

Euchaeta marina (Prestandrea) (Copepoda, Calanoida) and Two Closely Related New Species from the Pacific¹

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DURING THE COURSE OF STUDY of southwest Pacific copepods and comparisons of various species with material from other oceans it became evident that *Euchaeta marina* is not as widespread as previously thought and that two undescribed but related species exist in the Pacific. These two new species with *E. marina* and *E. wolfendeni* are grouped together in Group A (Vervoort 1957). In the genus *Euchaeta*, Group A is characterized in the female by the two distal setae on maxilla 2, which bear long spines as well as short spinules; and in the male by a thin-skinned lobe at the base of the long terminal spiniform process of the left exopod of leg 5.

An investigation was made of the availability of several synonyms of *E. marina* as names for the species described here. *Euchaeta indica* Wolfenden, 1905, was the only likely candidate but on further investigation it was found to be a senior synonym of *E. wolfendeni* A. Scott. It is clear from Wolfenden's (1905) text describing *E. indica* and *E. marina*, especially the description of the female genital segment, that the wrong figures are referred to in the text. On plate C figures 12, 13, 14, 15, and 16 agree with the written description of *E. marina* while figures 7, 10, 11, 17 and 18 agree with the written description of *E. indica*, although figure 8, which is of *E. indica*, is incorrectly described on p. 1009. This means that the creation of a new name for specimens figured on plate C, figures 7, 8, 10, 11, 17, and 18, by A. Scott (1909) was unnecessary and that his name *E. wolfendeni* is a junior synonym of *E. indica*.

METHODS

Specimens of "*E. marina*" from the collections of the New Zealand Oceanographic Institute (NZOI), Auckland University Zoology Department (New Zealand), Rijksmuseum van Natuurlijke Historie (Leiden), and the United States National Museum were examined. Records published by Wilson (1950) were reassessed (Table 1), but unfortunately much of the Carnegie material (Wilson 1942) has been mixed together so occurrences at each station could not be determined.

Only records accompanied by a recognizable description were placed in the synonymy.

Dissected specimens were stained lightly with lignin pink and mounted in Euparal.

Heptner's genital segment nomenclature (1968) and method of describing the proportions of the exopods of female legs 1 and 2 (1971) were used. The actual length of the external spines was measured, whereas the distance between the bases of the external spines was measured parallel to the axis of the leg. It appears from whole-mount observations of *Euchaeta marina* that the genital field is similar to that of *Paraeuchaeta* but that the posterior border of the genital field of *E. marina* is not as well defined.

Euchaeta marina (Prestandrea 1833)

Figs. 1a; 2; 3a,b; 4a-d; 5a; 6a,b

Cyclops marinus Prestandrea 1833: 12.

Euchaeta prestandreae Philippi 1843: 54, pl. 4 fig. 5; Claus 1862: 183, pl. 30 figs. 8-17.

E. atlantica Lubbock 1856: 19, pl. 8.

E. sutherlandii Lubbock 1856: 26, pl. 9.

E. marina. Giesbrecht 1892: 262, pl. 1 figs. 10, 11; pl. 15 figs. 31, 33; pl. 16 figs. 1, 2, 8, 15-17, 22, 23, 25, 28-30, 41, 46; pl. 37 figs. 30, 37, 38, 49; Vervoort 1963: 158.

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TABLE 1

STATION LIST AND MATERIAL EXAMINED

STATION NO.	LATITUDE ° / ' / "	LONGITUDE ° / ' / "	DATE	TIME	DEPTH HAUL (M)	<i>E. marina</i>		<i>E. rimana</i>		<i>E. marinella</i>	
						♀	♂	♀	♂	♀	♂
U.S. NATIONAL MUSEUM MATERIAL											
U.S.F.S. Albatross											
2074	41 43 N	65 21.8 W	2 Sep 83	—	—	1					
2195	39 44 N	70 03 W	5 Aug 84	—	—	19	3				
2219	39 46.3 N	69 29 W	23 Aug 84	—	—	1					
2236	39 11 N	72 08.5 W	13 Sep 84	—	—	1					
2711	38 59 N	70 07 W	16 Sep 86	—	—	2					
—	6 44 N	80 27 W	31 Mar 88	—	surface			1		4	1
—	12 34 N	97 21 W	89	—	—			2	1		
4009	21 50.5 N	159 15 W	17 Jun 02	1848	surface			174	22		
4011	21 20 N	158 21 W	18 Jun 02	1603	surface			10	2	1	3
4037	20 12 N	156 11 W	10 Jul 02	1847	surface			100	50		
¶4427	33 55 N	119 40 W	14 Apr 04	2111	bottom	2					
4588	19 50 N	106 05 W	12 Oct 04	2031	surface			75	11		
4607	12 00 N	91 30 W	17 Oct 04	1903	surface			15	4	5	1
4611	10 32 N	88 25 W	18 Oct 04	1903	surface			125	52		
4615	9 06 N	85 08 W	19 Oct 04	1902	surface			3	2	4	
4619	7 17 N	82 11 W	20 Oct 04	1900	surface			3			
4638	0 27 N	87 13 W	6 Nov 04	0853	0-589			8	2	2	
4640	0 40 N	88 11 W	6 Nov 04	2032	surface			8	2	4	
4646	4 02 S	89 16 W	8 Nov 04	1905	surface			11	2	2	
4659	8 55 S	86 05 W	14 Nov 04	1949	0-589			2	1	1	
4661	10 17 S	88 02 W	15 Nov 04	1904	surface			1			
4684	20 40 S	93 19 W	9 Dec 04	1930	surface				1	65	2
4700	20 29 S	103 26 W	25 Dec 04	1948	surface			132	40		
4706	14 19 S	98 46 W	28 Dec 04	1948	surface			48	10	67	4
4707	12 53 S	97 42 W	29 Dec 04	0912	0-589			5	1	6	1
4708	11 40 S	96 55 W	29 Dec 04	1945	surface			15	1		
4709	10 15 S	95 41 W	30 Dec 04	0912	0-589			7	1		
4714	4 19 S	91 28 W	1 Jan 05	1945	surface			6	5	2	1
4715	2 40.5 S	90 19 W	2 Jan 05	0952	0-589			70	20		
4724	11 13.5 S	109 29 W	17 Jan 05	0954	0-589			2	1		
4731	15 47 S	118 22.5 W	20 Jan 05	1930	surface					3	
4734	17 36 S	122 15 W	22 Jan 05	0907	0-589			129	15		
5155	5 13.5 N	119 57.3 E	19 Feb 08	1104	15			1			
5185	10 05.8 N	122 18.5 E	30 Mar 08	1726	1006			5	6	9	7
Bache											
¶10192	28 35 N	73 33 W	26 Feb 14	—	0-1000	183	7		21		
10197	24 30 N	81 45 W	13 Mar 14	—	0-100	1	1				
10205	20 00 N	79 00 W	20 Mar 14	—	0-100	2					
10207	27 25 N	80 10 W	21 Mar 14	—	0-400	1					
10208	20 00 N	78 00 W	21 Mar 14	—	surface	4	2				
10209	27 50 N	79 10 W	23 Mar 14	—	0-75	46	1				
Carnegie											
1	38 14 N	67 37 W	12 May 28	—	0-70	95	38				
Fish Hawke											
949	39 50 N	170 00 W	23 Aug 81	—	surface	2	1				
Grampus											
10307	43 00 N	68 00 W	31 Aug 51	—	—		1				

TABLE 1 (cont.)

STATION NO.	LATITUDE	LONGITUDE	DATE	TIME	DEPTH HAUL (m)	<i>E. marina</i>		<i>E. rimana</i>		<i>E. marinella</i>	
						♀	♂	♀	♂	♀	♂
Miscellaneous											
Naples	—	—	—	—	—	2	2				
Pierce	24 30 N	81 45 N	29 Dec 46	—	—	1					
Rathbun	41 00 N	68 00 W	14 Sep 72	—	—	1					
Rathbun	41 25 N	70 15 N	26 Aug 81	—	surface	23	8				
NEW ZEALAND OCEANOGRAPHIC INSTITUTE MATERIAL											
A303	31 40 S	177 33 W	3 Jul 56	1025	surface			1			
C544	23 01.2 S	166 19 W	24 Sep 60	0620	surface			1		23	11
F945	31 19.5 S	165 19 E	22 Oct 68	1505	0-200			3			
F946	34 32.5 S	157 31.5 E	2 Nov 68	2315	0-200			1			
AUCKLAND UNIVERSITY ZOOLOGY DEPARTMENT MATERIAL											
AUZ 15	29 26 S	168 49 E	8 Jul 62	0946	surface			13		1	
AUZ 46	32 40 S	171 02 E	14 Jul 62	1026	surface			8		3	
AUZ 49	32 40 S	171 02 E	14 Jul 62	2155	surface			15			
AUZ 51	33 50 S	172 06 E	15 Jul 62	0825	surface			51		2	
AUZ 75	35 15 S	176 15 E	22 Jul 62	2010	914-1829			1			
AUZ 87	31 57 S	177 38 E	24 Jul 62	1721	128			1			
RIJKSMUSEUM VAN NATUURLIJKE HISTORIE MATERIAL											
Atlantide											
10	34 12 N	12 04 W	15 Nov 45	—	0-35	4	1				
11	34 13 N	12 16 W	15 Nov 45	—	0-35	7	2				
24	27 23 N	16 36 W	30 Nov 45	—	167	14	1				
25	26 57 N	17 10 W	30 Nov 45	—	3	17	1				
26	25 34 N	18 24 W	1 Dec 45	—	3	300	13				
27	24 30 N	19 11 W	2 Dec 45	—	3	200	16				
28	22 59 N	20 30 W	3 Dec 45	—	3	133	29				
30	19 54 N	22 42 W	5 Dec 45	—	3	1					
33	17 11 N	24 52 W	7 Dec 45	—	3	1					
50	7 16 N	13 29 W	30 Dec 45	—	3	3					
52	6 30 N	11 21 W	1 Jan 46	—	0-10	87	9				
62	4 16 N	8 18 W	10 Jan 46	—	133	147	1				
67	4 29 N	6 41 E	11 Jan 46	—	3	7	1				
82	5 27 N	0 07 E	29 Jan 46	—	567	15					
83	5 29 N	0 20 E	29 Jan 46	—	3	13					
91	5 44 N	1 02 E	31 Jan 46	—	3	13	1				
92	6 01 N	2 21 E	1 Feb 46	—	3	87					
114	4 01 N	7 12 E	22 Feb 46	—	0-50	1					
119	2 55 N	9 21 E	28 Feb 46	—	3	1					
122	1 29 S	8 50 E	4 Mar 46	—	3	2					
132	4 46 S	12 23 E	15 Mar 46	—	3	3					
134	7 35 S	12 46 E	16 Mar 46	—	3	5					
138	7 40 S	7 56 E	24 Mar 46	—	3	399	1				
139	1 30 N	10 10 W	2 Apr 46	—	583	439	70				
140	4 10 N	12 18 W	4 Apr 46	—	3	75					
Snellius Expedition 1929-1930											
32	4 43 S	118 53.5 E	2 Aug 29	—	0-1					1	
32*	4 42.5 S	118 53 E	2 Aug 29	1035-1055	± 30			55		4	
35	2 52.5 S	118 30.5 E	3/4 Aug 29	—	1170-1800			1			
36	2 50 S	118 44 E	6 Aug 29	1119-1200	± 60			7		1	

TABLE 1 (cont.)

STATION NO.	LATITUDE ° /	LONGITUDE ° /	DATE	TIME	DEPTH HAUL (m)	<i>E. marina</i>		<i>E. rimana</i>		<i>E. marinella</i>	
						♀	♂	♀	♂	♀	♂
38	1 04.5 S	117 57 E	7 Aug 29	—	0-250			3	2		
39a	1 14 S	118 20.5 E	9 Aug 29		1100- 1400			4	1		
41*	0 24 N	119 01 E	12 Aug 29		0800- 0905			5	1		
67*	6 10.5 N	119 53 E	8 Sep 29		1500- 1530			2			
74	4 21.5 N	120 01 E	18 Sep 29		—			2			
76	1 46.5 N	123 08 E	20 Sep 29		0730- 0845			3			
80	1 06.5 S	126 46.5 E	1 Oct 29		—			37	1		
82	1 14 S	128 11.5 E	2 Oct 29		—			8	2		
83*	1 38 S	128 23.5 E	2 Oct 29		1025- 1100			350	21		
91*	3 50 S	131 41.5 E	8 Oct 29		0750- 0910			2			
106*	7 09 S	132 43 E	17 Oct 29		1630- 1700			6			
112	8 39 S	130 35 E	19 Oct 29		—			1			
127	10 49.5 S	123 59 E	29/30 Oct 29		—			1	2		
129*	11 21.5 S	124 17.5 E	30 Oct 29		1525- 1545			103	6		
147*	9 43.5 S	118 06 E	27 Nov 29		0805- 0855			14			
154*	10 26.5 S	122 28 E	9 Dec 29		0830- 0915			21	2		
161*	8 45.5 S	123 59.5 E	14 Dec 29		0815- 0915			14	1		
163	8 51.5 S	124 24.5 E	17 Dec 29		—			10	1		
164*	7 25 S	123 20.5 E	18 Dec 29		1520- 1606			24	2		
175	7 47 S	118 12 E	31 Jan 30		—				1		
175*	7 23 S	118 03 E	1 Feb 30		1100- 1155			108	2		
181*	8 02.5 S	120 13.5 E	6 Feb 30		1030- 1100			3			
189*	4 53.5 S	121 03 E	15 Feb 30		1440- 1530			11	1		
197	8 00.5 S	121 40 E	19/20 Feb 30		—			1			
199*	5 24.5 S	121 28 E	5 Mar 30		0807- 0837			5			
210*	3 44 S	126 01.5 E	14 Mar 30		1705- 1740			2			
222*	3 03 S	126 04.5 E	22 Mar 30		1445- 1550			54			
229*	3 01.5 S	126 59.5 E	5 Apr 30		1730- 1830			5			
241*	6 45 S	128 11 E	12 Apr 30		1730- 1813			265	2		
247	7 31.5 S	126 35.5 E	15 Apr 30		1700			1			
248*	5 54.5 S	125 35 E	16 Apr 30		1135- 1250			1			
250	4 35 S	126 38.5 E	17 Apr 30		1900			2			
259*	0 27.5 S	126 54 E	11 May 30		1730- 1800			11			

TABLE 1 (cont.)

STATION NO.	LATITUDE ° / ' / "	LONGITUDE ° / ' / "	DATE	TIME	DEPTH HAUL (m)	<i>E. marina</i>		<i>E. rimana</i>		<i>E. marinella</i>	
						♀	♂	♀	♂	♀	♂
261*	7 34 N	127 48 E	17 May 30	0930–1025	± 130			4			
263*	6 44 N	127 55 E	17 May 30	2315–2400	± 60			7			
268*	5 46 N	126 37 E	19 May 30	0900–0946	± 30			1			
272*	4 44 N	129 17 E	23 May 30	2100–2155	± 60			6			
274	2 47 N	128 32 E	24/25 May 30	—	0–1			1			
275*	2 28.5 N	129 38.5 E	25 May 30	2100–2140	± 15			17	1		
286*	3 39.5 N	127 03 E	31 May 30	1245–1340	± 30			1			
288*	2 19.5 N	127 44.5 E	2 Jun 30	1430–1520	± 100			500	6		
289*	2 34.5 N	125 27 E	12 Jun 30	1515–1600	± 130			12			
300*	4 45 N	124 31.5 E	22 Jun 30	2100–2145	± 60			8			
308*	3 09.5 N	120 33 E	29 Jun 30	1030–1200	± 160			2			
310*	0 44.5 S	118 26.5 E	5 Jul 30	2105–2200	± 60			6			
317a	7 55 S	122 12.5 E	21/24 Aug 30	—	0–1			30	11		
Bongao, Tawitawi, Sulu Is.			9 Sep 29	—	surface			1			
Mamoedjoe, Celebes			5 Aug 29	2100–2300	0–1			2			
Reede Makassar, Celebes			1 Aug 29	1700	0–1			5	1		

* Localities where the work consisted solely of collecting for biological purposes, namely, towing with a "Straminpose" or dredging.

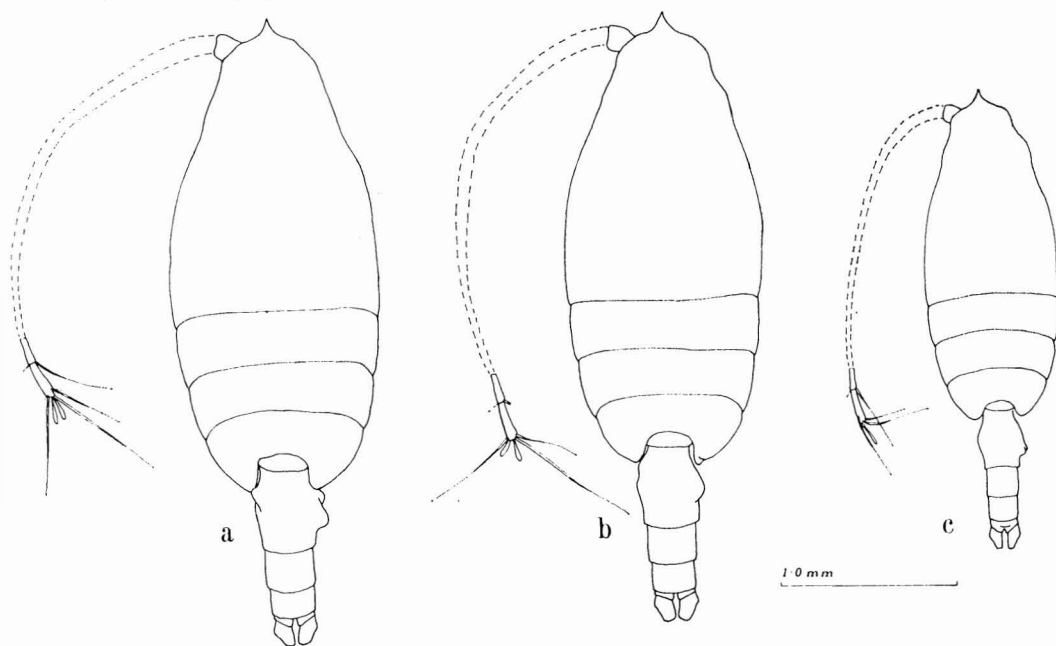


FIG. 1. *Euchaeta* females, dorsal view. a, *E. marina*, Bache Station 10192; b, *E. rimana* sp. n., Albatross Station 4009; c, *E. marinella* sp. n., NZOI Station C544.

Material Examined

See Table 1.

Description

Giesbrecht (1892) has given an excellent description of *Euchaeta* to which a few details are added here.

FEMALE: Total length 2.73–3.52 mm. Maxilla 1 (Fig. 2) inner lobe 1 with one anterior surface seta, three posterior surface setae, and seven spines along edge, exopod with 11 setae, outer lobe 1 with five setae. Maxilliped endopod segment 1 with five setae. Leg 1 exopod: $Bb \approx 2/3BC$, $Cc \approx 4/3BC$ (Fig. 3*b*). Leg 2 exopod: $Aa \leq AB$, $Bb \approx 1/2BC$, $Cc \leq CD$ (Fig. 3*a*). Geni-

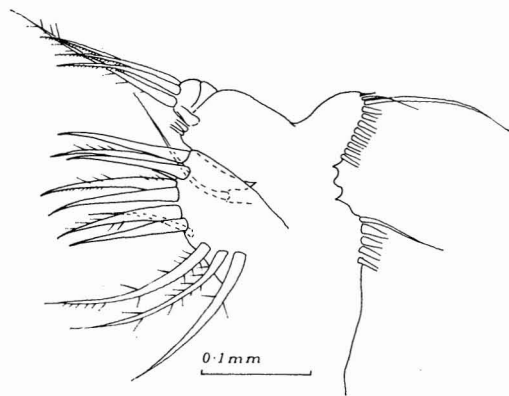


FIG. 2. Maxilla 1 of female *Euchaeta marina* from Bache Station 10192.

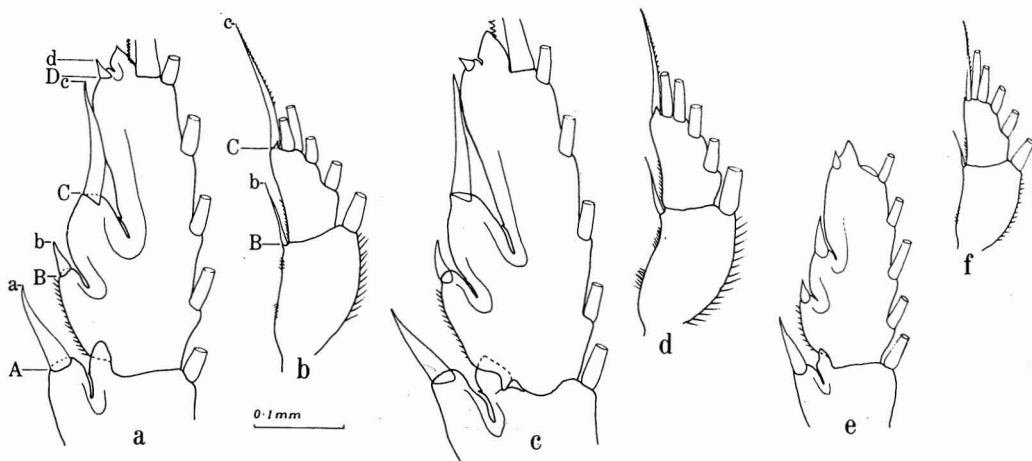


FIG. 3. Exopods of female legs. *a, b, Euchaeta marina*; *c, d, E. rimana* sp. n.; *e, f, E. marinella* sp. n. *a, c, e, leg 2*; *b, d, f, leg 1*.

tal segment viewed dorsally with anterior left side projection, right side with large dorsalmost lateral projection not obscuring more ventral projection that extends from right genital pad (Fig. 4*a*). In ventral view genital field with genital valve region almost completely uncovered by genital pads, gap between right and left pads about as wide as right pad itself (Fig. 5*a*).

MALE: Total length 2.85–3.35 mm. Leg 5 (Fig. 6*a, b*) exopod segment 2 with inner distal corner of lamella, which is bordered by very small teeth, separated by smooth excavation from coarser outer edge teeth. Thick spine arising at base of serrate lamella more than half

length of lamella. Thin-skinned lobe on distal part of left exopod segment 3 arises at base of terminal spiniform process.

Discussion

Euchaeta marina is distinguished from the other two new species by the shape of the genital segment in the female and by the form of the lamella of exopod segment 2 of the left leg 5 in the male (see Table 2).

Distribution

This species appears to be confined to the Atlantic Ocean and Mediterranean Sea (Fig. 7).

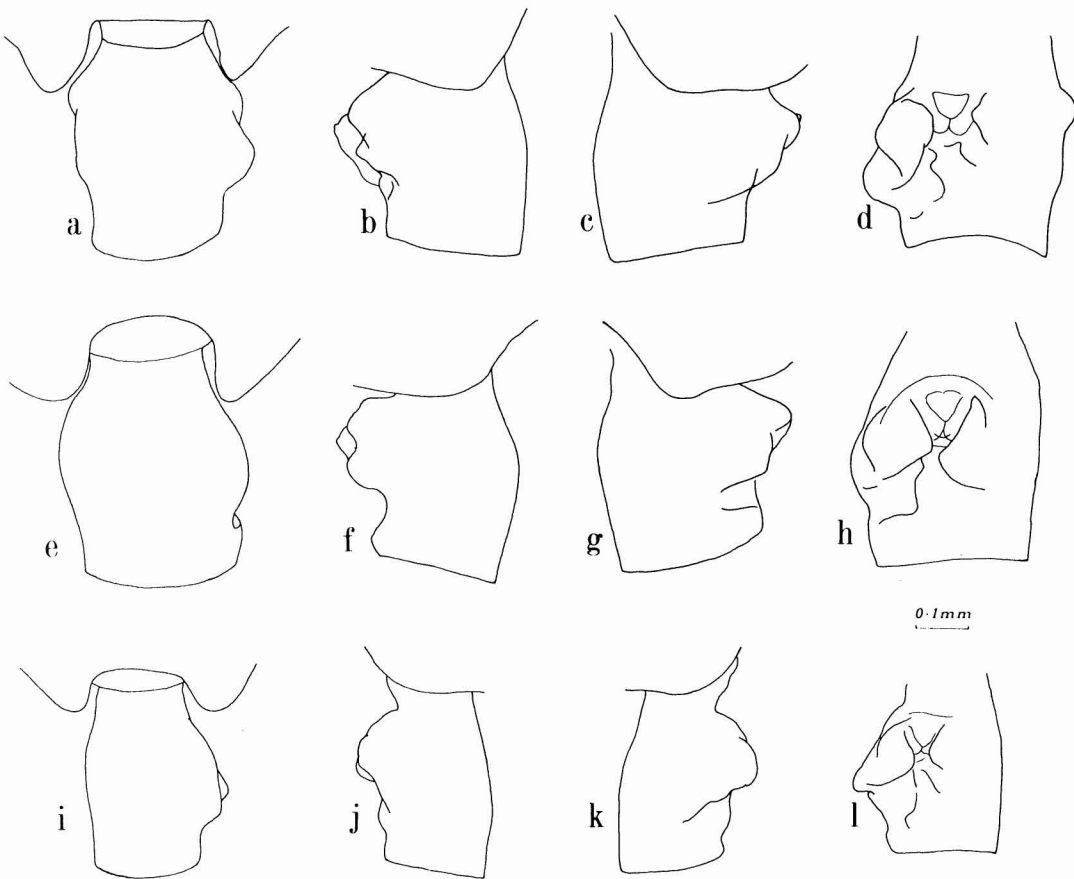


FIG. 4. Female genital segment. *a-d*, *Euchaeta marina*; *e-h*, *E. rimana* sp. n.; *i-l*, *E. marinella* sp. n. *a*, *e*, *i*, dorsal view; *b*, *f*, *j*, left side; *c*, *g*, *k*, right side; *d*, *h*, *l*, ventral view.

Two females were said to have come from Albatross Station 4427 off the coast of California, but these I assume to have incorrect location data.

***Euchaeta rimana* sp.n.**

Figs. 1*b*; 3*c*, *d*; 4*e-h*; 5*b*; 6*c*, *d*

Euchaeta prestandreae. Brady 1883: 60, pl. 8 figs. 7-15.

E. marina. Wolfenden 1905: 1007, pl. C figs. 12, 13, 14, 15, 16, 19; A. Scott 1909: 67, pl. 19 figs. 9-20; Mori 1937: 43, pl. 19 figs. 1-8; Sewell 1947: 113, fig. 25 *A, D*; Brodsky 1962: 20, fig. 23; in part, Dakin and Colefax 1940: 99, figs. 137*a-d*.

Material Examined

See Table 1.

Description

Very similar to *Euchaeta marina* but differs in the following respects:

FEMALE: Total length 2.80-4.30 mm. Leg 1 exopod: $Bb \approx 2/3BC$, $Cc \geq BC$ (Fig. 3*d*). Posterior thoracic corners slightly asymmetrical, more produced on right. Left side of genital segment in dorsal view without prominent projection, right side with moderate projection that obscures more ventral projection (Fig. 4*e*). Genital field in ventral view with genital pads

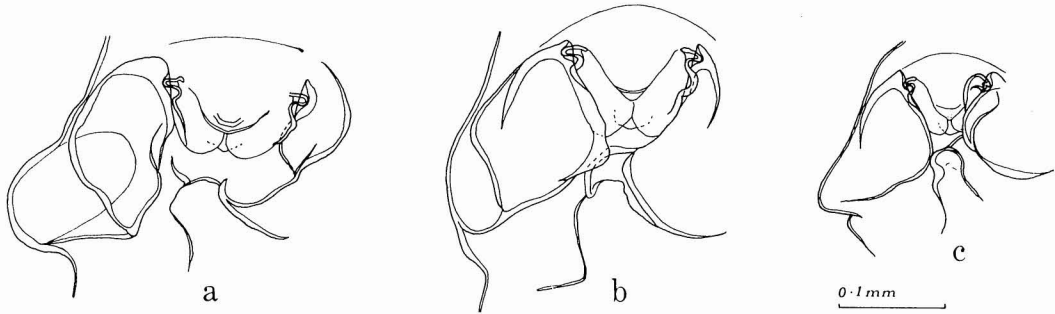


FIG. 5. Female genital field and right border of genital segment. *a*, *Euchaeta marina*; *b*, *E. rimana* sp. n.; *c*, *E. marinella* sp. n.

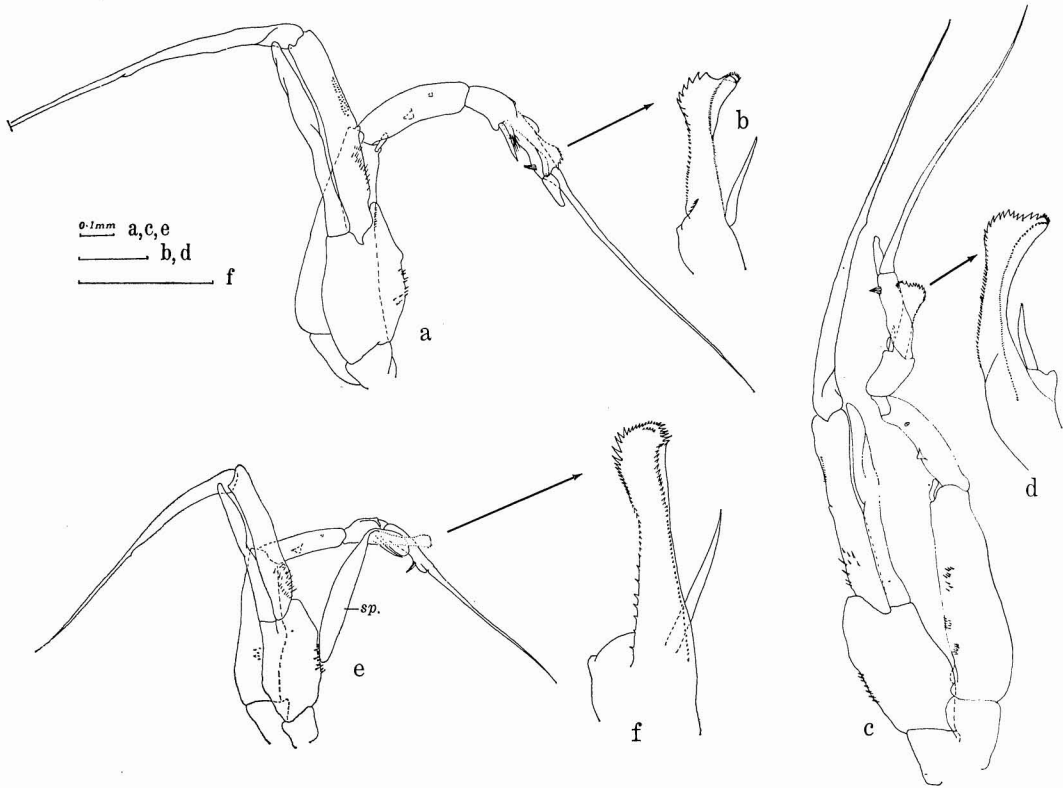


FIG. 6. Leg 5 of male *Euchaeta*: *a*, *b*, *E. marina*; *c*, *d*, *E. rimana* sp. n.; *e*, *f*, *E. marinella* sp. n.

Note: *sp.* = spermatophore.

almost meeting in midline, right pad triangular (Fig. 5*b*).

MALE: Total length 3.11–4.10 mm. Serrate lamella of left leg 5 exopod segment 2 without distal smooth excavation separating inner distal fine teeth and coarser outer teeth (Fig. 6*d*). Thick spine arising at base of serrate lamella less than half length of lamella.

Types

Holotype: one female, USNM 73890; paratype lot: 172 females, 20 males, USNM 141491.

Type Locality

Albatross Station 4009 (see Table 1).

TABLE 2
DIFFERENCES AMONG GROUP A *Euchaeta* spp.

	<i>E. marina</i>	<i>E. rimana</i>	<i>E. marinella</i>	<i>E. indica</i> (= <i>E. wolfendeni</i>)
Female				
Total Length	2.73–3.52 mm	2.80–4.30 mm	2.35–2.68 mm	2.24–2.55 mm
Leg 2, Exopod Segment	Aa ≤ AB, Bb ≈ ½BC, Cc ≤ CD	Aa ≤ AB, Bb ≈ ½BC, Cc ≤ CD	Aa ≈ ¾AB, Bb ≤ ½BC, Cc ≤ ½CD	Aa ≈ ¾AB, Bb ≈ ½BC, Cc ≤ ½CD
Genital Segment—Length in Relation to Rest of Abdomen	shorter	shorter	shorter	longer
Genital Segment—Dorsal View				
Male				
Total Length	2.85–3.35 mm	3.11–4.10 mm	2.30–2.55 mm	2.21–2.44 mm
Left Leg 5—Exopod Segment 2 Distal Lamella				
Distance Exopod Segment 2 Spine Extends along Lamella	> 1/2	< 1/2	> 1/2	> 1/2
Exopod Segment 3 Lobe Origin	base of terminal spine	base of terminal spine	proximal to base of terminal spine	proximal to base of terminal spine

NOTE: Aa, Bb, etc., see Fig. 3.

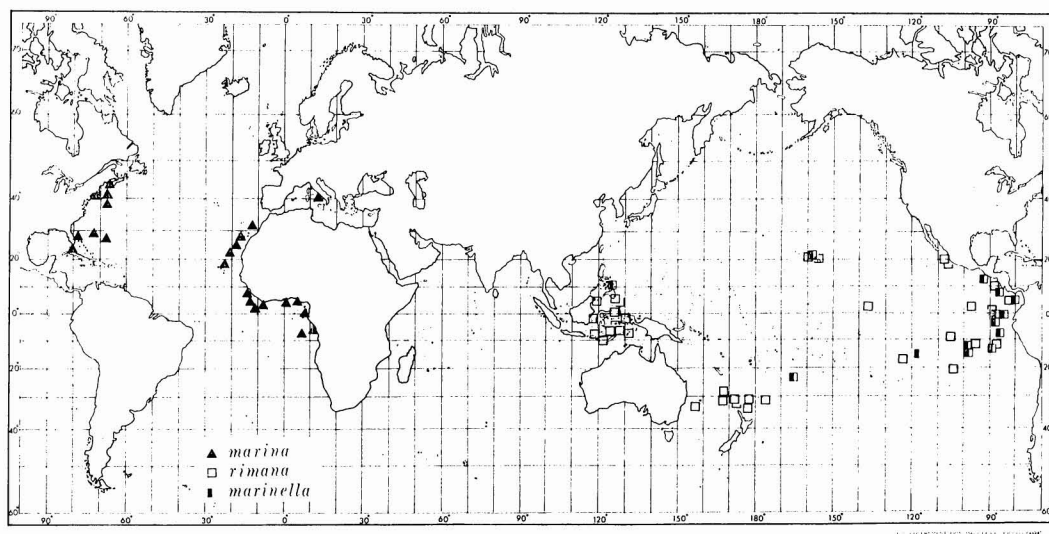


FIG. 7. Distribution of *Euchaeta marina*, *E. rimana* sp. n., and *E. marinella* sp. n. based on specimens seen by the author.

Discussion

The specific name is an anagram of the name *marina*. This species may be distinguished from *E. marina* by its generally slightly larger size, the shape of the female genital segment, and the form of the lamella of exopod segment 2 on the male left leg 5 (see Table 2).

Distribution

This species appears to be distributed in the Indian Ocean (Wolfenden 1905, Sewell 1947) and Pacific Ocean (Fig. 7), although one sample from Bache Station 10192 in the Atlantic had some *E. rimana* mixed with *E. marina*.

Euchaeta marinella sp.n.

Figs. 1*c*; 3*e, f*; 4*i-l*; 5*c*; 6*e, f*

Euchaeta concinna. In part, Wilson 1950: 212, pl. 8 figs. 72, 73.

Material Examined

See Table 1.

Description

Very similar to *Euchaeta marina* but differs in the following respects:

FEMALE: Total length 2.35–2.68 mm. Leg 1 exopod: Bb \geq 1/2BC, Cc \geq BC (Fig. 3*f*). Leg 2 exopod: Aa \approx 3/4AB, Bb \leq 1/2BC, Cc \leq 1/2 CD (Fig. 3*e*). Genital segment in dorsal view without projection on left, right side with long flat projection which does not obscure more ventral, triangular projection (Fig. 4*i*). Genital field in ventral view with genital pads not meeting in midline, gap between them about one-half width of right pad (Fig. 5*c*).

MALE: Total length 2.30–2.55 mm. Thin-skinned lobe on distal part of left exopod segment 3 of leg 5 arises very close to group of spines on that segment and barely extends beyond base of terminal spiniform process. Serrate lamella of exopod of segment 2 with distalmost part bordered by small teeth flanked distolaterally by larger teeth. Thick spine arising at base of serrate lamella more than one-half length of lamella.

Types

Holotype: one female, NZOI catalogue number 108. Paratypes: NZOI catalogue number 174; 67 females, four males, USNM 141496.

Type Locality:

NZOI Station C544 (see Table 1).

Discussion

The specific name indicates the small size of this species as compared with *E. marina*. This species is separated from *E. marina* and *E. rimana* by its small size, the shape of the female genital segment and exopod of leg 2, the male leg 5 left exopod segment lamella and position of the thin-skinned lobe (see Table 2).

Distribution

This species is known only from the Pacific (Fig. 7).

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