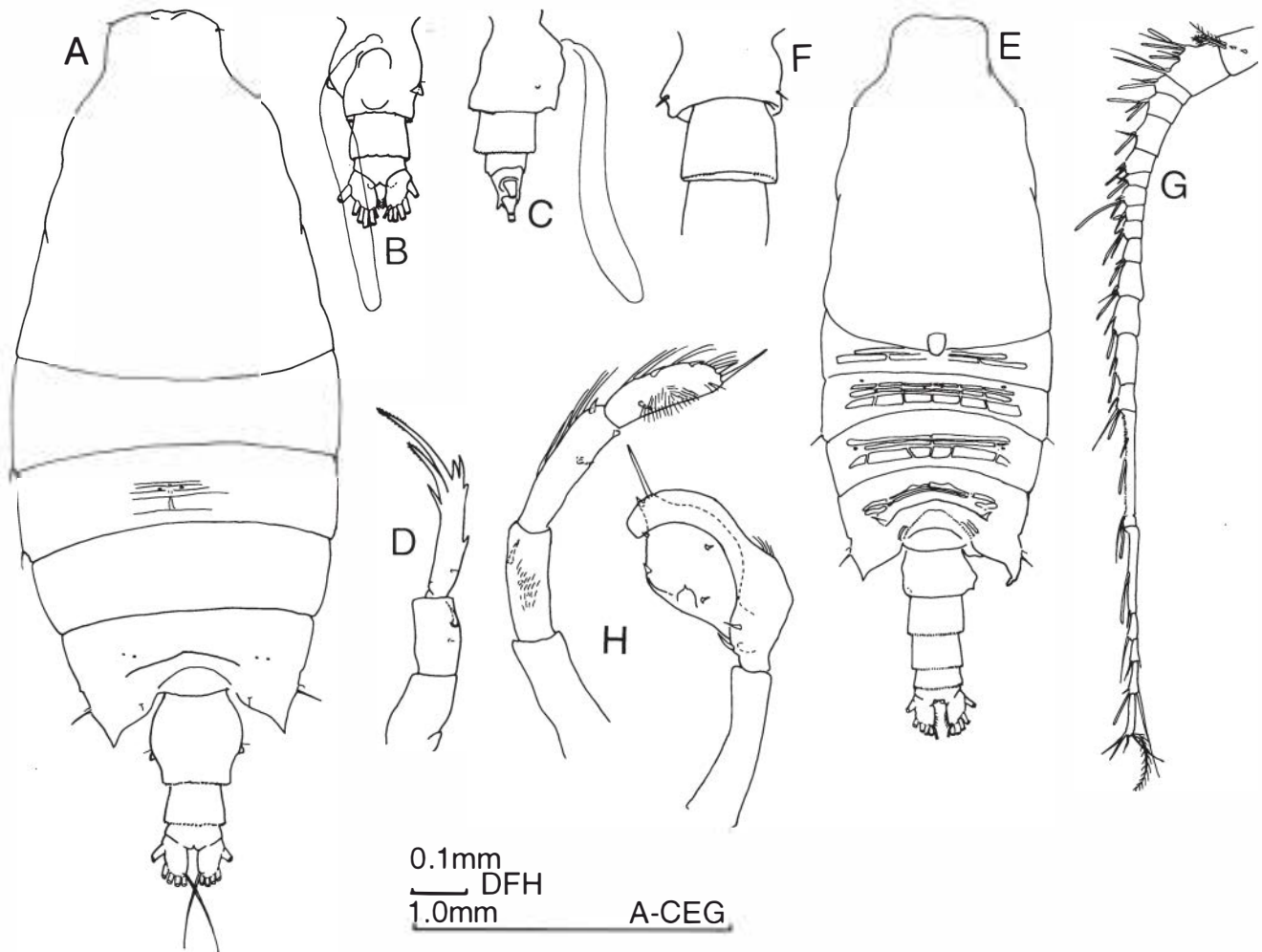


Fig. 120. *Candacia ethiopica*. Female from Stn AUZ49. Female. A, dorsal view; B, urosome, ventral view; C, urosome, lateral view; D, leg 5. Male. E, dorsal view; F, anterior part of urosome, ventral view; G, right antenna 1; H, leg 5.

with the following additional characteristics. Posterior metasome corners pointed. Genital segment symmetrical, in dorsal view its sides are distinctly swollen in the middle. Antenna 1 24-segmented. Maxilla 2 basipod 2 proximal seta thick and almost as long as distal seta. Leg 1 basipod 2 with an inner edge seta. Leg 5 3-segmented, segment 3 terminated by 3 teeth more or less equal, inner margin without setae.

(Rose 1933; Grice 1963b)

Male: As in the family and generic definitions with the following additional characteristics. Posterior metasome asymmetrical. Genital segment in dorsal view with a knob-like process. Comb on right prehensile antenna 1 finely toothed, the segment preceding and following the joint is long and slender, segments 2 and 3 separate. Leg 5 with a chela on right.

(Rose 1933; Grice 1963b)

REMARKS: The Southwest Pacific specimens appear to be identical with those recorded by Grice (1962) and Mori (1937), whereas the figures of Giesbrecht (1892)

suggest there may be some differences between Pacific and Mediterranean specimens. Urosome segment 2 of Giesbrecht's (1892) female appears to be longer (although this may not be the case because his illustrated specimen seems to have an expanded urosome), and the shape of the ventral surface of genital segment differs in lateral view; Pacific females are smoothly rounded whereas the illustrated Mediterranean female has an angular ventral protrusion at midlength with an undulating profile posterior to this protrusion.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929).

#### NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500–1000	1 male 3.1 mm
A302	0–500	1 female 3.25 mm
F879	0–1267	2 males 3.2, 3.4 mm
AUZ57	0–690	3 females, 2.86–3.33 mm
AUZ75	0–200	1 female 3.22 mm
AUZ99	0–100?	1 female 3.14 mm

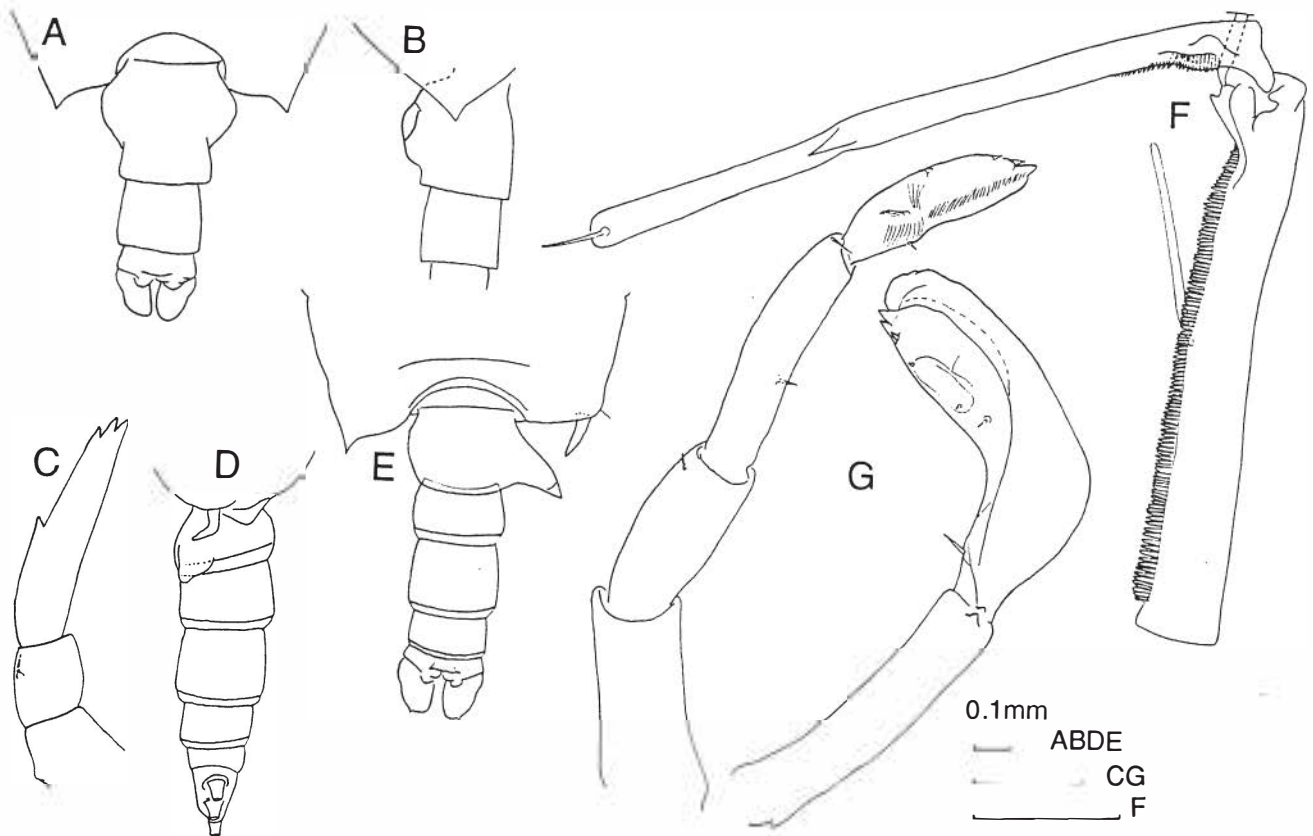


Fig. 121. *Candacia longimana*. Female from Stn AUZ57. A, urosome, dorsal view; B, urosome, lateral view; C, leg 5. Male from Stn F879, 0–1267 m. D, urosome, lateral view; E, urosome, dorsal view; F, segments either side of "knee" joint on right antenna 1; G, leg 5.

**DISTRIBUTION:** This epi- to mesopelagic species has been taken in tropical and subtropical regions of all oceans (Grice 1963b)

*Candacia maxima* Vervoort, 1957 (Figs 122, 183, 193)

**DESCRIPTION:** Size: females: 3.78–3.96 mm, males: 3.73–3.87 mm.

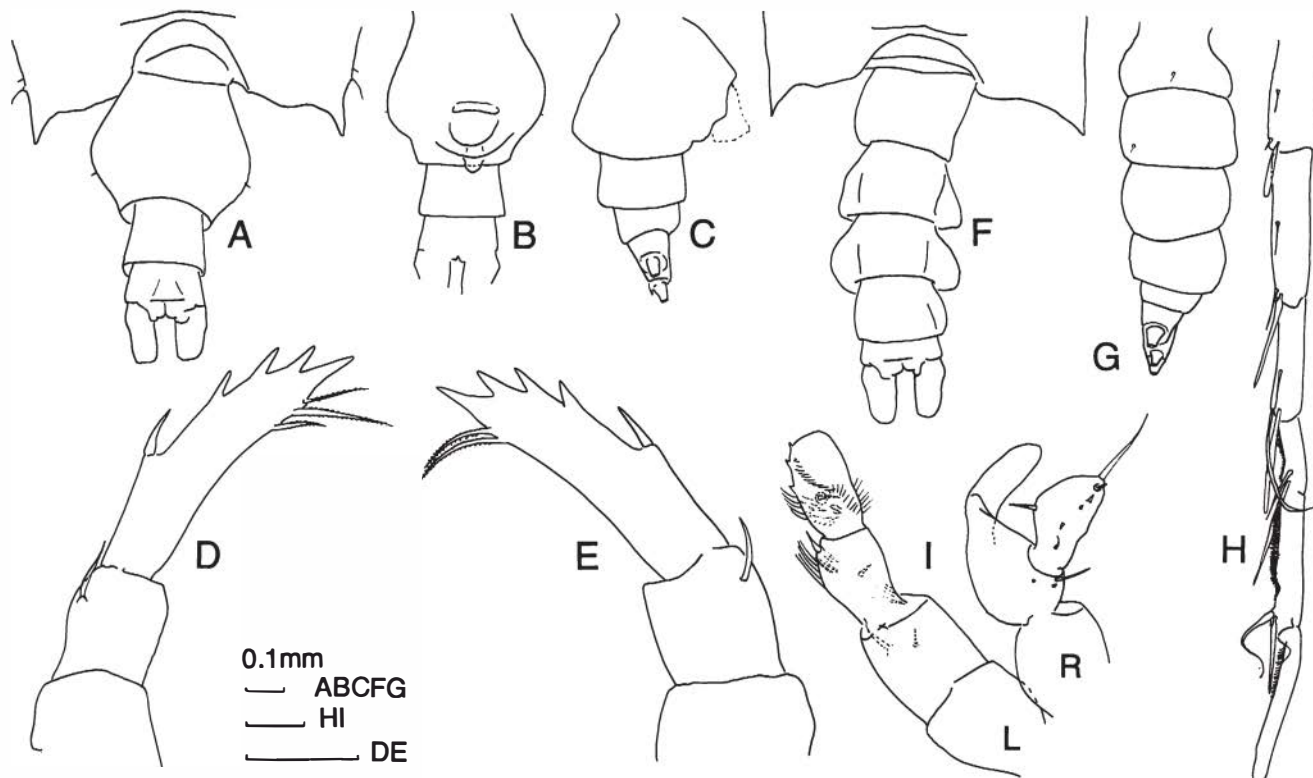
**Female:** As in the family and generic definitions with the following additional characteristics. Similar to *C. falcifera* and *C. longimana*. Posterolateral metasome border produced into acute backwards-directed spines. Genital segment is perfectly symmetrical with onion-shaped lateral swellings, urosome segment 2 symmetrical. Antenna 1 24-segmented, extends to posterior border of the metasome. Maxilla 2 basipod 2 proximal spine not notably thicker than distal spine. Leg 5 symmetrical, segments 1 and 2 are more or less fused, segment 2 with 1 outer distal seta, segment 3 produced into a strong point at apex and with 3 strong additional teeth along distal outer margin, a more slender spine is on proximal part of outer margin,

inner margin has 3 fine subapical setae.

(Vervoort 1957; Grice 1963b)

**Male:** As in the family and generic definitions with the following additional characteristics. Posterior metasome corners almost completely symmetrical in dorsal view, posterolateral margin is produced into acute points which reach almost to middle of genital segment. Urosome segments 1–4 all slightly asymmetrical but without any particularly obvious knobs or protrusions; in dorsal view genital segment without a lateral process. Right antenna 1 geniculate and 24-segmented with joint between segments 18 and 19; segments 14, 15, and 16 without thick spines, segment 17 carrying a small toothed lamella and without a distolateral spine, segment 18 with teeth, segments 19 and 20 separate; a particularly long plumose seta is found on segment 23. Leg 5 on left is 4-segmented, segments 2 and 3 with 1 external seta, segment 4 with 2 small spines on outer margin; on right, segment 3 with a curved, elongate, claw-shaped plate with a seta on outer proximal margin, segment 3 with a strong apical seta, 3 outer edge spines, and 1 fine inner edge seta.

(Vervoort 1957; Grice 1963b)



**Fig. 122.** *Candacia maxima*. Female from Stn B110, 0–500 m. **A**, urosome, dorsal view; **B**, urosome, ventral view; **C**, urosome, right side; **D**, leg 5 on one side; **E**, leg 5 on other side. Male from Stn A453, 0–100 m in the Ross Sea. **F**, urosome, dorsal view; **G**, urosome, left side; **H**, segments 14–19 of right antenna 1; **I**, leg 5.

**REMARKS:** The Southwest Pacific specimens generally agree with the original description although the male leg 5 has more spines and some segments are decorated with hairs; the 2 terminal segments on the left leg are hairy and the last 3 segments bear extra spines, right segment 3 with extra small spines (Fig. 122I). The Southwest Pacific female has its leg 5 with the inner border of segment 3 with 2 subequal setae on one side and 3 unequal setae on the other; these setae are of equal length in Vervoort's (1957) illustrated specimen.

**PREVIOUS SOUTHWEST PACIFIC RECORDS:** Nil.

**NEW RECORDS:**

Stn No.	Depth of Haul (m)	Specimens
B111	0-500	1 female 3.84 mm

**DISTRIBUTION:** This mesopelagic species has been taken in subantarctic waters (Vervoort 1957).

*Candacia norvegica* (Boeck, 1865)

(Figs 123, 183, 193)

**DESCRIPTION:** Size: females: 2.75–3.20 mm, males: 2.60–3.20 mm.

**Female:** As in the family and generic definition with the following additional characteristics. Posterior metasome with short points hardly bending outwards. Genital segment symmetrical with 2 small lateral spines, directed backwards; in lateral view there is no protuberance on ventral surface. Antenna 1 24-segmented extending as far as caudal rami. Legs 2–4 with terminal spine on exopod segment 3 longer than half the segment. Leg 5 segment 3 with 2 apical spines, 3 external spines and 3 inner setae, distal two approximately equal in length; segment 2 with an inner seta and outer spine. (Rose 1933; Grice 1963b)

**Male:** As in the family and generic definitions with the following additional characteristics. Posterior metasome with a bent hook on right, strongly pigmented. Genital segment produced horizontally on right into a knob indented distally. Right antenna 1 with segments 2 and 3 separate, the segment proximal to "knee" joint large, 7 times longer than wide and with a set of fine teeth. Leg 5 right chela relatively straight. (Rose 1933; Grice 1963b)

**REMARKS:** The female genital segment of the Southwest

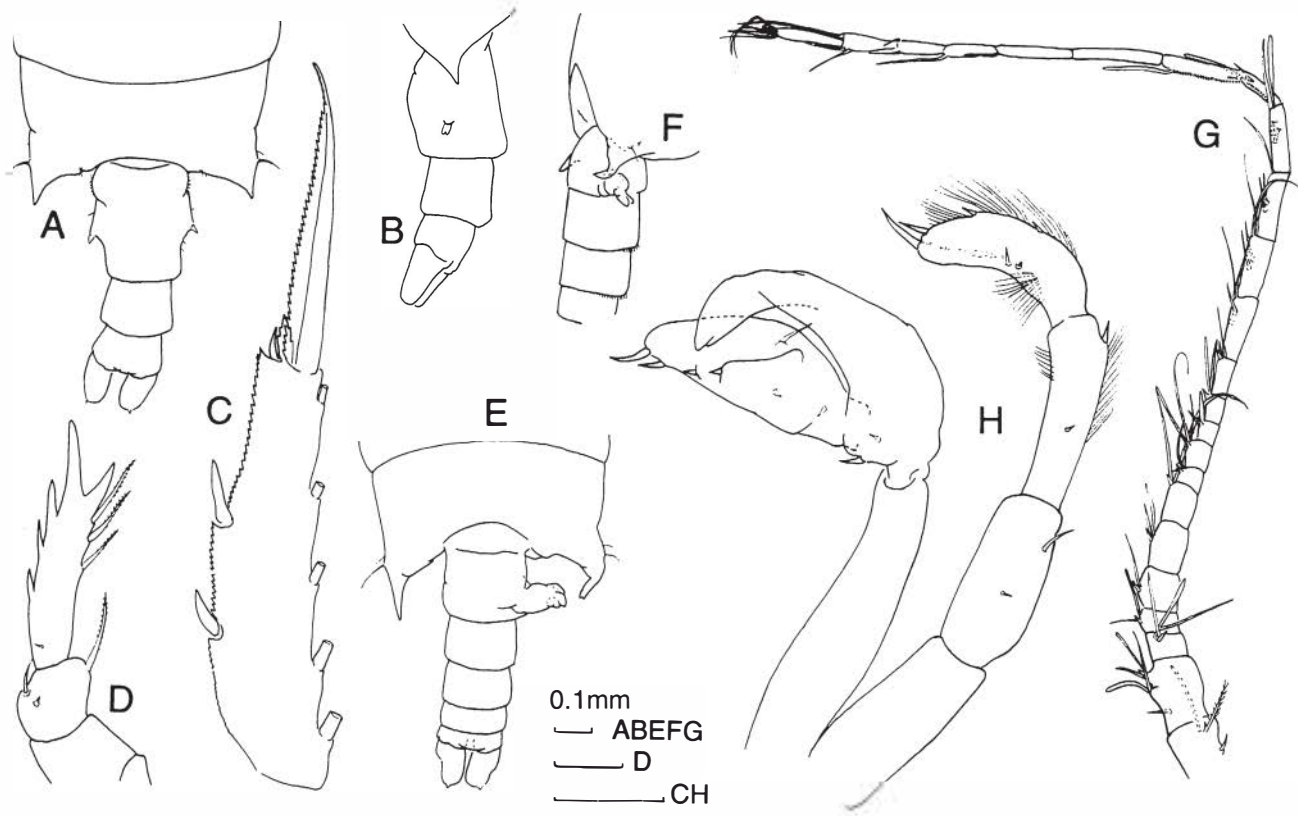


Fig. 123. *Candacia norvegica* from Stn VUZ112. Female. A, urosome, dorsal view; B, urosome, left side; C, exopod segment 3 of leg 2; D, leg 5. Male. E, urosome, dorsal view; F, dorsolateral view of anterior urosome; G, right antenna 1; H, leg 5.

Pacific specimens appears to differ slightly from the description of this species by Sars (1903) in that the swollen anterior part is bordered by small hairs.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
VUZ112	0-732	11 females 2.75-3.1 mm, 2 males 2.6 mm
Mu67/94s	0-1000	1 female 2.95 mm

DISTRIBUTION: Possibly a mesopelagic species which, with the present records, apparently occurs in both hemispheres of all oceans (Grice 1963b).

*Candacia pachydactyla* (Dana, 1849)  
(Figs 124, 183, 193)

DESCRIPTION: Size: females: 2.15-2.8 mm, males: 2.3-2.6 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior metasome corners pointed. Genital segment with 1 robust spine-like process extending obliquely posteriad from left side, and one, robust spine extending posteriad from right side; both spines surpass posterior margin on genital segment. Leg 5 segment 3 thickened with strong terminal spines, inner edge setae are short. (Rose 1933; Grice 1963b)

Male: As in the family and generic definitions with the following additional characteristics. Posterior metasome asymmetrical. Genital segment with a large process on right consisting of a single, broad and rounded projection. Right prehensile antenna 1 shortened, segments 2 and 3 fused, segments 17 and 18 fused and short. (Rose 1933; Grice 1963b)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Brady (1883); Hamilton (1896); Dakin and Colefax (1940).

NEW RECORDS: Nil.

DISTRIBUTION: This epi- to mesopelagic species has been taken in tropical and subtropical regions of all oceans (Grice 1963b; Vervoort 1965).

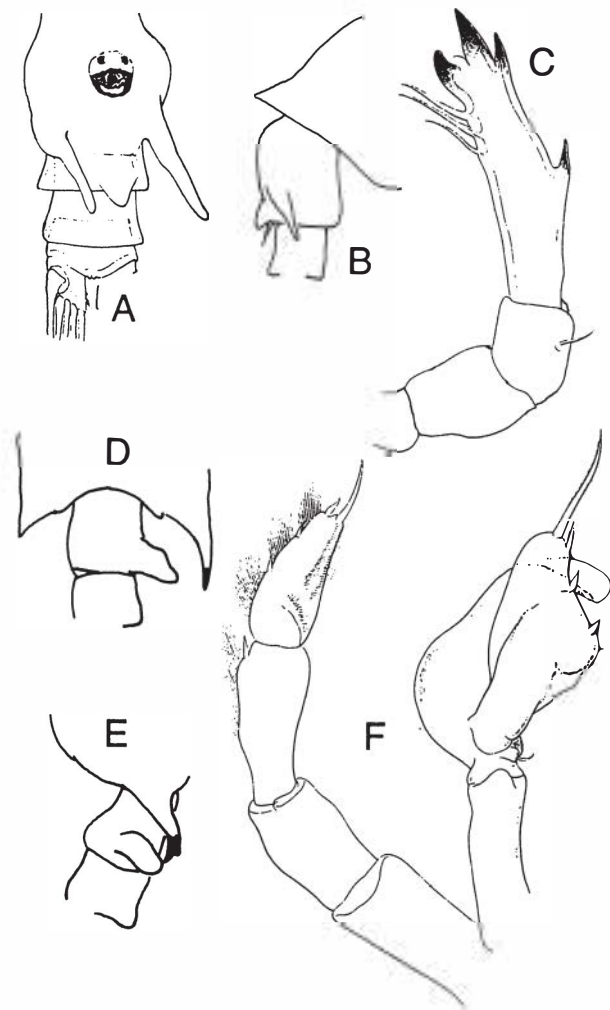


Fig. 124. *Candacia pachydactyla* from Giesbrecht (1892). Female. A, urosome, ventral view; B, urosome, left side; C, leg 5. Male. D, anterior urosome, dorsal view; E, anterior urosome, right side; F, leg 5.

*Candacia tenuimana* (Giesbrecht, 1888)  
(Figs 125, 183, 193)

DESCRIPTION: Size: females: 2.05–2.34 mm, males: 2.10–2.25 mm.

Female: As in the family and generic definitions with the following additional characteristics. Similar to *C. longimana* but maxilla 2 is shorter. Posterior metasome corners pointed. Genital segment with 1 small knob on left. Leg 5 segment 3 with 3 spines, innermost spine is largest, external spine is smaller than middle spine; inner margin without setae.

(Rose 1933; Grice 1963b)

Male: As in the family and generic definitions with the following additional characteristics. Posterior metasome corners hardly asymmetrical, a little longer on the right; the tip of the right posterior metasomal process notched. Genital segment with a pointed appendix on the right, in dorsal view it is directed outwards with the distal end curved posteriorly; with a small tubercle on the left of the genital segment. Antenna 1 24-segmented, segments 2 and 3 separate, comb finely toothed. Leg 5 on the left with its distal segment shorter than the penultimate segment.

(Rose 1933; Grice 1963b)

REMARKS: The Southwest Pacific specimens appear to agree with other descriptions of this species.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1970); Nyan Taw (1978).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	500–1000	1 male 2.1 mm (P5 damaged)
A302	0–500	2 females 2.1, 2.05 mm
A313	0–914	1 female, 1 male
F946	0–200	1 male 2.25 mm
	200–500	1 female 2.1 mm
	0–1000	1 female 2.2 mm
Mu67/88s	0–600	1 female

DISTRIBUTION: This mesopelagic species has been taken in tropical and subtropical regions of all oceans (Grice 1963b; Vervoort 1965).

*Candacia varicans* (Giesbrecht, 1892)  
(Figs 126, 183, 193)

DESCRIPTION: Size: females: 2.30–2.40 mm, males: 2.00–2.30 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior metasome corners pointed. Genital segment symmetrical. Urosome segment 2 symmetrical. Antenna 1 24-segmented. Maxilla 2 basipod 2 proximal seta as thick as, and almost as long as, distal seta. Leg 5 segment 3 with 2 spine-like points externally and 1 on each of distolateral corners, inner margin without setae.

(Rose 1933; Grice 1963b)

Male: As in the family and generic definitions with the following additional characteristics. Posterior metasome symmetrical. Right prehensile antenna 1 with segments 14 and 15 with a dorsal spine, segment 16 without a spine, segment 17 with a toothed lamella and distolateral spine onto which teeth extend, segment 18



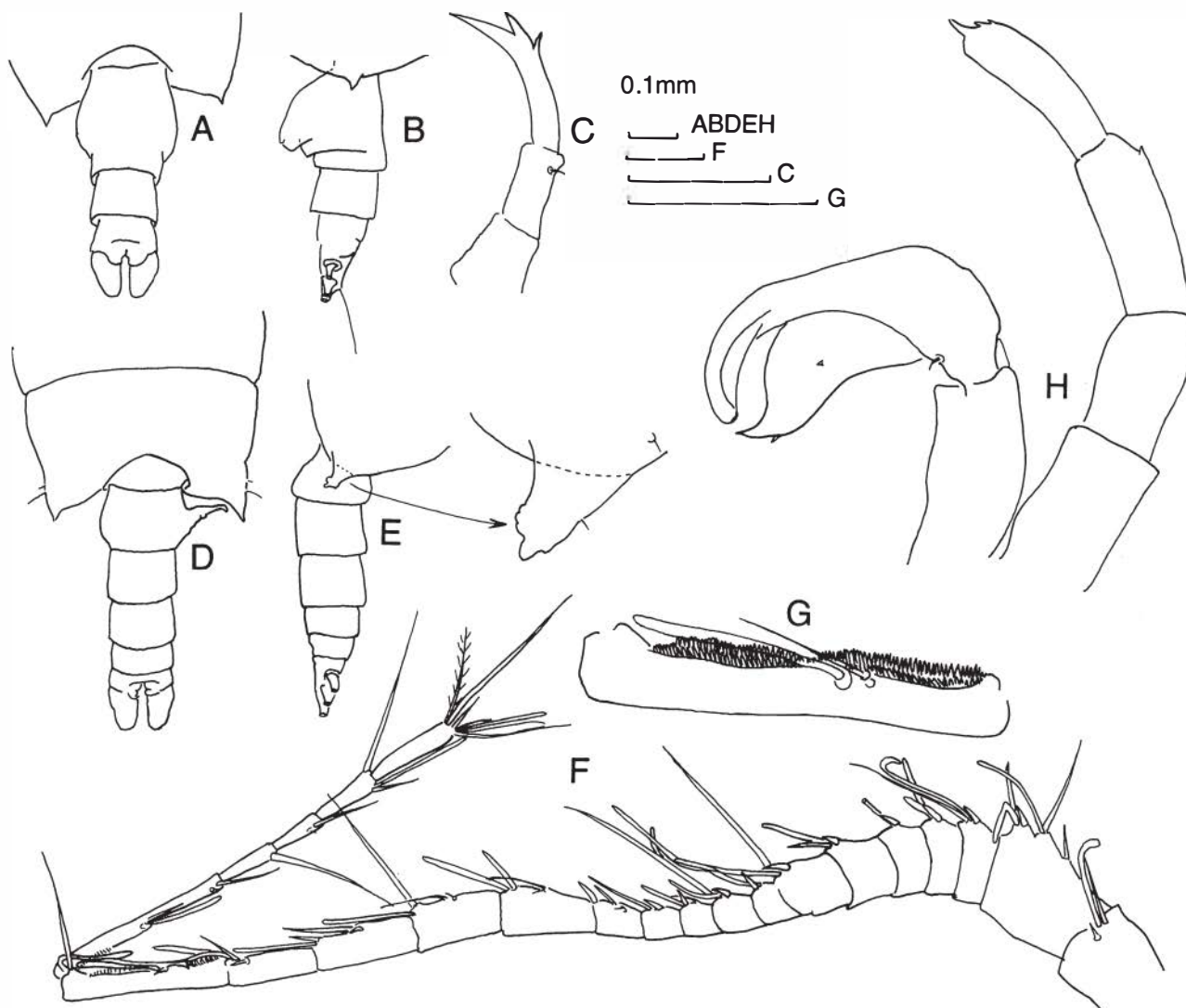


Fig. 125. *Candacia tenuimana*. Female from Stn A302, 0-500 m. A, urosome, dorsal view; B, urosome, lateral view; C, leg 5. Male from Stn F946, 200-500 m. D, urosome, dorsal view; E, urosome, right side; F, right antenna 1; G, detail of segment proximal to "knee:" joint on right antenna 1; H, leg 5.

with coarse pigmented teeth, segments 19 and 20 fused and with small teeth on the proximal end of these fused segments. Right leg 5 chelate.

(Rose 1933; Grice 1963b)

REMARKS: The Southwest Pacific specimens appear to agree with the original description. Male left leg 5 with 2 terminal segments hairy in the Southwest Pacific specimens.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F945	0-500	3 females 2.3-2.4 mm, 1 male 2.0 mm
F946	0-200	2 females 2.4 mm
F947	0-200	1 female 2.3 mm, 2 males 2.2-2.3 mm

DISTRIBUTION: Probably an epi- to mesopelagic species widespread in tropical and subtropical waters of all oceans (Grice 1963b; Vervoort 1965).

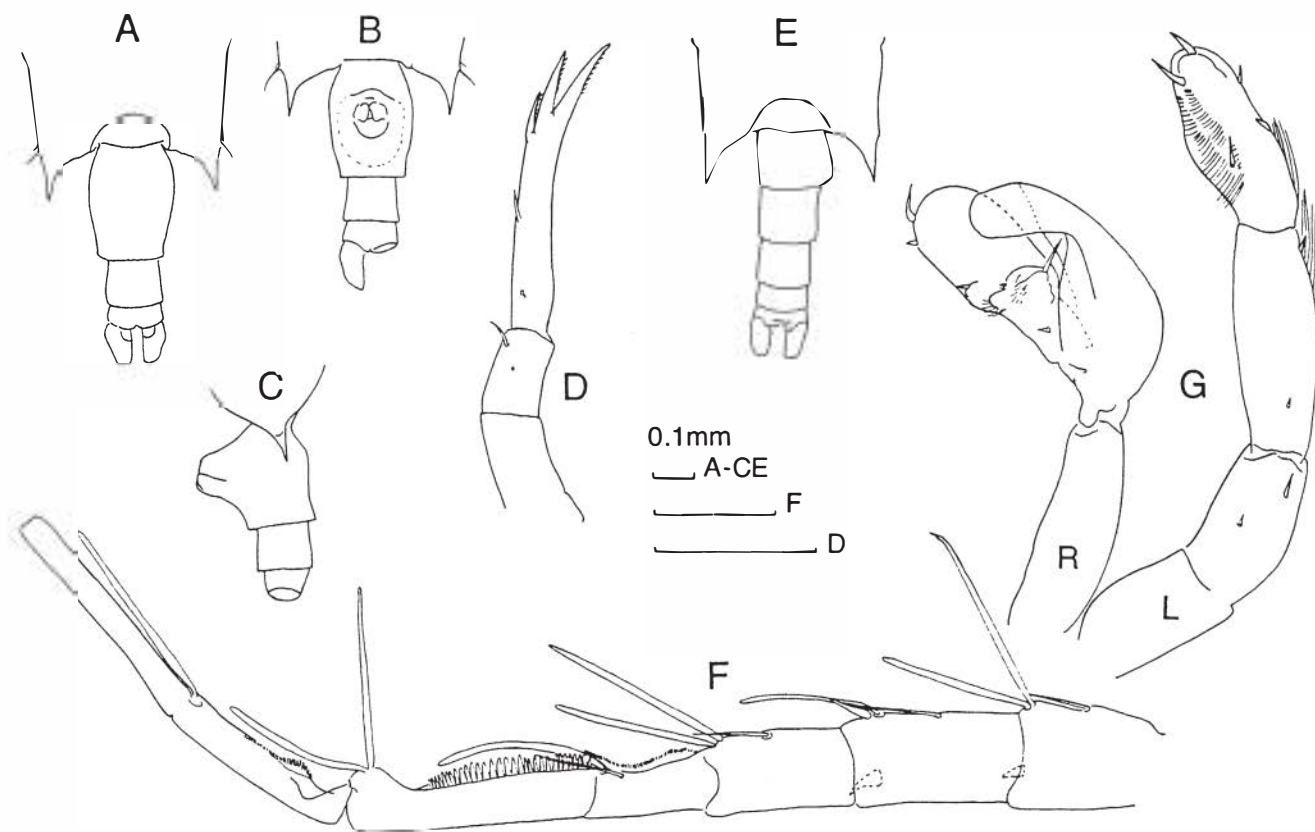


Fig. 126. *Candacia varicans* from Stn F947, 0–200 m. Female. A, urosome, dorsal view; B, urosome, ventral view; C, urosome, lateral view; D, leg 5. Male. E, urosome, dorsal view; F, part of geniculate antenna 1; G, leg 5.

*Paracandacia* Grice, 1963b

DEFINITION: As in the family definition with the following additional characteristics. Right antenna 1 of male with segments 17–18 and 19–20 fused and there are no teeth in the geniculate region. In both sexes the basal tooth of the mandible is simple except in *P. simplex* which has a minute point arising from the external side of the basal tooth near its tip. The proximal spine on basipod 2 of maxilla 2 is approximately half the length of the distal spine and is considerably thinner than the distal spine. Female leg 5 terminal segments end in a finger-like process which may be finely serrated on one of both margins. There are 2 setae on the inner lateral margins of these segments. Male right leg 5 is not chelate; it ends in a long feather-like seta.

TYPE SPECIES: *Candace truncata* Dana, 1849

REMARKS: The following species have been described: *P. bispinosa* (Claus, 1863); *P. simplex* (Giesbrecht, 1889) (= *C. parasimplex* Brodsky, 1962); *P. truncata* (Dana, 1849); *P. worthingtoni* Grice, 1981. The following species have been taken in the Southwest Pacific.

*Paracandacia simplex* (Giesbrecht, 1889)

(Figs 127, 183, 193)

Description. Size: females 1.85–2.30 mm, males 1.80–2.05 mm.

Female: As for the family and generic definitions with the following additional characteristics. Posterior metasome points directed backwards. Genital segment almost symmetrical, without spine-like protrusions. Leg 5 segment 3 terminal finger-like process finely serrated proximally; with 2 inner edge setae the distal-most of which is approximately twice as long as the proximal seta. (Rose 1933; Grice 1963b)

Male: As for the family and generic definitions with the following additional characteristics. Right antenna 1 segments 17–18 and 19–20 (fused) without knob-like or elongate protrusions. (Rose 1933; Grice 1963b)

REMARKS: The Southwest Pacific female has small spinules on the left side of the genital segment as well as larger spinules on the right unlike the specimen figured by Giesbrecht (1892).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Nyan Taw (1978).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F945	0-200	1 female 2.05 mm

DISTRIBUTION: This epipelagic species has been taken in tropical, subtropical and temperate regions of all oceans (Grice 1963b; Vervoort 1965).

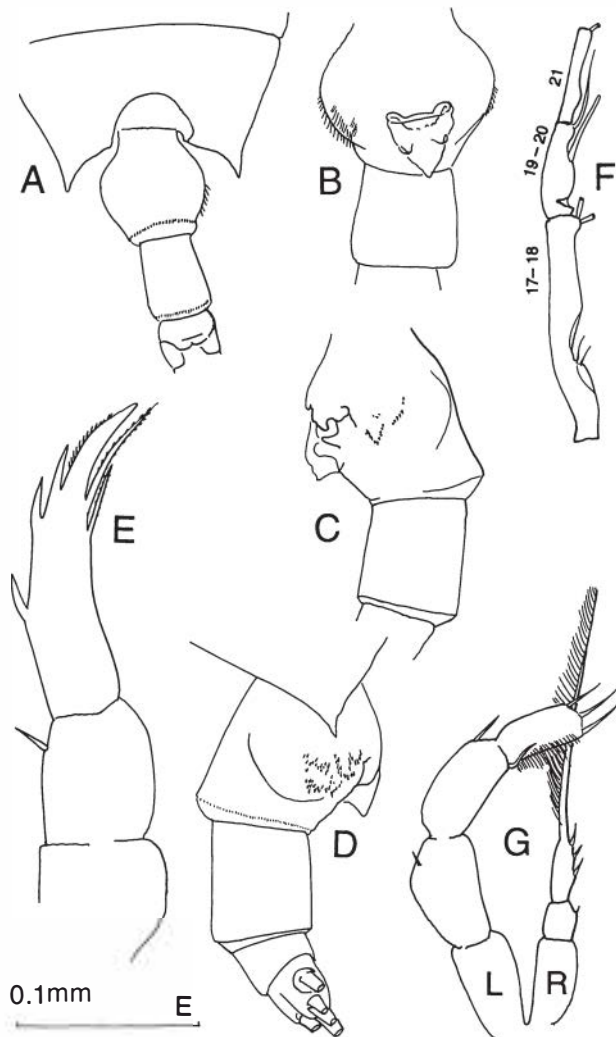


Fig. 127. *Paracandacia simplex*. Female from Stn F945, 0-200 m. A, urosome, dorsal view; B, genital segment, ventral view; C, genital segment, left side; D, urosome, right side; E, leg 5. Male. F, right antenna 1, segments 17-21 (from Grice 1963); G, leg 5 (from Giesbrecht 1892).

*Paracandacia truncata* (Dana, 1849)  
(Figs 128, 183, 193)

DESCRIPTION: Size: females 2.1 mm, males, 2.1 mm.  
Female: As for the family and generic definitions with the following additional characteristics. Posterior

corners of metasome are pointed and directed ventrally so that they are scarcely visible from above. Anal segment short and often fused with caudal rami. Antenna 1 23-segmented, proximal 8 segments are thickened. Maxilla 2 marginal spine 2 of segment 3 is much longer and thicker than spine 1. Leg 5 segment 3 terminal finger-like process finely serrated distally; inner margin setae subequal, distalmost seta is slightly longer than the proximal seta. (Mori 1937; Grice 1963b)

Male: As for the family and generic definitions with the following additional characteristics. Urosome and caudal rami symmetrical. Right prehensile antenna 1 with terminal section of 5 segments; segment 16 with an elongate protrusion distally, segment 19-20 (fused) is not produced. Left leg 5 segment 4 with 3 setae; right leg is not chelate and segment 3 terminates in a long plumose seta. (Mori 1937; Grice 1963b)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Brady (1883); Dakin and Colefax (1940); Greenwood (1978).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in the Pacific and Indian Oceans (Grice 1963b; Greenwood 1978).

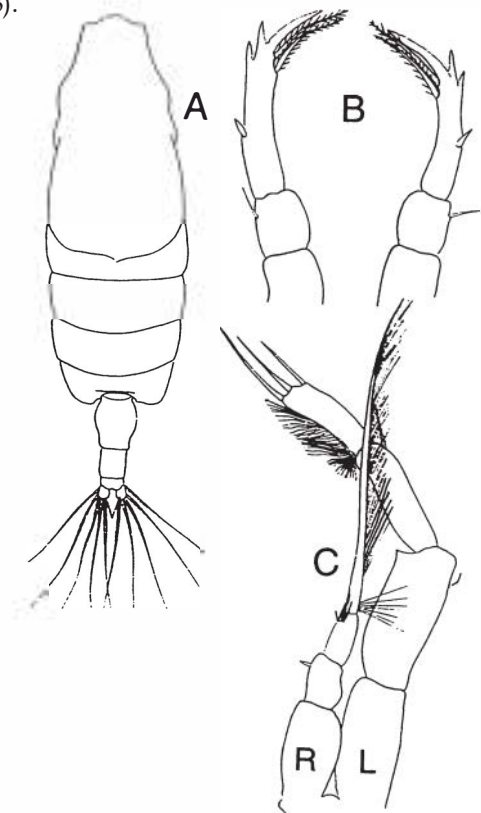


Fig. 128. *Paracandacia truncata* from Dakin and Colefax (1940). Female. A, dorsal view; B, leg 5. Male. C, leg 5.

*Paracandacia worthingtoni* Grice, 1981  
(Figs 129, 193, 193)

DESCRIPTION: Size: females 1.50–1.80 mm, males 1.70–1.90 mm.

Female: As for the family and generic definitions with the following additional characteristics. Fused pedigerous segments 4 and 5 pointed. Genital segment asymmetrical in dorsal view; right side protuberant, bearing patches of hair. Urosome segment 2 with a small number of hairs on right lateral side. Terminal finger of leg 5 finely serrate on external margin, internal setae subequal. (Grice 1981)

Male: As for the family and generic definitions with the following additional characteristics. Fused pedigerous segments 4 and 5 pointed, points asymmetrical. Urosome segments 2 and 3 subequal. Right antenna 1 segment 16 with an elongate protuberance, segments 19–20 fused and bearing 2 small rounded knobs. Left leg 5 segment 3 with an outer edge elongate spine; right segment 3 with its lateral spines equal in size. (Grice 1981)

REMARKS: This species is similar to *P. bispinosa* but may be distinguished from it by the absence of large lateral spines on the genital segment in female and by the presence of small rounded protuberances on segment 19–20 of the right antenna 1 and the details of leg 5 in

male. The Southwest Pacific female specimens have more elongate points on last metasomal segment, there are some differences in details of decoration on genital segment including a conspicuous tapering spine on right side which is surrounded by fine hairs, and both borders of terminal finger-like process may be finely serrated on leg 5.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Grice (1981); the specimens which Farran (1929) identified as *C. bispinosa* may in fact be this species.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
F945	0–500	3 females 2.3–2.4 mm,
A292	surface	1 male 1.8 mm
A295	surface	4 females, 1 male
A302	surface	1 female, 2 males
	0–500	2 females 1.8 mm,
		2 males 1.8, 1.9 mm
C537	surface	1 female 1.75 mm
C544	surface	1 female 1.73 mm;
		1 male 1.78 mm

DISTRIBUTION: This epipelagic species has been taken in the south central Pacific (Grice 1981).

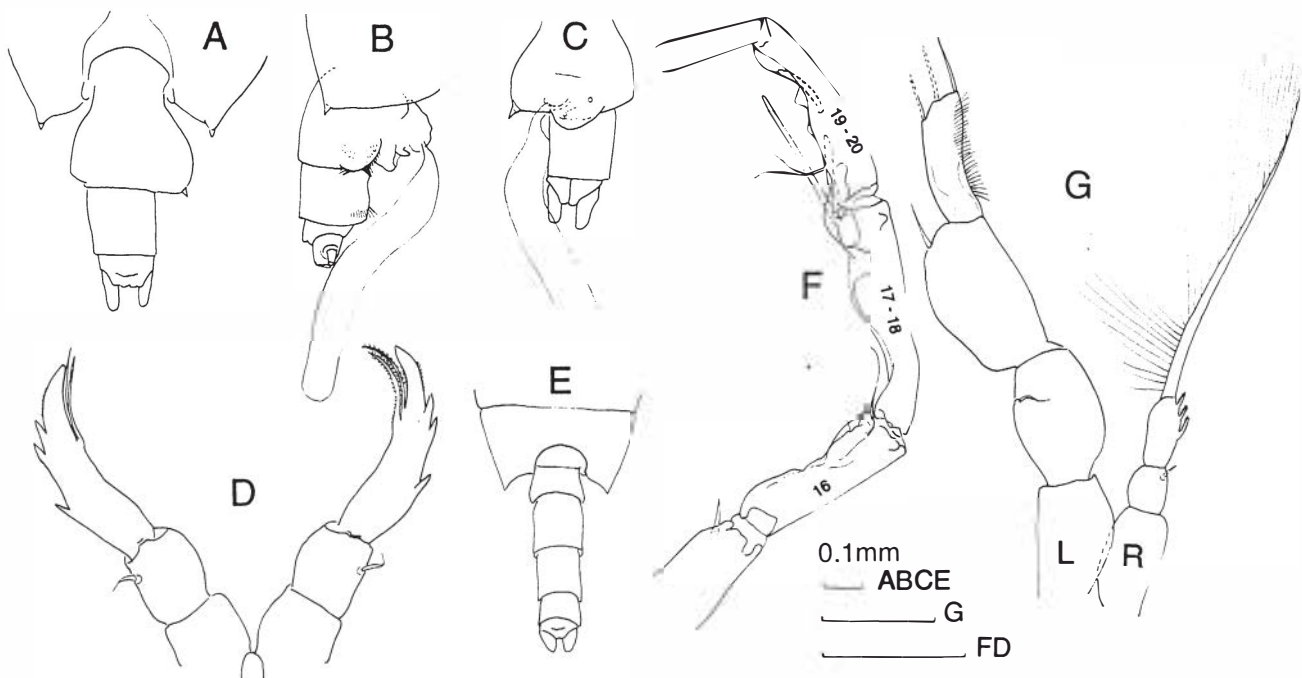


Fig. 129. *Paracandacia worthingtoni*. Female from Stn A295, surface. A, urosome, dorsal view; B, urosome, lateral view; C, urosome, ventral view; D, leg 5. Male from Stn A302, 0–200 m. E, urosome, dorsal view; F, segments 15–21 of right antenna 1; G, leg 5.

Family **PONTELLIDAE** Dana, 1853

**DEFINITION:** Female: Head and pedigerous segment 1 separate, sometimes with a hook on the lateral borders; pedigerous segments 4 and 5 fused or separate, usually with asymmetrical expansions. Rostrum bifurcate, sometimes with a widened base incorporating a lens. Eyes usually large, with 1 or 2 pairs of dorsal chitinous lenses and 1 ventral lens. Urosome 1- to 3-segmented in female, often asymmetrical; genital area covered by a genital operculum, without seminal receptacles; caudal rami with up to 6 setae. Antenna 1 with 16–24 segments. Antenna 2 basipods 1 and 2 separate with 1 and 2 setae respectively; endopod much larger than the exopod; exopod usually 5-segmented with 1, 3, 2, 2, 4 setae in *Anomalocera patersoni*, terminal segment atrophied or rudimentary; proximal segment of the endopod more or less fused to basipod with 2 setae, compound distal segment bilobed with 9, 7 setae or with setation reduced. Mandibular blade with 5–7 teeth, basipod 2 with 4 setae, exopod 5-segmented with 1, 1, 1, 1, 2 setae and endopod 2-segmented with 3 and 6 setae and of similar size. Maxilla 1 with inner lobe 1 large with 8–10 spines and setae; inner lobe 2 as long as inner lobe 1 with 3 setae; inner lobe 3 short with 3 setae; basipod 2 with 3 setae; proximal endopod segment fused to basipod 2, endopod segments with 2, 2, 5 setae or reduced; exopod relatively small, sometimes atrophied with 9 setae; outer lobe 2 with 1 seta; outer lobe 1 with 7–8 setae. Maxilla 2 with long, strong setae although sometimes rudimentary on the proximal part of limb; lobes 1–5 usually with 4, 3, 3, 3, 2 setae; endopod setation 1, 1, 2, 2. Maxilliped small 5- or 6-segmented with basipod 1 large with inner border lobed and with 0, 2, 2, 2/3 long setae; basipod 2 and endopod short, basipod 2 with 2 or 3 setae, free endopod 3- or 4-segmented with 2, 2, 2+1, 3 setae or with setation reduced. Exopods of swimming legs 1–4 3-segmented. Endopod of leg 1, 2- or 3-segmented; of legs 2, 3 and 4, 2-segmented. Spine and setal formula typically, although setation may be reduced:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0–1	0–0	I-1; I-1; II, I, 4	0–1; 0–2; 1, 2, 3
Leg 2	0–1	0–0	I-1; I-1; III, I, 5	0–3; 2, 2, 4
Leg 3	0–1	0–0	I-1; I-1; III, I, 5	0–3; 2, 2, 4
Leg 4	0–1	0–0	I-1; I-1; III, I, 5	0–3; 2, 2, 3

Female leg 5 not natatory, rudimentary, basipod 1 fused with the coupler; basipod 2 with 1 seta; exopod 2-segmented, segment 1 with 2 outer spines and inner distal spinous process, segment 2 with 1 or 2 spines plus an apical spinous process, or exopod may be 1-segmented and armed with spinous processes or tapering to a point; endopod 1-segmented with a

simple or bifid apex or absent.

Male: Male urosome, eyes, rostrum and pedigerous segment 5 often exhibit secondary sexual characteristics. Urosome 4–5-segmented, free urosome segments sometimes with asymmetrical processes, genital opening on left. Antenna 1 prehensile on right, middle section swollen, terminating in 2–4 segments. Mouthparts identical to those of female. Leg 5 asymmetrical, basipod 1 and coupler fused to form a transverse plate, sometimes with basipod 1 free on right side only; right leg subchelate, comprising an unarmed basipod 1, basipod 2 with 1 seta, and 2-segmented exopod: segment 1+2 swollen with an outer process and spine, segment 3 forming a subchela. Left leg 5 comprising basipod 2 with an outer seta; exopod segment 1 elongate with an outer seta; exopod segments 2 and 3 partly fused with up to 4 outer and distal spines on apical segment. (Rose 1933; Barthélémy *et al.* 1998; Boxshall in prep.)

An example of this family is *Pontella novaezelandiae* (Figs 130, 131).

**REMARKS:** This family contains the following genera: *Anomalocera* Templeton, 1837; *Calanopia* Dana 1852; *Epilabidocera* Wilson, 1932; *Ivellopsis* Claus, 1893 (see Wickstead & Krishnaswamy 1964); *Labidocera* Lubbock, 1853; *Pontella* Dana, 1846; *Pontellina* Dana, 1849; *Pontellopsis* Brady 1883. Silas and Pillai (1973) have made a useful review of the family with special reference to the Indian Ocean. Members of this family have mouthparts modified for carnivory although they also can eat phytoplankton (Turner 1978; Ohtsuka & Onbé 1991). Pontellidae are carnivorous based on mouthpart morphology (Itoh 1970; Ohtsuka & Onbe 1991), gut contents (Itoh 1970; Otsuka 1985a; Ohtsuka & Onbe 1991; Krambrun & Champalbert 1995), and in laboratory feeding studies (Landry 1978; Greene 1988). Pontellidae usually inhabit the neustonic environment and live in close association with the thin film at the sea surface (Turner *et al.* 1979; Matsuo & Marumo 1982; Champalbert 1985; Ohtsuka 1985). Several members of this family have a surface attachment structure (a mass of fine setules arranged in two semicircles on a flattened area of the anterodorsal surface of the cephalosome) which appears to allow the copepods to stay attached to the surface film (Ianora *et al.* 1992). *Anomalocera* and *Pontella* exhibit a circadian rhythm and swimming activity is increased by increasing pressure (Champalbert 1979). Members of the Pontellidae often have blue photoprotective pigment (Momzikoff 1983). There is also a tendency for some species in this family to produce resting eggs (Uye *et al.* 1984; Lindley 1990).

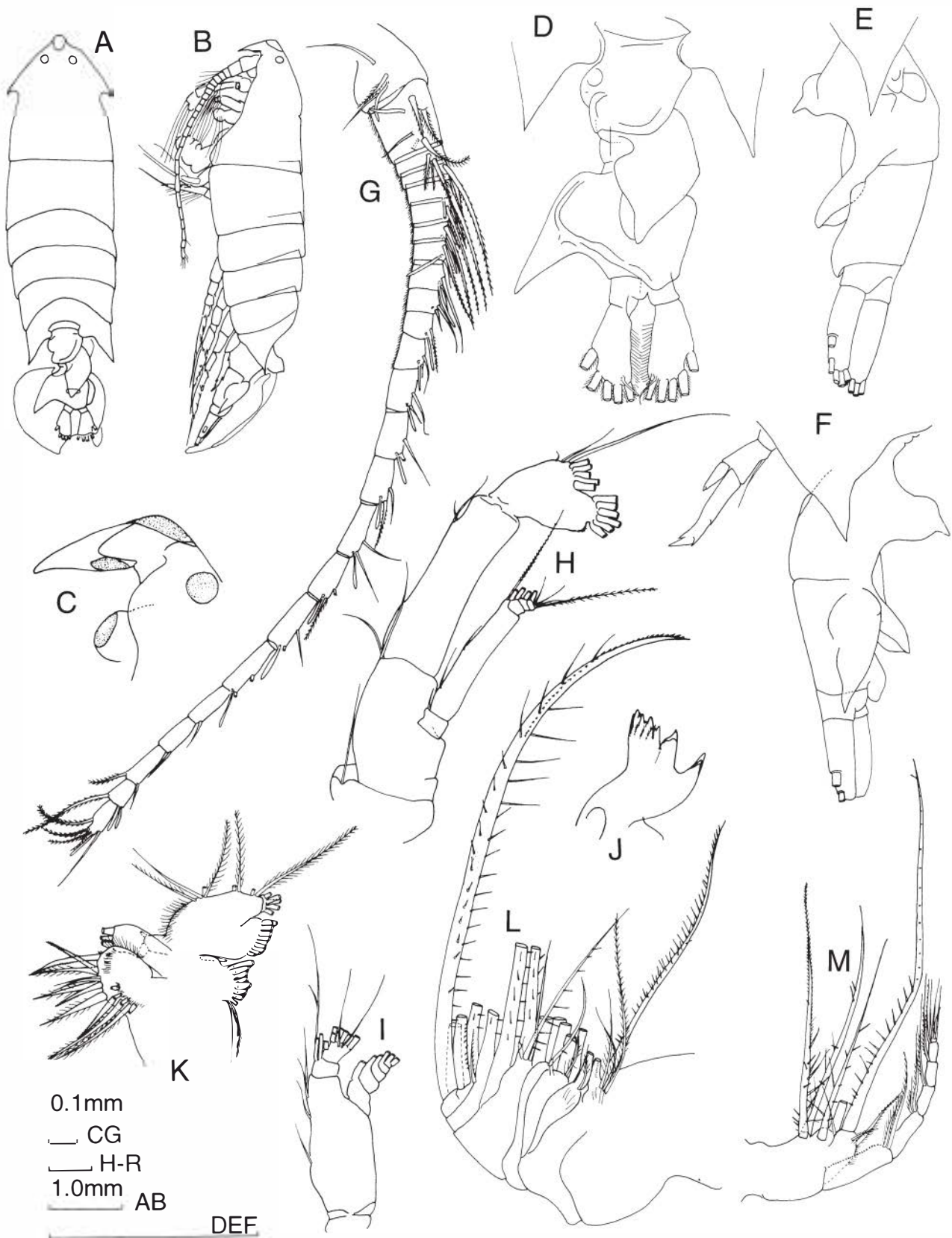
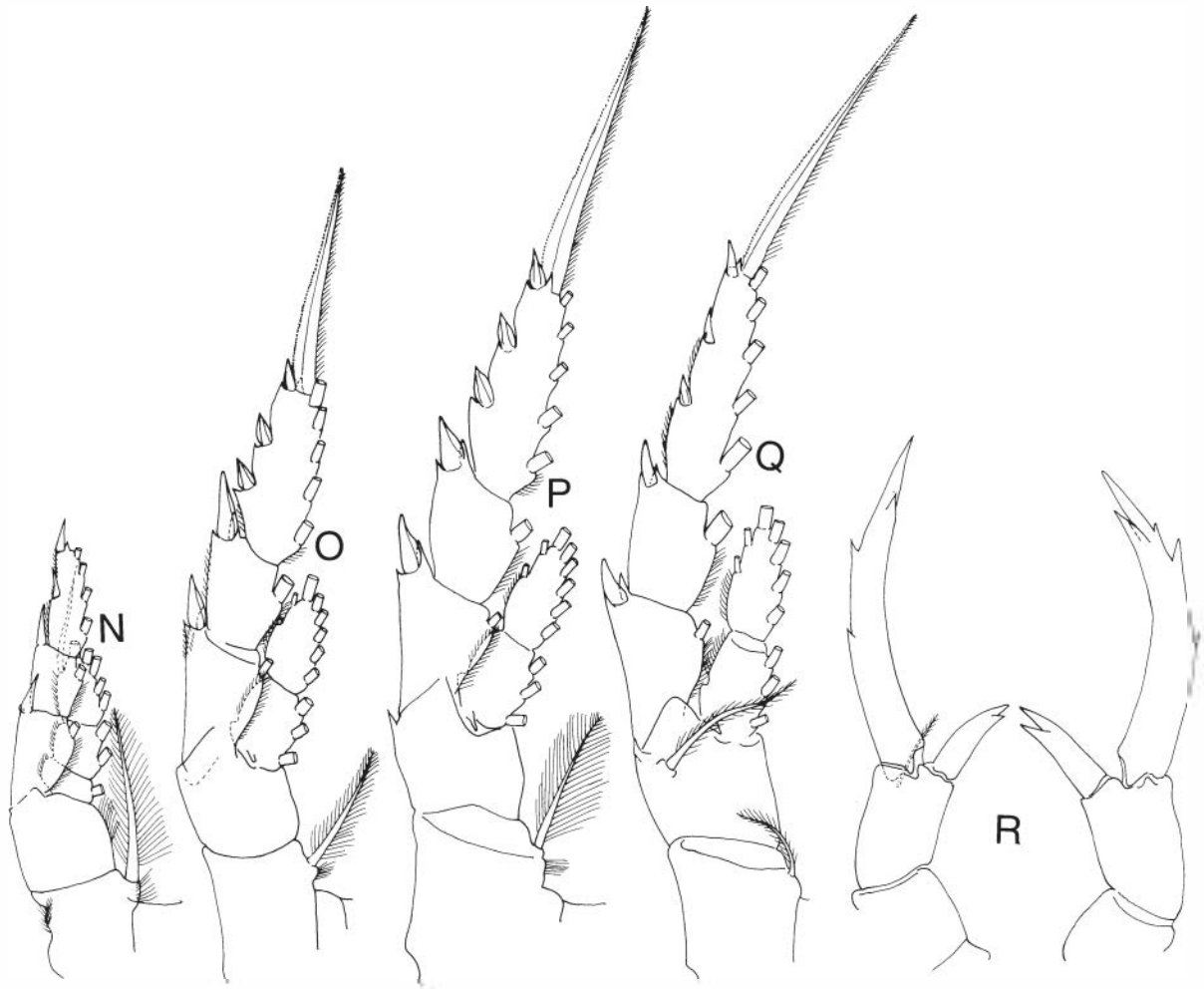


Fig. 130. *Pontella novaezelandiae*. Female from Stn J1/57/72. A, dorsal view; B, lateral view; C, anterior head and rostrum, lateral view; D, urosome, dorsal view; E, urosome, right side; F, urosome, left side; G, antenna 1; H, antenna 2; I, mandibular palp; J, mandible blade; K, maxilla 1; L, maxilla 2; M, maxilliped; Facing page: N, leg 1; O, leg 2; P, leg 3; Q, leg 4; R, leg 5.



*Anomalocera* Templeton, 1837

DEFINITION: As in the family definition with the following additional characteristics. Female head with lateral hooks, 2 pair of dorsal lenses; no rostral lens. Pedigerous segments 4 and 5 separate, the latter extending into points. Urosome 3-segmented, genital segment asymmetrical. Antenna 1 20-segmented. Mandible with 7 pointed teeth. Maxilla 1 basipod 2 hardly as large as inner lobe 2. Other appendages as in *Pontella*. Leg 5 exopod 2-segmented; endopod 1-segmented. Male ventral eye more prominent than in female. Male posterior metasomal points and urosome asymmetrical. Male antenna 1 prehensile as in *Pontella*. Male leg 5 as in *Pontella* but the right chela is much stronger. (Rose 1933)

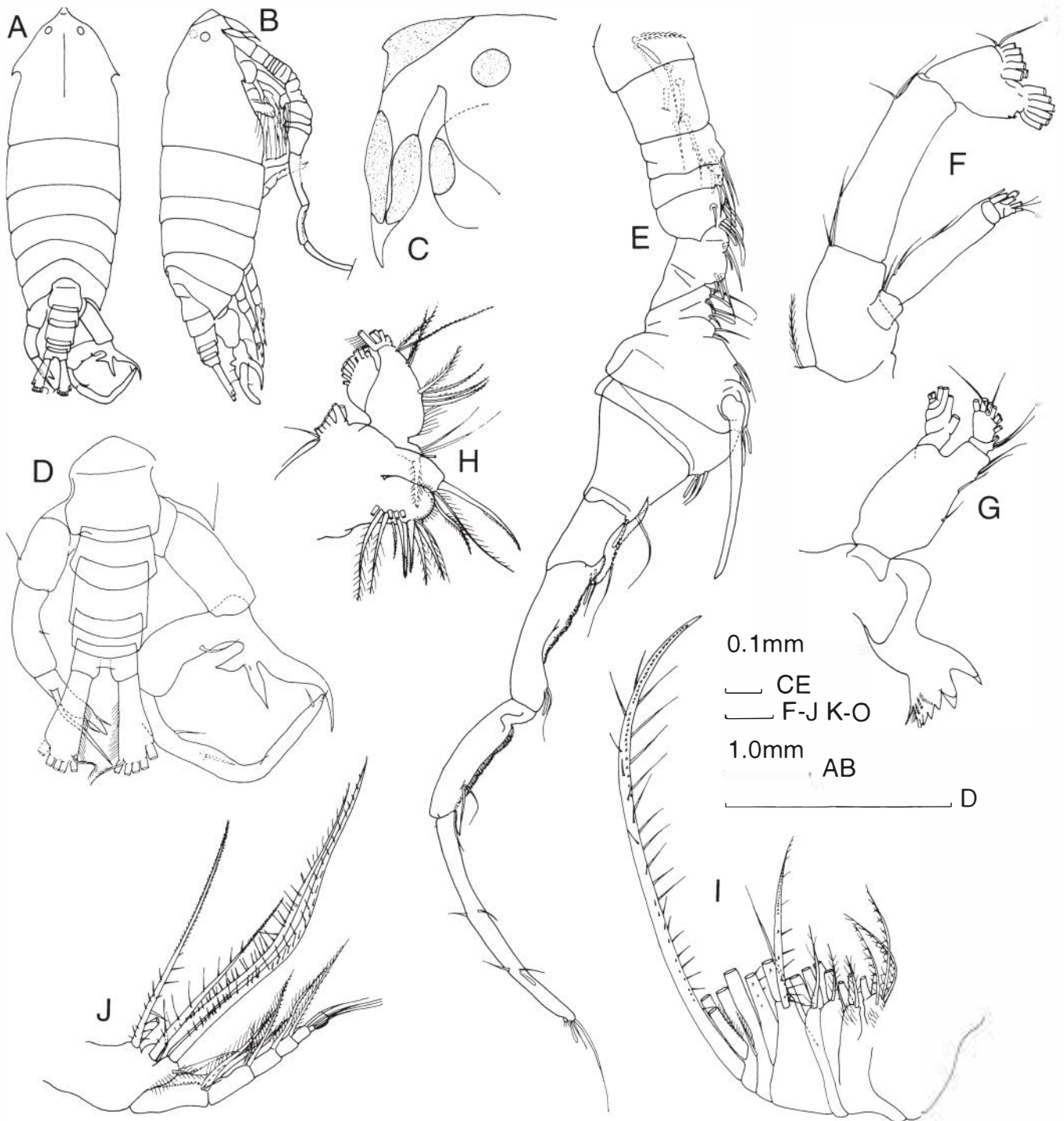
TYPE SPECIES: *Anomalocera patersonii* Templeton, 1837

REMARKS: This genus contains the following species: *Anomalocera opalis* Pennell, 1976; *A. ornata* Sutcliffe,

1949; *A. patersonii* Templeton, 1837, none of which has been taken in the Southwest Pacific.

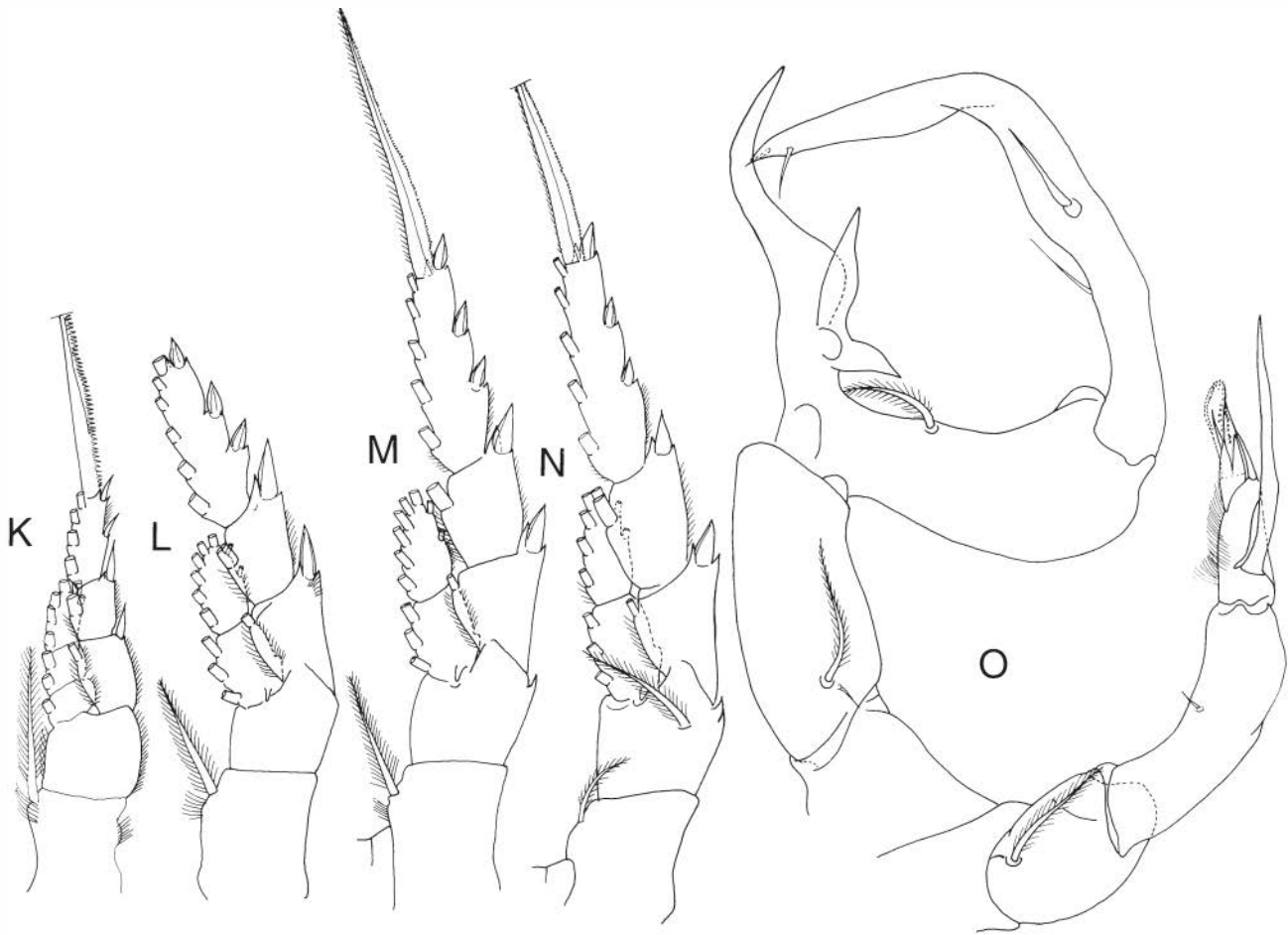
*Calanopia* Dana, 1852

DEFINITION: As in the family definition with the following additional characteristics. Head with or without lateral hooks; head and pedigerous segment 1 usually separate, pedigerous segments 4 and 5 fused. Head without dorsal cuticular lenses. Urosome 2-segmented in the female, symmetrical or slightly asymmetrical; 5-segmented in the male; caudal rami about 2-3 times as long as wide. Male right antenna 1 geniculate with a 4-segmented terminal section. Antenna 2 exopod longer than half the endopod. Leg 1 endopod 2-segmented. Female leg 5 symmetrical or slightly asymmetrical, 3 or 4-segmented, endopod absent. Male leg 5 4-segmented on both sides, 2 distal segments of the right leg forming a stout chela. (Mori 1937)



**Fig. 131.** *Pontella novaezelandiae*. Male from Stn J1/57/72. **A**, dorsal view; **B**, lateral view; **C**, anterior head and rostrum, lateral view; **D**, urosome, dorsal view; **E**, right antenna 1; **F**, antenna 2; **G**, mandible; **H**, maxilla 1; **I**, maxilla 2; **J**, maxilliped; Facing page: **K**, leg 1; **L**, leg 2; **M**, leg 3; **N**, leg 4; **O**, leg 5.





TYPE SPECIES: *Pontella elliptica* Dana, 1846

REMARKS: The following species have been described in this genus: *Calanopia americana* Dahl, 1894; *C. asymmetrica* Mulyadi & Ueda, 1996; *C. aurivilli* Cleve, 1901; *C. australica* Bayly & Greenwood 1966; *C. biloba* Bowman, 1957; *C. elliptica* (Dana, 1846); *C. herdmani* A. Scott, 1909; *C. media* Gurney, 1927; *C. minor* A. Scott 1902; *C. parathompsoni* Gaudy, 1969; *C. sarsi* Wilson, 1950; *C. sewelli* Jones & Park, 1967; *C. seymouri* Pillai, 1969; *C. thompsoni* A. Scott, 1909. The following species have been taken in the Southwest Pacific.

*Calanopia aurivilli* Cleve, 1901 (Figs 132, 184, 194)

DESCRIPTION: Size: females: 1.34–1.45 mm, males: 1.12–1.38 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior metasomal points moderately long. Urosome segment 2 slightly longer than genital segment. Caudal rami

almost twice as long as wide. Maxilliped with apical part 4-segmented. Leg 5 symmetrical, exopod 1-segmented, terminated in 3 spines, the innermost of which is plumose, and with 1 outer edge spine. (A. Scott 1909)

Male: As in the family and generic definitions with the following additional characteristics. Maxilliped with apical part 4-segmented. Leg 5 left basipod 2 inflated and fringed with small spines; exopod segment 2 is equal to two-thirds the length of exopod segment 1; the right exopod segment 1 moderately broad with a well developed "thumb", palm simple; claw-like second segment is spoon-shaped. (A. Scott 1909)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in the warm waters of the Indo-Pacific (Tanaka 1964c; Farran 1929).

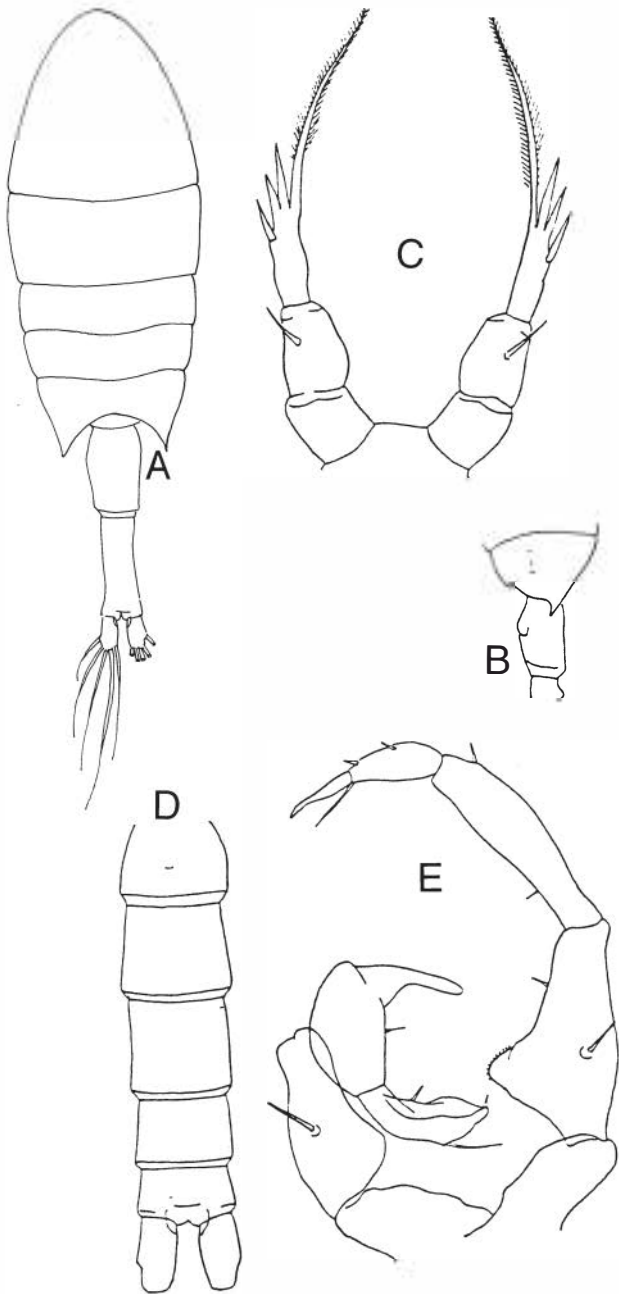


Fig. 132. *Calanopia aurivilli* from A. Scott (1909). Female. A, dorsal view; B, genital segment, left side; C, leg 5. Male. D, urosome, dorsal view; E, leg 5.

*Calanopia australica* Bayly & Greenwood, 1966  
(Figs 133, 184, 194)

DESCRIPTION: Size: females: 1.84–2.06 mm, males: 1.74–1.98 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head angular, with cephalic hooks; posterior metasome produced into a symmetrical spine on each side. Uro-

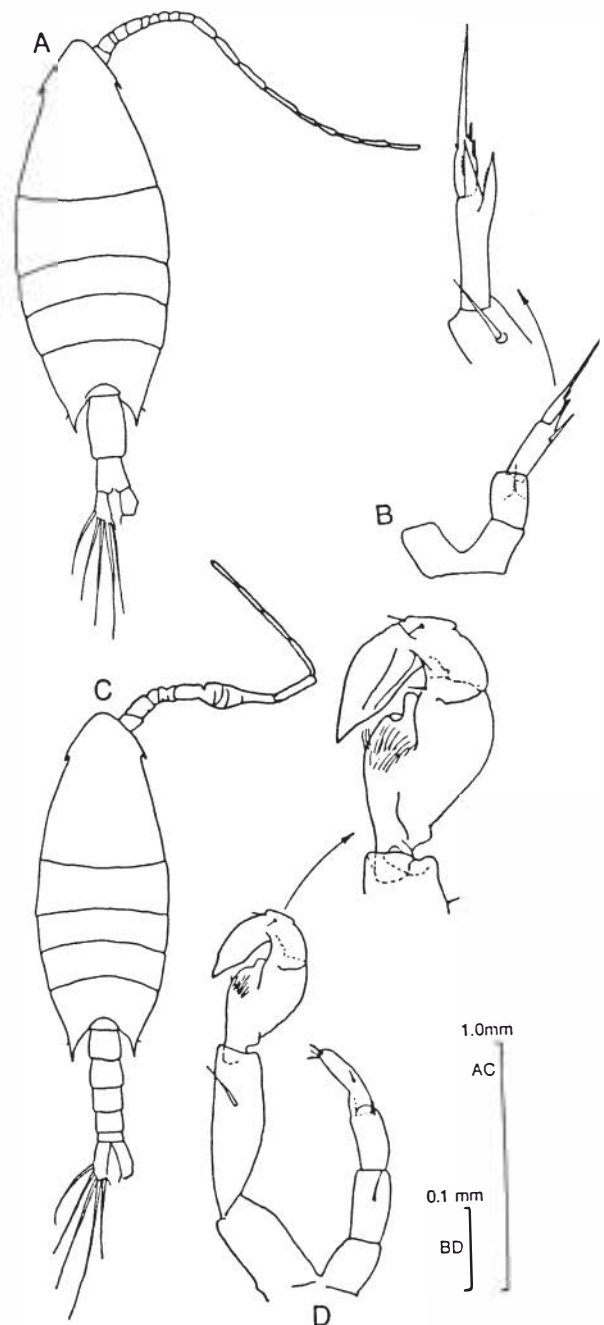


Fig. 133. *Calanopia australica* from Bayly and Greenwood (1966). Female. A, dorsal view; B, leg 5. Male. C, dorsal view; D, leg 5.

some 2-segmented; genital segment 1.7 times as long as anal segment; caudal rami asymmetrical, left slightly longer than right. Leg 5 symmetrical, 4-segmented; segment 2 with a posterior surface seta, segment 3 produced at the outer distal corner into 2 subequal spine-like processes with serrated margins, segment 4 small with 2 small outer spines, a long straight terminal spine with fine marginal serrations, and a minute spine

is usually present on the inner border.

(Bayly & Greenwood 1966)

Male: As in the family and generic definitions with the following additional characteristics. Anterior head angular, with cephalic hooks; posterior metasome produced into a symmetrical spine on each side. Urosome 5-segmented, caudal rami symmetrical, longer than in female. Right leg 5 with first 2 segments as long as entire left leg, segment 2 with a posterior surface seta, terminal part of leg with a complex hook-like structure consisting of a basal part enlarged with a cluster of needle-like spines near outer edge in region of maximum width, distally this segment has a protuberance with a single spine; distal hook is sharply curved outwards and tapers to a point which extends as far as the spine-cluster, there are 2 small subequal spines near the inner proximal border. Left leg 5 is 4-segmented, segment 2 has a posterior surface seta, segment 3 has an outer distal spine, terminal segment has a row of proximal inner edge fine setules, 1 outer edge spine at midlength, and 3 terminal spines 1 of which is broader than the others.

(Bayly & Greenwood 1966)

REMARKS: This species is closest to *C. thompsoni* with which it shares the presence of lateral cephalic hooks.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bayly and Greenwood (1966); Greenwood (1979).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in Moreton Bay and the Brisbane River estuary (Bayly 1966; Greenwood 1979) and Nicobar Islands (Silas & Pillai 1973).

***Calanopia elliptica*** (Dana, 1846, 1849)

(Figs 134, 184, 194)

DESCRIPTION: Size: females: 1.70–2.00 mm, males: 1.80–1.90 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior metasomal points long. Urosome segment 2 about as long as genital segment. Caudal rami nearly 3 times as long as wide. Maxilliped with apical part 5-segmented. Leg 5 asymmetrical (left leg longest); exopod 2-segmented. (A. Scott 1909)

Male: As in the family and generic definitions with the following additional characteristics. Urosome segment 2, right side distal border produced into a well-defined tooth. Maxilliped with apical part 5-segmented. Leg 5 terminal segment of the left exopod with

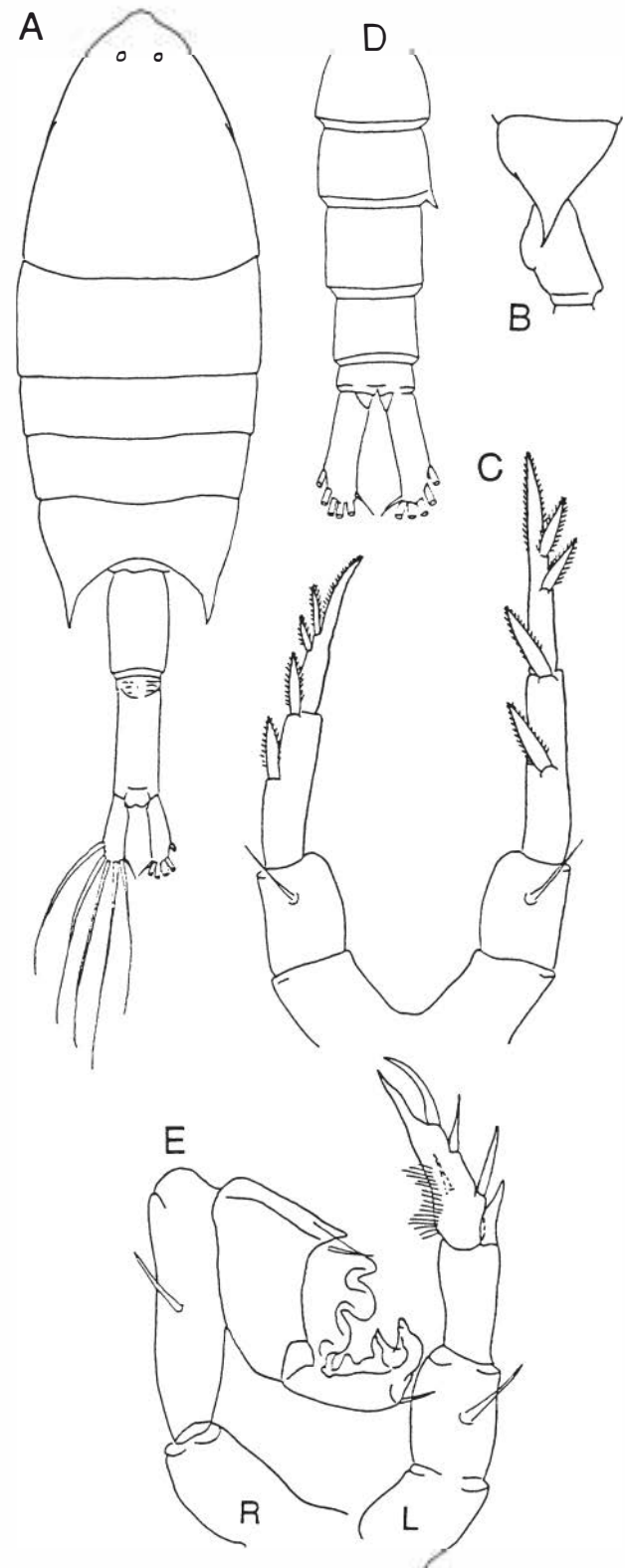


Fig. 134. *Calanopia elliptica* from A. Scott (1909). Female. A, dorsal view; B, genital segment, left side; C, leg 5. Male. D, urosome, dorsal view; E, leg 5.

a pad of fine hairs; the palm-like margin of the right exopod segment 1 produced into 3 strong blunt teeth, the claw-like exopod segment 2 with 3 small pointed teeth. (A. Scott 1909)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Dakin and Colefax (1940); Chiba and Hirakawa (1972); Greenwood (1979).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in the Indo-Malaysian region and eastern Australia from New South Wales to the Great Barrier Reef also the Mediterranean Sea (Greenwood 1979).

### *Epilabidocera* Wilson, 1932

DEFINITION: As in the family definition with the following additional characteristics. Anterior head with cephalic hooks and dorsal lenses but no rostral lens. Posterior metasome and urosome segment 1 in male asymmetrical. Distal part of male antenna 1, 3-segmented. First pair of legs with 3-segmented endopod. Female leg 5 biramous, exopod and endopod 1-segmented. Male right leg 5 long, with a small chela.

TYPE SPECIES: *Paralabidocera amphrites* McMurrich, 1916

REMARKS: Wilson (1932) renamed *Paralabidocera* which was preoccupied by Wolfenden (1908) for a different genus of copepods. Species include *Epilabidocera amphrites* (McMurrich 1916) and *E. longipedata* (Sato, 1913) (= *Pontella pulvinata* Wilson, 1950) (see Nishimura 1969). The two species in this genus are found in the north Pacific and have not been taken in the Southwest Pacific.

### *Labidocera* Lubbock, 1853

DEFINITION: As in the family definition with the following additional characteristics. Head and pedigerous segment 1 separate, head with or without hooks and with 1 pair of dorsal cuticular lenses and a protuberant ventral eye which extends anteroventrally between the rostral prongs. Rostrum deeply bifurcate with 2 relatively fine filaments, and lacking a lens. Pedigerous segments 4 and 5 fused with corners produced into pointed lobes. Female urosome 2- or 3-segmented, male urosome 4- or 5-segmented; genital segment and caudal rami sometimes asymmetrical in female; symmetrical in male. Female antenna 1 23-segmented; male right

antenna 1 with at least 4 separate segments distal to the hinge between segments 18 and the fused segments 19–21, the middle section is expanded. Mandible with 3–4 small teeth. Maxilla 1 exopod relatively well-developed. Maxilliped with 6 distinct segments. Exopod of legs 1, 2, 3, and 4, 3-segmented; endopod of legs 1, 2, 3, and 4, 2-segmented. Female leg 5 biramous, each ramus is 1-segmented; male right leg 5 uniramous with a chela, left leg sometimes with a rudimentary endopod.

(Giesbrecht 1892)

TYPE SPECIES: *Labidocera darwinii* Lubbock, 1853

REMARKS: The following species are now in this genus. *Labidocera acuta* (Dana, 1849); *L. acutifrons* (Dana, 1849) (= *L. albatrossi* Wilson, 1950); *L. aestiva* Wheeler, 1900 (= *L. insolita* Wilson, 1950); *L. antiquae* Fleminger 1979; *L. barbadiensis* Fleminger & Moore, 1977; *L. barbuda* Fleminger 1979; *L. bataviae* A. Scott, 1909; *L. bengalensis* Krishnaswamy, 1952; *L. brunescens* (Czerniavsky, 1868); *L. carpentariensis* Othman, Greenwood & Fleminger, 1982; *L. caudata* Nicholls, 1944; *L. cervi* Kramer, 1895; *L. dakini* Greenwood, 1978c (= *Labidocera* sp. Dakin & Colefax, 1940, in part); *L. darwinii* (Lubbock, 1853); *L. detruncata* (Dana, 1849) (= *L. tenuicauda* Wilson, 1950, in part); *L. diandra* Fleminger, 1967; *L. euchaeta* Giesbrecht, 1889; *L. farrani* Greenwood & Othman, 1979; *L. fluviatilis* Dahl, 1894 (= ?*L. brasiliense* Farran 1929); *L. gallensis* Thompson & Scott, 1903 (see Silas & Pillai 1973); *L. gangetica* Sewell, 1934; *L. glauca* L.V. Smith, 1941; *L. insolita* Wilson, 1950; *L. jaafari* Othman 1986; *L. japonica* Mori, 1935; *L. javaensis* Mulyadi, 1997; *L. johnsoni* Fleminger, 1964; *L. jollae* Esterley, 1906; *L. kolpos* Fleminger, 1967; *L. kroeyeri* (Brady, 1883); *L. laevidentata* (Brady, 1883); *L. lubbockii* Giesbrecht, 1889; *L. madurae* A. Scott, 1909; *L. minuta* Giesbrecht, 1892; *L. mirabilis* Fleminger, 1957; *L. moretoni* Greenwood, 1978c; *L. mura-moi* Mulyadi, 1997; *L. nerii* (Krøyer, 1849); *L. orsinii* Giesbrecht, 1889; *L. panamae* Fleminger & Moore, 1977 (male see Fleminger 1979); *L. papuensis* Fleminger, Othman & Greenwood, 1982; *L. patagoniensis* (Lubbock, 1853); *L. pavo* Giesbrecht, 1889; *L. pectinata* Thompson & Scott, 1903 (= *L. similis* Cleve, 1904); *L. pseudacuta* Silas & Pillai, 1967; *L. rotunda* Mori, 1929 (= *L. bipinnata* Tanaka, 1936, see Fleminger *et al.* 1982); *L. scottii* Giesbrecht, 1897; *L. spinolobata* Shen & Lee, 1963; *L. tasmanica* Nyan Taw, 1974; *L. trispinosa* Esterly, 1905 (= *L. tenuicauda* Wilson, 1950, in part); *L. wilsoni* Fleminger & Tan, 1966; *L. wollastoni* (Lubbock, 1857); *Labidocera* sp. Farran, 1936 (female unknown).

The following species are not well known, being mostly based on immature stages: *L. agilis* (Dana, 1849); *L. chubbi* Brady, 1915; *L. crispata* (Dana, 1849); *L. exigua* (Dana, 1849); *L. frivola* (Dana, 1849); *L. hebes* (Dana, 1849); *L. inermis* Brady, 1883; *L. media* (Dana, 1849); *L. simplex*

(Dana, 1849); *Labidocera* sp. Pesta, 1911b; *Labidocera* sp. Chiba & Maeda, 1955. Fleminger (1965) examined Wilson's material deposited at the Smithsonian Institution and found instances of mis-identification, apparent mislabelling; he suggested synonymies in some instances.

These species have been segregated into several species groups (see Fleminger & Tan 1966; Silas & Pillai 1967; Fleminger 1967, 1975, 1979; Greenwood 1978c; Fleminger & Moore 1977; Fleminger *et al.* 1982) although the system of subdivision has not been fully worked out yet.

The following species have been taken in the Southwest Pacific.

***Labidocera acuta*** (Dana, 1849) (Figs 135, 184, 194)

DESCRIPTION: Size: females: 3.05–3.40 mm, males: 2.80–3.30 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head with an acutely pointed spine, without lateral cephalic hooks; posterior metasomal wings symmetrical and acutely pointed. Urosome 3-segmented; genital segment asymmetrical with a posterior right side projection which extends half way along the next segment, visible from the dorsal surface; another small ventral projection is placed posteriorly. Leg 5 with a rather variable exopod with relatively large spines on the outer border; endopod claw-like, half to one-third as long as the exopod. (Giesbrecht 1892)

Male: As in the family and generic definitions with the following additional characteristics. Posterior metasomal points asymmetrical, right side longest and bent outwards. Urosome segment 1 with a small right side spine. Left leg 5 with 3 terminal and 1 outer spine; right leg 5 without a "thumb" on the chela, but with a curved triangular flap. (Giesbrecht 1892)

REMARKS: This species, along with *L. pseudacuta*, is distinguished by the distinctive spine on the anterior head.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Brady (1883); Dakin and Colefax (1940); Greenwood (1979).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has an Indo-west Pacific neritic distribution (Fleminger 1967; Greenwood 1979; Heinrich 1988), extending into the eastern South Atlantic (Razouls 1995).

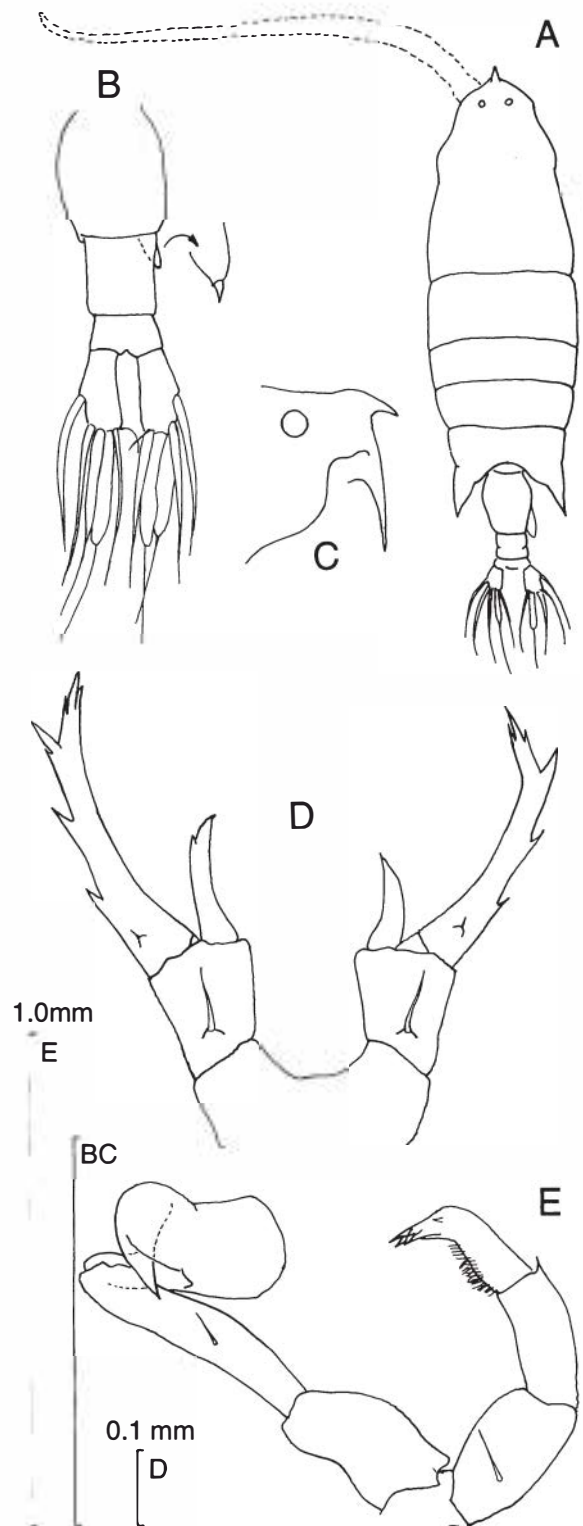


Fig. 135. *Labidocera acuta*. From Giesbrecht (1892). A, female, dorsal view. From Greenwood (1979). Female. B, urosome, dorsal view; C, anterior head and rostrum, lateral view; D, leg 5. Male. E, leg 5.

*Labidocera acutifrons* (Dana, 1849)  
(Figs 136, 184, 194)

DESCRIPTION: Size: females: 3.40–4.15 mm, males: 3.30–4.08 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head slightly pointed, without lateral cephalic hooks; posterior metasomal corners slightly divergent. Urosome 3-segmented, genital segment slightly asymmetrical with a small lump on the right side; next segment with a dorsoposterior spine on the right side directed towards the anal flap which is large. Caudal rami slightly asymmetrical, larger on the left. Leg 5 exopod with 3 terminal spines, endopod spiniform.

(Giesbrecht 1892)

Male: As in the family and generic definitions with the following additional characteristics. Anterior head pointed; posterior metasome symmetrical. Left leg 5 with a rudimentary endopod, exopod segment 2 with 3 terminal spines; right leg 5 exopod claw with an extra small segment bearing 2 setae, and with a spine.

(Giesbrecht 1892)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Brady (1883) as *Pontella acutifrons*; Dakin and Colefax (1940); Greenwood (1979).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A295	surface	1 female 3.4 mm
C544	surface	1 male 3.6 mm (damaged)

DISTRIBUTION: This epipelagic species has been found in the whole tropical and subtropical Atlantic, Pacific and Indian Oceans (Vervoort 1965; Fleminger 1967; Heinrich 1988).

*Labidocera cervi* Krämer, 1895 (Figs 137, 184, 194)

DESCRIPTION: Size: females: 2.80–3.48 mm, males: 2.75–3.15 mm

Female: As in the family and generic definitions with the following additional characteristics. Anterior rounded, posterior metasomal corners asymmetrical, larger on the right. Urosome 2-segmented with a suture evident just posterior to midlength on the genital segment; genital segment asymmetrical with a rounded projection ventrally and showing on the left, right posterolateral border with a small conspicuous spherical projection. Caudal rami almost symmetrical. Leg 5 may be slightly asymmetrical, with 3 terminal and 2 outer edge spines, endopod spiniform.

(Farran 1929)

Male: As in the family and generic definitions with the following additional characteristics. Anterior head rounded, posterior metasomal corners symmetrical.

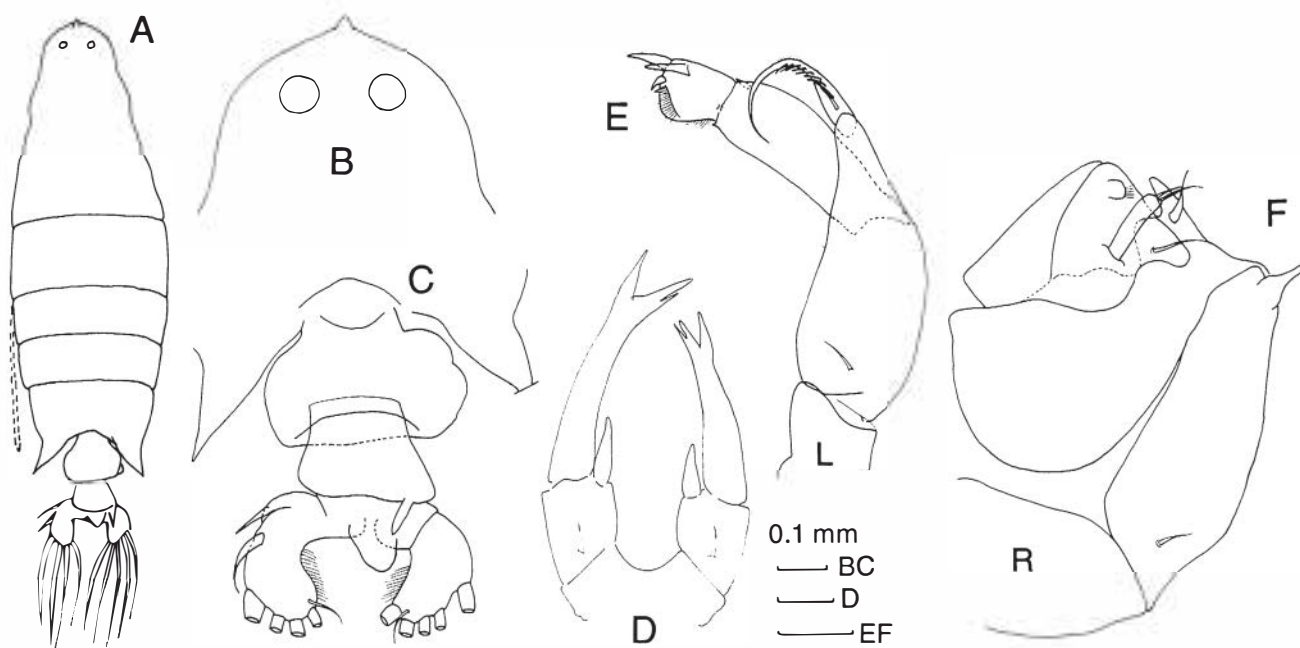
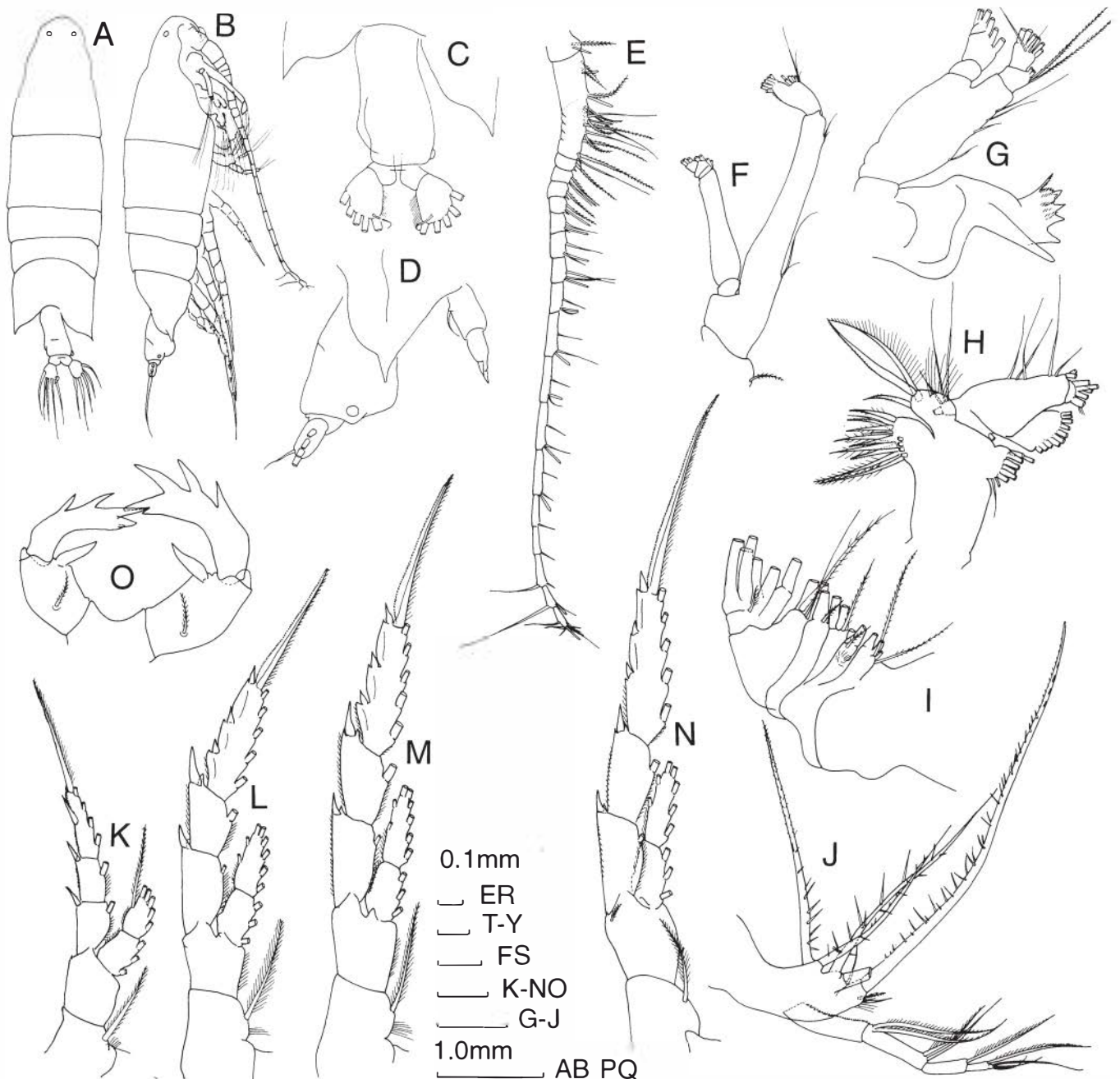


Fig. 136. *Labidocera acutifrons*. From Giesbrecht (1892). A, female, dorsal view. Female from Stn A295 surface. B, anterior head, dorsal view; C, urosome, dorsal view; D, leg 5. Male from Stn C544. E, left leg 5; F, right leg 5.

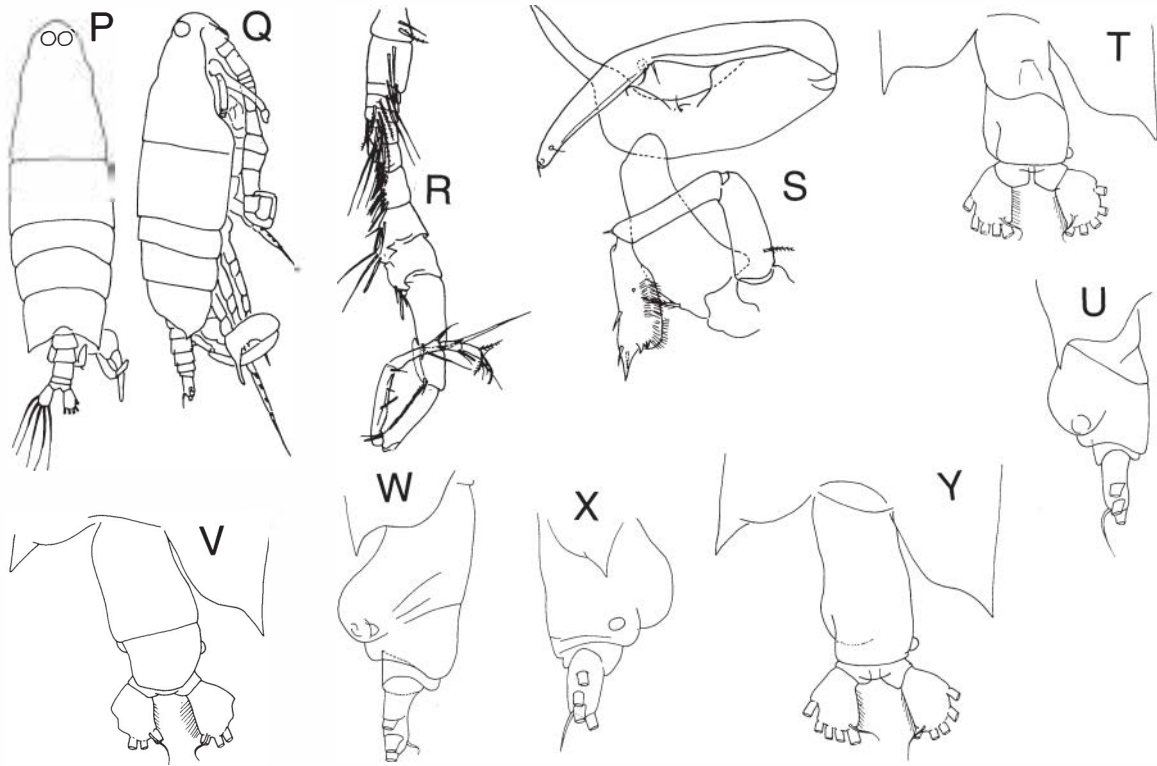
Left leg 5 terminal segment with 3 terminal and 1 outer edge spines and an inner edge rounded projection bearing hairs and 3 broad distal spinules; right leg 5 with a long "thumb" on the chela set at an obtuse angle to the rest of the segment, the border juxtaposed to exopod segment 2, the border juxtaposed to exopod segment 2 has an outer rectangular flange, an

inner triangular flange, and a small rounded knob bearing a small seta between these 2 flanges, the anterior surface bears a small conical projection near the base of the triangular flange; exopod segment 2 extends as far as the thumb on exopod segment 1.

(Farran 1929; JMB-G. pers. observ.)



**Fig. 137.** *Labidocera cervi* from Waitemata Harbour 28-8-64. Female. **A**, dorsal view; **B**, lateral view; **C**, urosome, dorsal view; **D**, urosome, right side; **E**, antenna 1; **F**, antenna 2; **G**, mandible; **H**, maxilla 1; **I**, maxilla 2; **J**, maxilliped; **K**, leg 1; **L**, leg 2; **M**, leg 3; **N**, leg 4; **O**, leg 5. Male (overleaf). **P**, dorsal view; **Q**, lateral view; **R**, left antenna 1; **S**, leg 5. Female urosome, various views. **T**, **U**, from Waitemata Harbour 28-8-64. **V**, from VUW143i; **W**, **X**, **Y**, from Stn N756.



REMARKS: Greenwood (1979) discussed the differences between New Zealand and Australian specimens of this species and concluded these are not consistent or great enough to warrant the description of a separate species in Australia given that this genus is highly variable.

A close examination of specimens from Waitemata Harbour, made available by Associate Professor John Jillett, University of Otago, reveals that there is a good amount of consistency in the appearance of *L. cervi* from different parts of New Zealand. The shape of the posterior metasomal corners in the female, the presence of a posterolateral knob on the right side of the female genital segment, and the details of male leg 5 are characteristic. There is some variability in the extent to which the suture representing fusion between the first 2 female urosome segments is evident. In the specimen figured from Waitemata Harbour (Fig. 137 C, D) there was hardly any sign of segmentation, whereas other specimens from the same location had a conspicuous suture (Fig. 137 T, U). Similar observations were made of specimens from other locations (Fig. 137 V-Y). Given that some of the specimens examined are from Waitemata Harbour which is adjacent to the type locality of Kramer's *L. cervi*; and that Farran's (1929) description of specimens from northern New Zealand (as first reviser) is recognisably the same as the present specimens, then *L. cervi* should be used for New Zealand *Labidocera*.

Comparison of Greenwood's (1979) drawings of specimens attributed to *L. cervi* leads me to believe the Australian specimens will eventually prove to be recognised as an undescribed species.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Kramer (1895); Brady (1899); Thompson and Anderton (1921); Farran (1929); ?Dakin and Colefax 1940); Bary (1951); Bradford (1972); Jillett (1971); ?Nyan Taw (1978); ?Greenwood (1979); Bradford *et al.* (1980).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
VUZ107	0-914	1 male 2.95 mm
VUW142g		4 females 3.20-3.31 mm, 47 males 2.87-3.04 mm
VUW143i		6 females 3.12-3.44 mm, 117 males 2.88-3.15 mm
Mu67/28		4 females 3.24-3.40 mm, 1 male 3.00 mm
Waitemata Harbour	A 28.8.64	3 females 3.4 mm, 6 males 2.80-3.10 mm

*Labidocera cervi* was present in hauls from 0 to 200 m or near the sea floor at the following stations: N360, N361, N395, N396, N409, N439, N440, N441, N462, N478.



DISTRIBUTION: This epipelagic species has been taken in the neritic waters of New Zealand; it has been also recorded from Australian waters (Greenwood 1979).

*Labidocera dakini* Greenwood, 1978a

(Figs 138, 184, 194)

Description: Size: females: 2.44 mm, males: 2.20 mm.

Female: As in the family and generic definitions with the following additional characteristics. Head without cephalic hooks. Pedigerous segments 4 and 5 fused, posterior margins of metasome produced into symmetrical downward-curved processes. Genital segment elongate and ornate; length 2.7 times posterior width; deeply excavated on right side ventrolaterally with a prominence before and behind the excavation; posterodorsal lobe bearing a characteristic long spine which extends posteriorly to level of caudal rami, and expanded basally with a secondary spur; 3 other spines arise from dorsolateral surface, 1 anterior to midlength, 1 larger spine posterior to midlength, and 1 near posterior border of segment. Urosome segment 2, 0.25 times the length of genital segment, its posterodorsal margin with 3–4 small spines. Caudal rami asymmetrical, larger on right. Leg 5 almost symmetrical; exopod long, medially curved, tapering to a distal point, with 2 small setae laterally; endopod at least half the length of exopod, bifurcate distally into 2 stout medially curved processes. (Greenwood 1978a)

Male: As in the family and generic definitions with the following additional characteristics. Head without cephalic hooks. Pedigerous segments 4 and 5 incompletely fused; posterolateral metasomal margins produced into asymmetrical processes, right process elongate, longer than left, extending to posterior border of urosome segment 2, appearing single in dorsal view, but there is a ventrally-directed secondary process. Genital segment twice as wide as the remaining urosome segments, with a small acuminate process on the right ventrolateral posterior border. Anal segment short. Right leg 5 chela (exopod segment 1) with an elongate "thumb" which is only slightly curved; the border of exopod segment 1 between thumb and exopod segment 2 slightly excavated, the excavation with a sinuous border on one side, the other border having a rounded tooth centrally and with a smaller tooth distal to it; terminal segment (exopod segment 2) with a proximal expanded flange which fits the excavation in exopod segment 1, there are 2 small setae on the inner border and 2 small setae on the rounded tip. (Greenwood 1978a)

(Greenwood 1978a)

REMARKS: The male described as *Labidocera* sp. by Dakin and Colefax (1940) is referable to this species (Green-

wood 1978a). *Labidocera dakini* is placed in the *kroeyeri* complex (see Fleminger *et al.* 1982)

PREVIOUS SOUTHWEST PACIFIC RECORDS: Dakin and Colefax (1940) as male *Labidocera* sp.; Greenwood (1979).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in Australian waters of Moreton and Waterloo Bays, near Sydney, the Arafura Sea, and Philippine Islands (Greenwood 1978a; 1979).

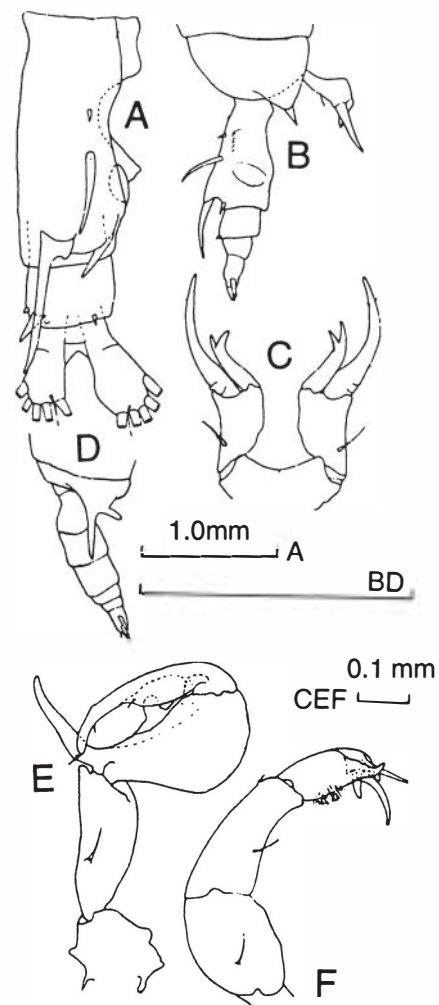


Fig. 138. *Labidocera dakini* from Greenwood (1978). Female. A, urosome, dorsal view; B, urosome, lateral view; C, leg 5. Male. D, urosome, right side; E, right leg 5; F, left leg 5.

*Labidocera detruncata* (Dana, 1849)

(Figs 139, 184, 194)

Description: Size: females: 2.42–2.72 mm, males: 2.40–2.70 mm.

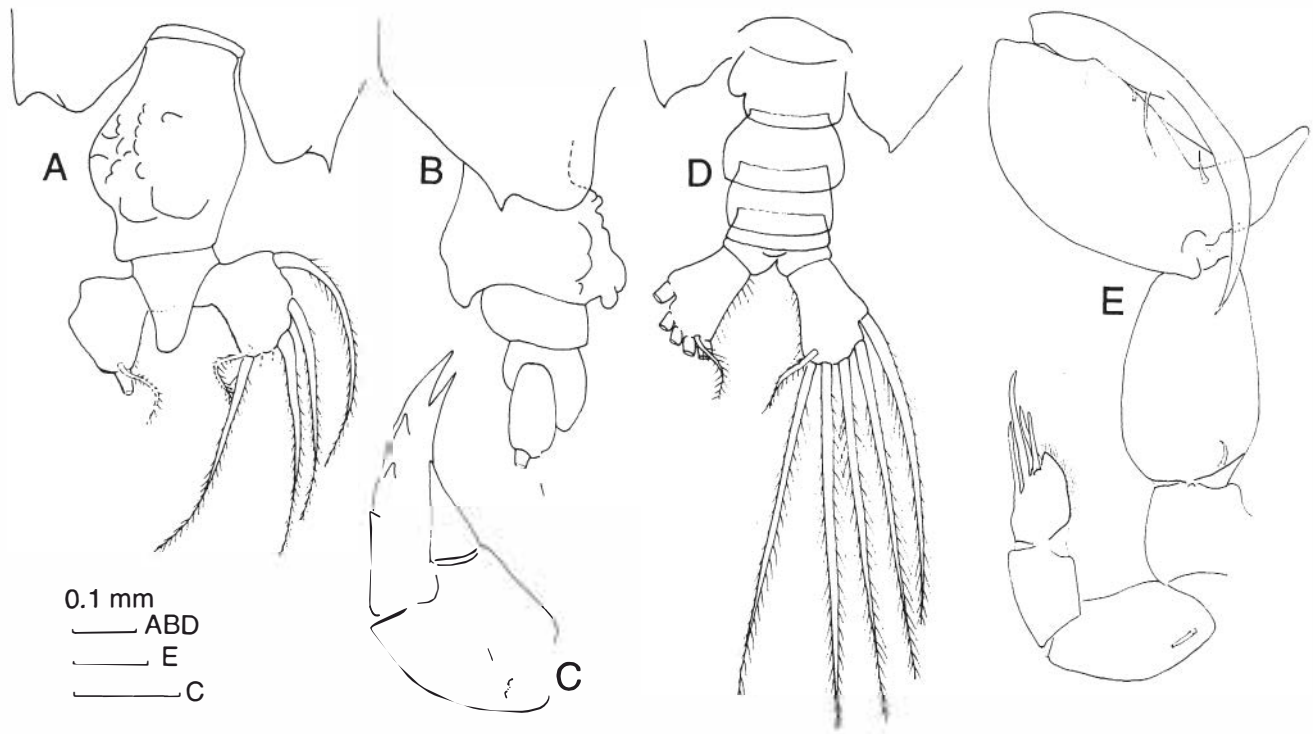


Fig. 139. *Labidocera detruncata*. Female from Stn A302, surface. A, urosome, dorsal view; B, urosome, left side; C, leg 5. Male from Stn A295. D, urosome, dorsal view; From Stn F945, 0–200 m. E, leg 5.

Female: As in the family and generic definitions with the following additional characteristics. Head rounded, without lateral cephalic hooks; posterior metasome slightly asymmetrical, larger on right, posterior margin with a small lateral tooth. Urosome 3-segmented, genital segment with left dorsal surface uneven, lined and notched in a checkered pattern. Caudal rami almost symmetrical. Leg 5 exopod with 2 terminal and 3 outer edge spines, endopod small.

(Brady 1883 as *Pontella*; Silas & Pillai 1973)

Male: As in the family and generic definitions with the following additional characteristics. Head rounded, without lateral cephalic hooks; posterior metasome points symmetrical. Left leg 5 terminal segment with 4 characteristic long spines, 1 of which is longer, and inner edge hairs; right leg 5 "thumb" of chela triangular, terminal segment bearing 3 slender marginal setae.

(Brady 1883 as *Pontella*; Silas & Pillai 1973)

REMARKS: The specimens from the Southwest Pacific and those figured by Grice (1962) are considered to be the same as that figured by Dana (1849) judging from the shape of the female urosome and the shape of the "thumb" on the male right leg 5 chela. The larger specimens figured by Dakin and Colefax (1940) and

Farran (1936 as *Labidocera* sp.) have been described as a different species (*L. farrani*) by Greenwood and Othman (1979).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

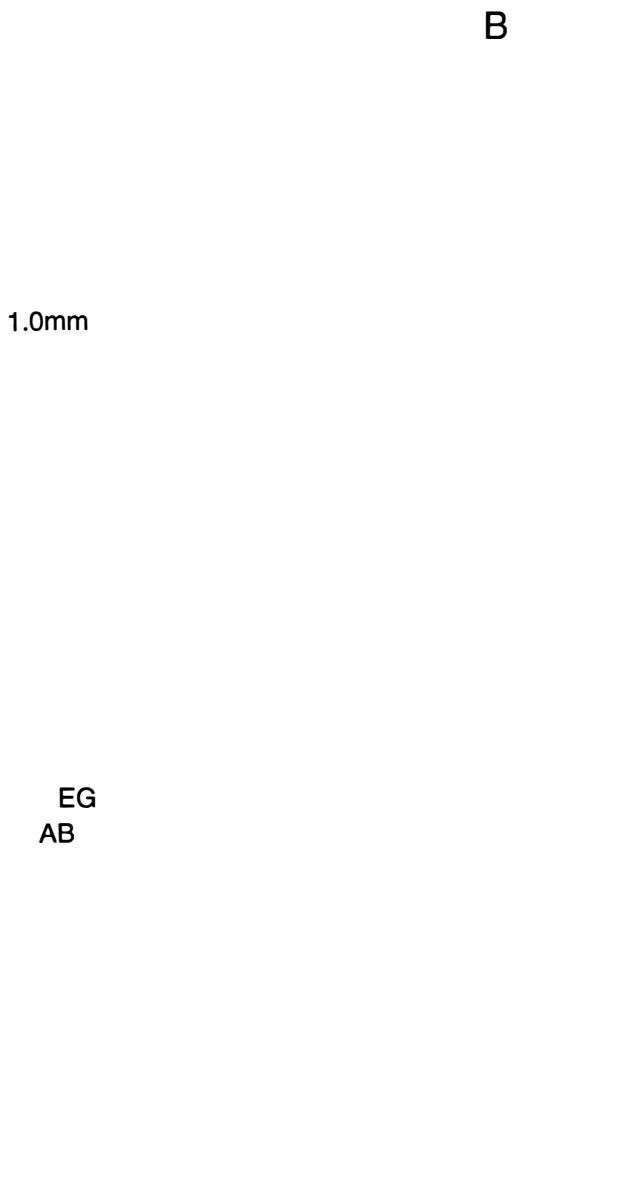
NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	surface	1 male 2.65 mm
A295	surface	1 female 2.60 mm, 1 male 2.64 mm
A302	surface	1 female 2.72 mm
A303	0–10	1 female 2.72 mm
C537	0–250	1 male 2.52 mm
F945	0–200	1 male 2.70 mm

DISTRIBUTION: This epipelagic species is an oceanic form in the Indian and Pacific Oceans (Fleminger 1967).

*Labidocera farrani* Greenwood & Othman, 1979  
(Figs 140, 184, 194)

DESCRIPTION: Size: females: 2.82–3.22 mm, males: 2.59–2.96 mm.



**Fig. 140.** *Labidocera farrani* from Greenwood and Othman (1979). Female. **A**, urosome, dorsal view; **B**, urosome, right side; **C**, leg 5. Male. **D**, lateral view; **E**, left leg 5; **F**, detail of terminal part of left leg 5; **G**, right leg 5.

Female: As in the family and generic definitions with the following additional characteristics. Head without cephalic hooks but with lateral prominences at bases of antenna 1; posterior margins of metasome are widely flared, asymmetrical, with that on right side broader and extending more posteriorly than that on left; both processes taper to an obtuse point. Urosome 3-segmented; genital segment broadens posteriorly into a bulbous shape in both dorsal and lateral

views; posterodorsal border is strongly humped with rounded tubercles forming posterior surface, the three most posterior of these are usually developed into more acute projections of which the central one is largest and all curve towards the right side; left lateral surface is smoothly rounded; right side extends laterally into an obtuse dorsoventrally flattened conical process. Urosome segment 2 is short, slightly asymmetrical. Caudal rami are asymmetrical, right ramus being larger. Leg 5 is almost symmetrical on each side, but right exopod is slightly longer than left, and right basipod 2 is slightly shorter than left; the endopod on both sides is weakly bifid, the smaller tooth being subterminal; both exopods have 3 small rounded lateral prominences, an obtuse terminal point, and a small subterminal point on medial border.

(Greenwood & Othman 1979)

Male: As in the family and generic definitions with the following additional characteristics. Head without cephalic hooks but with lateral prominences at bases of antenna 1; posterior margins of metasome are almost symmetrical in dorsal view, tapering to a simple abbreviated pointed process with right side extending slightly more posterior than that on left. Urosome 5-segmented. Right leg 5 basipod almost as long as total length of left leg; exopod segment 1 is expanded and subcylindrical, the "thumb" of chela is large, curved, spatulate, and arises proximally with slight posterior ornamentation, a large seta arises within hollow of thumb, and there is a single seta distally; exopod segment 2 is elongate and curved with a large inner tooth at just less than midlength, there are 2 setae proximal to the tooth and a single seta distally on the segment. Left leg 5 simple, short, 3-segmented, segment 2 has a posterior seta near its base, the terminal segment is short with a hairy medial surface and 4 distolateral spines, 1 of them long.

(Greenwood & Othman 1979)

REMARKS: This species appears to be related to the *detruncata* complex of Fleminger (1967) (see Greenwood & Othman 1979). This species is synonymous with *L. detruncatum* of Dakin and Colefax (1940) and *Labidocera* sp. of Farran (1936).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Dakin and Colefax (1940) as *L. detruncatum*; Greenwood (1979) as *Labidocera* sp.

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in the neritic waters of the Gulf of Carpentaria, Great Barrier Reef, Moreton Bay, Sydney (Greenwood & Othman 1979).

*Labidocera kroeyeri* (Brady, 1883)  
(Figs 141, 184, 194)

DESCRIPTION: Size: females: 2.40–2.50 mm, males: 1.95–2.05 mm.

Female: As in the family and generic definitions with the following additional characteristics. Head with lateral cephalic hooks; lateral wings of posterior metasome pointed, symmetrical. Urosome 3-segmented; anal segment short; genital segment and urosome segment 2 asymmetrical with many spines and hooks. Caudal rami symmetrical. Leg 5 exopod claw-like, twice as long as endopod which is bifurcate at its tip. (Giesbrecht 1892)

Male: As in the family and generic definitions with the following additional characteristics. Head with lateral cephalic hooks; lateral wings of posterior metasome pointed, asymmetrical, with 2 spines on right. Left leg 5 chela with a short "thumb" and 2 processes at midlength. (Giesbrecht 1892)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1979).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in the Indo-west Pacific including Moreton Bay, Australia (Greenwood 1979).

*Labidocera laevidentata* (Brady, 1883)  
(Figs 142, 185, 194)

DESCRIPTION: Size: females: 1.60–1.95 mm, males: 1.70 mm.

Female: As in the family and generic definitions with the following additional characteristics. Head with anterior lateral cephalic hooks; posterior metasome symmetrical, produced into divergent spines.

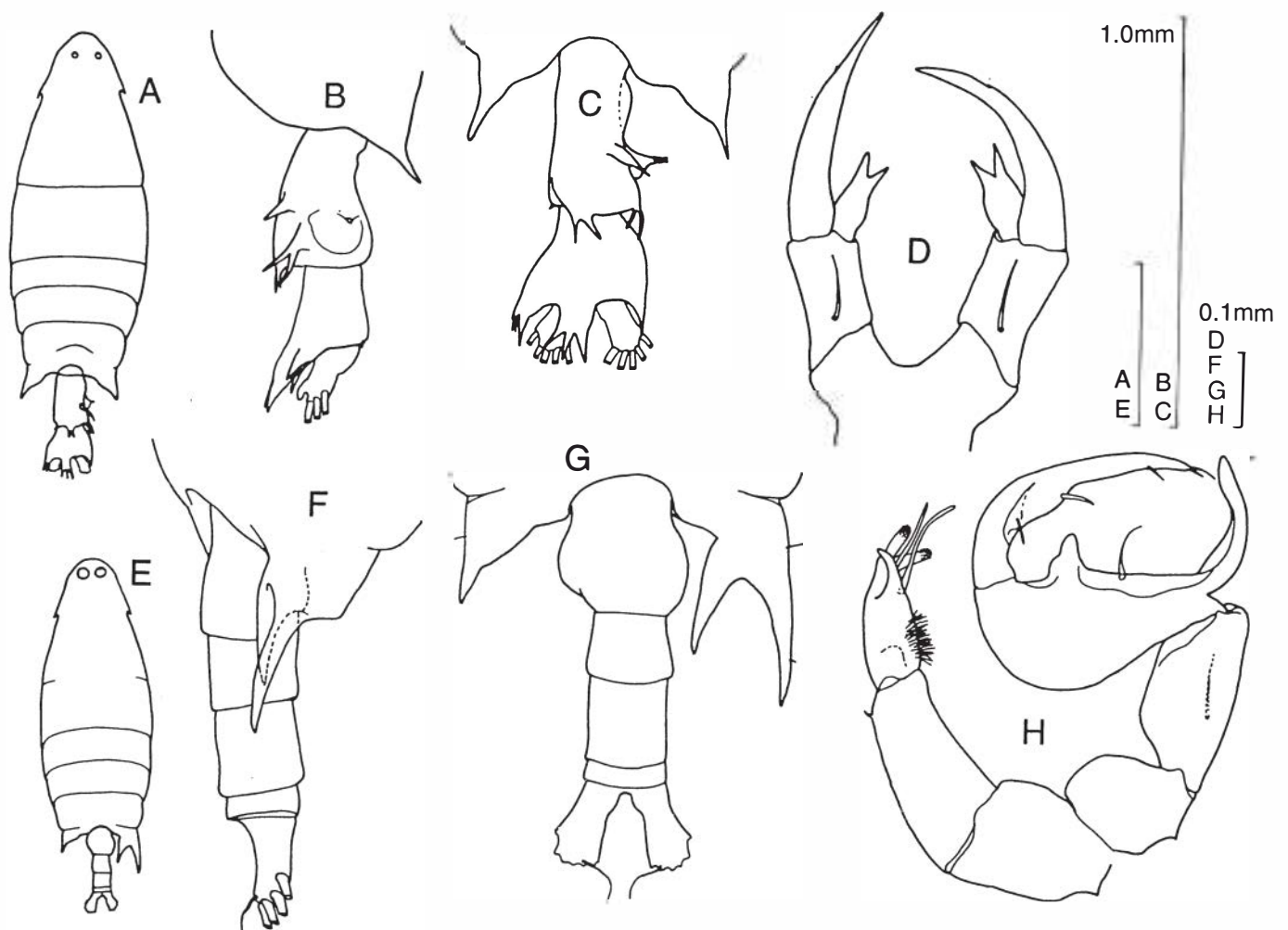


Fig. 141. *Labidocera kroeyeri* from Greenwood (1979). Female. A, dorsal view; B, urosome, right side; C, urosome, dorsal view; D, leg 5. Male. E, dorsal view; F, urosome, right side; G, urosome, dorsal view; H, leg 5.

Urosome 3-segmented; genital segment almost symmetrical, bearing a pair of posterior dorsal spines, and is as long as combined lengths of urosome segment 2 and anal segment which are both asymmetrical; urosome segment 2 provided with a bifurcate pointed process distally; caudal rami asymmetrical, with that on right being broader and longer than that on left. Leg 5 is slightly asymmetrical; right exopod is shorter and stouter than that on left, each exopod is armed with 3 outer-edge and 2 inner-edge spines, the apex terminates in a strong slightly curved spine; endopod on each side is short with a feebly bifurcate tip.

(A. Scott 1909)

Male: As in the family and generic definitions with the following additional characteristics. Body elongate, posterior metasome asymmetrical, one spine on left, 2 on right; sides of head produced into 2 recurved cephalic hooks. Leg 5 uniramous, hooked on right side; terminated by 3 unequal crooked spines on left, the longest of which has an enlargement at its base, and lies at right angles to the other 2 spines.

(Brady 1883 as *Pontella*)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1979).

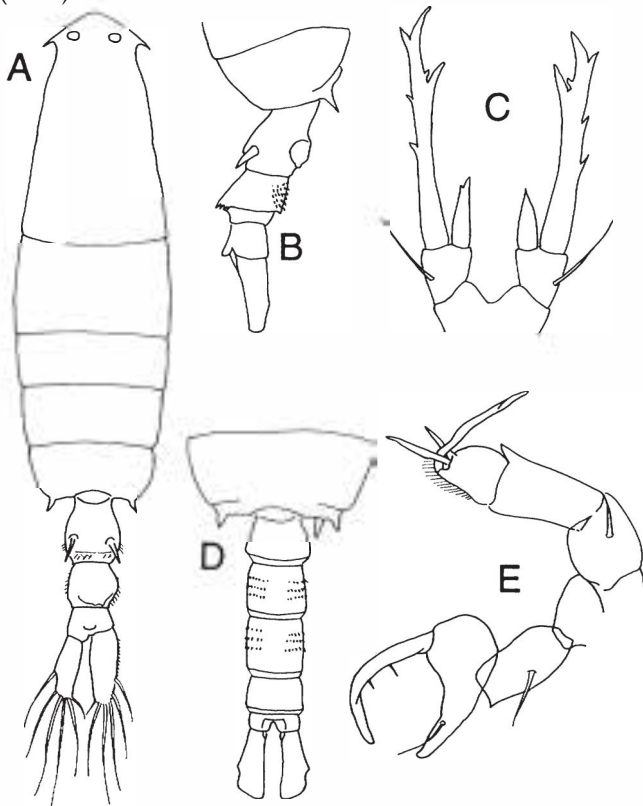


Fig. 142. *Labidocera laevidentata* from A. Scott (1909). Female. A, dorsal view; B, urosome, right side; C, leg 5. Male. D, urosome, dorsal view; E, leg 5.

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been recorded around the Philippines, Indonesia, Gulf of Thailand, Indian Ocean round the Maldive and Laccadive Islands, and the Great Barrier Reef (Greenwood 1979).

*Labidocera minuta* Giesbrecht, 1889

(Figs 143, 185, 194)

DESCRIPTION: Size: females: 1.76–2.26 mm, males: 1.68–1.75 mm.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head rounded, lateral head with small hooks on each side; posterior metasome rounded, asymmetrical, ventrally directed on the right. Urosome 3-segmented,

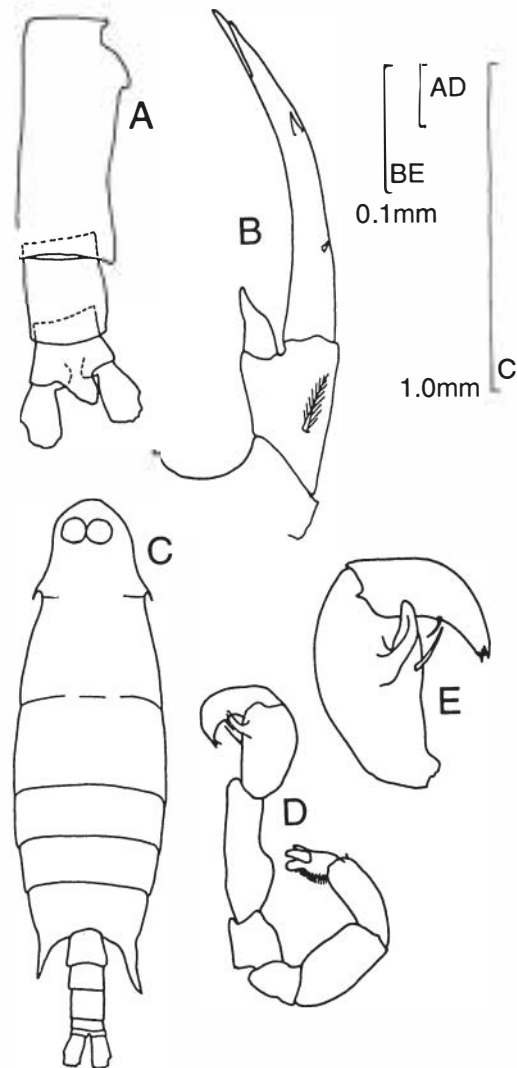


Fig. 143. *Labidocera minuta* from Greenwood (1979). Female. A, urosome, dorsal view; B, leg 5. Male. C, dorsal view; D, leg 5; E, terminal segments of right leg 5.

genital segment asymmetrical, right side with anterior and posterior projections; right posterior corner of genital segment and right ventral surface of urosome segment 2 are covered with chitinous tubercles. Right caudal ramus slightly larger than left. Leg 5 exopod with 2 terminal and 1 outer edge spine, endopod bifurcate at tip. (Giesbrecht 1892; Silas & Pillai 1973)

Male: As in the family and generic definitions with the following additional characteristics. Anterior head rounded, lateral head with small hooks on each side; posterior metasomal points asymmetrical, largest on right. Left leg 5 terminal segment with at least 3 lobe-like distal projections, right "thumb" of chela short and truncate. (Giesbrecht 1892; Silas & Pillai 1973)

REMARKS: This species is placed in the *kroeyeri* complex (see Fleminger *et al.* 1982).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Dakin and Colefax (1940); Greenwood (1979).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in offshore warm waters of the tropical to subtropical Indo-Pacific; found in New South Wales, Moreton Bay, and Great Barrier Reef waters (Greenwood 1979).

*Labidocera moretoni* Greenwood, 1978a  
(Figs 144, 185, 194)

DESCRIPTION: Size: females: 1.97 mm, males: 1.36 mm.

Female: As in the family and generic definitions with the following additional characteristics. Head without cephalic hooks, posterior margins of metasome produced into acute slightly downcurved asymmetrical processes, smaller on right than left, and curved towards the midline. Urosome 3-segmented; genital segment large, with anterodorsal and posteroventral swellings extending on right side into 2 triangular lobes, the posterior more dorsally situated. Caudal rami symmetrical. Leg 5 asymmetrical, endopods with denticulated terminal regions, exopods terminated in a single point. Left leg 5 with exopod strongly curved at midlength so that the terminal, straight portion lies transverse to body axis beneath urosome; there are 3 spines along the outer border, distalmost being largest; left endopod is about 1.5 times the length of right endopod with about 10 denticles forming a distal crescent. Right leg 5 with distal basipod 2 segment, exopod, and endopod all shorter than corresponding regions of left leg; exopod only slightly curved towards midline, with a single spine on outer margin; endopod with 10-12 smaller

denticles forming a distal crescent.

(Greenwood 1978a)

Male: As in the family and generic definitions with the following additional characteristics. Head without cephalic hooks; posterior metasomal margins asymmetrical, produced on the left into a pointed process extending to middle of genital segment, on right produced dorsally into a pointed process which reaches the posterior border of genital segment, with a shorter rounded process above it, and with a ventral, elongate spine with its proximal portion directed ventrally, but which turns through an abrupt spiral so that the bulk of the spine is directed laterally then posteriorly. Urosome 5-segmented; genital segment with a spiniform process on the right posterolateral border, reaching beyond the posterior border of urosome segment 2. Caudal rami symmetrical. Right leg 5 in the form of a stout chela; basipod 2 twice length of basipod 1; exopod segment 1 broadly expanded, with a stout thumb-like conical process arising proxi-

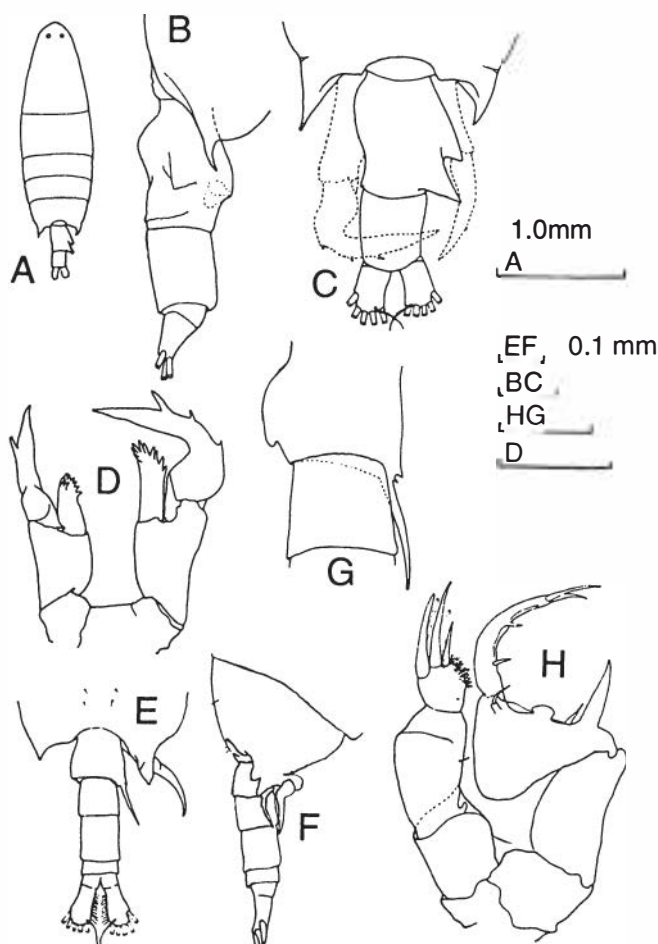


Fig. 144. *Labidocera moretoni* from Greenwood (1978). Female. A, dorsal view; B, urosome, right side; C, urosome, dorsal view; D, leg 5. Male. E, urosome, dorsal view; F, urosome, right side; G, genital segment, dorsal view; H, leg 5.

mally, with a stout seta near base of thumb, a large domed "tooth" centrally, and a small anterodistal seta; exopod segment 2 curved, the concave face with 2 setae and 2 unequal spines terminally. Left leg 5 relatively short; combined lengths of basipod 2 and exopod segment 1 similar to basipods 1 and 2 combined of right leg; exopod segment 1 broad with a small seta on inner border; terminal segment short with a hairy inner distal border, and 3 stout spines distally, the 2 outermost spines being twice the length of the segment, the other equal to its segment, there are also 2 delicate aesthete-like processes.

(Greenwood 1978a)

REMARKS: This species is part of the *kroeyeri* complex (see Fleminger *et al.* 1982).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1978, 1979).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species is neritic having been found in Moreton Bay, Curtis Island, and Mackay, Queensland (Greenwood 1979).

*Labidocera tasmanica* Nyan Taw, 1974

(Figs 145, 185, 194)

DESCRIPTION: Size: females: 2.63–3.35 mm, males: 2.45–2.83 mm.

Female: As in the family and generic definitions with the following additional characteristics. Head without lateral hooks, posterior metasomal corners project as a sharp point and are symmetrical in dorsal view. Urosome asymmetrical, 2-segmented; genital segment swollen ventrally, more than twice as long as wide, genital aperture situated on lateral ventro-posterior region of swelling, there is a small triangular process on each side of the segment situated on mid-lateral part of anterior half of segment (right process is a little more anterior than left process). Caudal rami symmetrical. Leg 5 biramous; endopod without any spines or processes, long and slender, at least 3.5 times as long as the maximum width, distal part tapering and ending in a blunt slightly curved point; exopod long and slender, longer than endopod, ending in a blunt fork which has 3 processes on the inner margin directed inwards.

(Nyan Taw 1974)

Male: As in the family and generic definitions with the following additional characteristics. Metasome similar to that of female. Urosome 5-segmented and symmetrical, caudal rami twice as long as wide. Left leg 5 3-segmented, smaller and shorter than right leg;

without processes on segment 1, segment 2 with a small spine on outer distal corner, distal segment with 4 spines (1 long spine which is longer than its segment distally, 2 shorter spines on inner distal border, the proximal-most spine being shortest, and a small outer-edge spine); there is a bunch of fine bristles on inner proximal region of distal segment. Right leg 5 is subchelate and 3-segmented; middle segment is broad and produced into a stout spine arising proximally; distal segment long, broad proximally with a serrated border on the expansion, and produced into a blunt apex, there are 3 small setae at inner midlength, a seta on distal inner border, and 1 seta on distal outer margin.

(Nyan Taw 1974)

REMARKS: This species appears to be related to the *detruncata* group of Fleminger (1967) (see Nyan Taw 1974).

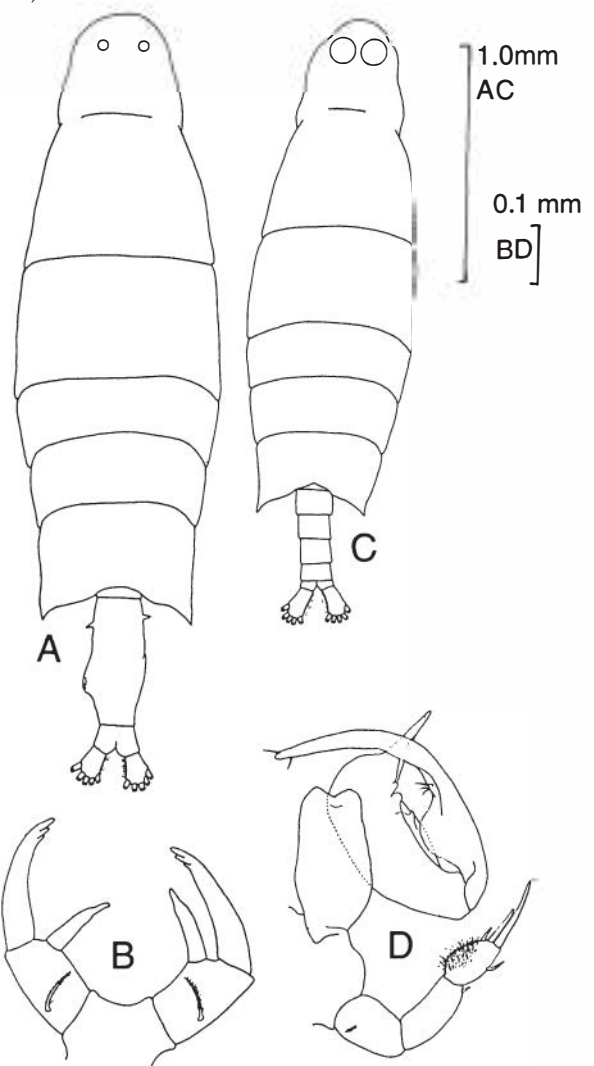


Fig. 145. *Labidocera tasmanica* from Nyan Taw (1974). Female. A, dorsal view; B, leg 5. Male. C, dorsal view; D, leg 5.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nyan Taw (1974, 1978).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken only in Tasmanian coastal waters (Nyan Taw 1974, 1978).

### *Pontella* Dana, 1846

DEFINITION: As for the family with the following additional characters. Head with lateral hooks but usually without a crest and separated from pedigerous segment 1; with 1 pair of dorsal cuticular lenses, usually with a rostral lens (larger in male) in front of ventral eyes. Pedigerous segments 4 and 5 separate, usually with pointed lobes extending posteriorly, often asymmetrical and differing between the sexes. Female urosome 2-, or 3-segmented, asymmetrical; male urosome 4-, or 5-segmented, symmetrical. Antenna 1 24-segmented; right male antenna 1 geniculate, with a 2-segmented terminal part. Mandible with 7 pointed teeth on blade. Maxillae 1 and 2 as in *Labidocera*. Maxilliped with 7 joints. Exopods of legs 1-4, 3-segmented; endopod of leg 1 3-segmented, of legs 2-4, 2-segmented. Female leg 5 biramous as in *Labidocera*; male leg 5 uniramous, similar to that of *Labidocera*.

(Rose 1933)

TYPE SPECIES: *Pontia atlantica* Milne-Edwards, 1828

REMARKS: The following species have been described in this genus. *Pontella agassizii* Giesbrecht, 1895; *P. alata* A. Scott, 1909 (male unknown); *P. andersoni* Sewell, 1912 (female unknown); *P. asymmetrica* Heinrich 1967; *P. atlantica* (Milne-Edwards, 1840); *P. cerami* A. Scott, 1909; *P. chierchiaie* Giesbrecht, 1889 (= *P. bifurcata* Tanaka, 1936; *P. forcipata* Tanaka, 1936); *P. cristata* Kraemer, 1896; *P. danae* Giesbrecht, 1892; *P. denticauda* A. Scott, 1909; *P. diagonalis* Wilson, 1950 (male = *P. spinipes*, Wolfenden 1906); *P. elegans* (Claus, 1892) (female unknown); *P. elephas* Brady 1883; *P. fera* Dana, 1849; *P. forcifcula* A. Scott, 1909 (female unknown); *P. gaboonensis* T. Scott, 1894b (see Vervoort 1965); *P. hantoni* Greenwood, 1979; *P. indica* Chiba, 1956; *P. investigatoris* Sewell, 1912 (female unknown); *P. karachiensis* Fazal-ur-Rehman, 1973; *P. kieferi* Pesta, 1933; *P. labuanensis* Mulyadi, 1997; *P. latifurca* Chen & Zhang, 1965; *P. lobiancoi* (Canu, 1888); *P. marplatensis* Ramirez, 1966; *P. meadii* Wheeler, 1900 (= *P. pennata* Wilson, 1932); *P. mediterranea* (Claus, 1863); *P. mimocerami* Fleminger, 1957; *P. natalis* Brady, 1915 (see Heinrich 1989); *P. novaezelandiae* Farran, 1929; *P. polydactyla*

Fleminger, 1957; *P. princeps* Dana, 1849; *P. rostricaudata* Ohtsuka, Fleminger & Onbe, 1987; *P. securifer* Brady, 1883; *P. sewelli* Heinrich, 1987; *P. sinica* Chen & Zhang, 1965; *P. speciosa* Dana, 1849; *P. spinicauda* Mori, 1937; *P. spinipedata* Heinrich, 1989; *P. spinipes* Giesbrecht 1889; *P. surrecta* Wilson, 1950; *P. tenuiremis* Giesbrecht, 1889; *P. valida* Dana, 1853 (see also Sherman 1967) (= ?*P. asymmetrica* Heinrich, 1967); *P. whiteleggei* Kraemer, 1896 (see also Heinrich, 1967); *Pontella* sp. Dakin & Colefax, 1940 (male unknown); *Pontella* sp. Pillai, 1975; *Pontella* sp. A, Silas & Pillai, 1973; *Pontella* sp. B, Silas & Pillai, 1973. *Pontella longipedata* Sato, 1913 (= *Pontella pulvinata* Wilson, 1950) has been removed to *Epi-labidocera* (see Nishimura 1969).

The following species are not well known and many of them are based on juvenile forms: *P. argentea* Dana, 1849; *P. detonsa* Dana, 1849; *P. gracilis* Wilson, 1950; *P. inermis* Brady, 1883; *P. raynaudii* (Milne-Edwards, 1840); *P. savignyi* (Milne-Edwards, 1828); *Pontella* sp. Chiba *et al.* 1955.

The following species have been taken in the Southwest Pacific.

### *Pontella cristata* Kraemer, 1896 (Figs 146, 185, 194)

DESCRIPTION: Size: females: 4.14-5.00 mm, males: 4.50 mm.

Female: As in the family and generic definitions with the following additional characteristics. Head with a distinct crest. Urosome 3-segmented; genital segment with a posteriorly directed pointed process arising from right under side. (Kraemer 1896)

Male: As in the family and generic definitions with the following additional characteristics. Head with a distinct crest. Left leg 5 terminal segment with a long seta arising proximally; right leg penultimate segment with 2 bifurcate expansions on the palm of the chela. (Kraemer 1896)

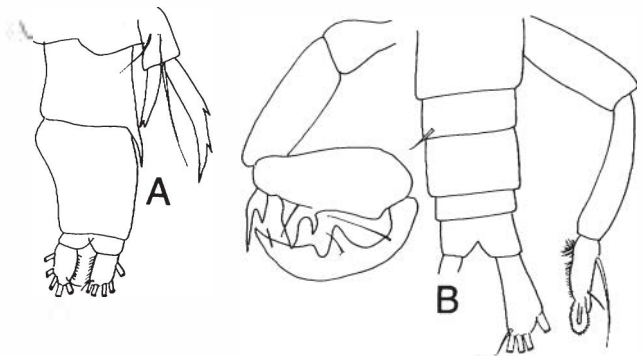


Fig. 146. *Pontella cristata* from Kraemer (1896). Female. A, urosome and leg 5. Male. B, urosome and leg 5.



REMARKS: It is surprising that this species has not been collected since Kraemer's (1896) description and Farran's (1936) record of a female (a record of Wilson, 1942) proved to be incorrect (personal observation). It is possible that this is a composite species or a species known by another, more recent name.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Kraemer (1896).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species is known only off New South Wales (Kraemer 1896) and questionably from the Great Barrier Reef (Farran 1936).

*Pontella hanloni* Greenwood, 1979

(Figs 147, 185, 194)

DESCRIPTION: Size: females: unknown, males: 1.45 mm

Female: Unknown.

Male: Head without cephalic hooks, with a pair of small dorsal lenses; pedigerous segments 4 and 5 weakly divided, posterior margins drawn into small acuminate processes, symmetrical. Urosome 5-segmented, caudal rami symmetrical. Leg 5 elongate. Right leg 5 with a small distal chela; basipod 1 broad proximally, narrowing distally, basipod 2 elongate, with a distinct lateral shoulder subterminally and 2 proximal inner setae; exopod segment 1 with a long sinusoidal spine of similar length to the segment extending medially from inner distal border forming thumb of chela; exopod segment 2 shorter than exopod segment 1, curved towards thumb and with distal region expanded into lamelliform flaps closing either side of thumb. Left leg 5 with a short basipod 2 and 2 stout curved processes on inner border, proximal process longer than length of basipod 2, curved distally, distal process smaller with a channel-like groove along distal face; exopod segment 1 twice the length of basipod 2 with an inner seta at midlength and an outer distal denticulate spine; exopod segment 2 elongate, with a pad of hairs proximally, 2 setae at midlength, and a long, curved lamellate spine and a small spine, both inserted subterminally.

(Greenwood 1979)

REMARKS: This species is remarkable for the absence of cephalic hooks, and the unusual shape of male left basipod 2 of leg 5.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1979).

NEW RECORDS: Nil

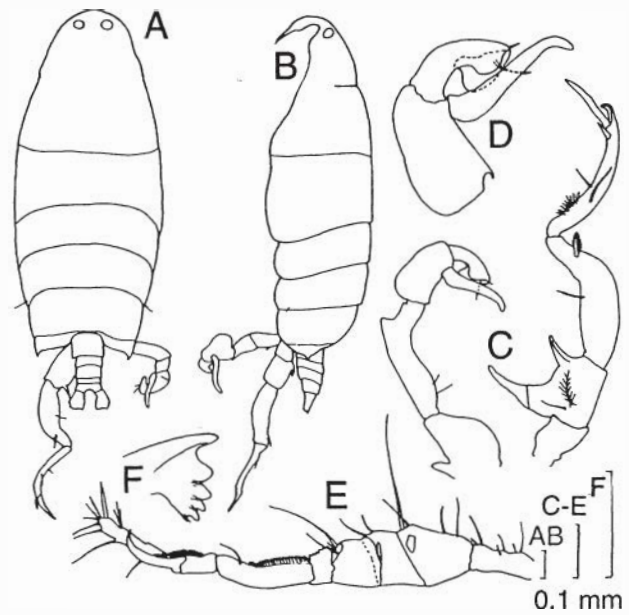


Fig. 147. *Pontella hanloni* from Greenwood (1979). Male. A, dorsal view; B, lateral view; C, leg 5; D, detail of exopod segments 1 and 2 of right leg 5; E, right antenna 1; F, mandible blade.

DISTRIBUTION: This epipelagic species is known from Moreton Bay, Australia (Greenwood 1979).

*Pontella novaezelandiae* Farran, 1929

(Figs 130, 131, 185, 194)

DESCRIPTION: Size: females: 5.95–6.20 mm, males: 4.90–5.40 mm.

Female: As in the family and generic definitions with the following additional characteristics. Slight indication of a rostral lens. Urosome 3-segmented, genital segment with 2 dorsal processes, anterior one blunt and directed dorsally, posterior one tapering to a point and overlapping urosome segment 2 which has a laterally directed winged process on left. Caudal rami symmetrical. Leg 5 not quite symmetrical.

(Farran 1929)

Male: As in the family and generic definitions with the following additional characteristics. Head terminated by a small crest ending in a blunt tooth; rostrum with a well-developed lens. Right antenna 1 of the type found in *P. lobiancoi*. Right leg 5 palm of chela with a long, slender, proximal thumb and bifid projection arising from its base, left leg 5 with a 1-segmented exopod with a long outer spine arising near its base, a small distal outer spine and 2 terminal spines slightly modified.

(Farran 1929)

REMARKS: This species is easily identified from the characteristics mentioned above, being unlike any other described species.

DISTRIBUTION: This epipelagic species appears to be found near the coast of northern New Zealand (Farran 1929).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
C628	surface	1 female 5.95 mm, 8 males 5.1–5.4 mm
N718	0–55	1 male 5.1 mm
AUZ81	0–100?	1 female 6.05 mm, 1 male 5.20 mm
AUZ82	90–100?	2 males 5.3 mm
J1/57/72	surface	5 females 5.3–5.7 mm, 6 males 4.5–4.8 mm

*Pontella securifer* Brady, 1883 (Figs 148, 185, 194)

DESCRIPTION: Size: females: 4.07–4.46 mm, males: 3.62–4.40 mm.

Female: As in the family and generic definitions with the following additional characteristics. Rostral lens obvious. Posterior metasome produced on left. Urosome 2-segmented; genital segment asymmetrical, extending dorsally over left caudal ramus, and has 2 processes which vary in position. Antenna 1 extends to pedigerous segment 3. Leg 5 slightly asymmetrical

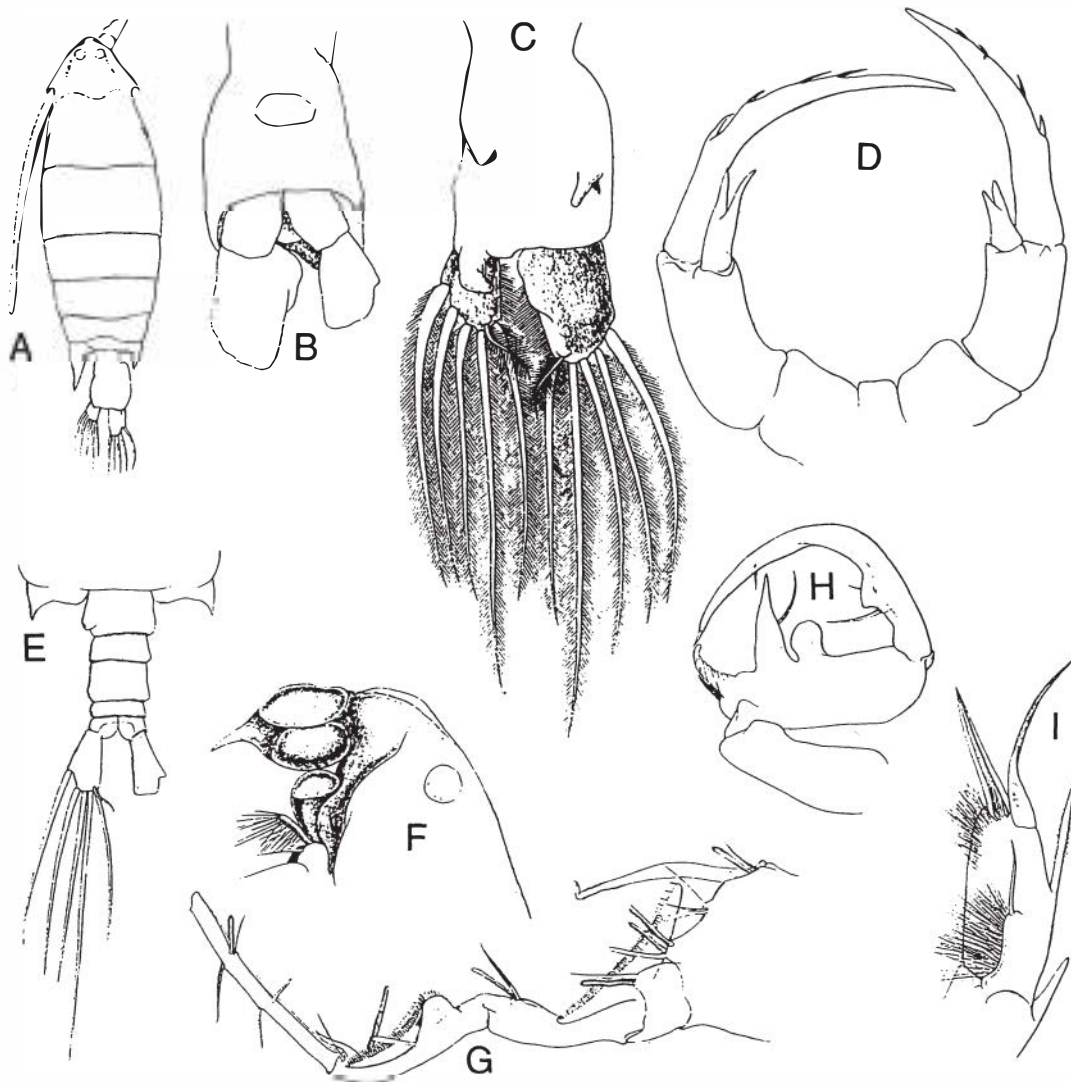


Fig. 148. *Pontella securifer* from Giesbrecht (1892). Female. A, dorsal view; B, urosome, ventral view; C, urosome, dorsal view; D, leg 5. Male. E, urosome, dorsal view; F, anterior head, lateral view; G, right antenna 1; H, right leg 5; I, terminal part of left leg 5.

with a small bifurcate endopod and long tapering exopod with 4 outer-edge spines.

(Giesbrecht 1892; Tanaka 1964c)

Male: As in the family and generic definitions with the following additional characteristics. Grasping antenna 1 with a large toothed process on segment 18; segment 19–20–21 has 2 toothed processes, one of which is protruded and coarsely toothed. Right leg 5 with palm of chela with a short, curved thumb-like process proximally and one conical and one papilla-shaped process more distally; left leg exopod bears 3 apical spines and an outer marginal spine.

(Giesbrecht 1892; Tanaka 1964c; Silas & Pillai 1973)

REMARKS: It appears that some Atlantic specimens differ from those from the Pacific (see Wilson 1932).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Dakin and Colefax (1940); Farran (1936).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in tropical parts of at least the Pacific Ocean, probably the Indian and maybe the Atlantic (see Vervoort 1965).

*Pontella tenuiremis* Giesbrecht, 1889

(Figs 149, 185, 194)

DESCRIPTION: Size: females: 2.80 mm, males: 2.65–2.80 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior border of metasome symmetrical. Urosome 2-segmented, genital segment asymmetrical with 2 rounded posterior lobes on each side of segment, right posteriormost. Leg 5 with a small bifurcate endopod, exopod with 3 inner, 1 terminal and 2 outer spines and 1 outer proximal spinule.

(Giesbrecht 1892)

Male: As in the family and generic definitions with the following additional characteristics. Right leg 5 segment 3 with a long curved process, left leg segment 3 with 3 rounded, terminal processes.

(Giesbrecht 1892)

REMARKS: This species is close to *Pontella fera*.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Heinrich (1968).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in the tropical and subtropical western Pacific (Giesbrecht 1889; Heinrich 1968, 1988) and Indian Ocean (Thompson & Scott 1903; Tsuruta 1963).

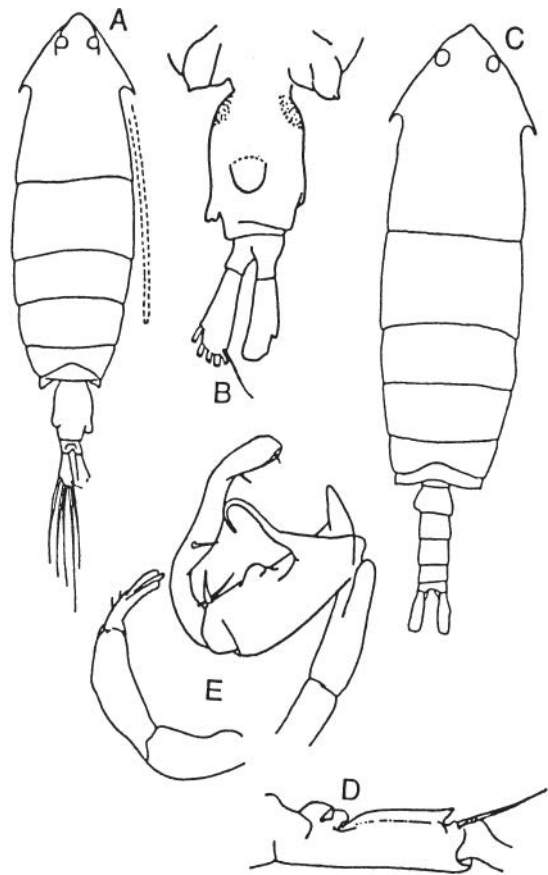


Fig. 149. *Pontella tenuiremis*. Female from Giesbrecht (1892). A, dorsal view; B, urosome, ventral view. Male from Grice (1961). C, dorsal view. Males from Giesbrecht (1892). D, segments 19–21 of right antenna 1; E, leg 5.

*Pontella valida* Dana, 1852

(Figs 150, 185, 194)

DESCRIPTION: Size: females: 2.45–3.60 mm, males: 2.57–3.28 mm.

Female: As in the family and generic definitions with the following additional characteristics. Rostrum without a visible lens structure. Posterior metasome ending in symmetrical angular processes. Urosome 2-segmented, asymmetrical, genital segment with a large thumb-like protuberance on right margin, left margin smoothly curving and terminated with an angular indentation posteriorly. Caudal rami asymmetrical, right ramus wider than left. Leg 5 symmetrical, endopod spiniform, exopod bearing spiniform processes, 4 inner, 3 outer, and 1 apical.

(Sherman 1967)

Male: As in the family and generic definitions with the following additional characteristics. Rostrum without a visible lens structure. Posterior metasome margins slightly angular. Urosome 5-segmented; caudal rami symmetrical. Right leg 5 chela massive

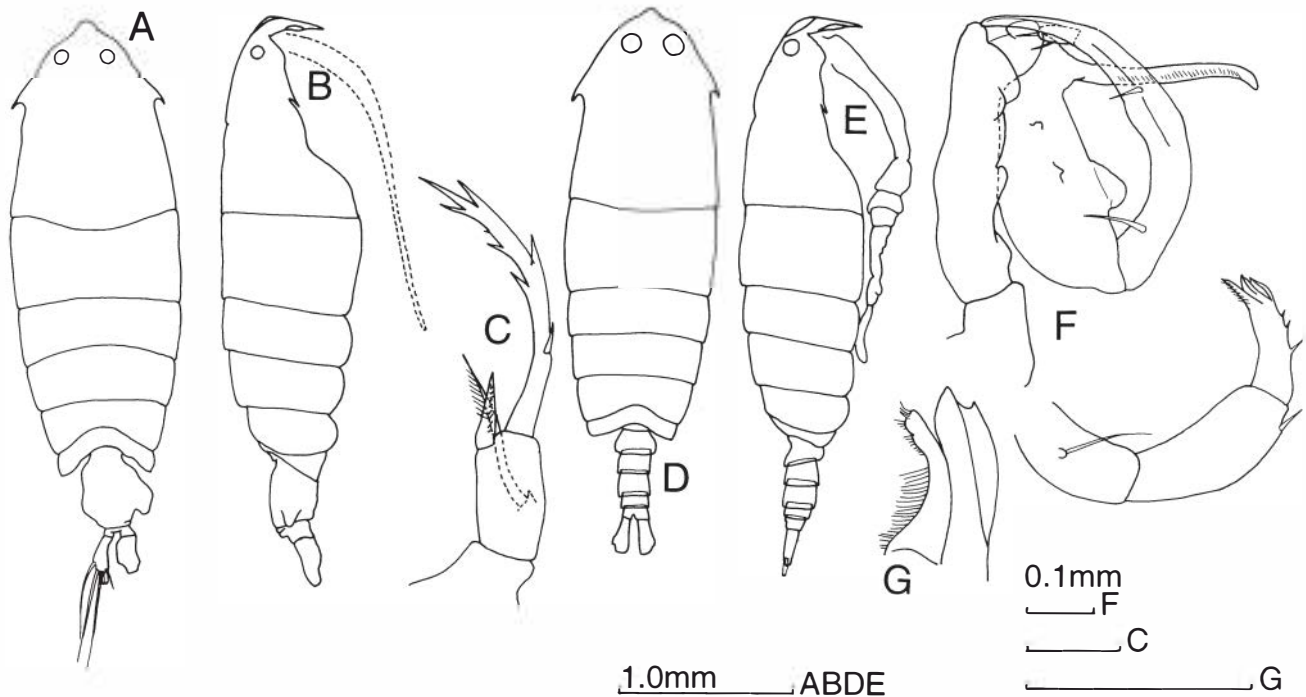


Fig. 150. *Pontella valida*. Female from Stn A295, surface. A, dorsal view; B, lateral view; C, leg 5. Male from Stn A303, 0–10 m. D, dorsal view; E, lateral view; F, leg 5; G, terminal part of left leg 5.

with elongate thumb, 2 small denticles, a large ridge-like process, and 2 well-developed spines on inner margin; distal margin of terminal segment ends in 2 asymmetrical lobes, smaller lobe with 2 small spines; left leg 5 penultimate segment with one anterior outer margin spine, distal segment with 3 short spines on outer anterior margin and 3 lamelliform processes at distal end with medial process well-developed and an inner process bearing small setae. (Sherman 1967)

REMARKS: This species is similar to *P. tenuiremis* but can be distinguished by the bilobed structure of the distal end of male right leg 5 and absence of any elongate process at proximal end of the thumb. The female is distinguished by the asymmetrical urosome and large thumb-like protrusion on right side of genital segment, and leg 5 endopods which bear 8 spiniform processes (Sherman 1967). Although Sherman (1967) indicates he could see no sign of a rostral lens in either sex, such a structure is observed on the posterior surface of the rostrum in the Southwest Pacific specimens. Also in the Southwest Pacific specimens the right leg 5 chela has a large terminal spine and 2 triangular peg-like processes on the inner border, terminal segment has 2 inner edge spines. The terminal segment of left leg 5 appears as if it might have only 2 terminal processes; the outer lamelliform process described by Sherman (1967) may in fact be a

lamellar extension of the more strongly built spine adjacent to the elongate hairy inner process.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Heinrich (1967 as *P. asymmetrica*, 1968).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A295	surface	2 females 3.36, 3.44 mm, 1 male 3.03 mm
A303	0–10	1 male 3.27 mm
C544	surface	3 males 3.28–3.12 mm
AUZ99	0–100?	2 males 3.00, 3.20 mm
AUZ123	0–100?	3 females 3.40–3.60 mm
Tui A	0–18	1 female 3.57 mm

DISTRIBUTION: This epipelagic species has been taken from 18° to 25° S and 92° to 174° W in the Pacific Ocean (Sherman 1967); the present records extend the distribution to at least 35° S in the Southwest Pacific.

*Pontella whiteleggei* Kraemer, 1896  
(Figs 151, 185, 194)

DESCRIPTION: Size: females: 5.30–6.70 mm, males: 4.70–5.30 mm.

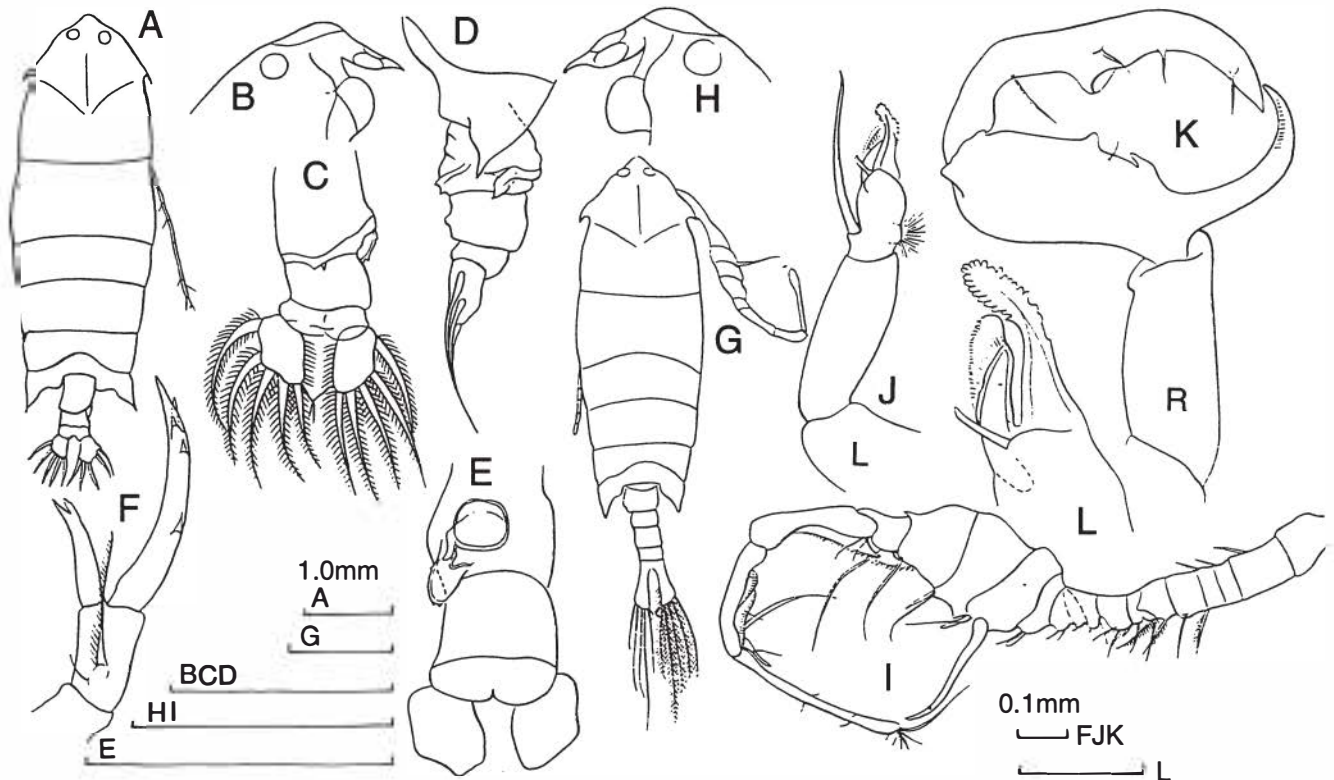


Fig. 151. *Pontella whiteleggei* from Heinrich (1967). Female. A, dorsal view; B, anterior head, lateral view; C, urosome, dorsal view; D, urosome, lateral view; E, urosome, ventral view; F, leg 5. Male. G, dorsal view; H, anterior head, lateral view; I, geniculate antenna 1; J, left leg 5; K, right leg 5; L, terminal part of left leg 5.

Female: As in the family and generic definitions with the following additional characteristics. Rostral lens present. Urosome 3-segmented; genital segment with a ventral right side projection, visible from the dorsal surface; this projection may be smooth or with variously toothed edge. (Heinrich 1967)

Male: As in the family and generic definitions with the following additional characteristics. Large rostral lens present. Left leg 5 exopod with a long seta inserted proximally, 2 serrate-edged lobes and 1 peg-like projection are found terminally; right leg 5 heavily built with a long thumb on chela and 2 projections on palm. (Heinrich 1967)

REMARKS: The present specimens agree with the above description although the form of the genital segment could not be verified because of the spermatophore coupler covering the urosome.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Kraemer (1896); Brady (1883) (as *Pontella strenua* in part); Heinrich (1967).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
AUZ81	0-100?	1 male 5.2 mm
AUZ88	0-100?	1 male 5.3 mm
AUZ123	0-100?	1 female 6.2 mm (damaged)

DISTRIBUTION: This epipelagic species has been taken in the subtropical South Pacific (Heinrich 1967).

### *Pontellina* Dana, 1949

DEFINITION: As in the family definition with the following additional characteristics. Prosome in dorsal view broadly oval, head lacking cephalic hooks, female without cuticular lenses, male with 1 pair of dorsal lenses; with inconspicuous ventral eye without a lens; head and pedigerous segment 1 separate; pedigerous segments 4 and 5 fused; posterior metasome points symmetrical. Urosome 2-segmented; genital segment with hairs on the posterior border and 4 groups of spinules laterally; caudal rami weakly asymmetrical, right ramus fused to anal segment. Antenna 1 with segments 13, 14, and 15 separate and equal in length,

with plumose setae. Antenna 2 endopod twice the length of exopod. Maxilla 2 with numerous strong curved distal setae. Maxilliped carrying large, spiny setae. Leg 1 endopod 3-segmented. Leg 5 with 1-segmented exopod bearing one lateral and 3 terminal setae as well as one medial setiform process fused to exopod and serrated along its medial margin; endopod 1-segmented and terminating in 1 or 2 apical spines. Male leg 5 with basipod 2 bearing a large plumose seta posteriorly; endopods lacking; exopod 2-segmented; right leg with an elongate basipod 1 and cheliform exopod; left leg with reduced basipod 1, distal segment of exopod armed with 4 short setiform processes.

(Fleminger & Hülsemann 1974)

TYPE SPECIES: *Pontellina plumata* Dana, 1849

REMARKS: This genus was reviewed by Fleminger and Hülsemann (1974) and the following species have been described: *Pontellina morii* Fleminger & Hülsemann, 1974; *P. platychela* Fleminger & Hülsemann, 1974; *P. plumata* Dana, 1849 (= ?*Pontellopsis speciosus* Brady, 1915; = *Pontellopsis aequalis* Mori, 1932); *P. sorina* Fleminger & Hülsemann, 1974.

The following species have been taken in the Southwest Pacific.

*Pontellina morii* Fleminger & Hülsemann, 1974  
(Figs 152, 186, 194)

DESCRIPTION: Size: females: 1.38–1.88 mm, males: 1.26–1.68 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterolateral corner of metasome ending in a short, symmetrical, spiniform process extending posteriorly; the junction of the spine with the border of its segment is relatively abrupt in both dorsal and lateral views. Genital segment with posterolateral cluster of coarse hairs on both sides, lacking anterolateral cluster found in *P. plumata* although several fine hairs may occur at this site; posterior margin of segment bordered by fine long hairs as in *P. plumata*. Leg 5 exopod with hairs along the inner margin; endopod relatively longer than that of *P. plumata*, typically with 2 relatively equal apical spines. (Fleminger & Hülsemann 1974)

Male: As in the family and generic definitions with the following additional characteristics. Posterior metasome typically ending posteriorly in a small spiniform process as in female. Leg 5 with chela of the *plumata*-type but both segments show distinctive features; distal segment short, not reaching opposing distolateral digitiform process on proximal segment, apex of distal segment with a prominent triangular spur posteriorly; proximal segment in lateral view

with a basal process posterior to digitiform process acuminate, intersection of posterior basal process and digitiform process usually in the form of a deep angular notch; in posterior view proximal segment with axis of posterior basal process extending somewhat parallel to digitiform process and not overlapping anterior basal process, the latter angled toward articulation between proximal and distal segments. Left leg 5 with exopod segment 1 longer than that in *P. plumata*. (Fleminger & Hülsemann 1974)

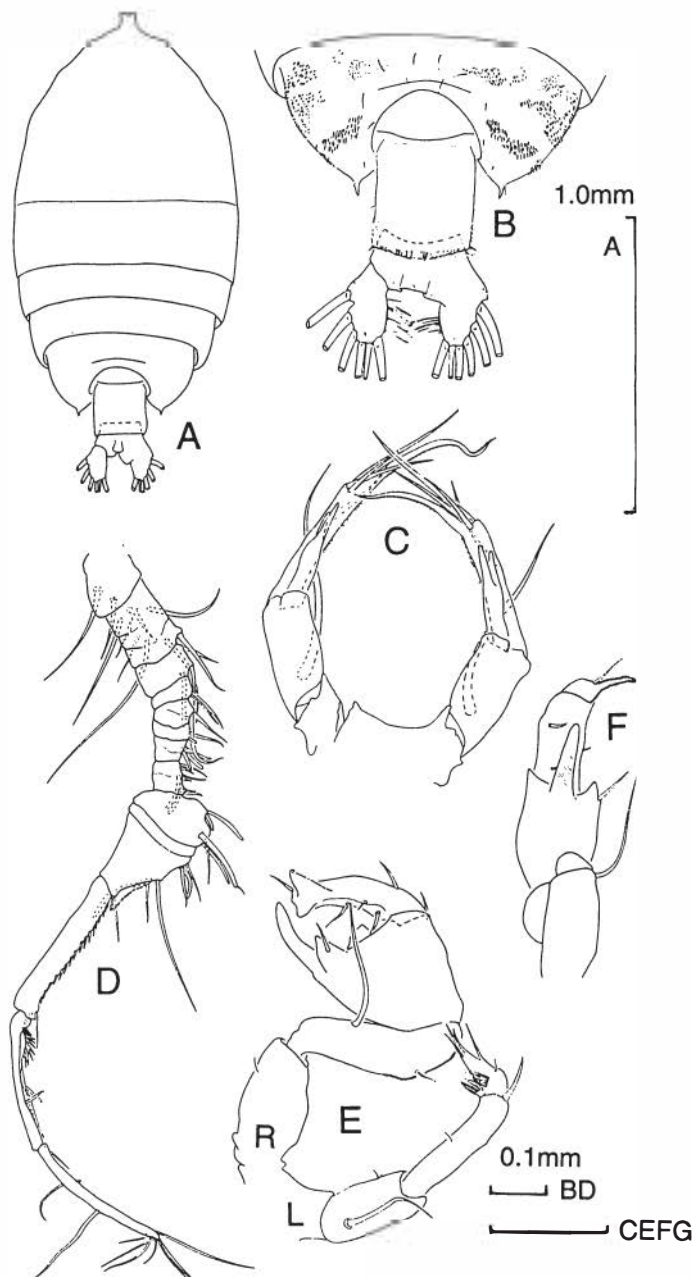


Fig. 152. *Pontellina morii* from Fleminger and Hülsemann (1974). Female. A, dorsal view; B, urosome, dorsal view; C, leg 5. Male. D, right antenna 1; E, leg 5; F, right leg 5 chela, lateral view.

REMARKS: The fine detail of minute structures on the genital segment (Hülsemann & Fleminger 1990) generally supports the taxonomic conclusions of Fleminger and Hülsemann (1974).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1979).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species has been taken in the Indian and Pacific Oceans mainly between 20° S and 20° N (Fleminger & Hülsemann 1974).

*Pontellina plumata* (Dana, 1849) (Figs 153, 186, 194)

DESCRIPTION: Size: females: 1.44–1.94 mm, males: 1.34–1.92 mm.

Female: As in the family and generic definitions with the following additional characteristics. Posterior corner of metasome in lateral view produced into a conspicuous spiniform process; ventral margin of the spine is more or less continuous with ventral margin of pedigerous segment 4–5, the transition with dorsal margin is abrupt and stepped; in dorsal view spine more or less continuous with posterior tapering of corner. Genital segment bearing anterolateral and posterolateral clusters of hairs on both sides of segment; anterior cluster larger, best seen in dorsal view; a row of relatively long, fine hairs encircling the segment near distal margin. Leg 5 with inner margin of exopod lacking hair, endopod polymorphic with 1 or 2 apical spines fused to segment; exopod 2–3 times longer than endopod. (Fleminger & Hülsemann 1974)

Male: As in the family and generic definitions with the following additional characteristics. Posterior corner of metasome in lateral view somewhat angular, apex usually bearing 1 minute denticle. Chela of right leg 5 with proximal segment extending distolaterally as a relatively slender digitiform process opposing the apex of the distal falcate segment, base of distolateral digitiform process flanked by a small anterior process, triangular in lateral view, and a small angular posterior process bearing a sensoriform seta, in lateral view posterior basal process and digitiform process with relatively straight margins intersecting at an angle greater than 70°; in posterior view 2 basal processes are overlapping, both extending toward centre of lumen of chela; additional sensoriform setae on proximal segment of chela: 1 anteromedial near articulation with distal segment; on distal segment: 1 proximomedial, 1 mediosubapical, and 3 lateral. Left leg 5 with exopod segment 1 short relative to other species in the genus. Length of right caudal ramus exceeds

length of left exopod segment 1 by 1.55–1.85 times. (Fleminger & Hülsemann 1974)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Brady (1883) (in part as *Pontella plumata*, pl. 37, fig. 11 only); Dakin and Colefax (1940).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	surface	1 female 1.75 mm
A302	0–500	2 females 1.7, 1.8 mm

DISTRIBUTION: This epipelagic species has warm-water, circumglobal distribution bounded approximately in the north and south by the subtropical convergence zones of each hemisphere (Fleminger & Hülsemann 1974).

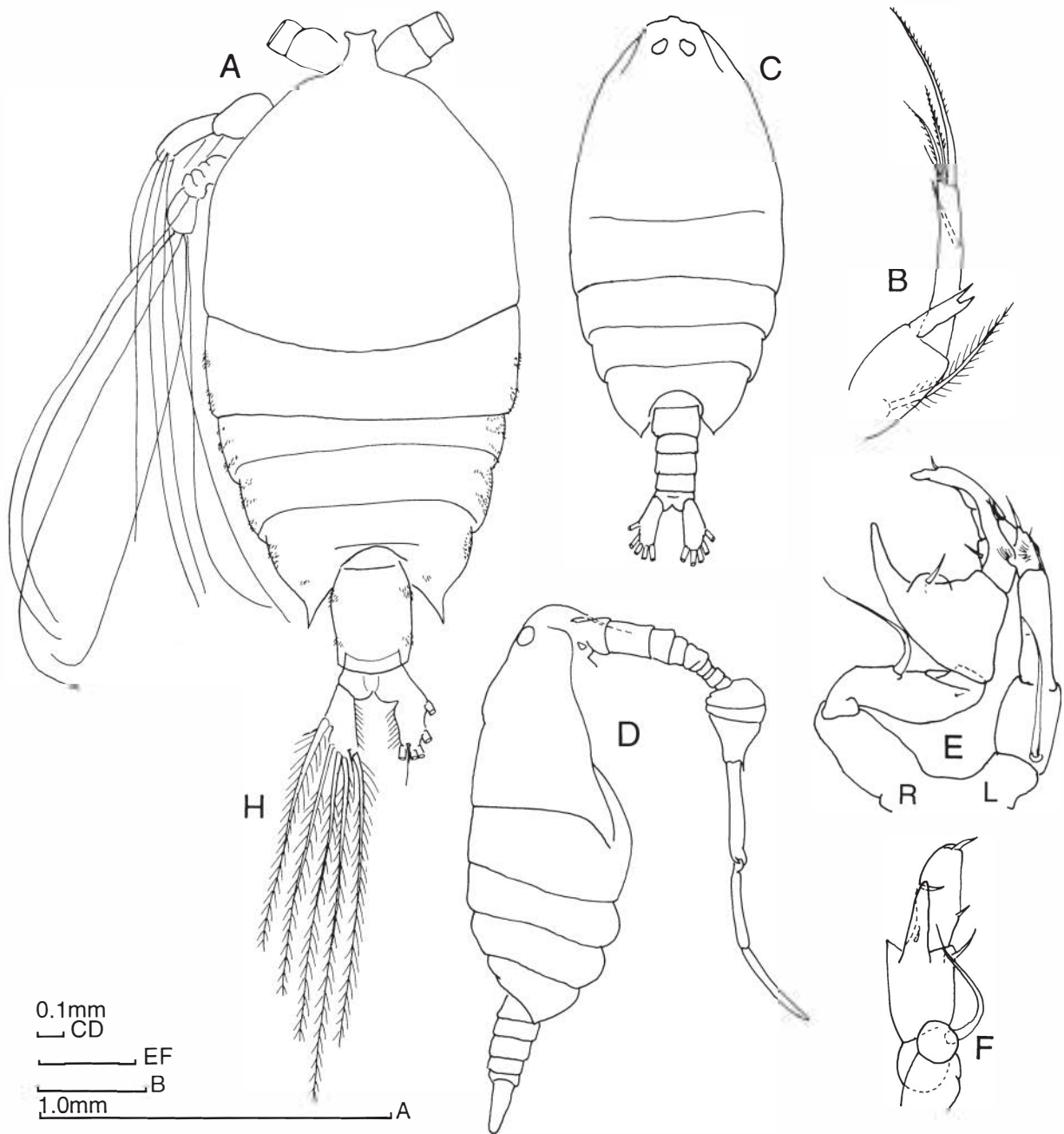
### *Pontellopsis* Brady, 1883

DEFINITION: As in the family definition with the following additional characteristics. Head and pedigerous segment 1 separate; head without lateral hooks or dorsal or rostral lenses; pedigerous segments 4 and 5 fused and extending posteriorly into a point, most often asymmetrical in the male. Urosome asymmetrical in both sexes; 1- or 2-segmented in the female; male urosome segment 3 with a projection on the right. Antenna 1 of the female 16-segmented. The prehensile male antenna 1 swollen in the middle, terminal part 2-segmented. Maxilla 2 distal setae large and spinous. Maxilliped 5-segmented. Legs as in *Pontella*.

(Brady 1883; Rose 1933)

TYPE SPECIES: *Pontellopsis villosa* Brady, 1883

REMARKS: The following species have been described in this genus: *Pontellopsis albatrossi* Wilson, 1950 (male unknown); *P. armata* (Giesbrecht, 1889); *P. bitumida* Wilson, 1950; *P. brevis* (Giesbrecht, 1892); *P. digitata* Wilson, 1950; *P. grandis* (Lubbock, 1853); *P. herdmani* Thompson & Scott, 1903 (male unknown); *P. inflato-digitata* Chen & Shen, 1974; *P. kraemeri* (Giesbrecht, 1896) (male unknown); *P. laminata* Wilson, 1950 (male unknown); *P. lubbockii* (Giesbrecht, 1889); *P. macromyxa* A. Scott, 1909; *P. occidentalis* Esterly, 1906; *P. pacifica* Chiba, 1953; *P. perspicax* (Dana, 1849); *P. pexa* A. Scott, 1909 (male unknown); *P. regalis* (Dana, 1849); *P. scotti* Sewell, 1932; *P. sinuata* Wilson, 1950; *P. strenua* (Dana, 1849) (male see Wilson 1950); *P. tasmanensis* Greenwood, 1978b; *P. tenuicauda* (Giesbrecht, 1889) (male



**Fig. 153.** *Pontellina plumata*. Female from Stn A302, 0–500 m. **A**, dorsal view; **B**, leg 5. Male from Fleminger and Hülsemann (1974). **C**, dorsal view; **D**, lateral view; **E**, leg 5; **F**, leg 5 chela, lateral view.

see Mori 1937); *P. villosa* Brady, 1883; *P. yamadae* Mori, 1937.

The following species are not well known or are based on juveniles. *Pontellopsis contracta* (Dana, 1849); *P. curta* (Dana, 1849); *P. curticornis* (Dana, 1852); *P. emerita* (Dana, 1949); *P. globosa* Wilson, 1950; *P. protensa* (Dana, 1849); *P. rubescens* (Dana, 1849)

The following species have been taken in the South-west Pacific.

***Pontellopsis grandis*** (Lubbock, 1853)

(Figs 154, 186, 194)

**DESCRIPTION:** Size: females: 3.35–4.28 mm, males: 3.18 mm.

**Female:** As in the family and generic definitions with the following additional characteristics. Anterior head rounded. Posterior metasomal points symmetrical. Urosome 2-segmented, genital segment with a large triangular projection on right, about half as



long as segment 2. Caudal rami almost symmetrical. Leg 5 exopod with 2 terminal, 1 inner edge and 2 outer edge spines; endopod bifurcate at the tip.

(Lubbock 1853)

Male: As in the family and generic definitions with the following additional characteristics. Right posterior angles of metasome twice as long as on left side. Urosome segment 3 with "a short cylindrical appendage attached underneath on the right side; a hemispherical portion at the end is dark violet, covered with numerous small spines and surrounded with a light yellow border on which they are rather larger and more scattered; there are a few hairs on the violet part." The left leg 5 "is much smaller than the right, and has no inner branch. The second segment has a spine externally at the apex. The third is small and bears the two tufts of hairs, and the fourth is small, and bears at the apex a little tapering delicate lobe, ...

The right leg also consists of four segments; the third, which in some species is so much swollen, is small, ... The fourth segment is small, and the spine of the third is large and pointed, ... The presence of two hairs on the smaller spine unmistakably denote it to be the real homology of the apical segment; ...".

(Lubbock 1853)

REMARKS: The identity of the Southwest Pacific females is not clear. Giesbrecht (1892) combined together all the varieties of what he considered to be *Monops regalis* (Dana) and included *Monops grandis* Lubbock, 1853 as a synonym. Even though he notes a large amount of variability none of his figures resembles the present females. There is a resemblance of the Southwest Pacific females to females subsequently identified as *Pontellopsis regalis* (Dana) by Wilson (1950; Fig. 496', from Hawaii; USNM 74095; see also holotype vial of *P. albatrossi*) and by Tanaka (1964) from Japan. The existing name that most closely resembles these forms, in that the right side of the female genital segment extends into a posteriorly directed lobe bearing a small spine, is *Monops grandis* Lubbock, 1853. Lubbock's name has been reinstated here for the Southwest Pacific females as in the U.S. National Museum collections it appears that no intergrades exist between the different types of *P. regalis*.

With the female specimens labelled *P. regalis* (Wilson 1950, Fig. 496') (USNM 74095) were two types of male. The left leg 5 was almost indistinguishable in the two types in the vial, but the nature of the right side extension on urosome segment 3, viewed laterally, distinguished them. One male differed from all other specimens of "*P. regalis*" in the vial in that in lateral view the projection on the right side of urosome segment 3 is smooth and globular dorsally compared with the narrow spinose projection on the other specimens. The spinose projection seen in these specimens (USNM 74095) is reminiscent of Lubbock's (1853) description of this projection in *Monops grandis* (see above).

The true identity of the Southwest Pacific specimens must await a revision of all specimens related to *Pontellopsis regalis*.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nil.

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
AUZ49	surface	1 female 4.28 mm
AUZ81	0-100?	1 female 3.95 mm, 1 copepodite 3.00 mm
AUZ111	0-100?	1 female 4.11 mm

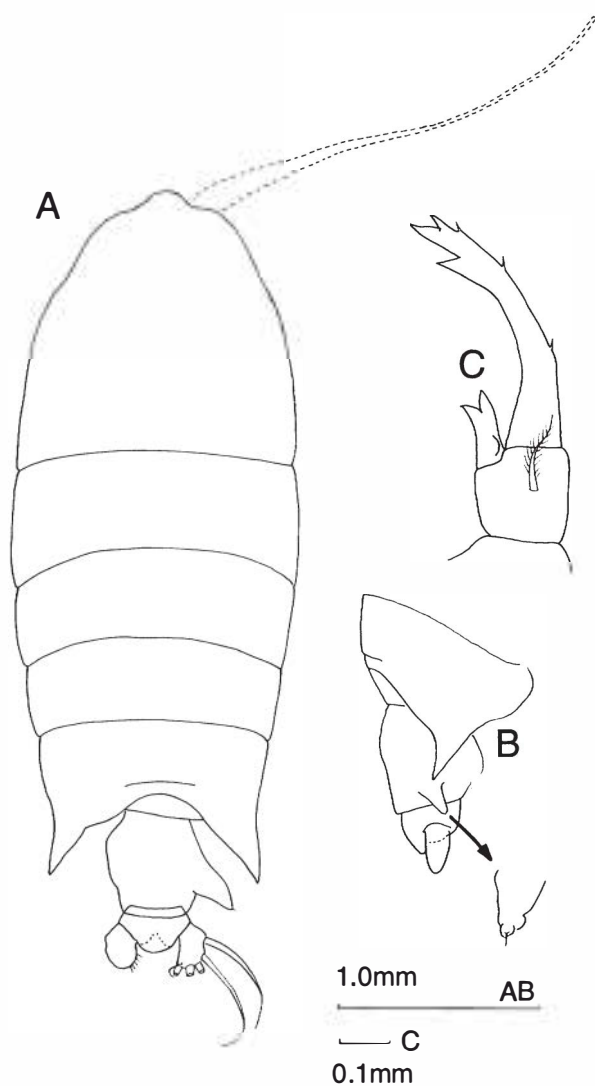


Fig. 154. *Pontellopsis grandis*. Female from Stn AUZ81. A, dorsal view; B, urosome, lateral view; C, leg 5.

DISTRIBUTION: This epipelagic species is known provisionally from the Pacific and Atlantic Oceans (Lubbock 1853; Wilson 1950; Tanaka 1964c).

*Pontellopsis herdmani* Thompson & Scott, 1903  
(Figs 155, 186, 194)

DESCRIPTION: Size: females: 1.70–2.14 mm, males: unknown.

Female: As in the family and generic definitions with the following additional characteristics. Urosome 2-segmented; genital segment asymmetrical, greatest width proximal to distal quarter of segment, the segment tapering uniformly to anterior of segment and abruptly to distal quarter; right posterodorsal region produced into a posteriorly directed spine-like lobe reaching the base of caudal rami; small transparent obtuse spine placed on right ventrolateral anterior quarter of segment. Anal segment produced posterodorsally into a rounded supraanal plate almost reaching posterior border of caudal rami. Leg 5 almost symmetrical, left exopod slightly shorter than right exopod and with stronger curvature; both exopods bifid distally, inner spine longer and thicker than outer spine, 2–3 minute spines on outer surface of right exopod, 1–3 on left exopod, endopods of similar length, bifid distally, terminal spines being of similar length to the remainder of the endopod.

(Greenwood 1979)

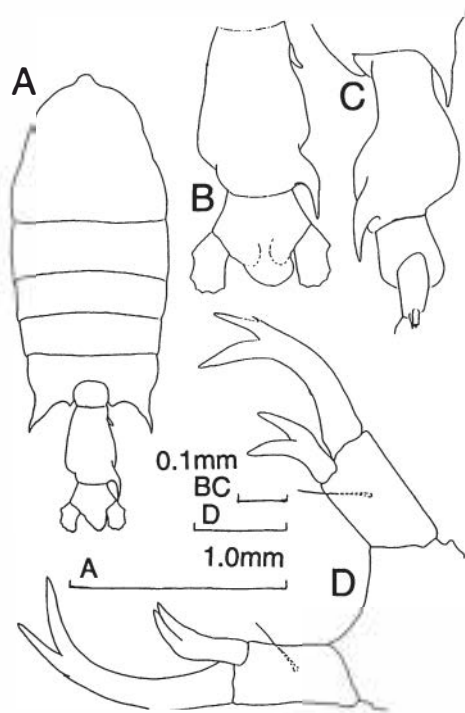


Fig. 155. *Pontellopsis herdmani*. Female from Greenwood (1979). A, dorsal view; B, urosome, dorsal view; C, urosome, right side; D, leg 5.

Male: Unknown.

REMARKS: Greenwood (1979) discusses the relationships of this species with close relatives and previous confusion about its identity.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1979).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species is known from the northern Indian ocean and Moreton Bay (Greenwood 1979).

*Pontellopsis kraemeri* (Giesbrecht, 1896)  
(Figs 156, 186, 194)

DESCRIPTION: Size: females: 1.9–2.2 mm, males: unknown.

Female: As in the family and generic definitions with the following additional characteristics. Anterior head rounded; posterior metasomal points almost symmetrical. Urosome 2-segmented, genital segment asymmetrical with a rounded lobe extending posteriorly on the left side. Caudal rami asymmetrical, largest on the right. Leg 5 exopod with 3 small, 1 large inner-edge, and 1 small outer edge spines; endopods with bifurcate tips.

(Giesbrecht 1896)

Male: Unknown.

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Dakin and Colefax (1940).

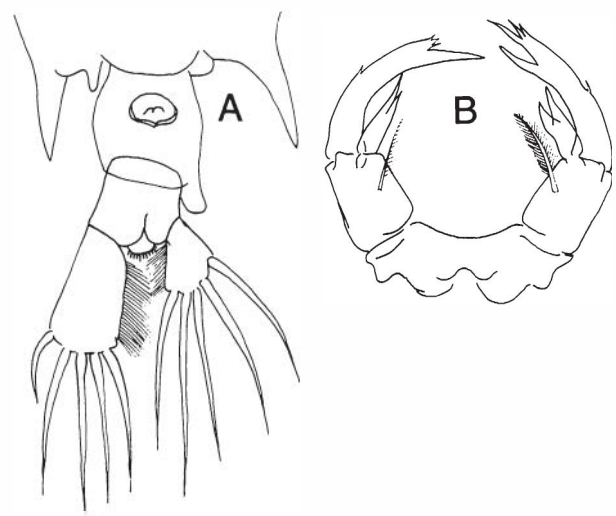


Fig. 156. *Pontellopsis kraemeri*. Female from Giesbrecht (1896). A, urosome, ventral view; B, leg 5.

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species is known from the Indian Ocean and western Pacific (Dakin & Colefax 1940).

*Pontellopsis tasmanensis* Greenwood, 1978b  
(Figs 157, 186, 194)

DESCRIPTION: Size: females: 1.42–1.69 mm, males: 1.28–1.54 mm.

Female: As in the family and generic definitions with the following additional characteristics. Metasome with posterior margins produced symmetrically into small rounded posterolateral processes. Urosome 2-segmented; genital segment asymmetrical, right posterolateral region produced into a variable rounded or broadly triangular lobe which extends laterally; forms with larger lobes sometimes with a small seta at tip of lobe and a similar small seta on mid-ventrolateral surface; no other spines or projections present. Anal segment produced posterodorsally into a large, slightly asymmetrical triangular supra-

anal plate reaching almost to posterior border of caudal rami; caudal rami symmetrical. Leg 5 asymmetrical; right exopod with a stout spine extending from inner border slightly distal to midlength, not reaching end of ramus, corresponding spine absent from left exopod; both exopods terminate in a single point and 2 variable subterminal spines on outer border, the more distal the larger; 2 minute spinules are placed on outer borders. Endopods similar, bifid terminally, left ramus narrower and longer. (Greenwood 1978b)

Male: As in the family and generic definitions with the following additional characteristics. Posterior margins of metasome rounded on left side, right side produced as an elongate spine-like process reaching beyond middle of urosome segment 4. Urosome 5-segmented; genital segment symmetrical with a small seta on right posterolateral margin; urosome segment 2 with a patch of minute tubercles on right posterolateral surface; urosome segment 3 slightly asymmetrical, slightly swollen on right side, the apex of swelling with minute tubercles. Leg 5 with right thumb-like process at base of exopod segment 1 similar in length to finger-like exopod segment 2; "thumb"

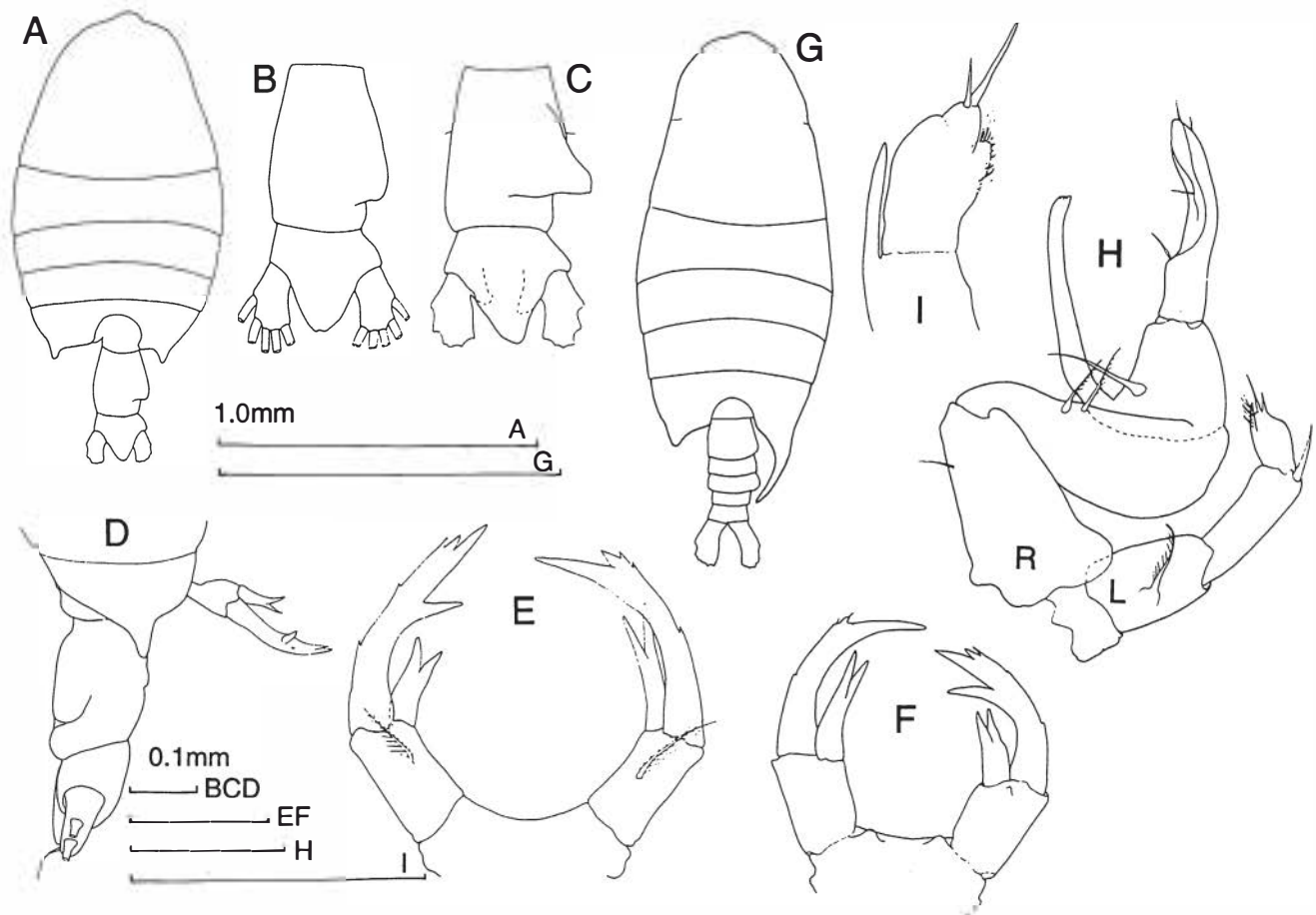


Fig. 157. *Pontellopsis tasmanensis* from Greenwood (1978). Female. A, dorsal view; B, C, urosome, dorsal view; D, urosome, right side; E, F, leg 5. Male. G, dorsal view; H, leg 5, I, terminal part of left leg 5.

slightly expanded or spatulate distally; large seta on exopod segment 1 distal to base of thumb; exopod segment 2 with an excavated lateral surface and bearing 4 setae; 1 at base of excavation, 1 in centre of excavation, and 2 terminal. Left leg 5 basipod 2 and exopod segment 1 of similar length; distolateral margin of exopod segment 1 with a stout spine extending about two-thirds the length of exopod segment 2; exopod segment 2 short; lobe on medial face bearing fine setae and with 1 long and 1 short terminal setae. (Greenwood 1978b)

REMARKS: This species is closely related to *P. macronyx*, *P. scotti*, *P. tenuicauda*, and *P. yamadae*. Greenwood (1978) discusses the relationship in detail.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1978b, 1979).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species is known from Moreton Bay, Australia (Greenwood 1978b, 1979).

#### Family PARAPONTELLIDAE Giesbrecht, 1892

DEFINITION: Female: Head and pedigerous segment 1 separate, pedigerous segments 4 and 5 fused. Rostrum with 2 filaments. A small ventral and large central eye present; without a cuticular lens. Urosome of female 3-segmented; caudal rami with 5–6 setae. Antenna 1 18–19-segmented. Antenna 2 endopod fused to basipod 2, exopod longer than endopod; basipods 1 and 2 with 1 seta each; endopod segment 1 with 1 seta, segment 2 may be separated from a 3rd segment with 2–4 and 6–7 setae respectively; exopod 5–7-segmented, with a total of 5–7 setae, terminal segment with only 2 terminal setae. Mandible with large cutting teeth; basipod 2 elongate, without setae; exopod rudimentary, 1-segmented with 3–5 setae; endopod segment 1 with 1 seta, segment 2 with 6 setae. Maxilla 1 elongate, inner setae small, terminal part of endopod directed laterally; inner lobe 1 with 11–13 spines and setae; inner lobes 1 and 2 with 2 setae each; basipod and endopod fused with a total of 8–13 setae; exopod with 8 setae; outer lobe 2 absent; outer lobe 1 absent? or with 4 setae. Maxilla 2 lobes 1, 2, and 3 weakly developed, remaining lobes with strong claw-like setae; lobes 1–5 with 3, 1–2, 1–2, 2, 2–3 setae respectively; endopod with 5 spines and 2 setae. Maxilliped basipod 1 produced distally with long setae; basipod 2 without setae; remainder of the limb with segments fused and reduced, especially the setae; basipod 2 with 4 strong setae; endopod with a total of

6–9 small setae. Swimming legs with the rami 3-segmented except for endopods of legs 2–4 which are 2-segmented; terminal exopod spines are toothed along their outer borders. Spine and seta formula as follows:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0-1	0-0	I-1; I-1; II, 1, 4	0-1; 0-2; 1, 2, 3
Leg 2	0-1	0-0	I-1; I-1; III, I, 5	0-3; 1, 2, 4
Leg 3	0-1	0-0	I-1; I-1; III, I, 5	0-3; 1, 2, 3
Leg 4	0-1	0-0	I-1; I-1; III, I, 5	0-3; 1, 2, 3

Leg 5 symmetrical, biramous or uniramous (*Neopontella*); both basipod 1 and coupler are fused; basipod 2 with 1 small lateral seta; exopod segment 1 elongate with a long terminal articulated spine (exopod segment 2?), a small outer distal articulated spine, sometimes a small lateral articulated spine; and an inner distal spine which is fused or articulated to exopod segment 1; endopod, if present, is 1-segmented and is bifid distally.

Male: Posterior prosome may be conspicuously asymmetrical. Urosome 4–5-segmented. Antenna 1 geniculate on the right, 12–15-segmented, distal part 2-segmented. Leg 5 of male uniramous although an endopod remnant may be present on one side, 3-segmented on each side, asymmetrical; basipods 1 and 2 and coupler are fused and bear a lateral seta on each side; left exopod segment 1 with a small outer distal spine, exopod segment 2+3 with 2 outer, 1 terminal, and sometimes an inner proximal spine; right exopod segment 1 with a prominent inner process and sometimes another distal spine; exopod segment 2+3 drawn out into a point, has a prominent inner proximal process, and sometimes has an outer edge spine. (Giesbrecht 1892; Sars 1903)

REMARKS: This family now contains only *Neopontella* and *Parapontella*. *Bathypontia* was removed by Brodsky (1950) to the family Bathypontiidae.

#### *Neopontella* A. Scott, 1909

DEFINITION: As in the family definition with the following additional characteristics. Female antenna 1 18-segmented. Female leg 5 uniramous, 3-segmented, terminal segment armed with 3 strong spines. Male urosome 4-segmented, posterior metasomal borders symmetrical in dorsal view. Male leg 5 uniramous, asymmetrical; terminal segments on both sides lamelliform, on right it has a claw-like appearance but there is no articulation between thumb-like process and palm. (A. Scott 1909)

TYPE SPECIES: *Neopontella typica* A. Scott, 1909

REMARKS: This monotypic genus has only been recorded in deep water from in the Malay Archipelago. No members of this genus were taken in the Southwest Pacific.

### *Parapontella* Brady, 1878

DEFINITION: As in the family definition with the following additional characteristics. Female antenna 1 19-segmented. Female leg 5 biramous, endopod and exopod 1-segmented, Male urosome 5-segmented, posterior metasomal borders asymmetrical in dorsal view. Male leg 5 uniramous on each side, 3-segmented, without a claw. (Giesbrecht 1892)

TYPE SPECIES: *Pontellina brevicornis* Lubbock, 1857

REMARKS: Examples of this monotypic genus have been taken only in the North Atlantic Ocean. No members of this genus have been taken in the Southwest Pacific.

### Family **SULCANIDAE** Nicholls, 1945

DEFINITION: As in the generic definition.

REMARKS: This family was created by Nicholls (1945) to contain one species which has affinities with the Parapontellidae and Tortanidae. Its most outstanding features are a uniramous antenna 2, with greatly elongated segments; the long setae throughout, particularly on maxilla 2 and the maxilliped; and the peculiar structure of the anal region to which the generic name refers. In addition to these features, the absence of fully articulated outer edge spines on the exopods of legs 2–4, is reminiscent of the Acartiidae.

### *Sulcanus* Nicholls, 1945

DEFINITION: Head without lateral hooks, eye prominent, without cuticular lenses, rostrum absent, labrum prominent and with accessory lobes. Head and pedigerous segment 1 fused, pedigerous segments 4 and 5 separate; posterior metasome rounded, with posterior spines and almost symmetrical in both sexes. Urosome 4-segmented in female, genital segment without genital operculum or seminal receptacles; 5-segmented in male. Anal segment cleft almost to its base, dorsally excavated, and overhung by a large anal operculum. Caudal rami symmetrical in female; slightly asymmetrical in male, right ramus being longer and wider than left ramus. Antenna 1 16-segmented in female

with segments more or less fused and with tubercles at bases of large setae; male right antenna 1 geniculate and with 18 distinct segments. Antenna 2 uniramous, 3-segmented, 2 terminal segments elongate, with a terminal bunch of long setae; exopod lacking. Mandible palp biramous; exopod subterminal, unsegmented; endopod terminal, 2-segmented. Maxillae 1 and 2 with reduced segmentation but strongly armed with long curved denticulate spines. Maxilliped with basal portion enlarged and extending beyond the point of insertion of the distal portion, and bearing long, strong, curved, denticulate spines; terminal portion reduced, 2-segmented. Basipods of swimming legs increase in length from legs 1–3. Endopods 2-segmented on legs 1 and 2, 3-segmented on legs 3 and 4. Distolateral borders of exopod segments of legs 2–4 (except exopod segment 2 of leg 2) expanded into a conspicuous tooth; these spines do not seem to be completely articulated. Terminal exopod spine of legs 1–4 with outer edge teeth. Spine and setal formula:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0–1	0–0	0-1; 0-1; II, I, 4	0–2; 1, 2, 3
Leg 2	0–1	0–0	I-1; 0-1; II, I, 5	0–3; 1, 2, 4
Leg 3	0–1	0–0	I-1; I-1; II, I, 5	0–1; 0–2; 1, 2, 4
Leg 4	0–1	0–0	I-1; I-1; II, I, 5	0–1; 0–2; 1, 2, 3

Leg 5 uniramous, 3-segmented, and slightly asymmetrical in female; in male the left leg is uniramous and right leg is biramous, with both strongly modified. (Nicholls 1945; Barthélémy *et al.* 1998)

TYPE SPECIES: *Sulcanus conflictus* Nicholls, 1945

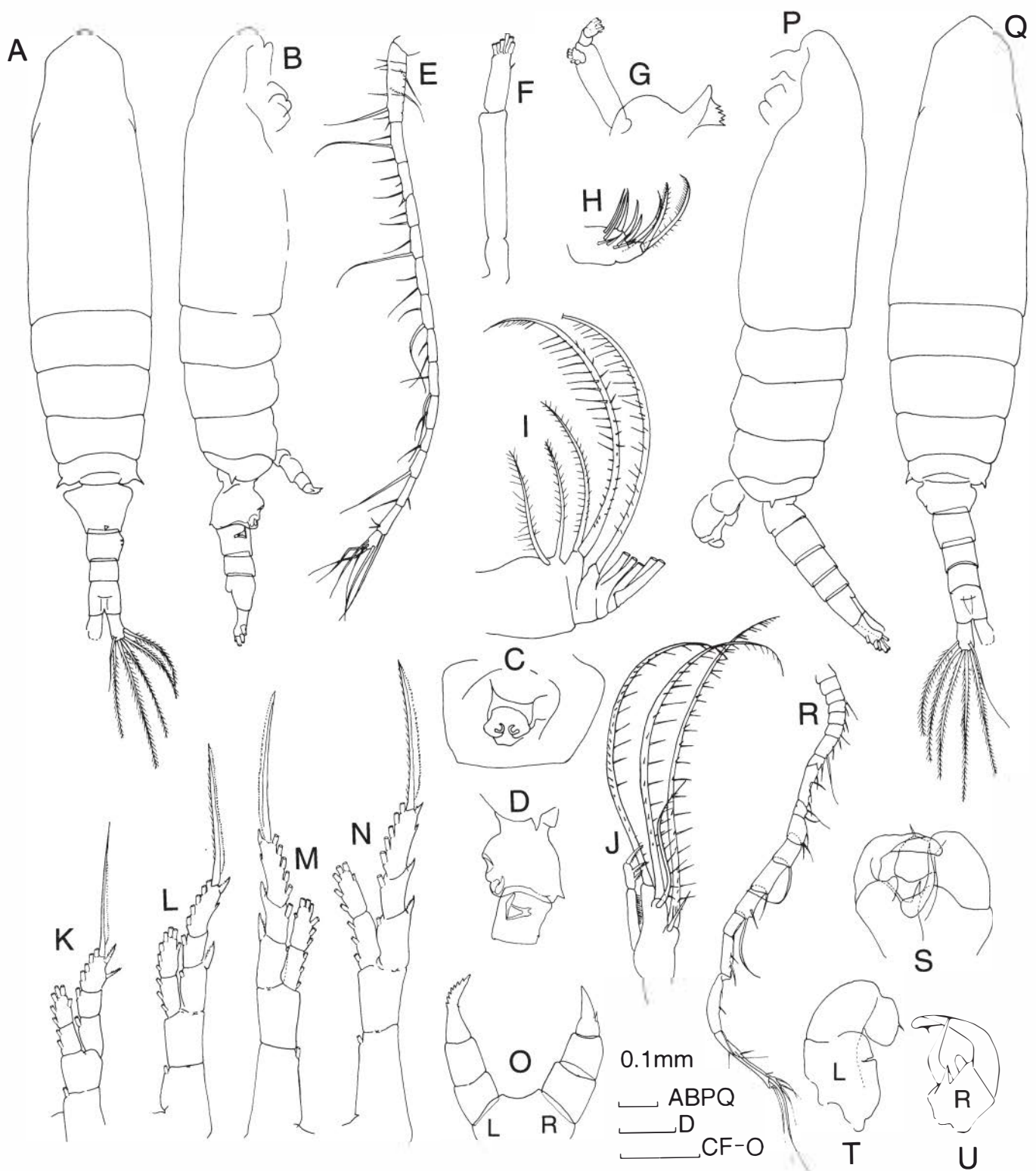
REMARKS: This euryhaline genus and the type species were described from the mouth of the Georges River where the salinity was about one-quarter that of the open sea. Other specimens were recorded from the estuary of the Swan River, Western Australia. They differed in a few respects but Nicholls (1945) did not consider the differences great enough to warrant description as a separate species. The ecology of *Sulcanus conflictus* has been studied by Rippingale (1981) and Ough and Bayly (1989).

### *Sulcanus conflictus* Nicholls, 1945

(Figs 158, 186, 195)

DESCRIPTION: Size: females: 1.40–1.60 mm, males 1.50–1.60 mm.

Female: As in the generic definition with the following additional characteristics. Genital segment is asymmetrically expanded into flattened, wing-like processes anteriorly, in the dorsolateral region of the



**Fig. 158.** *Sulcanus conflictus*. Female. **A**, dorsal view; **B**, lateral view; **C**, genital segment, ventral view; **D**, genital segment, left side; **E**, antenna 1; **F**, antenna 2; **G**, mandible; **H**, maxilla 1; **I**, maxilla 2; **J**, maxilliped; **K**, leg 1; **L**, leg 2; **M**, leg 3; **N**, leg 4; **O**, leg 5. Male. **P**, lateral view; **Q**, dorsal view; **R**, right antenna 1; **S**, leg 5. **T**, left leg 5; **U**, right leg 5. **E**, **R**–**U** from Nicholls (1945); remaining parts from specimens from Orakei Basin, Auckland, New Zealand.

segment; a single pointed process is situated dorsally in the mid-line, near the posterior margin. Urosome segment 2 is unevenly sculptured on right side only; left margin is entire. Anal segment with a large anal process, the portion of the segment distal to the anal operculum is deeply excavated into a longitudinal furrow occupying one-third of the total width of the segment. Antenna 1 extends to middle of anal segment, variable fusion occurs usually between segments 2-9, 10-11, and 12-13. Antenna 2 basal segment unarmed, distal segment bears 6 long terminal setae. Mandible has a well-developed blade with prominent teeth, the palp has a long basipod with a 1-segmented distal exopod with 3 lateral and 2 terminal setae; and a 2-segmented terminal endopod, segment 1 unarmed, segment 2 with 4 long terminal setae. Maxilla 1 with a large basal segment armed on its inner margin with stout denticulate spines, and a smaller distal segment bearing 2 long curved similar spines and a small accessory seta. Maxilla 2 5- or 6-segmented and bears unusually long strong denticulate spines which reach forward as far as the eye. Leg 5 is uniramous, 3-segmented, terminal segment being spur-like and asymmetrical; the right one has a serrated outer margin.

(Nicholls 1945)

Male: As in the generic definition with the following additional characteristics. Generally similar to female. Caudal rami are slightly asymmetrical, left ramus being longer than right ramus; setae of right ramus may be considerably reduced. Right antenna 1 18-segmented with the hinge situated between free segments 16 and 17, leaving 2 distinct segments in the terminal portion. Leg 5 is large and asymmetrical; there is a large basal part containing the fused basipods which are coalesced in midline. Right leg 5 exopod 1-segmented and tapers to end in a flattened, rounded, spoon-shaped process; adjacent to base of exopod is a small inner, rounded process which does not appear to be articulated; adjacent to this process is a long, curved, spine-like process articulated at its base and apparently used in conjunction with the outer ramus in transferring the spermatophore; this process may represent an endopod. Left leg 5 is more solidly built and is uniramous; it is partially divided into two portions, the end part is roughly ovoid and bears a single small seta on its outer margin. (Nicholls 1945)

REMARKS: Nicholls records specimens from the Swan River which differ slightly from the Georges River specimens in that their antennae 1 extend beyond the caudal rami, endopod segment 1 of leg 1 has 2 inner setae instead of 3, and there appear to be some slight differences in male leg 5. The specimens from Orakei Basin were submitted for examination by Dr Brian Foster, now deceased. I have been unable to trace the

original material for closer examination and have to rely on a single female and dissected limbs of another female that are now in my possession. From the details that I have observed it appears that the Orakei Basin specimens agree with the original description of Nicholls (1945), although the endopods of legs 3 and 4 also appear to be 2-segmented. Orakei Basin is closed off from the water of Waitemata Harbour on the peaks of high water on spring tides every one or two months. In time, the salinity reduces if there is sufficient fresh water input. During the period from April 1976 to April 1977 *S. conflictus* was recorded in the Basin 4, 10, 12 May, 19 November, 5 December, and 7 March (Vaughan 1979).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Nicholls (1945); Nyan Taw (1978); Nyan Taw and Ritz (1978).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
Orakei Basin	surface	2 females

DISTRIBUTION: This euryhaline species is known from Georges River, Botany Bay, New South Wales; Swan River, Western Australia (Nicholls 1945); Derwent River estuary, Tasmania (Nyan Taw 1978); the present new record extends the distribution to northern New Zealand. Nicholls (1945) comments on the fact that this species is found together with *Gladioferens*, an Australasian genus.

Family ACARTIIDAE Sars, 1903

DEFINITION: Female: Small, more or less slender copepods. A single eye present. Head and pedigerous segment 1 separate, pedigerous segments 4 and 5 always fused, posterolateral corners of the prosome rounded or pointed. Urosome 3-segmented, anal operculum may be on anal segment or anus may open between the last two urosome segments into a dorsal groove on anal segment; caudal rami generally slightly asymmetrical, short or long, sometimes fused with anal segment, with 6 setae. Without a rostrum with or without paired filaments. Upper lip large, prominent and trilobed. Antenna 1 17-22-segmented, many segments with long setae. Antenna 2 endopod 3-segmented; basipod 2 (with 1 seta) and endopod segment 1 are fused, the resulting segment bears 9 setae arranged in a proximal group of 8 and an isolated distal seta, the 8 proximal setae are interconnected at their bases by tiny tendinous strands extending from a single muscle inserted adjacent to last seta, enabling

8 setae to be moved as a single unit (*Acartia*); endopod segment 2 with 6–9 distal setae; small terminal segment with 7 terminal setae; exopod with reduced number of segments: 4-segmented with 1, 2, 2, 3 setae respectively. Mandible with well-developed blade with a large separate tooth on one border, palp basipod 2 with 1–2 setae; endopod 1-segmented with 2+8–9 setae; exopod 5-segmented with 1, 1, 1, 1, 2 setae respectively. Maxilla 1 with reduced lobes and setation; inner lobe 1 short with about 6–8 spines and setae, inner lobes 2 and 3 and basipod 2 with 0, 3, 1 setae; endopod apparently absent; exopod with 2+5 setae; outer lobes 1 and 2 with 8–9 and 1–0 setae. Maxilla 2 lobes 1–5 with 3–4, 2–3, 2–3, 1–3, 1–2 setae respectively; endopod with 4–5 setae. Maxilliped reduced and highly modified, basipod 1 with 5–6 long setae; basipod 2 with 1 short thick setae; endopod with fused segments with 4–5 short thick setae. Swimming legs 1–4 slender and delicate with long natatory setae; distolateral borders of exopod segments of legs 2–4 expanded into a conspicuous tooth; articulated spines are not present in this position. Leg 1 basipod 2 may have a small outer edge spine or seta; terminal exopod spine of legs 2–4 with outer edge teeth. Spine and seta formula as follows:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0-0	1/0-0	I-1; I-1; II, I, 4	0-1; 1, 2, 3
Leg 2	0-0	0-0	0-1; 0-1; 0, 1, 5	0-2; 1, 2, 4
Leg 3	0-0	0-0	0-1; 0-1; 0, 1, 5	0-2; 1, 2, 4
Leg 4	0-0	1-0	0-1; 0-1; 0, 1, 5	0-2; 1, 2, 3

Female leg 5 usually uniramous, small, symmetrical, 3-segmented, basipod 1 and coupler may be fused or basipods 1 and 2 and the coupler may be fused (*Paracartia*); basipod 2 with an outer seta; exopod in the form of a spine or elongate seta; small endopod present in *Acartiella*.

Male: Male urosome 5-segmented. Male antenna 1 usually prehensile on the right side only, with 12–18? segments; middle segments may be greatly inflated. Mouthparts more or less the same in both sexes. Leg 5 uniramous, asymmetrical, attached to a plate formed from fusion of basipod 1 and coupler; basipod 2 usually asymmetrically developed with an outer distal seta; left leg with 2-segmented exopod (3-segmented in *Paracartia africana*), exopod segment 2 with variously decorated tip; right leg usually with a 3-segmented exopod, exopod segments 1 and 2 often with inner processes; exopod segment 3 opposed to the process on exopod segment 2 to form a type of subchela.

(Bradford 1976; Huys & Boxshall 1991)

An example of this family is *Acartia ensifera* (Figs 159, 160).

REMARKS: This family is now considered to include *Acartia* Dana, 1846; *Acartiella* Sewell, 1914; *Paracartia* T. Scott, 1894b; and *Paralabidocera* Wolfenden, 1908 (see Bradford 1976). There is a need to revise this family, paying particular attention to the structure of the genital segment as there appears to be a diversity of structure that may be of taxonomic value. Acartiidae are omnivorous but with a tendency to herbivory based on mouthpart morphology (Itoh 1970; Ohtsuka *et al.* 1996), gut contents (Rodríguez & Durbin 1992; Kleppel 1993; Dam *et al.* 1994; Swadling & Marcus 1994), laboratory feeding experiments (Gaudy 1974; Ayukai 1987a, b; Roman 1987; Greene 1988), and direct observation (Davis 1977).

#### *Acartia* Dana, 1846

DEFINITION: As for the family with the following additional characters. The anal segment is without an anal operculum, as the anus opens between the last two urosome segments into a dorsal groove on the anal segment. Caudal rami are short, separated from anal segment. Antenna 2 basipod 2 is fused with endopod segment 1 which is long and slender and bears 9 setae; exopod is shorter than segment 1 of endopod. Swimming leg 1 exopod with a long slender outer distal spine on segments 1 and 2, and with 2 spines on segment 3. Female leg 5 3-segmented, uniramous, with the last segment modified into a long, slender spine. Male leg 5 is larger on the right, exopod segment 2 with a large inner lobe, and segment 3 is in the form of a clasper. (Bradford 1976)

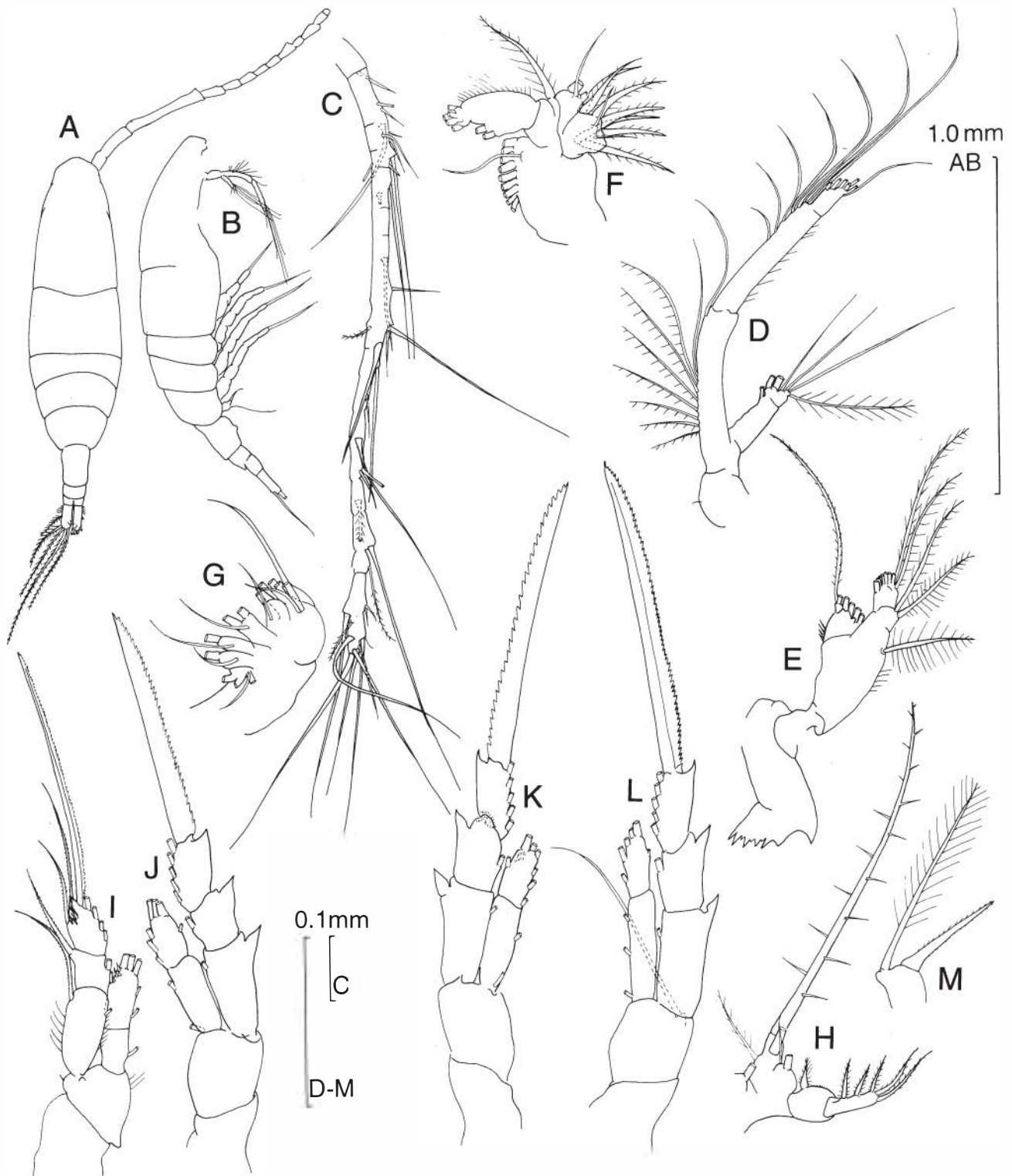
TYPE SPECIES: *Acartia negligens* Dana, 1849

REMARKS: This genus as now defined contains six subgenera (Steuer 1915, 1923): *Acanthacartia* Steuer, 1915; *Acartia* Dana, 1846 (= *Planktacartia* Steuer, 1915 see Wilson 1966); *Acartiura* Steuer, 1915; *Euacartia* Steuer, 1915; *Hypoacartia* Steuer, 1915; and *Odontacartia* Steuer, 1915. Bradford (1976) suggested that some of these subgenera may eventually prove to be able to stand in their own right. Madhupratap and Haridas (1994), who described another species nominally related to *Euacartia*, find no compelling evidence for the separation of these two species into a separate subgenus but fall short of suggesting that the *Acartia* subgenera have no validity.

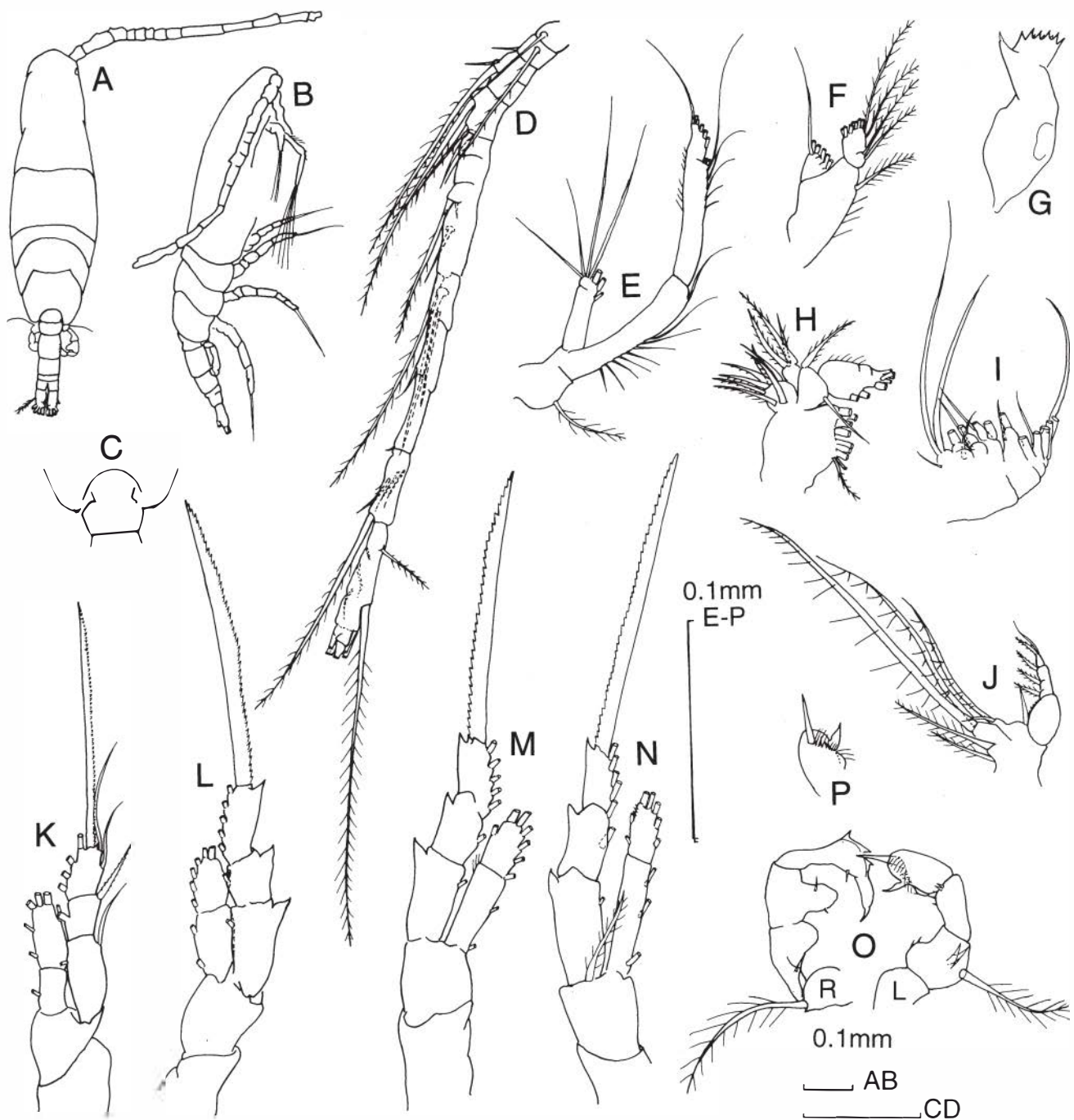
#### Subgenus *Acanthacartia*

DEFINITION: As for the family and generic definition with the following additional characteristics. Rostral





**Fig. 159.** *Acartia ensifera*. Female from Stn N414. **A**, dorsal view; **B**, lateral view; **C**, antenna 1; **D**, antenna 2; **E**, mandible; **F**, maxilla 1; **G**, maxilla 2; **H**, maxilliped; **I**, leg 1; **J**, leg 2; **K**, leg 3; **L**, leg 4; **M**, leg 5.



**Fig. 160.** *Acartia ensifera*. Male from Stn N477. **A**, dorsal view; **B**, lateral view; **C**, genital segment, dorsal view; **D**, right antenna 1; **E**, antenna 2; **F**, mandibular palp; **G**, mandibular blade; **H**, maxilla 1; **I**, maxilla 2; **J**, maxilliped; **K**, leg 1; **L**, leg 2; **M**, leg 3; **N**, leg 4; **O**, leg 5; **P**, terminal exopod segment of right leg 5.

filaments usually present. Posterior metasomal borders rounded. Fifth legs as in *Acartiura*, although the heavy spine on male left leg terminal exopod segment is not the simple spine found in *Acartiura* but

has one or more accessory spines arising from its base. Spermathecal canal appears to be looped only in ventral view. (Steuer 1915, 1923; Bradford 1976)

TYPE SPECIES: *Acartia pietschmanni* Pesta, 1911a

REMARKS: The following species have been described in the subgenus: *Acartia* (*Acanthacartia*) *bacorehuisensis* Zamora-Sanches & Gomez-Aguirre, 1986; *A. (A.) bifilosa* Giesbrecht, 1892, var. *inermis* Rose, 1929; *A. (A.) bilobata* Abraham, 1970; *A. (A.) californiensis* Trinast, 1976; *A. (A.) chilkaensis* Sewell, 1919, var. *sittangi* Steuer, 1934; *A. (A.) dweepi* Haridas & Madhupratap, 1978; *A. (A.) fossae* Gurney, 1927; *A. (A.) giesbrechti* Dahl, 1894; *A. (A.) gracilis* Herrick, 1887; *A. (A.) hamata* Mori, 1937; *A. (A.) italica* Steuer, 1910b; *A. (A.) levequei* Grice, 1964; *A. (A.) pietschmanni* Pesta, 1911a; *A. (A.) plumosa* T. Scott, 1894b; *A. (A.) ransoni* Rose, 1953; *A. (A.) seehaiyai* (Subbaraju, 1969); *A. (A.) sinjiensis* Mori, 1940 (= *A. iseana* Ito, 1956; see Ueda & Hiromi 1987; = *A. baylyi* Greenwood, 1972); *A. (A.) spinata* Esterly, 1911; *A. (A.) steueri* Smirnov, 1936; *A. (A.) tonsa* Dana, 1849 (= *A. bermudensis* Esterly, 1911, which is probably an arostrate *A. tonsa*, see Bradford (1976)); *A. (A.) tropica* Ueda & Hiromi, 1987; *A. (A.) tsuensis* Ito, 1956; *A. (A.) tumida* Willey, 1920.

The following species has been taken in the Southwest Pacific.

*Acartia* (*Acanthacartia*) *sinjiensis* Mori, 1940  
(Figs 161, 186, 195)

*A. (A.) baylyi* Greenwood, 1972

DESCRIPTION: Size: females: 1.05–1.09 mm, males: 1.00–1.03 mm.

Female: As for the family, generic and subgeneric definitions with the following additional characteristics. Caudal rami twice as long as wide. Antenna 1 extending a little beyond metasome. Rounded posterior borders of metasome with 3–7 (usually 4) small conical spines, the most dorsal being largest. Genital segment longer than wide with greatest width and depth about one-third the length from anterior end; posterodorsal border with 6–8 spines. Urosome segment 2 with 4–8 posterodorsal spines which are slightly larger than those on metasome and genital segment. Leg 5 with basipod 1 fused medially; basipod 2 longer than wide, terminal spine curved and modified into 3 areas: basal portion with a posterior hemispherical bulb, an intermediate portion expanded, blade-like, and the terminal portion narrower with acutely dentate margins; these denticles extend further towards the base of the spine on the medial border. Outer distal plumose seta is three-quarters the length of the terminal spine.

(Greenwood 1972; Ueda & Hiromi 1987)

Male: As for the family, generic and subgeneric definitions with the following additional characteristics. Caudal rami 1.3 times as long as wide, longer than anal segment. Posterodorsal borders of metasome similar in shape and spination to those of the female, sometimes with 1 or 2 additional hairs. Urosome segment 2 posterodorsal border with 6 separate conical spines and a further 2–5 hair-like ventrolateral spinules on each side, on posterior half of segment. Urosome segment 3 with 4–6 spines on the posterodorsal border, the most dorsal of the positions frequently with a pair of spines. Urosome segment 4 short laterally, extending above and beyond the anterior part of anal segment dorsally; posterodorsal rim with 2 large dorsal spines and a pair of smaller spinules on each side. Anal segment unarmed. Antenna 1 extending to posterior border of pedigerous segment 3; right antenna 1 with segment proximal to hinge with a fringe of short hairs and a single curved terminal spine, and segment distal to hinge has a similar fringe of longer setae and 3 proximal spines. Right leg 5 basipod 2 inner border with a shallow depression housing a spinule and fine hairs; exopod segment 1 with a finely plumose seta on posterior surface; exopod segment 2 with a larger inner projection which is furrowed transversely at the inner end so presenting distinct proximal and distal lobes, the latter slightly smaller, the distal border of the flange with a central conical spine; exopod segment 3 long, curved, of irregular width but only slightly narrowed proximal to the "neck" region, its outer margin without spines but with a lamellate extension proximal to midpoint, inner margin is smoothly curved except for a single spine on a slight projection near midpoint, the segment terminates in a similar small conical spine. Left leg 5 basipod 2 with a lamellate process developed from the anteromedial surface on the proximal half of segment, directed medially and terminating in a delicate acuminate spine with fine hairs at its tip; exopod segment 1 without spines or setae; exopod segments 2+3 broad at its base, narrowing distally and curved medially to terminate in a conical spine, inner surface with a slight central concavity marked proximally by a sparse group of fine hairs, a long spine arising from the centre of the concavity, this spine slightly curved distally, with plumose margins and a proximal lateral barb. (Greenwood 1972; Ueda & Hiromi 1987)

REMARKS: See Ueda and Hiromi (1987) for a discussion of the synonyms of this species.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1978) as *A. baylyi*.

NEW RECORDS: Nil.

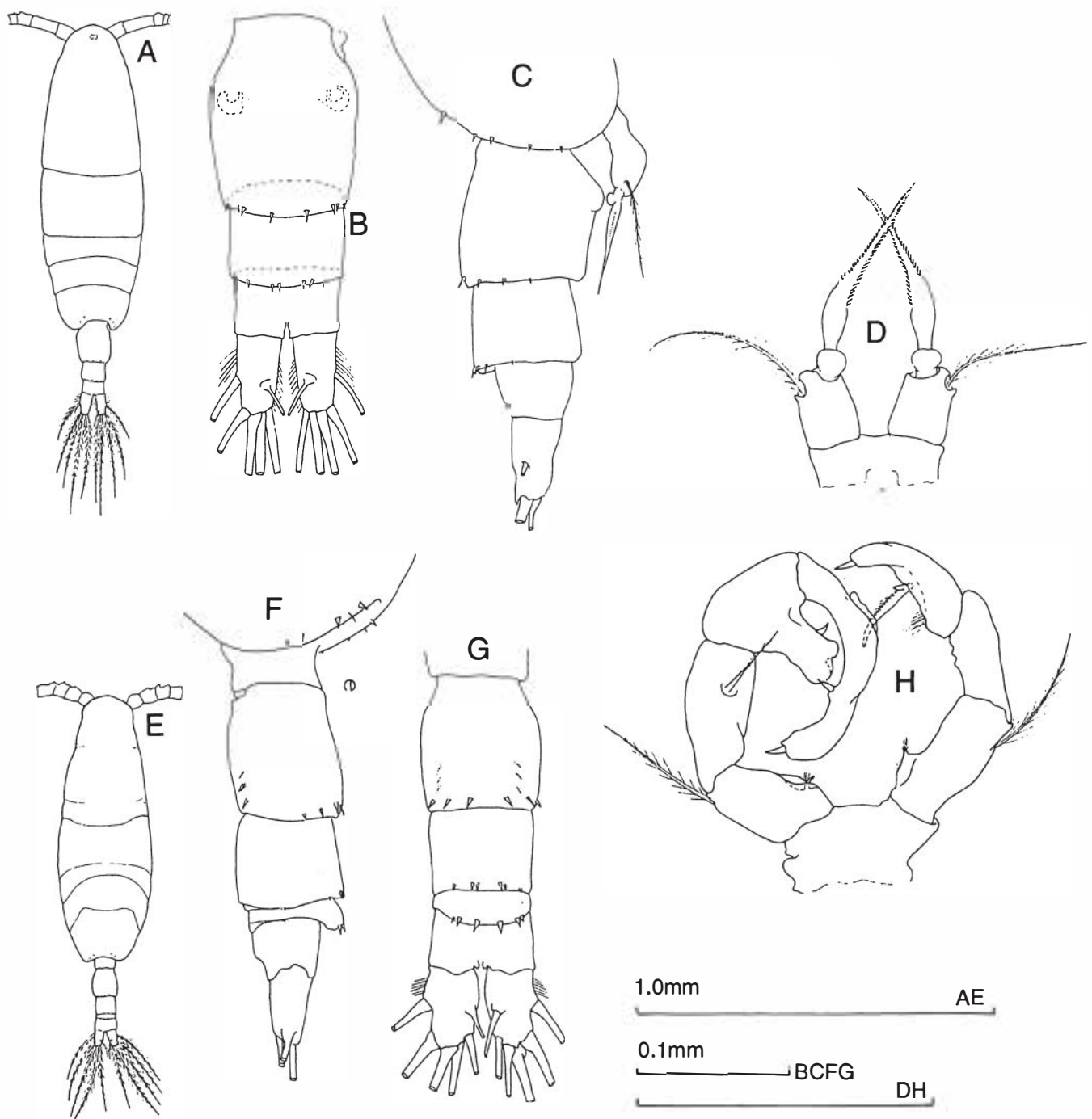


Fig. 161. *Acartia (Acanthacartia) sinjiensis* from Greenwood (1972). Female. A, dorsal view; B, urosome, dorsal view; C, urosome, lateral view; D, leg 5. Male. E, dorsal view; F, urosome, lateral view; G, urosome, dorsal view; H, leg 5.

**DISTRIBUTION:** This euryhaline and eurythermal species has been recorded from temperate and subtropical waters of the west Pacific including the Brisbane estuary and Moreton Bay (Ueda & Hiromi 1987; Greenwood, 1977).

#### Subgenus *Acartia*

**DEFINITION:** As for the family and generic definition with the following additional characteristics. Rostral filaments present. Posterior metasomal borders

rounded or drawn out into a point. Right male leg 5 exopod segment 1 with a proximal appendage.  
(Steuer 1915)

TYPE SPECIES: *A. negligens* Dana, 1849

REMARKS: The following species have been described in the genus: *Acartia (Acartia) danae* Giesbrecht, 1892; *A. (A.) forcipata* Herdman, Thompson & A. Scott, 1897; *A. (A.) nana* Brady, 1914; *A. (A.) negligens* Dana, 1849.

The following species have been taken in the Southwest Pacific.

*Acartia (Acartia) danae* Giesbrecht, 1889  
(Figs 162, 186, 195)

DESCRIPTION: Size: females: 1.08–1.27 mm, males: 0.73–0.80 mm.

Female: As for the family, generic, and subgeneric

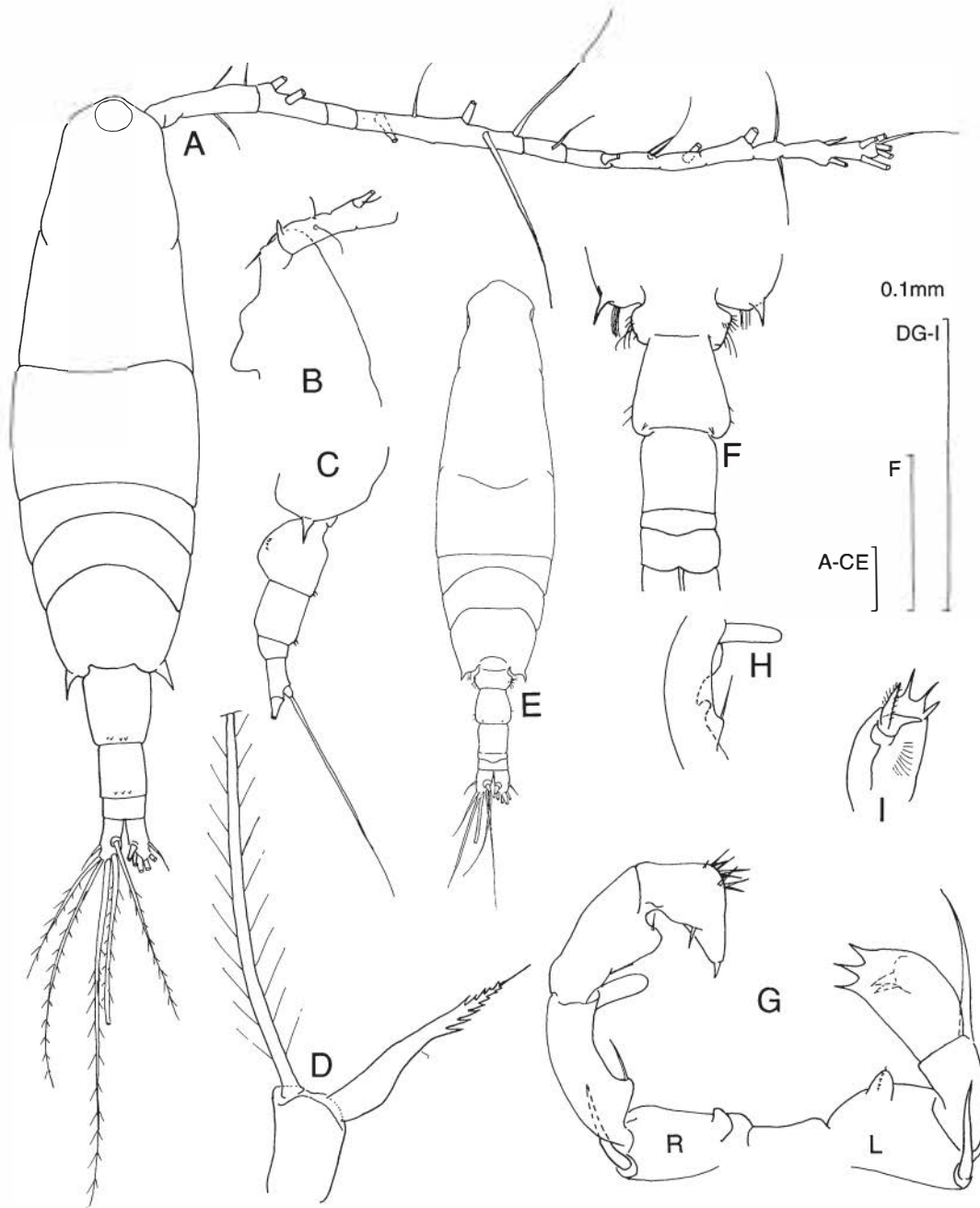


Fig. 162. *Acartia (Acartia) danae* from Stn F946, 0–200 m. Female. A, dorsal view; B, anterior head, lateral view; C, urosome, left side; D, leg 5. Male. E, dorsal view; F, urosome, dorsal view; G, leg 5; H, another view of right leg 5 exopod segment 1; I, another view of left leg 5 exopod segments 2+3.

definitions with the following additional characteristics. Posterior metasome terminated in symmetrical points. Urosome without spines, but with fine dorsal hairs on posterior border of first 2 segments, genital segment longer than following segment. Antenna 1 extends as far as posterior border of caudal rami; its first segment with a strong, thick spine. Leg 5 basipod 2 longer than wide; terminal spine twice as long as its segment, denticulate at the end; plumose seta 3 times longer than the spine. (Giesbrecht 1892)

Male: As for the family, generic and subgeneric definitions with the following additional characteristics. Posterior metasome as in female. Urosome segment 1 with lateral hairs. Right leg 5 with a pointed projection on internal border of basipod 2; left exopod segment 2+3 with 4 short spines. (Steuer 1923)

REMARKS: The Southwest Pacific specimens show some differences from the above description. Female urosome has a few posterodorsal spinules on the genital segment and urosome segment 2 and the genital segment has a short row of lateroventral spinules. Male posterior metasome has a patch of posteroventral long hairs, ventral to the large posterior spine on each side. Male urosome segment 2 has a few posterodorsal spinules and 2 lateroposterior oblique rows of spinules. Male left leg 5 segments 2+3 has a longitudinal row of fine, long hairs; this segment has 2 sharp, fine spines terminally; a thicker spine of the same length, seen as terminal in some views; and 2 subterminal, heavier spines (which appear to originate from the same papilla) one of which is short, heavy and curved, the other is longer, less heavy and plumose. This means that the left segments 2+3 has a total of 5 spines. Male left exopod segment 1 has a long outer edge spine which extends almost to the end of segments 2+3.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Dakin and Colefax (1940); Jillett (1971).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A303	450-1000	1 male 0.8 mm
A332	surface	3 females 1.1-1.2 mm
F945	0-200	2 females, 1 male
	0-500	4 females 1.15-1.30 mm, 1 male 0.80mm
	500-1000	1 female 1.2 mm
F946	0-200	3 females, 1 male
F947	0-200	2 females

DISTRIBUTION: This epipelagic species is widespread in the tropical and subtropical Pacific, Indian, and Atlantic oceans (Steuer 1923; Grice 1962).

*Acartia (Acartia) negligens* Dana, 1849  
(Figs 163, 186, 195)

DESCRIPTION: Size: females: 1.04-1.27 mm, males: 0.80-1.02 mm.

Female: As in the family, generic, and subgeneric definitions with the following additional characteristics. Posterior metasome border rounded with 1 or many small spines and a range of more dorsal fine hairs. Urosome with spinules; the first two segments with dorsal spinules on posterior border. Antenna 1 reaches the end of the body, its first segment with a small, slender spine. Basipod 2 of leg 5 longer than wide, inner spine dentate and less than twice the length of its segment, external plumose seta long, at least 5 times longer than the spine. (Giesbrecht 1892)

Male: As in the family, generic, and subgeneric definitions with the following additional characteristics. Posterior metasome rounded. Antenna 1 shorter than body. Urosome segments 1 and 2 hairy laterally; other segments with dorsoposterior spinules. Leg 5 similar to *A. danae*, but internal appendices on basipod 2 are rounded; left exopod segments 2+3 have one of the spines much larger than the others. (Steuer 1923)

REMARKS: The posterior body of the male from the Southwest Pacific appears to be more decorated than the above description. There are long posterior hairs and a row of small posterodorsal spinules on both sides of the posterior metasome. Urosome segment 1 has lateral hairs; urosome segment 2 has posterodorsal and some posterolateral spines; urosome segment 3 with a few posterodorsal spines and lateral hairs; urosome segment 4 and anal segment with lateral hairs. Male right leg 5 basipod with a small inner swelling bearing a small spinule, exopod segment 1 inner distal lamella notched on its proximal border, exopod segment 2 with a broadly rounded inner expansion with a small disal spine; left basipod 2 with an inner rounded lobe bordered with small spinules, exopod segment 1 outer edge spine extends at most about half way along segment 2+3, exopod segments 2+3 with a longitudinal row of hairs on its palm, with 3 terminal spines and one subterminal longer, plumose spine.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Farran (1929); Bary (1951); Greenwood (1978).

NEW RECORDS:

Stn No.	Depth of Haul (m)	Specimens
A292	surface	5 females

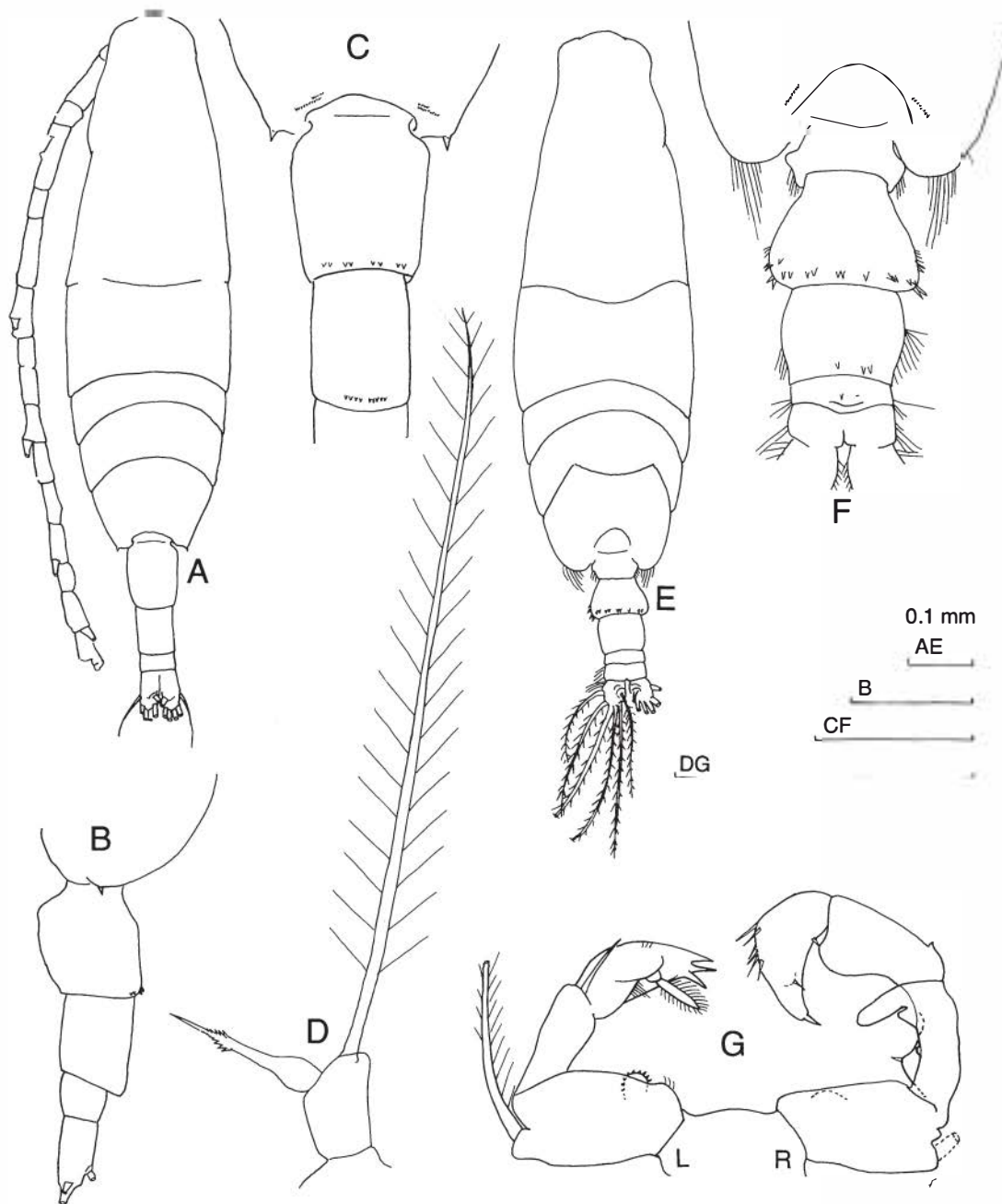


Fig. 163. *Acartia (Acartia) negligens*. Female from Stn A292, surface. A, dorsal view; B, urosome, lateral view; C, anterior urosome, dorsal view; D, leg 5. Male from Stn A295, surface. E, dorsal view; F, urosome, dorsal view; G, leg 5.

A295	surface	1 female, 2 males
	0-500	6 females
A302	0-500	1 female
F945	0-200	1 female
	0-500	2 females 1.00 mm
F946	0-200	2 females

DISTRIBUTION: This epipelagic species is a widespread inhabitant of tropical and subtropical waters of the Pacific, Indian, and Atlantic oceans (Steuer 1923).

#### Subgenus *Acartiura*

DEFINITION: As for the family and generic definitions with the following additional characters: The last metasomal segment is rounded but may bear spines. Rostral filaments absent. Caudal rami are slightly asymmetrical, with right ramus longest. Female genital segment with spermathecal canal looped when viewed both laterally and ventrally, and genital aper-

tures are close together on ventral surface. Female leg 5 has a smooth terminal spine bearing some distal hairs on both sides and with an evenly bulbous base. Male pedigerous segment 2 has a pair of setae arising in dorsal midline from pores. Male leg 5 has right basipod 2 with 2 inner ridges and an outer distal plumose seta, exopod segment 1 usually (not in *A. discaudata*) has a distal inner lobe and a proximal inner spine, exopod segment 2 has its inner lobe bearing 1-3 spines, exopod segment 3 has a terminal spine, and inner edge spine and at least 3 transverse rows of outer spines; left basipod 2 has an inner proximal ridge, left basipod 2 has an inner proximal ridge, posterior surface spines, and an outer distal plumose seta; exopod segment 1 usually has some spinules; terminal exopod segment is shaped like a hand with 2 lateral distal opposing spines, anterior spine much heavier and thicker-walled than posterior spine but both are simple; patches of spinules and hairs are proximal to the anterior spine. (Bradford 1976)

TYPE SPECIES: *A. clausii* Giesbrecht, 1892

REMARKS: The following species have been described in this subgenus: *Acartia (Acartiura) clausii* Giesbrecht, 1892; *A. (A.)* var. *gaboonensis* T. Scott, 1892 (see T. Scott (1894) and Steuer (1923)); *A. (A.) discaudata* Giesbrecht, 1892; *A. (A.) ensifera* Brady, 1899; *A. (A.) enzoi* Crisafi, 1974; *A. (A.) fancetti* McKinnon, Kimmerer & Benzie, 1992; *A. (A.) floridana* Davis, 1948; *A. (A.) hudsonica* Pinhey, 1926; *A. (A.) jilletti* Bradford, 1976; *A. (A.) longiremis* (Lilljeborg, 1853b); *A. (A.) margalefi* Alcaraz, 1976 (= *A. lefevreae* Bradford, 1976); *A. (A.) omorii* Bradford, 1976; *A. (A.) simplex* Sars, 1904; *A. (A.) teclae* Bradford, 1976; *A. (A.) tranteri* Bradford, 1976. McKinnon *et al.* (1992) also mentioned two other forms. Bradford (1976) partially revised this subgenus for the Southwest Pacific but it is possible that not all the species have been discovered and described.

The following species have been recorded in the Southwest Pacific.

***Acartia (Acartiura) ensifera* Brady, 1899**  
(Figs 159, 160, 187, 195)

DESCRIPTION: Size: females: 0.98–1.25 mm, males: 0.81–1.18 mm.

Female: As for the family, generic and subgeneric definitions with the following additional characteristics. Body slender. Posterior metasome naked. Urosome segments completely naked. Genital segment length:width is 1.28–1.50; in lateral view the segment has a ventral prominence posterior to genital apertures, in ventral view this appears as a wide, not well

defined ridge; in dorsal and lateral view the genital swelling is on anterior half of segment. Leg 5 terminal spine slender. (Bradford 1976)

Male: As for the family, generic and subgeneric definitions with the following additional characteristics. Body slender. Posterior metasome naked or with some hairs ventrally. Urosome segments 2–4 naked, genital segment with posterodorsal hairs. Basipod 2 of left leg 5 with 2 rows of posterior surface spines, distal row composed of 2 or 3 large soft spines, proximal spines small; exopod segment 1 with some inner edge spines, exopod segments 2+3 with a convex distal border so opposing spines do not appear to be terminal when leg 5 is mounted flat, anterior spine is longer than posterior spine, both are inserted at the same level; right exopod segment 2 inner lobe with proximal part slightly more protruding than distal part.

(Bradford 1976)

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Brady (1899); Bradford (1976, 1985); Bradford and Chapman (1988); Bradford *et al.* (1980).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species is endemic to New Zealand coastal waters (Bradford, 1976).

***Acartia (Acartiura) fancetti* McKinnon, Kimmerer & Benzie, 1992**  
(Figs 164, 187, 195)

DESCRIPTION: Size: females: 0.72–1.08 mm, males: 0.75–0.96 mm.

Female: As for the family, generic and subgeneric definitions with the following additional characteristics. Posterior metasome with 0–7 (mean 4) spines, posteroventral margin of segment without hairs. Mean length:width of genital segment is 1.04; lateral faces of genital segment with rows of denticles on anterior half of segment, never extending onto posterior half, posterodorsal margin usually without denticles. Caudal rami length:width 2.00 in dorsal view. (McKinnon *et al.* 1992)

Male: As for the family, generic and subgeneric definitions with the following additional characteristics. Posterior metasome with 2–8 dorsal spines. Length:width of the caudal ramus 1.56. Urosome segment 2 usually with a row of posterodorsal denticles, sometimes with posterodorsal denticles on urosome segment 3. (McKinnon *et al.* 1992)

REMARKS: This species can be distinguished from *A. tranteri* and two other as yet unnamed Australian



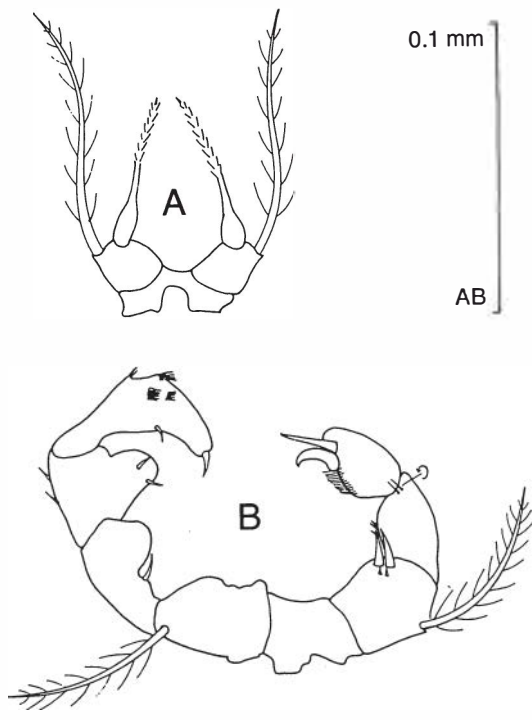


Fig. 164. *Acartia (Acartiura) fancetti* from McKinnon *et al.* (1992), A, female leg 5; B, male leg 5.

forms only by using a suite of characters (McKinnon *et al.* 1992).

PREVIOUS SOUTHWEST PACIFIC RECORDS: McKinnon *et al.* (1992).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species is known from Westernport and Port Phillip Bays, Victoria, Australia (McKinnon *et al.* 1992).

*Acartia (Acartiura) jillettei* Bradford, 1976  
(Figs 165, 187, 195)

DESCRIPTION: Size: females: 0.92–1.18 mm, males: 0.79–1.01 mm.

Female: As for the family, generic and subgeneric definitions with the following additional characteristics. Posterior metasome naked, genital segment and urosome segment 2 usually with small posterodorsal spinules. Genital segment length:width 1.01–1.26, in lateral and ventral view this segment has a ventral protuberance posterior to genital apertures (protuberance narrow in ventral view); in dorsal and lateral views genital swelling is placed slightly anterior of centre of segment. (Bradford 1976)

Male: As for the family, generic and subgeneric

definitions with the following additional characteristics. Posterior metasome naked except for posteroventral hairs, genital segment bordered by hairs, urosome segment 2 with lateral rows of spinules. Leg 5 like that of *A. ensifera* except that left exopod segment 2+3 has a long posterior spine (longer than anterior spine and about equal to length of segment), both spines are inserted at the same level on segment, basipod 2 with 4–6 spines at the distal posterior row. (Bradford 1976)

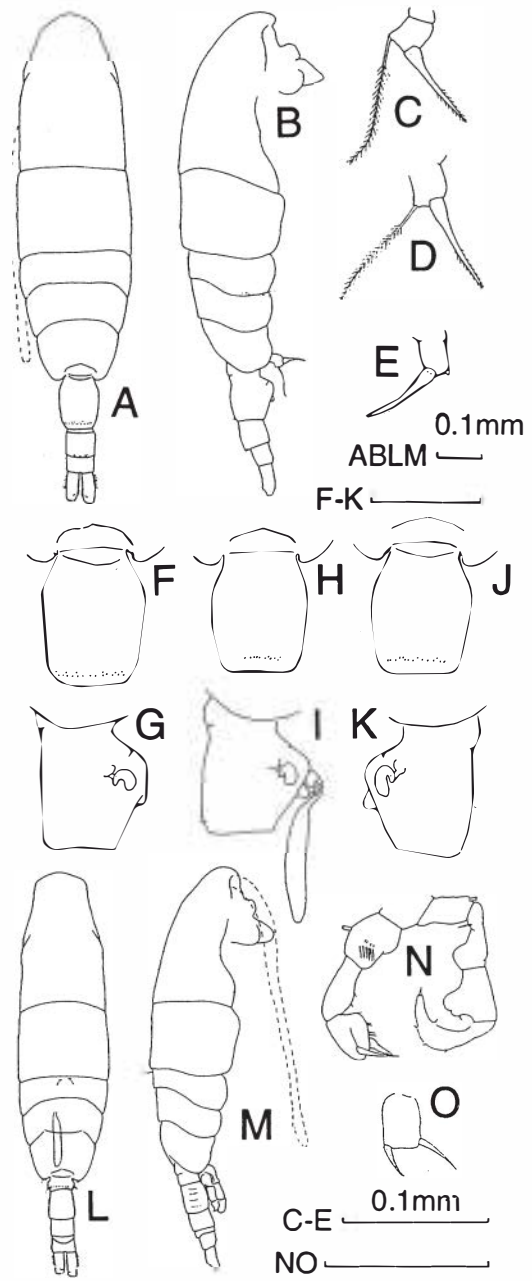


Fig. 165. *Acartia (Acartiura) jillettei* from Bradford (1976). Female. A, dorsal view; B, lateral view, C–E, leg 5; F–K, genital segment, dorsal and lateral views. Male. L, dorsal view; M, lateral view; N, leg 5; O, terminal part of left leg 5.

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1976); Bradford *et al.* (1980).

NEW RECORDS: Nil.

DISTRIBUTION: Probably widespread in New Zealand bays and harbours (Bradford 1976).

*Acartia (Acartiura) simplex* Sars, 1905c  
(Figs 166, 187, 195)

DESCRIPTION: Size: females: 1.04–1.18 mm, males: 0.93–0.99 mm.

Female: As for the family, generic, and subgeneric definitions with the following additional characteristics. Posterior metasome with posterior spines. Urosome segments completely naked. Genital segment length:width 1.05–1.24, in lateral view the segment has a small ventral prominence posterior to genital apertures, in dorsal and lateral views the genital swelling is placed anteriorly. (Bradford 1976)

Male: As for the family, generic and subgeneric definitions with the following additional characteristics. Posterior metasome with posterodorsal spines and posterior hairs. Urosome segments 1–4 apparently bordered by fine posterodorsal hairs. Basipod 2 of left leg 5 with 2 rows of posterior surface spinules, distal row composed of about 3 large soft spines, proximal spines small, exopod segment 1 with a few inner edge hairs, exopod segment 2+3 with equal spines about half the length of the segment, posterior spine is inserted distal to anterior spine; right exopod segment 2 with 2 rows of outer edge spinules. (Bradford 1976)

REMARKS: The specimens figured here differ from the description of Bradford (1976) in the degree of ornamentation on the urosome of both sexes. The female urosome is not naked but is decorated with small spinules; on the genital segment there are latero-anterior patches of spinules with one row extending on the the dorsal surface on each side; urosome segment 2 with dorsoposterior spinules; the anal segment has a few hairs; whereas the caudal rami are hairy and have dorsoposterior spines at the base of

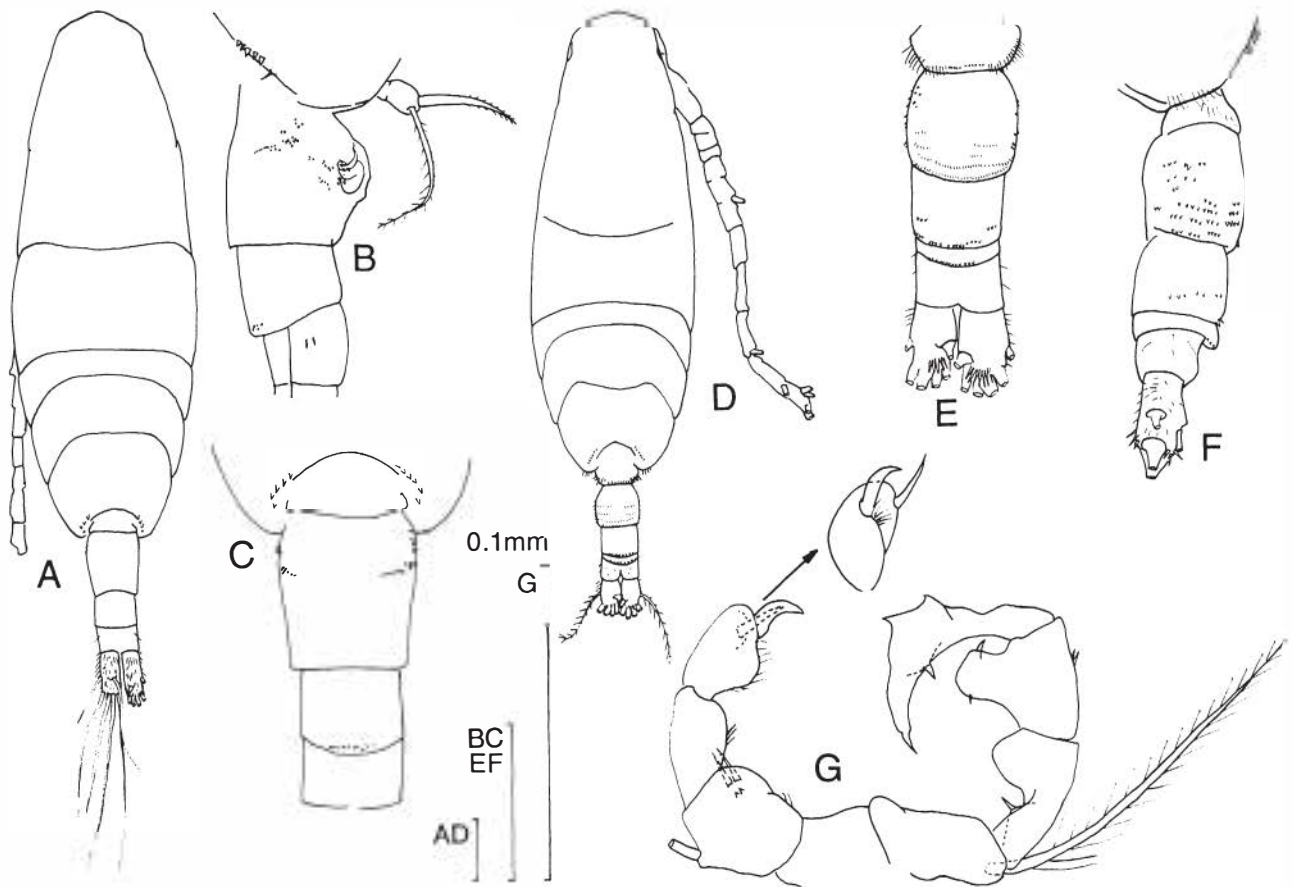


Fig. 166. *Acartia (Acartiura) simplex* from Stn N367. Female. A, dorsal view; B, urosome, right side; C, urosome, dorsal view. Male. D, dorsal view; E, urosome, dorsal view; F, urosome, left side; G, leg 5.

the caudal setae. The male urosome is more like the description of Bradford (1972) but urosome segment 2 has several extra rows of spinules on the dorsal and lateral surfaces and the anal segment and caudal rami are hairy. A close examination of variability in *A. simplex* is required.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Sars (1905); Bradford (1976).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species is probably found in estuarine conditions in New Zealand waters including the Chatham Islands (Bradford 1976).

*Acartia (Acartiura) tranteri* Bradford, 1976  
(Figs 167, 187, 195)

DESCRIPTION: Size: females: 0.97–1.11 mm, males: 0.90–1.00 mm.

Female: As for the family, generic and subgeneric definitions with the following additional characteristics. Posterior metasome with 4–7 (mean 5) dorsal spines and with ventral hairs. Genital segment length: width 1.10, with a row of posterodorsal spinules and oblique rows of lateral surface spinules always extending onto the posterior half of the segment; urosome segment 2 with a row of posterodorsal spinules. Genital segment with the genital swelling anterior in both dorsal and lateral views. Leg 5 terminal spine slender. (Bradford 1976; McKinnon *et al.* 1992)

Male: As for the family, generic and subgeneric definitions with the following additional characteristics. Posterior metasome with dorsal and ventral spines, genital segment bordered by posterodorsal hairs, urosome segment 2 with a posterodorsal row and lateral rows of small spinules, urosome segments 3 and 4 with a posterodorsal row of small spinules. Basipod 2 of left leg 5 with 2 types of posterior surface spines, a distal row composed of 2–3 large spines and 1–2 small proximal spines, exopod segment 1 with anterior surface spinules, exopod segment 2+3 with anterior spine shorter than posterior spine which is inserted distal to anterior spine, distal border of the segment slightly convex; right exopod segment 2 with outer edge spines, inner lobe long, proximal part of tip slightly tapering, produced more than distal part.

REMARKS: Nil.

PREVIOUS SOUTHWEST PACIFIC RECORDS: Bradford (1976); Greenwood (1978, 1981); McKinnon *et al.* (1992).

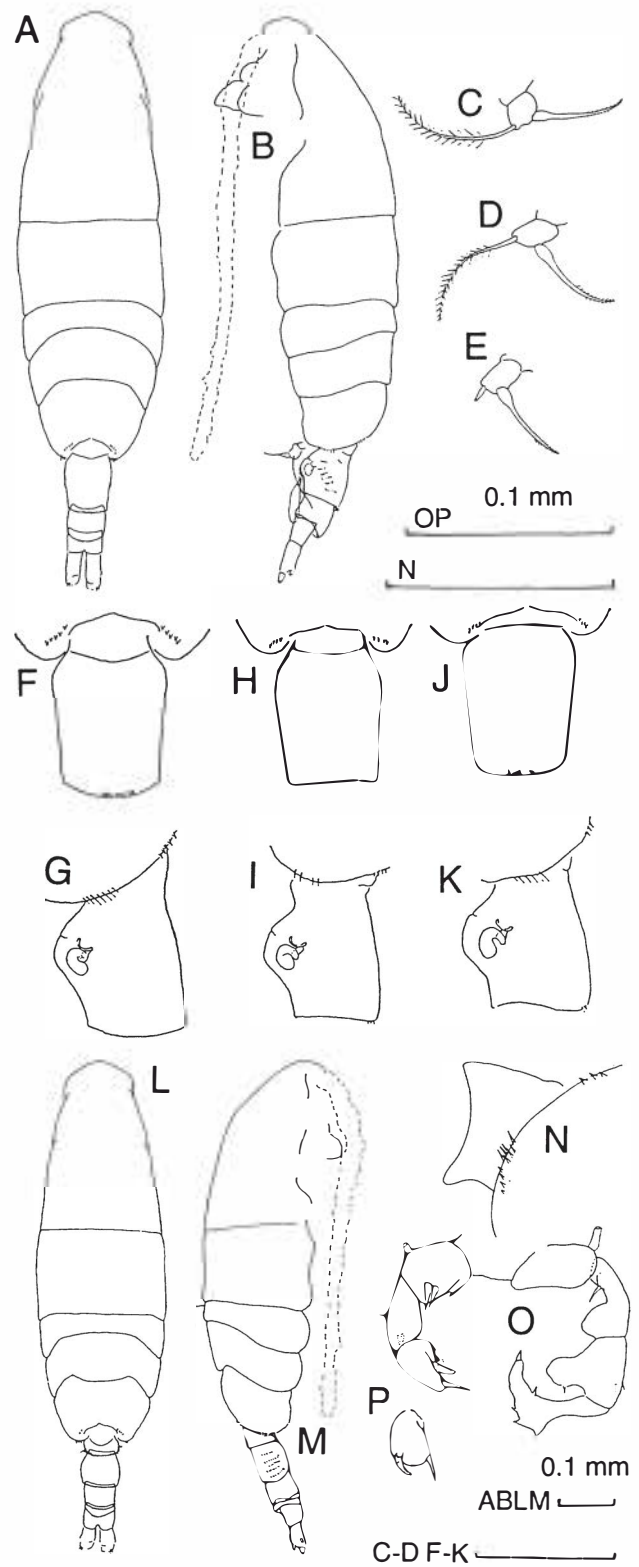


Fig. 167. *Acartia (Acartiura) tranteri* from Bradford (1976). Female. A, dorsal view; B, lateral view; C–E, leg 5; F–K, genital segment, dorsal and lateral views. Male. L, dorsal view; M, lateral view; N, posterior border of pedigerous segment 4+5, lateral view; O, leg 5; P, terminal part of left leg 5.

NEW RECORDS: Nil

DISTRIBUTION: This epipelagic species has been taken in eastern Australian coastal waters (Greenwood 1978a; 1981; McKinnon *et al.* 1992).

#### Subgenus *Euacartia*

DEFINITION: As for the family and generic definitions with the following additional characteristics. Rostral filaments present. Posterior metasomal borders rounded. Female leg 5 basipod 2 long with a short outer edge seta. (Steuer 1915)

TYPE SPECIES: *A. southwelli* Sewell, 1914

REMARKS: The following species have been described in this subgenus, which have not been taken in the Southwest Pacific: *Acartia (Euacartia) sarojus* Madhupratap & Haridas, 1994; *A. (E.) southwelli* Sewell, 1914. Madhupratap and Haridas (1994) find no compelling evidence for the separation of these two species into a separate subgenus but fall short of suggesting that the *Acartia* subgenera have no validity.

#### Subgenus *Hypoacartia*

DEFINITION: As for the family and generic definitions with the following additional characteristics. Female metasomal border terminates in a slender point. Female leg 5 inner border with a broad, dentate terminal spine. The male leg 5 similar to that of *A. discaudata*. (Steuer 1915)

TYPE SPECIES: *Acartia macropus* Cleve, 1901

REMARKS: The following species have been described in the subgenus, neither of which has been taken in the Southwest Pacific: *Acartia (Hypoacartia) adriatica* Steuer, 1910a; *A. (H.) macropus* Cleve, 1901.

#### Subgenus *Odontacartia*

DEFINITION: As for the family and generic definitions with the following additional characteristics. Rostral filaments present. Posterior metasomal borders drawn out into lateral spines, likewise the posterior borders of the urosome segments, especially in the male (with the exception of *A. lilljeborgii*). (Steuer 1915)

TYPE SPECIES: *Acartia lilljeborgii* Giesbrecht, 1889

REMARKS: The following species have been described in the subgenus: *Acartia (Odontacartia) amboinensis* Carl, 1907; *A. (O.) australis* Farran, 1936; *A. (O.) bispinosa* Carl, 1907; *A. (O.) bowmani* Abraham, 1976; *A. (O.) centrura* Giesbrecht, 1892; *A. (O.) erythraea* Giesbrecht, 1892; *A. (O.) fariai* Oliveira, 1945; *A. (O.) hamata* Wilson, 1950; *A. (O.) japonica* Mori, 1940 (see Ueda 1986); *A. (O.) lilljeborgii* Giesbrecht, 1889; *A. (O.) pacifica* Steuer, 1915; *A. (O.) spinicauda* Giesbrecht, 1892. Dakin and Colefax (1940) recorded an *Acartia (O.)* species which is like *A. erythraea* although the male appears to be slightly different in the decoration of the posterior metasome and urosome. In order to clarify the identity of Dakin and Colefax's species, fresh material will have to be examined and *A. australis* Farran, 1936 and *A. bispinosa* Carl, 1907 will have to be taken into account also. The following species has been definitely recorded from the Southwest Pacific.

#### *Acartia (Odontacartia) pacifica* Steuer, 1915 (Figs 168, 187, 195)

DESCRIPTION: Size: females: 1.15–1.20 mm, males: 1.12 mm.

Female: As for the family, generic, and subgeneric definitions with the following additional characteristics. Last metasomal segment extends laterally into large spines, with 2 smaller spines dorsally. Postero-dorsal border of genital segment with 2 small spines, urosome segment 2 with a pair of larger posterodorsal spines. Caudal rami with patches of hairs just anterior to lateral setae. Antenna 1 with the following segments armed in the following manner: segments 1–3 naked, segment 4 with a short anterodistal spine, segments 5–7 naked, segments 8–10 with a short pointed posterodistal spine. Leg 5 basipod 2 short, terminal spine with a proximal knob and its distal half bordered by hairs. (Steuer 1923)

Male: As for the family, generic and subgeneric definitions with the following additional characteristics. Urosome segment 1 naked; segment 2 extends posterolaterally into points, has a pair of posterodorsal spines, and ventrolateral surfaces usually with a patch of sensory hairs; segment 3 with a pair of large posterodorsal spines; segment 4 with a pair of smaller spines more towards midline; anal segment with large hairs; caudal rami with outer and inner edge hairs. Leg 5 similar to that of *A. spinicauda* but left exopod 2+3 with its inner edge setae longer and distinctly haired. (Steuer 1923)

REMARKS: There are two varieties of this species; a typical form and a variety named *mertoni* by Steuer (1923) which differs in the details of the spinulation

on the posterior metasome, urosome and leg 5. Greenwood (1978) also noted some differences in the specimens of both forms taken in Moreton Bay, Queensland (see Fig. 168).

PREVIOUS SOUTHWEST PACIFIC RECORDS: Greenwood (1978).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species is known from the Indo-west Pacific (see Greenwood 1978a).

### *Acartiella* Sewell, 1914

DEFINITION: As for the family definition with the following additional characteristics. Rostral filaments

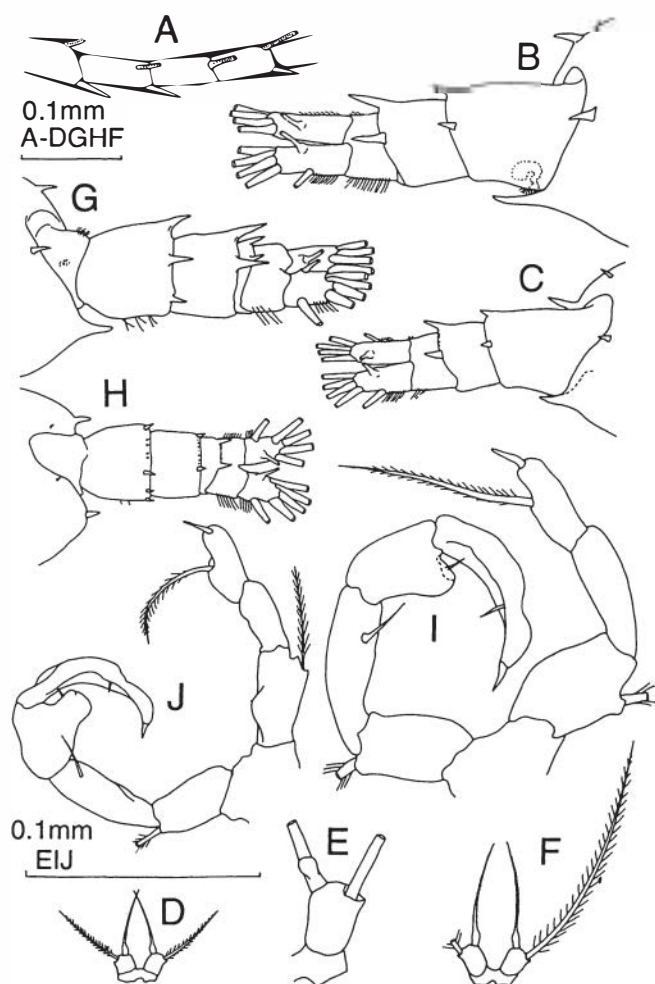


Fig. 168. *Acartia (Odontacartia) pacifica* from Greenwood (1978). Female. A, antenna 1 segments 15-19; B, C, urosome, dorsolateral view; D-F, leg 5. Male. G, H, urosome, dorso-lateral view; I, J, leg 5. A, B, E, F, G, I are forma *typica*; C, D, H, J, are forma *mertoni*.

absent. Posterior metasome segment 5 rounded, anal operculum present on anal segment, caudal rami long. Female leg 5 with an endopod. Male leg 5 with first basipods on each side fused, on each side there is basipod 2, exopod segment 1, and the fused exopod segments 2 and 3. (Steuer 1915)

TYPE SPECIES: *Acartiella kempfi* Sewell, 1914

REMARKS: The following species have been described in this genus, none of which has been taken in the Southwest Pacific: *Acartiella gravellyi* Sewell, 1919; *A. kempfi* Sewell, 1914; *A. keralensis* (Wellershaus, 1969); *A. major* Sewell, 1919; *A. natalensis* (Connell & Grindley, 1974); *A. nicolae* Dussart, 1985; *A. sewelli* (Steuer, 1934); *A. sinensis* Shen & Lee, 1963; *A. tortaniformis* (Sewell, 1912).

### *Paracartia* T. Scott, 1894b

DEFINITION: As for the family definition with the following additional characteristics. Rostral filaments present. There is strongly marked sexual dimorphism. Female last metasomal segment strongly spread into wing-shaped extensions, the genital segment swollen. Female leg 5 with both basipods fused. Male leg 5 resembles that of *A. discaudata*.

TYPE SPECIES: *Acartia dubia* T. Scott, 1894b

REMARKS: The following species have been described in the genus *Paracartia*, none of which has been taken in the Southwest Pacific: *Paracartia africana* (Steuer, 1915); *P. asymmetrica* (Tanaka, 1964d); *P. dubia* (T. Scott, 1894b); *P. grani* (Sars, 1904); *P. josephinae* (Crisafi, 1974); *P. latisetosa* (Krichagin, 1873) (= *P. verrucosa* Giesbrecht, 1892); *P. longipatella* (Connell & Grindley, 1974); *P. spinicaudata* T. Scott, 1894b.

### *Paralabidocera* Wolfenden, 1908

DEFINITION: As for the family definition with the following additional characteristics. Two rostral filaments present. Posterior metasomal corners rounded, female genital segment swollen and may be asymmetrical, anal operculum absent. Female leg 5 with fused first basal segments, an endopod, and a bifurcate 1-segmented exopod. Male leg 5 generally as in other Acartiidae but much more powerfully built. The spermatophore has a larger coupler which wraps around both sides of the female genital segment.

TYPE SPECIES: *Paracartia antarctica* Thompson, 1898

REMARKS: The following Antarctic species have been described in this genus, none of which have been taken in the Southwest Pacific: *Paralabidocera antarctica* (Thompson, 1898) (see Bayly 1978 for small form); *P. grandispina* Waghorn, 1979; *P. separabilis* Brodsky & Zvereva, 1976. Farran (1929) recorded *P. antarctica* east of Cook Strait; this Antarctic species has never been subsequently found near this location so is not illustrated here.

#### Family TORTANIDAE Sars, 1902

DEFINITION: As in the definition of the only genus.

REMARKS: This monotypic family probably has an Indo-West Pacific origin.

#### *Tortanus* Giesbrecht, 1898

DEFINITION: Small copepods with one median eye, no rostrum; a semicircular plate, thickly covered with short bristles, lies anterior to the labrum. Head and pedigerous segment 1 separate; pedigerous segments 4 and 5 fused or separate, posterior corners of pedigerous segment 5 with rounded or pointed extremities which are small or absent in the male. Urosome 2- or 3-segmented in female, genital segment without seminal receptacles; 5-segmented in male, often asymmetrical, both because of asymmetry in individual segments and as a result of curvature along the longitudinal axis; urosome asymmetry less frequent in males; female genital segment often asymmetrical, bearing a common genital aperture located medially on ventral surface, copulatory pore contained within median genital aperture. Caudal rami sometimes asymmetrical, one larger than the other, often fused to the anal segment, with 6 setae. Antenna 1 12- to 15-segmented, prehensile on the right side in the male, its middle part widened and sometimes equipped with a denticulate plate. Antenna 2 basipods 1 and 2 separate, endopod and basipod 2 often fused; with exopod indistinctly 3-segmented, typically with an unarmed first segment, a long middle segment with up to 3 setae, and a short segment with 2 setae; endopod 2-segmented with 6 terminal setae. Mandible with an elongate palp; unarmed basipod 2; endopod 2-segmented with 0 and 6 setae; exopod indistinctly 1-4-segmented with 5 setae in total. Maxilla 1 with much-reduced number of lobes (inner lobe 1 and one other the only ones present); inner lobe 1 with up to 13 spines and setae, the distal segment elongate bearing 3 powerful claw-like setae around the apex, and up to 7 short setae subapically. Maxilla 2 with

lobes 1-3 reduced; the remaining lobes bear claw-like setae. Maxilliped reduced with 2 long spines on the first segment; the distal part of the limb bearing 3 or 4 setae on the inner margin and 1 on the outer margin of the distal segment. Swimming legs with 3-segmented exopods; endopod of leg 1 2 or 3-segmented, legs 2-4 with 2-segmented endopods. Spine and seta formulae typically:

	basipod 1	basipod 2	exopod segments	endopod segments
Leg 1	0-1	0-0	0-1; 0-1; II*, 1, 4	0-3; 1, 2, 3
Leg 2	0-1	0-0	I-1; I-1; III*, I, 5	0-3; 2*, 2, 3
Leg 3	0-1	0-0	I-1; I-1; III, I, 5	0-3; 2*, 2, 3
Leg 4	0-1	1-0	I-1; I-1; III, I, 5	0-3; 1, 2, 3

Setation sometimes reduced on segments indicated (\*)

Female leg 5 simple, uniramous, 2-3-segmented; basipod 1 and coupler fused; basipod 2 with an outer seta; free exopodal segment typically with 1 outer margin spine and 3 spinous processes arranged around the margins; exopod segment sometimes in the form of a curved tapering process. Male leg 5 asymmetrical, uniramous; right leg 3-segmented, first segment unarmed, second segment often expanded into a medial or distal lamellate process armed with up to 3 setae, third segment forming a subchela typically curved and armed with 3 or 4 small setae. Left leg 4-segmented; first segment unarmed, second and third segments elongate, each with an inner and outer seta, fourth segment curved, typically armed with 2 setae on the inner margin, an apical seta and 2 on the outer margin; the inner seta on the third segment often carried on a slender process.

(Brodsky 1950; Barthélémy *et al.* 1998; Boxshall in prep.)

TYPE SPECIES: *Corynura gracilis* Brady, 1883 (designated by Ohtsuka (1992).

REMARKS: This genus has been reviewed (Ohtsuka 1992) and its division into the subgenera (*Tortanus*, *Eutortanus*, *Acutanus*, and *Atortus*) discussed. This genus now contains the following, mostly tropical, species: *Tortanus angularis* Ohtsuka, 1992; *T. barbatus* (Brady, 1883); *T. bonjoi* Othman, 1987; *T. bowmani* Othman, 1987; *T. brevipes* A. Scott, 1909; *T. capensis* Grindley, 1978; *T. compernis* Gonzalez & Bowman, 1965; *T. derjungini* Smirnov, 1935; *T. dextrilobatus* Chen & Zhang, 1965; *T. digitalis* Ohtsuka & Kimoto 1989; *T. discaudatus* (Thompson & Scott, 1897); *T. erabuensis* Ohtsuka, Fukuura & Go, 1987; *T. forcipatus* (Giesbrecht 1889); *T. giesbrechti* Jones & Park, 1967; *T. gracilis* (Brady, 1883); *T. longipes* Brodsky, 1948; *T. lophus* Bowman, 1971; *T. murrayi* A. Scott, 1909; *T. reticauda* (Giesbrecht, 1889);

*T. rubidus* Tanaka, 1965; *T. ryukyuensis* Ohtsuka & Kimoto 1989; *T. scaphus* Bowman, 1971; *T. setacaudatus* (Williams, 1906); *T. sheni* Hulsemann, 1988 (= *T. denticulatus* Shen & Bai, 1956); *T. sinicus* Chen, 1983; *T. spinicaudatus* Shen & Bai, 1956; *T. tropicus* Sewell, 1932; *T. vermiculus* Shen, 1955. One species has apparently been taken in the Southwest Pacific.

Tortanidae are carnivores based on mouthpart morphology (Itoh 1970; Ohtsuka *et al.* 1996), gut contents (Itoh 1970), and laboratory feeding experiments (Greene 1988; Uye & Kayano 1994).

***Tortanus (Tortanus) barbatus* (Brady, 1883)**  
(Figs 169, 187, 195)

DESCRIPTION: Size: females: 1.6–2.1 mm, males: ? mm.

Female: As in the family and generic definition with the following additional characters. Genital segment and urosome segment 2 free, caudal rami and the remaining parts of the urosome fused, asymmetrical. Setae on the caudal rami may be variable; a long seta may or may not be present on midlateral border of right caudal ramus. Leg 5 asymmetrical, terminal segment on one side short and tapering, on the other side elongate and with an inner-edge toothed region at midlength; teeth can vary from obtuse to elongate and whip-like. (Greenwood 1978a)

Male: As in the family and generic definition with the following additional characters. Urosome with anal segment and caudal rami fused, only slightly asymmetrical. Right leg 5 segment 2 with a triangular inner expansion with one seta at midlength along its distal border; left leg segment 3 naked, segment 4 with a long outer seta, numerous spinules on the inner distal surface and outer distal ridges. (Greenwood 1978a)

REMARKS: This is apparently a variable species; Greenwood (1978a) discusses the morphological variability and the synonymy.

PREVIOUS SOUTHWEST PACIFIC RECORDS: *Tortanus barbatus* (Brady 1883); Dakin and Colefax (1940) as *Tortanus* sp.; Greenwood (1978).

NEW RECORDS: Nil.

DISTRIBUTION: This epipelagic species is known mainly from tropical Indo-Malaysia, found as far south as Victorian coastal waters (Greenwood).

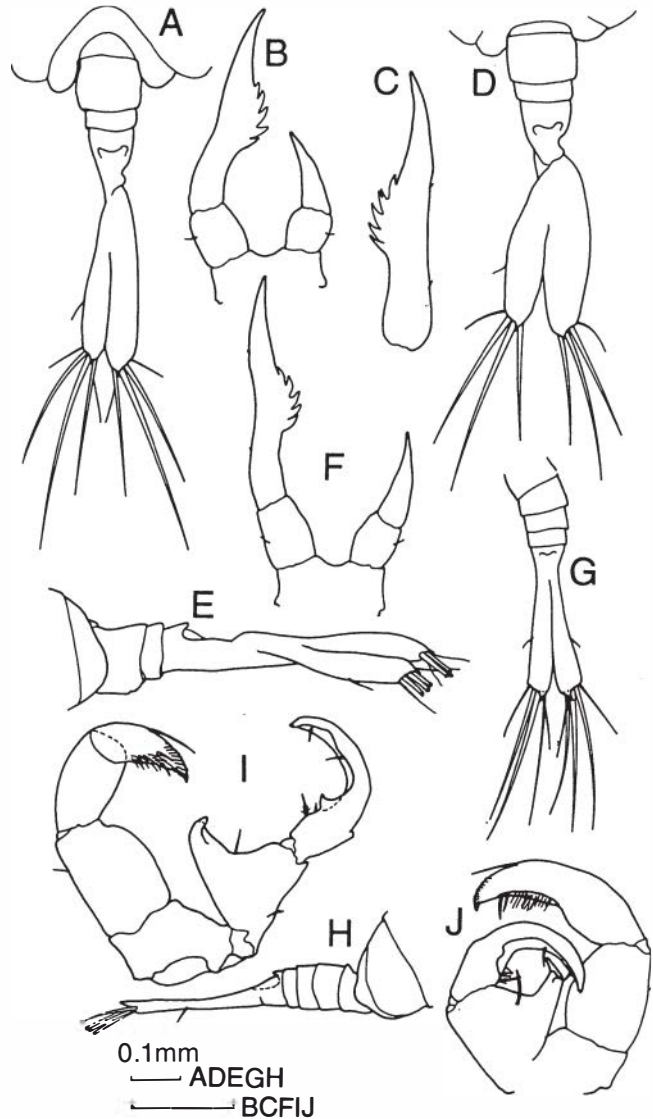


Fig. 169. *Tortanus (Tortanus) barbatus* from Greenwood (1978). Female. A, urosome, dorsal view; B, leg 5; C, aberrant left leg 5 with bifid denticle; D, E, urosome of broad-caudal ramus form, dorsal and lateral views; F, leg 5 of same. Male. G, H, urosome, dorsal and lateral view; I, leg 5, posterior view; J, leg 5, anterior view.

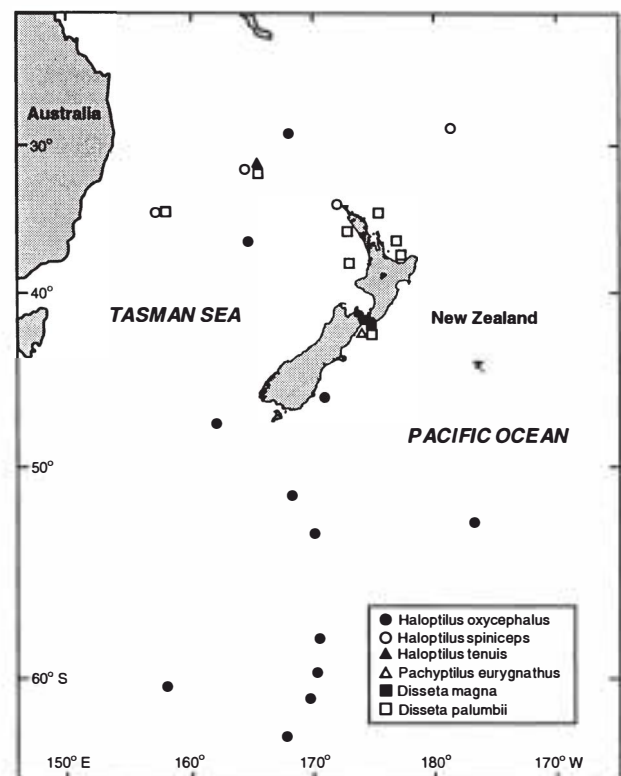
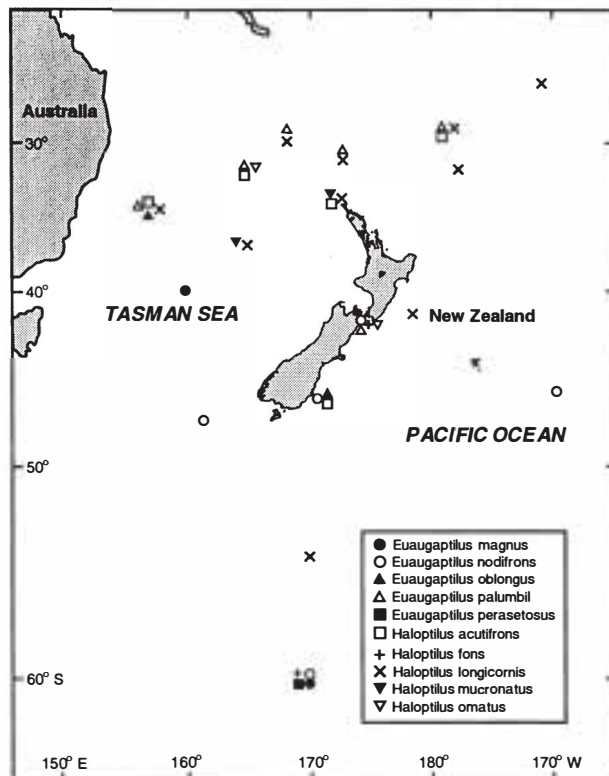
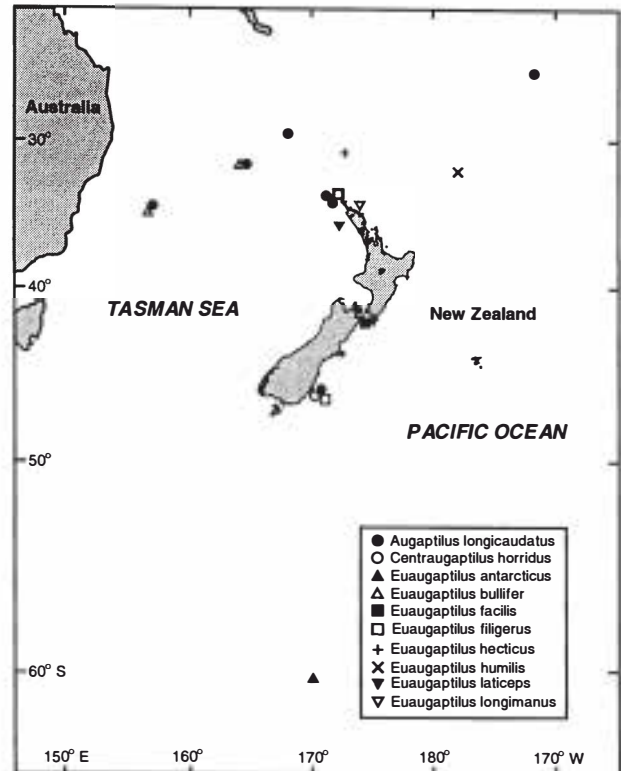
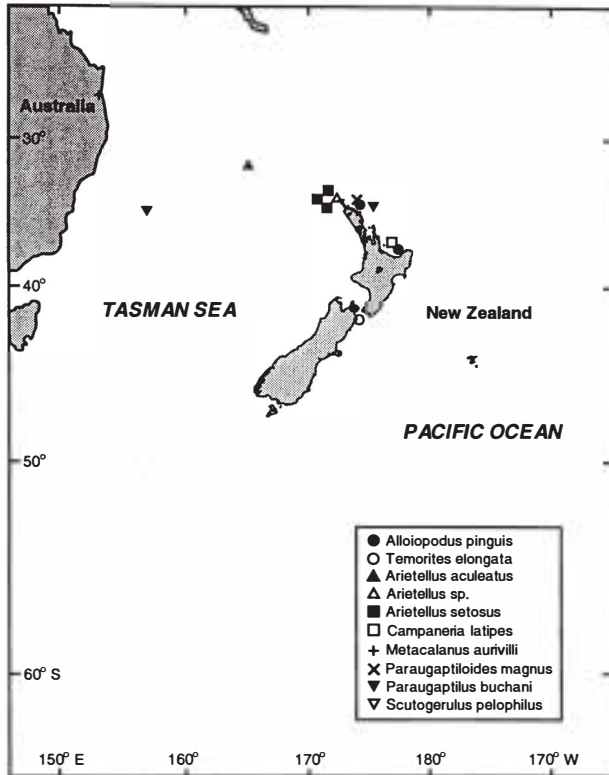


Fig. 170 (top left), Fig. 171 (top right), Fig. 172 (bottom left), Fig. 173 (bottom right). Records of distribution of genera *Alloiopodus*, *Temorites*, *Arietellus*, *Campaneria*, *Metacalanus*, *Praugaptiloides*, *Praugaptilus*, *Scutogerulus*, *Augaptilus*, *Centraugaptilus*, *Euaugaptilus*, *Haloptilus*, *Pachyptilus*, and *Disseta* in the Southwest Pacific Ocean.



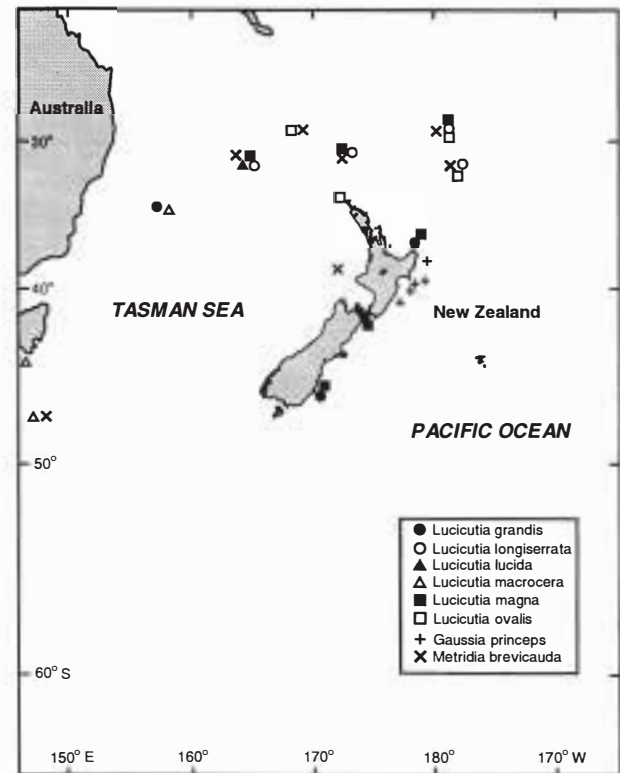
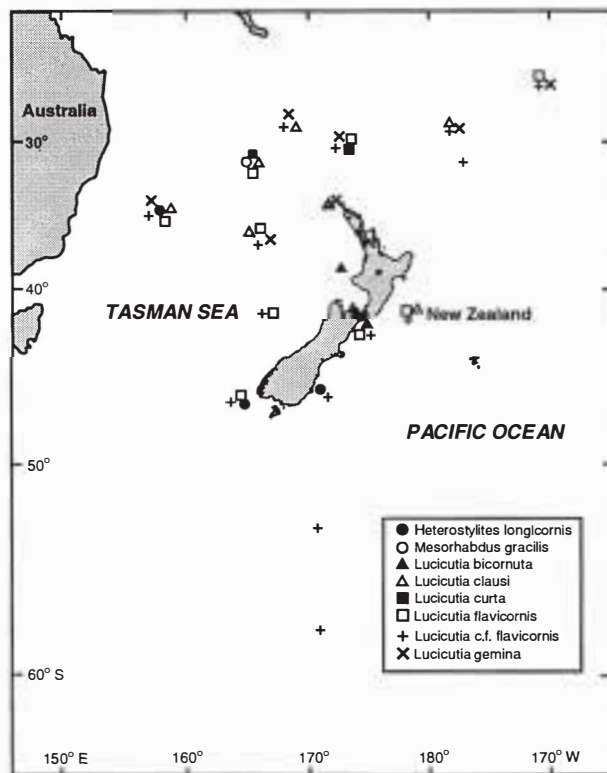
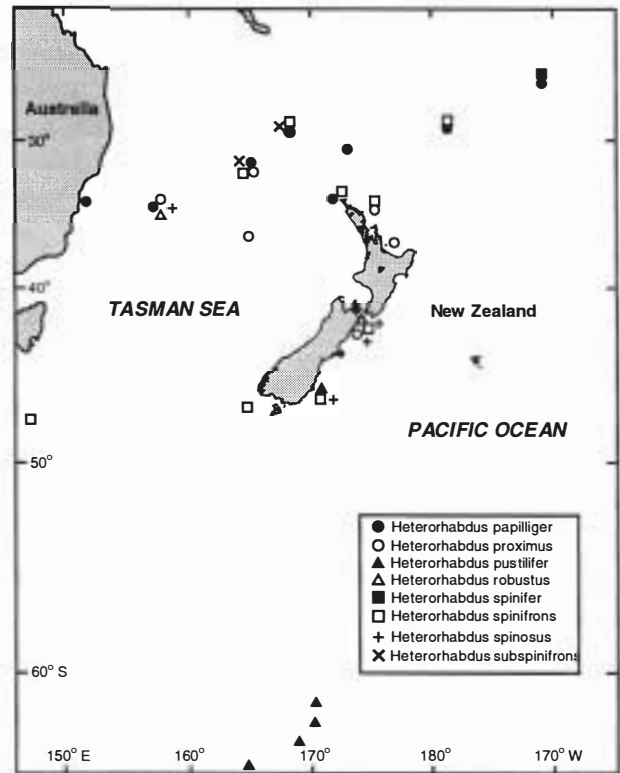
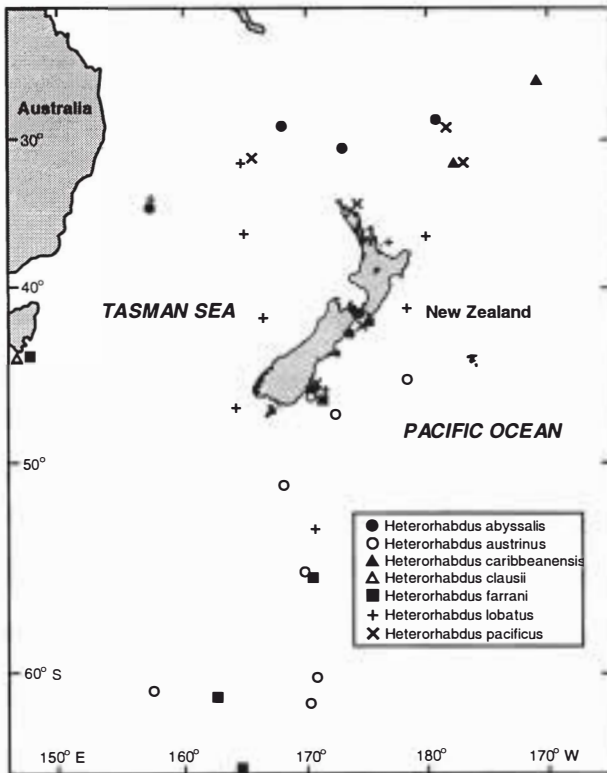


Fig. 174 (top left), Fig. 175 (top right), Fig. 176 (bottom left), Fig. 177 (bottom right). Records of distribution of genera *Heterorhabdus*, *Heterostylites*, *Mesorhabdus*, *Lucicutia*, *Gaussia*, and *Metridia* in the Southwest Pacific Ocean.

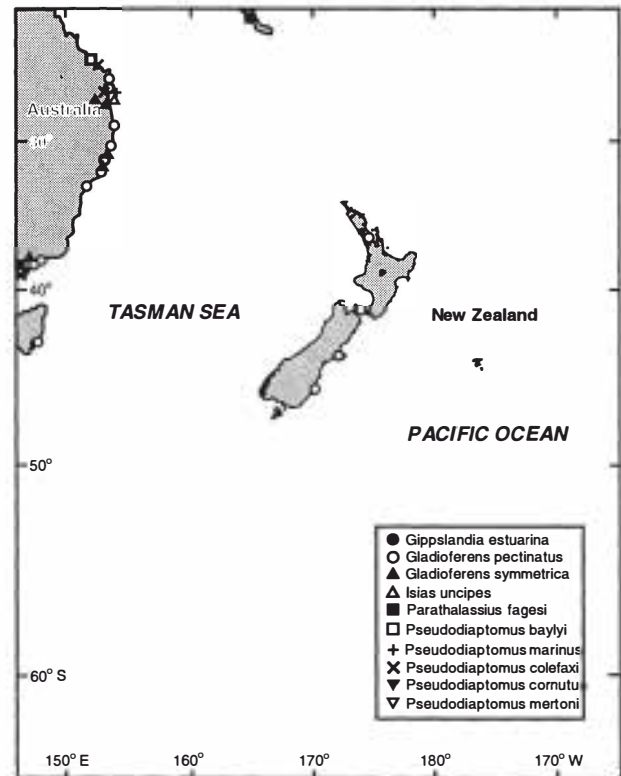
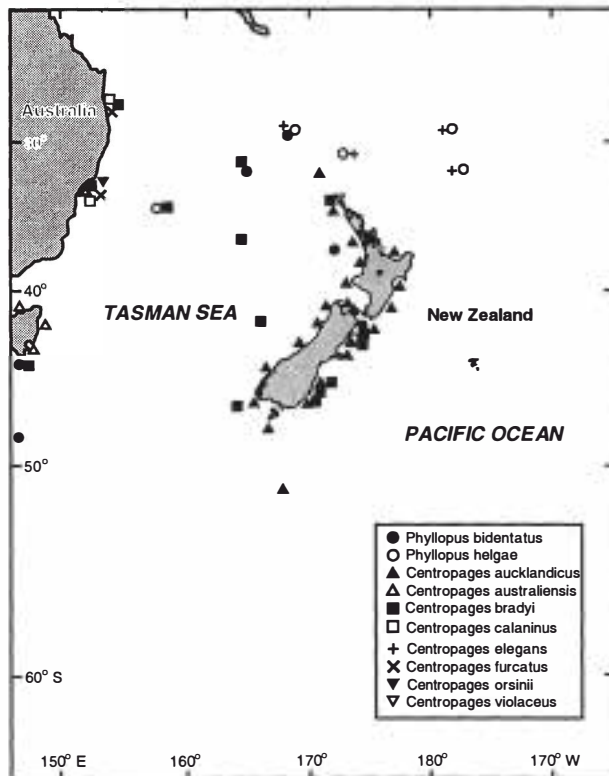
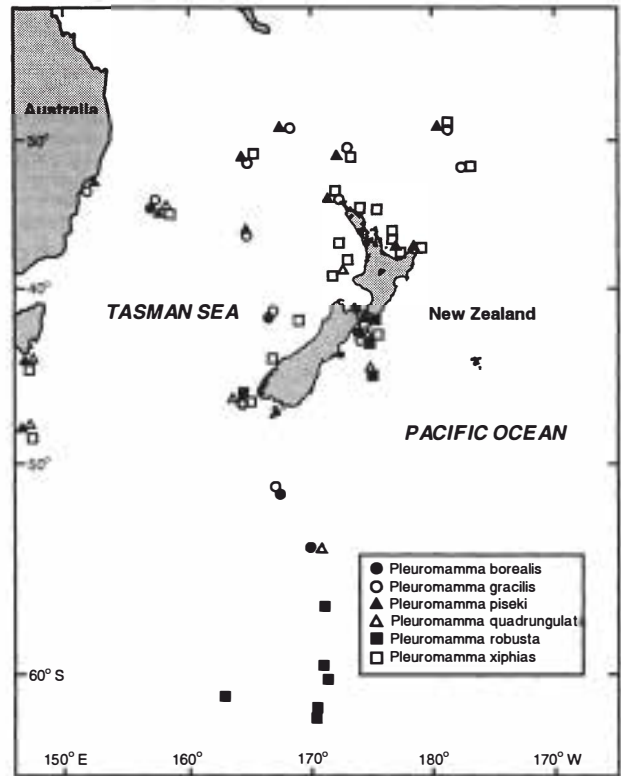
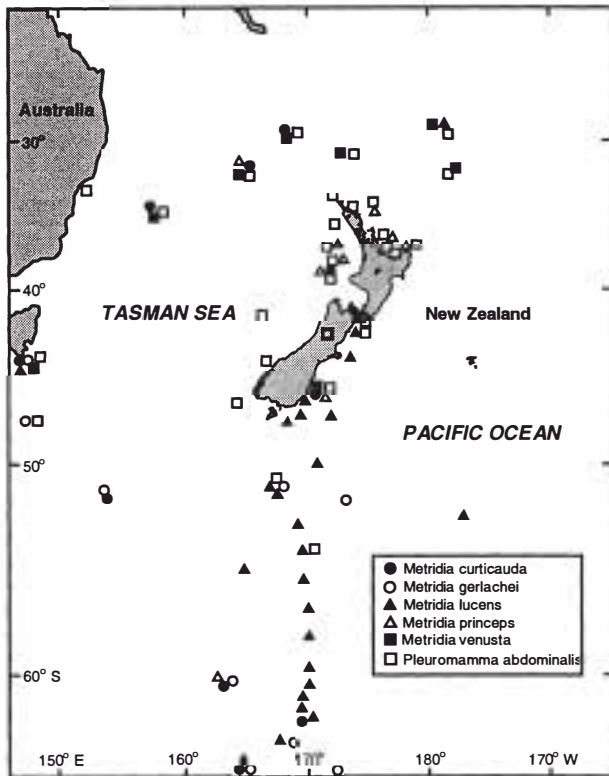


Fig. 178 (top left), Fig. 179 (top right), Fig. 180 (bottom left), Fig. 181 (bottom right). Records of distribution of genera *Metridia*, *Pleuromamma*, *Phyllopus*, *Centropages*, *Gippslandia*, *Gladioferens*, *Isias*, *Parathalassius*, and *Pseudodiaptomus* in the Southwest Pacific Ocean.

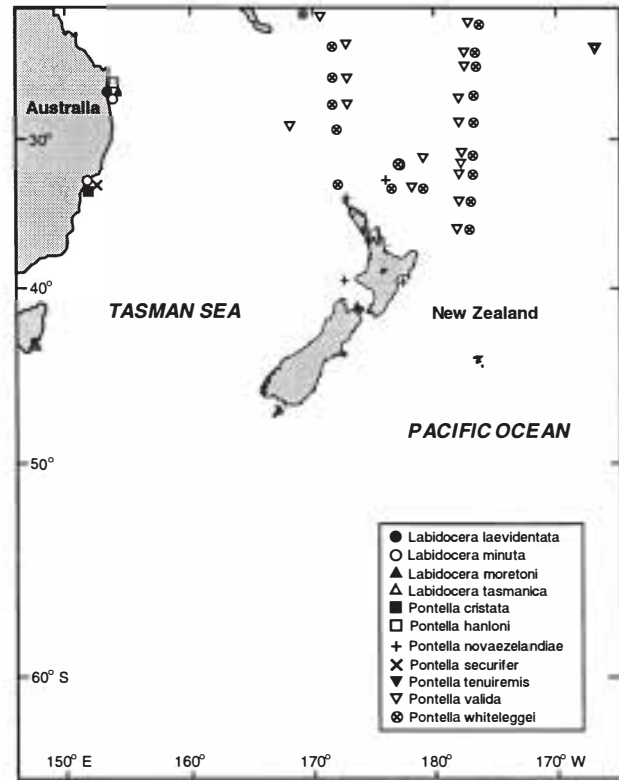
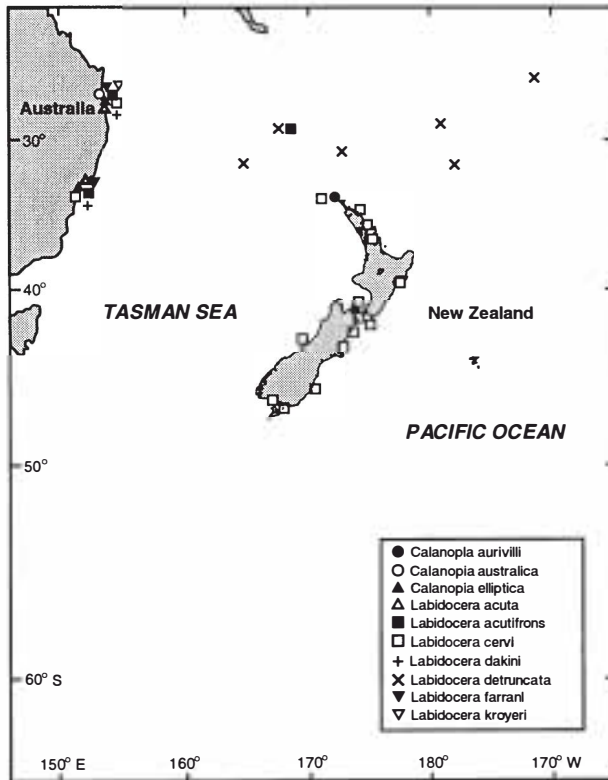
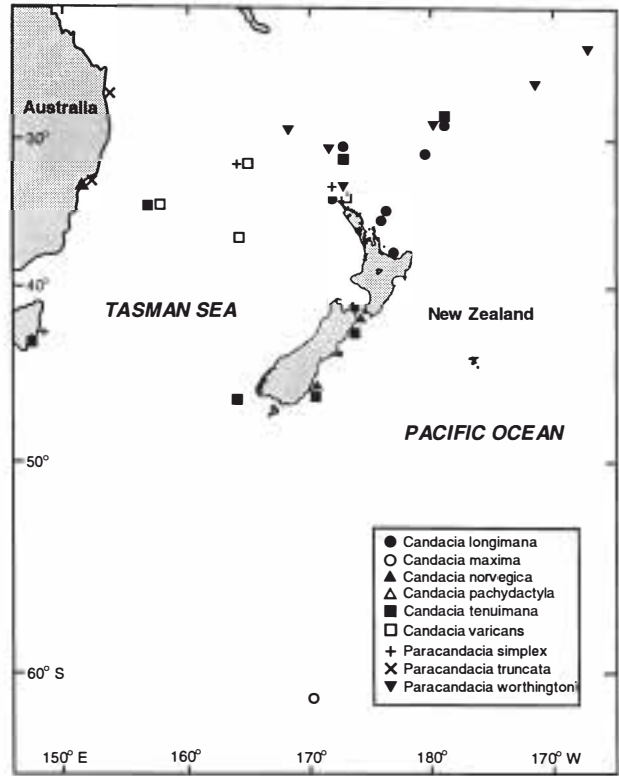
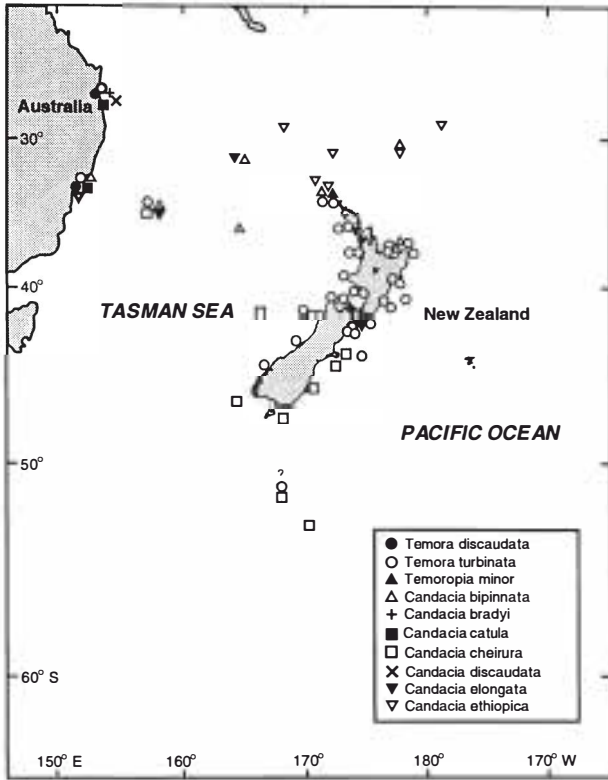


Fig. 182 (top left), Fig. 183 (top right), Fig. 184 (bottom left), Fig. 185 (bottom right). Records of distribution of genera *Temora*, *Temoropia*, *Candacia*, *Paracandacia*, *Calanopia*, *Labidocera*, and *Pontella* in the Southwest Pacific Ocean.

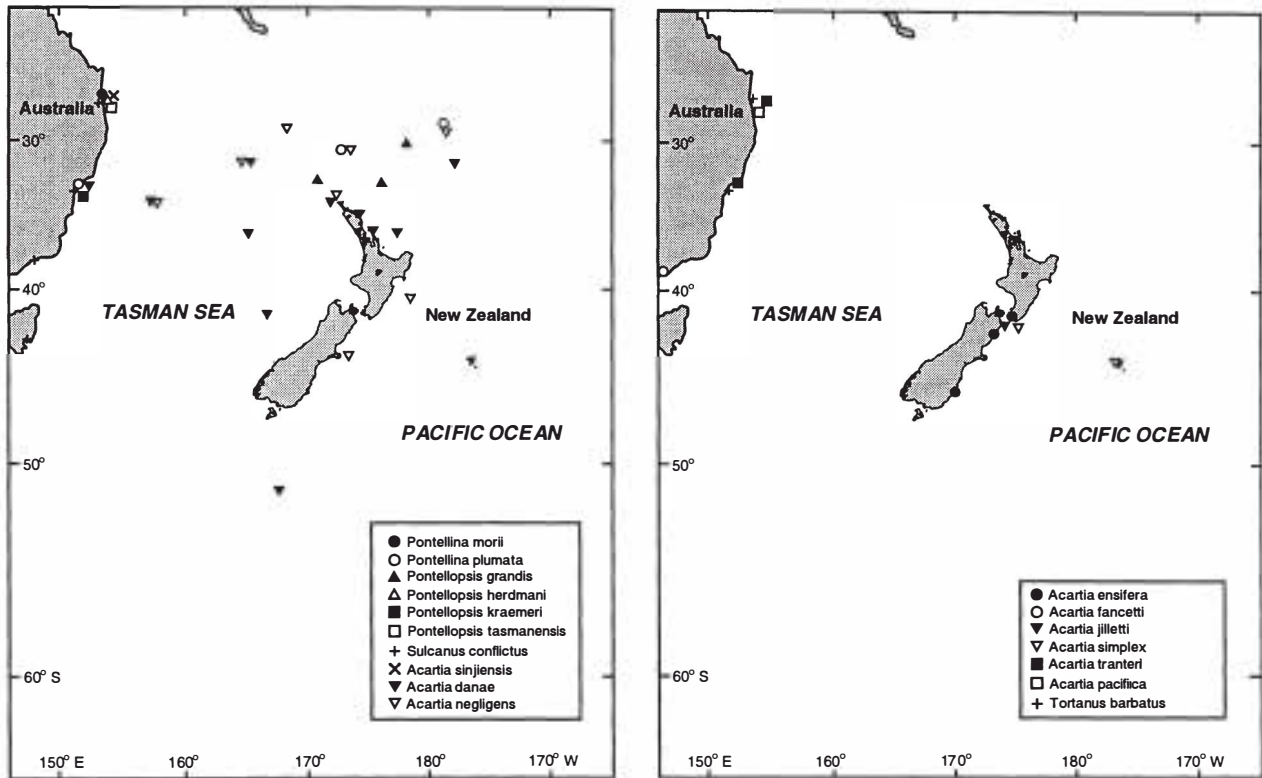


Fig. 186 (left), Fig. 187 (right). Records of distribution of genera *Pontellina*, *Pontellopsis*, *Sulcanus*, *Acartia*, and *Tortanus* in the Southwest Pacific Ocean.

**DISTRIBUTION OF SOUTHWEST PACIFIC CALANOIDA : BATHYPONTIIDAE, ARIETELLIDAE, AUGAPTILIDAE, HETERORHABDIDAE, LUCICUTIIDAE, METRIDINIDAE, PHYLLOPODIDAE, CENTROPAGIDAE, PSEUDODIAPTOMIDAE, TEMORIDAE, CANDACIIDAE, PONTELLIDAE, SULCANIDAE, ACARTIIDAE, AND TORTANIDAE.**

**Vertical Distribution**

The material studied was collected with a wide variety of gear between 23°S and 64°S. Near-surface layers down to 500 m were more comprehensively sampled than deeper waters (Fig. 188), but depths to 1000 m were also well represented in the collections, particularly by the series of University of Otago stations. Bathypelagic depths were only sparsely sampled, often with inappropriate gear. These limitations accepted, the present collection, together with previous records from the area, are sufficiently comprehensive to demonstrate broad features of vertical and latitudinal distribution.

The characteristic depth zones of each species (Figs 189–195) were determined by several criteria apart from their observed occurrence in the present records. Where a species occurred in hauls from deep water to

the surface I have assumed that it was caught in deep water, provided that the species was absent from the numerous shallow samples. Also, existing records of distribution in other parts of the world have been considered in the determination of each characteristic vertical and latitudinal distribution. Bathypelagic species are defined as those which usually occurred in present samples with a maximum depth around 1000 m or more and were seldom taken in samples from less than 500 m. Mesopelagic species commonly occurred in samples with maximum depths between 500 and 1000 m but may be found at epipelagic depths, usually in night samples. Epipelagic species had a high proportion of their occurrence in samples from less than 200 m maximum depth.

Bathypontiidae: Only two species of this family have been taken in the Southwest Pacific (Fig. 189). One

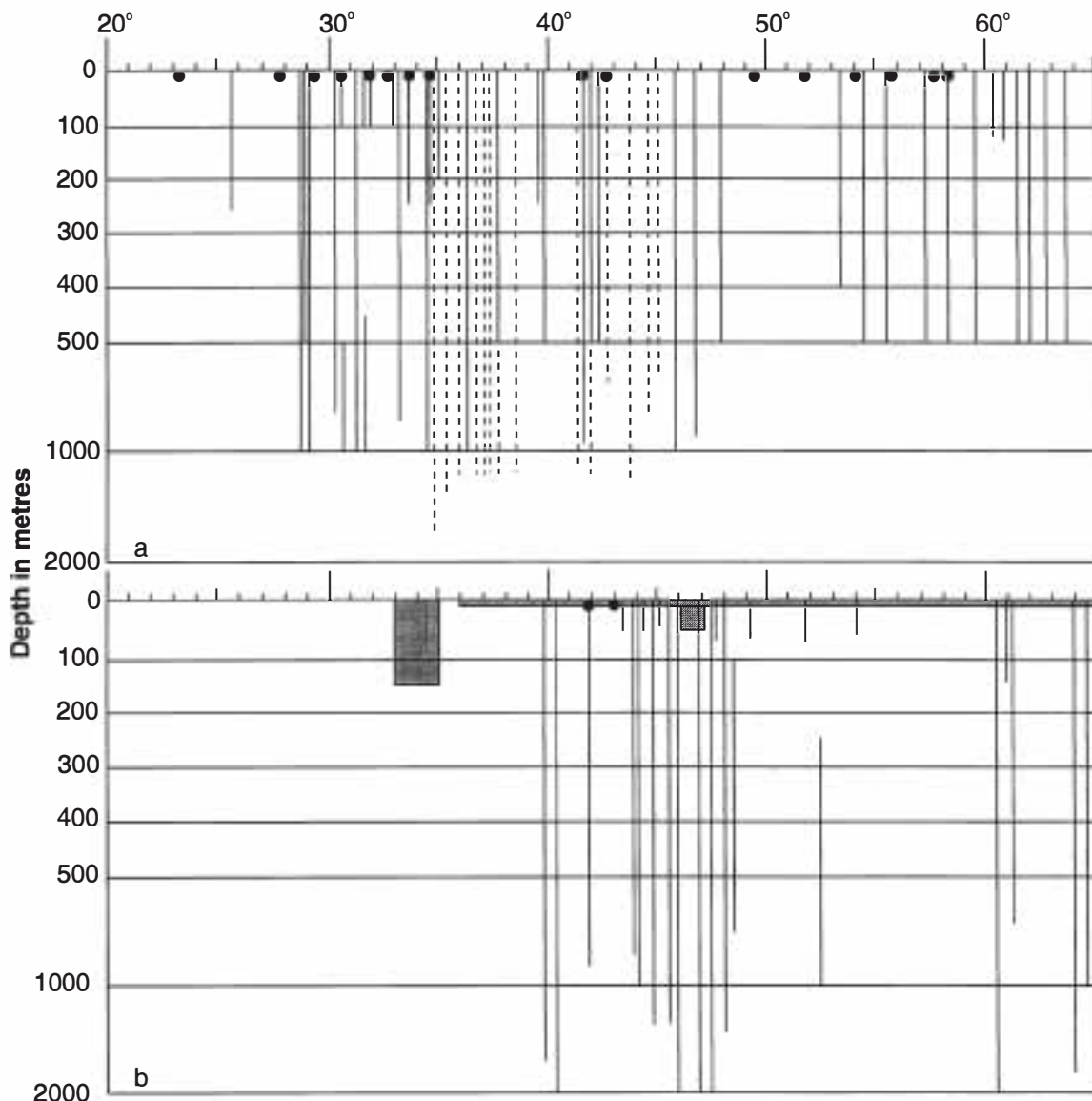


Fig. 188. Distribution of samples with latitude and depth from which the present records are derived. a, new records; b, previous records. - - Menzies trawl hauls, — vertical hauls, • surface hauls, hatched areas represent a number of samples.

species (*Temorites elongata*) is bathypelagic and the other (*Alloiopodus pinguis*) is benthopelagic at about 1700 m.

Arietellidae: All members of this family live at mesopelagic or deeper depths apart from *Metacalanus aurivilli* which appears to be epipelagic (Fig. 189). Three species (*Campaneria latipes*, *Paraugaptiloides magnus*, and *Scutogerulus pelophilus*) are benthopelagic at depths greater than 1000 m.

Augaptilidae: Most species in this family live at mesopelagic or deeper depths (Fig. 190) although some species are found quite near the surface (*Euaugaptilus hecticus*, *Haloptilus longicornis*, *H. mucronatus*, *H. oxy-*

*cephalus*, and *H. spiniceps*).

Heterorhabdidae: Most species in this family live at mesopelagic or deeper depths (Fig. 191) although *Heterorhabdus papilliger* is found quite near the surface.

Lucicutiidae: Most species in this family live at mesopelagic or deeper depths (Fig. 191) although some species are found near the surface (*Lucicutia flavicornis*, *L. cf. flavicornis*, *L. gemina*, *L. ovalis*).

Metridinidae: Most species in this family live at mesopelagic or deeper depths (Fig. 192) although some species may be found near the surface (*Metridia lucens*, *M. gerlachei*).

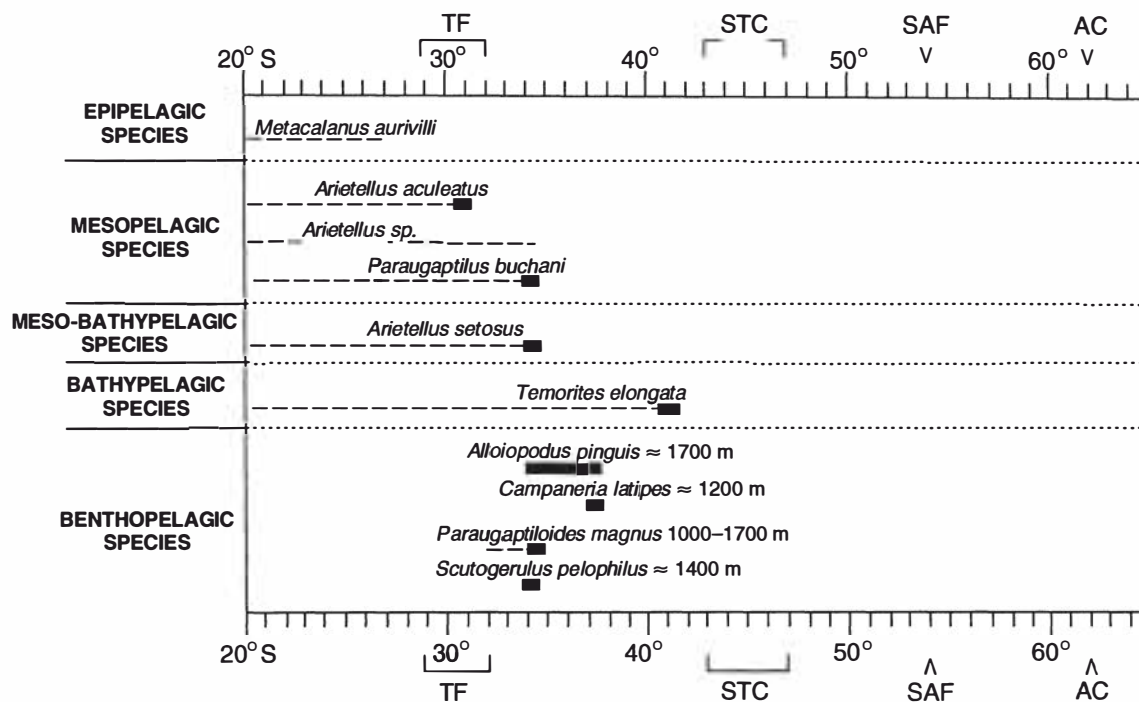


Fig. 189. Distribution of Bathypontiidae and Arietellidae with depth and latitude. — Southwest Pacific records; - - - likely distribution from all existing records. TF = Tasman Front, STC = Subtropical Convergence, SAF = Subantarctic Front, AC = Antarctic Convergence.

Phyllopodidae: Only two species (*Phyllopus bidentatus*, *P. helgae*) were recorded in the Southwest Pacific and they live at mesopelagic to bathypelagic depths (Fig. 192).

Centropagidae: Members of the family are exclusively at epipelagic depths (Fig. 192) often closely associated with coastal or estuarine waters, and may be endemic to particular land masses.

Pseudodiaptomidae: Members of this family are found in coastal or estuarine waters of Australia (Fig. 193).

Temoridae: Only three species of this family were taken in the Southwest Pacific, two of them are epipelagic and one (*Temoropia minor*) is bathypelagic (Fig. 193).

Candaciidae: Members of this family are found at epipelagic and mesopelagic depths (Fig. 193).

Pontellidae: Members of this family are exclusively epipelagic with a strong tendency to be neustonic. A number of species are confined to coastal waters and may be endemic to particular regions (Fig. 194).

Sulcanidae: The only member of this family (*Sulcanus conflictus*) was taken in estuarine conditions (Fig. 195).

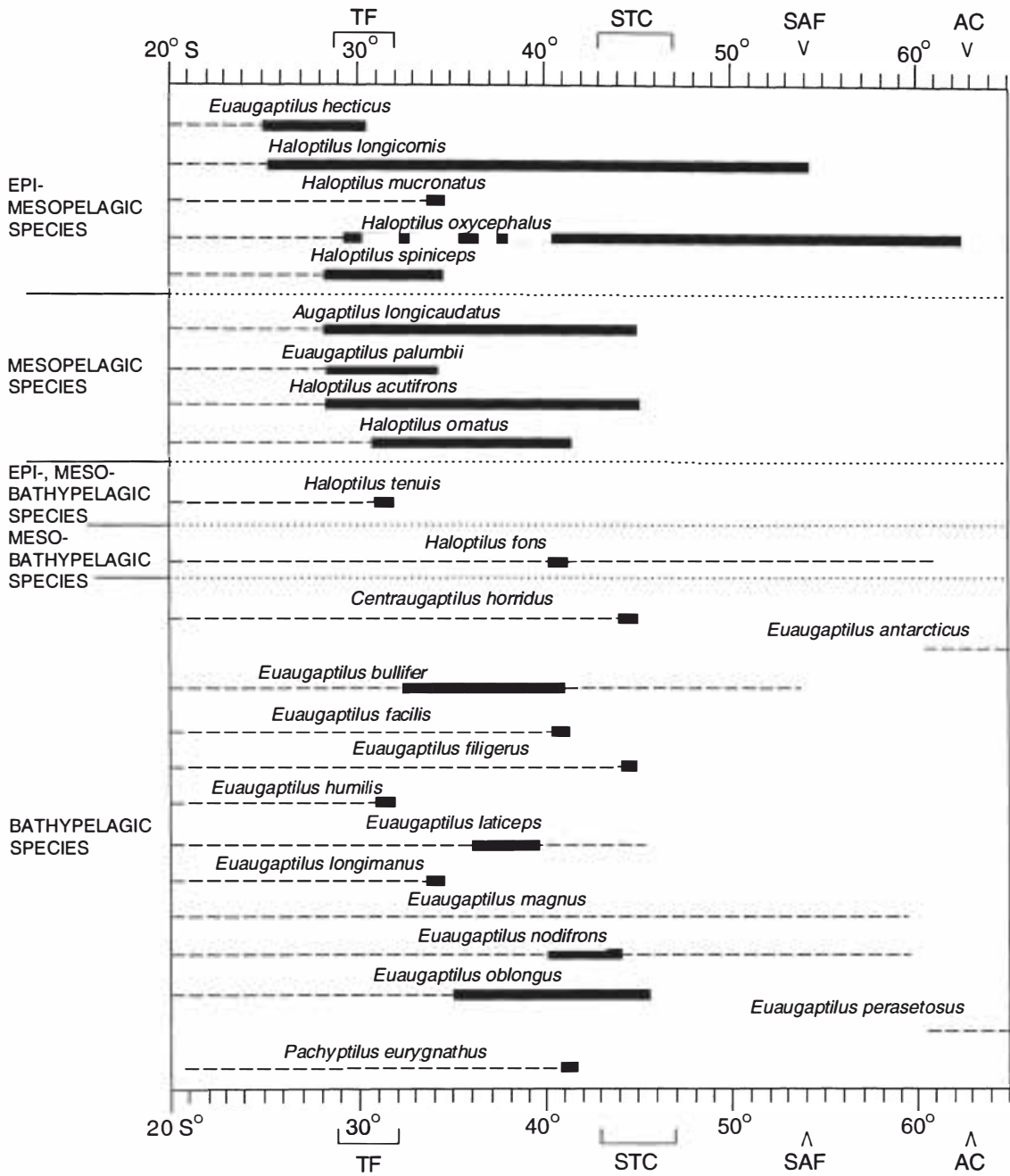
Acartiidae: Members of this family are exclusively

epipelagic with a tendency to favour coastal waters and to be endemic to particular landmasses (Fig. 195).

Tortanidae: The only member of the family is epipelagic in Southwest Pacific waters (Fig. 195).

### Horizontal Distribution

Among the Southwest Pacific epipelagic species the Centropagidae, Pseudodiaptomidae, Temoridae, Pontellidae, and Acartiidae contain coastal forms which are rarely encountered in oceanic water. Some species are apparently endemic to particular land masses. For example, *Centropages aucklandicus*, *Pontella novaezelandiae*, *Acartia ensifera*, *A. jilletti*, and *A. simplex* are confined to New Zealand waters, *Centropages australiensis*, *Gippislandia estuarina*, *Gladioferens symmetricus*, *Isias unciipes*, *Pseudodiaptomus baylyi*, *P. colefaxi*, *P. cornutus*, *Calanopia australica*, *Labidocera farrani*, *L. moretoni*, *L. tasmanica*, *Pontella cristata*, *P. hanloni*, *Pontellopsis tasmanensis*, *Acartia baylyi*, *A. fancetti*, and *A. tranteri* are confined to Australian waters, and *Gladioferens pectinatus*, *Labidocera cervi*, and *Sulcanus conflictus* are found in southeast Australian and New Zealand coastal waters. Other species, such as *Temora turbinata*, are widespread in tropical and subtropical coastal

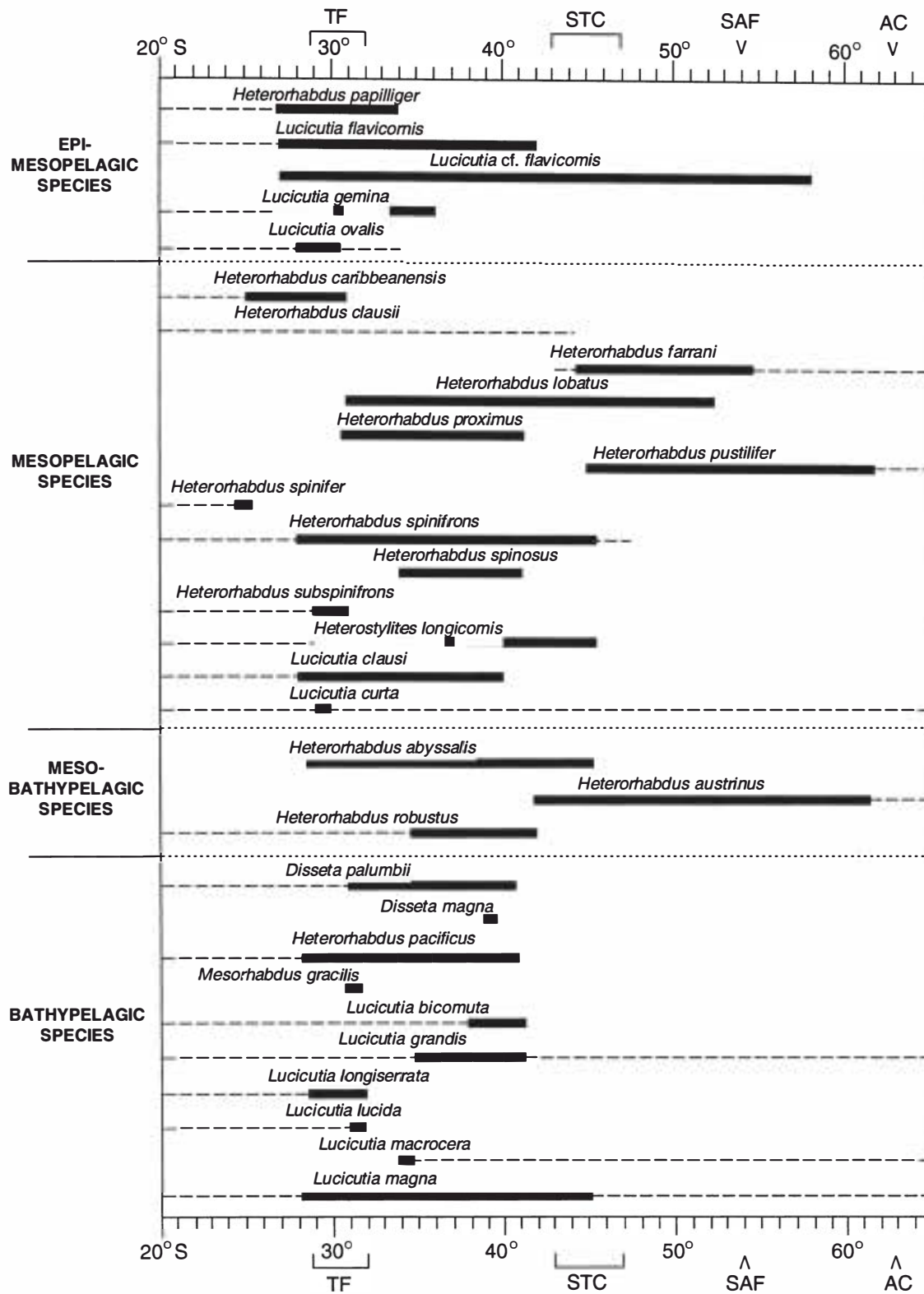


**Fig. 190.** Distribution of Augaptilidae with depth and latitude. — Southwest Pacific records; - - - likely distribution from all existing records. TF = Tasman Front, STC = Subtropical Convergence, SAF = Subantarctic Front, AC = Antarctic Convergence.

waters, except on the eastern Pacific Ocean boundary, but appears to be capable of surviving transport across the Tasman Sea (Bradford 1977).

Oceanic epipelagic species in the Southwest Pacific have distributions which are approximately related to watermass distribution. The processes which maintain the distribution patterns of species must be related to those that maintain the shape of the water-

mass patterns because planktonic species by definition are not able to alter their position substantially against currents (McGowan 1974). The watermass/gyre systems, as closed circulation structures, act as conservers of populations although there is clearly a large amount of leakage along their edges. In addition to the impact of recirculation patterns, a combination of, at least, physiological requirements (temperature,



**Fig. 191.** Distribution of Heterorhabdidae and Lucicutiidae with depth and latitude. ■ Southwest Pacific records; - - - likely distribution from all existing records. TF = Tasman Front, STC = Subtropical Convergence, SAF = Subantarctic Front, AC = Antarctic Convergence.



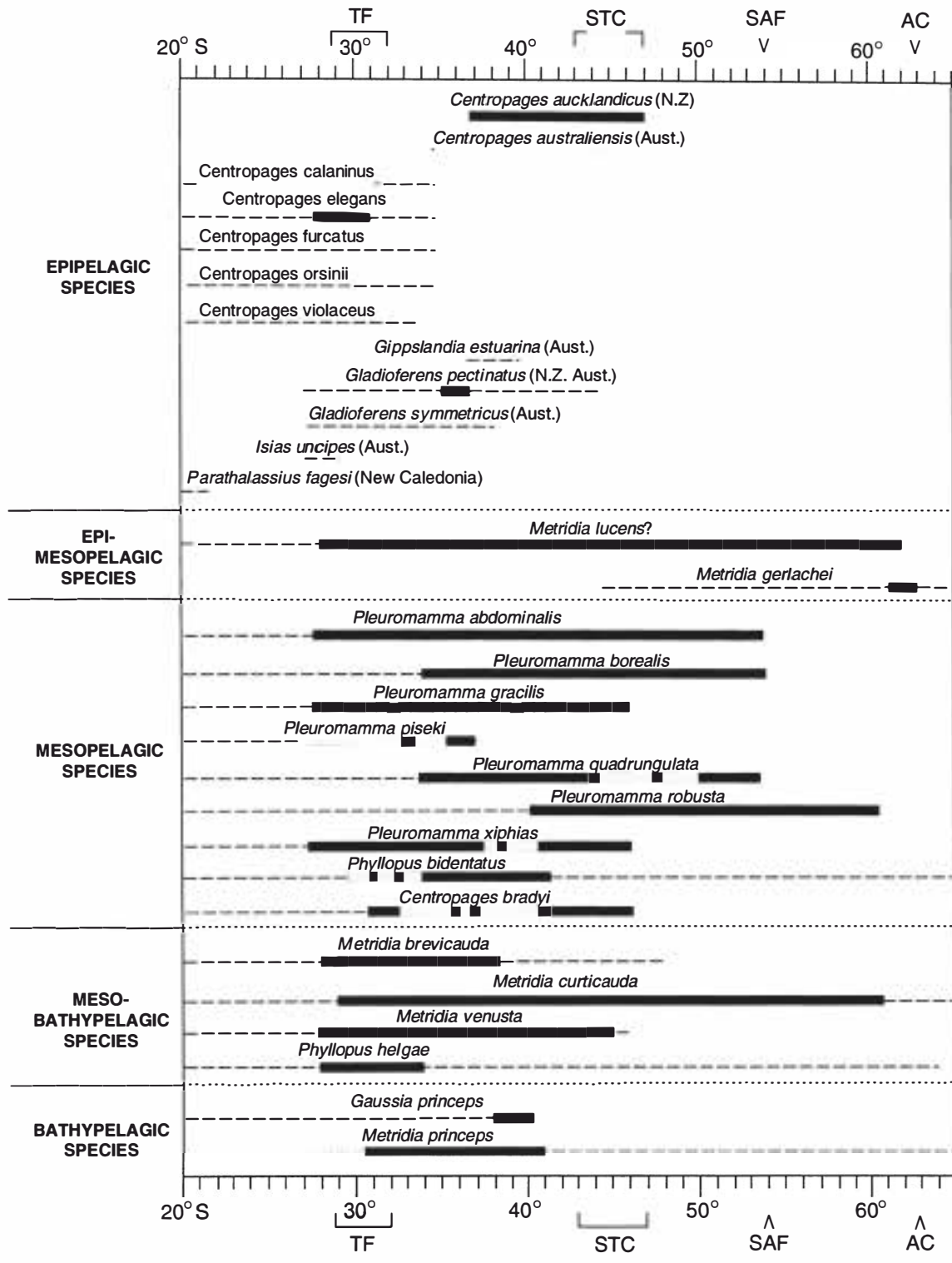


Fig. 192. Distribution of Metridinidae, Phyllopodidae and Centropagidae with depth and latitude. ■ Southwest Pacific records; - - - likely distribution from all existing records. TF = Tasman Front, STC = Subtropical Convergence, SAF = Subantarctic Front, AC = Antarctic Convergence.

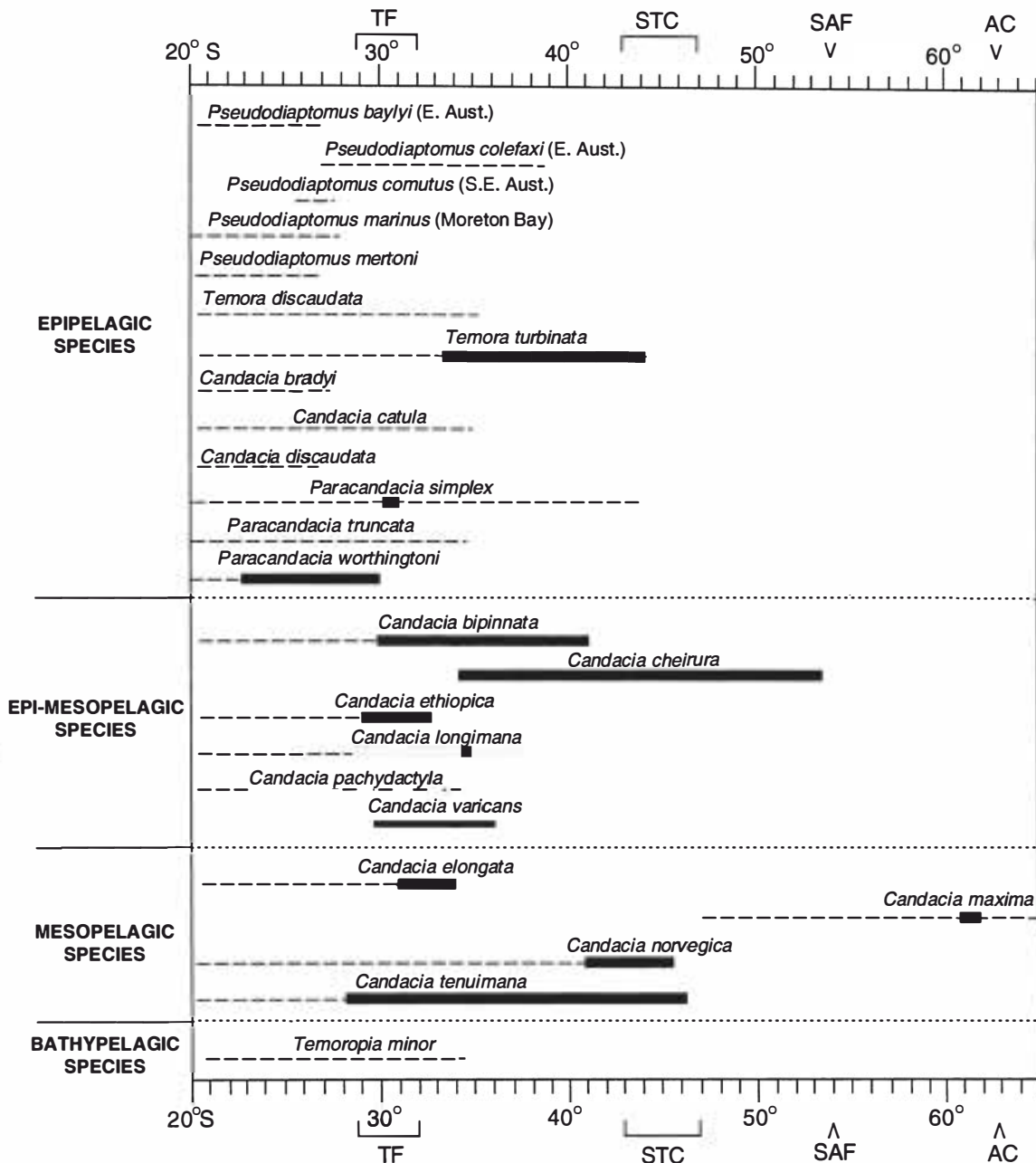
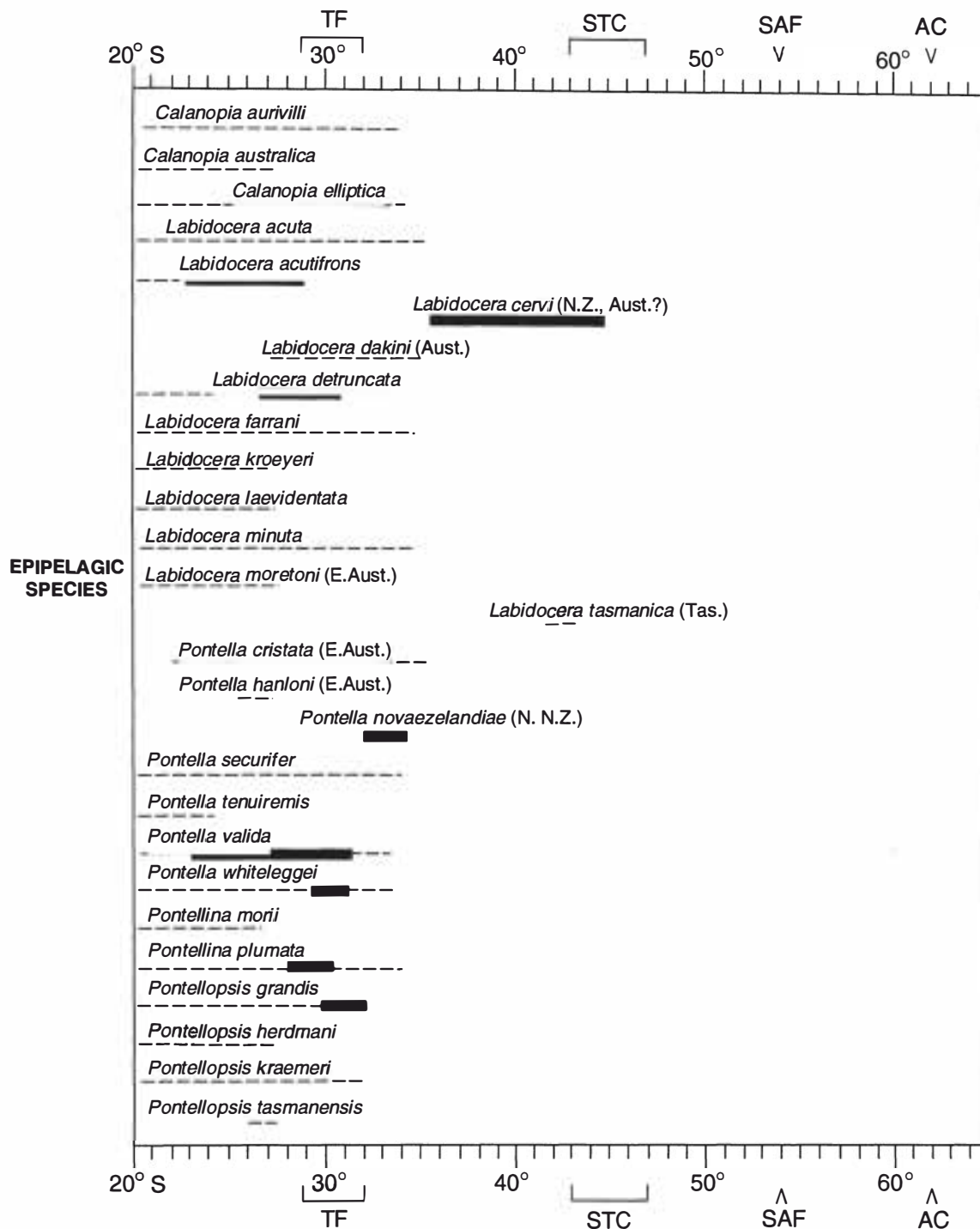


Fig. 193. Distribution of Pseudodiaptomidae, Temoridae, and Candaciidae with depth and latitude. ■ Southwest Pacific records; - - - likely distribution from all existing records. TF = Tasman Front, STC = Subtropical Convergence, SAF = Subantarctic Front, AC = Antarctic Convergence.

salinity, food etc.), behaviour, competition, and predation are also probably involved in the maintenance of distributions. As yet, we do not have much information on many of these subjects especially in relation to the species dealt with here.

*Metacalanus auriivilli* and a number of Centropagidae, Temoridae, Candaciidae, Pontellidae, and Acartiidae appear to have tropical or subtropical distributions which seem to be limited approximately

by the Tasman or Subtropical Fronts. Warm-water (tropical) epipelagic species usually have a cosmopolitan distribution if they are able to breed at a range of latitudes which extend to 40°S whereas those with breeding ranges restricted to lower latitudes are not circumglobal in distribution because of the geographical barriers (South American and African continents) presented to their distribution (Fleminger & Hülsemann 1973). In warm (tropical) Southwest Pacific



**Fig. 194.** Distribution of Pontellidae with depth and latitude. ■ Southwest Pacific records; - - - likely distribution from all existing records. TF = Tasman Front, STC = Subtropical Convergence, SAF = Subantarctic Front, AC = Antarctic Convergence.

waters, epipelagic species which have Indo-Pacific or Pacific distributions and whose distributions extend to 35°S at most are: *Metacalanus aurivilli*, *Centropages calaninus*, *C. elegans*, *Pseudodiaptomus mertonii*, *Temora discaudata*, *Candacia bradyi*, *C. catula*, *Paracandacia*

*truncata*, *P. worthingtoni*, *Calanopia aurivilli*, *Labidocera acuta*, *L. detruncata*, *L. laevidentata*, *L. minuta*, *Pontella tenuiremis*, *P. valida*, *P. whiteleggei*, *Pontellina morii*, *Pontellopsis herdmani*, *P. kraemeri*, *Acartia pacifica*, and *Tortanus barbatus*. Other species, which appear to have

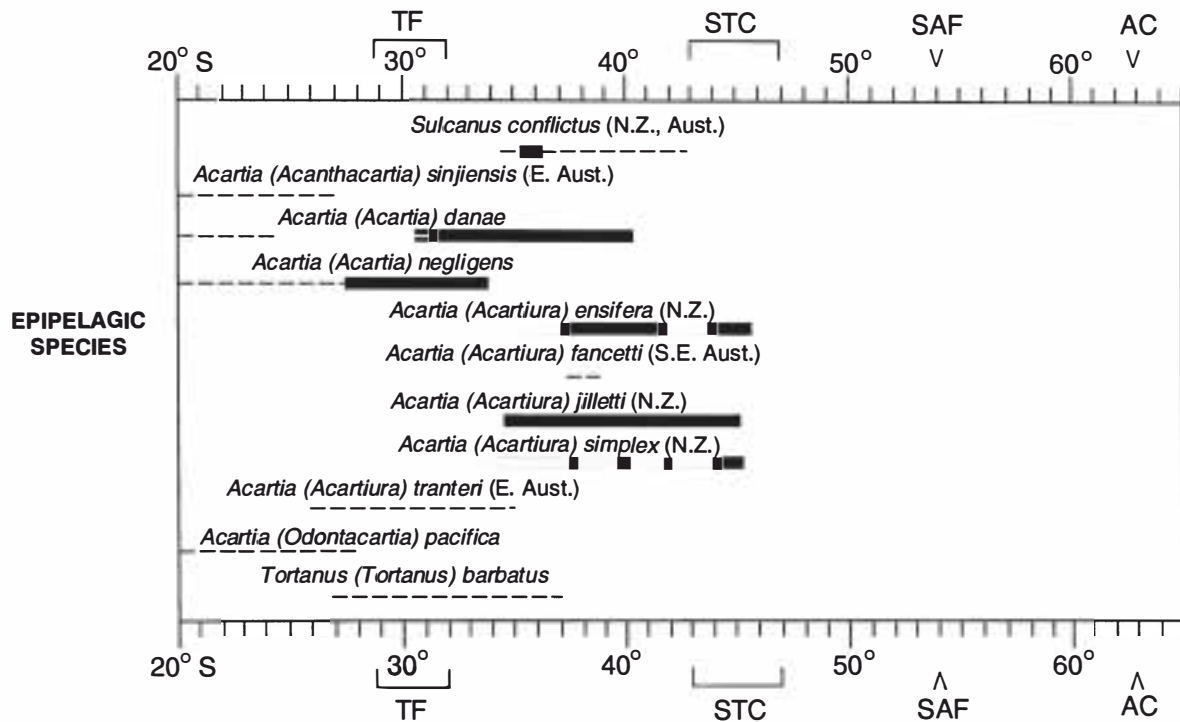


Fig. 195. Distribution of Sulcanidae, Acartiidae, and Tortanidae with depth and latitude. ■ Southwest Pacific records; --- likely distribution from all existing records. TF = Tasman Front, STC = Subtropical Convergence, SAF = Subantarctic Front, AC = Antarctic Convergence.

the same distribution in the Southwest Pacific, are in fact distributed over all the world's oceans which suggests that their distribution in the Southwest Pacific is not well known in detail or there may still be unresolved taxonomic problems, e.g., *Pontella securifer*. In tropical or subtropical/warm-temperate Southwest Pacific waters only two epipelagic species with widespread distributions (*Paracandacia simplex* and *Acartia danae*) have distributions extending to 40°S or beyond.

Among the families studied in this volume it is difficult to be sure that there are any with warm-temperate (transition zone) southern hemisphere distributions although *Candacia cheirura* is possibly such a species. Species with Antarctic-subantarctic distributions (*Heterorhabdus farrani*, *H. pustulifer*, *H. austrinus*, *Metridia gerlachei*, and *Candacia maxima*) are probably carried north in Antarctic Intermediate Water. Species with Antarctic distributions (*Euaugaptilus antarcticus*, and *E. perasetosus*) probably have deeper distributions in Antarctic waters than those with Antarctic-subantarctic distributions such that

they are returned to Antarctic waters in the Deep Warm Current. *Pleuromamma quadrangulata* has an unusual distribution for a mesopelagic species in that it appears to be confined to the southern hemisphere even though it has been taken as far north as the equator (Steuer 1932).

Among the species distributed across both hemispheres and in all oceans and which are classified here as "mesopelagic" or "bathypelagic", are species with a number of apparently different latitudinal distributions. Many of these apparent differences are probably due to lack of data. Nevertheless there are a few widely recorded species (e.g., *Euaugaptilus laticeps*) whose large latitudinal distribution suggests that they are probably found over a wide bathymetric range so they are able to maintain distributions which range from the Antarctic to the northern hemisphere. The bathymetric classification of species recorded here must be seen as provisional until more extensive plankton collections are made in the South Pacific at bathypelagic depths and beyond.

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