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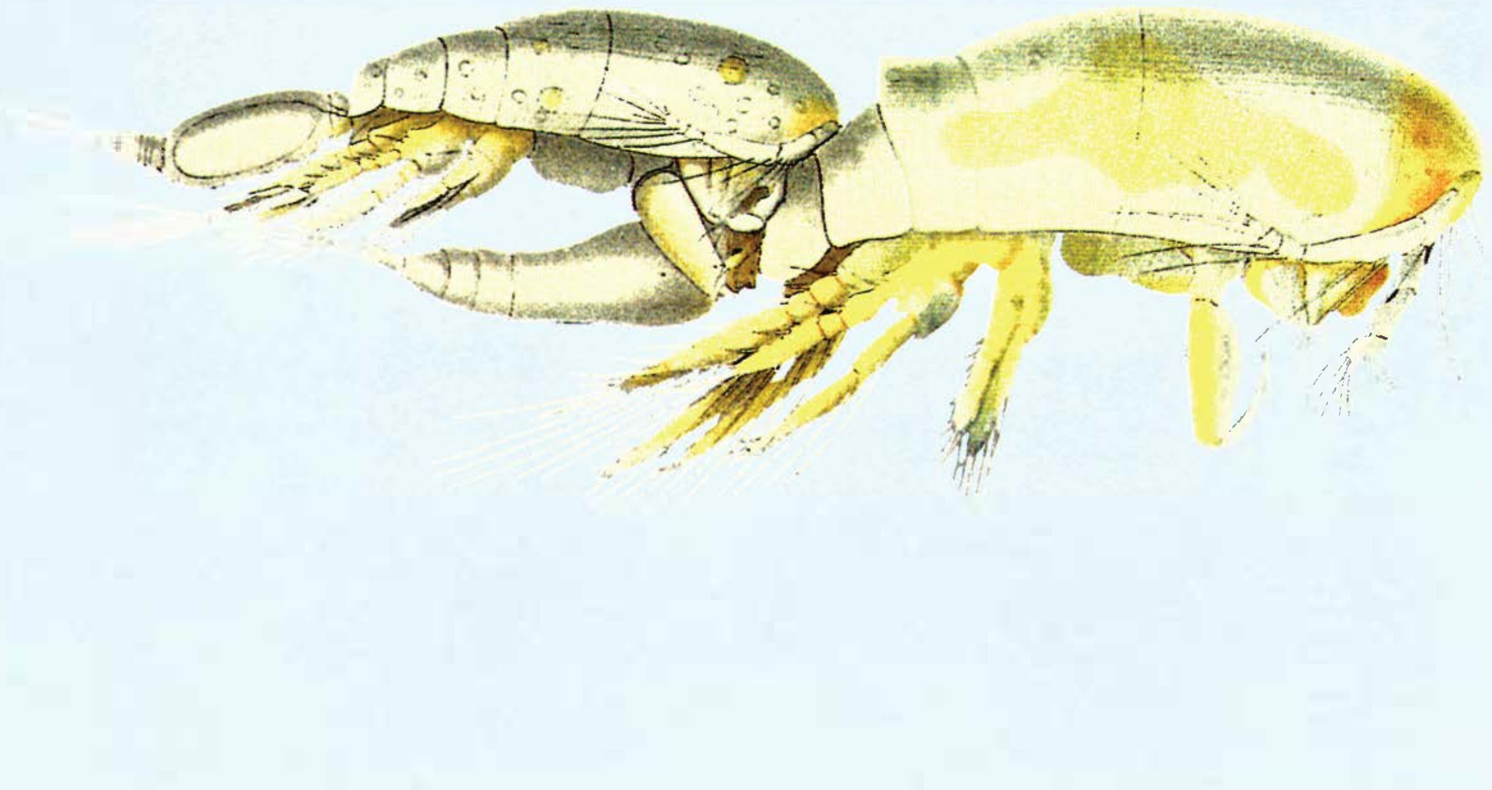

The Marine Fauna of New Zealand:

Pelagic Copepoda: Poecilostomatoida : Oncaeidae

Gayle A. Heron and Janet M. Bradford-Grieve

New Zealand Oceanographic Institute Memoir 104

COVER PHOTO: *Oncaea conifera* Giesbrecht, 1891 reproduced from Giesbrecht (1892).

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The Marine Fauna of New Zealand : Pelagic Copepoda : Poecilostomatoida : Oncaeidae

by

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ABSTRACT

Eighteen oncaeid species (2 *Lubbockia*, 15 *Oncaea* (4 new), 1 *Conaea*) are recorded from the Southwest Pacific Ocean. These are based on specimens collected from New Zealand waters, the Ross Sea (Antarctica), Gulf of Naples, and the Northeast Pacific. Six of the Southwest Pacific Oncaeidae species also occurred in the Gulf of Naples sample, and three of the Southwest Pacific species were found in 15 samples from the Northeast Pacific. Seven of the Southwest Pacific *Oncaea* species with a prosomal dorsoposterior projection included *O. conifera* Giesbrecht, 1891, *O. furcula* Farran, 1936 (here raised to specific status) and three new species (*O. derivata, O. quadrata*, and *O. redacta*). *Oncaea media* Giesbrecht, 1891, plus a new sibling species (*O. scottodicarloi*), occurred near New Zealand as well as in the Gulf of Naples sample. Males of two species (*O. curvata* and *O. prolata*) are described. One small (0.42 mm) female copepod, *O. lacinia* Heron, English & Damkaer, 1984, from the most southerly Southwest Pacific station, is the most abundant oncaeid species known from the Arctic Ocean. A new combination, *Conaea expressa* (Gordejeva, 1973), is made although this species has not been taken in the Southwest Pacific.

Keywords: Copepoda, Poecilostomatoida, Oncaeidae, *Lubbockia, Oncaea, Conaea,* distribution, taxonomy, New Zealand, Gulf of Naples, Northeast Pacific, Ross Sea, marine fauna

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INTRODUCTION

Eighteen species of Oncaeidae were distinguished in 48 samples from New Zealand waters (Fig. 1, Tables 1, 2). Comparisons of these species were made with Oncaeidae from the Gulf of Naples (Italy), the Northeast Pacific, and several other localities (Tables 3, 4). Fifteen of these species, four of them new, belong to the genus *Oncaea*.

Oncaea includes numerous species, many with few conspicuous distinguishing characteristics, and a number of incorrectly identified *Oncaea* species, have accordingly appeared in the literature. When misidentifications are made and repeated, the problems for diagnosis of morphologically similar *Oncaea* species are compounded. Usually a combination of characters must be considered in order to identify many species of this genus. In addition, some investigators have named new species without sufficient distinguishing characters. Unless a published record of a species has included figures and a description that positively identifies that species, it has not been included in the summary of records. We have observed at least 16 undescribed species from other areas that are similar to eight of the species discussed in this study, signifying the possibilities for misidentified species.

Seven *Oncaea* species in the New Zealand region have a dorsoposterior projection on the third prosomal segment of the female in lateral view. This is the character usually assumed to indicate *O. conifera* Giesbrecht, l891. Comparisons were made with specimens collected from the Gulf of Naples, and it was determined that two of the seven New Zealand species with a dorsal projection, *O. conifera* and *O. furcula* Farran, 1936, also occurred near Naples. At least 12 undescribed species of *Oncaea*, which have leg 4 endopod with a terminal conical process and female prosome with a dorsal projection in lateral view, were observed in samples collected from the Panama Basin, Gulf of Mexico, Northeast Pacific, and near Liberia. Descriptions of these species will be forthcoming.

Many *Oncaea* are smaller than 0.50 mm; *O. minima* Schmeleva, 1968 is as small as 0.18 mm. Therefore Southwest Pacific Oncaeidae will not have been completely sampled in this collection as net meshes used would not have retained smaller species. Generally, distributions of Oncaeidae are considered to be poorly known (*see* e.g., Boxshall & Böttger 1987). There is some evidence that "planktonic" poecilostome copepods, including the Oncaeidae, may not be truly planktonic (Sars 1918; Heron & Damkaer 1978; Boxshall 1981). *Oncaea* essentially has a benthic mode of feeding (Boxshall 1981). *Oncaea mediterranea* was observed grazing on appendicularian houses by Alldredge (1972), who noted individuals of *O. mediterranea* feeding on abandoned houses of *Megalocerus abyssorum*, preferring the inner particle-collecting apparatus which contains smaller particles than the outer incurrent filters. *Oncaea mediterranea* has also been observed on the mucous feeding web of the pteropod *Gleba cordata* (Boxshall 1981). *Oncaea venusta* has been recorded among hydroid colonies although apparently as an accidental associate (Ho 1984), and Turner (1986) found that this species is omnivorous and appears to select larger-sized phytoplankton species even when they were not the most abundant; the presence of very small centric diatoms is thought to be evidence of grazing on other zooplankters. *Oncaea curvata* has been recorded as a temporary inhabitant of sea ice (Hoshiai & Tanimura 1986), and *O. praeclara* was described from sediment samples taken in the vicinity of deep-sea hydrothermal vents in the eastern Pacific Ocean (Humes 1988).

METHODS

Measurements were made of the total length (TL) of studied specimens, but in many instances where the urosome was flexed the measurement of the prosome (PRO) was considered to be more relevant for consistent comparisons. Several species, especially those with a thin exoskeleton, appeared to be vulnerable to losing one or both caudal rami.

Figures were drawn with the aid of a Wild M20 drawing tube. A letter after the explanation of each figure indicates the 0.05 mm scale (*see* Fig. 2) at which the figure is shown.

Species of Oncaeidae have a number of pores on dorsal and lateral surfaces, but only those conspicuous with a light microscope were figured.

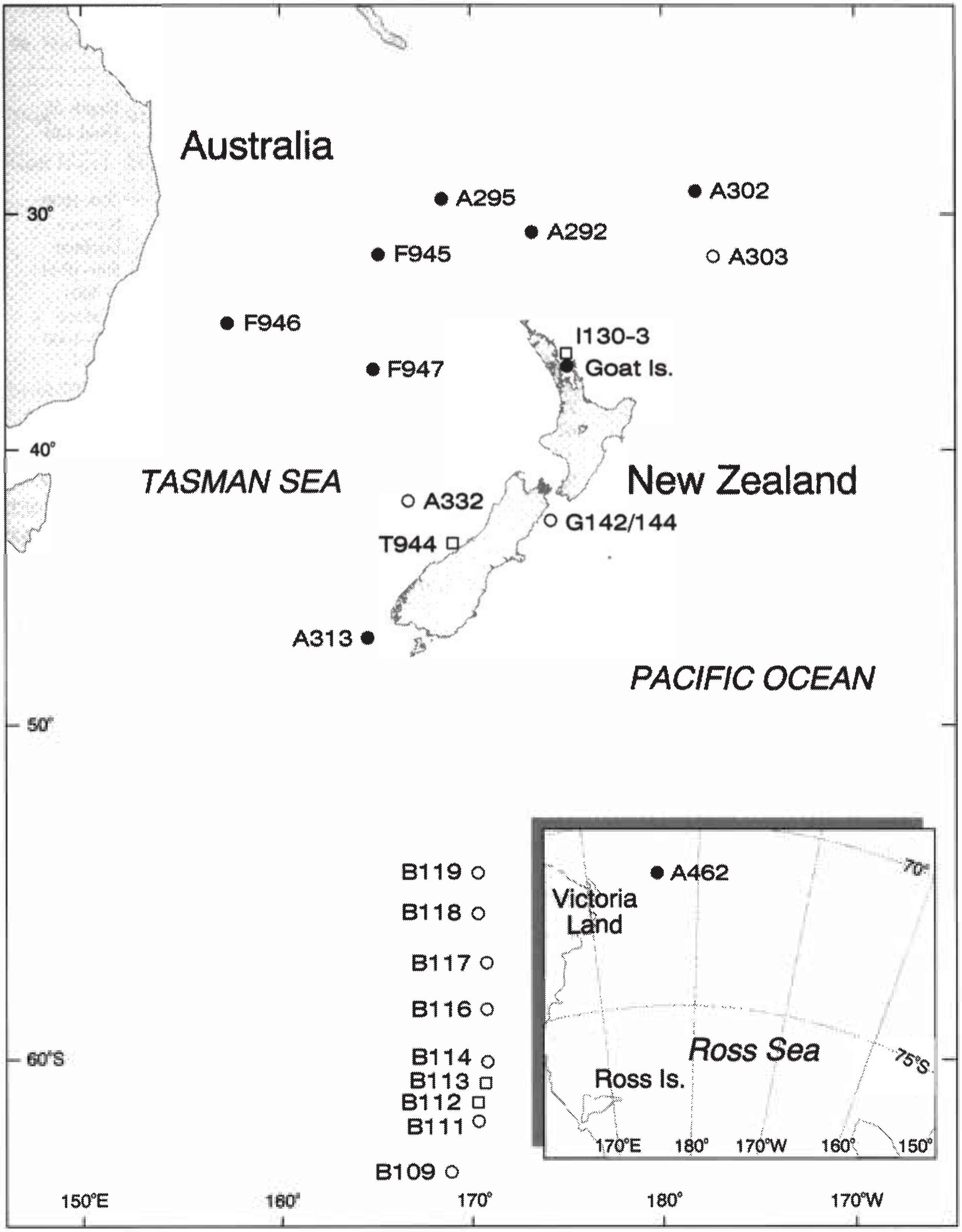


Fig. 1. Map of the Southwest Pacific Ocean (including the Ross Sea) indicating the position of stations from which specimens were collected, with the maximum sampling depth indicated: □ = 0–125 m; ■ = 126–250 m; o = 251–500 m; ● = > 500 m.

Table 1. New Zealand Oceanographic Institute station data

Stn No.	Date	Time	Latitude (° S)	Longitude	Gear (see Table 2)	Depth of Haul (m)
A292	5.6.56	1530	30 45'	173 16'E	N70	500–1000
		1050–1150			L50	Surface
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
A313	17.8.56	0245–0606	46 46'	164 35'E	N70	0–914
A332	1/2.2.57	2300–0225	41 41'	167 03'E	N70	Surface
A462	20.1.59	0320	71 15'	176 30'E	N70	0–1000
B109	1.12.58	1500	62 37'	169 51'E	N15	0–125
		1515			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			N15	0–500
B117	4.12.58	0330	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
F945	22.10.68	1458–1505	31 19.5'	165 19'E	N70	0–200
		1538–1555				0–500
		1645–1700				500–1000
F946	2/3.11.68	2308–2315	34 32.5'	157 31.5'E	N70	0–200
		2335–2344				200–500
		0025–0100				0–1000
F947	5.11.68	1350–1355	36 18.5'	165 05.5'E	N70	0–200
		1446–1500				0–500
		1529–1540				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
		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
I130	12.8.75	0905	35 52'	174 30'E	Bilge pump	0–6
I133	12.8.75	1112	35 52'	174 30'E	Bilge pump	0–6

Stn No.	Date	Time	Latitude (° S)	Longitude	Gear (see Table 2)	Depth of Haul (m)
T944	30.7.88	0905	42 59.9'	169 45.3'E	Pump	140
Goat Island	28.8.85		36 17'	179 49'E	WP2	Vertical

Table 2. Details of gear used at stations

Symbol	Net	Closing	Mesh (µm)	Diam. (m)	Source
N70	Discovery N70 Net	yes	240	0.7	Kemp & Hardy (1953)
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)
Pump	Plankton Pump (hose on output side)	-	60	-	Miller & Judkins (1981)
Bilge pump	Small submersible bilge pump with *in situ* net	-	165	0.1	-
WP2	Working Party 2 Net	no	100	0.57	Heron (1982)

Table 3. Sources of non-New Zealand oncaeid specimens

Sample No.	Latitude	Longitude (°W)	Programme/Station/ Vessel	Date	Depth (m)
1	13 13'N	127 06'	Tethys 7, RV *Baird*	23 June 1960	1470 oblique
2	1 45'S	133 44'	Tethys 12, RV *Baird*	29 June 1960	1470 oblique
3	43 20'N	139 06'	*Oshawa* 6	22 Oct. 1964	4220–0
4	47 33.5'N	126 48.5'	*Brown Bear* 344–4	19 May 1964	1800–0
5	47 33.8'N	128 22.7	*Brown Bear* 344–5	20 May 1964	2128–0
6	45 17'N	141 48'	*Brown Bear* 344–25	30 May 1964	4500–0
7	45 29.3'N	126 58'	*Brown Bear* 344–35	4 June 1964	2750–0
8	45 13'N	136 04'	*Brown Bear* 352–16	22 Jan. 1965	4150–0
9	45 27'N	126 33'	*Brown Bear* 352–21	26 Jan. 1965	2750–0
10	7 25'N	15 00'	*Geronimo*	18 Feb. 1965	20–0
11	45 22'N	128 36'	*Brown Bear* 368–20	10 Aug. 1965	2700–0
12	47 47.6'N	135 34.7'	*Brown Bear* 368–36	18 Aug. 1965	3700–0

Sample No.	Latitude	Longitude (°W)	Programme/Station/ Vessel	Date	Depth (m)
13	45 32'N	139 48'	*Brown Bear* 380–13	10 Nov. 1965	4650–0
14	29 44.9'N	76 50.8'	RV *Gosnold* 74	21 Aug. 1965	0–2000
15	Gulf of Naples, Italy		B. Scotto di Carlo	1 Feb. 1967	100–0
16	49 56'N	144 54'	*Thompson* TT091	20 July 1974	480–420
17	38 04'N	124 05'	EPA / ERL	6 April 1977	180–110
18	30 08'N	124 32'	EPA / ERL	6 April 1977	230–100
19	2 32.0'S	84 00'	*Thompson* TT199	10 June 1986	100–0
20	4 26'N	84 59.1'	*Thompson* TT199	21 June 1986	100–0
21	Bermuda vicinity		M.J. Dagg	11 July 1991	250–150
22	28 29.81'N	89 39.05'	M.J. Dagg	11 April 1993	300–0

Table 4. Sources of non-New Zealand Oncaeidae by sample number from Table 3.

Sample No.	*Oncaea conifera*	*Oncaea furcula*	*Oncaea derivata*	*Oncaea redacta*	*Oncaea mediter-ranea*	*Oncaea venusta*	*Oncaea media*	*Oncaea scotto-dicarloi*	*Oncaea englishi*	*Conaea rapax*
	F–M	F–M	F–M	F–M	F–M	F–M	F–M	F–M	F–M	F–M
1			2–0			3–0				1–0
2			1–0		1–0					1–1
3				2–0					2–3	1–2
4				1–0					3–4	
5				2–0					7–7	0–2
6				1–1					16–10	
7				3–1					2–8	1–1
8				1–0					4–1	
9				3–0					2–1	
10			1–0			1–0				
11				1–0					8–10	
12				3–0					8–8	
13				1–0					1–3	6–1
14			3–0			1–0	3–1	1–2		
15	16–15	1–2			7–7	5–3	125–1	125–4		
16				5–0						
17									1–0	1–0
18										1–1
19			3–0				15–0	15–0		
20			2–0			1–0	15–0	15–0		
21	5–0	3–0			4–0	1–0		6–0		
22					1–0					

Swimming legs are illustrated in posterior view. In the spinal and setal formulae, Roman numerals indicate spines and Arabic numerals setae. All *Oncaea* species have a terminal conical process on endopods of legs 2 and 3, and also on leg 4 in some species. The size of these processes varies slightly among specimens within a species, although the relative size and position of the spines remain constant. These processes support a terminal pore from which an unidentified substance occasionally extrudes.

The free margin of the labrum was drawn after dissection; consequently, it is in a more flattened position than *in situ*.

Males of most of the *Oncaea* species we have studied are difficult to distinguish. A number of morphological characters must be considered, including size, lateral and dorsal profiles, and comparisons of the shapes of the conical processes and terminal spines on the endopods of legs 2–4 of the male to those of the related female. The general pattern of the very small pores, figured on males in lateral view posterolaterally on the first prosomal seg-ment, may be used to assist in preliminary separation of several of the species, when pores are present. Often they are difficult, sometimes impossible, to discern, and the two sides may vary.

SYSTEMATICS

Family **ONCAEIDAE** Giesbrecht, 1892

Prosome and urosome divisions well defined, the latter generally slender. Prosome and urosome of female 5-segmented; urosome of male 6-segmented. Prosome elongate to elongate-oval, or cyclopiform. First antenna short, with reduced number of segments. Second antenna 3-segmented, subprehensile to prehensile. Labrum medially incised. Mandible complex, with 3–5 subterminal elements. First maxilla small, bilobed. Maxilliped a well-developed claw in both sexes. Legs 1–4, exopods and endopods essentially 3-segmented. Leg 5 a single free segment or represented by 1–3 setae. (Heron & Damkaer 1978)

Remarks: Heron and Damkaer (1978) exclude *Pachos* Stebbing, 1910 (= *Pachysoma* Claus, 1863) from the Oncaeidae on the basis of the form of the first antenna and the oral appendages. Krämer (1895) described the genus *Onceola* which he placed in the Oncaeidae. The 4-segmented second antenna, the maxilliped apparently without a terminal claw, and the 2-segmented leg 4 endopod separate *Onceola* from the Oncaeidae. There are some similarities between *Onceola* and some Lichmolgidae (*see* Humes & Stock 1973). Boxshall (1977) described a new genus, *Paralubbockia*, in the Oncaeidae, that was later placed in a new family Paralubbockiidae by Boxshall and Huys (1989).

Key to the Genera
(Heron & Damkaer 1978):

1. Legs 1–4 with inner coxal seta 2
- Legs 1–4 without inner coxal seta 3

2. Mandible with narrow serrate tip; leg 5 a free segment armed with 4 elements . . . . *Pseudolubbockia*
- Mandible terminating in a lash or lashed element; leg 5 absent (1 species) or an elongate free segment armed with 2 elements . . . . *Lubbockia*

3. Caudal rami with conspicuous expansion on dorsal surface, surrounding insertion of dorsal seta 4
- Caudal rami without expansion on dorsal surface . . . . *Oncaea*

4. Legs 1–3 exopod segment 3 with II, III, III outer spines . . . . *Epicalymma*
- Legs 1–3 exopod segment 3 with III, II, II outer spines . . . . *Conaea*

Pseudolubbockia Sars, 1909

Differs from *Lubbockia* by the more robust body which is swollen anteriorly and regularly narrows posteriorly, by the different structure of the first antenna which is longer, composed of 6 well-defined segments (the third is extremely small and the fourth is very long, occupying almost half the length of the antenna), by the relatively weak development of the maxillipeds, and by the form of the armament of leg 5 each of which is spread laterally and is composed of a single lamelliform segment, obliquely truncated distally and bearing 4 equal, slender spines.

(Sars 1909)

TYPE SPECIES: *Pseudolubbockia dilatata* Sars, 1909

REMARKS: This genus is monotypic (*P. dilatata* Sars, 1909; male *see* Heron & Damkaer 1969) and has not been taken in the Southwest Pacific.

Lubbockia Claus, 1863

Prosome elongate to elongate-oval; urosome slender. First antenna 7-segmented, with 1 or more incomplete sutures on female, the third segment with 2 spines; at least 3 terminal segments always fused on male. Second antenna with elongate third segment; female armature formula: 0, 1, 3 (sub-apical) + 3 (terminal) + 3 or 4 terminal claws. Mandible blade with scale-like denticles on median edge and terminating in a lash; 1 inner and 2 dorsal elements. First maxilla bilobed, lobes with 2, 3 or 3, 3 elements. Second maxilla with short setule and 3 (1 bifurcate) or 4 ornamented elements. Oral appendages of male degenerate in some species, maxilliped usually dimorphic. Generic pattern of armature of legs 1–4 is as follows with a numeral representing a constant value and an * indicating a variable count.

	Leg	1	2	3	4
Coxa	Si	1	1	1	1
Basis	Si	*	0	0	0
	Se	1	1	1	1
Endopod					
segment 1	Si	1	1	1	1
segment 2	Si	1	2	2	2
segment 3	Si	4	3	*	*
	St	I	II	II	II
	Se	I	I	I	I
Exopod					
segment 1	Se	I	I	I	I
segment 2	Si	1	1	1	1
	Se	I	I	I	I
segment 3	Si	4	5	5	5
	St	I	I	I	I
	Se	*	*	II	II

Si = inner border; Se = outer border; St = terminal border; 1–5 = setae; I–III = spines.

All species, except *Lubbockia flemingi*, with a hyaline papilla partially covering vent on outer edge of leg 1 coxa. *Lubbockia*, as well as *Oncaea*, species usually with small or conspicuous conical projections between 2 terminal spines on the endopods of legs 2 and 3, and sometimes of leg 4. These terminal projections appear to support a vent, which is present even when the projection is lacking. Often a vent is also on the inner distal corner of basis of each swimming leg. Leg 5 a free segment bearing 2 terminal elements, or leg 5 absent and represented by 1 lateral seta. (Heron & Damkaer 1978)

TYPE SPECIES: *Lubbockia squillimana* Claus, 1863

REMARKS: This genus contains the following species: *L. aculeata* Giesbrecht, 1891; *L. brevis* Farran, 1908 (male *see* Heron, English & Damkaer 1984); *L. carinata* Heron & Damkaer, 1978; *L. extenuata* Boxshall, 1977; *L. flemingi* Heron & Damkaer, 1978; *L. forcipula* Heron & Damkaer, 1978 (male unknown); *L. glacialis* Sars, 1900 (male *see* Heron, English & Damkaer, 1984); *L. minuta* Wolfenden, 1905 (male *see* Heron & Damkaer 1969 as *L. glacialis*); *L. petersoni* Heron & Damkaer, 1978; *L. squillimana* Claus, 1863; *L. wilsonae* Heron & Damkaer, 1969 (male *see* Heron & Damkaer 1978). Two of these species of *Lubbockia* were collected at the more northerly stations near New Zealand.

Lubbockia aculeata Giesbrecht, 1891 (Figs 2a, 25a)

Lubbockia aculeata Giesbrecht, 1891: 477; 1892: 606–611, pl. 48, figs 3, 9, 11, 13, 16, 20; Boxshall 1977: 110–114, figs 4a-g, 5a-f; Heron & Damkaer 1978: 15–18, figs 10–11.

MATERIAL EXAMINED: 1 stage V – TL 1.72 mm, PRO 1.00 mm; 1 female – TL 2.21 mm, PRO 1.18 mm.

REMARKS: *Lubbockia aculeata* females may be distinguished from those of *L. squillimana* by the larger size, the elongated lateroposterior corner of the prosomal fifth segment, the tooth on the basal segment of the maxilliped, and by the spines on leg 5 not extending beyond the posterior edge of the genital segment.

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	hr	Depth of Haul (m)	Specimens
A302		0–500	1 stage V
G144	2400	250–500	1 female

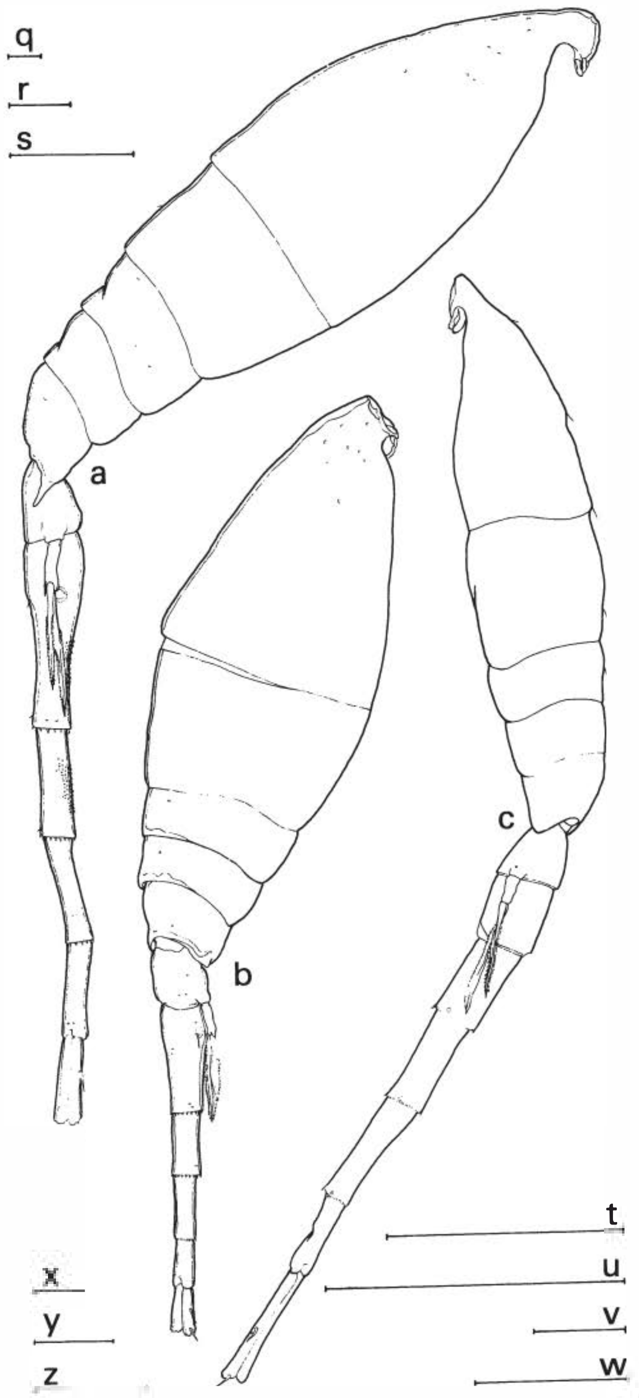


Fig. 2. ***Lubbockia aculeata*** **Giesbrecht.** Female: a, lateral (q). ***Lubbockia squillimana*** **Claus.** Female: b, lateral (q); male: c, lateral (q). (The scales here apply to all subsequent figures; all scales = 0.05 mm.)

DISTRIBUTION: *Lubbockia aculeata* has a predominantly tropical distribution (Heron & Damkaer 1978).

Lubbockia squillimana Claus, 1863
(Figs 2b,c, 25a)

Lubbockia squillimana Claus, 1863: 164, 165, pl. 25, figs 1–5; Giesbrecht 1892: 606–611, pl. 4, fig. 6, pl. 48, figs 1, 2, 4–8, 17–19, 21; Mori 1937: 121, 122, pl. 67, figs 1–9; Boxshall 1977: 115, fig. 6a-g; Heron & Damkaer 1978: 18, 19, fig. 12a-f.
Lubbockia minuta Marukawa, 1927: 1237, fig. 2384. (Not *L. minuta* Wolfenden, 1905.)
Lubbockia marukawai Mori, 1937: 122, 123, pl. 67, figs 10–13.

MATERIAL EXAMINED: 1 female – TL 1.52 mm, PRO 0.93 mm; 1 male – TL 1.87 mm, PRO 0.89 mm.

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	Depth of Haul (m)	Specimens
A295	0–500	1 female
A302	0–500	1 female

DISTRIBUTION: *Lubbockia squillimana*, like *L. aculeata*, has a predominantly tropical distribution (Heron & Damkaer 1978).

Oncaea Philippi, 1843

Body cyclopiform. Three-segmented second antenna with terminal segment length shorter than that of first segment. Legs 1–4 with long lancet-shaped spines; exopod outer-spine formula III, III, II, II; endopods of legs 2, 3, and 4 of some species terminated with a conical process between two apical spines. Leg 5 small, rod- or knob-shaped, free or unsegmented, with 2 setae and a lateral seta or 1 seta, 1 spinule, and a lateral seta. (Heron 1977)

TYPE SPECIES: *Oncaea venusta* Philippi, 1843

REMARKS: This genus contains the following species: *O. africana* Shmeleva, 1979 (male unknown); *O. alboranica* Shmeleva, 1979 (male unknown); *O. antarctica* Heron, 1977; *O. atlantica* Shmeleva, 1967 (*see* also Boxshall & Böttger 1987); *O. bathyalis* Shmeleva, 1968; *O. borealis* Sars, 1918; *O. bowmani* Heron, 1977 (male unknown); *O. brocha* Heron, 1977; *O. brodskii* Shmeleva, 1968; *O. clevei* Früchtl, 1923 (male *see* Tanaka 1960); *O. compacta* Heron, 1977 (male *see* Heron, English & Damkaer 1984); *O. conifera* Giesbrecht, 1891; *O. convexa* Heron, 1977 (male unknown); *O. curta* Sars, 1916; *O. curvata* Giesbrecht, 1902 (male, *see* this volume); *O. damkaeri* Heron, 1977; *O. delicata* Heron, English & Damkaer, 1984; *O. dentipes* Giesbrecht, 1891; *O. englishi* Heron, 1977; *O. furnestini* Shmeleva, 1979 (male unknown); *O. hawii* Böttger-Schnack & Boxshall, 1990 (male unknown); *O. illgi* Heron, 1977; *O. infantula* Gordejeva, 1972; *O. inflexa* Heron, 1977; *O. ivlevi* Shmeleva, 1966; *O. lacinia* Heron, English & Damkaer, 1984; *O. latimana* Gordejeva, 1975a; *O. longiseta* Shmeleva, 1968; *O. longipes* Shmeleva, 1968 (male *see* Shmeleva 1979); *O. macilenta* Heron, 1977 (male unknown); *O. media* Giesbrecht, 1891; *O. mediterranea* (Claus, 1863); *O. memorata* Gordejeva, 1973 (male *see* Gordejeva 1975b); *O. minima* Shmeleva, 1968 (male *see* Krsiníc & Malt 1985); *O. minor* Shmeleva, 1979 (female unknown); *O. minuta* Giesbrecht, 1892; *O. mollicula* Gordejeva, 1975b; *O. neobscura* Razouls, 1969 (stage V, *see* Malt 1982b); *O. notopus* Giesbrecht, 1891 (male unknown); *O. obscura* Farran, 1908 (stage V, *see* Malt 1982b); *O. oceanica* Gordejeva, 1972; *O. olsoni* Heron, 1977; *O. ornata* Giesbrecht, 1891 (male *see* Boxshall 1977?); *O. ovalis* Shmeleva, 1966; *O. parila* Heron, 1977 (male *see* Heron, English & Damkaer 1984); *O. parobscura* Shmeleva, 1979 (stage V, *see* Malt 1982b); *O. petila* Heron, 1977 (male unknown); *O. platysetosa* Boxshall & Böttger, 1987 (male unknown); *O. praeclara* Humes, 1988; *O. prendeli* Shmeleva, 1966; *O. prolata* Heron, 1977 (male, *see* this volume); *O. pumilis* Heron, 1977 (male *see* Heron, English & Damkaer 1984); *O. rotunda* Heron, 1977; *O. rotundata* Boxshall, 1977 (male *see* Malt 1983a); *O. rufa* Boxshall & Böttger, 1987 (male unknown); *O. shmelevi* Gordejeva, 1972; *O. setosa* Heron, 1977 (male unknown); *O. similis* Sars, 1918 (male *see* Malt, Lakkis & Ziedane 1989); *O. subtilis* Giesbrecht, 1892 (male *see* Gallo 1976); *O. tenella* Sars, 1916; *O. tenuimana* Giesbrecht, 1891 (male *see* Shmeleva 1979); *O. tregoubovi* Shmeleva, 1968; *O. umerus* Böttger-Schnack & Boxshall, 1990 (male unknown); *O. venusta* Philippi, 1843; *O. vodjanitskii* Shmeleva & Delalo, 1965; *O. walleni* Heron, 1977 (male unknown); *O. zernovi* Shmeleva, 1966 (male *see* Krsiníc 1988).

It should be noted that the species published by Shmeleva (1969) had been published previously in Russian journals. We have examined slides of the holotype and a paratype of *O. heronae* Malt, 1982b, and found that the pattern of the exopod spines was irregular or possibly abnormal; leg 2 and left exopod pattern of the holotype differed from each other and from that of the paratype. We agree with Malt that the species shows similarities to *O. brodskii* and *O. longipes* (legs 3 and 4 single terminal spine, maxilliped ornamentation); therefore we believe that all three species belong to a genus other than *Oncaea*. In fact, a number of the *Oncaea* species listed above should probably be assigned to at least three new genera, but only after the species in question have been re-examined from fresh material, a task we are not yet ready to carry out. In the New Zealand samples, 15 species of *Oncaea* were identified, four of them undescribed; most showed rather distinct patterns of distribution.

Key to species of *Oncaea* females from New Zealand waters

1. In lateral view, prosome with conspicuous dorsoposterior projection; leg 4 endopod with conical process between terminal and subterminal spines 2
- In lateral view, prosome without dorsoposterior projection 8

2. Length of caudal ramus greater than anal segment length 3
- Length of caudal ramus scarcely as long or shorter than anal segment length 4

3. Leg 5 length about equals width; leg 4 endopod with terminal spine longer than subterminal spine . . . . *O. antarctica*
- Leg 5 length almost three times width; leg 4 endopod with terminal spine scarcely as long as subterminal spine . . . . *O. inflexa*

4. Genital segment length at least one third longer than remainder of urosome 5
- Genital segment less than one third longer than remainder of urosome 6

5. Leg 5 lateral seta longer than inner seta; in lateral view, prosome with sclerotised ridge near apex . . . . *O. furcula*
- Leg 5 lateral seta shorter than inner seta; in lateral view, prosome without ridge near apex . . . . *O. derivata*, n. sp.

6. Prosome third segment dorsoposterior margin with small protrusion, lateral view; leg 2 third endopod inner-spine length about twice that of conical process . . . . *O. redacta*, n. sp.
- Prosome third segment dorsoposterior margin with conspicuous protrusion, lateral view; leg 2 third endopod inner spine length scarcely equaling that of conical process 7

7. In lateral view, posterior corner of prosome

rounded, posterior third of genital segment dorsal margin tapered; leg 3 second exopod spine scarcely as long as third exopod proximal spine . . . . *O. conifera*
- In lateral view, posterior corner of prosome jagged, genital segment squarish; leg 3 second exopod spine reaching farther than base of third exopod proximal spine . . . . *O. quadrata* n. sp.

8. Leg 4 third endopod with 2 spines *O. englishi*
- Leg 4 third endopod with 3 spines 9

9. Leg 5 not delimited from first urosomal segment 10
- Leg 5 delimited from first urosomal segment 11

10. Genital segment length less than remainder of urosome . . . . *O. curvata*
- Genital segment length greater than remainder of urosome . . . . *O. lacinia*

11. Anal segment length approximately equal to sum of 2 preceding segments . . . *O. mediterranea*
- Anal segment length less than sum of 2 preceding segments 12

12. Genital segment length about double that of remainder of urosome . . . . *O. media*
- Genital segment length less than double that of remainder of urosome 13

13. Leg 4 third endopod terminal spine more than twice length of subterminal spine . . . . *O. scottodicarloi* n. sp.
- Leg 4 third endopod terminal spine less than twice length of subterminal spine 14

14. Caudal ramus length at least equal to that of 2 preceding segments . . . . *O. venusta*
- Caudal ramus length less than that of 2 preceding segments . . . . *O. prolata*

Oncaea antarctica Heron, 1977 (Figs 3a-d, 25b)

Oncaea antarctica Heron, 1977: 42–45, figs 2a-i, 3a-f, 4a-f.
Oncaea conifera, Tanaka, 1960: 66, 67, pl. 29, figs 1–8; Bradford 1971: 28.

REMARKS: *Oncaea antarctica* was one of the most abundant species during this study; the largest number was collected in the southernmost sample. Mean lengths: 10 females – TL 1.21 mm (1.15–1.26 mm), PRO 0.82 mm (0.78–0.85 mm); 5 males – TL 0.61 mm (0.59–0.63 mm), PRO 0.42 mm (0.41–0.44 mm). *Oncaea antarctica* also was the most abundant species in a study of five samples collected from the Southwest Pacific-Antarctic area (Heron 1977).

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	Depth of Haul (m)	Specimens
A462	0–1000	7 females
B109	0–125	106 females, 29 males
	0–500	21 females, 12 males
B111	0–500	4 females, 1 male
B112	0–125	4 females
	0–500	11 females, 1 male
B113	0–500	8 females, 1 male
B114	0–125	5 females
	0–500	8 females, 1 male
B117	0–500	14 females
B118	0–125	1 female
F946	200–500	1 male

DISTRIBUTION: Southwest Antarctic-Pacific (Bradford 1971 (as *O. conifera*, in part?: 0–1300, 0–1000, 0–700, 0–1000 m; Heron 1977: 1000–2000, 0–1000, 0–500 m), Southeast Antarctic-Indian Ocean (Tanaka 1960: 0–50, 0–200, 0–250, 0–400 m), and in the present study southern subantarctic/antarctic zone of the Southwest Pacific: 0–125, 0–500 m.

Oncaea inflexa Heron, 1977 (Figs 3e-h, 26a)

Oncaea inflexa Heron, 1977: 45–47, figs 4g-i, 5a-g, 6a-e, 7a-c.

REMARKS: *Oncaea inflexa* was the species with the highest number of specimens in one sample, with 166 females and 15 males (G142, 2400h, 250–500 m). Mean lengths: 14 females – TL 1.31 mm (1.26–1.37 mm), PRO 0.89 mm (0.81–0.94 mm); 7 males – TL 1.01 mm (0.98–1.06 mm), PRO 0.71 mm (0.69–0.74 mm). In the 1977 Southwest Pacific-Antarctic study, *O. inflexa* occurred only in the two samples collected from north of the Antarctic Convergence Zone, with most specimens in the deep sample.

NEW SOUTHWEST PACIFIC RECORDS:

Station No. hr	Depth of Haul (m)	Specimens
A313	0–914	9 females
B109	0–125	1 female
B112	0–500	2 females
B113	0–500	8 females, 1 male

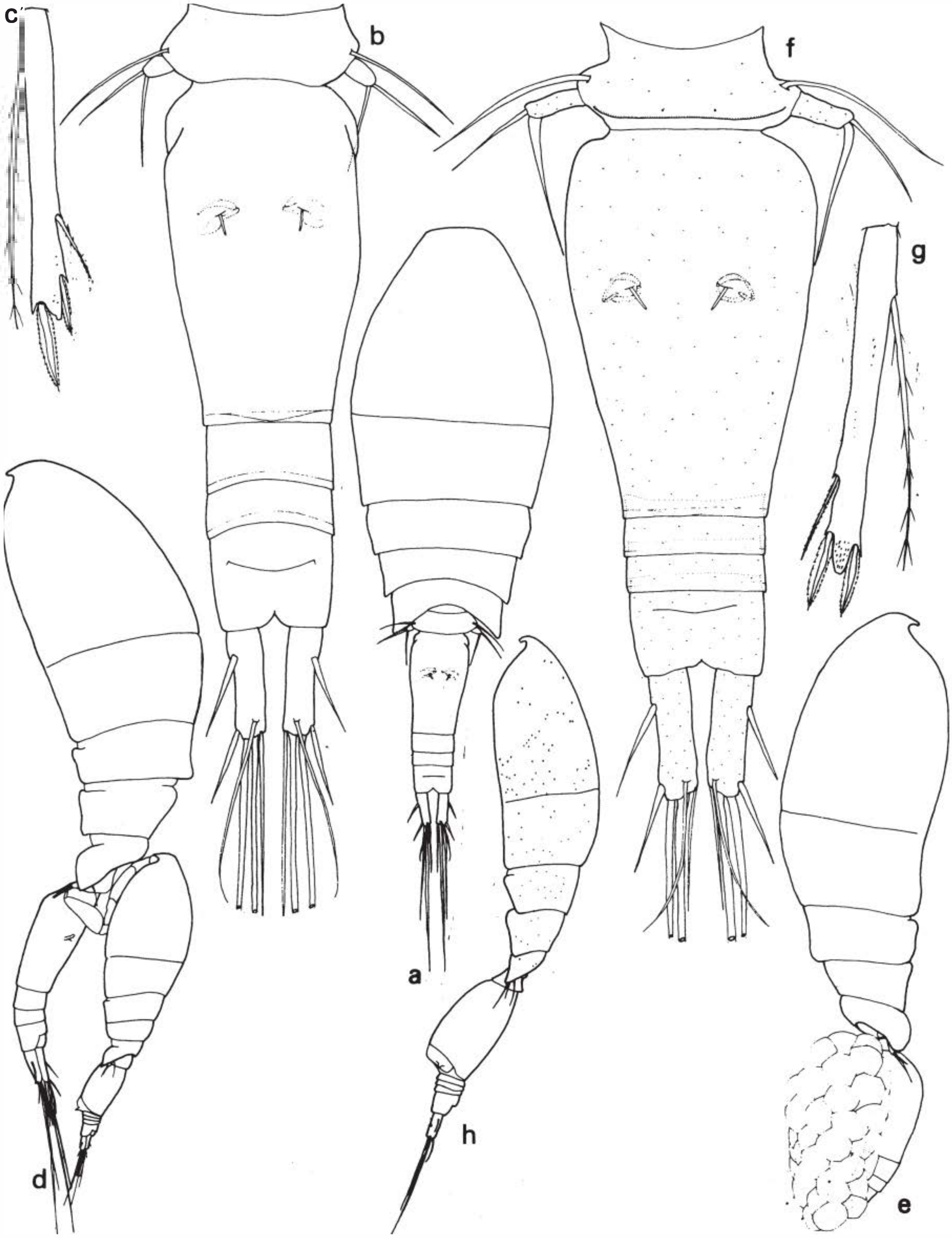


Fig. 3. ***Oncaea antarctica*** **Heron.** Female: a, dorsal; b, urosome, dorsal; c, endopod of leg 4. Female and male: d, lateral. ***Oncaea inflexa*** **Heron.** Female: e, lateral; f, urosome, dorsal; g, endopod of leg 4. Male: h, lateral. (From Heron l977, figs 2a,c, 3f, 4b,g,h, 6c,e.)

B114		0–125	2 females
		0–500	5 females, 1 male
B116		0–125	1 female
B117		0–500	11 females, 5 males
B118		0–125	1 female
		0–500	11 females, 3 males
B119		0–500	9 females, 2 males
G142	0600	250–500	17 females, 12 males
	1200	250–500	3 females, 2 males
	2400	100–250	8 females, 5 males
	2400	250–500	166 females, 15 males
G144	1800	100–250	2 females
	1800	250–500	2 females

Distribution: Southwest Pacific-Subantarctic (Heron 1977: 0–500, 0–1000 m), and in the present study in subantarctic water from the Subtropical Convergence to the Antarctic Convergence: 0–125, 100–250, 0–500, 250–500, 0–914 m).

Oncaea conifera Giesbrecht, 1891

(Figs 4a-l, 5a-h, 25b)

Oncaea conifera Giesbrecht, 1891: 477; 1892: 591–603, 755, 756, 774, 789, pl. 2, fig. 10, pl. 47, figs 4, 16, 21, 23, 28, 34–38, 42, 55, 56; Farran 1936: 127 (form a only), text-fig. 25a, d, text-fig. 26a; Moulton 1973: ("stocky", figures only), fig. 4Aa, e, i, fig. 4Bm, q, u.

Material Examined: Gulf of Naples mean lengths: 14 females – TL 1.21 mm (1.15–1.29 mm), PRO 0.81 mm (0.78–0.85 mm); 4 males – TL 0.82 mm (0.70–0.94 mm), PRO 0.56 mm (0.48–0.63 mm). Southwest Pacific mean lengths: 14 females – TL 1.22 mm (1.15–1.29 mm), PRO 0.83 mm (0.81–0.89 mm); 7 males – TL 0.79 mm (0.74–0.83 mm), PRO 0.54 mm (0.52–0.57 mm). Bermuda vicinity: 5 females – TL 1.18 mm (1.16–1.20 mm), PRO 0.80 mm (0.78–0.81 mm) (Table 4).

Female: Body (Fig. 4a, b) with scattered refractile points; exoskeleton moderately chitinised. Prosome about twice as long as urosome; third segment with moderate dorsoposterior projection in lateral view; fifth segment with rounded lateroposterior corner, lateral view. Urosome (Fig. 4c) first segment with faint transverse sclerotised line dorsoposteriorly; genital segment (Fig. 4d) tapered in lateral view; gonopore just anterior to midregion of dorsal surface, with a setule; caudal ramus length approximately equal to that of anal segment.

Rostral area with thickened, rounded posteroventral margin. First antenna (Fig. 4e) 6-segmented with armature formula 3, 8, 4 + 1 spinule, 3 + 1 esthete, 2 + 1 esthete, 6 + 1 esthete.

Second antenna (Fig. 4f) 3-segmented; first segment with distal inner spinulose seta; second segment with row of minute dentiform spinules along inner surface, outer rows of setules; terminal segment with row of setules on posterior surface; proximal inner surface with curved spine and three setae; distally four curved spines and 3 setae.

Labrum (Fig. 4g) posteriorly protuberant; free margin divided into 2 rounded posteroventral lobes, each with row of dentiform setules inserted on under surface; lobes separated by quadrate vertex; several thin lamellae extended posteriorly between the lobes, the outermost covered with short hyaline setules. Ovate, spiniform protuberance anterior to vertex of labrum; lateral setules. Undersurface of labrum (Fig. 4h) with a vertical double row of small dentiform processes midline, anterior to 4 sclerotised median teeth-like structures; the under surface of the lamellae with rows of dentiform setules.

Mandible (Fig. 4i) with expanded, triangular base, terminally flattened, and bearing 5 elements; outer stout seta with row of long setules; broad element with posterior row of setules and concave inner base cups outer basal edge of adjacent blade-like element which has an inner dentiform edge; two posterior spinulose setae, shorter seta hyaline.

First maxilla (Fig. 4j) flat, bilobed; 2 setae and 1 spine on inner lobe; 4 setae on outer lobe with sclerotisation near inner base of the 3 outer setae; small spinules in several curved rows.

Second maxilla (Fig. 4k) 2-segmented; first segment with expanded base; second segment produced distally as elongate claw, with 2 inner rows of setules; outer lateral seta; a seta and a curved element with 2 rows of setules medially on proximal inner surface.

Maxilliped (Fig. 4l) 4-segmented; second segment robust, inner surface with 2 spines; anterior row of setules; terminal segment consisting of long claw with row of setules on concave surface; seta near inner base and small outer setule.

Legs 1-4 (Fig. 5a-d) with serrate, hyaline flanges on spines. Endopods of legs 2–4 with conical process between second and terminal spines. Leg armament:

	Leg	1	2	3	4
Basis	Si	1	-	-	-
	Se	I	1	1	1
Endopod					
segment 1	Si	1	1	1	1
segment 2	Si	1	2	2	2
segment 3	Si	5	3	2	1
	St	I	I	I	I
	Se	-	II	II	II

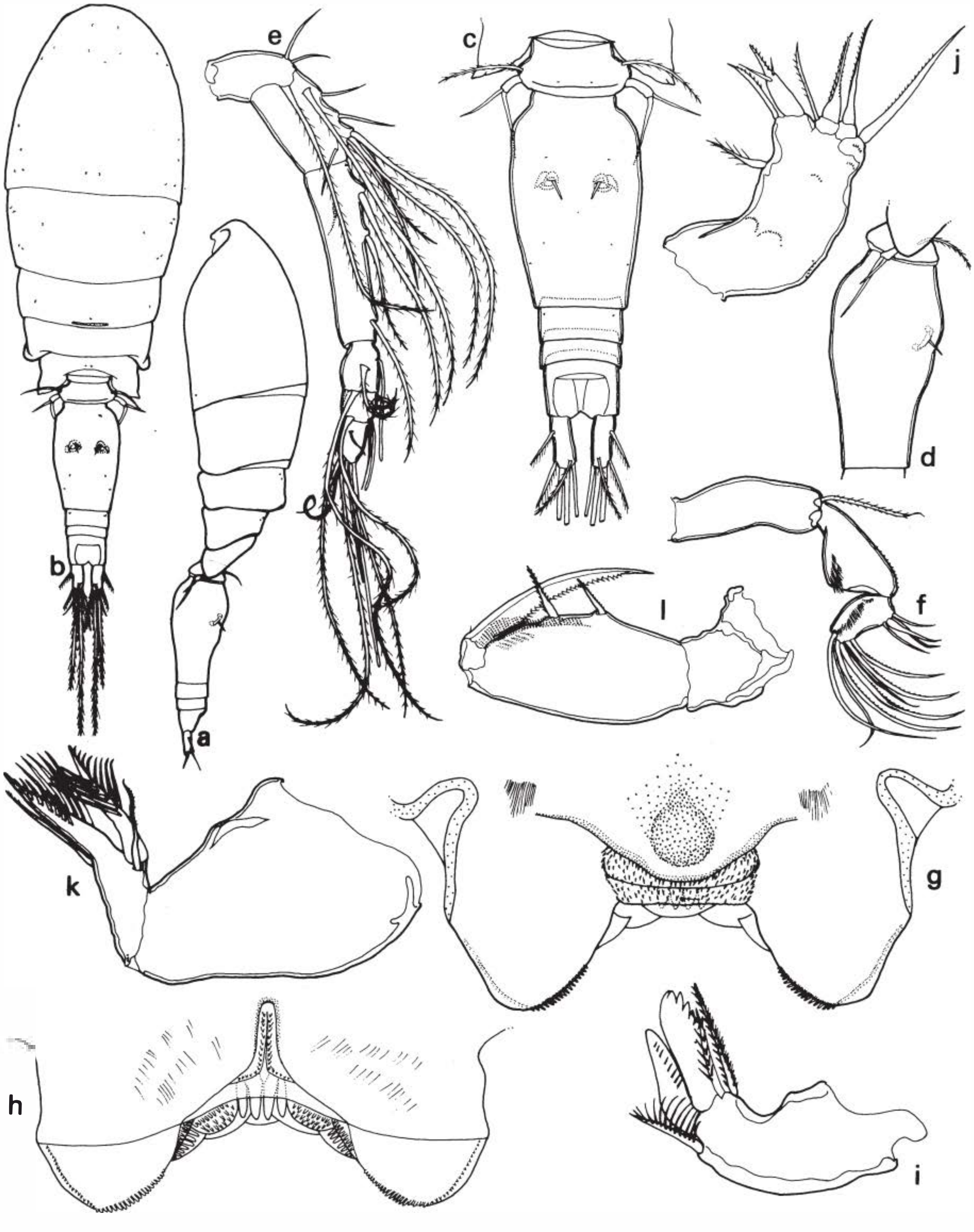


Fig. 4. ***Oncaea conifera*** **Giesbrecht.** Female, l.26 mm, Gulf of Naples: a, lateral (q); b, dorsal (q); c, urosome, dorsal (r); d, segment of leg 5 and genital segment, lateral (r); e, first antenna, left (s); f, second antenna, left (s); g, labrum, ventral, exterior (t); h, labrum, interior (t); i, mandible, right (u); j, first maxilla, left (u); k, second maxilla, right (t); l, maxilliped, right (u).

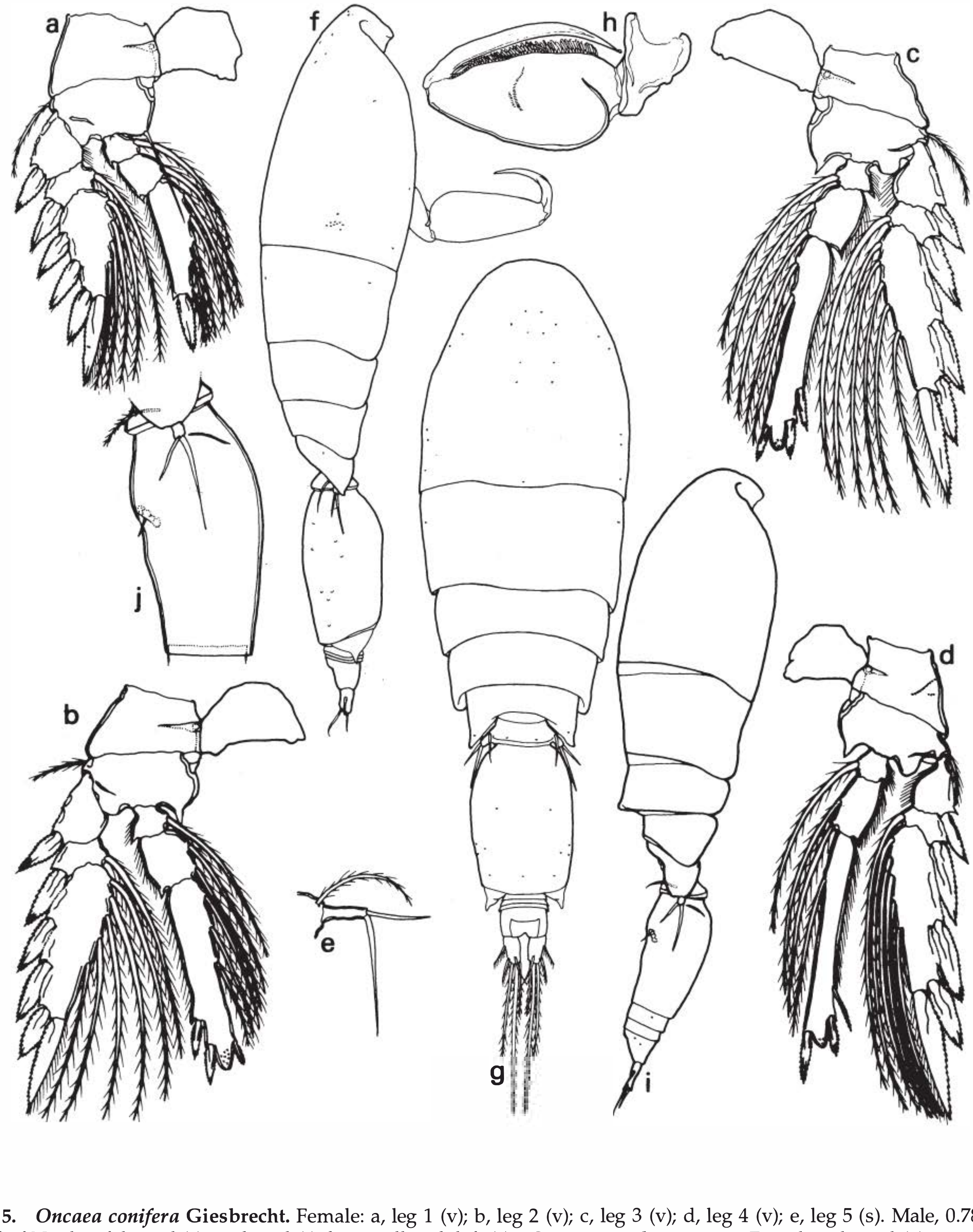


Fig. 5. ***Oncaea conifera* Giesbrecht.** Female: a, leg 1 (v); b, leg 2 (v); c, leg 3 (v); d, leg 4 (v); e, leg 5 (s). Male, 0.78 mm, Gulf of Naples: f, lateral (r); g, dorsal (r); h, maxilliped, left (s). ***Oncaea quadrata* n. sp.** Female: i, lateral (q); j, segment of leg 5 and genital segment (r).

Exopod					
segment 1	Se	I	I	I	I
segment 2	Si	1	1	1	1
	Se	I	I	I	I
segment 3	Si	4	5	5	5
	St	I	I	I	I
	Se	III	III	II	II

Si = inner border; Se = outer border St = terminal border; 1–5 = setae; I–III = spines.

Leg 5 (Fig. 5e) with oblong free segment, about 3 times as long as wide; 2 terminal setae, inner twice the length of outer; ratio of length of outer seta to that of segment 1.3:1; seta on body near leg. Leg 6 (*see* Fig. 4d) probably represented by spiniform setule on external genital area.

MALE: Body (Fig. 5f, g) with scattered refractile points, usually associated with pores. Prosome about twice as long as urosome; cephalosome with posterolateral pattern of about 10 small pores. Urosome with refractile points; first segment with transverse sclerotised ridge dorsoposteriorly; caudal setae with relative lengths as in female.

Rostral area and mouthparts, except first antenna and maxilliped, as in female. First antenna with segments corresponding to the terminal 3 of the female fused in male; armature similar to corresponding segments of female, except for absence of distal seta on third segment.

Maxilliped (Fig. 5h) is lacking small segment proximal to claw of female; second segment conspicuously expanded with 2 setae within inner longitudinal cleft; posterior expansion with 3 rows of short, spatulate setules of graduated lengths; anterior expansion with row of short spatulate setules; two rows of anterior small, delicate setules; claw with narrow process near inner base and small terminal lamella.

Swimming legs as in female. Leg 5 (*see* Fig. 5g) not delimited from thoracic segment; lengths of setae similar to those of female; seta on body near leg. Leg 6 (*see* Figure 5f,g) represented by posterolateral flap on ventral surface of genital segment.

REMARKS: Four males of *Oncaea conifera* were found in the Gulf of Naples sample, two attached to *O. conifera* females, one loose in the sample, and one (0.78 mm) attached to an *O. mediterranea* female (1.33 mm); consequently, the male-female pairing attachment cannot be considered as the single reliable criterion to identify a male.

When Farran (1936) studied specimens from the Great Barrier Reef Expedition, he distinguished three forms (Forms a, b, and c) as being similar to *O. conifera*. His description and figures of Form a appear to be the same as Giesbrecht's (1892) description of *O. conifera*. Moulton (1973) studied copepods collected during the Indian Ocean Expedition, and discussed a fourth form of *O. conifera* ("bumped" group), in addition to the forms described by Farran. Moulton's figures of what he referred to as the "stocky" group appear to indicate the same species as Giesbrecht's figures of *O. conifera.* It is possible that Moulton considered a mixture of the very similar species *O. conifera* and *O. quadrata* n. sp., for his analysis and discussion of the "stocky" group, which he stated presented "some problems." *Oncaea conifera* does not appear as particularly stocky, while the outline of *O. quadrata* n. sp. is robust, especially the urosome, compared to *O. conifera* and the other five species in the New Zealand area, which all resemble *O. conifera*.

Humes (1988) called attention to four median teeth on the posteroventral margin of the labrum when he described a new species, *O. praeclara*, from deep-sea hydrothermal vents in the eastern Pacific, and Böttger-Schnack and Boxshall (1990) noted four median structures on the posterior surface of the labrum in the descriptions of two new species, *O. umerus* and *O. hawii*, from the Red Sea. Most species of *Oncaea* that we have examined have had such median tooth-like structures, arising from the interior of the labral vertex, underneath the median lamella or lamellae (*see* Fig. 4h). These sclerotised tooth-like structures are more conspicuous in some species than in others.

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	hr	Depth of Haul (m)	Specimens
A292		500–1000	5 females, 2 males
A295		400–1000	1 female
A302		0–500	4 females
A303		450–1000	1 female
F945		0–200	1 female
		0–500	3 females
F946		200–500	1 female, 1 male
F947		0–200	2 females
		0–500	2 females
G142	0600	250–500	3 females
	1200	100–250	1 female
	1200	250–500	1 female, 1 male
	2400	100–250	3 females, 2 males
	2400	250–500	1 female
G144	1800	100–250	1 female
	1800	250–500	1 female, 1 male

DISTRIBUTION: Widespread in tropical Eastern Pacific (Giesbrecht 1891: 0–4000 m), Mediterranean (Giesbrecht 1892); Great Barrier Reef, Northeastern Australia (Farran 1936, as Form a: 0–150, 0–180, 0–250, 0–500, 0–600 m); Indian Ocean 9–32° S (Moulton 1973 as "stocky" group: 0–200 m); Bermuda at 3° N in the Atlantic Ocean and in the subtropical Southwest Pacific, this memoir.

Oncaea quadrata n.sp. (Figs 5i,j, 6a-j, 7a-h, 26d)

MATERIAL EXAMINED: Southwest Pacific mean lengths: 26 females – TL 1.37 mm (1.26–1.42 mm), PRO 0.95 mm (0.85–1.00 mm); 12 males – TL 0.89 mm (0.85–0.93 mm), PRO 0.61 mm (0.59–0.63 mm).

TYPES: Holotype: female 1.26 mm (G142, 0600 h, 250–500 m) deposited in the collection of New Zealand Oceanographic Institute, NIWA, holotype number H-634. Allotype: male 0.89 mm (G142, 0600 h, 250–500 m) deposited in the collection of New Zealand Oceanographic Institute, NIWA, type number P-986. Paratypes: 9 females, 4 males (G142, 0600 h, 250–500 m); 5 females, 1 male (G142, 1200 h, 250–500 m); 3 males (G142, 2400 h, 100–250 m); 5 females, 2 males (G142, 2400 h, 250–500 m); 9 females (G144, 1800 h, 250–500 m); 6 females, 3 males (F947, 0–200 m) (deposited in the collection of New Zealand Oceanographic Institute, NIWA, paratype numbers P-981–P-985.

FEMALE: Body (Figs 5i, 6a) with robust appearance; exoskeleton heavily cuticularised. Prosome less than twice as long as urosome; third segment with conspicuous dorsoposterior projection in lateral view; fifth segment with uneven lateroposterior corner (Fig. 5j). Urosome (Fig. 6b) first segment with faint sclerotized ridge dorsoposteriorly; genital segment (*see* Fig. 5j) with a robust, squarish shape; a ridge anteriorly in dorsal and lateral view; gonopore on posterior of upper third of dorsal surface, each area with a setule; caudal ramus length scarcely longer than anal segment.

Rostral area with thickened, rounded margin. First antenna (Fig. 6c) and second antenna (Fig. 6d) with armament similar in number to that of *O. conifera*.

Labrum (Fig. 6e) posteriorly protuberant; free margin divided into 2 rounded posteroventral lobes, each with row of dentiform setules inserted on under surface; lobes separated by semicircular vertex, from which arise several thin lamellae, extending posteriorly between the lobes. Deltoid, spiniform protuberance anterior to vertex of labrum; lateral setules present.

Mandible (Fig. 6f), first maxilla (Fig. 6g), second maxilla (Fig. 6h), and maxilliped (Fig. 6i) with armament similar in number to that of *O. conifera*.

Legs 1–4 (Figs 6j, 7a-c) also with armament similar in number to that of *O. conifera;* endopods 2–4 with conical process between second and terminal spines. Leg 5 (Fig. 7d), a rod-shaped free segment, twice as long as wide; with 2 terminal setae, inner seta twice the length of outer; shorter seta longer than length of segment by ratio 1.7:1; seta on body near leg. Leg 6 (*see* Fig. 6b) probably represented by spiniform setule on external genital area.

MALE: Body (Fig. 7e, f) with scattered refractile points, usually associated with pores. Prosome less than twice as long as urosome; cephalosome with conspicuous posterolateral pattern of about 20 hooded pores. Urosome first segment with transverse sclerotised line dorsoposteriorly; caudal setae with relative lengths as in female.

Rostral area and mouthparts, except first antenna and maxilliped, as in female. First antenna with segments corresponding to terminal 3 of the female fused in male; armature similar to corresponding segments of female, except for absence of distal seta on third segment. Maxilliped (Fig. 7g) lacks the small segment proximal to claw of female; the second segment with two rows of anterior small, delicate setules; claw with small terminal lamella; armature similar to that of *O. conifera* male.

Swimming legs as in female. Leg 5 (Fig. 7h) not delimited from thoracic segment; general shape of segment and lengths of setae similar to those of female, the inner seta longer by ratio of 1.5:1. Seta on body near leg. Leg 6 (*see* Fig. 7e) represented by posterolateral flap on ventral surface of genital segment.

ETYMOLOGY: The specific name *quadrata*, from *quadratus* (L.), meaning four-cornered or square, refers to the appearance of the genital segment, markedly squarish in lateral view.

REMARKS: *Oncaea quadrata* was the third most abundant species of the seven in this Southwest Pacific collection; it has a dorsal projection on the third segment of the prosome and was the only species of this group not found in any of the samples from other areas. *Oncaea quadrata* most closely resembles *O. conifera*, but may be distinguished by a more robust overall appearance, especially the genital segment in lateral view. There are also small differences in sizes of spines on legs 2–4, those of *O. quadrata* being longer, especially the inner terminal spine

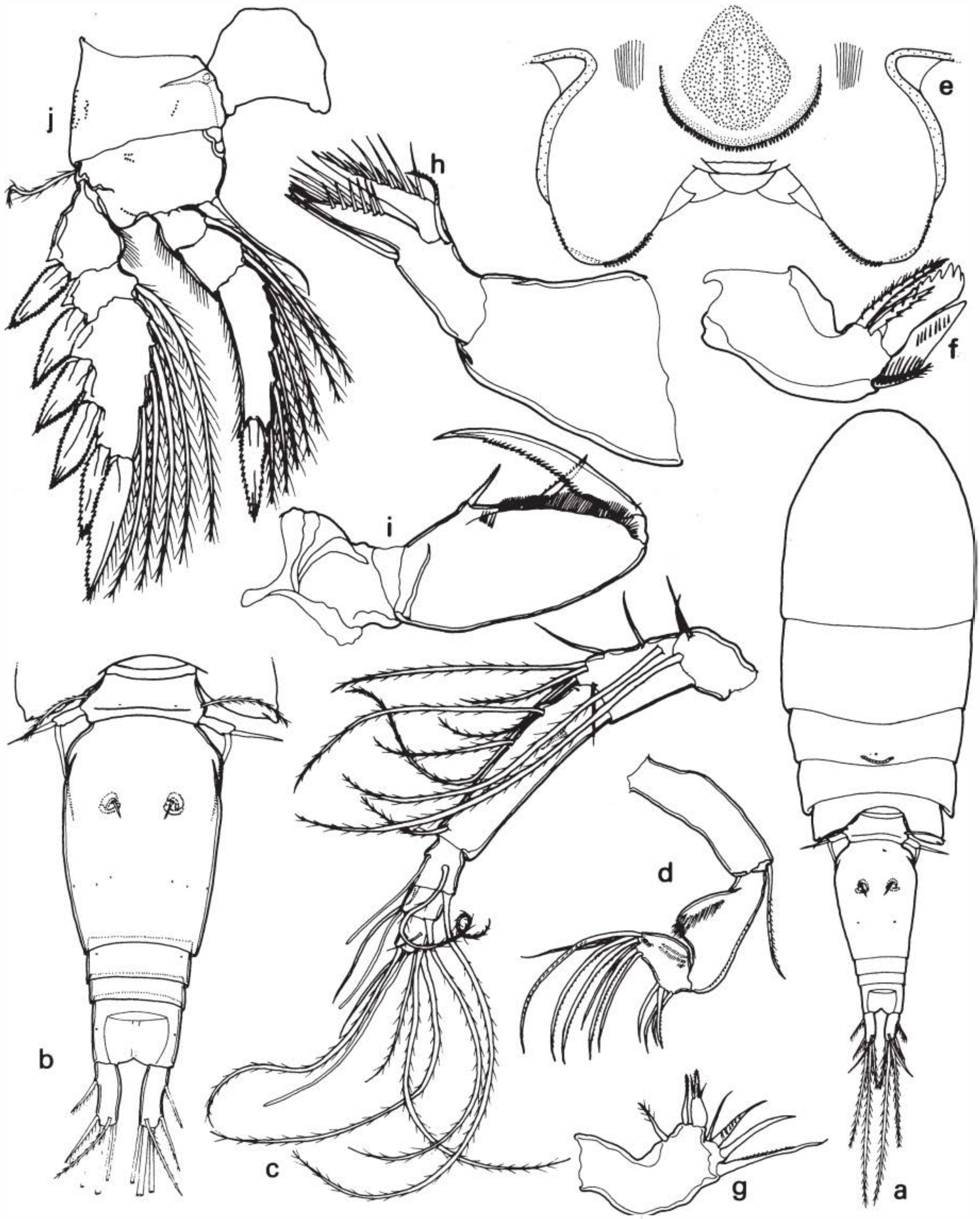


Fig. 6. *Oncaea quadrata* **n. sp.** Female: a, dorsal (q); b, urosome (r); c, first antenna, right (s); d, second antenna, left (s); e, labrum, ventral (t); f, mandible, left (t); g, first maxilla, right (w); h, second maxilla, right (t); i, maxilliped, right (s); j, leg 1 (v).

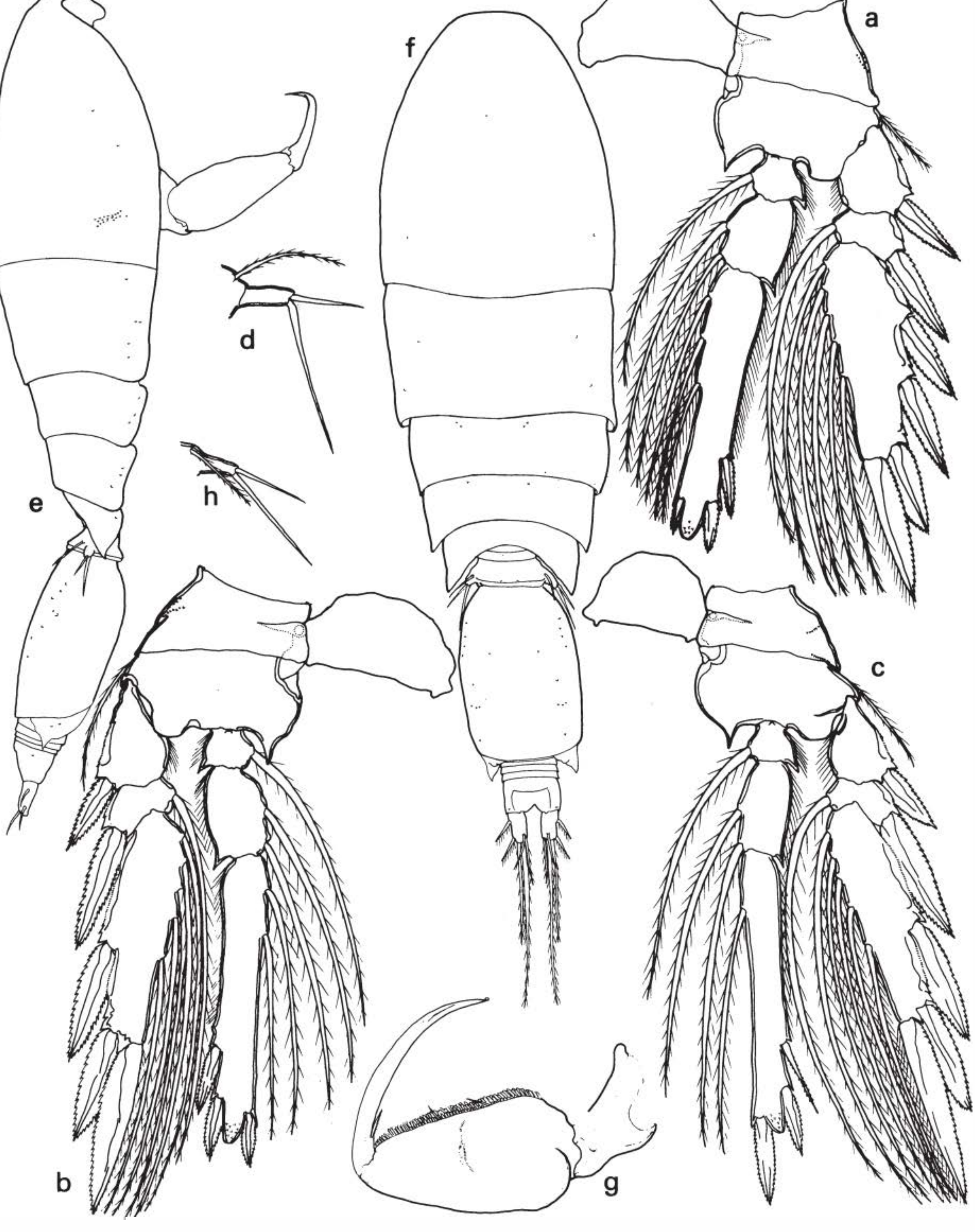


Fig. 7. ***Oncaea quadrata*** **n. sp.** Female: a, leg 2 (v); b, leg 3 (v); c, leg 4 (v); d, leg 5 (s). Male: e, lateral (r); f, dorsal (r); g, maxilliped, left (s); h, leg 5 (s).

of leg 2 endopod. The width of the serrate, hyaline flange on spines and the size of the conical processes of legs 2 and 3 endopods are more pronounced than those of *O. conifera*.

New Southwest Pacific Records:

Station No.	hr	Depth of Haul (m)	Specimens
A292		500–1000	4 females, 2 males
A295		0–500	1 female
		400–1000	2 females
A302		0–500	2 females
		500–1000	1 female
A303		450–1000	1 female
F945		500–1000	7 females
F946		200–500	3 females
		0–1000	7 females
F947		0–200	8 females, 4 males
		0–500	6 females
G142	0600	100–250	1 female
	0600	250–500	13 females, 5 males
	1200	250–500	5 females, 1 male
	2400	100–250	3 females, 4 males
	2400	250–500	5 females, 2 males
G144	1800	250–500	10 females

Distribution: Subtropical Southwest Pacific (this memoir: 0–200, 0–500, 100–250, 250–500, 400–1000 m).

Oncaea furcula Farran, 1936 (Figs 8a-l, 9a-g, 26a)

Oncaea conifera Farran, 1936: 127–129 (form b, var. *furcula* only), text-fig. 25b, e, text-fig. 26b; Moulton 1973: ("long" only) 142, 144, 145, 147, 148, 150–154, fig. 4Ad, h, i, fig. 4Bp, t, x. (Not *O. conifera* Giesbrecht, 1891.)

Material Examined: Southwest Pacific mean lengths: 3 females – TL 1.11 mm (1.07–1.15 mm), PRO 0.73 mm (0.70–0.74 mm). Gulf of Naples mean lengths: 1 female – TL 1.07 mm, PRO 0.70 mm; 2 males – TL 0.87, 0.94 mm, PRO 0.59, 0.63 mm. Bermuda vicinity mean lengths: 3 females – TL 1.09 mm (1.07–1.10 mm) (Table 4).

Female: Body (Fig. 8a,b) relatively slender; exoskeleton delicately chitinised. Prosome about twice as long as urosome; cephalosome tapered anteriorly with a narrow, sclerotised ridge in lateral view; third segment with small protrusion on dorsoposterior margin in lateral view; fifth segment with lateroposterior round corner not continuous with remainder of segment. Urosome (Fig. 8c, d) first segment with faint transverse sclerotised line dorsoposteriorly; genital segment length more than double that of width, exceeding total length of 3 posterior segments of prosome; gonopore on anterior third of dorsal surface, with a setule; caudal ramus length about equal to that of each of the anal, penultimate, and antepenultimate segments.

Rostral area with thickened, rounded posteroventral margin. First antenna (Fig. 8e) and second antenna (Fig. 8f) with armament similar to that of *O. conifera*.

Labrum (Fig. 8g) posteriorly protuberant; free margin divided into 2 rounded posteroventral lobes, each with row of dentiform setules inserted on under surface; several layers of thin median lamellae extend posteriorly between the lobes. Spiniform circular protuberance anterior to vertex of labrum; lateral setules.

Mandible (Fig. 8h), first maxilla (Fig. 8i), second maxilla (Fig. 8j), and maxilliped (Fig. 8k) with armament similar to that of *O. conifera*.

Legs 1–4 (Figs 8l, 9a-c) with armament similar in number to that of *O. conifera;* endopods 2–4 with conical process between second and terminal spines; endopods 2–4 with length of terminal inner spine often reduced (Fig. 9d), variable between specimens and between right and left ramus. Leg 5 (*see* Fig. 8b) is a short free segment, twice as long as wide; 2 terminal setae, inner twice the length of outer, which is twice the length of segment; seta on body near leg as long as inner seta of leg 5. Leg 6 (*see* Fig. 8d) probably represented by spiniform setule on external genital area.

Male: Body (Fig. 9e) with scattered refractile points usually associated with pores. Prosome almost twice as long as urosome; cephalosome tapered anteriorly with posterolateral stepped line of small pores. Urosome (Fig. 9f) first segment with transverse sclerotised line dorsoposteriorly.

Rostral area and mouthparts, except first antenna and maxilliped, as in female. First antenna with segments corresponding to terminal 3 of the female fused in male; armament is similar to corresponding segments of female, except for absence of distal seta on third segment. Maxilliped (Fig. 9g) is lacking small segment proximal to claw of female; claw with dense sclerotisation on outer base; armament similar to that of *O. conifera* male.

Swimming legs as in female with normal, symmetrical armament. Leg 5 (*see* Fig. 9e,f) not delimited from thoracic segment; general shape of leg and lengths of setae similar to those of female; seta on body near leg as long as inner seta of leg 5. Leg 6 (*see* Fig. 9e,f) represented by posteroventral flap on ventral surface of genital segment; pointed posterior corner protruding laterally in dorsal view.

REMARKS: Farran's description was brief, but considering the several diagnostic characters he noted for both female and male, it appears that his form b, var. *furcula*, is this species and because his name is available it is used here. Moulton's (1973) description of the "long" group was also brief, but the characters he described are similar to those of *O. furcula*, including a figure (4Bt) of both a normal and an abnormal terminal spine on a third endopod of leg 4.

Oncaea furcula appears to be fragile compared to the usual sturdy species of *Oncaea*, and it is vulnerable to abnormalities of endopod spines of legs 2–4. Most of the specimens examined were damaged, missing one or both caudal rami. Of the seven females examined, two had one stunted inner terminal spine on 1 ramus of legs 2–4 endopods and five had two stunted terminal spines, but not two abnormal endopods on the same leg; the abnormal short spines were nude or bore minute serrate margins.

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	hr	Depth of Haul (m)	Specimens
A292		500–1000	1 female
A302		0–500	1 female
F945		0–500	1 female
G144	1800	100–250	1 female

DISTRIBUTION: Great Barrier Reef, northeastern Australia (Farran 1936 as *O. conifera* var. *furcula*: 0–250, 0–500, 0–600 m); Indian Ocean 9–32° S (Moulton 1973 as *O. conifera* "long" form: 0–200 m); Mediterranean (0–100 m), Bermuda at 30° N in the North Atlantic (150–250 m), subtropical waters in the Southwest Pacific (100–250, 0–500, 500–1000 m), this memoir.

Oncaea derivata n.sp. (Figs 9h-j, 10a-l, 11a, 25c)

Oncaea conifera Moulton, 1973: ("bumped" only) 142, 145, 147, 148, 150–154, Fig. 4Ac, g, k, fig. 4Bo, s, w. (Not *O. conifera* Giesbrecht, 1891.)

MATERIAL EXAMINED: Southwest Pacific: 8 females (only 2 with caudal rami) – TL 1.11, 1.20 mm, PRO (mean of 7) 0.75 mm (0.73–0.79 mm). Panama Basin: mean of 5 females – TL 1.12 mm (1.11–1.12 mm), PRO 0.74 mm (0.74–0.75 mm). Florida vicinity: mean of 3 females – TL 1.20 mm (1.15–1.22 mm), PRO 0.79 mm (0.78–0.81 mm). Liberia vicinity: 1 female – TL (missing caudal rami), PRO 0.79 mm (Table 4).

TYPES: Holotype: female 1.20 mm (F947, 0–500 m) deposited in the collection of the New Zealand Oceanographic Institute, NIWA, holotype number H-635. Paratypes: 3 females (2 on slides) (A292 500–1000 m) deposited in the collection of the New Zealand Oceanographic Institute, NIWA, paratype number P-994.

FEMALE: Body (Figs 9h,j, 10a) relatively slender with scattered refractile points; exoskeleton delicately chitinised. Prosome length to that of urosome 1.7:1; cephalosome length approximately equal to that of remaining segments of prosome, as well as to that of genital segment plus succeeding segments of urosome; fifth segment with lateroposterior corner uneven. Urosome (Figs 9i, 10b) first segment with faint transverse sclerotised line dorsoposteriorly; genital segment length more than double the width and about equal to total length of three posterior segments of prosome; gonopore located on posterior margin of anterior third of dorsal surface, with a setule; caudal ramus approximately twice as long as wide.

Rostral area with thickened, rounded posteroventral margin. First antenna (Fig. 10c) and second antenna (Fig. 10d) with armament similar in number to that of *O. conifera.*

Labrum (Fig. 10e) posteriorly protuberant; free margin divided into 2 posteroventral lobes, each with a row of dentiform setules inserted on under surface; several layers of thin median lamellae extend posteriorly between the lobes. Spiniform circular protuberance with posterior setules, anterior to vertex of labrum; lateral setules.

Mandible (Fig. 10f), first maxilla (Fig. 10g), second maxilla (Fig. 10h), and maxilliped (Fig. 10i) with armament similar in number to that of *O. conifera.*

Legs 1–4 (Figs 10j-l, 11a) with armament similar in number to that of *O. conifera*; endopods 2–4 with conical process between second and terminal spines. Leg 5 with oblong free segment, about 3 times as long as wide; 2 terminal setae, inner twice the length of outer, and slightly longer than the segment; seta on body near leg. Leg 6 (*see* Fig. 10b) probably represented by spiniform setule on external genital area.

MALE: Unknown.

ETYMOLOGY: The specific name *derivata*, from *derivatus* (L.), meaning derivative, refers to the principal-component analysis which Moulton (1973) used to distinguish this from three other similar species.

REMARKS: The more prominent dorsoposterior projection on the prosomal third segment; shorter seta near leg 5; and anal segment length about equal to width, and longer than caudal rami, differentiate *O.*

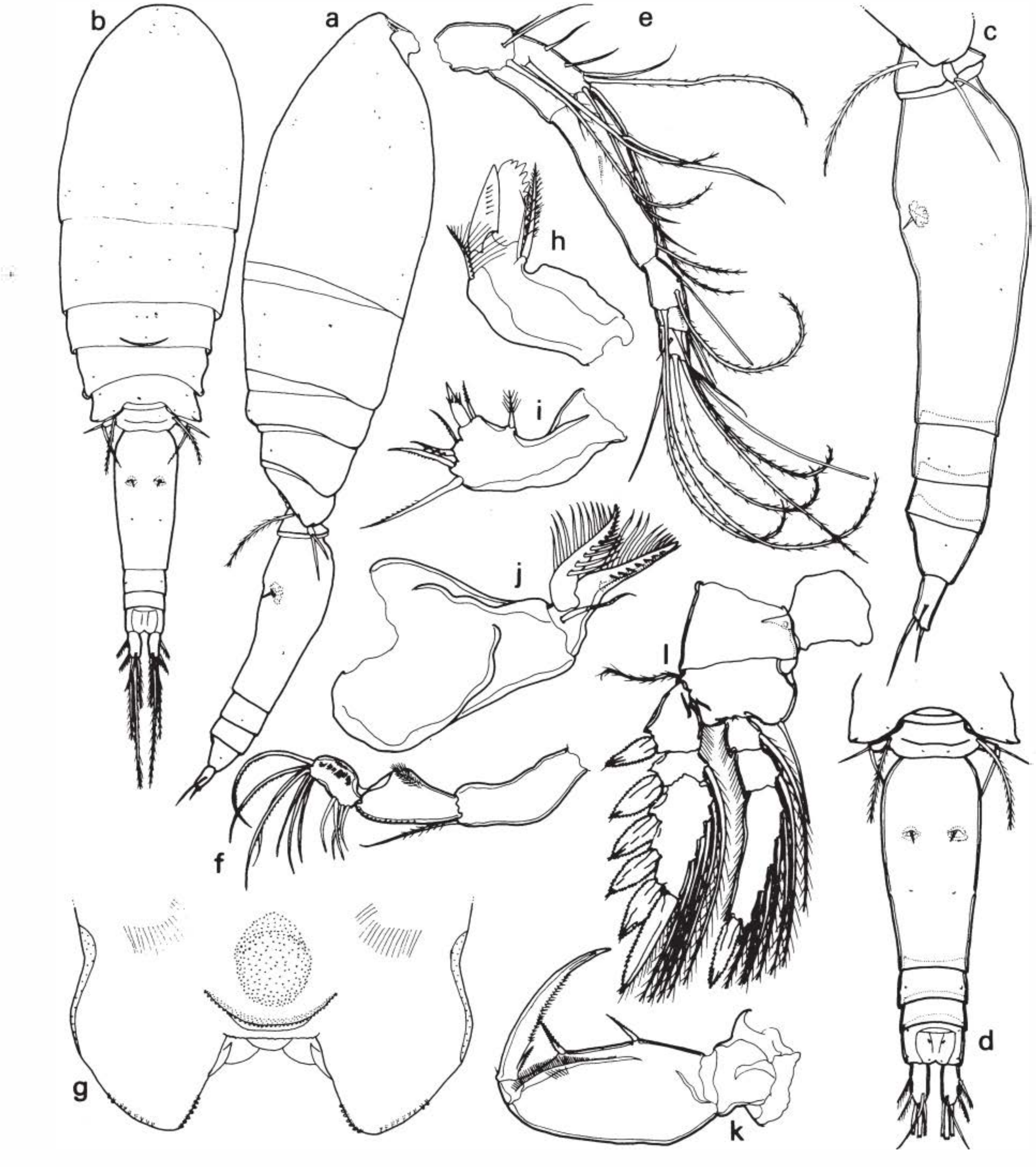


Fig. 8. ***Oncaea furcula*** **Farran**. Female: a, lateral (r); b, dorsal (x); c, urosome, lateral (s); d, urosome, dorsal (r); e, first antenna , left (s); f, second antenna, left (v); g, labrum, ventral (u); h, mandible, right (t); i, first maxilla, right (t); j, second maxilla, left (t); k, maxilliped, left (s); l, leg 1 (s).

Fig. 9. *Oncaea furcula* **Farran.** Female: a, leg 2 (s); b, leg 3 (v); c, leg 4 (s); d, third endopod of leg 4 (s). Male, 0.87 mm, Gulf of Naples: e, lateral (r); f, urosome, dorsal (r); g, maxilliped, left (s). *Oncaea derivata* **n. sp**. Female: h, lateral (q) (NZOI Stn A292); i, urosome, lateral (s); j, lateral (r) (Panama Basin #20, 1.12 mm).

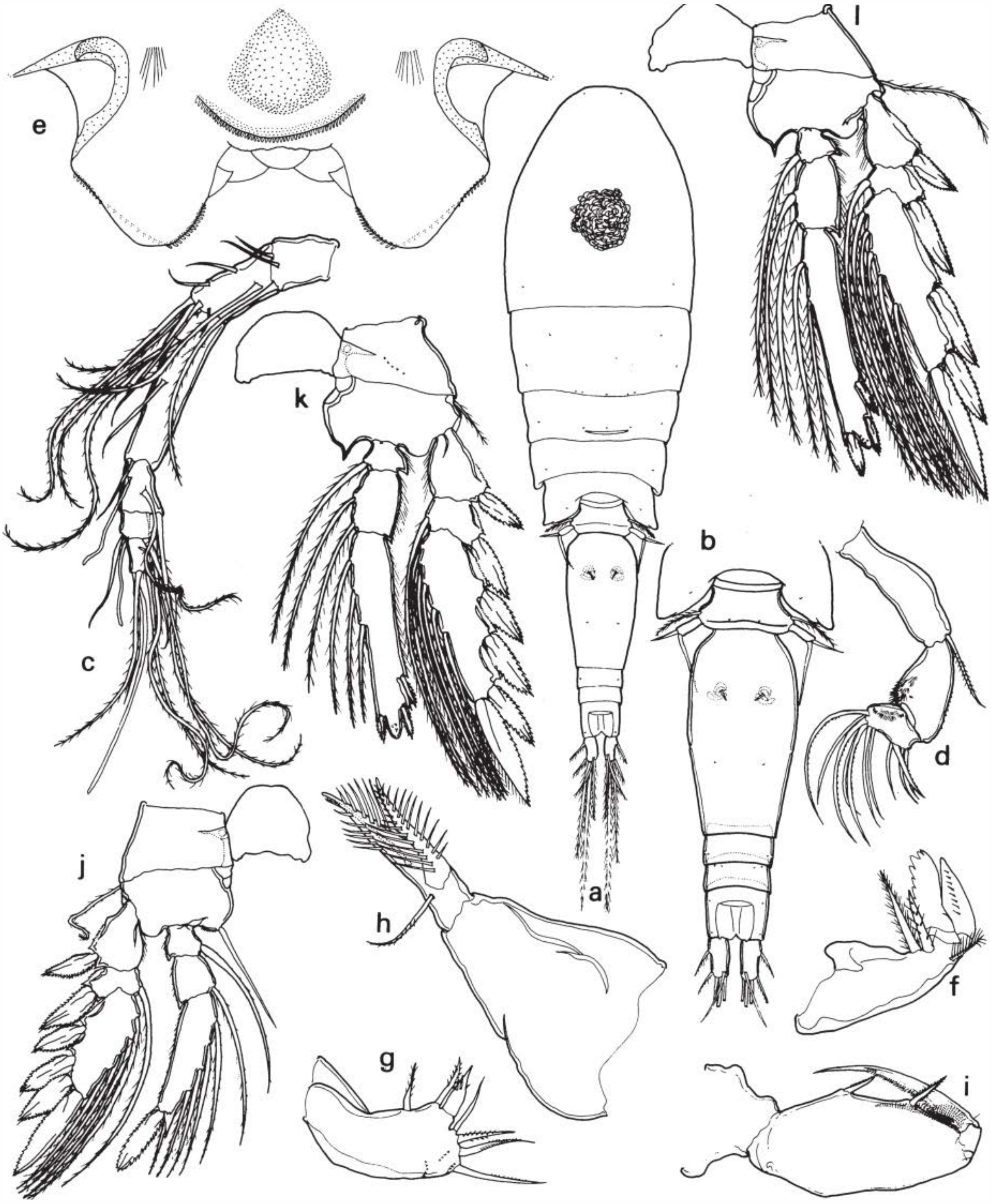


Fig. 10. ***Oncaea derivata* n. sp.** Female: a, dorsal (x); b, urosome, dorsal (r); c, first antenna, right (s); d, second antenna, left (s); e, labrum, ventral (u); f, mandible, left (t); g, first maxilla, left (t); h, second maxilla, right (t); i, maxilliped, left (s); j, leg 1 (s); k, leg 2 (s); l, leg 3 (s).

derivata females from those of *O. furcula*, which they closely resemble.

Oncaea derivata has a propensity for developing a tumorous growth on the mid-dorsal surface of the cephalosome. The growth appears to be associated with pores; the copepod has probably endured the abnormality since before at least the last moult because chitin has grown in irregular folds to cover the expansion. The eight specimens of this species in New Zealand samples all had various sizes of a tumorous growth. Such an abnormality on 33 of Moulton's specimens prompted him to refer to this species as the "bumped" form, but he also included 31 specimens without such a growth in that same "group". None of the five specimens of *O. derivata* from the Panama Basin had a tumorous growth, while two of the three specimens from the Florida vicinity had the abnormality. It should be noted that one specimen of a different undescribed species with such a tumorous growth was observed in a Panama Basin sample.

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	Depth of Haul (m)	Specimens
A292	500–1000	6 females
A302	0–500	1 female
F947	0–500	1 female

DISTRIBUTION: Indian Ocean 9–32° S (Moulton 1973 as *O. conifera* "bumped" form: 0–200 m); subtropical waters of the Southwest Pacific (0–500, 500–1000 m), Panama Basin (samples 19, and 20, Table 3), Florida (sample 14, Table 3), Liberia (sample 10, Table 3) in this memoir.

Oncaea redacta n. sp. (Figs 11b-i, 12a-j, 27a)

Oncaea conifera Farran, 1936: 127–129 (form c only), text-fig. 25c, f, text-fig. 26c; Moulton 1973: 142, 144, 145, 147, 148, 150–154 ("minus" only), fig. 4Ab, f, j, fig. 4Bn, r, v. (Not *O. conifera* Giesbrecht, 1891.)

MATERIAL EXAMINED: Southwest Pacific: 1 female – TL 1.11 mm, PRO 0.74 mm. Northeast Pacific: mean of 15 females – TL 1.12 mm (1.11–1.20 mm), PRO 0.77 mm (0.74–0.82 mm); 2 males – TL 0.62, 0.63 mm, PRO 0.44, 0.41 mm (Table 4).

TYPES: Holotype female 1.15 mm (*Brown Bear* (BB) 344–35, 45°17′ N, 141°48′ W, 0–2750 m) deposited in the collection of the New Zealand Oceanographic Institute, NIWA, holotype number H-636. Type Locality: Northeast Pacific. Allotype: male 0.62 mm (BB 344–35, 0–2750 m) deposited in the collection of the New Zealand Oceanographic Institute, NIWA, type number P-992. Paratypes: 2 females (BB 344–35, 0–2750 m); 1 female (BB 344–4, 0–1800 m); 2 females (BB 344–5, 0–2128 m); 1 female, 1 male (slide) (BB 344–25, 0–4500 m); 4 females (BB 352–21, 0–2750 m) deposited in the collection of the New Zealand Oceanographic Institute, NIWA, paratype numbers P-987–P-991.

FEMALE: Body (Fig. 11b,c) relatively slender; exoskeleton moderately chitinised. Prosome about twice as long as urosome; third segment with small protrusion on dorsoposterior margin in lateral view; fifth segment with lateroposterior corner rounded. Urosome (Fig. 11d) first segment with faint transverse sclerotized line dorsoposteriorly; genital segment about twice as long as wide in lateral view; gonopore located just above midline on dorsal surface, with a setule; caudal ramus length twice as long as width and about equal to length of anal segment.

Rostral area with thickened, rounded margin. First antenna (Fig. 11e) and second antenna (Fig. 11f) with armament similar in number to that of *O. conifera*.

Labrum (Fig. 11g) posteriorly protuberant; free margin divided into 2 posteroventral lobes, each with row of dentiform setules inserted on under surface; several layers of thin median lamellae extend posteriorly between the lobes. Spiniform protuberance anterior to semicircle of short setules and vertex of labrum.

Mandible (Fig. 11h), first maxilla (Fig. 11i), second maxilla (Fig. 12a), and maxilliped (Fig. 12b) with armament similar in number to that of *O. conifera.*

Legs 1–4 (Fig. 12c-f) with armament similar in number to that of *O. conifera*; endopods 2–4 with conical process between second and terminal spines. Leg 5 (Fig. 12g) a short free segment, twice as long as wide; 2 terminal setae, outer two-thirds the length of inner; seta on body near leg longer than inner seta of leg 5. Leg 6 (*see* Fig. 11d) probably represented by spiniform setule on external genital area.

MALE: Body (Fig. 12h,i) with few scattered refractile points, usually associated with pores. Prosome less than twice as long as urosome. Urosome first segment with transverse sclerotised line dorsoposteriorly.

Rostral area and mouthparts, except first antenna and maxilliped, as in female. First antenna with segments corresponding to terminal 3 of female fused

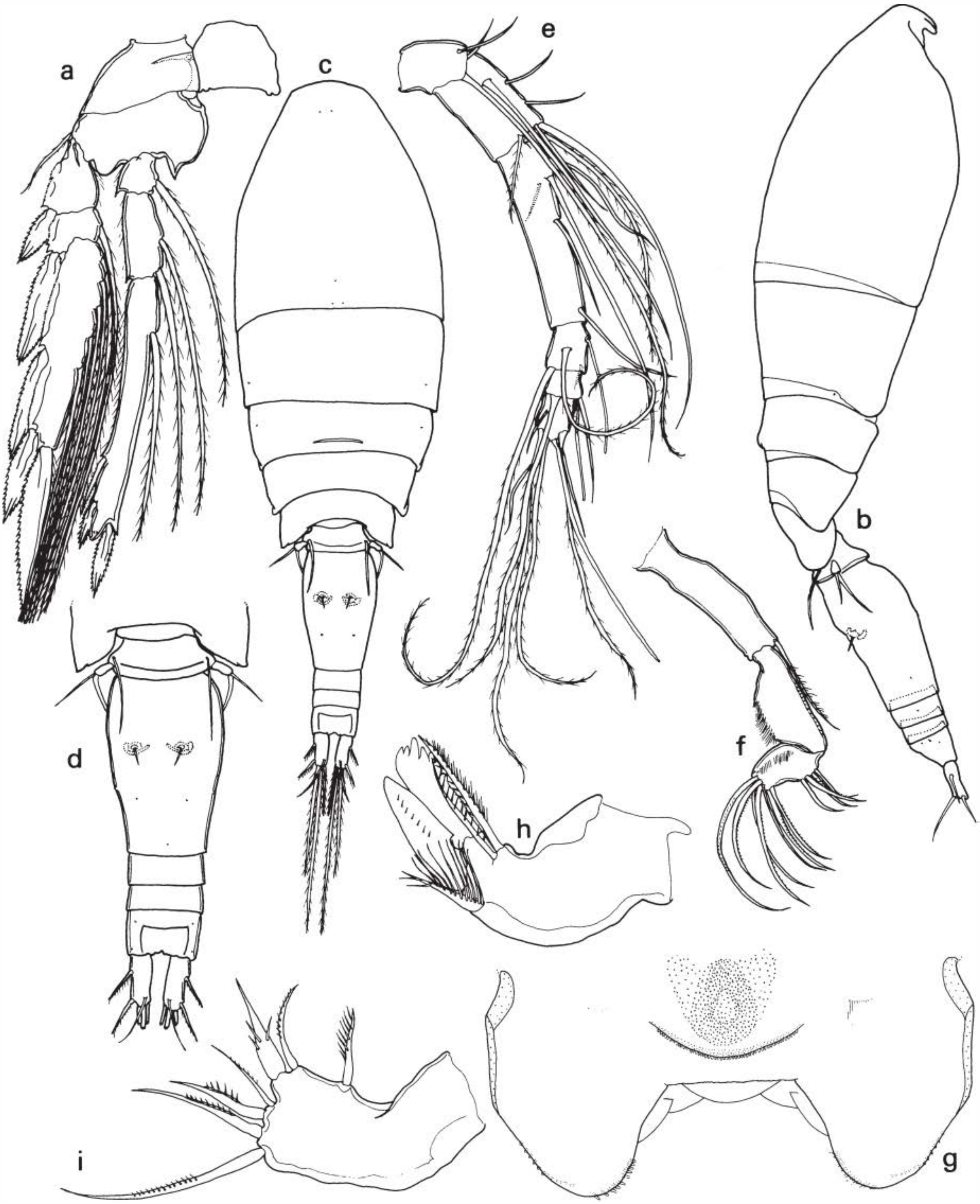


Fig. 11. ***Oncaea derivata*** **n. sp.** Female: a, leg 4 (s). ***Oncaea redacta*** **n. sp.** Female: b, lateral (r); c, dorsal (x); d, urosome, dorsal (r); e, first antenna, left (s); f, second antenna, left (s); g, labrum, ventral (u); h, mandible, right (u); i, first maxilla, right (u).

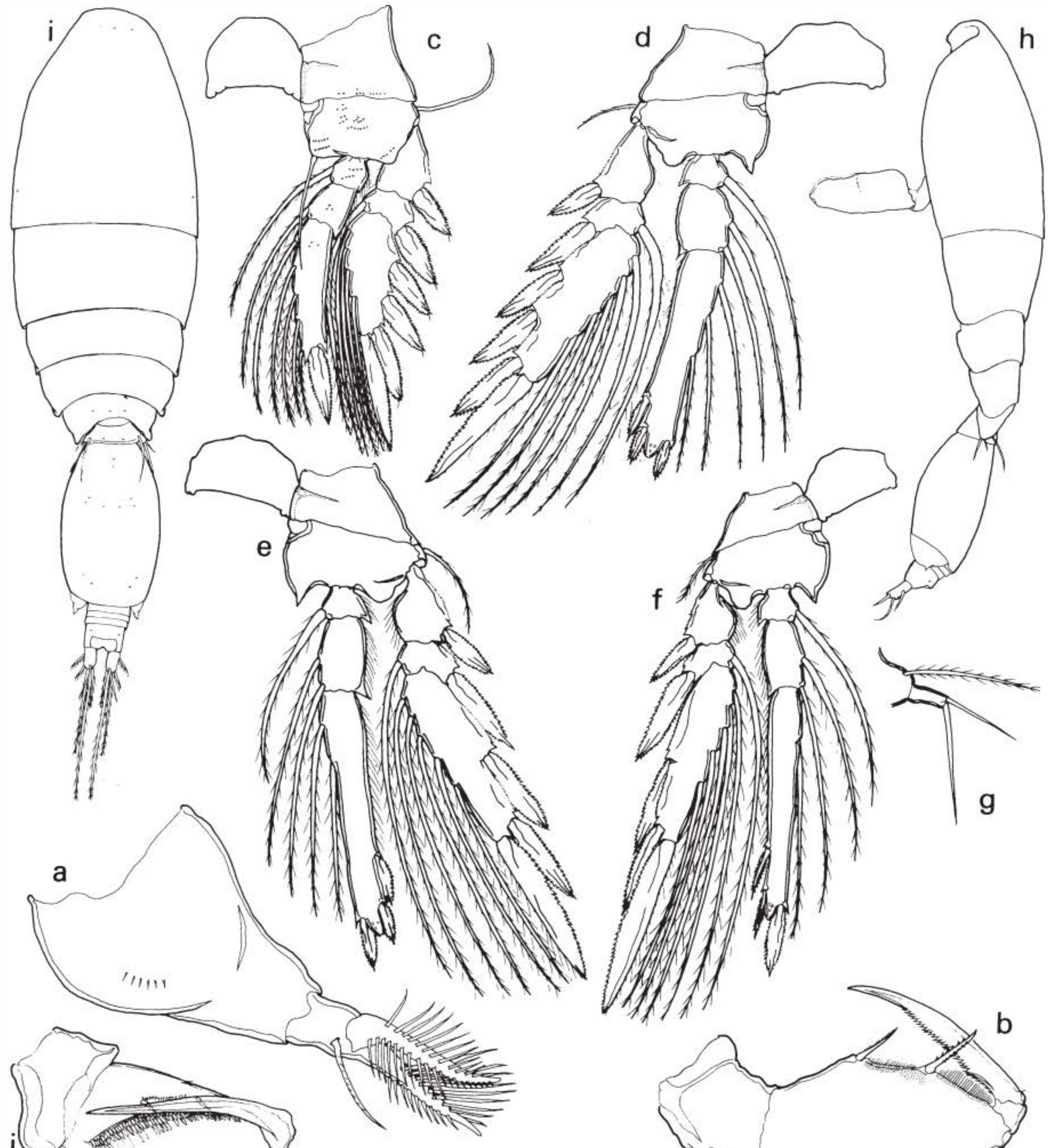


Fig. 12. ***Oncaea redacta*** **n. sp.** Female: a, second maxilla, left (t); b, maxilliped, left (s); c, leg 1 (v); d, leg 2 (v); e, leg 3 (v); f, leg 4 (v); g, leg 5 (s); male: h, lateral (r); i, dorsal (r); j, maxilliped, left, anterior (s).

in male; armament similar to corresponding segments of female, except for absence of distal seta on third segment. Maxilliped (Fig. 12j) lacking small segment proximal to claw of female; armament similar to that of *O. conifera* male.

Swimming legs as in female. Leg 5 not delimited from thoracic segment; general shape of segment and lengths of setae similar to those of female; seta on body near leg longer than inner seta of leg 5. Leg 6 (*see* Fig. 12h) represented by posterolateral flap on ventral surface of genital segment.

ETYMOLOGY: The specific name *redacta* from *redactus* (L.), meaning edited and reduced, refers to the slight projection of the dorsal third prosomal segment profile.

REMARKS: Moulton (1973) stated that his "minus" group had no prosomal dorsal projection, but his figure 4Bn, lateral view, shows a slight projection. With the other characteristics described by Moulton and the fact that he thought it was similar to Farran's (1936) form c, we believe his "minus" group is *O. redacta*.

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	Depth of Haul (m)	Specimens
F946	200–500	1 female

DISTRIBUTION: Great Barrier Reef (Farran 1936 as *O. conifera* form c: 0–500, 0–600 m); Indian Ocean 9–32° S (Moulton 1973 as *O. conifera* form "minus": 0–200 m); subtropical water in the Southwest Pacific (this memoir: 200–500 m).

Oncaea mediterranea (Claus, 1863)

(Figs 13a-d, 14a-d, 26c)

Antaria mediterranea Claus, 1863: 159, pl. 30, figs 1–7.
Oncaea mediterranea (Claus): Bourne 1889: 151, pl. 12, figs 1–7; Dakin & Colefax 1940: 116, fig. 205Ba-d; Razouls 1974: 237, figs 3, 4.
Oncaea mediterranea var. *flava* Giesbrecht, 1892: 591–604, 755, 756, 774, 789, pl. 47, fig. 10; Heron 1977: 51, figs 8e-h, 9a-h, 10a, b (female only).

MATERIAL EXAMINED: Mean lengths: Gulf of Naples: 7 females – TL 1.23 mm (1.20–1.26 mm), PRO 0.78 mm (0.77–0.81 mm); 7 males – TL 0.94 mm (0.89–0.97 mm), PRO 0.61 mm (0.57–0.64 mm). Southwest Pacific: 14 females – TL 1.19 mm (1.14–1.23 mm), PRO 0.76 mm (0.72–0.79 mm); 14 males – TL 0.92 mm (0.89–0.95 mm), PRO 0.59 mm (0.57–0.95 mm). Bermuda vicinity: 4 females – TL 1.23 mm (1.20–1.26 mm), PRO 0.76 mm (0.74–0.79 mm). Gulf of Mexico: 1 female – TL 1.18 mm, PRO 0.75 mm (Table 4).

The female of *O. mediterranea* was described from specimens in a Southwest Pacific-Antarctic sample (Heron 1977) where no males were found.

MALE: Most surfaces of the body densely covered with minute refractile granulations (Fig.14a,b), similar to female. Rostral area and mouthparts, except first antenna, second antenna, and maxilliped, as in female. First antenna with segments corresponding to terminal 3 of female fused in male; armament similar to corresponding segments of female, except

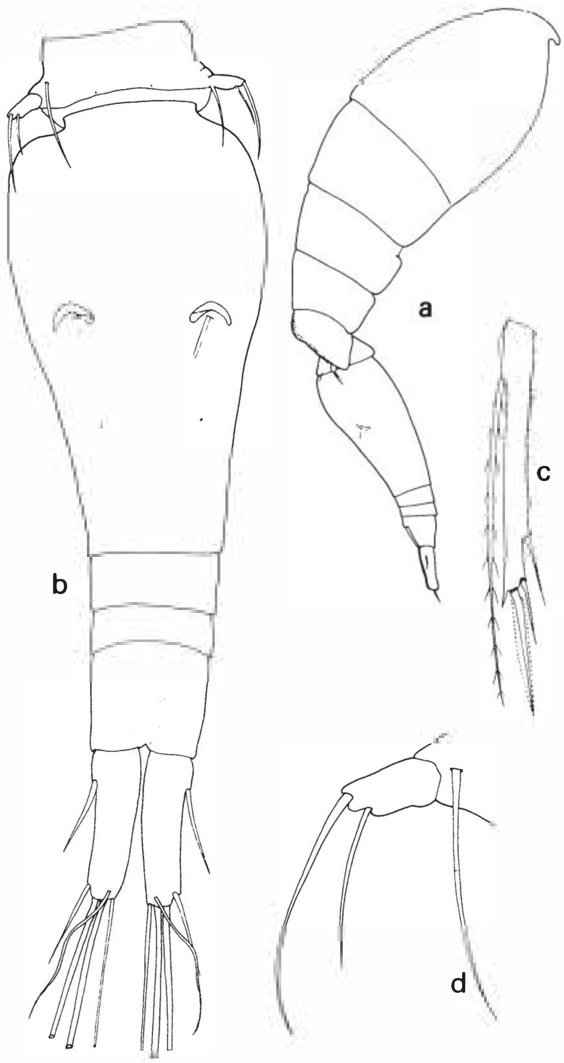


Fig. 13. ***Oncaea mediterranea* (Claus)**. Female: a, lateral; b, urosome, dorsal; c, endopod of leg 4; d, leg 5. (From Heron, 1977, figs. 8e,f, 10a,b.)

for absence of distal seta on third segment. Second antenna similar to that of female except for armament of third segment on proximal inner surface (Fig. 14c); length of the second seta is increased, the third spiniform element length is reduced, and stoutness is increased. Maxilliped (Fig. 14d) lacking small segment proximal to claw of female; claw with small terminal lamella; armature similar to that of *O. conifera* male.

Swimming legs as in female. Leg 5 not delimited from thoracic segment; general shape of segment and lengths of setae similar to those of female; seta on body near leg. Leg 6 (*see* Fig. 14b) represented by posterolateral flap on ventral surface of genital segment.

REMARKS: *Oncaea mediterranea* was found in more samples (22) than any of the other species of Oncaeidae, and the highest number of specimens occurred in G142 samples.

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	hr	Depth of Haul (m)	Specimens
A302		0–500	4 females
B113		0–500	1 female
B116		0–125	3 females, 1 male
B117		0–500	2 females
B118		0–500	3 females, 1 male
B119		0–500	2 females
F945		0–200	2 females
		0–500	4 females
		500–1000	1 female
F946		0–200	1 female, 1 male
		200–500	3 females
		0–1000	2 females
F947		0–200	4 females, 2 males
		0–500	1 female
G142	0600	100–250	30 females, 30 males
	0600	250–500	15 females, 33 males
	1200	0–100	1 female
	1200	100–250	4 females, 4 males
	1200	250–500	9 females, 53 males
	2400	100–250	44 females, 40 males
	2400	250–500	34 females, 30 males
G144	1800	100–250	5 females, 7 males
	1800	250–500	7 females, 19 males
T944		140	4 females, 11 males
Goat Island			1 female, 10 males

DISTRIBUTION: Widespread in the Mediterranean (Claus 1863 as *Antaria mediterranea;* Giesbrecht 1892 as *O. mediterranea* var. *flava*, Razouls 1974); Plymouth, U.K. (Bourne 1889: surface); off Sydney, Australia (Dakin & Colefax 1940: surface – 200 m); Southwest Subantarctic Pacific (Heron 1977: 0–500, 0–1000 m); subtropical and subantarctic Southwest Pacific (this memoir: 0–100, 100–250, 250–500, 500–1000 m).

Oncaea venusta Philippi, 1843

(Figs 14e-l, 15a-j, 27b)

Oncaea venusta Philippi, 1843: 62, 63, pl. 3, fig. 2a-d; Giesbrecht 1891: 47; 1892: 590–604, 755, 756, 774, 789, pl. 2, fig. 5, pl. 3, fig. 7, pl. 47, figs. 2, 5, 13, 19, 39, 44, 48, 50, 54, 58; Mori 1937: 119, 120, pl. 66, figs 1–9; Dakin & Colefax 1940: 116, fig. 205Aa-f; Ho 1984: 23–61, figs 12a-f, 13a-f, 14a-d.

MATERIAL EXAMINED: Mean lengths: Gulf of Naples: 5 females – TL 1.17 mm (1.09–1.22 mm), PRO 0.72 mm (0.67–0.74 mm); 3 males – TL 0.93 mm (0.93–0.94 mm), PRO 0.59 mm (0.59 mm). Liberia vicinity: 1 female – TL 1.22 mm, PRO 0.75 mm. Southwest Pacific: 11 females – TL 1.19 mm (1.04–1.29 mm), PRO 0.73 mm (0.67–0.76 mm); 13 males – TL 0.92 mm (0.85–0.97 mm), PRO 0.58 mm (0.53– 0.63 mm). Bermuda vicinity: 1 female – TL 1.20 mm, PRO 0.74 mm. Florida vicinity: 1 female – TL 1.20 mm, PRO 0.71 mm. Eastern mid-Pacific: 3 females – TL 1.26 mm (1.23–1.30 mm), PRO 0.75 mm (0.74–0.76 mm). Panama Basin: 1 female – TL 1.22 mm, PRO 0.73 mm (Table 4).

FEMALE: Body (Fig. 14e,f) stout; exoskeleton heavily cuticularised. Prosome anteriorly canaliculate and densely covered with refractile points.

Rostral area with thickened, rounded margin (Fig. 14g). First antenna and second antenna (Fig. 14h), with armament similar in number to that of *O. conifera.* Labrum (Fig. 14i) posteriorly protuberant; free margin divided into 2 truncated posteroventral lobes separated by a semicircular vertex, from which a thin, hyaline lamella covered with hyaline, petaloid setules is suspended. Two adjacent conspicuous sclerotised, spiniform protuberances anterior to vertex of labrum. Mandible (Fig. 14j) heavily sclerotised, with 5 elements; the blade-like element with terminal dentiform edge. First maxilla (Fig. 14k), second maxilla (Fig. 141), and maxilliped (Fig. 15a) heavily sclerotised, all with armament similar in number to that of *O. conifera.*

Legs 1–4 (Fig. 15b-e) with armament similar in number to that of *O. conifera.* Leg 5 (Fig. 15f) a short free segment; two terminal setae, the inner slightly longer; seta on body near leg. Leg 6 (*see* Fig. 14f) probably represented by spiniform setule on external genital area.

MALE: Body (Fig. 15g,h) densely covered with refractile points. Cephalosome with an irregular posterolateral cluster of about l6 hooded pores.

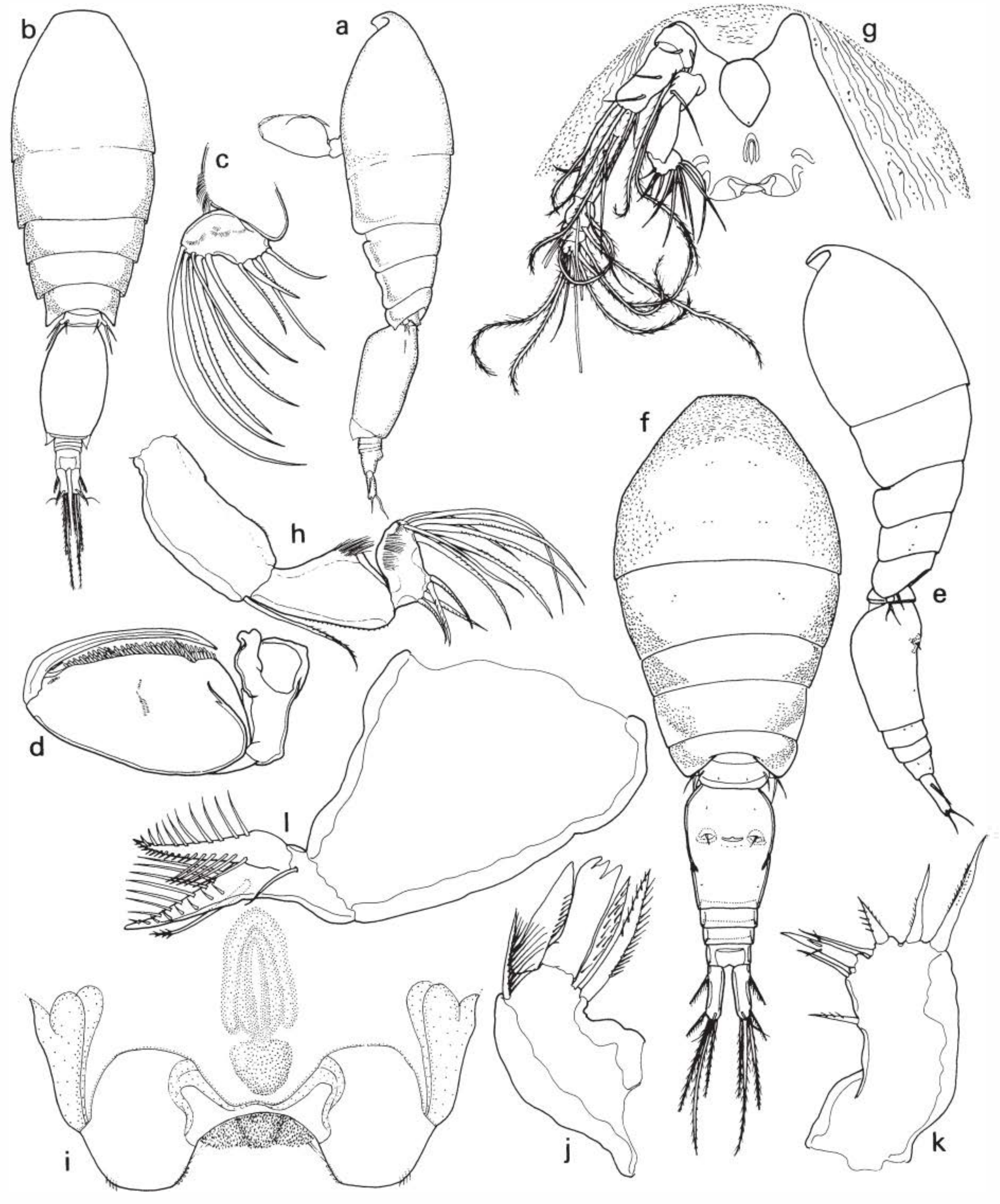


Fig. 14. ***Oncaea mediterranea*** **(Claus).** Male: a, lateral (q); b, dorsal (q); c, third segment of second antenna, right (s); d, maxilliped, left (v). ***Oncaea venusta*** **Philippi.** Female: e, lateral (q); f, dorsal (q); g, anterior of prosome, ventral (r); h, second antenna, right (s); i, labrum, ventral (u); j, mandible, right (u); k, first maxilla, left (u); l, second maxilla, right (w).

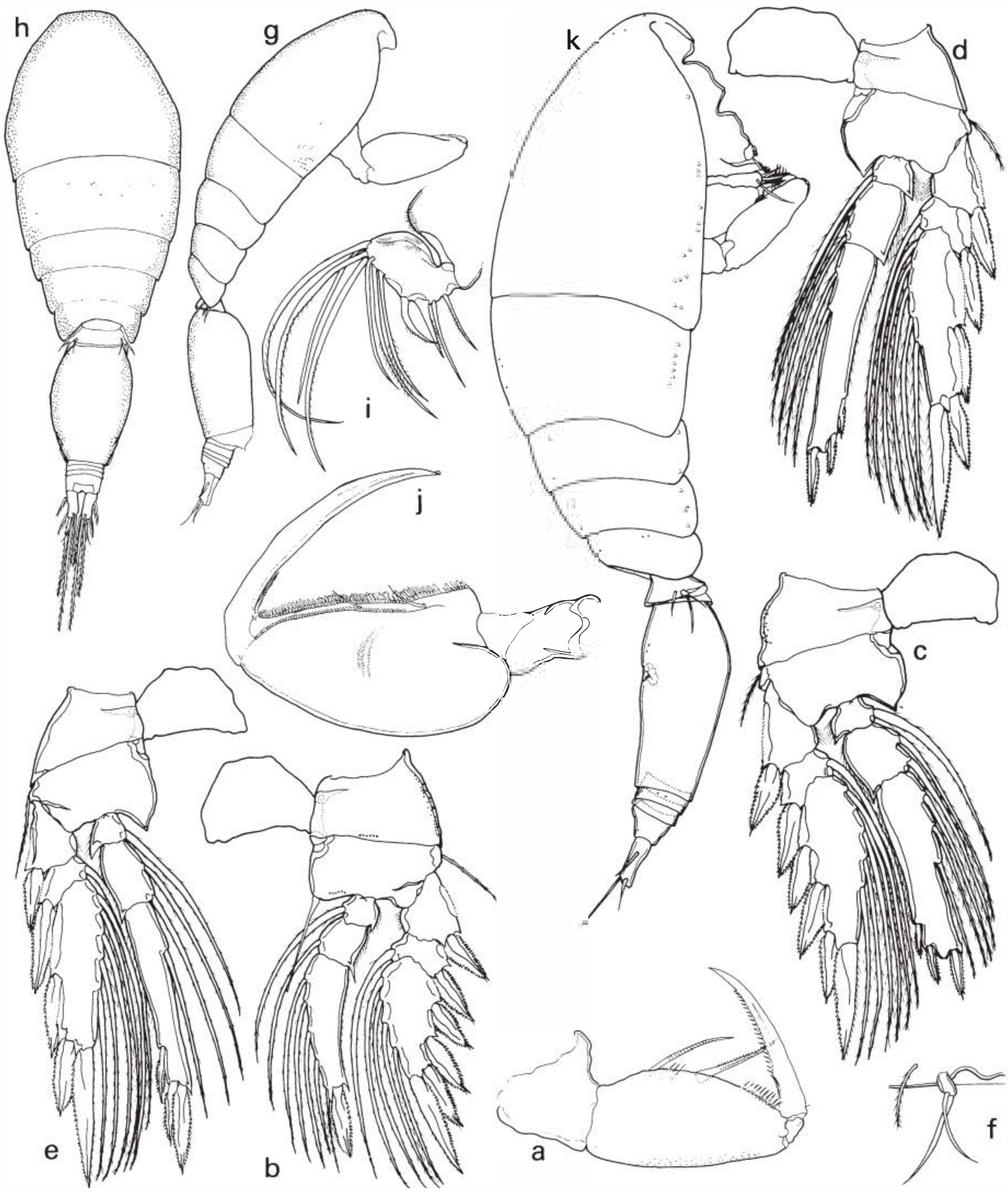


Fig. 15. *Oncaea venusta* **Philippi.** Female: a, maxilliped, right (s); b, leg 1 (y); c, leg 2 (y); d, leg 3 (y); e, leg 4 (y); f, leg 5 (s). Male: g, lateral (q); h, dorsal (q); i, third segment of second antenna, right (s); j, maxilliped, left (s). *Oncaea media* **Giesbrecht.** Female, 0.86 mm, Gulf of Naples: k, lateral (r).

Rostral area and mouthparts, except first antenna, second antenna, and maxilliped, as in female. First antenna with segments corresponding to terminal 3 of female fused in male; armament similar to corresponding segments of female, except for absence of distal seta on third segment. Second antenna similar to that of female except for armament of third segment on proximal inner surface (Fig. 15i), the fourth element, in group of four, being spiniform. Maxilliped (Fig. 15j) second segment with 2 rows of anterior small, delicate setules; claw with small terminal lamella; armament similar in number to that of *O. conifera.*

Swimming legs as in female. Leg 5 similar to that of female, but not delimited from first urosomal segment. Leg 6 (*see* Fig. 15g) represented by posterolateral flap on ventral surface of genital segment.

REMARKS: Although only one female *O. venusta* was found in the sample collected near Liberia, at least 100 specimens of another closely related new species, to be described elsewhere, were in that sample.

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	Depth of Haul (m)	Specimens
A292	surface	3 females
A295	surface	1 female, 2 males
	0–500	5 females
	400–1000	1 female
A302	0–500	1 male
A303	450–1000	1 male
F945	0–200	2 females, 1 male
	0–500	9 females, 3 males
F946	0–200	12 females, 3 males
	200–500	6 females, 1 male
	0–1000	13 females
F947	0–200	3 females
	0–500	3 females
I130	0–6	1 female
I133	0–6	1 female
Goat Island		11 females, 10 males

DISTRIBUTION: Widespread in the Mediterranean (Philippi 1843; Giesbrecht 1891, 1892); Atlantic Ocean (Giesbrecht 1891: 5°N–2°S, 24–38°W); Pacific Ocean (Giesbrecht 1891: 87°W–137°E, 20°N–4°S); Northeast Pacific near Japan (Mori 1937: in warmer waters 23–41°N; Ho 1984: 10 m); off Sydney, Australia (Dakin & Colefax 1940); subtropical Southwest Pacific (this memoir: surface, 0–200, 200–500, 400–1000 m).

Oncaea media Giesbrecht, l89l

(Figs 15k, 16a-k, 17a-i, 26b)

Oncaea media Giesbrecht, 1891: 477; 1892: 591–600, 602, 603, 756, 774, pl. 2, fig. 12, pl. 47, fig. 1 (not fig. 11), 29–33, 40; Tanaka 1960: 69, 70, pl. 31, figs 4–9.

MATERIAL EXAMINED: Mean lengths: Gulf of Naples: 20 females – TL 0.85 mm (0.74–0.92 mm), PRO 0.56 mm (0.48–0.59 mm); 1 male – TL 0.68 mm, PRO 0.46 mm. Southwest Pacific: 24 females – TL 0.88 mm (0.80–0.96 mm), PRO 0.58 mm (0.55–0.63 mm); 6 males – TL 0.63 mm (0.59–0.67 mm), PRO 0.43 mm (0.41–0.45 mm). Florida vicinity: 3 females – TL 0.76 mm (0.74–0.78 mm), PRO 0.49 mm (0.48–0.50 mm); 1 male – TL 0.61 mm, PRO 0.43 mm. Panama Basin: 30 females – TL 0.75 mm (0.70– 0.79 mm), PRO 0.53 mm (0.49–0.55 mm) (Table 4).

FEMALE: Body (Figs 15k, 16a) with scattered refractile points and pores, associated with conspicuous, cuticular channels, near lateral margins of prosomal segments. Exoskeleton moderately chitinised. Prosome length almost double that of urosome; genital segment length about double that of width, with similar proportion to total length of remaining segments of urosome; a double scallop pattern of sclerotisation between gonopores, located at posterior margin of anterior third of segment; caudal ramus length about double that of width.

Rostral area with thickened, rounded posteroventral margin. First antenna (Fig. 16b) and second antenna (Fig. 16c) with armament similar in number to that of *O. conifera*. Labrum (Fig. 16d) resembles that of *O. venusta* except for rounded lobes. Vertical rod-shaped sclerotised protuberance above a spiniform knob anterior to vertex of labrum.

Mandible (Fig. 16e) similar to that of *O. venusta*, blade-like element with terminal dentiform edge. First maxilla (Fig. 16f), second maxilla (Fig. 16g), and maxilliped (Fig. 16h) with armament similar in number to that of *O. conifera.*

Legs l–4 (Figs 16i-k, 17a) with armament similar in number to that of *O. conifera*. Leg 5 (Fig. 17b) with small free segment; 2 terminal setae, the outer two-thirds the length of inner seta; seta on body near leg. Leg 6 (*see* Fig. 16a) probably represented by spiniform setule on external genital area.

MALE: Body (Fig. 17c,d) with scattered refractile points, especially dense on urosome. Cephalosome with posterolateral sinuous line of small pores.

Rostral area and mouthparts, except first antenna, second antenna, and maxilliped, as in female. First antenna with segments corresponding to terminal 3 of female fused; armament similar to corresponding segments of female, except for absence of distal seta

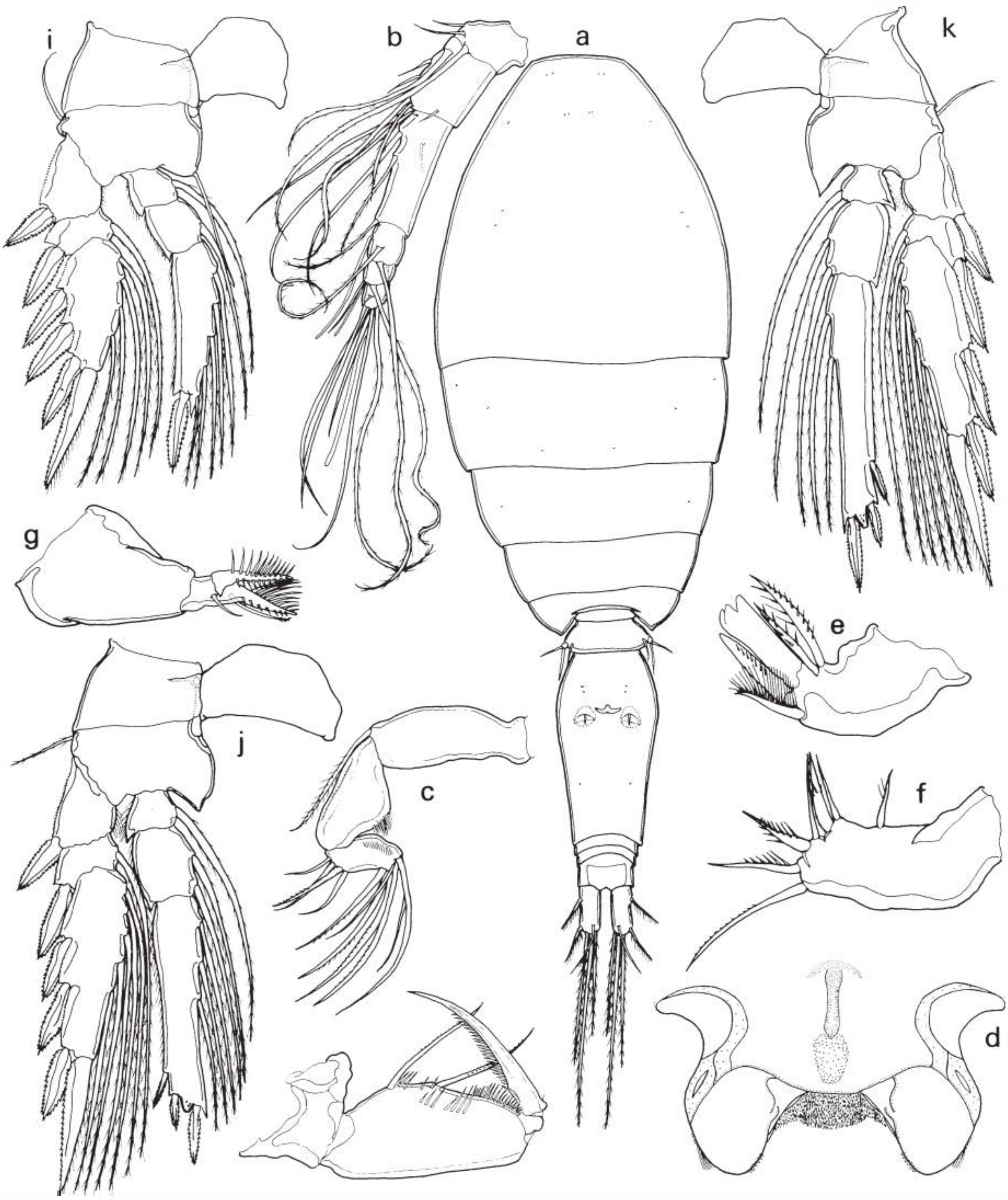


Fig. 16. ***Oncaea media*** **Giesbrecht.** Female: a, dorsal (r); b, first antenna, right (s); c, second antenna, right (z); d, labrum, ventral (t); e, mandible, right (u); f, first maxilla, left (u); g, second maxilla, left (z); h, maxilliped, right (z); i, leg 1 (z); j, leg 2 (z); k, leg 3 (z).

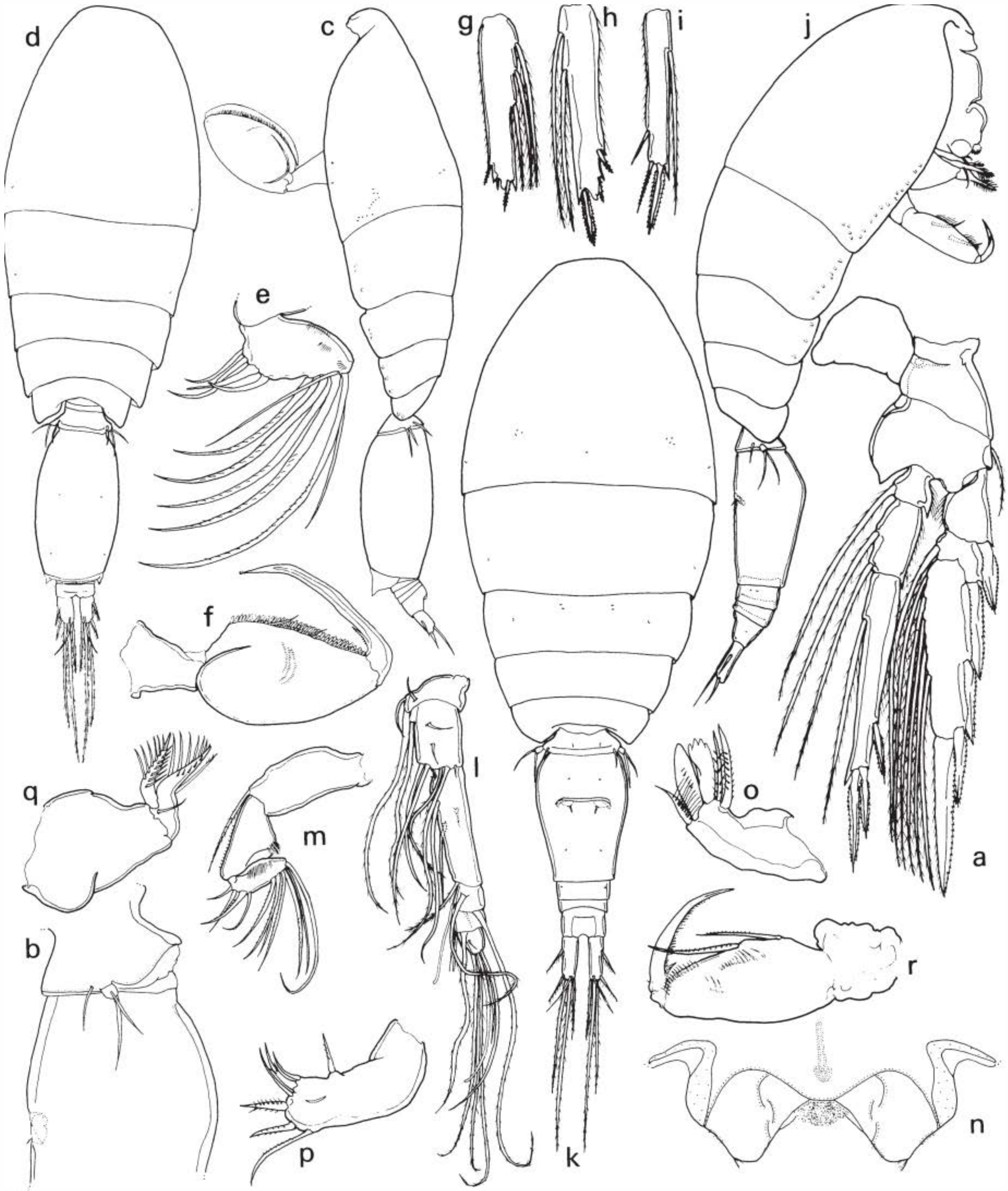


Fig. 17. ***Oncaea media*** **Giesbrecht.** Female: a, leg 4 (z); b, segment of leg 5 (z); male, 0.68 mm, Bay of Naples: c, lateral (r); d, dorsal (r); e, third segment of second antenna, left (t); f, maxilliped, right (z); g, third endopod of leg 2 (z); h, third endopod of leg 3 (z); i, third endopod of leg 4 (z). ***Oncaea scottodicarloi*** **n. sp**. Female, 0.72 mm, Gulf of Naples: j, lateral (r), k, dorsal (r); l, first antenna, right (s); m, second antenna, right (z); n, labrum, ventral (t); o, mandible, right (t); p, first maxilla, right (t); q, second maxilla, right (z); r, maxilliped, left (z).

on third segment. Second antenna similar to that of female except for armament of third segment on proximal inner surface (Fig. 17e); the fourth element, in group of 4, spiniform. Maxilliped (Fig. 17f) lacking small segment proximal to claw of female; second segment with several rows of anterior small, delicate setules; claw with small terminal lamella; armature similar to that of *O. conifera* male.

Swimming legs as in female, except for pattern of terminal endopod spines of legs 2–4 (Fig. 17g-i). Leg 5 (*see* Fig. 17c) small, not delimited from thoracic segment; shape of segment and length of setae similar to those of female; setae on body near leg. Leg 6 represented by posterolateral flap (*see* Fig. 17c) on ventral surface of genital segment.

Remarks: Giesbrecht (1891) recorded this species from 99–115° W, 5° N–3° S. In 1892, he recorded it from near Naples as well as from the Pacific, with size range of females 0.55–0.82 mm and males 0.6–0.63 mm. The sample from the Gulf of Naples, which we examined, had more than 125 females, 0.74–0.92 mm; they were similar to all of Giesbrecht's figures of the species except for plate 47, figure 11, dorsal view of urosome; that figure depicts the genital segment length to be about one-fourth longer than total length of segments which follow, and a straight line of sclerotisation between, but anterior to, the gonopores.

Sewell (1947) recorded *O. media* females "forma major" 0.733–0.817 mm and "forma minor" 0.58–0.65 mm from the northern Arabian Sea, without any figures or descriptive details. This has caused much confusion in the identification of *O. media*, especially since the urosome illustrated by Giesbrecht was that of the following species, *O. scottodicarloi*.

New Southwest Pacific Records:

Station No.	Depth of Haul (m)	Specimens
A292	surface	1 female
A302	surface	1 female
A303	surface	1 female
A332	surface	5 females
F945	0–200	3 females
	0–500	4 females
F946	0–200	4 females
	0–1000	6 females
F947	0–200	5 females
	0–500	1 female
I130	0–6	1 female
I133	0–6	1 female, 1 male
Goat Island		16 females, 5 males

Distribution: Widespread in the South China Sea (Tanaka 1960: surface); Indian Ocean (Tanaka 1960: surface); south of South Africa (Tanaka 1960, off Cape of Good Hope: surface); eastern tropical Pacific (Giesbrecht 1891: 13°N–3°S, 99°–32°W, 0–4000 m); Mediterranean (Giesbrecht 1892); subtropical Southwest Pacific this memoir: surface, 0–200, 0–500, 0–1000 m).

Oncaea scottodicarloi n. sp. (Figs 17j-r, 18a-k, 27a)

Oncaea media Giesbrecht, 1892, pl. 47, fig. 11 only.

Material Examined: Mean lengths: Gulf of Naples: 23 females – TL 0.72 mm (0.67–0.78 mm), PRO 0.47 mm (0.42–0.51 mm); 4 males – TL 0.58 mm (0.57–0.60 mm), PRO 0.40 mm (0.37–0.42 mm). Southwest Pacific: 21 females – TL 0.70 mm (0.67–0.74 mm), PRO 0.47 mm (0.42–0.52 mm); 6 males – TL 0.58 mm (0.57–0.60 mm), PRO 0.40 mm (0.37–0.41 mm). Bermuda vicinity: 6 females – TL 0.65 mm (0.61–0.68 mm), PRO 0.42 mm (0.40–0.44 m). Florida vicinity: 1 female – TL 0.59 mm, PRO 0.41 mm; 2 males – TL 0.53, 0.56 mm, PRO 0.39, 0.41 mm. Panama Basin: 30 females – TL 0.66 mm (0.63–0.70 mm), PRO 0.42 mm (0.39–0.44 m) (Table 4).

Types: Holotype: female 0.68 mm (Gulf of Naples, 0–100 m) deposited in the Naples Museum. Allotype: male 0.58 mm (Gulf of Naples, 0–100 m) deposited in the Naples Museum. Paratypes: 40 females and 2 males deposited in the Naples Museum (all Laboratorio di Oceanografia Biologica, Stazione Zoologia, Naples, paratypes). 16 females and 5 males deposited in the collection of the New Zealand Oceanographic Institute, NIWA, paratype number P-993.

Female: Body (Fig. 17j, k) with scattered refractile points and pores associated with conspicuous cuticular channels, parallel to lateral margins of first and second segments of prosome. Exoskeleton moderately chitinised. Prosome length about double that of urosome; genital segment longer than width of segment, at the widest point, by one-third, and one-fourth longer than total length of segments which follow; a straight line of sclerotisation between, but anterior to, gonopores, located between upper one-fourth and one-half of segment; caudal ramus length about 3 times that of width.

Rostral area with thickened, acutely rounded posteroventral margin. First antenna (Fig. 17l) and second antenna (Fig. 17m) with armament similar in number to that of *O. conifera*.

Labrum (Fig. 17n) resembles that of *O. venusta* except for lobes being acutely rounded. Vertical rod-shaped sclerotised protuberance anterior to ver-

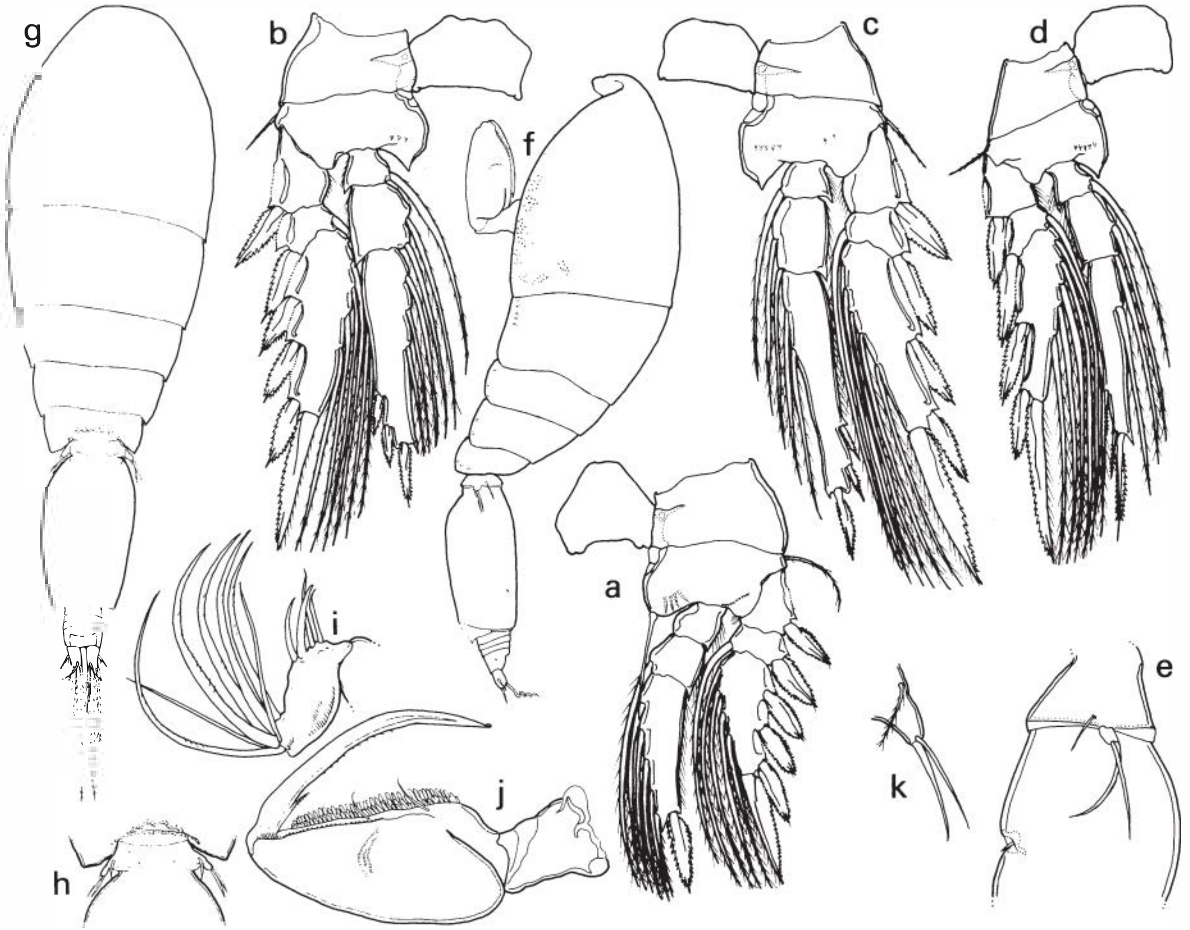


Fig. 18. ***Oncaea scottodicarloi*** **n. sp.** Female: a, leg l (z); b, leg 2 (z); c, leg 3 (z); d, leg 4 (z); e, segment of leg 5 (z). Male, 0.59 mm, Gulf of Naples: f, lateral (r); g, dorsal (r); h, posterior of fifth prosomal segment and segment of leg 5, dorsal (s); i, third segment of second antenna, left (t); j, maxilliped, left (w); k, leg 5 (u).

tex of labrum.

Mandible (Fig. 17o) similar to that of *O. venusta,* blade-like element with terminal dentiform edge. First maxilla (Fig. 17p), second maxilla (Fig. 17q), and maxilliped (Fig. 17r) with armament similar to that of *O. conifera.*

Legs 1–4 (Fig. 18a-d) with armament similar to that of *O. conifera.* Leg 5 (Fig. 18e) with small free segment; two terminal setae almost equal in length, the slightly wider inner seta almost always curved dorsally; seta on body near leg. Leg 6 (*see* Fig. 17k) probably represented by spiniform setule on external genital area.

MALE: Body (Fig. 18f,g) with scattered, posterolateral clusters, and dense clusters of refractile points near lateral edge of cephalosome, all associated with pores. Fifth segment of prosome with a dorsoposterior scrolled pattern of sclerotisation (Fig. 18h).

Rostral area and mouthparts, except first antenna, second antenna, and maxilliped, as in female. First antenna with segments corresponding to terminal 3 of the female fused in male; armament similar to corresponding segments of female, except for absence of distal seta on third segment. Second antenna similar to that of female except for armament of third segment on the proximal inner surface (Fig. 18i); the fourth element, in group of 4, spiniform. Maxilliped (Fig. 18j) lacking small segment proximal to claw of female; second segment with several rows of anterior small, delicate setules; claw with short spinules on concave surface; small terminal lamella; armament similar to that of *O. conifera* male.

Swimming legs as in female. Leg 5 not delimited from thoracic segment; setae slightly shorter than those of female, one seta spiniform. Leg 6 (*see* Fig. 18f) represented by posterolateral flap on ventral surface of genital segment.

Etymology: This species is named for the late Bruno Scotto di Carlo, Stazione Zoologica, who published significant copepod investigations of the Mediterranean Sea. Dr Scotto di Carlo also sent the valuable sample from the Gulf of Naples, which enabled us to make critical diagnoses of species described by Giesbrecht.

Remarks: Giesbrecht's 1891 and 1892 records of *O. media*, near Naples as well as from the eastern Pacific, probably included both *O. scottodicarloi* and *O. media*, since both were included in his illustrations and range of sizes. The sample from the Gulf of Naples, which we examined, had more than 125 females of *O. media*, 0.74–0.92 mm. All of Giesbrecht's figures of the species matched *O. media*, except for plate 47, figure 11, dorsal view of female urosome, which resembles that of *O. scottodicarloi*. There were also more than 125 females of *O. scottodicarloi*, 0.67–0.78 mm, in the Gulf of Naples sample. The relative lengths of segments of the urosome, the form and location of the sclerotisation between gonopores, and relative lengths of endopod spines of leg 4 are important distinctions between the two species.

Oncaea curta Sars, 1916 (6 females: 0.59–0.71 mm) and several small undescribed species which resemble *O. media* and *O. scottodicarloi* were in the Gulf of Naples sample, possibly accounting for the lower end of Giesbrecht's size range. *Oncaea curta*, also examined from samples collected near Plymouth, U.K. (9 females: 0.63–0.70 mm) and Gulf of Mexico (14 females: 0.61–0.69 mm; 6 males: 0.46–0.49 mm), has characters similar to those of *O. scottodicarloi*. *Oncaea curta* may be identified by the genital segment length being about equal to the total length of succeeding segments, lack of sclerotisation between gonopores, leg 1 terminal endopod spine length being about equal to that of third outer spine of third exopod, shorter exopod spines of legs 2–4, especially the second exopod, and in the lengths of leg 5 setae, the longer being twice that of the shorter seta. Malt's (1982a) figure 3v', of *O. media*, repeated as *O. media* forma *minor* (Malt 1983b, fig. 10a) resembles *O. curta*.

Several undescribed species, closely related and similar in size to *O. scottodicarloi* and *O. media*, occurred in samples from the Gulf of Mexico, near Florida, and Liberia.

New Southwest Pacific Records:

Station No.	Depth of Haul (m)	Specimens
A295	surface	1 female
I130	0–6	3 females
I133	0–6	1 female
Goat Island		21 females, 6 males

Distribution: Mediterranean (Giesbrecht 1892 as *O. media* pl. 47, fig. 11; this memoir); Atlantic near Bermuda, Florida, and the Panama Basin region of the eastern Pacific (this memoir); subtropical Southwest Pacific (this memoir: surface).

Oncaea prolata Heron, 1977

(Figs 19a-c, 20a-d, 26d)

Oncaea notopus Giesbrecht, 1902: 41, pl. 13, figs 1–6. (Not *O. notopus* Giesbrecht, 1891.)
Oncaea prolata Heron, 1977: 68, figs 19g-r, 20a-c (female only).

Material Examined: Mean length of 8 females – TL 0.68 mm (0.64–0.71 mm), PRO 0.46 mm (0.44–0.48 mm); 1 male – TL 0.50 mm, PRO 0.36 mm.

Female: The female of *O. prolata* was described from the Southwest Pacific-Antarctic area (Heron 1977) where no males were found.

Male: Body (Fig. 20a,b) with scattered refractile points. Prosome slightly longer than double the length of urosome. Urosome first segment with transverse sclerotised line dorsoposteriorly. Rostral area and mouthparts, except first antenna and maxilliped, as in female. First antenna with segments corresponding to terminal 3 of the female fused in male; arma-

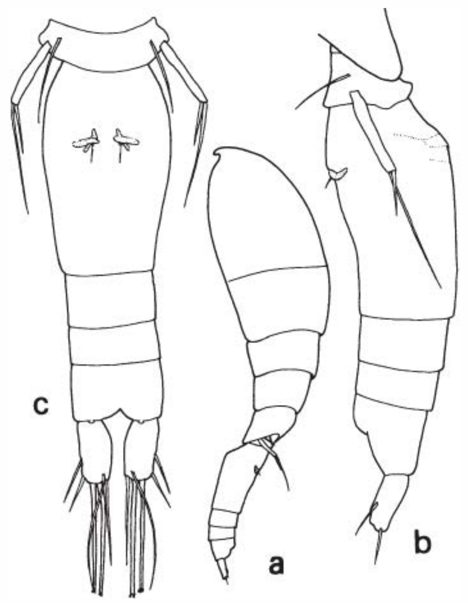


Fig. 19. ***Oncaea prolata*** **Heron.** Female: a, lateral; b, urosome, lateral; c, urosome, dorsal. (From Heron 1977, fig. 19g, h, i.)

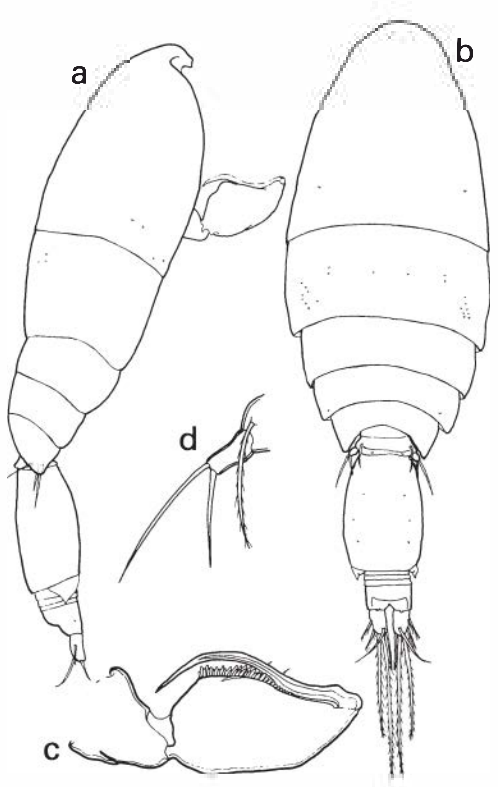


Fig. 20. ***Oncaea prolata*** **Heron.** Male: a, lateral (r); b, dorsal (r); c, maxilliped, left (s); d, leg 5 (u).

ment similar to corresponding segments of female, except for absence of distal seta on third segment. Maxilliped (Fig. 20c) lacking small segment proximal to claw of female; claw with sinuous profile; armament similar to that of *O. conifera* male.

Swimming legs as in female. Leg 5 (Fig. 20d) a free segment; long terminal seta about 1.7 times length of shorter seta; seta on body near leg. Leg 6 (*see* Fig. 20a) represented by posterolateral flap on ventral surface of genital segment.

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	Depth of Haul (m)	Specimens
B109	0–125	7 females, 1 male
B113	0–500	1 female

DISTRIBUTION: Southwest Pacific-Antarctic (Heron 1977: 1000–2000, 0–1000, 0–500 m); Atlantic sector of the Antarctic (Giesbrecht 1902 as *O. notopus*: 0–500 m); Antarctic Convergence region of the Southwest Pacific (this memoir: 0–125, 0–500 m).

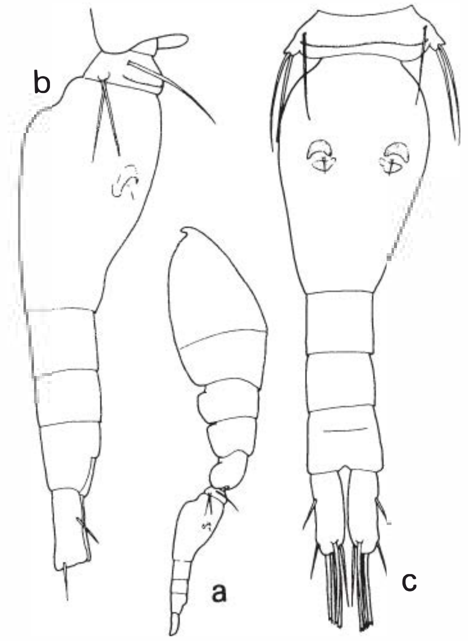


Fig. 21. ***Oncaea curvata*** **Giesbrecht.** Female: a, lateral; b, urosome, lateral; c, urosome, dorsal. (From Heron 1977, fig. 21d,e,f.)

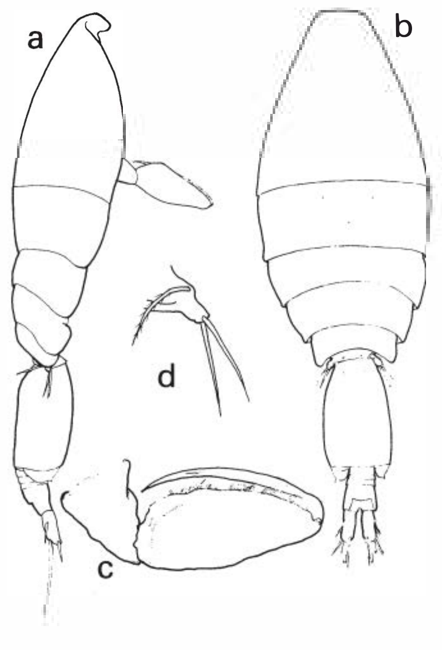


Fig. 22. ***Oncaea curvata*** **Giesbrecht**. Male: a, lateral (r); b, dorsal (r); c, maxilliped, right (r); d, leg 5 (u).

Oncaea curvata Giesbrecht, 1902
(Figs 21a-c, 22a-d, 25c)

Oncaea curvata Giesbrecht, 1902: 42, pl. 13, figs 12–17; Tanaka 1960: 68, 69, pl. 30, figs 1–11, pl. 31, figs 1–3; Heron 1977: 70, fig. 21d-q (female only).

MATERIAL EXAMINED: Mean length of 6 females – TL 0.61 mm (0.59–0.67 mm), PRO 0.40 mm (0.37–0.42 mm); 2 males – TL 0.48, 0.49 mm, PRO 0.31, 0.33 mm.

MALE: Exoskeleton thinly chitinised, the prosome with a tapered outline (Fig. 22a, b), both characters similar to those of female. Only male appendages showing sexual dimorphism are first antenna and maxilliped. Segments of first antenna corresponding to terminal 3 of female fused in the male; armament similar to corresponding segments in female, except for absence of distal seta on third segment. Maxilliped (Fig. 22c) lacking the small segment proximal to claw of female; second segment with 2 proximal anterior semicircular rows of small setules; armament similar to that of *O. conifera* male.

Swimming legs as in female. Leg 5 (Fig. 22d) similar to that of female, small and not delimited from body; two terminal setae about equal in length; seta on body near leg. Leg 6 represented by posterolateral flap (*see* Fig. 22a) on ventral surface of genital segment.

REMARKS: *Oncaea curvata* was collected only at the southernmost station. The female of *O. curvata* was described from specimens of a southwest Pacific-Antarctic sample (Heron 1977) in which no males were found.

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	Depth of Haul (m)	Specimens
B109	0–125	4 females
	0–500	4 females, 2 males

DISTRIBUTION: Atlantic sector of the Antarctic (Giesbrecht 1892: surface, 0–500 m); Indian Ocean sector of the Antarctic (Tanaka 1960: 0–200, 0–250, 0–400 m); Southwest Pacific Antarctic Convergence zone (Heron 1977: 0–1000 m; this memoir: 0–125, 0–500 m).

Oncaea lacinia Heron, English & Damkaer, 1984
(Figs 23a-e, 26b)

Oncaea lacinia Heron, English & Damkaer, 1984: 476–478, figs 14f-o, 15a-g.

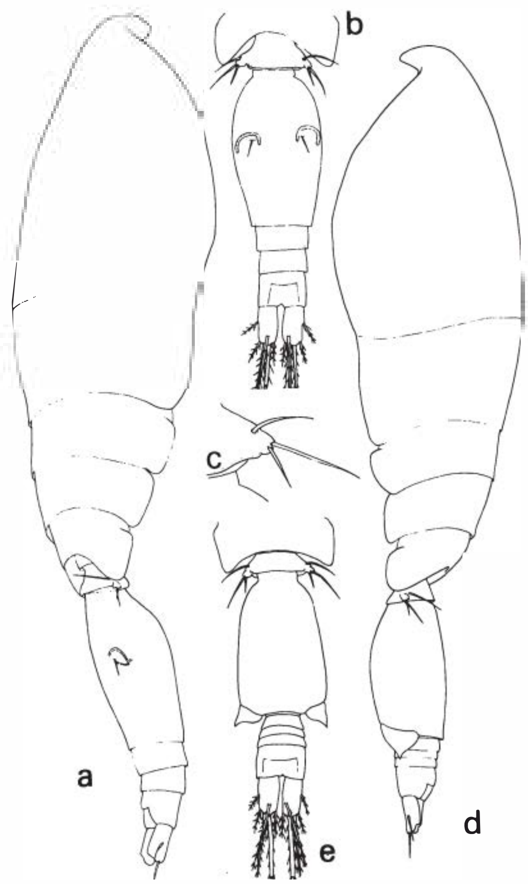


Fig. 23. ***Oncaea lacinia*** **Heron, English & Damkaer.** Female: a, lateral; b, urosome, dorsal; c, leg 5. Male: d, lateral; e, urosome, dorsal. (From Heron, English & Damkaer 1984, figs 14f,g, 15c,d,e.)

MATERIAL EXAMINED: One female – TL 0.42 mm, PRO 0.26 mm found at the southernmost station.

REMARKS: *Oncaea lacinia* was the most abundant oncaeid (4,471 females, 3,454 males) occurring in samples collected (100 µm mesh aperture nets) from Fletcher's Ice Island, floating in the Canadian Basin of the Arctic Ocean, May-September, 1968 and has also been recorded from the Norwegian Sea (Heron *et al.* 1984).

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	Depth of Haul (m)	Specimens
B109	0–125	1 female

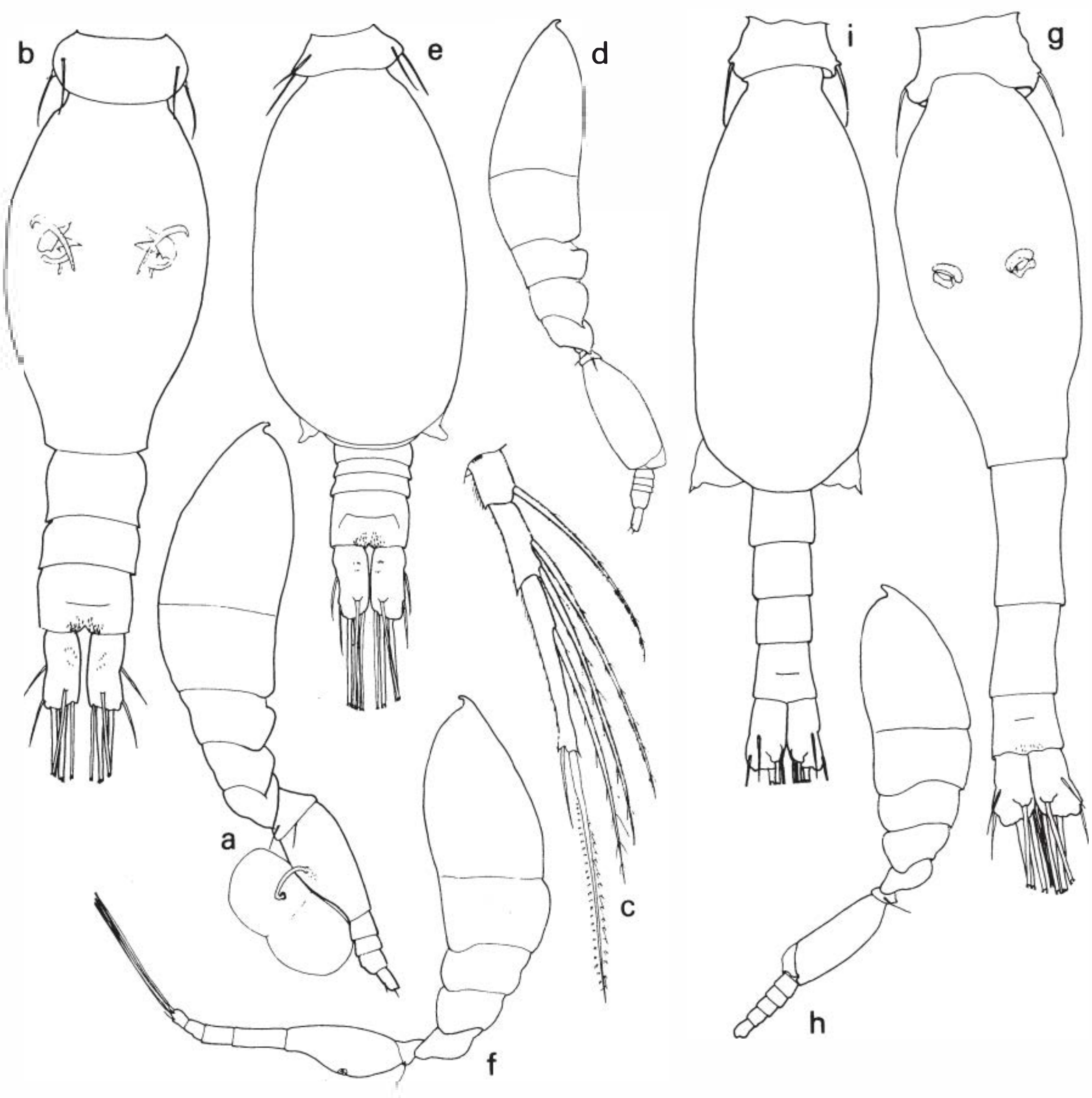


Fig. 24. ***Oncaea englishi*** **Heron.** Female: a, lateral; b, urosome, dorsal; c, leg 4 endopod. Male: d, lateral; e, urosome, dorsal. ***Conaea rapax*** **Giesbrecht.** Female: f, lateral; g, urosome, dorsal; male: h, lateral; i, urosome, dorsal. (From Heron 1977, figs 25n,o, 27c,f,h, 30d,f, 31h, 32b.)

Distribution: Arctic Ocean 83–85° N, 142–157° W (Heron *et al.* 1984: 250–300, 300–350, 351–400, 400–500, 500–1000, 1000–1500, 1500–2000, 2000–2500, 2500– 3000 m); Norwegian Sea 66°N, 2°E (Heron *et al.* 1984: 1000–2000 m); Antarctic Convergence zone of the Southwest Pacific (this memoir: 0–125 m).

Oncaea englishi Heron, 1977 (Figs 24a-e, 25d)

Oncaea englishi Heron, 1977: 79–82, figs 25n,o, 26, 27; Malt 1983b: 4, 5, 8, 9, fig. 17a-c; Malt 1983c: 451, 454, figs 1n-w, 2e,f, 3b,c; Heron, English & Damkaer 1984: 478, 479.

Material Examined: A few specimens of *O. englishi* from the southernmost and one of the most northern Southwest Pacific stations; mean of 4 females – TL 0.98 mm (0.96–1.00 mm), PRO 0.67 mm (0.65– 0.70 mm), 2 males – TL 0.89, 0.90 mm, PRO 0.59, 0.60 mm (Table 4).

Remarks: *Oncaea englishi* was originally described from the Southwest Pacific-Antarctic area. Subsequently, it was found to be one of the most abundant Oncaeidae in a collection from the Arctic Ocean, and the species was also recorded from the Norwegian Sea (Heron *et al.* 1984); it also was recorded at several localities in the mid-eastern Atlantic and the southern Adriatic Trench (Malt 1983a, b). *Oncaea* *englishi* has also been found in a number of the deep samples collected in the Northeast Pacific and at the mouth of the Strait of Juan de Fuca, northwest of the state of Washington: 54 females - TL 0.92 mm (0.85–1.03 mm), PRO 0.63 mm (0.59–0.67 mm); 55 males – TL 0.81 mm (0.78–0.88 mm), PRO 0.55 mm (0.52–0.59 mm) (Table 4).

New Southwest Pacific Records:

Station No.	Depth of Haul (m)	Specimens
A295	400–1000	1 female
A302	500–1000	1 female
A462	0–1000	2 females, 2 males
B109	0–125	2 females

Distribution: Southwest Pacific-Antarctic (Heron 1977; Heron *et al.* 1984: 1000–2000, 0–1000 m); North Atlantic and Mediterranean (Malt 1983b); Arctic (Heron *et al.* 1984: 500–1000, 1000–1500, 1500–2000, 2000–1500 m); Northeast Pacific (Heron *et al.* 1984: 0–3000, 0–200 m); Norwegian Sea (Heron *et al.* 1984: 1000–2000 m); subtropical (400–1000 m), Antarctic Convergence region (0–125 m) and just north of the Ross Sea (0–1000 m) (this memoir).

Conaea Giesbrecht, 1891

Conaea resembles *Oncaea* but differs in the following characters: 3-segmented second antenna with terminal segment as long or longer than first segment and with prehensile armament; legs 1–4 third exopod segments with outer spine formula III, II, II, I; leg 4 endopod shorter than exopod with third segment reduced (not longer than either the first or second segments); a single terminal spine, the length at least double that of segment. Leg 5 reduced to two elements, either a small spinule and a lateral seta or 1 seta and a lateral seta. (Heron 1977)

Type Species: *Conaea rapax* Giesbrecht, 1891

Remarks: Malt (1982b) subsumed *Conaea* and *Epicalymma* into the genus *Oncaea*. We consider her reasons to be unsubstantiated and therefore continue to support Giesbrecht's judgment that *Conaea* is a valid genus. When Giesbrecht described the genus, *C. rapax* was the sole species. Since then, three additional species of *Conaea* have been recognised, and the closely related genus *Epicalymma*, with five species, has been described. We believe that in addition to *Conaea* and *Epicalymma*, some described species of *Oncaea* should be assigned to, at least, three new genera. Differences in exopod spine formulae of swimming legs signify that other diagnostic differences also may be recognised. To determine and describe the new genera, species in question should be re-examined from fresh material, rather than relying only on figures, which we are not presently prepared to undertake.

The following combination of characters should be considered in separating the three genera:

Swimming legs 1-4 third exopod short spine formula:

	Oncaea	*Conaea*	*Epicalymma*
1-	I I III	I I III	I I II
2-	I I III	I I II	I I III
3-	I I II	I I II	I I III
4-	I I II	I I I	I - I

Caudal dorsal seta:
- Never longer than about two-thirds the length of inner long terminal seta (*Oncaea*); or
- With base surrounded by a dilation of the segment, seta almost as long as inner and outer long setae (the three long and resilient) (*Conaea*, *Epicalymma*).

Second antenna third segment:
- Not prehensile, length shorter than that of first segment (*Oncaea*); or
- Prehensile, as long or longer than first segment (*Conaea*, *Epicalymma*).

Second maxilla with second segment length:
- Less than that of first segment (*Oncaea*); or
- Greater than that of first segment (*Conaea*, *Epicalymma*).

Leg 2 exopod length:
- Always shorter than that of endopod (*Oncaea*); or
- Longer than that of endopod (*Conaea*, *Epicalymma*).

Legs 2 and 3 endopods:
- Terminating with a conical process between two apical spines (*Oncaea*); or
- Without terminal conical process (*Conaea*, *Epicalymma*).

Leg 4 third endopod:
- Longer spine length not exceeding that of segment (*Oncaea*); or
- Single spine length at least double that of segment (*Conaea*); or
- Longer spine length at least three times that of segment (*Epicalymma*).

Leg 5 represented by:
- Two setae, or one seta and one spinule, on a segment, free or unsegmented, plus a lateral seta (*Oncaea*); or
- Only one seta or spinule plus a lateral seta (*Conaea*, *Epicalymma*).

Conaea contains the following species: *C. expressa* (Gordejeva, 1973); *C. hispida* Heron, 1977 (male unknown); *C. rapax* Giesbrecht, 1891; *C. succurva* Heron, 1977 (male unknown). *Antaria gracilis* Dana, 1853 is not conspecific with *Oncaea gracilis* T. Scott, 1894 (which is probably *Conaea rapax*) and *A. gracilis* is not a *Conaea* (Heron 1977). The following species has been taken in the Southwest Pacific.

Conaea rapax Giesbrecht, 1891 (Figs 24f-i, 27c)

Conaea rapax Giesbrecht, 1891: 477; 1892: 82, 605, pl. 48, figs 50–59; Heron 1977: 86–90, figs 30d-j, 31a-h, 32a-d.
Oncaea gracilis (Dana): T. Scott 1894: 116, pl. 13, figs 4–12; Malt 1983a: 3–5, figs 14a-e.
Conaea gracilis (Dana): Wilson 1950: 191, pl. 5, figs 36–46; Boxshall 1977: 145–148, figs 22a-g, 23a-f.

REMARKS: Dana's (1853) figures for *Antaria gracilis* could belong to *Oncaea* or *Corycaeus*. Scott (1894) stated that his own specimen "should perhaps be ascribed" to *Conaea rapax*.

Conaea rapax was represented in the Southwest Pacific by three females, mean length: TL 1.04 mm (1.02–1.05 mm), PRO 0.66 mm (0.63–0.67 mm) and one male – TL 0.94 mm, PRO 0.63 mm. *Conaea rapax* has also been found in deep samples collected in the Northeast Pacific and at the mouth of the Strait of Juan de Fuca, northwest of the state of Washington: 12 females – TL 1.02 mm (0.97–1.14 mm), PRO 0.63 mm (0.60–0.67 mm); 8 males – TL 0.92 mm (0.87–1.00 mm), PRO 0.59 mm (0.56–0.63 mm) (Table 4).

NEW SOUTHWEST PACIFIC RECORDS:

Station No.	Depth of Haul (m)	Specimens
A292	500–1000	1 female
A295	400–1000	1 male
A302	500–1000	2 females

DISTRIBUTION: *Conaea rapax* is a widespread species with records from the Eastern Pacific (Giesbrecht 1891, 1892), Gulf of Guinea (Scott 1894), Fiji Islands area (Wilson 1950), near the Cape Verde Islands (Boxshall 1977), and just north of the convergence in the Southwest Pacific-Antarctic area (Heron 1977).

Conaea expressa (Gordejeva, 1973), new comb.

Oncaea expressa Gordejeva, 1973: 1573, figs 10–19.

REMARKS: *Conaea expressa*, described from specimens from the tropical Atlantic, is transfered to the genus *Conaea*, which includes, in addition to *C. rapax*, two Antarctic species, *C. succurva* Heron, 1977 and *C. hispida* Heron, 1977.

Conaea expressa may be separated from the other species by comparing differences in lengths of swimming leg spines, especially those of leg 2 endopod terminal spiniform seta length being about twice that of the short seta and about the same length as the terminal spine of the exopod.

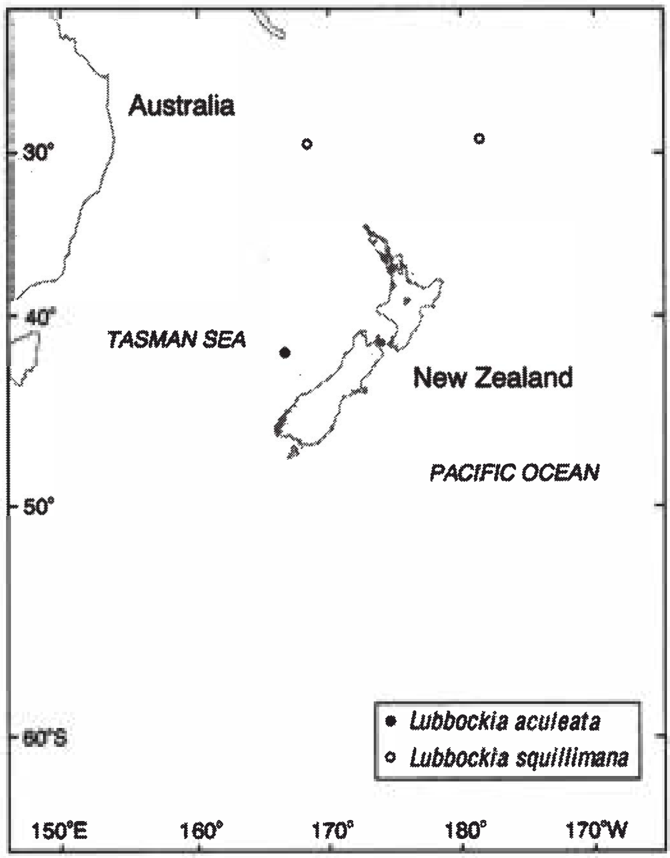
Epicalymma Heron, 1977

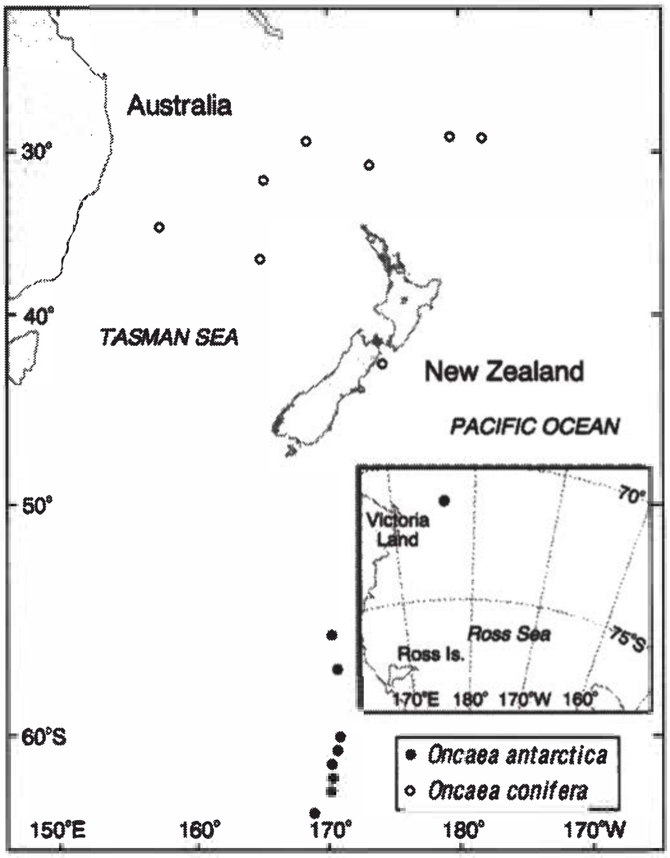
Body with moderately slender prosome. Three-segmented second antenna with terminal segment as long or longer than first segment and with prehensile armament. Legs 1–4 exopod spines with serrate narrow hyaline flange; third exopod segments with outer-spine formula II; III; III; I; leg 4 third endopod longer-spine length at least three times that of segment. Leg 5 reduced to two elements, 1 seta and a lateral seta. (Heron 1977)

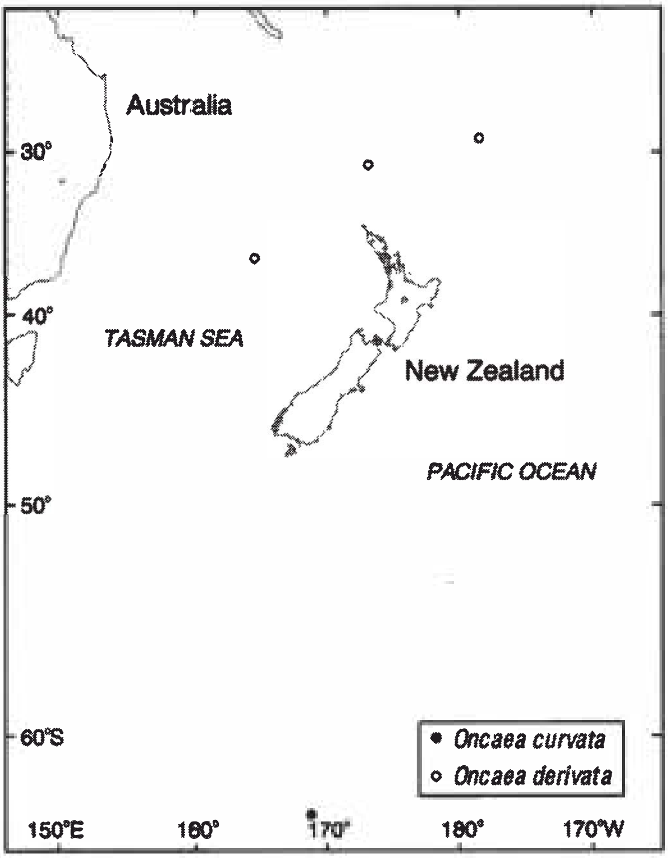
TYPE SPECIES: *Epicalymma schmitti* Heron, 1977

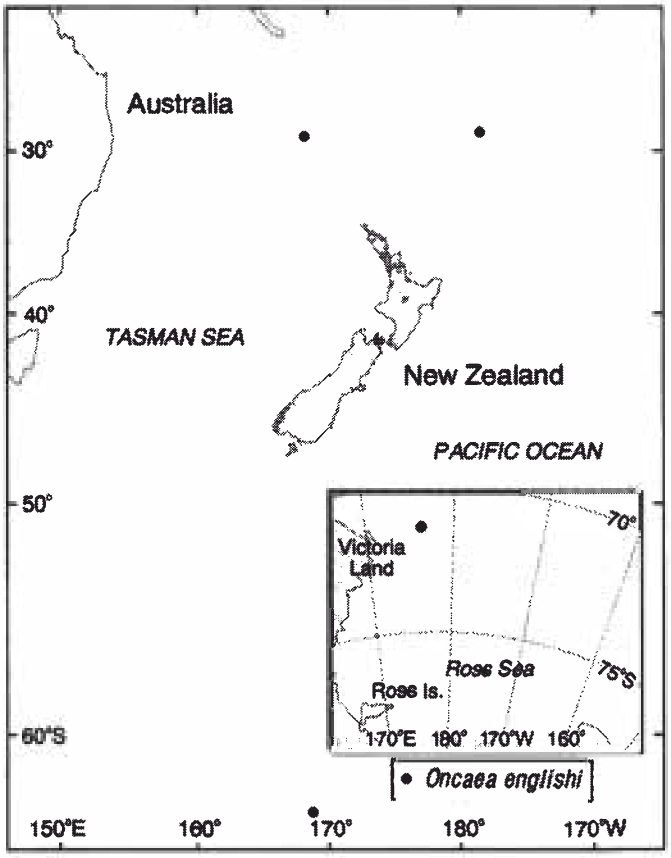
REMARKS: See "Remarks" on *Conaea* for an evaluation of the separation of *Oncaea*, *Conaea*, and *Epicalymma*. *Epicalymma* includes six species: *E. schmitti* Heron, 1977 (Antarctic, Arctic); *E. umbonata* Heron, 1977 (male unknown) (Antarctic and Arctic); *E. brittoni* Heron, English & Damkaer, 1984 (male unknown) (Arctic); *E. vervoorti* Heron, English & Damkaer, 1984 (Arctic); *E. exigua* (Farran, 1908) (Irish Atlantic Slope, Arctic, Norwegian Sea); and *E. ancora* (Gordejeva, 1973) (male unknown) (tropical Atlantic), none of which has been taken in the Southwest Pacific.

Fig. 25. New records of a, *Lubbockia aculeata* and *L. squillimana;* b, *Oncaea antarctica* and *O. conifera;* c, *Oncaea curvata* and *O. derivata;* d, *Oncaea englishi* in the Southwest Pacific Ocean.


Australia
30°
40°
TASMAN SEA
New Zealand
PACIFIC OCEAN
50°
60°S
• Lubbockia aculeata
○ Lubbockia squillimana
150°E
160°
170°
180°
170°W


Australia
30°
40°
TASMAN SEA
New Zealand
PACIFIC OCEAN
50°
70°
Victoria Land
Ross Sea
Ross Is.
75°S
170°E 180° 170°W 160°
60°S
• Oncaea antarctica
○ Oncaea conifera
150°E
160°
170°
180°
170°W


Australia
30°
40°
TASMAN SEA
New Zealand
PACIFIC OCEAN
50°
60°S
• Oncaea curvata
○ Oncaea derivata
150°E
160°
170°
180°
170°W


Australia
30°
40°
TASMAN SEA
New Zealand
PACIFIC OCEAN
50°
70°
Victoria Land
Ross Sea
Ross Is.
75°S
170°E 180° 170°W 160°
60°S
• Oncaea englishi
150°E
160°
170°
180°
170°W

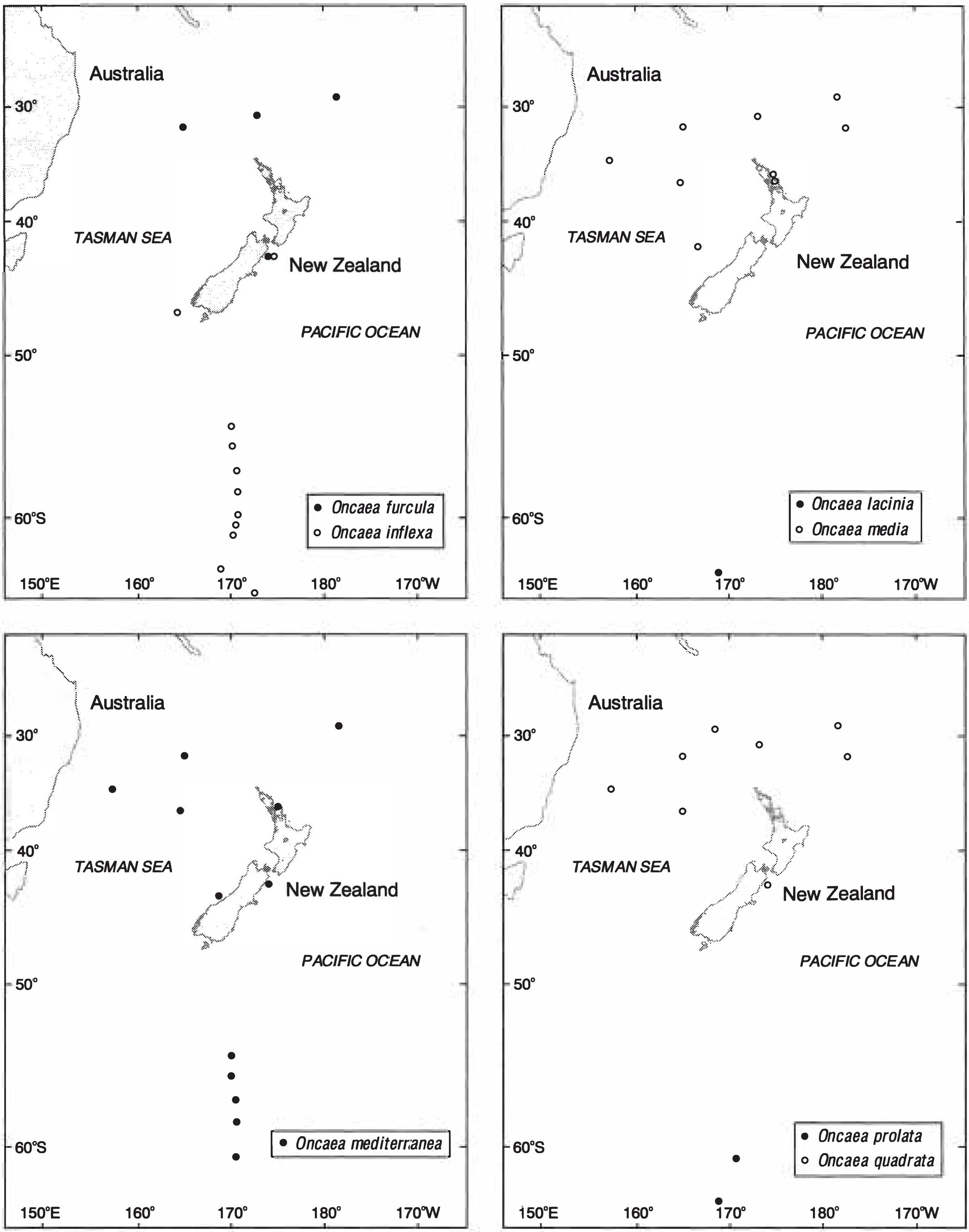


Fig. 26. New records of a, *Oncaea furcula* and *O. inflexa;* b, *Oncaea lacinia* and *O. media;* c, *Oncaea mediterranea;* d, *Oncaea prolata* and *O. quadrata,* in the Southwest Pacific Ocean.

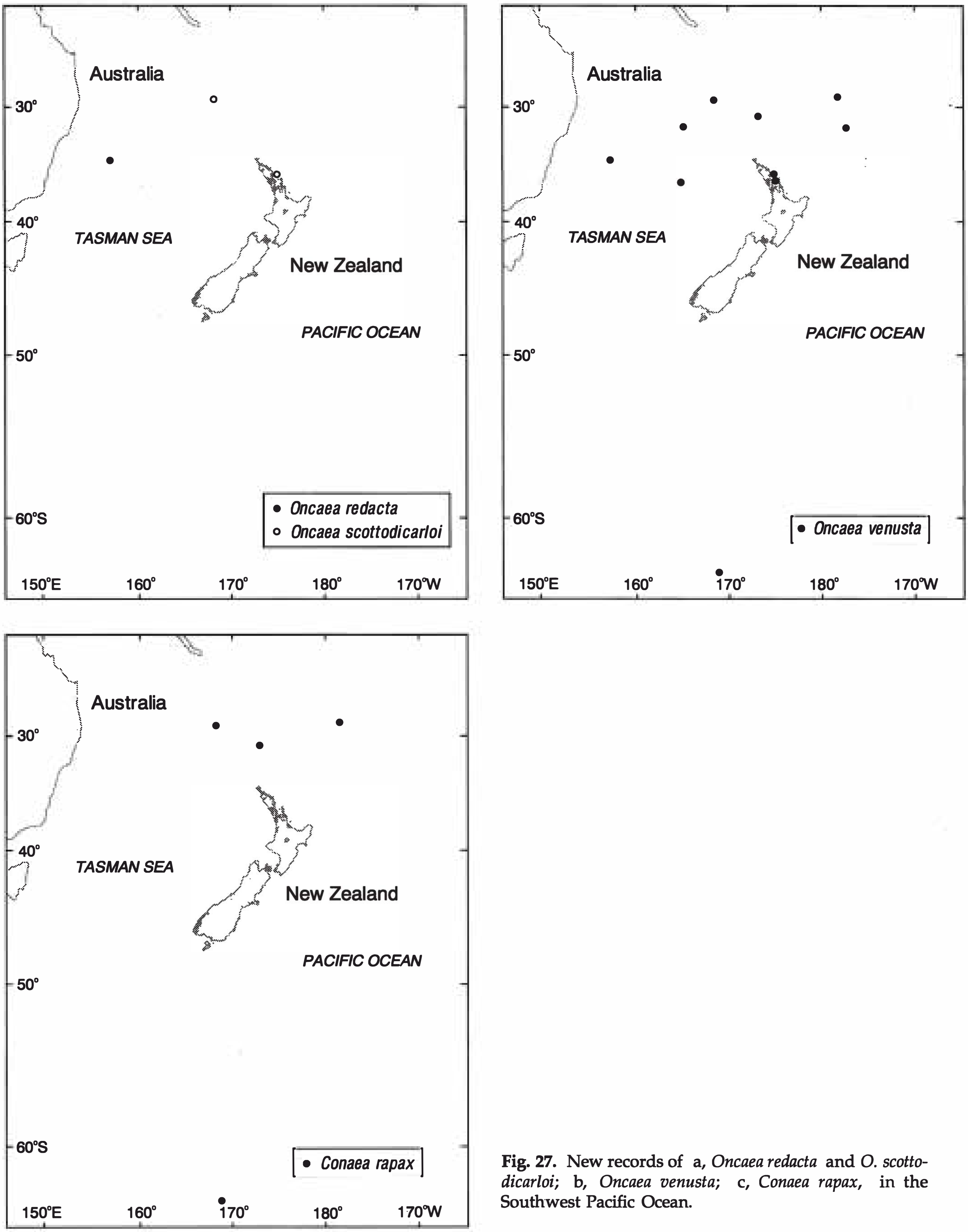


Fig. 27. New records of a, *Oncaea redacta* and *O. scottodicarloi*; b, *Oncaea venusta*; c, *Conaea rapax*, in the Southwest Pacific Ocean.

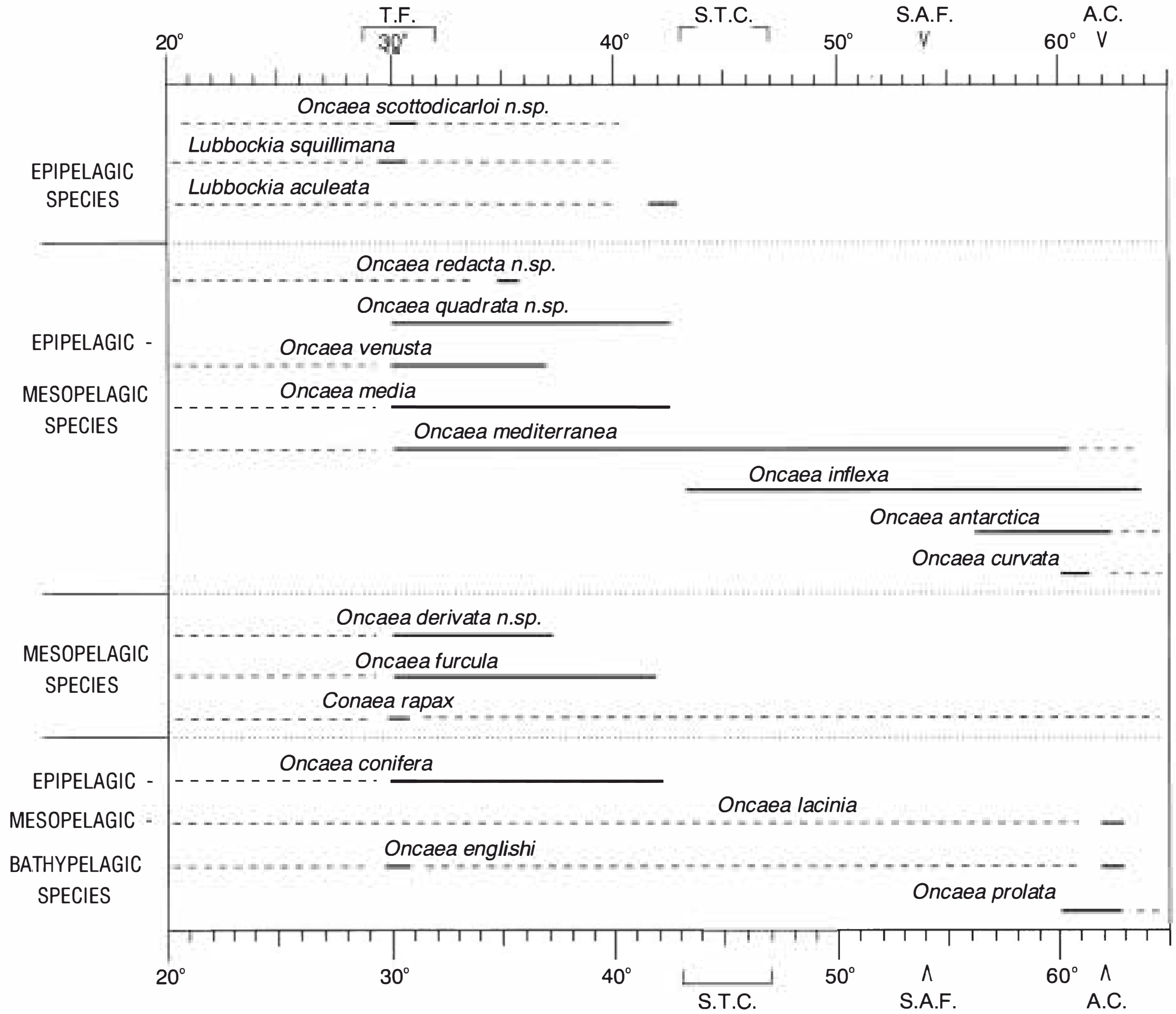


Fig. 28. Distribution of Oncaeidae with depth and latitude: _______ Southwest Pacific records, ---- likely distribution from existing records. S.T.C. = Subtropical Convergence, S.A.F. = Subantarctic Front, A.C. = Antarctic Convergence.

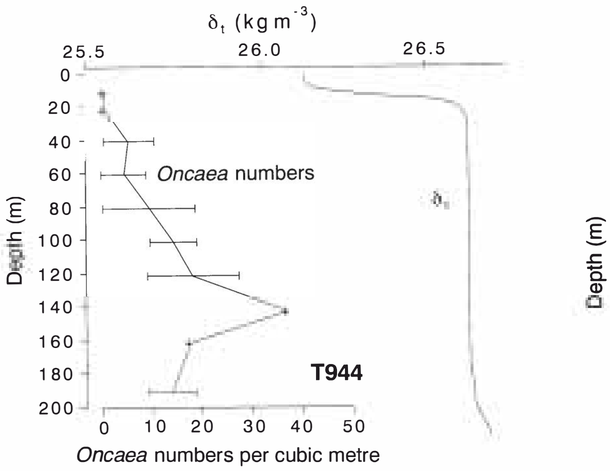


Fig. 29. Vertical distribution of *Oncaea* sp. (numbers.m^{-3}) taken with a plankton pump and retained on a 60 µm mesh net, and of density (mg m^{-3}) at Stn T944 (*see* Table 1; Bradford-Grieve *et al.*, in prep.).

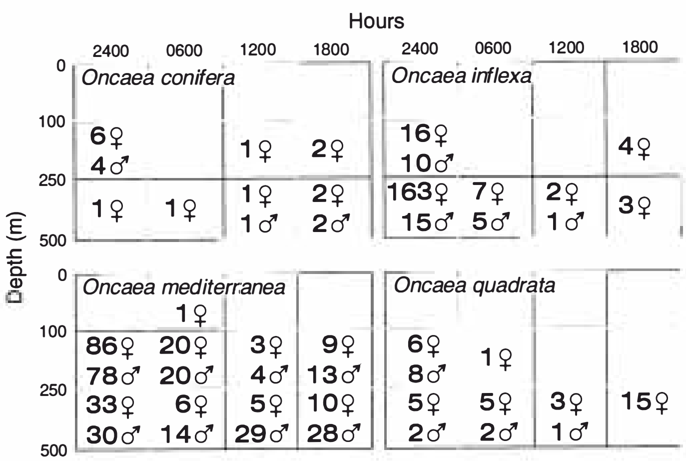


Fig. 30. Time and depth at which four *Oncaea* species were caught (numbers.m^{-3}) at Stns G142 and G144 (*see* Bradford 1970).

DISTRIBUTION OF SOUTHWEST PACIFIC ONCAEIDAE

Vertical Distribution

The material studied was collected with a variety of gear between 30° S and 64° S. Near-surface layers down to 500 m were more comprehensively sampled than deeper waters, but depths to 1000 m were also represented in the collections. Bathypelagic depths were only sparsely sampled, often with inappropriate gear. These limitations accepted, the present collection, together with previous records, demonstrate broad features of vertical and latitudinal distribution of larger Oncaeidae.

The presumed depth zones of each species (Fig. 28) 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 we 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 m 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.

It appears that Oncaeidae more usually have a wide range of depths over which they may be found (*see* e.g., Heron 1977; Malt 1983b). For example *Oncaea lacinia* was found in a number of samples taken at intervals between 250 m and 3000 m in the Arctic Ocean (Heron *et al.* 1984) but shallower than 125 m near the Antarctic Convergence in the present samples.

It is possible that the classification of vertical distributions (Fig. 28) will need to be amended when more information becomes available. For example Malt (1983b) classified *O. mediterranea* as an epipelagic-mesopelagic species and *O. conifera* as an epipelagic-mesopelagic-bathypelagic species. For both their apparent distributions to be as they are then *O. mediterranea* would have to migrate to bathypelagic depths (*see* Deacon 1937) to make use of the Warm Deep Current to distribute it widely in the South Pacific, whereas *O. conifera* must not be migrating to bathypelagic depths if its distribution is restricted to north of the Subtropical Convergence in the Southwest Pacific. Although the records of *O. curvata*, accepted here based on identifiable drawings, suggest *O. curvata* is epipelagic, it is likely to be an epipelagic-mesopelagic species based on the records of Vervoort (1957). He recorded this species from a number of Antarctic localities over depth ranges of 0–100, 100–250, 250–500, 500–750, and 750–1000 m.

A study of the detailed vertical distribution of microzooplankton off the west coast of New Zealand, using a pump (*see* Bradford-Grieve *et al.* in prep.) revealed that in the surface 200 m *Oncaea* spp. were distributed with their maximum concentrations at the base of or below the surface mixed layer. For example at station T944 about 37 individuals m^{-3} (mostly *O. mediterranea*) were located at the base of the mixed layer (Fig. 29) with very few in the surface dilute layer and a reduction in concentrations below the subsurface maximum.

In a previous study of diel variation in vertical distribution of pelagic copepods off Kaikoura (Bradford 1970), *Oncaea* were taken but were not reported on. Here we are able to give details of the changes in vertical distribution of *Oncaea conifera*, *O. inflexa*, *O. mediterranea*, and *O. quadrata* at six-hourly intervals (Fig. 30). All four species were absent from the surface 100 m (except for one stray female *O. mediterranea* at midday) and all four species attained maximum concentrations at 2400 hours either at 100–250 m (*O. conifera*, *O. mediterranea*, *O. quadrata*) or at 250–500 m (*O. inflexa*). *Oncaea conifera*, *O. inflexa*, and *O. quadrata* were absent from the surface 250 m for some, but not the same part, of the day, whereas *O. mediterranea* was always present at 100–250 m but in lowest concentrations at 1200 hours. Thus it appears that all four species make diel vertical migrations but with slightly different timing and slightly different depth preferences in the surface 500 m.

Horizontal Distribution

The wide vertical range over which some species are found appears to influence horizontal distributions. Therefore there are a number of species with widespread distributions across both hemispheres and to the Antarctic Convergence (*Conaea rapax, O. englishi, O. lacinia,* and *O. mediterranea*) which is probably maintained by transport in the Warm Deep Current (Deacon 1937). Oncaeids which are widespread and appear to be limited to the Subtropical Convergence (*Lubbockia aculeata, L. squillimana, Oncaea conifera, O. furcula, O. media*) probably do not go as deep in the water column. There are several apparent Antarctic species which may extend slightly into the subantarctic zone (*Oncaea antarctica, O. curvata, O. prolata*) and *Oncaea inflexa* appears to have a subantarctic distribution. *Oncaea quadrata,* which is newly described from the Southwest Pacific and nowhere else, may prove to be more widespread in all major oceans as are other *Oncaea* species with a similar distribution in this part of the world.

Oceanic epipelagic copepod species in the Southwest Pacific have distributions which are approximately related to water-mass distribution (*see* e.g., McGowan 1974; Bradford-Grieve 1994). 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 & Hulsemann 1973). It is probable that the same holds for species with distributions to mesopelagic depths as there would be population continuity in the gradual drift to the west that occurs in Antarctic Intermediate Water (Reid 186) which would ensure that species found in the South Atlantic Ocean are also found in the Indian and Pacific Oceans.

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INDEX

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