

Calanoid Copepods of the  
Family Euchaetidae from  
the Gulf of Mexico and  
Western Caribbean Sea

TAISOO PARK

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 196

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*Taisoo Park*

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## ABSTRACT

Park, Taisoo. Calanoid Copepods of the Family Euchaetidae from the Gulf of Mexico and Western Caribbean Sea. *Smithsonian Contributions to Zoology*, number 196, 26 pages, 20 figures, 1975.—The study is based on zooplankton samples taken from various depth ranges between the surface and a depth of about 3000 m in the Gulf of Mexico and western Caribbean Sea. Twenty species of *Euchaeta* were found, including the following eight new records and a new species: *E. aequatorialis* (Tanaka), *E. calva* (Tanaka), *E. comosa* (Tanaka), *E. confusa* (Tanaka), *E. gracilicauda* (A. Scott), *E. sarsi* Farran, *E. scotti* Farran, *E. vorax* Grice and Hulsemann, and *E. alaminae*, new species. *Euchaeta calva* (Tanaka) and *E. comosa* (Tanaka) are restored from synonymy; *E. withi* (Sewell) is recognized as synonymous with *E. hansenii* With. The males of *E. pubera*, *E. calva*, *E. comosa*, *E. gracilicauda*, *E. incisa*, and *E. vorax* are described for the first time. The relative abundance and bathymetrical distribution of each species are briefly discussed. A key to the species is given.

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# Calanoid Copepods of the Family Euchaetidae from the Gulf of Mexico and Western Caribbean Sea

*Taisoo Park*

## Introduction

The family Euchaetidae comprises medium to large-sized marine planktonic copepods, which are primarily carnivorous and numerically important in the oceanic zooplankton communities from the surface down to the bathypelagic realm. The family has often been classified into two genera—*Euchaeta*, consisting mostly of shallow-living forms, and *Paraeuchaeta* of bathypelagic species. In this study, all species are placed under a single genus, *Euchaeta*, since the splitting of the family into two genera seems unjustifiable from a morphological point of view (Vervoort, 1957). However, in the systematic account following (as a matter of convenience), they are arranged into two groups according to their bathymetrical distribution.

Over 50 species of *Euchaeta* have so far been described. Except for a relatively small number of common species, the euchaetids are among the most poorly known marine copepods. Most of them are deep living, and most of the deep-living species are so rare that their original descriptions are often based on a single specimen and many have never been recaptured. Adult males are even more scarce and thus remain unknown for many species. Furthermore, the sexual dimorphism is so much

greater than the differences between species that the female and male of the same species are often described as separate species or misidentified with different species.

In the Gulf of Mexico and Caribbean Sea, the following 15 species of *Euchaeta* have been known to occur (Fleminger, 1957; Owre and Foyo, 1967; Grice, 1969; Park, 1970): *E. acuta* Giesbrecht, *E. barbata* Brady, *E. bisinuata* Sars, *E. gracilis* Sars, *E. hansenii* With, *E. incisa* Sars, *E. malayensis* (Sewell), *E. marina* (Prestandrea), *E. media* Giesbrecht, *E. paraconcinna* Fleminger, *E. pseudotonsa* Fontaine, *E. pubera* Sars, *E. spinosa* Giesbrecht, *E. tonsa* Giesbrecht, and *E. withi* (Sewell). According to Fontaine (1967), *E. tonsa* reported by Owre and Foyo (1967) from the Florida Current should be referred to *E. pseudotonsa*.

In order to discover all euchaetid species of the Gulf of Mexico and western Caribbean Sea and to determine their relative abundance, I have examined over 200 zooplankton samples taken on the R/V *Alaminos* in 1971–1973 from various depth ranges between the surface and a depth of about 3000 m over these areas. The samples were collected mainly with Bongo nets originally designed by McGowan and Brown (1966). The original opening-closing mechanism was replaced with a new and more reliable one operated by messengers. The tows were made horizontally at various depths from half an hour to as long as three hours, depend-

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ing on the depths of sampling, in order to obtain samples large enough to contain sufficient numbers of specimens of the rare species. In addition, a number of samples were collected obliquely with standard plankton nets of two different sizes (1 and 2 m, respectively, in mouth diameter). The 2-m net tows down to depths exceeding 1000 m proved to be extremely useful in this study.

During this study, all the previously known species have been found except *E. acuta* and *E. malayensis*. Also found are the following eight new records and a new species: *E. aequatorialis* (Tanaka), *E. calva* (Tanaka), *E. comosa* (Tanaka), *E. confusa* (Tanaka), *E. gracilicauda* (A. Scott), *E. sarsi* Farran, *E. scotti* Farran, *E. vorax* Grice and Hulsemann, and *E. alaminae*, new species. The males of *E. pubera*, *E. calva*, *E. comosa*, *E. gracilicauda*, *E. incisa*, and *E. vorax* are described here for the first time. The male known as *E. withi* is recognized in this study as belonging to *E. hansenii*, known from the female only. *Euchaeta calva* (Tanaka) and *E. comosa* (Tanaka) are restored from synonymy.

*Euchaeta malayensis* (Sewell) seems to be an Indo-Pacific species and its record by Owre and Foyo (1967) from the Florida Current, which is based on a single specimen much larger (9.7 mm in body length) than the size range known for the species (6.0–7.5 mm) (Sewell, 1929; Tanaka, 1958; Tanaka and Omori, 1968) needs to be confirmed. *Euchaeta acuta* has been known to have a wide range of distribution (Vervoort, 1957) but seems to be more common in the temperate regions. Roe (1972) found *E. acuta* as a very common euchaetid species in the Canary Islands area, while Grice (1962) and Vervoort (1963) have failed to find the species in their extensive studies in the equatorial

Pacific and Atlantic, respectively. In the Gulf of Mexico and Caribbean Sea, *E. acuta* has been recorded from the Florida Current (Owre and Foyo, 1967), but no specimens referable to this species have been found in the present study.

The present paper is intended to make contributions to the systematics of the euchaetid species in the Gulf of Mexico and western Caribbean Sea, providing descriptions and figures of the characters useful in the species identification, together with notes on the abundance and bathymetrical distribution of each species. The body length given for each species was measured from the tip of the forehead to the end of the caudal ramus, and the prosome length from the tip of the forehead to the end of the posterolateral corner of the metasome. When the posterolateral corners are asymmetrically produced, as in the male of many species, the prosome length was determined from the side with the longer projection. Although only the body length is customarily given in the literature, the prosome length is found to be very useful, for in most specimens the urosome is flexed to a various extent and thus the total length of the body is difficult to measure accurately.

ACKNOWLEDGMENTS.—This study was supported by National Science Foundation Grant GA-27485. The identification of several species reported herein was possible by comparing them with specimens of closely related species from the other geographical areas. I am particularly grateful to the following persons who provided specimens for such comparisons: Thomas E. Bowman of the National Museum of Natural History, Abraham Fleminger of Scripps Institution of Oceanography, George D. Grice of Woods Hole Oceanographic Institution, and Makoto Omori of Tokyo University.

### Key to the Species of *Euchaeta* Found in the Gulf of Mexico and Western Caribbean Sea

#### FEMALE

1. One or 2 of 6 apical setae of maxilla armed with long, widely separated spines in addition to usual fine and short spinules. Appendicular caudal setae straight and parallel to and much thicker than other caudal setae .....2
- None of 6 apical setae of maxilla provided with long, widely separated spines in addition to usual fine and short spinules. Appendicular caudal setae geniculated or turned outward and not thicker than other caudal setae .....7
2. Two of 6 apical setae of maxilla armed with long, widely separated spines ..... *E. marina*
- One of 6 apical setae of maxilla armed with long, widely separated spines .....3

3. Dorsally or ventrally, genital segment nearly symmetrical (Figures 4b,d) ..... *E. pubera*  
Dorsally or ventrally, genital segment distinctly asymmetrical ..... 4
4. Right side of genital segment with a sharply pointed toothlike process (Figure 3c). Frontal  
eminence (fe) projected forward into a hornlike process (Figure 3a) ..... *E. paraconcinna*  
Right side of genital segment without such a toothlike process. Frontal eminence not  
projected forward into such a process ..... 5
5. Genital field elongated across genital segment and produced on left side into a large  
protuberance (Figure 5b) ..... *E. spinosa*  
Genital field differently shaped ..... 6
6. Viewed dorsally or ventrally, right side of genital segment forming a step posterior to  
middle of segment (Figure 2b). Outer coxal lobe of maxillule with 7 setae ..... *E. media*  
Right side of genital segment not forming such a step. Outer coxal lobe of maxillule with  
5 setae ..... *E. acuta*
7. Viewed laterally, genital prominence divided into 2 (Figures 15b,c) or 3 lobes (Figure 8b) ...8  
Viewed laterally, genital prominence not divided into lobes ..... 9
8. Viewed laterally, genital prominence with 3 lobes formed by 2-lobed genital flange together  
with a large protuberance posterior to genital aperture (Figure 8b) ..... *E. bisinuata*  
Viewed laterally, genital prominence divided into 2 lobes, anterior lobe being genital flange  
(Figures 15b,c) ..... *E. incisa*
9. Genital prominence extraordinarily large and similar in shape to a molar tooth (Figure  
13a) ..... *E. gracilis*  
Genital prominence differently formed ..... 10
10. Viewed laterally, genital prominence more or less triangular in shape. Genital flanges not  
prominent (Figure 16b) ..... *E. pseudotonsa*  
Viewed laterally, genital prominence not triangularly shaped. Genital flanges (gf) prominent  
(Figure 14b) ..... 11
11. Genital segment with a process on left side posterior to genital field (Figures 7b, 19c) ...12  
Genital segment without such a process ..... 14
12. Process of genital segment toothlike; genital prominence with straight posterior side clearly  
distinct from ventral wall of segment (Figure 7b) ..... *E. barbata*  
Process of genital segment not toothlike but composed of several ridges; genital prominence  
without a distinct posterior side (Figures 12b, 19c) ..... 13
13. Rostrum relatively short, pointing straight forward in parallel to dorsal margin of forehead  
(Figure 19a). Ventral wall of genital segment posterior to genital field strongly curved  
(Figure 19c) ..... *E. vorax*  
Rostrum relatively long, pointing obliquely forward (Figure 12a). Ventral wall of genital  
segment posterior to genital field only slightly curved Figure 12b) ..... *E. gracilicauda*
14. Outer coxal lobe of maxillule with 9 setae (Figure 11f) ..... 15  
Outer coxal lobe of maxillule with 5 to 7 setae ..... 16
15. Viewed laterally, genital flange (gf) produced posteriorly into a large triangular lobe  
extending beyond genital field (Figure 14b) ..... *E. hansenii*  
Genital flange not produced posteriorly into such a lobe (Figure 11b,c) ..... *E. confusa*
16. In third exopodal segment of second leg, incision posterior to second external spine  
unusually deep, extending higher than incision posterior to first external spine (Figure  
10c) ..... *E. comosa*  
In third exopodal segment of second leg, incision posterior to second external spine not  
unusually deep ..... 17
17. Laterally, genital prominence without a posterior side separate from posterior ridge of  
genital field (Figure 12b) ..... *E. gracilicauda*  
Laterally, genital prominence with a distinct posterior side meeting ventral wall of segment  
at an angle (Figures 18b, 20b) or in a continuous curve (Figure 6b) ..... 18
18. External spine of second exopodal segment of first leg short of reaching middle of third  
exopodal segment (Figure 20f). Laterally, genital prominence with high posterior side  
almost perpendicular to ventral wall of segment (Figures 20b,d) ... *E. alaminae*, new species  
External spine of second exopodal segment of first leg reaching about to distal end of  
third exopodal segment. Genital prominence appearing differently in lateral view ..... 19
19. Laterally, posterior ridge (pr) of genital field produced posteriorly into a distinct lobe  
similar in size to posterior lobe of genital flange (Figures 6b, 18b) ..... 20

- Laterally, posterior ridge of genital field not visible or only slightly produced (Figures 9b, 17c) ..... 21
20. Laterally, dorsal wall of genital segment with a hump about middle of segment (Figure 18b).  
 Posterior side of genital prominence meeting ventral wall of segment at an angle *E. scotti*  
 Laterally, dorsal wall of genital segment smoothly curved outward without such a hump  
 (Figure 6b). Posterior side of genital prominence merging into ventral wall of segment  
 forming a smooth curve ..... *E. aequatorialis*
21. Viewed laterally, length of genital flange (fl) 80-95/100 length of genital segment (sl) posterior to genital flange (Figure 17c). Rostrum small (Figure 17a) ..... *E. sarsi*  
 Viewed laterally, length of genital flange (fl) 55-65/100 length of genital segment (sl) posterior to genital flange (Figure 9b). Rostrum large (Figure 9a) ..... *E. calva*

## MALE

1. Third exopodal segment of left fifth leg prolonged into a spiniform process (Figure 4o) ... 2  
 Third exopodal segment of left fifth leg not prolonged into a spiniform process (Figure 9k) ..... 7
2. Third exopodal segment of left fifth leg less than two times the length of preceding segment (Figure 5d) ..... *E. spinosa*  
 Third exopodal segment of left fifth leg more than five times length of preceding segment (Figure 4o) ..... 3
3. Serrated lamella of second exopodal segment of left fifth leg extending beyond tuft of spinules of third exopodal segment (Figures 1d, 3e) ..... 4  
 Serrated lamella far short of reaching tuft of spinules of third exopodal segment (Figures 2c, 4p) ..... 5
4. Rostrum and frontal eminence closely contiguous (Figure 1c) ..... *E. marina*  
 Rostrum and frontal eminence widely apart (Figure 3d) ..... *E. paraconcinna*
5. Serrated lamella of second exopodal segment of left fifth leg divided into 2 lobes (Figure 2c) ..... *E. media*  
 Serrated lamella single lobed (Figure 4p) ..... 6
6. Digitiform process of second exopodal segment of left fifth leg tapering into a sharp point (Figure 4q) ..... *E. pubera*  
 Digitiform process terminating with a blunt end ..... *E. acuta*
7. Digitiform process very small, much shorter than haired tubercle of third exopodal segment (Figure 8e) ..... *E. bisinuata*  
 Digitiform process long ..... 8
8. Digitiform process (dp) with distal half distinctly bent outward and considerably narrower than proximal half (Figures 14d,f) ..... *E. hanseii*  
 Digitiform process more or less uniform in thickness and relatively straight except distal end ..... 9
9. Digitiform process with distal end pointed (Figures 7e, 11l, 18e, 19l) ..... 10  
 Digitiform process with distal end rounded (Figures 9n, 13f) ..... 13
10. Serrated lamella in form of an elongated triangle with fine marginal teeth (Figure 19k) ..... *E. vorax*  
 Serrated lamella in different form with relatively coarse marginal teeth ..... 11
11. Serrated lamella of second exopodal segment of left fifth leg with 4 large teeth on medial edge in addition to many small teeth (Figure 11m) ..... *E. confusa*  
 Serrated lamella with 2 or no large teeth on medial edge in addition to small teeth ..... 12
12. Serrated lamella with 2 large teeth on medial edge in addition to many small teeth, and its distal third slightly narrower than the rest (Figure 7d) ..... *E. barbata*  
 Serrated lamella with only small teeth, and its distal half considerably narrower than the rest (Figure 18d) ..... *E. scotti*
13. Serrated lamella terminating with a large tooth (Figures 13f, 16d) ..... 14  
 Serrated lamella not terminating with a large tooth ..... 15
14. Serrated lamella with large distal tooth and medially, with strongly curved toothed edge (Figure 13f) ..... *E. gracilis*  
 Serrated lamella with small distal tooth and medially, with slightly curved toothed edge (Figure 16e) ..... *E. pseudotonsa*



- 15. Viewed medially, serrated lamella with a sigmoidally curved toothed edge (Figure 15n) ..... *E. incisa*  
 Serrated lamella with teeth along only its margins, without a sigmoidally curved toothed edge ..... 16
- 16. Serrated lamella dagger shaped, with fine marginal teeth (Figure 17g) ..... *E. sarsi*  
 Serrated lamella differently shaped ..... 17
- 17. Serrated lamella more or less rectangular with distal projection along external margin (Figure 9l) ..... *E. calva*  
 Serrated lamella gradually narrowed distally, terminating in a round end ..... 18
- 18. Serrated lamella with large teeth on distal margin and very fine teeth on medial and lateral margins (Figure 10f) ..... *E. comosa*  
 All marginal teeth of serrated lamella more or less uniform in size ..... 19
- 19. Digitiform process of second exopodal segment of left fifth leg relatively long, with distal end sharply bent (Figure 12m) ..... *E. gracilicauda*  
 Digitiform process relatively short, with straight distal end (Vervoort, 1963:174, fig. 20f) ..... *E. aequatorialis*

**Shallow-Living Species**

(Species usually found in upper 500 m)

***Euchaeta marina* (Prestandrea, 1833)**

FIGURE 1

This is a common epiplanktonic species known to occur widely in the tropical, subtropical, and temperate zones of the World Ocean. In the Gulf of Mexico and western Caribbean Sea, it is the most common euchaetid species in the epipelagic zone. Although its bathymetrical distribution extends occasionally down to a depth of about 500 m, its main concentration usually appears between depths of 25 and 100 m.

According to 200 randomly selected specimens for each sex, the female measured 2.84–3.44 mm in body length and 2.08–2.48 mm in prosome length; the male 2.88–3.40 mm in body length and 2.12–2.36 mm in prosome length.

***Euchaeta media* Giesbrecht, 1888**

FIGURE 2

In geographical distribution this species almost coincides with, but usually occupies a deeper bathymetrical range than, *E. marina*. In the Gulf of Mexico and western Caribbean Sea, *E. media* usually occurs within a depth range of 100 to 1000 m, with a highest concentration between depths of 200 and 500 m, where it is the most common euchaetid species.

According to more than 200 randomly selected

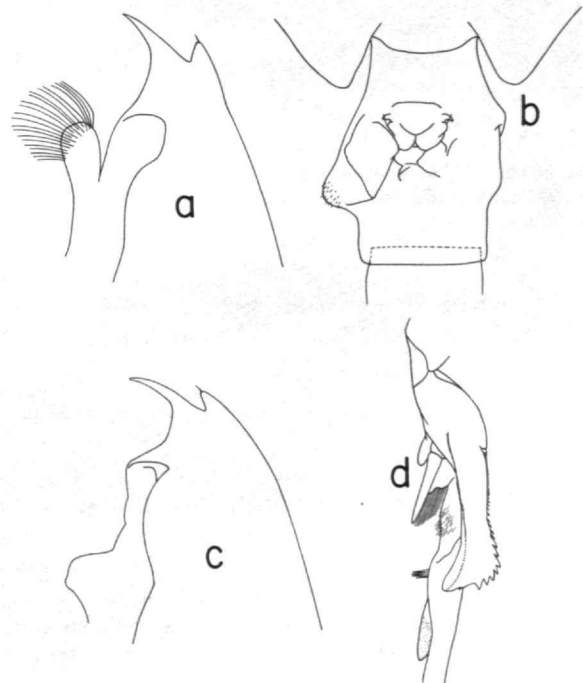


FIGURE 1.—*Euchaeta marina*. Female: a, forehead, lateral; b, genital segment, ventral. Male: c, forehead, lateral; d, exopod of left fifth leg, anterior.

specimens for each sex, the female measured 3.60–4.24 mm in body length and 2.48–2.80 mm in pro-

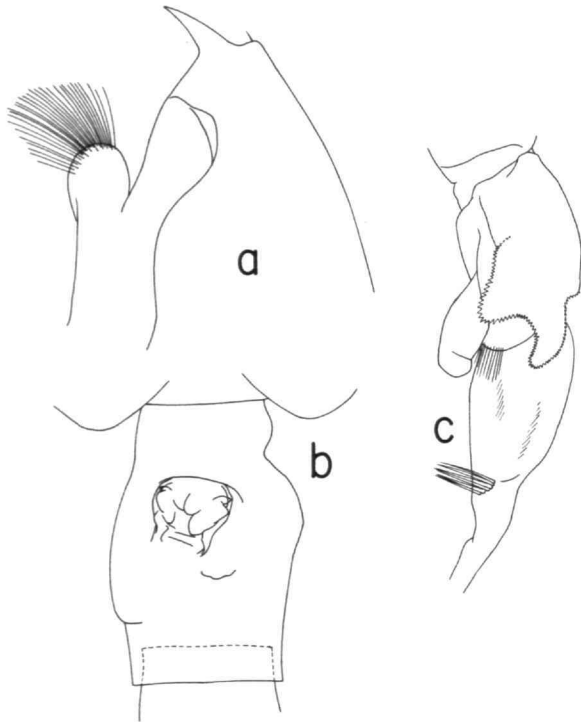


FIGURE 2.—*Euchaeta media*. Female: a, forehead, lateral; b, genital segment, ventral. Male: c, exopod of left fifth leg, anterior.

some length; the male, 3.42–3.74 mm in body length and 2.45–2.66 mm in prosome length.

***Euchaeta paraconcinna* Fleminger, 1957**

FIGURE 3

This species was originally described from the Gulf of Mexico and off North Carolina in the northwestern Atlantic. Vervoort (1963) recorded the species from the Gulf of Guinea. In the present study, the species was found to be very common in the upper 100 m throughout the area under consideration, with its bathymetrical distribution ranging down to a depth of about 200 m. The body length of the specimens was 2.32–2.80 mm in the female and 2.36–2.65 mm in the male, according to about 200 randomly selected individuals for each sex. The prosome length was 1.60–2.00 mm in the female and 1.72–1.92 mm in the male.

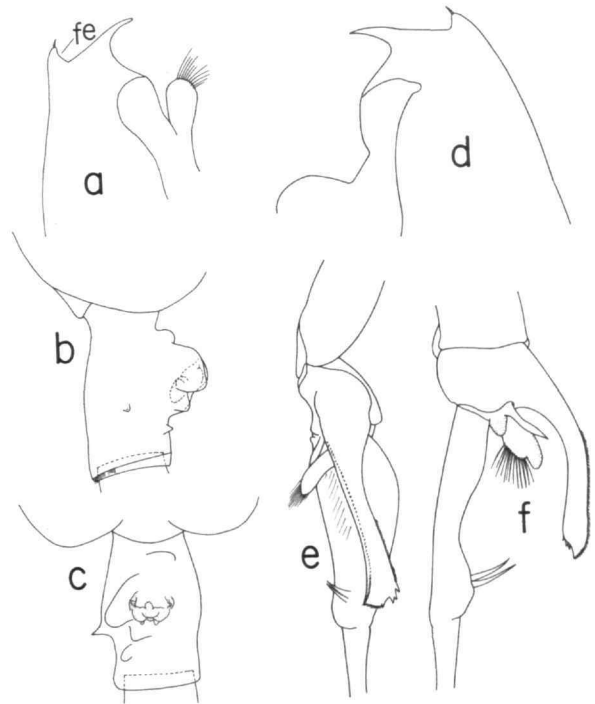


FIGURE 3.—*Euchaeta paraconcinna*. Female: a, forehead, lateral; b, genital segment, lateral; c, genital segment, ventral. Male: d, forehead, lateral; e, exopod of left fifth leg, anterior; f, exopod of left fifth leg, medial. (fe = frontal eminence.)

***Euchaeta pubera* Sars, 1907**

FIGURE 4

MALE.—Body and prosome lengths based on 45 specimens, 2.92–3.52 mm and 2.16–2.64 mm, respectively. Body slender. Dorsally, frontal eminence of forehead produced into a triangular form (Figure 4f). Rostrum well developed (Figure 4h), pointing downward. Posterolateral corners of metasome nearly symmetrical. Urosome about two-fifths length of prosome and covered with hair. Appendicular caudal setae geniculated and smaller than other caudal setae.

Antennule reaching about distal end of second urosomal segment. Antenna with reduced setae on coxa, basis, and first endopodal segment (Figure 4i). Feeding apparatus of oral appendages (Figure 4j,k) reduced as usual in the genus. Coxa of maxilliped with three distal setae only (Figure 4l). Exopod of first leg (Figure 4m) three segmented;

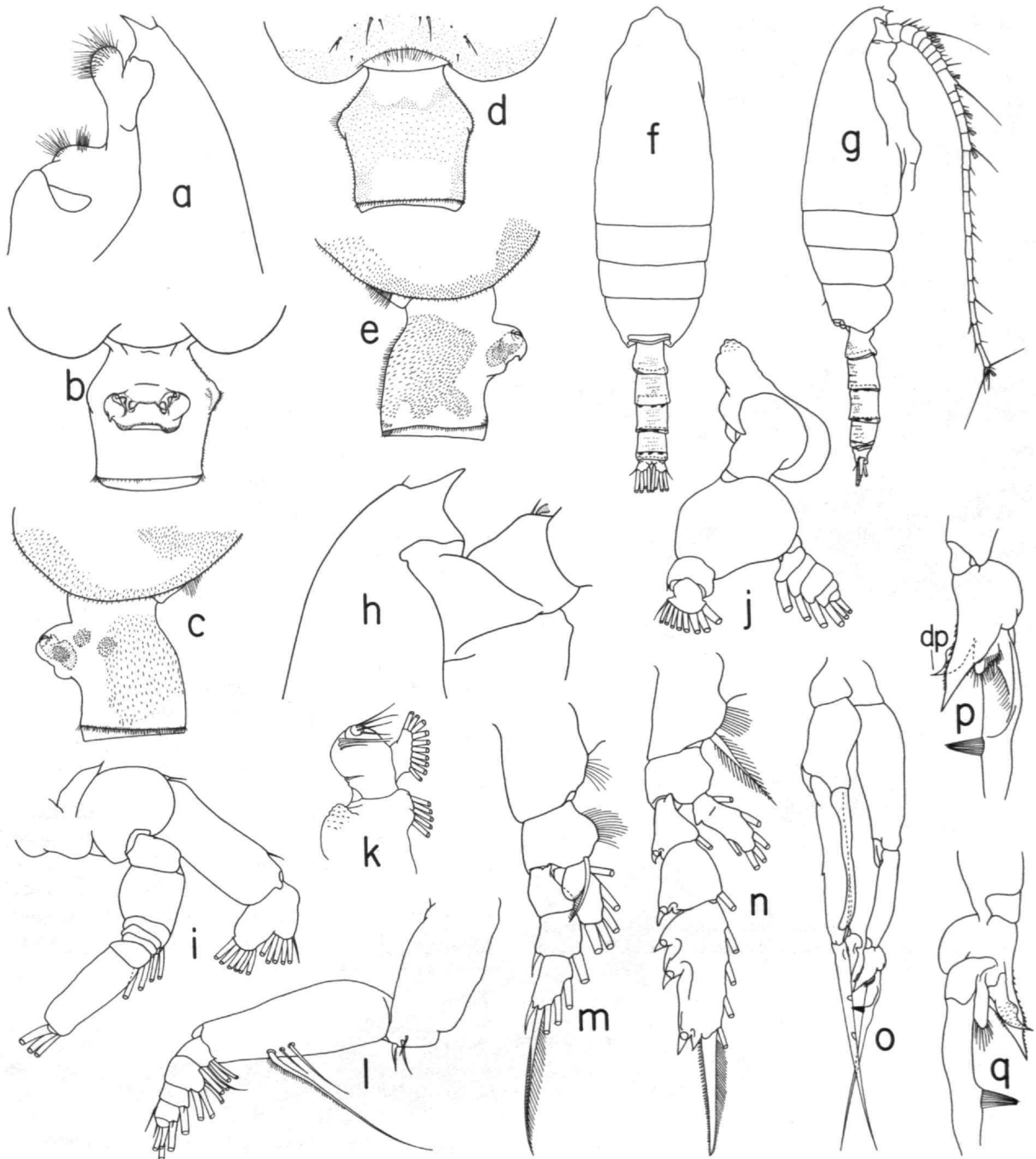


FIGURE 4.—*Euchaeta pubera*. Female: *a*, forehead, lateral; *b*, genital segment, ventral; *c*, genital segment, left side; *d*, genital segment, dorsal; *e*, genital segment, right side. Male: *f*, habitus, dorsal; *g*, habitus, lateral; *h*, forehead, lateral; *i*, antenna; *j*, mandible; *k*, maxillule; *l*, maxilliped; *m*, first leg, anterior; *n*, second leg, anterior; *o*, fifth pair of legs, anterior; *p*, exopod of left fifth leg, anterior; *q*, exopod of left fifth leg, medial. (dp = digitiform process.)



last two segments each with an external spine. Endopod of second leg (Figure 4n) with a short line representing a fused joint. Exopod with external spines of similar size. Third and fourth legs with three-segmented endopods and exopods. Distal exopodal segment of each fifth leg tapering in a long spiniform process (Figure 4o). Serrated lamella of second exopodal segment of left fifth leg nearly triangular in shape, with uniformly small teeth along most of internal margin and only middle portion of external margin (Figure 4p). Digiti-

form process tapering into a slightly curved spiniform process (Figure 4q).

REMARKS.—Wilson (1950) described a male as belonging to *E. pubera*. According to the description and figure of the fifth pair of legs, however, his male seems to be referable to *E. marina*. The male described here therefore represents the hitherto unknown male of *E. pubera*.

The female specimens obtained in the present study were 3.28–4.12 mm in body length and 2.48–3.12 mm in prosome length.

DISTRIBUTION.—*Euchaeta pubera* was originally described by Sars (1907) from the North Atlantic and has been known to occur, usually in small numbers, in the tropical, subtropical, and temperate zones of the Atlantic and Pacific oceans. Grice (1969) recorded the species in the Gulf of Mexico. In the present study, the species was represented by 214 females and 45 males, most of which were found in samples from depths of 100 to 200 m in the Gulf of Mexico and western Caribbean Sea.

### *Euchaeta spinosa* Giesbrecht, 1892

FIGURE 5

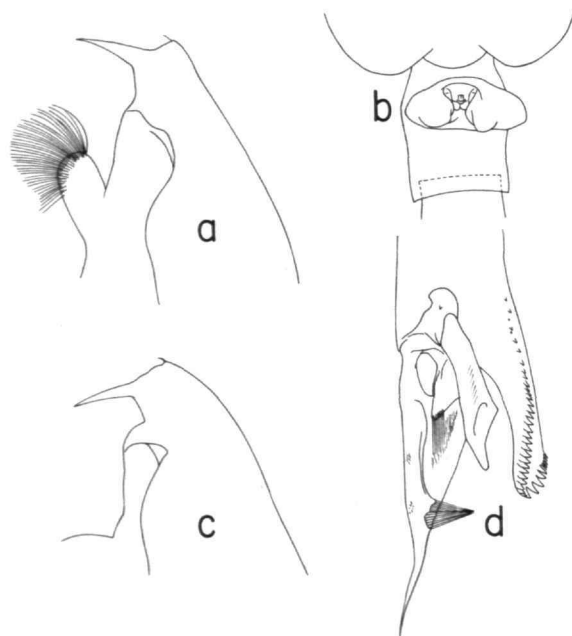


FIGURE 5.—*Euchaeta spinosa*. Female: a, forehead, lateral; b, genital segment, ventral. Male: c, forehead, lateral; d, exopod of left fifth leg, medial.

This is a mesopelagic species with a wide range of geographical distribution over the tropical, subtropical, and temperate zones of the World Ocean. In the present study, the species was found to be quite common in the Gulf of Mexico and western Caribbean Sea, and seemed to occupy mainly a bathymetrical range of 200 to 500 m. According to about 100 randomly selected individuals for each sex, the female measured 5.83–6.83 mm in body length and 4.33–4.92 mm in prosome length, and the male 5.75–6.17 mm in body length and 4.28–4.67 mm in prosome length.

### Deep-Living Species

(Species usually found below 500 m)

#### *Euchaeta aequatorialis* (Tanaka, 1958)

FIGURE 6

This species has so far been known to occur in the tropical Atlantic and off the Pacific coast of Middle Japan (Tanaka, 1958; Vervoort, 1963). In

the present study, only three female specimens referable to this species were found in three separate tows down to depths of 1650 to 2000 m in the Gulf of Mexico, and these findings are the first record of the species from this area. The specimens measured 4.16–4.24 mm in body length and 3.04–3.24

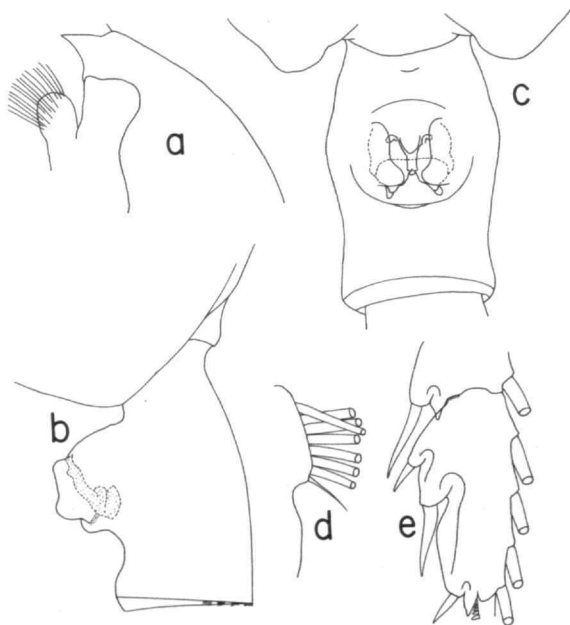


FIGURE 6.—*Euchaeta aequatorialis*, female: a, forehead, lateral; b, genital segment, lateral; c, genital segment, ventral; d, outer lobe of maxillule; e, exopod of second leg, anterior.

mm in prosome length, and were in good agreement in morphological details with the description given by Vervoort (1963).

### *Euchaeta barbata* Brady, 1883

FIGURE 7

This species was originally described from the southwestern Atlantic and has been known to occur widely over the tropical, subtropical, and temperate zones of the World Ocean. With (1915) distinguished a large form of *E. barbata* in the Norwegian Sea as a separate species, *E. farrani*, which was subsequently also found in the Antarctic seas by Farran (1929) and Vervoort (1957). This bipolar species shows no morphological differences from *E. barbata* except for the body size and appears to be only a geographical race rather than a separate species.

In the present study, *E. barbata* was found rather consistently, although in small numbers, in tows down to depths of 1000 to 3000 m. Altogether 82 females and 23 males have been identified from the

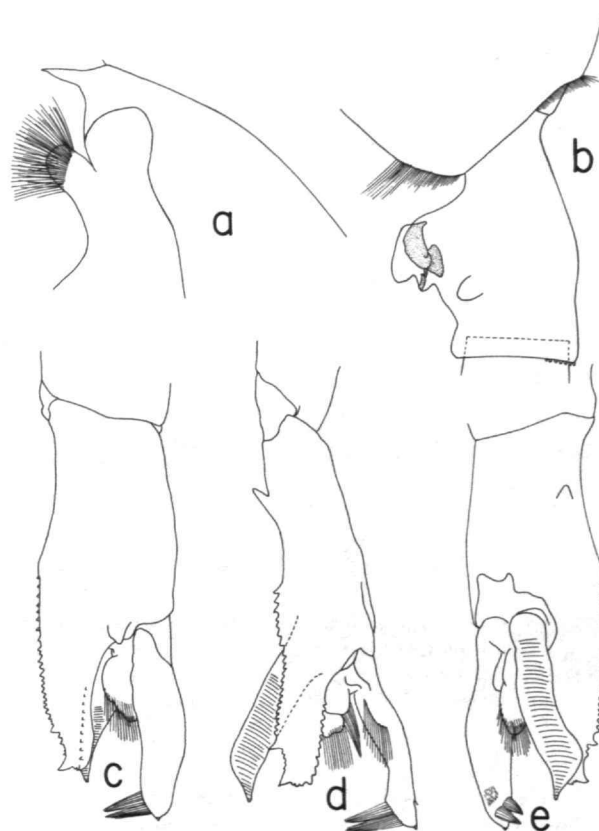


FIGURE 7.—*Euchaeta barbata*. Female: a, forehead, lateral; b, genital segment, lateral. Male: c, exopod of left fifth leg, lateral; d, exopod of left fifth leg, anterior; e, exopod of left fifth leg, medial.

Gulf of Mexico and western Caribbean Sea. The body length varied between 7.58 and 8.42 mm in the female and between 6.58 and 7.25 mm in the male. The prosome length of the female and male was 5.42–6.08 mm and 4.45–5.25 mm, respectively.

### *Euchaeta bisinuata* Sars, 1907

FIGURE 8

This is one of the more common bathypelagic euchaetid species throughout the tropical, subtropical, and temperate zones of the World Ocean. In the Gulf of Mexico and western Caribbean Sea, it was found to be the most common euchaetid species in the bathypelagial zone. Altogether, 234 females

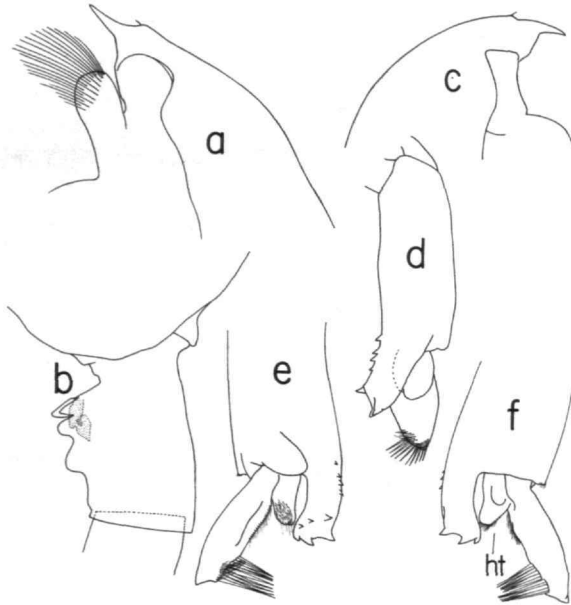


FIGURE 8.—*Euchaeta bisinuata*. Female: *a*, forehead, lateral; *b*, genital segment, lateral. Male: *c*, forehead, lateral; *d*, exopod of left fifth leg, anterior; *e*, exopod of left fifth leg, medial; *f*, exopod of left fifth leg, lateral. (ht = haired tubercle.)

and 42 males were identified in the present study, most of which were found from a depth range below 1000 m. The female measured 5.17–5.58 mm in body length and 3.67–4.04 mm in prosome length, and the male 4.48–4.75 mm in body length and 3.32–3.60 mm in prosome length.

### *Euchaeta calva* (Tanaka, 1958)

#### FIGURE 9

- Pareuchaeta calva* Tanaka, 1958:347–348, fig. 71.  
*Pareuchaeta comosa* Tanaka, 1958:363–365, fig. 79h–j [male only].  
*Euchaeta dudia*.—Vervoort, 1963:176–181, figs. 21–23.  
*Pareuchaeta dubia*.—Tanaka and Omori, 1967:245 [male only]; 1968:234 [male only].  
*Pareuchaeta californica*.—Tanaka and Omori, 1968:231–232, figs. 3E, 4E, 7A–C.  
*Pareuchaeta polita* Tanaka and Omori, 1968–247, figs. 3o, 4o, 15A–D.  
*Pareuchaeta simulantis* Tanaka and Omori, 1968:253–255, figs. 3w, 4w, 19A–F.

**FEMALE.**—Body length based on 86 specimens, 7.25–7.91 mm. Prosome length, 5.33–5.66 mm. Ros-

trum large, pointing obliquely forward (Figure 9a). Viewed laterally, genital prominence high and relatively narrow (Figure 9b). Length of genital flange (fl) 55–65/100 length of genital segment posterior to genital flange (sl). Posterior lobe of genital flange large, usually pointing posteroventrad. Antennule a little short of reaching distal end of prosome. Outer coxal lobe of maxillule with five large setae of similar size and a small seta of variable size in addition to 2 or 3 minute setae proximally (Figure 9e).

**MALE.**—Body length based on 11 specimens, 6.66–7.25 mm. Prosome length, 4.75–5.25 mm. Rostrum elongated, pointing downward (Figure 9h). Posterolateral corners asymmetrical, each with a tooth-like process dorsally. Antennule reaching middle of second urosomal segment. Serrated lamella of second exopodal segment of left fifth leg rectangular, with a projection along external margin (Figure 9l). Uniformly small teeth bordering entire length of internal margin and distal portion of external margin. Digitiform process straight and shorter than serrated lamella, with a uniform thickness and round distal end (Figure 9n).

**REMARKS.**—*Euchaeta calva* was originally described by Tanaka (1958) on the basis of six female specimens taken in the Izu region of Middle Japan. Tanaka and Omori (1968) redescribed the species from a female specimen obtained from the same locality and considered it synonymous with *Euchaeta californica* Esterly. Through loan I have re-examined Tanaka and Omori's specimen by comparing it with Esterly's original specimen of *E. californica* and found that they are distinctly different species. *Euchaeta californica* will be redescribed elsewhere from Esterly's original specimen and some additional material from the type-locality.

The female specimens of *E. calva* found in the present study were carefully compared with Tanaka and Omori's (1968) specimen and were found to be identical. The male described herein undoubtedly belongs to this species because of its close similarity to the female in body size, distribution, and relative abundance.

Tanaka (1958) has described an identical male from the Izu region, which he ascribed to *Euchaeta comosa*. Assuming that the male referred to *E. comosa* by Tanaka (1958) is identical with *Euchaeta dubia* Esterly (known exclusively from the male), Vervoort (1963) synonymized the two



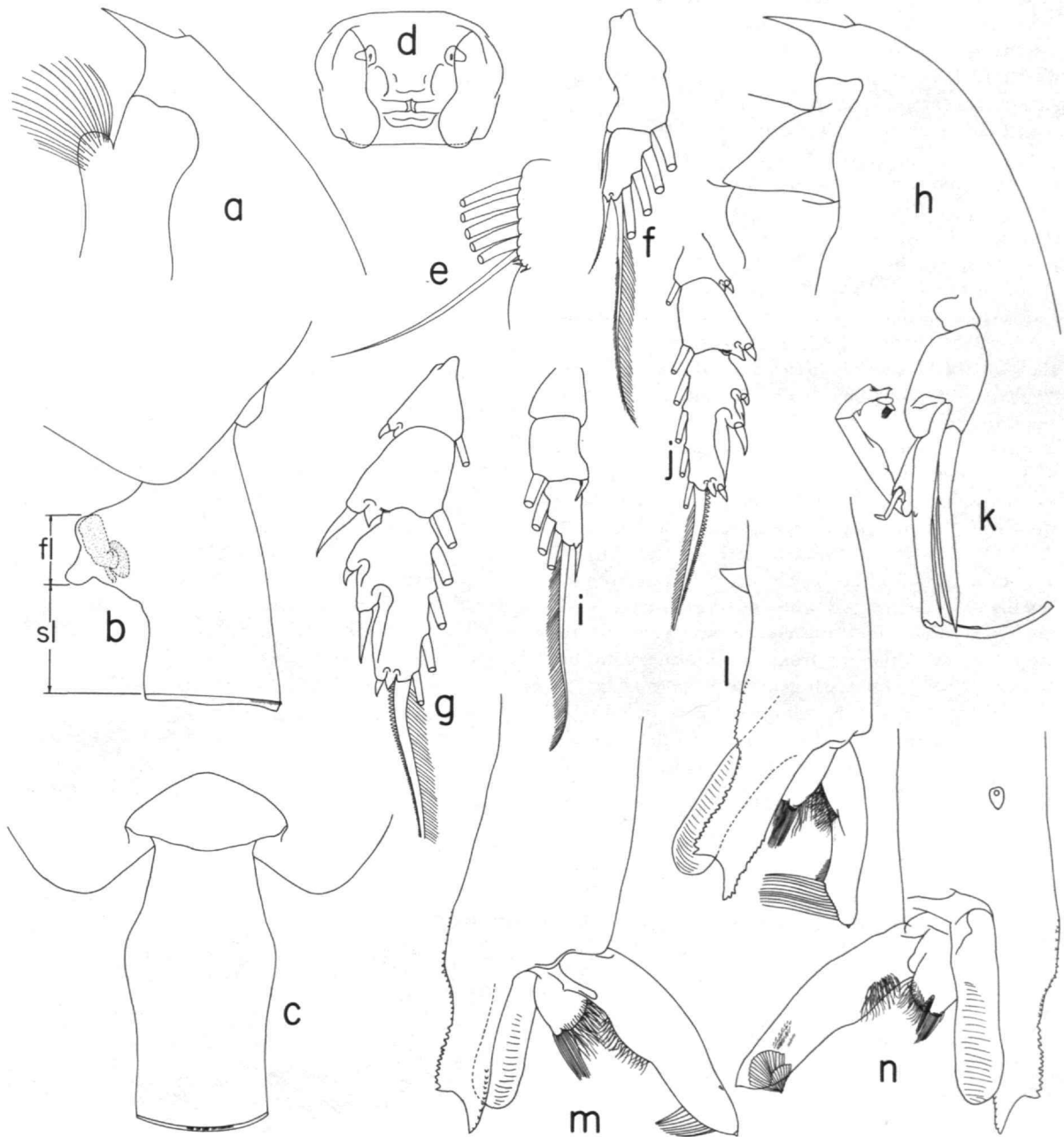


FIGURE 9.—*Euchaeta calva*. Female: *a*, forehead, lateral; *b*, genital segment, lateral; *c*, genital segment, dorsal; *d*, genital field; *e*, outer lobe of maxillule; *f*, exopod of first leg, anterior; *g*, exopod of second leg, anterior. Male: *h*, forehead, lateral; *i*, exopod of first leg, anterior; *j*, exopod of second leg, anterior; *k*, fifth pair of legs; *l*, exopod of left fifth leg, anterior; *m*, exopod of left fifth leg, lateral; *n*, exopod of left fifth leg, medial. (fl = length of genital flange; sl = length of genital segment posterior to genital flange.)

species. In the present study, *E. dubia* was reexamined on the basis of a specimen from the type-locality provided by Abraham Fleminger, and found to be distinctly different. As suggested by A. Fleminger (pers. comm.), *E. dubia* seems to represent the male sex of *E. californica* Esterly.

*Euchaeta comosa* Tanaka is therefore restored from synonymy in this study. However, the female and male of *E. comosa* as originally described by Tanaka (1958) cannot be considered as conspecific because they are significantly different in shape of the second leg. The male, which has been redescribed in detail (under the name of *E. dubia*) by Vervoort (1963) from specimens obtained in the Gulf of Guinea, is identical with the male of *E. calva* described here. The female is properly referable to *E. comosa* and a male attributable to it has been found in the present study.

Tanaka and Omori (1968) described two species (*Pareuchaeta polita* and *P. simulantis*) that show no significant differences from their description of *E. calva* (as *P. californica*). All of these three species were said to be closely allied to *E. sarsi* and distinguishable from it only by the rostrum and genital segment, but no account was given as to how they are different from one another. In the present study, their specimens of *P. polita* and *P. simulantis* were also reexamined through help by Makoto Omori, and it was found that they are all identical with their specimen of *E. calva* (referred to *P. californica*).

The female of *E. calva* as described here is very similar to that of *Euchaeta regalis* Grice and Hulsemann, 1968, which will be redescribed elsewhere from specimens from the type-locality. The male referred to *E. regalis* by Grice and Hulsemann (1968) is here identified with *E. comosa* Tanaka.

**DISTRIBUTION.**—*Euchaeta calva* has so far been known to occur in the Izu region, Middle Japan (Tanaka, 1958; Tanaka and Omori, 1967, 1968, as *P. dubia*), and in the Gulf of Guinea (Vervoort, 1963, as *E. dubia*). The records of *E. dubia* by DeDecker and Mombeck (1965) and Grice and Hulsemann (1967, 1968) from the Indian Ocean and the southeastern Pacific may also be referable to this species. In the present study, the species was represented by 86 females and 11 males, most of which were found in tows down to depths exceeding 1000 m. These findings constitute the first rec-

ord of the species in the Gulf of Mexico and Caribbean Sea.

### *Euchaeta comosa* (Tanaka, 1958)

FIGURE 10

- Pareuchaeta comosa* Tanaka, 1958:363, fig. 79a-g [female only].  
*Pareuchaeta dubia*.—Tanaka and Omori, 1968:234, figs. 3c, 4c, [female only].  
*Pareuchaeta hanseni*.—Tanaka, 1958:362, fig. 78g-h [male only].  
*Euchaeta regalis* Grice and Hulsemann, 1968:331, figs. 41-48 [male only].  
 Not *Pareuchaeta comosa* Tanaka, 1958:123, fig. 79h-j [male only] [= *P. calva* Tanaka, 1958].

**MALE.**—Body length based on 4 specimens, 7.75–8.08 mm. Prosome length, 5.41–5.75 mm. Frontal eminence of forehead inconspicuous. Rostrum

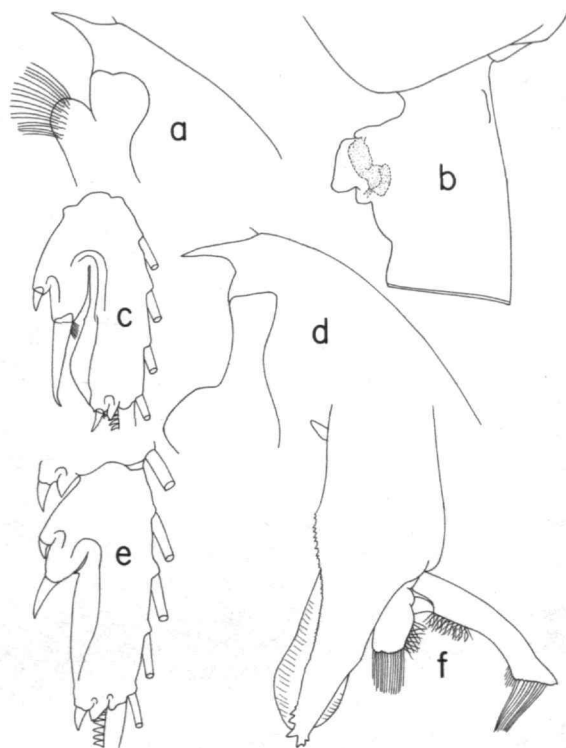


FIGURE 10.—*Euchaeta comosa*. Female: a, forehead, lateral; b, genital segment, lateral; c, third exopodal segment of second leg, anterior. Male: d, forehead, lateral; e, third exopodal segment of second leg, anterior; f, exopod of left fifth leg, anterior.

elongated, pointing downward (Figure 10d). Posterolateral corners asymmetrical, each with a low toothlike process dorsally. Antennule reaching about distal end of second urosomal segment. Exopod of first leg 3-segmented, with external spines of reduced size. Endopod of second leg 1-segmented. Third exopodal segment (Figure 10e) with an unusually deep incision posterior to second external spine as in the female. Serrated lamella gradually narrowed distally, terminating in a blunt end armed with several large teeth (Figure 10f). Internal margin finely serrated. External margin naked. Digitiform process large, with somewhat swollen, round distal end reaching close to distal end of serrated lamella.

**REMARKS.**—Tanaka's (1958) original description of *E. comosa* is based on female and male specimens obtained in the Izu region, Middle Japan. As the male of *E. comosa* described by Tanaka is similar to *E. dubia* Esterly, 1906, exclusively based on the male, Vervoort (1963) considered the two species synonymous. As discussed under *E. calva*, it has been found in the present study that the male referred to *E. comosa* by Tanaka is not identical with *E. dubia* Esterly but attributable to *E. calva*, and the female of *E. comosa* is a separate valid species.

The female specimens found in the present study are in good agreement with Tanaka's (1958) original description, and they are readily distinguished by the characteristic genital segment (Figure 10b) and unusually deep incision posterior to the second external spine of the third exopodal segment of the second leg (Figure 10c). The body lengths of the 24 specimens found in the study varied from 8.16 to 9.00 mm and the prosome lengths from 6.08 to 6.66 mm.

The male described above is believed to belong to *E. comosa* because of its close similarity to the female in size, distribution, and, particularly, form of the second leg. The exceptionally deep incision present in the third exopodal segment of the second leg in both the female and male of this species is not found in any other euchaetid species observed in the present study.

The male referred to *E. hansenii* by Tanaka (1958) and that described as belonging to *E. regalis* by Grice and Hulsemann (1968) seem to be identical with the male of *E. comosa* described above.

**DISTRIBUTION.**—*Euchaeta comosa* has so far been known to occur off the Pacific coast of Middle Japan by Tanaka (1958) and Tanaka and Omori (1968, as *Pareuchaeta dubia*) and in the south-eastern Pacific (as the male of *E. regalis*) by Grice and Hulsemann (1968). In the present study, the species was represented by 24 females and 4 males, all of which were found in tows down to depths exceeding 1000 m in the Gulf of Mexico and western Caribbean Sea, and these findings constitute the first record of the species in the Atlantic Ocean.

### *Euchaeta confusa* (Tanaka, 1958)

FIGURE 11

This species was originally described from the Izu region, Middle Japan, by Tanaka (1958) and has been recorded from the Kurile-Kamchatka Trench by Heptner (1971).

The female is characteristic in having a single-lobed genital flange and pronounced posterior edge of the genital field followed by a biconvex posterior side of the genital prominence (Figure 11b,c). The male is easily recognized by the serrated lamella of the left fifth leg (Figure 11l,m), which is unique in having four large serrated teeth along the internal margin.

In the present study, the species was represented by four females and two males found in two tows down to depths of 1000 and 2000 m, respectively, in the Bartlett Deep of the western Caribbean Sea. These findings are the first record of the species in the Atlantic Ocean. The females measured 6.50–7.08 mm in body length and 4.83–5.00 mm in prosome length, and the males 5.83–5.91 mm in body length and 4.16 mm in prosome length.

### *Euchaeta gracilicauda* (A. Scott, 1909)

FIGURE 12

**FEMALE.**—Body length based on 28 specimens, 6.00–6.41 mm. Prosome length, 4.08–4.50 mm. Rostrum (Figure 12a) long, pointing obliquely forward, often slightly curved backward. Laterally, frontal eminence of forehead distinct. Genital segment (Figure 12b) elongated, with relatively low genital prominence. On left side of genital segment posterior to genital prominence a small, low tubercle

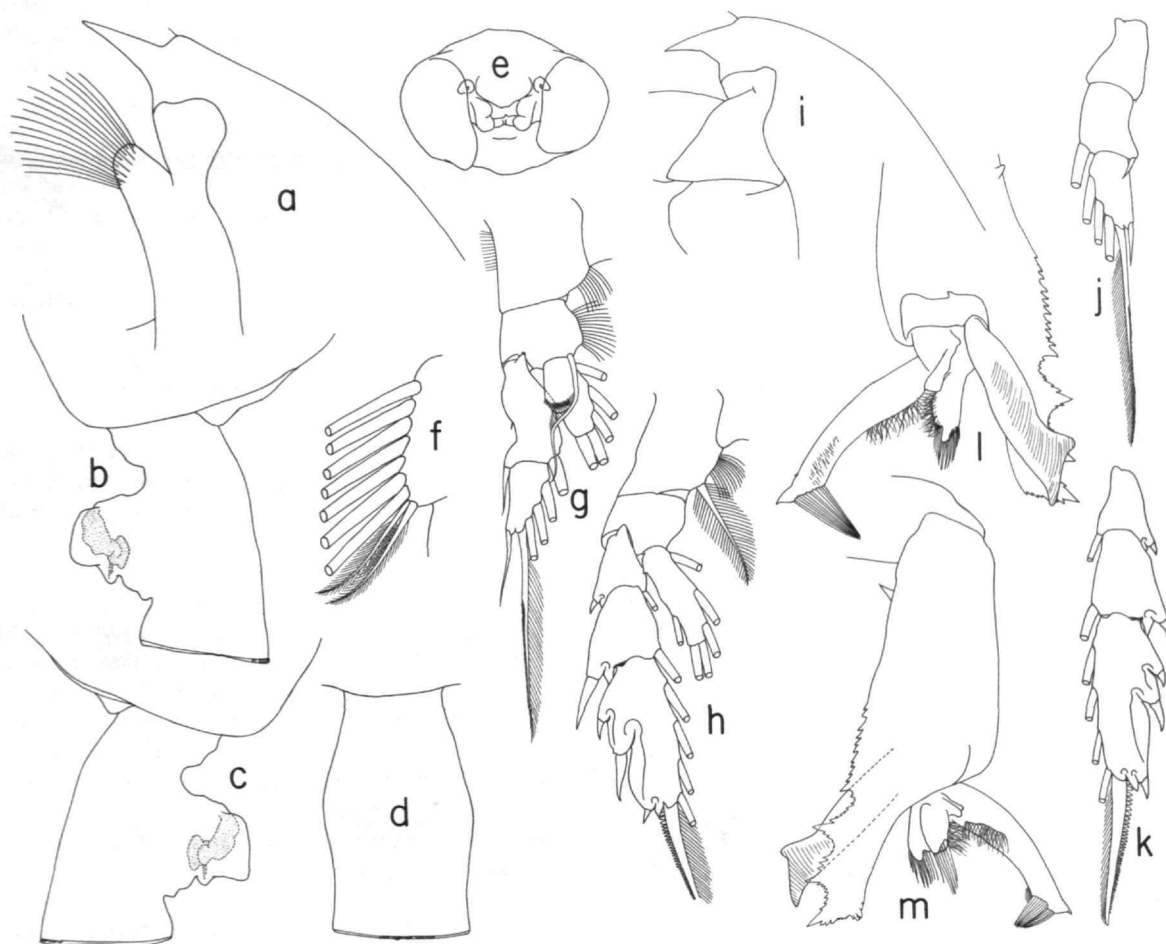


FIGURE 11.—*Euchaeta confusa*. Female: *a*, forehead, lateral; *b*, genital segment, left side; *c*, genital segment, right side; *d*, genital segment, dorsal; *e*, genital field; *f*, outer lobe of maxillule; *g*, first leg, anterior; *h*, second leg, anterior. Male: *i*, forehead, lateral; *j*, exopod of first leg, anterior; *k*, exopod of second leg, anterior; *l*, exopod of left fifth leg, medial; *m*, exopod of left fifth leg, anterior.

is present, clearly visible when the genital segment is tilted left (Figure 12*c*). Viewed laterally, genital flange well developed, with distinct posterior lobe, but flanking only proximal two-thirds of genital field. Genital field only slightly produced distally. Genital prominence without a distinct posterior side. Posterior to genital field, ventral surface of genital segment forming a single broad arch (Figure 12*b*).

Antennule reaching about middle of genital segment. Outer coxal lobe of maxillule (Figure 12*f*)

with 5 large setae of similar size in addition to two or three minute setae proximally. First two exopodal segments of first leg (Figure 12*g*) fused, but a faint line of joint visible. First segment with a minute external spine. Second and third segments each with a well-developed external spine. Endopod of second leg (Figure 12*h*) 1-segmented. External spines of exopod moderately developed, that of second segment being the largest. Incision posterior to second external spine of third segment not unusually deep.

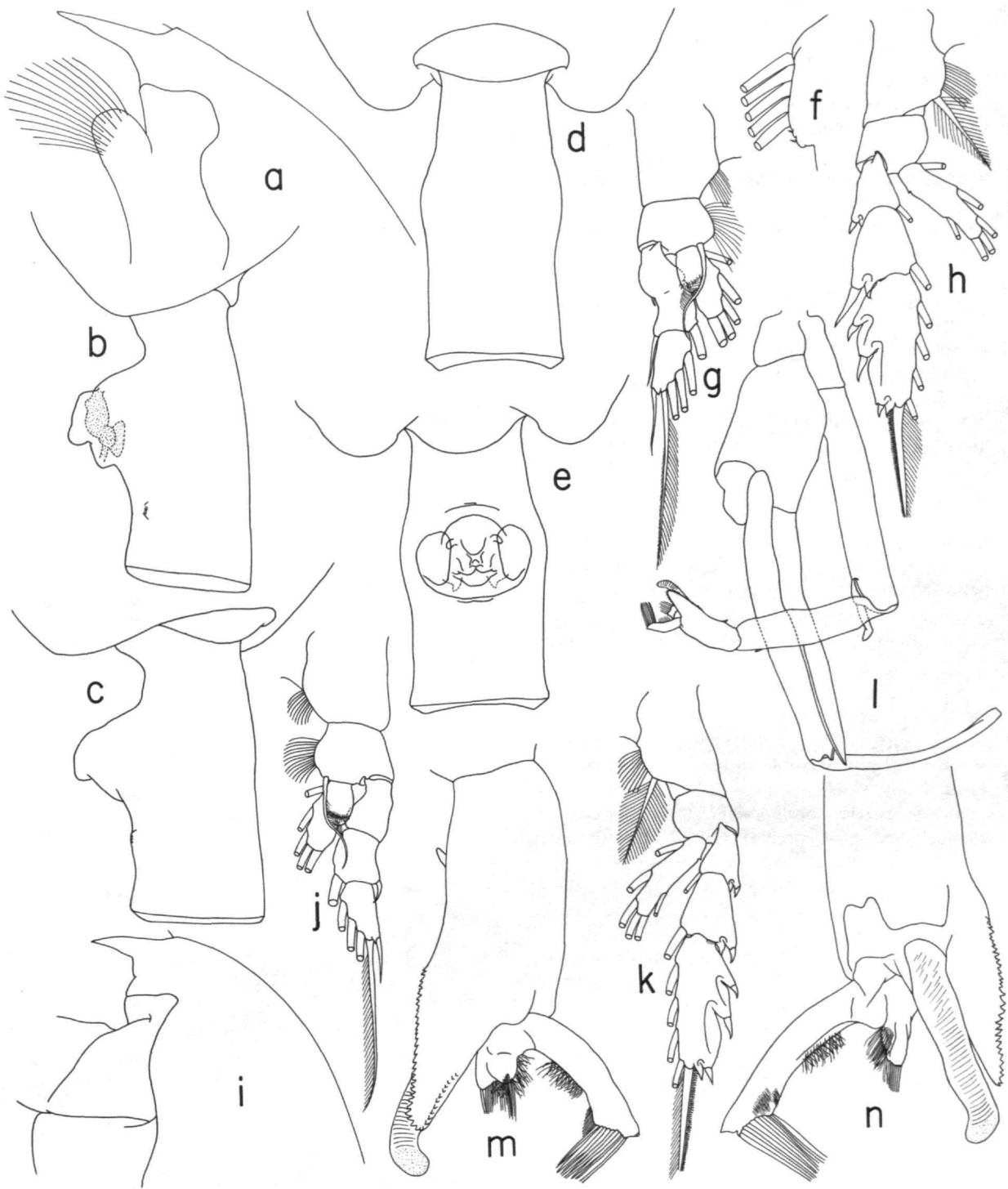


FIGURE 12.—*Euchaeta gracilicauda*. Female: *a*, forehead, lateral; *b*, genital segment, lateral; *c*, left side of genital segment viewed obliquely; *d*, genital segment, dorsal; *e*, genital segment, ventral; *f*, outer coxal lobe of maxillule; *g*, first leg, anterior; *h*, second leg, anterior. Male: *i*, forehead, lateral; *j*, first leg, anterior; *k*, second leg, anterior; *l*, fifth pair of legs, anterior; *m*, exopod of left fifth leg, anterior; *n*, exopod of left fifth leg, medial.

**MALE.**—Body length based on 3 specimens, 6.35–6.41 mm. Prosome length, 4.41–4.50 mm. Frontal eminence of forehead (Figure 12i) not pronounced. Rostrum well developed, pointing straight downward. Posterolateral corners of metasome asymmetrical. Antennule reaching middle of third urosomal segment. Exopod of first leg (Figure 12j) 3-segmented. Distal 2 segments each with an external spine of reduced size. Second (Figure 12k) to fourth legs similar to those of the female but external spines smaller. Serrated lamella of left fifth leg scooplike, with uniform marginal teeth (Figure 12m,n). Digitiform process elongate, with distal end sharply bent outward.

**REMARKS.**—*Euchaeta gracilicauda* was originally described by A. Scott (1909) from 3 female specimens 7 mm long captured in 2 plankton tows down to 750 m and 2000 m, respectively, in the Malay Archipelago. The specimens described herein are believed to be identical with A. Scott's species because they seem to show a perfect agreement in details of the genital segment and appendages. The rostrum also shows a close similarity between them, although it appears to be somewhat larger and less curved in the present specimens.

*Euchaeta gracilicauda* has been recorded from the Indian Ocean by Sewell (1929), but according to his figure of the genital segment, his specimen seems to be not referable to this species. Grice and Hulsemann (1969) have recorded *E. gracilicauda* from the eastern South Pacific. When reexamined through loan by George D. Grice, their specimens were not in agreement with *E. gracilicauda* in form of the rostrum and appeared to be referable to a new species I have found recently in sub-Antarctic waters.

Sars (1925) described *Euchaeta scotti* from the North Atlantic but his description is, however, obviously different in the form of genital segment from the original species description by Farran (1908). Although clearly distinguishable in the form of rostrum, Sars' *E. scotti* is rather closely related to *E. gracilicauda*.

The male of *E. gracilicauda* is described here for the first time. It is also similar to the male of *E. scotti* described by Sars (1925) except for the digitiform process of the left fifth leg, which in Sars' species is almost straight.

**DISTRIBUTION.**—Since the records by Sewell (1929) and Grice and Hulsemann (1968) are believed to

be not referable to this species, as stated above, the present findings seem to constitute the first record of the species since its original discovery from the Malay Archipelago by A. Scott (1909). The species was represented in the present study by 28 females and 3 males, all taken in tows down to depths exceeding 1000 m.

### *Euchaeta gracilis* Sars, 1905

FIGURE 13

This is a common euchaetid species in deep waters of the North Atlantic from the tropical to boreal region (Vervoort, 1963). It has also been recorded from the Indian Ocean by De Decker and Mombeck (1965) and Grice and Hulsemann (1967) and from the Pacific by Wilson (1950).

In the Gulf of Mexico and Caribbean Sea, *E.*

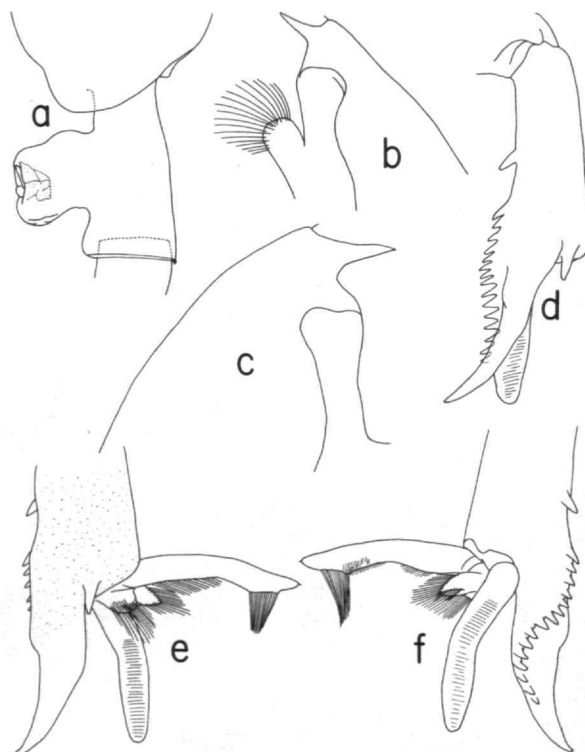


FIGURE 13.—*Euchaeta gracilis*. Female: a, genital segment, lateral; b, forehead, lateral. Male: c, forehead, lateral; d, exopod of left fifth leg, anterior; e, exopod of left fifth leg, lateral; f, exopod of left fifth leg, medial.



*gracilis* has been recorded by Grice (1969). In the present study, the species was represented by 32 females and 8 males, most of which were found in the samples obtained from a depth range of 500 to 1000 m. The female measured 6.00–6.66 mm in body length and 4.20–4.75 mm in prosome length, and the male 5.08–5.58 mm in body length and 3.66–4.00 mm in prosome length.

### *Euchaeta hansenii* With, 1915

FIGURE 14

*Paraeuchaeta withi* Sewell, 1947:131, fig. 30.

*Euchaeta sarsi*.—With, 1915:178, pl. 6: fig. 7b [male only].

Not *Pareuchaeta hansenii*.—Tanaka, 1958:362, fig. 78g–h [male only] [= *Pareuchaeta comosa* Tanaka].

MALE.—Body length based on 11 specimens, 8.08–8.58 mm. Prosome length, 5.75–6.08 mm. Frontal eminence of forehead inconspicuous (Fig-

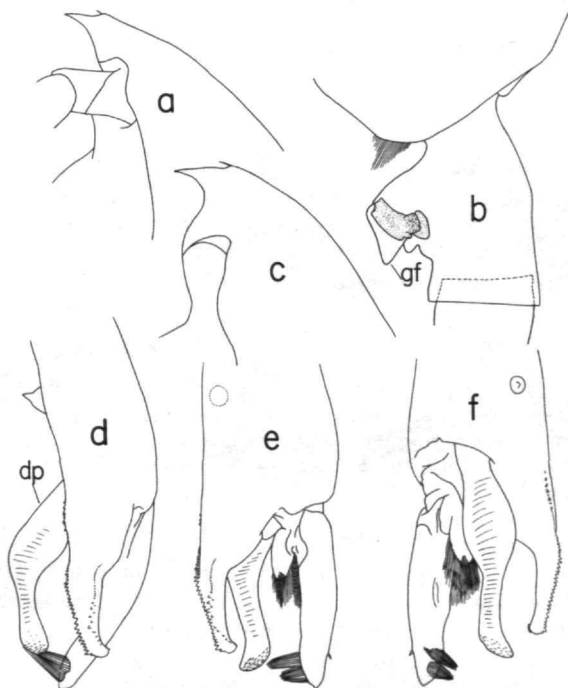


FIGURE 14.—*Euchaeta hansenii*. Female: a, forehead, lateral; b, genital segment, lateral. Male: c, forehead, lateral; d, exopod of left fifth leg, anterior; e, exopod of left fifth leg, lateral; f, exopod of left fifth leg, medial. (dp = digitiform process; gf = genital flange.)

ure 14c). Rostrum rather short but relatively heavy, pointing downward. Posterolateral corners of metasome asymmetrical, each with a small tooth-like process dorsally. Antennule reaching about distal end of second urosomal segment. Exopod of first leg 3-segmented, with external spines of reduced size. Endopod of second leg 1-segmented. Exopod with external spines of reduced size. Serrated lamella of left fifth leg (Figure 14d-f) elongated into a narrow scooplike structure, with small marginal teeth, all pointing medially. Distal half of digitiform process distinctly bent outward and much narrower than proximal half.

REMARKS.—The male described above is believed to represent the hitherto unknown male of *E. hansenii*, for it is usually found along with the female of that species and is the closest to it in body size. *Euchaeta withi* (Sewell, 1947), known exclusively from the male, seems to be identical with the male of *E. hansenii* described above. *Euchaeta withi* has been recorded from the North Atlantic by With (1915, as *E. sarsi*), the Arabian Sea by Sewell (1947), the Florida Current by Owre and Foyo (1967), and the western North Pacific by Tanaka and Omori (1968), and in all these areas the female of *E. hansenii* has also been found by the same authors.

The female specimens obtained in the present study show no anatomical differences from the original description by With (1915). Their body length ranged from 8.41 to 9.25 mm and their prosome length from 6.08 to 6.83 mm according to 79 specimens.

DISTRIBUTION.—*Euchaeta hansenii* has been known to occur widely in deep waters of the Atlantic, Pacific, and Indian oceans (Tanaka and Omori, 1968). In the present study, the species was represented by 79 females and 12 males, practically all of which were found in tows down to depths exceeding 1000 m.

### *Euchaeta incisa* Sars, 1905

FIGURE 15

MALE.—Body length based on 20 specimens, 4.83–5.75 mm. Prosome length, 3.50–4.08 mm. Frontal eminence of forehead (Figure 15h) relatively low. Rostrum powerful, pointing straight downward. Posterolateral corners of metasome asymmetrical,

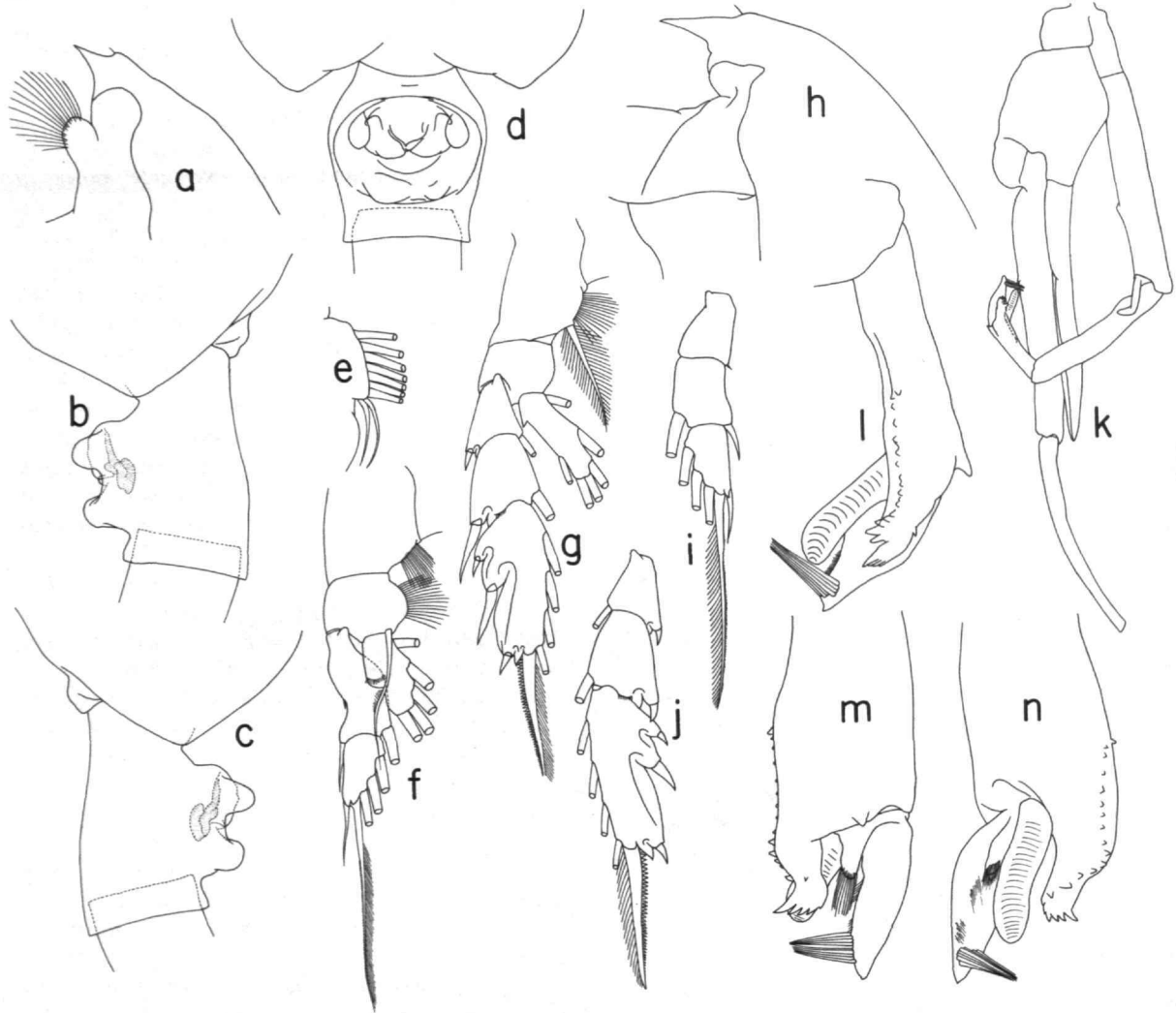


FIGURE 15.—*Euchaeta incisa*. Female: *a*, forehead, lateral; *b*, genital segment, left side; *c*, genital segment, right side; *d*, genital segment, ventral; *e*, outer lobe of maxillule; *f*, first leg, anterior; *g*, second leg, anterior. Male: *h*, forehead, lateral; *i*, exopod of first leg, anterior; *j*, exopod of second leg, anterior; *k*, fifth pair of legs, anterior; *l*, exopod of left fifth leg, anterior; *m*, exopod of left fifth leg, lateral; *n*, exopod of left fifth leg, medial.

each with a small toothlike process dorsally. Antennule reaching about middle of second urosomal segment. Exopod of first leg (Figure 15*i*) 3-segmented, last two segments each with a well-developed external spine. Endopod of second leg 1-segmented. Exopod (Figure 15*j*) with external spine of medium size. Incision posterior to second external spine of third exopodal segment moderately deep. Serrated lamella of left fifth leg rela-

tively short. Viewed medially (Figure 15*n*), toothed edge sigmoidally curved, with four to five large teeth on distal end. Digitiform process of a nearly uniform thickness, with round distal end, and slightly longer than serrated lamella.

REMARKS.—The male of *E. incisa*, described here for the first time, is readily recognized by its characteristic serrated lamella of the left fifth leg, as in the other euchaetid species. The female specimens

found in the present study were identical in every detail with the description given by Sars (1925). They measured 5.41–5.75 mm in body length and 4.00–4.25 mm in prosome length.

**DISTRIBUTION.**—*Euchaeta incisa* was originally described from the North Atlantic by Sars (1905) and has been recaptured in the western North Atlantic and the Gulf of Mexico by Grice (1963, 1969). In the present study, a total of 80 females and 20 males were found, mainly in tows down to depths over 1000 m.

### *Euchaeta pseudotonsa* Fontaine, 1967

FIGURE 16

This Atlantic bathypelagic species had been known to be conspecific with *E. tonsa* of the Pacific until Fontaine (1967) recognized it as a separate species. In the present study, the species was found to be one of the most common bathypelagic euchaetid species. Altogether, 172 females and 26 males were found in tows down to a depth range of 500 to 2000 m. The females measured 5.83–6.50 mm in

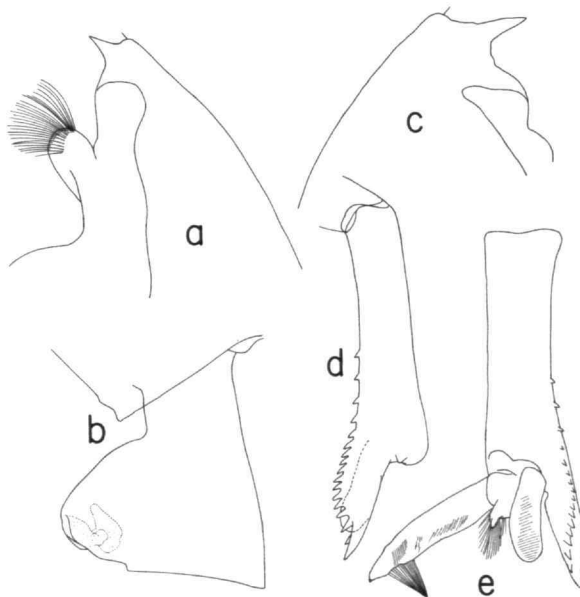


FIGURE 16.—*Euchaeta pseudotonsa*. Female: a, forehead, lateral; b, genital segment, lateral. Male: c, forehead, lateral; d, exopod of left fifth leg, anterior; e, exopod of left fifth leg, medial.

body length and 4.16–4.83 mm in prosome length, and the males 5.50–5.91 mm in body length and 3.91–4.25 mm in prosome length.

### *Euchaeta sarsi* Farran, 1908

FIGURE 17

Not *Euchaeta sarsi*.—With, 1915:178, pl. 6: fig. 7b [male only] [= *Euchaeta hanseni*].

Not *Paraeuchaeta sarsi*.—A. Scott, 1909:75, pl. 21: figs. 9–15 [male only] [= *Euchaeta barbata*].

*Euchaeta sarsi* is a deep-living species known to occur widely over the tropical, subtropical, and temperate zones of the World Ocean (Vervoort, 1963; Tanaka and Omori, 1968). In the present study, the species was represented by 35 females and 5 males found in tows down to depths exceeding 1000 m. These findings are the first record of the species in the Gulf of Mexico and Caribbean Sea. The females ranged from 8.50 to 9.41 mm in body length and from 6.25 to 6.75 mm in prosome length, and the males measured 7.00–7.41 mm in body length and 5.16–5.41 mm in prosome length.

The female of *E. sarsi* is closely related to that of *E. calva* but can be distinguished from it by the large body size and long genital flanges as compared with the length of the genital segment posterior to the flanges (Figure 17c). The male of *E. sarsi* was correctly described for the first time by Sars (1925) and redescribed by Tanaka (1958), and can be readily recognized, as in the other species of the genus, by its characteristic serrated lamella of the left fifth leg (Figure 17g-i).

### *Euchaeta scotti* Farran, 1908

FIGURE 18

This rather rare bathypelagic species was originally described by Farran (1908) from female specimens obtained from off Ireland. The male was correctly described for the first time by With (1915) from the Norwegian Sea. In the present study, the species was represented by 62 females and 9 males found in tows down to depths of more than 1000 m. These findings constitute the first record of the species from the Gulf of Mexico and Caribbean Sea. The females measured 5.91–6.16 mm in body length and 4.16–4.48 mm in prosome

length, and the males 5.33–5.58 mm in body length and 3.75–4.00 mm in prosome length.

The female is characteristic in having a humped dorsal wall of the genital segment and a straightly

sloping posterior side of the genital prominence (Figure 18*b*). In the male the hollow scoop-shaped serrated lamella and pointed digitiform process serve as distinguishing characters (Figure 18*d-f*).

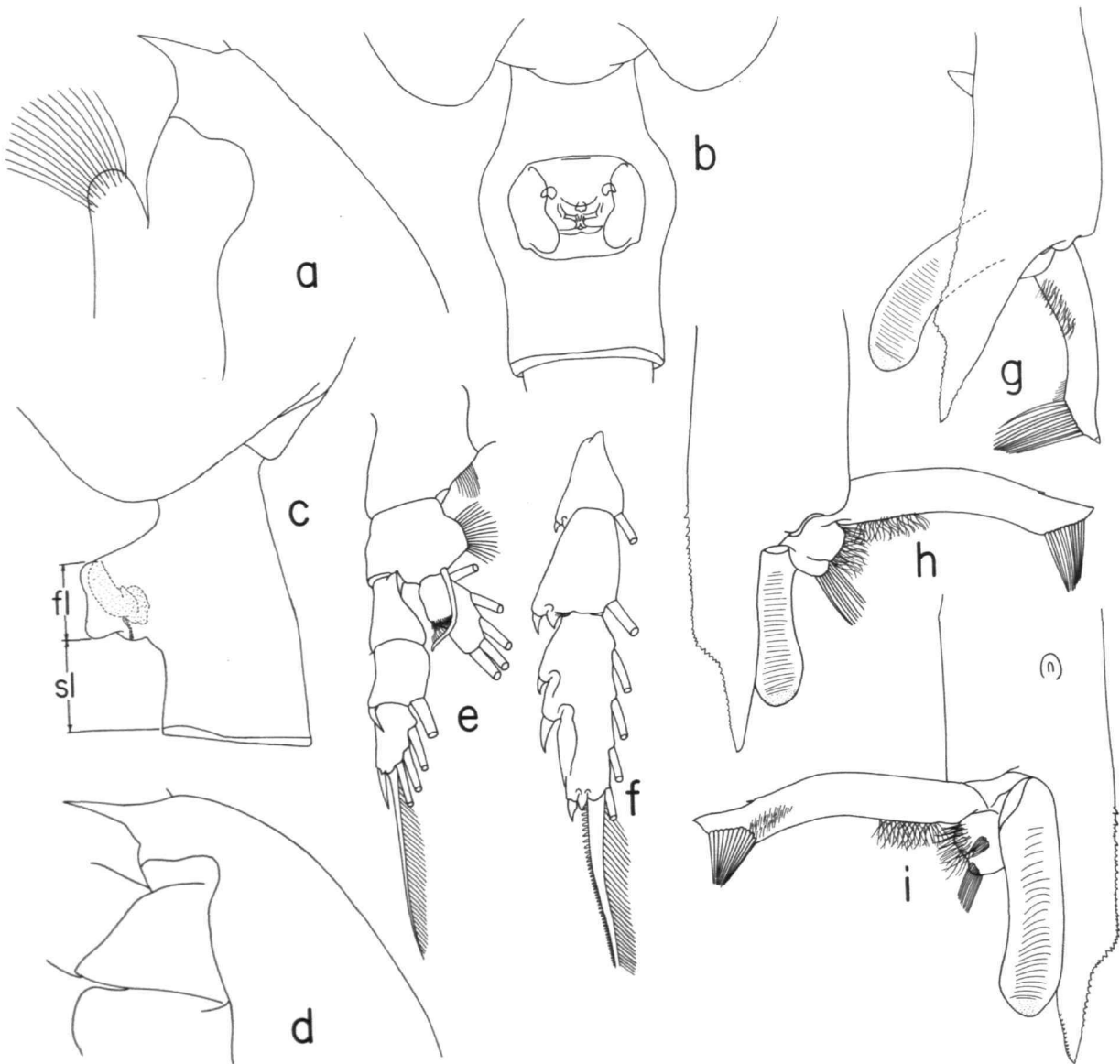


FIGURE 17.—*Euchaeta sarsi*. Female: *a*, forehead, lateral; *b*, genital segment, ventral; *c*, genital segment, lateral. Male: *d*, forehead, lateral; *e*, first leg, anterior; *f*, exopod of second leg, anterior; *g*, exopod of left fifth leg, anterior; *h*, exopod of left fifth leg, lateral; *i*, exopod of left fifth leg, medial. (fl = length of genital flange; sl = length of genital segment posterior to genital flange.)

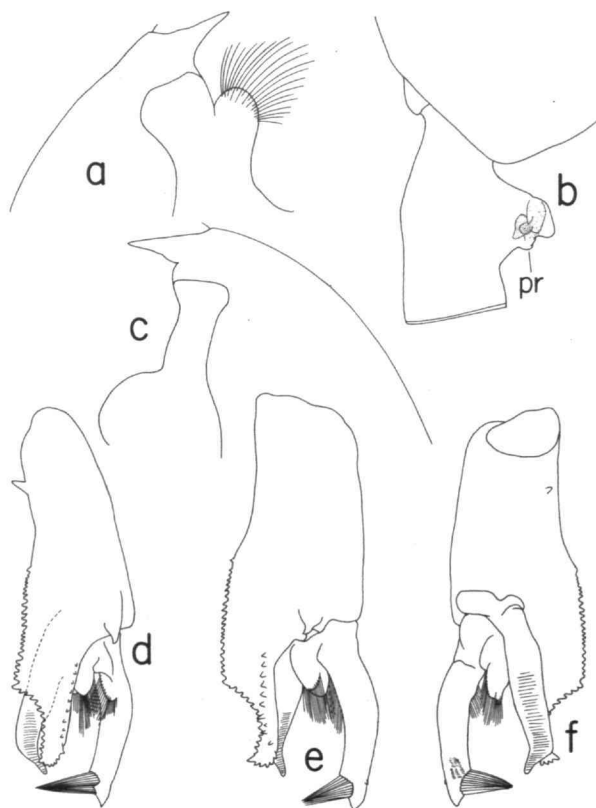


FIGURE 18.—*Euchaeta scotti*. Female: *a*, forehead, lateral; *b*, genital segment, lateral. Male: *c*, forehead, lateral; *d*, exopod of left fifth leg, anterior; *e*, exopod of left fifth leg, lateral; *f*, exopod of left fifth leg, medial. (pr = posterior ridge of genital field.)

### *Euchaeta vorax* Grice and Hulsemann, 1968

#### FIGURE 19

*Pareuchaeta striata* Tanaka and Omori, 1968:257–258, figs. 3x, 4x, 21A–D.

**FEMALE.**—Body length based on 14 specimens, 6.41–6.75 mm. Prosome length, 4.58–4.91 mm. Viewed laterally, forehead (Figure 19a) with a pronounced frontal eminence. Rostrum well developed, straight in parallel to dorsal margin of forehead. Genital segment (Figure 19c) elongated, with a small, low tubercle composed of several closely contiguous ridges on left side posterior to genital prominence. Laterally, genital flange undivided along ventral edge and produced posteriorly into a lobe. Posterior ridge (pr) of genital

field produced posteriorly, forming a conspicuous lobe extending far beyond distal end of genital flange. Posterior side of genital prominence merging into ventral wall of segment, forming a single smooth arch (Figure 19c).

Antennule reaching middle of genital segment. Outer coxal lobe of maxillule with 5 large setae of equal size in addition to 2 or 3 minute setae proximally. First 2 exopodal segments of first leg (Figure 12e) incompletely fused, with a faint line of joint. First segment with a minute external spine; second and third segments each with a well-developed external spine. Second leg (Figure 19f) with 1-segmented endopod and 3-segmented exopod. External spines of exopod moderately developed, that of second segment being the largest. Incision posterior to second external spine of third segment not unusually deep.

**MALE.**—Body and prosome length of specimen 6.66 mm and 4.66 mm, respectively. Forehead (Figure 19g) with a low frontal eminence. Rostrum arising from a broad base, pointing straight downward. Posterolateral corners of metasome asymmetrical. Antennule reaching distal end of second urosomal segment. Exopod of first leg (Figure 19h) 3-segmented; external spine of second segment small, turned inward. Second (Figure 19i) to fourth legs similar to those of female except that external spines are smaller. Serrated lamella of left fifth leg (Figure 19k) in form of an elongated triangle with uniformly fine marginal teeth. Medially, lateral toothed margin approximating medial toothed margin toward distal end (Figure 19l). Digitiform process slightly longer than serrated lamella, with distal portion tapering into a curved process.

**REMARKS.**—*Euchaeta vorax* was originally described by Grice and Hulsemann (1968) from a single female specimen captured in the eastern South Pacific. It was characterized mainly by the relative length of the genital segment and the presence of a knob on the dorsal side and another on the left side. When reexamined through loan by Thomas E. Bowman of the National Museum of Natural History, the holotype of *E. vorax*, without a distinct knob on the dorsal side of the genital segment, was practically identical with the specimens obtained in the present study. *Euchaeta vorax* resembles closely *E. gracilicauda* but may be readily distinguished from it by the relatively short

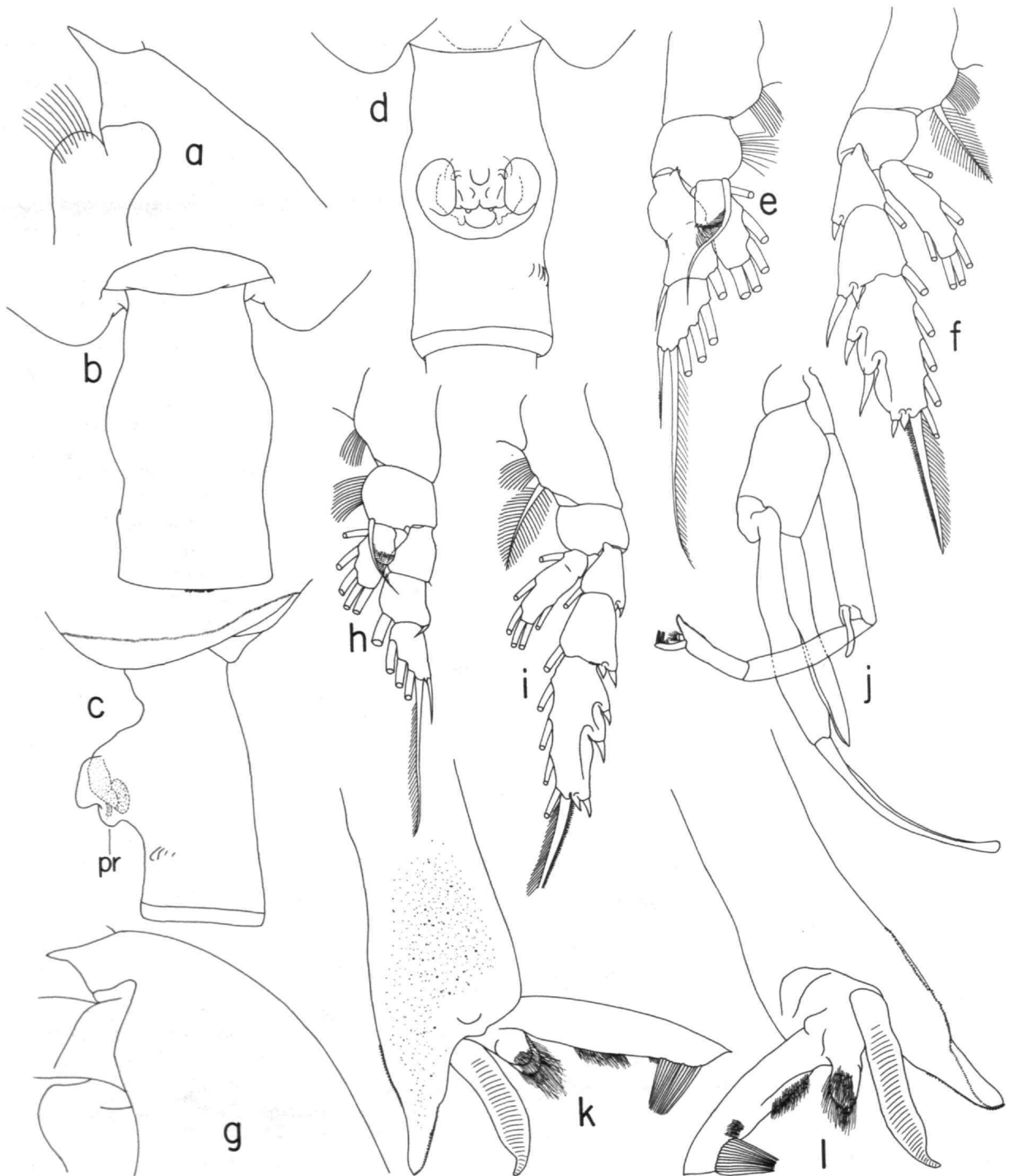


FIGURE 19.—*Euchaeta vorax*. Female: *a*, forehead, lateral; *b*, genital segment, dorsal; *c*, genital segment, lateral; *d*, genital segment, ventral; *e*, first leg, anterior; *f*, second leg, anterior. Male: *g*, forehead, lateral; *h*, first leg, anterior; *i*, second leg, anterior; *j*, fifth pair of legs, anterior; *k*, exopod of left fifth leg, anterior; *l*, exopod of left fifth leg, medial. (pr = posterior ridge of genital field.)



rostrum, the strong curvature of the ventral surface of the genital segment as viewed laterally, and the relatively large ridged tubercle on the left side of the genital segment.

Tanaka and Omori (1968) described an identical species, *Pareuchaeta striata*, from the Izu region of Middle Japan only a few months after the publication of *E. vorax*. I have examined a paratype of *P. striata* through loan by Makoto Omori to verify its identity with *E. vorax*.

The male of *E. vorax* is described here for the first time. It is readily distinguished from the males of the other species by its characteristic serrated lamella of the left fifth leg.

**DISTRIBUTION.**—The species was represented in the present study by 14 females and a single male, which are found in samples taken from depths exceeding 1000 m in the Gulf of Mexico and western Caribbean Sea. These findings are the first record of the species since its discovery in the

eastern South Pacific and western North Pacific almost simultaneously by Grice and Hulsemann (1968) and Tanaka and Omori (1968), respectively.

### *Euchaeta alaminae*, new species

FIGURE 20

**MATERIAL.**—A female from the R/V *Alaminos* cruise 73-A-7, station 6, 20°41'N and 84°17'W in the western Caribbean Sea, 2900–0 m, deposited as holotype in the National Museum of Natural History, Smithsonian Institution, under the catalog number of the United States National Museum (USNM 150969).

**FEMALE.**—Body length, 6.35 mm. Prosome length, 4.58 mm. Forehead (Figure 20a) with a distinct frontal eminence bearing suprafrontal sensilla. Rostrum large, pointing obliquely forward. Lat-

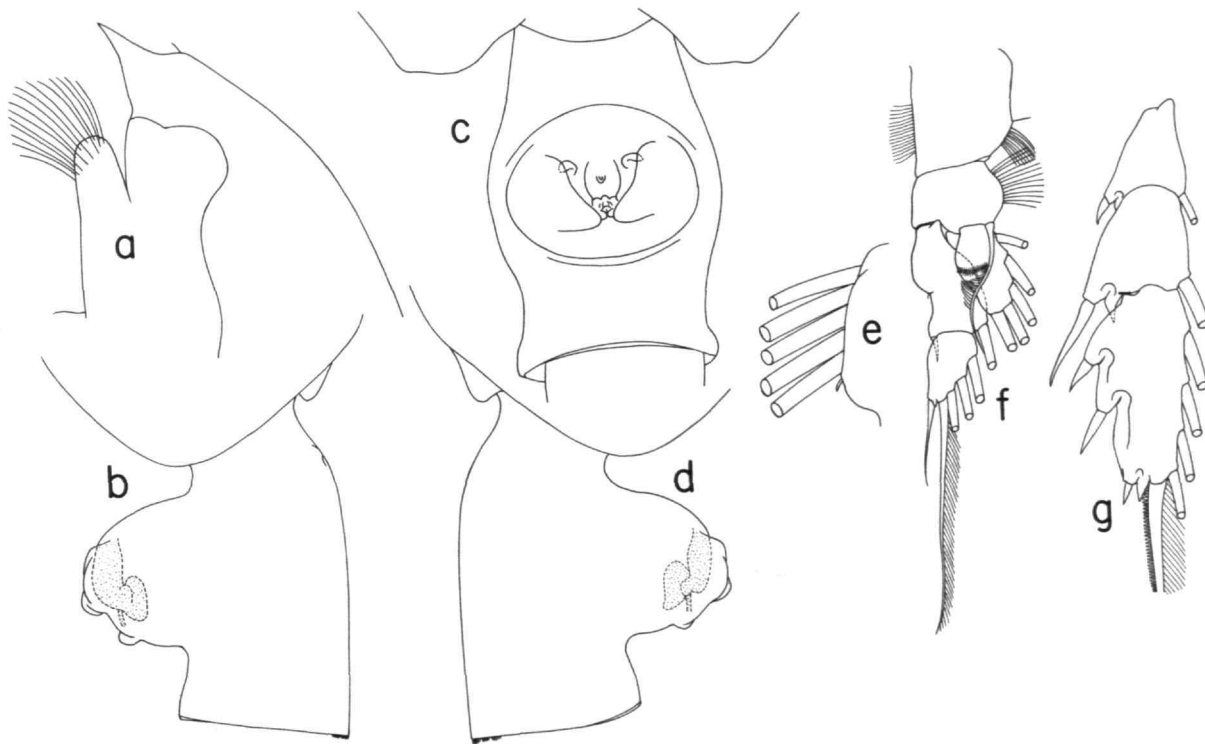


FIGURE 20.—*Euchaeta alaminae*, new species, female: a, forehead, lateral; b, genital segment, left side; c, genital segment, ventral; d, genital segment, right side; e, outer lobe of maxillule; f, first leg, anterior; g, exopod of second leg, anterior.

erally, posterolateral corners of metasome smoothly rounded but somewhat squarish when viewed dorsally or ventrally. Dorsally, genital segment symmetrical, with lateral sides moderately swollen at the middle. Laterally, dorsal side of genital segment markedly convex close to proximal end (Figure 20*b,d*). Genital prominence high, occupying about middle of segment. Anterior side of genital prominence highly convex and posterior side nearly perpendicular to ventral wall of segment. Laterally, genital flange appearing like a three-lobed structure. Ventrally (Figure 20*c*), genital flange with a large posterior lobe extending medially. Viewed laterally, posterior edge of genital field produced posteriorly to form a low ridge midway on posterior side of genital prominence. Appendicular caudal setae geniculated, not thicker than other caudal setae.

Antennule reaching distal end of prosome.

Outer coxal lobe (Figure 20*e*) of maxillule with 5 long setae. None of six apical setae of maxilla provided with long, widely separated spines in addition to fine spinules. First two exopodal segments of first leg fused (Figure 20*f*). External spine of first segment minute, that of second segment short of reaching middle of third segment. Endopod of second leg 1-segmented. External spines of exopodal segments (Figure 20*g*) well developed, that of second segment being the largest. Incision posterior to second external spine of third segment not unusually deep.

REMARKS.—Although the observation is based on a single specimen, the genital segment is so distinct from those of all other euchaetid species so far described that the specimen is considered as representing a valid new species. The species is named after the R/V *Alaminos*, the ship from which the specimen was collected.

#### General Remarks

There seemed to be no significant difference in the distribution of the euchaetid copepods between the western Caribbean Sea and the Gulf of Mexico. Except for three rare species (*E. aequatorialis*, *E. confusa*, and *E. alaminae*, new species), all the species showed similar patterns of abundance and bathymetrical distribution in both areas. All three specimens of *E. aequatorialis* were found in the Gulf of Mexico, and all six specimens of *E. confusa* and one specimen of *E. alaminae*, new species, were found in the Caribbean Sea.

*Euchaeta marina* and *E. paraconcinna* were found mainly in the upper 100 m, and the former was much more abundant than the latter. Occupying slightly deeper depths than these species were *E. pubera* and *E. media*, whose main concentrations occurred at depths of 100–200 m and 200–500 m, respectively. *Euchaeta media* was much more abundant than *E. pubera*. *Euchaeta spinosa* showed high concentrations in a similar depth range to *E. media*, but its bathymetrical range seemed to extend down to a depth of about 1000 m and therefore could be considered a mesopelagic species.

The remaining 15 species all belonged to the bathypelagic zone and seemed to have a wide

range of vertical distribution. The most common bathypelagic species was *E. bisinuata*, followed in order by *E. pseudotonsa*, *E. barbata*, *E. incisa*, *E. calva*, *E. hansenii*, and *E. scotti*. *Euchaeta gracilis*, *E. sarsi*, *E. gracilicauda*, *E. comosa*, and *E. vorax* were among the less common species, although their populations in the area seemed to be well established.

Since there are no comparable studies available, it is not possible to show in detail to what extent the euchaetid fauna in the Gulf of Mexico and western Caribbean Sea is different from that of the Atlantic. According to Vervoort (1963), the tropical Atlantic seems to show no significant difference from the Gulf of Mexico and western Caribbean Sea as far as the common species are concerned. However, Roe (1972) reported euchaetid populations near the Canary Islands that are significantly different from what have been found in the present study from the Gulf of Mexico and western Caribbean Sea, in that *E. acuta* is as abundant in the same depth range as *E. media*, *E. pseudotonsa* and *E. sarsi* are the dominant bathypelagic species, and *E. bisinuata* is absent.

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