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The Caprellidae (Crustacea: Amphipoda) of the Western North Atlantic

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Contents

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The Caprellidae (Crustacea: Amphipoda) of the Western North Atlantic[1]

Introduction

The most important publications on the systematics of the caprellids are the three monographic treatments by Paul Mayer (1882, 1890, 1903). These indispensable works summarized all that was known of caprellid taxonomy at that time, including many western Atlantic species. Unfortunately, Mayer's work complicated caprellid taxonomy by recognizing in some species, such as the composite species *Caprella acutifrons*, large numbers of varieties which appear by modern concepts to be full species. In other instances he took a rather narrow view of species.

Although caprellid amphipods are abundant and familiar members of the marine benthos, western Atlantic species have received only limited and superficial study by taxonomists. Seventeen valid species have been reported from this area. Holmes (1905) briefly characterized the five species known from New England and Kunkel (1918) did the same for four Connecticut species, including one species not mentioned by Holmes. Recently, Steinberg and Dougherty (1957) reported nine species from the Gulf of Mexico, one of which was new. In my paper (1965) five species occurring in Virginia waters are reviewed. Both Pearse (1908) and Stebbing (1895) described new species from the West Indies and Huntsman (1915) described a new species from the Bay of Fundy. Including the papers mentioned above, some 50 publications deal with the western Atlantic caprellids, the majority being faunal lists of local areas.

This paper deals primarily with the systematics of the Caprellidae occurring from the tropical to boreal areas of the western North Atlantic, roughly from the Equator to Nova Scotia. The paucity of available material from the east coast of South America prevents consideration of species south of the Equator. North of Nova Scotia the caprellid fauna changes abruptly and it is, therefore, desirable to defer treatment of the caprellids from this area until the Arctic caprellid fauna can be considered in its entirety. In all, 28 species of caprellids are treated in this paper with 2 new genera, 4 new species, and 1 new rank described.

[1] Modified from a dissertation submitted to The George Washington University in partial satisfaction of the requirements for the degree of Doctor of Philosophy.

This work is based primarily on the collections of the Division of Crustacea, Smithsonian Institution. Extensive unidentified collections were obtained from the National Museum of Canada, Woods Hole Marine Biological Laboratory, University of Cape Town, Zoölogische Laboratorium in Utrecht, Duke University Marine Laboratory, and the Smithsonian Oceanographic Sorting Center. In addition, I was able to spend 4 months collecting along the Gulf of Mexico and southeastern Atlantic coasts of the United States. Through the cooperation of the U.S. Coast Guard, I was allowed to accompany the USCGC *Madrona* (buoy tender) on a cruise servicing buoys along the Virginia and North Carolina coasts. These buoys yielded large numbers of several species which aided in the study of intraspecific variation.

Taxonomic Section

Taxonomic Characters

Mayer (1882, 1890, 1903) usually used 11 characters to delineate caprellid genera. These were the number of articles in the flagellum of antenna 2, the presence or absence of swimming setae on antenna 2, the number of articles in the mandibular palp and the setal formula for the terminal article,the number of gill pairs, the number of appendage pairs of both the male and female abdomens, the number of articles in pereopods 3–5, the number of gill pairs, and the length ratio of the inner and outer lobes of the maxilliped. Occasionally he resorted to other characters such as the fusion of pereonites 6 and 7 in *Metaprotella* and *Orthoprotella*. This paper adds the position of the insertion of pereopod 5 and the presence or absence of a molar on the mandible.

Body spination varies considerably within the same species and its value as a specific character is questionable. In *Aeginina longicornis* this variation is quite pronounced and has caused a considerable proliferation of names for what appear to be only infrasubspecific variants. Harrison (1940) found that body spination did not appear on *Pseudoprotella phasma* before the 10th instar, which lends support to my opinion that body spination is a questionable specific character. It should be noted that those species which are spinose are frequently covered with large amounts of detritus. Body spination may, therefore, offer some protective advantage and could possibly be correlated with predatory pressure.

The peduncle of antenna 1 is a useful character for the delineation of some species. The presence of setules sometimes distinguishes males of *Caprella linearis* (fig. 14b) from other related species. Inflation of the peduncular articles is exhibited in several species and is quite useful for the separation of *Caprella andreae* from other members of the *Caprella acutifrons* group.

The number of articles in the flagellum of antenna 1 varies considerably, depending upon the size and sex of the individual. The greatest number of articles may be useful for characterizing some species with an unusually long flagellum. The relative lengths of the proximal and distal flagellar articles have been used to characterize some species but probably do not have generic significance. Mayer divided *Caprella scaura* into groups on the basis of the number of fused proximal articles of the flagellum; however, in most species this number is proportional to the size of the individual and is of little value.

Most caprellid genera have 2 articles in the flagellum of antenna 2; however, some genera such as *Phtisica* and *Hemiproto* have more than 2. *Phtisica* lacks a molar on the mandible. The lack of a molar and the multiarticulate flagellum on antenna 2 may be correlated with the fact that *Phtisica* is frequently found in plankton samples and therefore subject to dietary habits different from those of benthic forms.

Mayer (1903, p. 47) used the presence of swimming setae on antenna 2 to characterize *Tritella*. Later Dougherty and Steinberg (1953) described *Tritella tenuissima* which lacked swimming setae, and they expressed the opinion that the presence or absence of swimming setae was not a good generic character. Since *T. tenuissima* shares more characters with *Triliropus* (p. 57) than with the members of *Tritella*, Mayer's belief that the presence of swimming setae is a valid generic character seems justified.

The mouthparts offer, in my opinion, some of the best, although virtually neglected, taxonomic characters. The mouthparts reflect feeding habits and thereby, at least to some extent, the niche of an organism. Mayer (1903, p. 13) admitted that he neglected the mouthparts except for the proportions of the maxillipedal lobes and the mandibular palp. Regrettably, he (1890, p. 107; 1903, p. 73) believed that the mouthparts of the *Caprella* species were all quite similar and of little value in classification. Most of the mouthparts of *Caprella* species are similar; however, the lacinia mobilis of the right mandible offers a useful character for subdividing this large genus. The left lacinia mobilis is usually 5-toothed apically, while the right lacinia mobilis may be either 5-toothed, serrate, or smooth. *Phtisica* and allied genera have developed [2] several accessory plates in addition to the lacinia mobilis, and these genera usually lack a molar (fig. 47i–j). This unusual type of mandible undoubtedly reflects genetic relationships and will probably form a basis for separation of the Caprellidae into subfamilies or other higher taxa.

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[2] Assuming that the caprellids arose from a podocerid type gammaridean having a typical mandible with incisor, lacinia mobilis, setal row, and molar.

As stated above Mayer used the mandibular palp as a generic character. Those caprellids which lack a mandibular palp such as *Caprella* have considerably more setation on the mouthparts, antennae, and gnathopods 1. This increase in setation could compensate for the loss of the cleaning ability of the mandibular palp. Very little is known of the dietary habits of those forms which bear a mandibular palp and only a little more is known of those that do not. The setal formula for the palp refers to the number of long, intermediate, and short setae on the terminal article. For example, the setal formula 1-x-y-1 indicates the presence of 1 long seta at either end of a row of a variable number of short setae (x) and also a variable number of intermediate setae (y).

In addition to the mandible the maxilliped also offers some neglected characters which may be of generic significance. The distal margin of the inner lobe varies in shape from rounded to flattened and may bear a variety of tooth types, spines, and setae. As examples of the extremes of inner lobe diversity, the paired inner lobes of *Phtisica* and allied genera are as large as the outer lobes, almost completely fused, and are armed with several unusually large teeth (fig. 47h) while the inner lobes of *Paracaprella* are much smaller than the outer lobes, not fused, and bear only a few setae (fig. 43e).

The outer lobe of the maxilliped shows considerable variation in spination, serration, and setation. Such characters as the subterminal notch in *Luconacia* (fig. 35d) or the large serrations on the medial margin in *Mayerella* (fig. 37e) may have generic importance. However, in too few of the caprellid species have maxillipeds been adequately illustrated and described to permit evaluation.

The palp of the maxilliped offers several characters which may possibly be of generic significance. Schurin (1935) used the reduction of the dactylus as one of the characters to separate his new genus, *Eugastraulax*, from the genus *Caprella;* however, the value of this character is questionable. In *Paracaprella* and *Deutella* the distal end of the terminal article bears several large setae (fig. 43e). These large setae are not present in most other caprellid genera. Another character which may have generic importance is the presence of a distal projection on the penultimate article as in *Paracaprella* (fig. 43e).

The number of spines on the outer lobe of maxilla 1 varies among some genera. In *Phtisica* there are 6 spines (fig. 47f) whereas in *Caprella* there are 7 spines (fig. 8e). Again it is regrettable that this character has not been examined in enough genera to comment on its value.

Gnathopod 1 has several characters which may be of generic or at least specific value. In the western Atlantic species, the number of grasping spines on the propodus varies from 1–5 (compare figs. 38d, 8h, 47c) and seems to be fairly constant within each genus. Another character of gnathopod 1 which may prove to be important is the

presence or absence of serrations on the grasping margins of the dactylus and propodus. In *Paracaprella* both margins are serrate (fig. 41h) whereas in contrast, those of *Hemiaegina* are completely smooth (fig. 30b).

The shape and ornamentation of gnathopod 2 has long been used as a specific character in the Amphipoda, and it is needless to comment on it here except that one must take into consideration the degree of variability this appendage shows at different growth stages. Mayer used the term "poison tooth" to refer to the large tooth on the palm of the propodus. There is evidence that glandular material is present near this tooth, and it appears to be venomous in nature (Wetzel, 1932, p. 387). I have used the term grasping spine when the major "tooth" of the propodus is a spine and have restricted the use of poison tooth to an eminence which is not delimited at its base or which has previously been designated a poison tooth. Usually grasping spines occur in pairs and when closed the tip of the dactylus fits between them. These spines are found on the gnathopods and the pereopods.

The number of gill pairs was used by Mayer as a generic character. Undoubtedly this is an important character but perhaps too much value is placed on it since the gills show various stages of reduction. Some genera with 3 pairs of gills show a closer relation to genera with 2 pairs than to other genera with 3 pairs, as for example *Dodecas* and *Dodecasella*.

The pereopods on pereonites 3–5 are reduced in many caprellid genera. Although the number of articles of these rudimentary appendages is presently important for generic identification, it is often difficult to count the articles, particularly when the terminal article is small or shows some degree of fusion with the penultimate article. Since these appendages are rudimentary and show all degrees of reduction, their value as a generic character is questionable. In *Mayerella reduncа* (p. 75) a female has 2 articles in pereopod 5 instead of the usual 3 and there can be no question that this specimen belongs to this species. The use of these pereopods as a generic character seems to mask the phylogenetic relationships of the genera, and it is my belief that the mouthparts provide a better concept of relationships. It should be noted that I follow the system of naming the pereopods according to the pereonites upon which they occur; i.e., pereopod 3 occurs on pereonite 3. This practice has not been consistently followed in the past; various authors (Barnard, Briggs, Guiler, and Huntsman) preferred to number these appendages beginning with pereonite 3.

The abdomen presents one of the most difficult characters to use for identification. It is extremely small and hard to illustrate accu-

rately. Unfortunately, it has been one of the most important characters and the correct generic determination usually depends upon elucidating its structure. Mayer stressed the importance of the abdomen by separating closely related genera such as *Deutella* and *Luconacia* primarily by differences in the abdomen. Mayer's emphasis on this character is justified; however, due to its vestigial nature it suffers from the same criticism as pereopods 3–5. In dealing with the many stages of reduction of the appendages on the abdomen, Mayer was inconsistent in what he considered to be a "Klappe" or vanished appendage. This is especially true in those genera which do not bear true appendages but which have several setae or even a single seta borne on a type of flap or lobe. For an example of this, compare Mayer's (1903) figures of the abdomen of the *Triliropus* male (pl. 9 fig. 70), which he says bears one-half pair of appendages, with that of the *Pseudoproto* male (pl. 9 fig. 52) which he claims to be without appendages. Both abdomens have lobes with several setae; therefore, due to this inconsistency I have refrained from using Mayer's terminology of one-half appendage pairs but have instead given the number of recognizable appendages and have described the lobes.

Illustrations and Measurements

Illustrations of the whole mounts were made by the use of a microprojector and those of dissected appendages with a camera lucida. Pencil sketches were first made which were later copied on Ethulon tracing film. All scales on the figures equal 1 mm for the whole mount.

Measurements of the total length refer to the length of a line drawn from the anterior portion of the cephalon between the insertions of antennae 1 and 2, through the midlateral portion of each pereonite, to the posterior tip of the abdomen.

Key to the Caprellidae of the Western North Atlantic

(See figure 1 for explanation of characters.)

1.	Mandible with palp or setae representing vestige of palp	2
	Mandible without palp	17
2.(1)	Pereopods 3 and 4 absent	3
	Pereopods 3 and 4 present	6
3.(2)	Abdomen with only pair of lobes	**Pseudaeginella antiguae** (p. 100)
	Abdomen with appendages	4
4.(3)	Abdomen with pair of appendages and pair of lobes.	**Aeginella spinosa** (p. 8)
	Abdomen with 2 pairs of appendages	5
5.(4)	Abdomen with only 2 pairs of appendages.	**Proaeginina norvegica** (p. 97)
	Abdomen with 2 pairs of appendages and pair of lobes.	**Aeginina longicornis** (p. 13)

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Pereopods 3 and 4 2- or 6-segmented 8
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Pereonites 6 and 7 not fused . . . . . **Fallotritella biscaynensis** (p. 58)
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Pereopods 3 and 4 6-segmented 15
9.(8) Pereopod 5 2- or 3-segmented 10
Pereopod 5 6-segmented 11
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Mayerella limicola (p. 73)
Abdominal appendage of male much longer than penes, recurved at tip.
Mayerella redunca (p. 75)
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Luconacia incerta (p. 68)
Pereopod 5 inserted in posterior part of pereonite 5 12
12.(11) Mandibular palp reduced; when 3-segmented, terminal article minute. 13
Mandibular palp not reduced, 3-segmented, terminal article not minute. 14
13.(12) Mandibular palp represented by single seta; males with large triangular projection on anteroventral margin of pereonite 2, basis of gnathopod 2 with proximal knob on posterior margin.
Paracaprella pusilla (p. 82)
Mandibular palp represented by knob with seta or with several reduced articles; males with small projection on anterolateral margin of pereonite 2, basis of gnathopod 2 without proximal knob.
Paracaprella tenuis (p. 86)
14.(12) Cephalon with dorsal spine . . . . . **Deutella californica** (p. 51)
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Abdomen of male with 3 pairs of appendages, females with 2 pairs . . 16
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Pereopods 3 and 4 absent 18
18.(17) Pereopods 5–7 without grasping spines 19
Pereopods 5–7 with grasping spines 21
19.(18) Cephalon with anteriorly directed triangular projection.
Caprella penantis variant (p. 35)
Cephalon without anteriorly directed projection 20
20.(19) Abdomen of male with hooked papillae at tip of appendage, female with small palplike appendage . . . . . **Caprella danilevskii** (p. 22)
Abdomen of male without hooked papillae on appendage, female without palplike appendage . . . . . **Caprella unica** (p. 49)
21.(18) Cephalon with large anteriorly directed dorsal spine or projection . . 22
Cephalon without dorsal spine or with nonanteriorly directed spine . . 24
22.(21) Cephalon with sharp anterodorsally directed spine, males with up to 9 fused articles in flagellum of antenna 1 . . . **Caprella scaura** (p. 40)
Cephalon with anteriorly directed triangular projection, males with less than 4 fused articles in flagellum of antenna 23
23.(22) Palm of propodus of pereopods 5–7 convex . . **Caprella andreae** (p. 19)
Palm of propodus of pereopods 5–7 concave . **Caprella penantis** (p. 33)

24.(21) Ventral spine present between insertions of gnathopods 2. **Caprella equilibra** (p. 25)
Ventral spine not present between insertions of gnathopods 2 25
25.(24) Propodus of gnathopod 2 with small spine on inner surface near poison tooth 26
Propodus of gnathopod 2 without small spine on inner surface near poison tooth . . . . . **Caprella equilibra** variant (p. 29)
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Ratio of total length to length of basis of gnathopod 2 smaller than 13.0; dorsal surface of pereonites 1–4 usually smooth, cephalon infrequently with small spine . . . . . **Caprella linearis** (p. 30)

Aeginella Boeck, 1861

Flagellum of antenna 2 biarticulate, swimming setae absent; mandibular palp 3-segmented, setal formula for terminal article 1-x-1, molar present; outer lobe of maxilliped larger than inner lobe; gills on pereonites 3 and 4; pereopods 3 and 4 absent, pereopod 5, 6-segmented; abdomen of male and female with pair of appendages and pair of lobes.

Type-species: *Aeginella spinosa* Boeck, 1861 (by monotypy).

Remarks.—The genus *Aeginella* is very closely related to *Aeginina* and *Proaeginina*, differing from them only by the structure of the abdomen. There is a gradation from 1 pair of appendages with lobes, 2 pairs of appendages, to 2 pairs of appendages with lobes in the series *Aeginella–Proaeginina–Aeginina*.

Aeginella spinosa Boeck, 1861

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Aeginella spinosa Boeck, 1861, pp. 673–674; 1871a, pp. 272 (192)–273 (193); 1873–76, pp. 684–686, pl. 32, fig. 4.—M. Sars, 1863, pp. 290–291.—Mayer, 1882, p. 36; 1890, pp. 36–37, pl. 1, fig. 24, pl. 5, figs. 30–33; 1903, p. 61.—G. Sars, 1886, pp. 70, 89; 1895, pp. 653–654, pl. 235, fig. 1.—Norman, 1886, p. 26; 1905a, p. 26.—Hansen, 1887b, pp. 172–173; 1895, p. 130.—Vanhöffen, 1897, p. 213.—Nordgaard, 1905, p. 185.—Stephensen, 1913a, pp. 222–223; 1916, p. 295; 1929a, p. 178, fig. 332; 1929b, pp. 19, 34; 1933, pp. 60, 77; 1935, p. 118; 1940, p. 69; 1942, pp. 429–430, 502, 503; 1944a, pp. 48–49, map 9; 1944b, pp. 135–136, 148, 159, 162.—Derjugin, 1915, pp. 453, 456.—Schneider, 1924 (1926), p. 59.—McCain, 1966, p. 92.

Diagnosis.—Since this genus is monotypic, the characters of the genus are diagnostic for the species.

Description.—Body rather robust, spinose; cephalon with anterior projection, separated from pereonite 1 by distinct suture. Pereonite 1 with dorsal anterior spine. Dorsal surface of pereonite 2 with pair of spines at midlength of pereonite and single posterior spine, insertion of gnathopod 2 with small spine, anterolateral margin produced

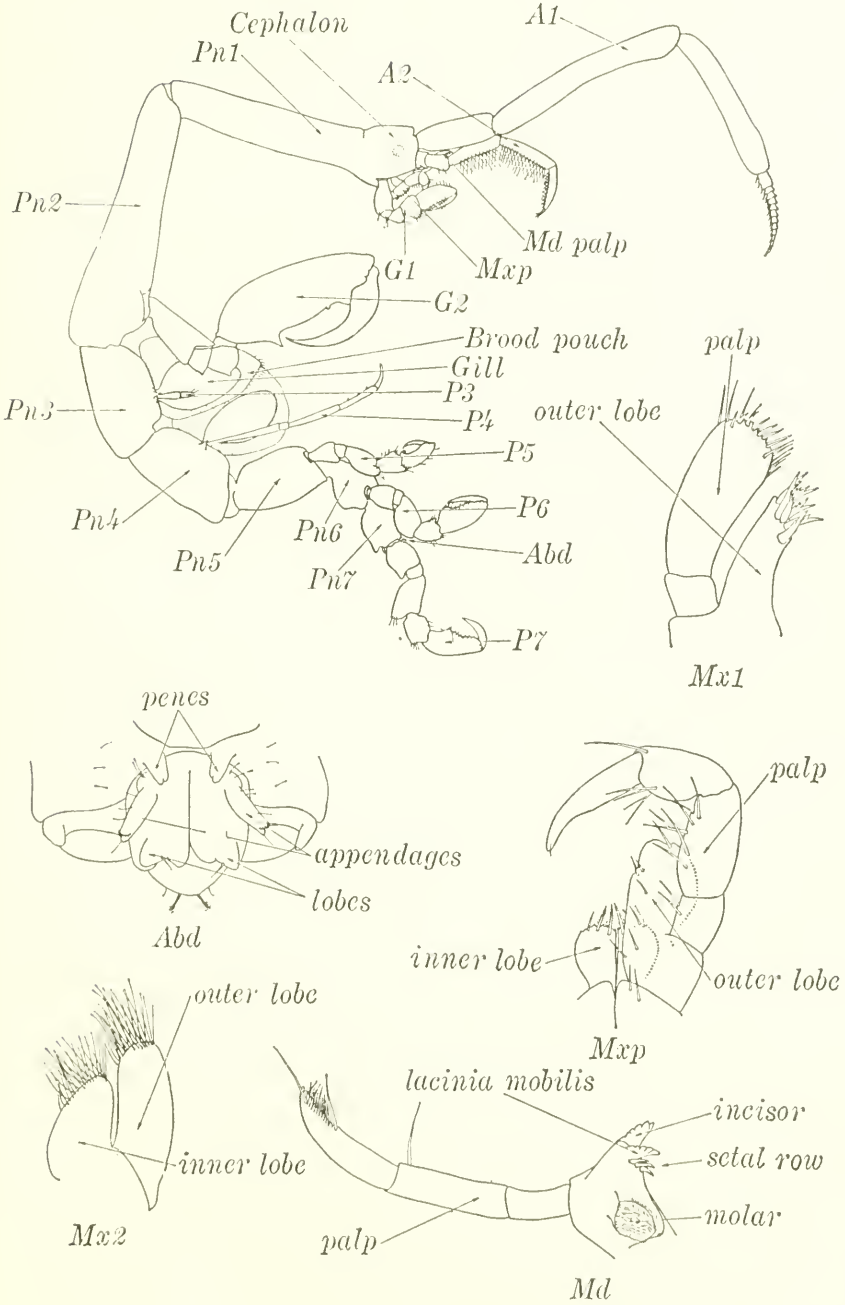

FIGURE 1.—Generalized caprellid: *A* (antenna), *Abd* (abdomen), *G* (gnathopod), *Md* (mandible), *Mx* (maxilla), *Mxp* (maxilliped), *P* (pereopod), *Pn* (pereonite).

into triangular projection. Dorsal surface of pereonite 3 with pair of anterior spines, sometimes reduced to small humps, pair of mid-posterior spines, and single posterior spine; anterolateral margin produced as in pereonite 2; lateral margin of pleura with anterior and posterior spines and spine above gills in males, females without posterior spine. Pereonite 4 similar to pereonite 3 in males, females without dorsal anterior spine. Dorsal surface of pereonite 5 similar to pereonite 3, pleura with only anterior spine and dorsally directed spine at base of pereopod 5. Pereonite 7 with dorsally directed spine at base of pereopod 7. Length of largest male 20 mm, female 16 mm.

Setal formula for terminal article of mandibular palp 1–10–1 to 1–12–1. Left mandible with 5-toothed incisor, 5-toothed lacinia mobilis, setal row of 3 serrate setae, molar with plumose seta. Right mandible with 5-toothed incisor, lacinia mobilis serrate on cutting margin, setal row of 2 serrate setae, molar with plumose seta. Palp of maxilla 1 usually with 5 robust apical spines and several setae; outer lobe with 7 apical spines, usually bifid but sometimes more branches with increase in size of individual. Inner and outer lobes of maxilla 2 quite setose on apical margin and spines occasionally present. Outer lobe of maxilliped with 2 apical setae, 1 long apical spine, and up to 12 smaller marginal spines; inner lobe with 2 small spines and up to 12 apical setae, as many as 9 of which plumose; palp similar to that of *Caprella*.

Propodus of gnathopod 1 triangular with 2 proximal grasping spines, grasping margin not distinctly serrate; grasping margin of dactylus serrate, particularly at tip. Propodus of gnathopod 2 quite robust, palm heavily setose with small proximal tooth, anterior margin with distal projection; dactylus not serrate.

Gills subelliptical.

Pereopods 3 and 4 absent. Pereopods 5–7, 6-segmented, palm of propodus with pair of proximal grasping spines.

Abdomen of male and female with 1 pair of appendages and pair of setose lobes; in male appendage placed on raised projection and uniarticulate; in female, appendage neither on projection nor articulated.

Variation.—This species appears to be quite constant in body spination with the exception of the first pair of spines on the dorsal surface of pereonite 4. These may be present as fully developed spines or as only small humps.

Distribution.—Type-locality: Haugesund, Norway.

Other records: Murman coast to Haugesund on the Norwegian coast, Spitsbergen, Faeroe Islands, Iceland, east and west coasts of Greenland.

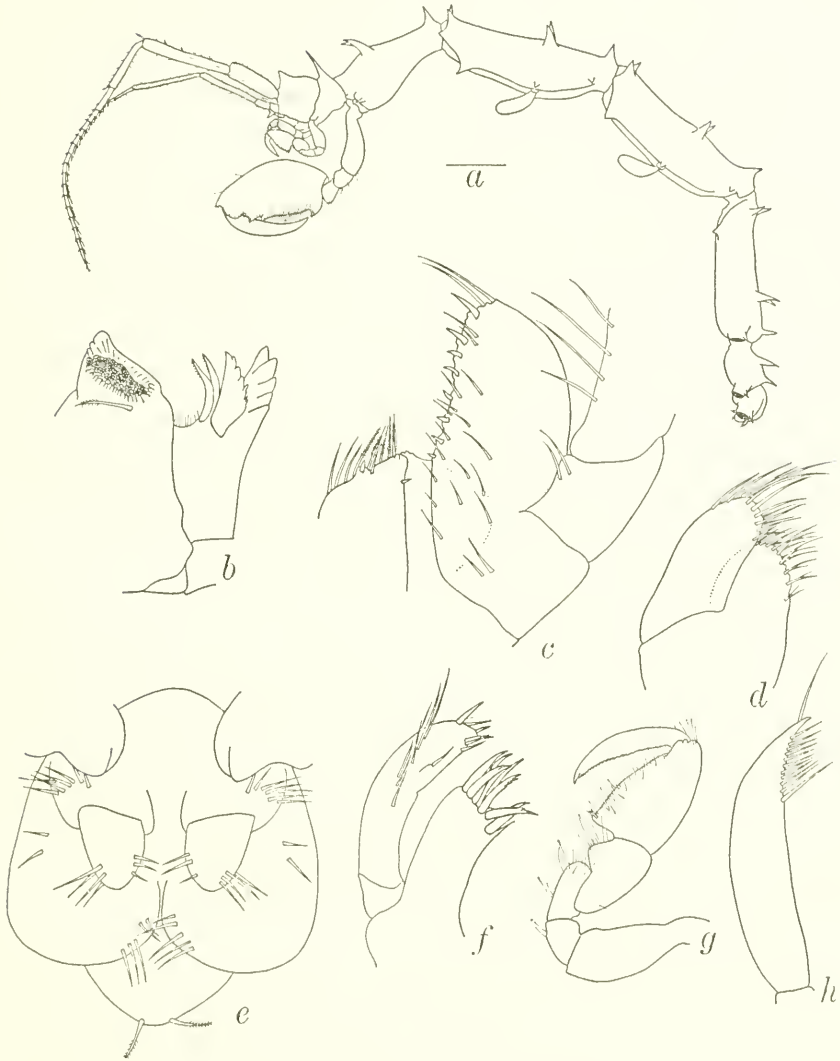

FIGURE 2.—*Aeginella spinosa*, male; *a*, lateral view; *b*, right mandible; *c*, inner and outer lobes of maxilliped; *d*, maxilla 2; *e*, abdomen; *f*, maxilla 1; *g*, gnathopod 1; *h*, terminal article of mandibular palp.

New records: Off Nova Scotia, 44°01′ N., 59°02.5′ W., 43°03′ N., 65°30′ W., and on the Banquereau Banks; off Cape Cod, 42°25′ N., 66°05′ W.

REMARKS.—This species is an Arctic one usually found in deeper water, to 1026 m. Its distribution is comparable to that of *Proaeginina norvegica* and *Aeginina longicornis*, the latter ranging far-

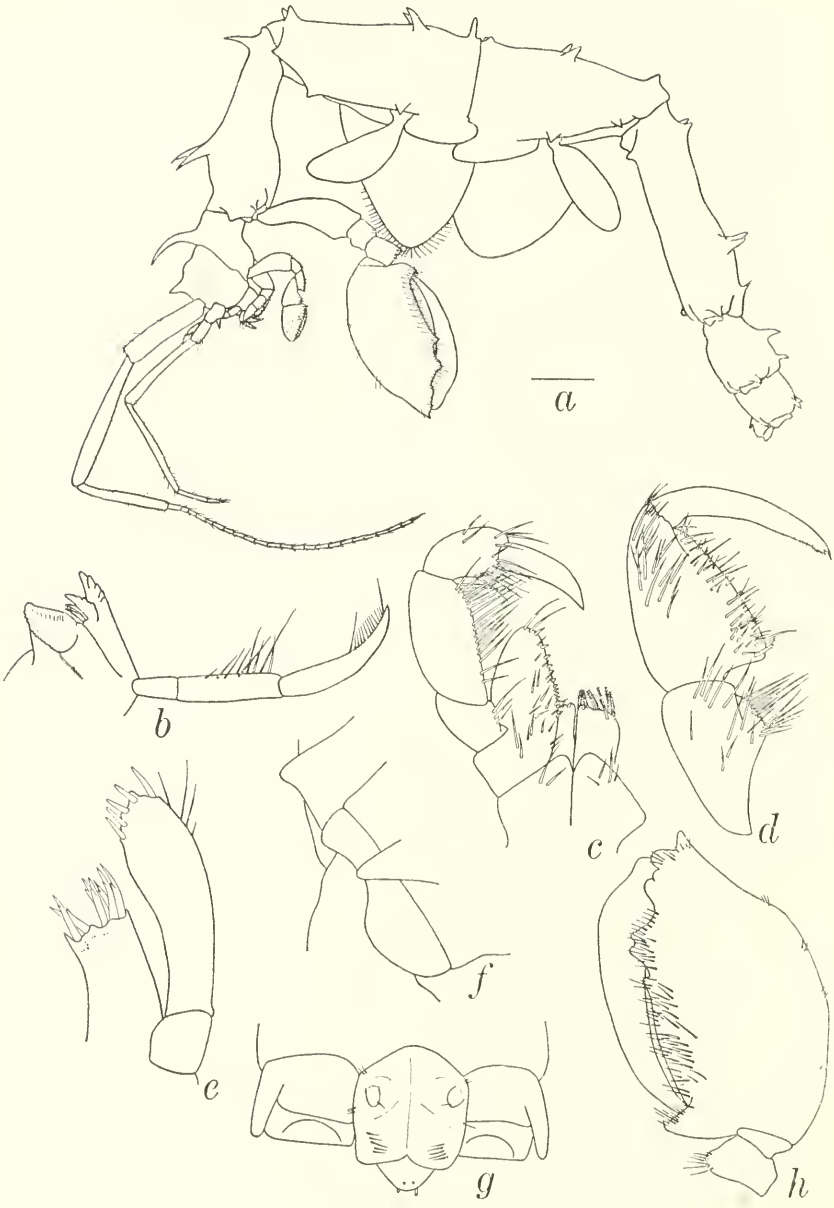

FIGURE 3.—*Aeginella spinosa*, female; *a*, lateral view; *b*, right mandible; *c*, maxilliped; *d*, gnathopod 1; *e*, maxilla 1; *f*, coxal plate of gnathopod 2; *g*, abdomen; *h*, gnathopod 2.

ther south along the western Atlantic coast and usually being found in shallower water.

Mayer (1903, p. 61) reported *Aeginella spinosa* from the asteroid, *Brisinga*, and this species has also been collected from red and brown algae and hydroids.

Aeginina Norman, 1905

Flagellum of antenna 2 biarticulate, swimming setae absent; mandible with 3-segmented palp, setal formula for terminal article 1–x–1 or 1–x–1–x, molar present; outer lobe of maxilliped larger than inner lobe; gills on pereonites 3 and 4; pereopods 3 and 4 absent, pereopod 5, 6-segmented; abdomen of male and female with 2 pairs of biarticulate appendages and 1 pair of lobes.

Type-species: *Aegina longicornis* Krøyer, 1842–43 (by monotypy).

Aeginina longicornis (Krøyer, 1842–43)

Figures 4–7, 54

Aegina longicornis Krøyer, 1842–43, pp. 509–515, pl. 7, figs. 1–12; 1846, pl. 24, fig. 3.—Boeck, 1871a, p. 270 (190); 1873–76, pp. 677–679.—Lütken, 1875, p. 159.—Mayer, 1882, pp. 83–84, fig. 11, pl. 5, figs. 6–10; 1890, pp. 32–35, pl. 5, figs. 27–29, pl. 6, figs. 9, 28; 1903, pp. 60–61.—Hansen,1887b, p. 171.—Norman, 1886, p. 26; 1905a, p. 26.—Stuxberg, 1882, p. 764.—Vanhöffen, 1897, p. 213.—d'A. Thompson, 1901, p. 41.—M. Rathbun, 1905, pp. 7, 76.—Brüggen, 1907, pp. 237–238.—Stephensen, 1913a, pp. 220–222; 1929b, p. 34.—Bousfield, 1958, p. 315.

Aegina spinosissima Stimpson 1854 (1853), pp. 44–45.—Miers, 1877a, pp. 104–105.—Norman, 1882, pp. 671, 684; 1886, p. 26; 1905a, p. 26.—Koelbel, 1886, p. 42.—Hansen, 1887a, p. 233; 1887b, p. 172.—Ohlin, 1895a, pp. xvii, xix, 60–62.—Vanhöffen, 1897, p. 213.—Whiteaves, 1901, p. 220.—M. Grieg, 1907, p. 551.—Calman, 1927, p. 42 (fig. 27).

Caprella spinifera Bell, 1855, pp. 407–408, pl. 35, fig. 2.—Goës, 1866, p. 535.

Aegina (*Caprella*) *echinata* Boeck, 1861, pp. 670–672.

Aegina laevis Boeck, 1861, pp. 672–673; 1871a, p. 272 (192); 1873–76, pp. 682–684, pl. 32, fig. 9.

Caprella spinosissima Bate, 1862, pp. 361–362, pl. 57, fig. 3.

Aegina echinata.—Boeck, 1871a, pp. 271 (191)–272 (192); 1873–76, pp. 680–682, pl. 32, fig. 6.—Lütken, 1875, p. 159.—Mayer, 1882, pp. 34–35.—Stuxberg, 1882, pp. 764, 780; 1887, p. 73.—G. Sars, 1895, pp. 651–652, pl. 234, fig. 2.—Stephensen, 1927a, pp. 147–148; 1928, p. 389, fig. 93 (5–7); 1929a, p. 178, fig. 331.—Gurjanova, 1929a, pp. 40–41, 46.

Aegina spinifera.—Buchholz, 1874, pp. 270, 388.—G. Sars, 1885, pp. 228–230, pl. 18, fig. 5; 1886, pp. 70, 89.—Ives, 1892, p. 481.—Klinckowström, 1892, p. 91.

Aegina Echinata.—Meinert, 1877–78, p. 168.

Aegina longicornis f. *nodosa* Mayer, 1890, p. 33, pl. 5, fig. 29.

Aegina longicornis f. *typica* Mayer, 1890, p. 33.

Aegina longicornis f. *spinifera* Mayer, 1890, pp. 33–34.—Gurjanova, 1935, p. 78.

Aeginella spinosissima.—Mayer, 1890, p. 37; 1903, p. 61.—Ortmann, 1901, pp. 154–155.—Stephensen, 1912, pp. 543–544; 1913b, p. 68.

Aegina longicornis f. *spinigera*.—Hansen, 1895, p. 130.
Aeginella longicornis.—Holmes, 1904 (1905), pp. 525–526.—Paulmier, 1905, p. 169, fig. 39.—Sumner, Osburn, and Cole, 1911 (1913), pp. 132, 134, 135, 656, chart 102.—Kunkel, 1918, pp. 175–176, fig. 53.—Allee, 1922, pp. 57, 58.—Dexter, 1944, p. 356.—Ferguson and Jones, 1949, p. 442.
Aegina longicornis nodosa.—M. Rathbun, 1905, pp. 7, 76–77.
Aegina longicornis spinifera.—M. Rathbun, 1905, pp. 7, 77.
Aegina longicornis spinosissima.—M. Rathbun, 1905, pp. 7, 77.
Aegina langicornis.—Brüggen, 1909, pp. 42–43.
Aeginina longicornis.—Norman, 1905a, p. 46.—Stappers, 1911, pp. 74–76.—Shoemaker, 1930, p. 352 (134).—Procter, 1933, p. 256.—Stephensen, 1933, pp. 59–60, 77; 1940, pp. 69–70; 1942, pp. 430–431, 502, 503; 1944a, p. 49, chart X; 1944b, pp. 135, 148, 159, 162.—Gurjanova, 1936, pp. 568, 580, 588, 589; 1964, p. 313.—Elton, 1937, p. 433.—Dunbar, 1954, pp. 784, 788.—Bousfield, 1958, p. 322.—McCain, 1965, pp. 191–192, fig. 1a; 1966, p. 92.—Cerame Vivas and Gray, 1966, p. 263.

Diagnosis.—Since this genus is monotypic, the characters of the genus are diagnostic for the species.

Description.—Body spination variable, smooth to quite spiny; cephalon separated from pereonite 1 by suture. Length of largest male 54 mm, female 34 mm, smallest ovigerous female 9 mm.

Antenna 1 usually longer than body, flagellum with up to 26 articles. Antenna 2 setose and usually shorter than articles 1 and 2 of antenna 1.

Mouthparts quite similar to those of typical *Caprella* (p. 18), lacinia mobilis of right mandible not distinctly 5-toothed but with several teeth and serrations.

Propodus of gnathopod 1 with pair of grasping spines, grasping margins of dactylus and propodus only slightly serrate. Propodus of gnathopod 2 with proximal poison tooth and distal notch, tooth, and rectangular projection, anterodistal margin with triangular projection; basis and ischium with anterodistal projections; carpus with posterodistal projection.

Propodus of pereopods 5–7 with pair of proximal grasping spines.

Abdomen of male and female with 2 pairs of biarticulate appendages and pair of lobes, medial margin of appendages with numerous minute knobs.

Variation.—The degree of spination of the body is variable. The most spiny form is illustrated in figure 4j, and there are various degrees of spination; some are almost smooth. Spination seems to vary from spinose in northern waters to smooth in southern; however, spiny forms have been found infrequently in the southern part of the range of this species.

Figure 6 illustrates the relationship of pereonite length to total body length. The solid black lines represent individuals, and the dashed lines indicate the linear relationship between pereonite length

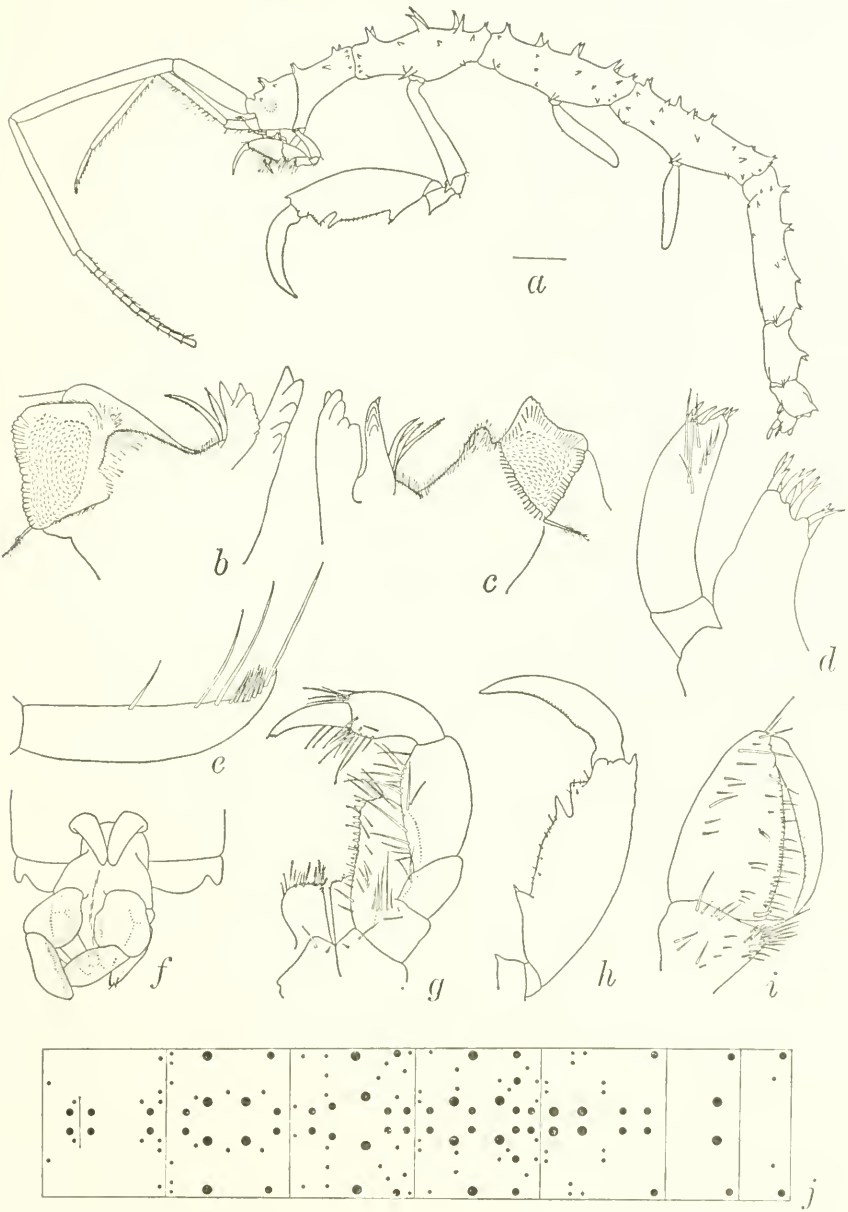

FIGURE 4.—*Aeginina longicornis*, male; *a*, lateral view; *b*, right mandible; *c*, left mandible; *d*, maxilla 1; *e*, terminal article of mandibular palp; *f*, abdomen; *g*, maxilliped; *h*, gnathopod 2; *i*, gnathopod 1; *j*, diagramatic representation of dorsal (middle) to lateral (edges) body spination, diameter of circle proportional to length of spine.

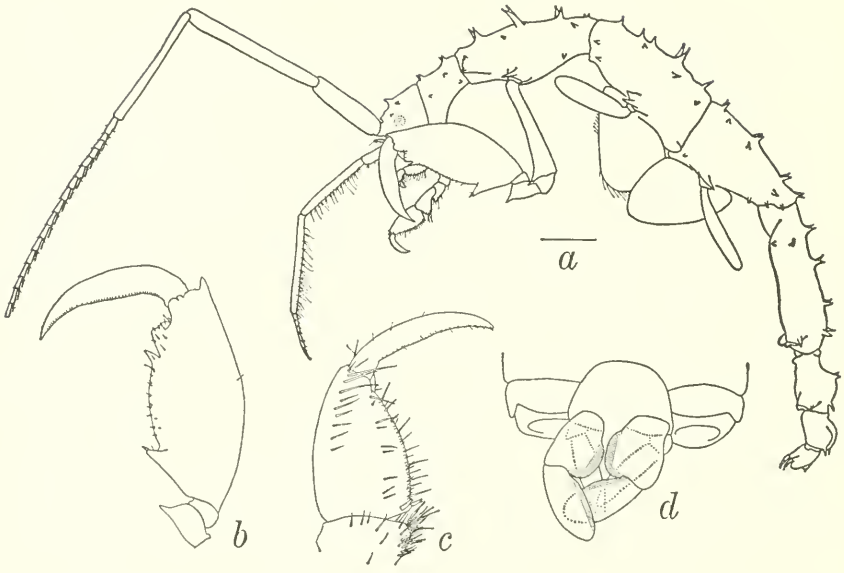

FIGURE 5.—*Aeginina longicornis*, female; *a*, lateral view; *b*, gnathopod 2; *c*, gnathopod 1; *d*, abdomen.

and total length. It is evident that pereonites 1 and 2 of both males and females increase in length at approximately the same rate. Therefore the statement made by many authors that pereonites 1 and 2 are elongated in males seems to be invalid.

DISTRIBUTION.—Type-locality: Near Frederikskäb, Greenland, at a depth of 22–29 m.

Other records: Siberian Polar Sea to 140° E.; Kara Sea; Novaya Zemlya; Franz Josef Land; Spitsbergen; Murmansk; Barents Sea; Norway; Denmark; Faeroe Islands; Shetland Islands; Jan Mayen; Iceland; eastern and western coasts of Greenland; Baffin Bay; east coast of North America from Newfoundland to Oregon Inlet, North Carolina.

New records: No records are available which extend the range of this species.

REMARKS.—This Arctic species is quite common in the northern parts of eastern North America. It is generally found in deeper water (to 2258 m) but has been collected frequently in shallow water. The habitat does not seem to be specific because it has been collected from green, red, and brown algae; sea grass; hydroids; bryozoans; and from the gut of the sea bass, *Centropristis*.

The seasonal distribution of ovigerous females is illustrated in figure 7. The largest number of samples containing ovigerous fe-

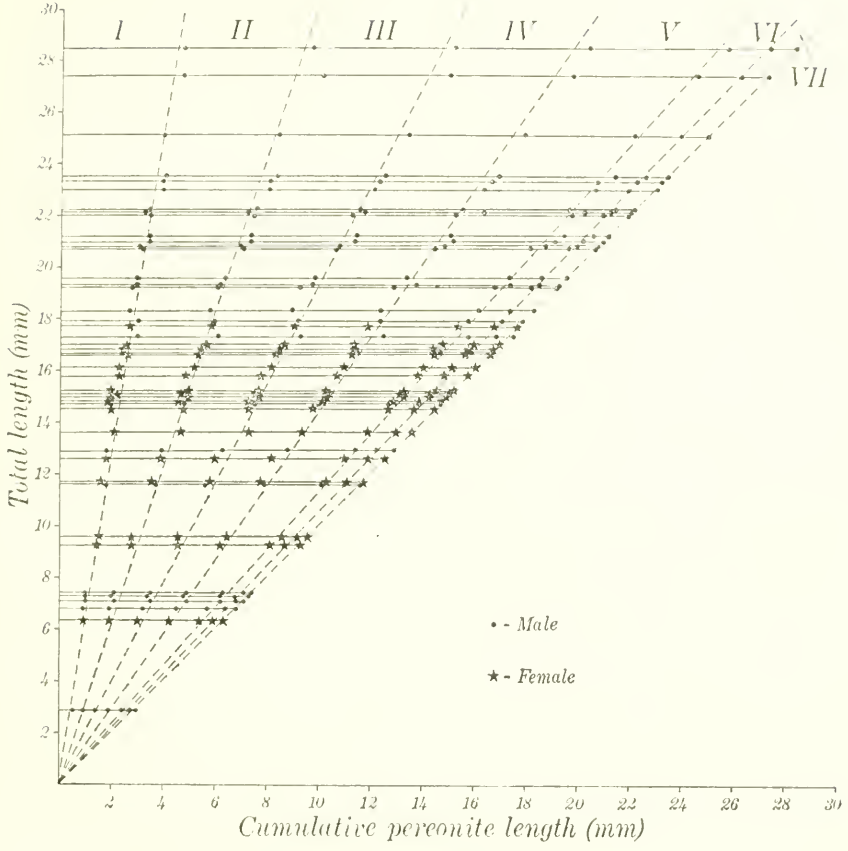

FIGURE 6.—*Aeginina longicornis*, cumulative pereonite length plotted against total length. Roman numerals indicate pereonites; I includes both pereonite 1 and cephalon. Solid horizontal lines represent individuals.

males was collected during August and September and the breeding season appears to extend from April to December. No ovigerous females were present in samples taken from January to March. Whether this is due to the fact that the caprellids do not breed during this period or simply that adequate samples were not taken, is not known.

The varieties of this species which are found along the east coast of North America do not appear to be geographically or bathymetrically isolated from each other and so they probably do not represent subspecies. These varieties may represent the phenotypic expression of different degrees of spination influenced by such parameters as substrate, breeding season, or diet; however, such data are not available to me.

FIGURE 7.—*Aeginina longicornis*, monthly and latitudinal distribution of ovigerous females.

Caprella Lamarck, 1801

Flagellum of antenna 2 biarticulate, swimming setae usually present; mandibular palp absent, molar present; outer lobe of maxilliped larger or equal to inner lobe; gills on pereonites 3 and 4; pereopods 3 and 4 absent, pereopod 5, 6-segmented; abdomen of male with pair of appendages and pair of lobes, female with pair of lobes.

Type-species: *Cancer linearis* Linnaeus, 1767 (subsequent designation by Dougherty and Steinberg, 1953).

REMARKS.—Mayer (1890, p. 107; 1903, p. 73) states that it is unnecessary to study in detail the mouthparts of members of this genus since the specific differences stand out much more clearly in other characters. I agree with this statement, hence, I have not included descriptions of the mouthparts other than the lacinia mobilis of the right mandible except for those appendages which exhibit variation. The typical mouthparts of *Caprella* may be characterized as follows: Mandible with 5-toothed incisor; left mandible with 5-toothed lacinia mobilis, right variable; setal row of left mandible with 3 serrate setae, right with 2 serrate setae; molar present with single small plumose seta. Outer lobe of maxilla 1 with 7 spines, palp with variable number of spines and setae. Lobes of maxilla 2 usually densely setose. Outer lobe of maxilliped with row of spines on medial margin and usually covered with numerous setae; inner lobe flattened apically with several spines and numerous simple and plumose setae; articles of palp usually heavily setose, grasping margin of dactylus finely toothed or serrate.

The abdomen also appears to vary little in *Caprella*. In the males it bears a pair of uniramous appendages at its proximal end; laterally it has a pair of lobes. The surface of the abdomen is usually covered with numerous setae, and occasionally the ventral surface between the lobes is raised to form a hump. The female abdomen is similar to that of the male except that it lacks appendages.

The propodus of ganthopod 1 is usually triangular in outline and invariably has a pair of proximal grasping spines.

***Caprella andreae* Mayer, 1890, new rank**

FIGURES 8, 9, 55

Caprella acutifrons [not Latreille].—van Beneden, 1859, pp. 78–81, pl. 1, figs. 9–11; 1861, p. 145.—[?] Stock and Bolklander, 1952, p. 3.

Caprella acutifrons f. *Andreae* Mayer, 1890, pp. 51, 55–56, pl. 2, fig. 38, pl. 4, fig. 56, 70–71; 1903, pp. 80–81.—Chevreux and de Guerne, 1893, p. 3.—d'A. Thompson, 1901, p. 41.—Stephensen, 1915, p. 53.—Chevreux and Fage, 1925, p. 452, fig. 430a.—Ruffo, 1938, p. 150 [in part].—Utinomi, 1947, pp. 71–72.

Caprella acutifrons f. *andreae*.—Stephensen, 1929a, p. 182.

DIAGNOSIS.—Cephalon with anteriorly directed triangular projection, peduncle of antenna 1 robust in males, palm of propodus of pereopods 5–7 convex with medial grasping spines.

DESCRIPTION.—Body smooth except for anteriorly directed triangular projection on cephalon, pleura developed on pereonites 3 and 4 in larger males. Length of largest male 12 mm, female 9 mm, smallest ovigerous female 7 mm.

Peduncle of antenna 1 inflated in males, sparsely setose. Antenna 2 typical of genus.

Mouthparts typical of genus, lacinia mobilis of right mandible 5-toothed.

Gnathopod 1 typical of genus, dactylus serrate, propodus with 2 proximal grasping spines. Propodus of gnathopod 2 in males with proximal poison tooth and distal rectangular projection, palm densely setose; in females propodus with proximal poison tooth, distal projection and small middistal projection; dactylus strong and constricted medially.

Gills oval and usually quite large and inflated in males, females elliptical.

Propodus of pereopods 5–7 with 2 grasping spines at midlength, palm convex.

Abdomen typical of genus.

VARIATION.—The inflation of antenna 1 and the development of pleura increase as the size of the individual increases, large males having an unusually enlarged antenna 1 and well-developed pleura.

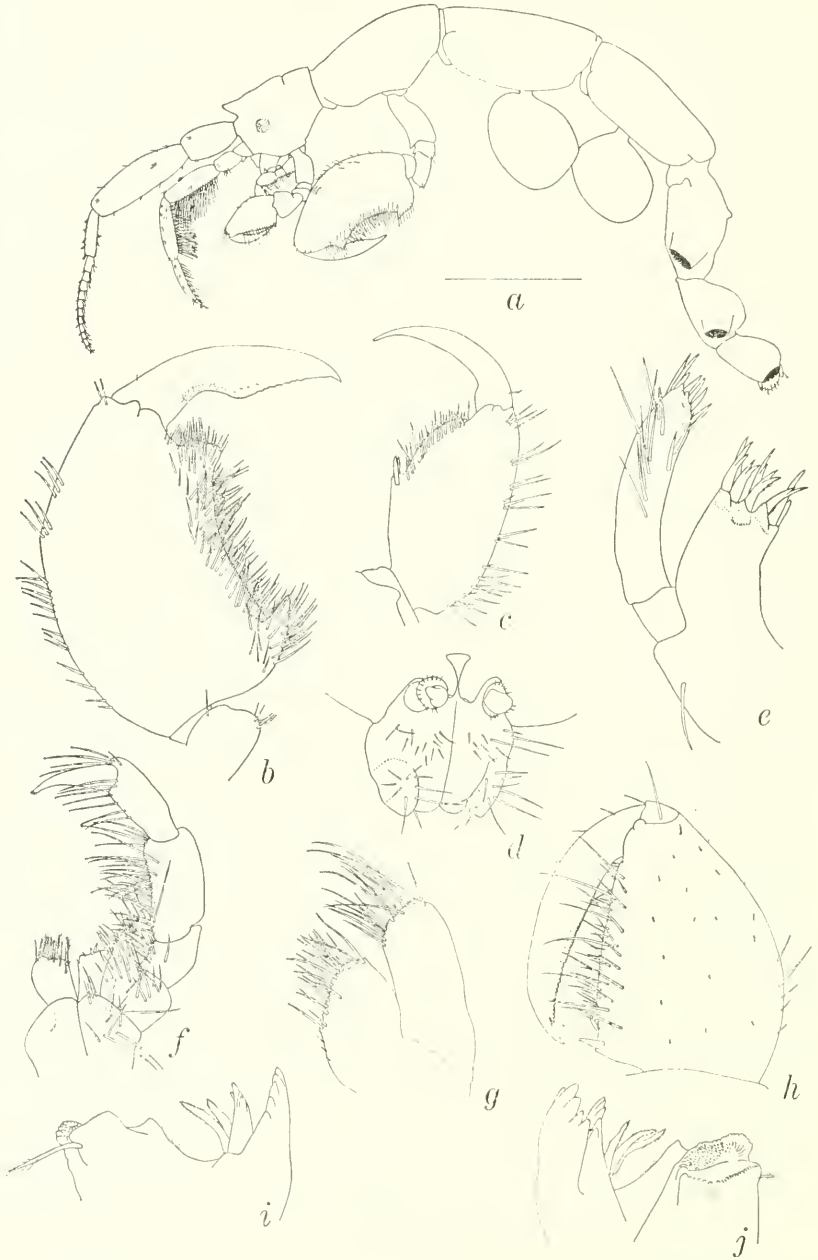

FIGURE 8.—*Caprella andreae*, male lectotype; *a*, lateral view; *b*, gnathopod 2; *c*, pereopod 6; *d*, abdomen; *e*, maxilla 1; *f*, maxilliped; *g*, maxilla 2; *h*, gnathopod 1; *i*, right mandible; *j*, left mandible.

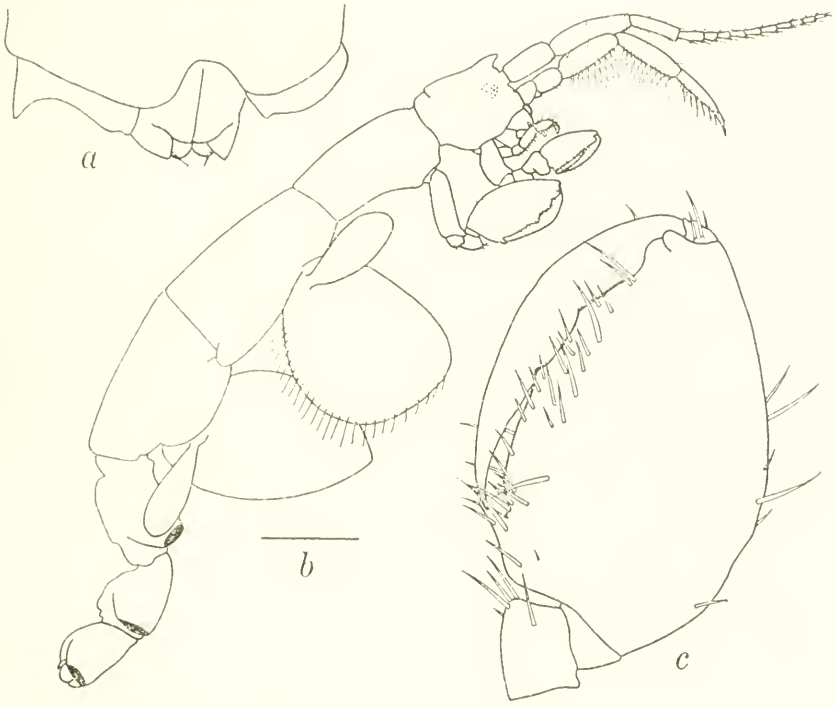

FIGURE 9.—*Caprella andreae*, female allolectotype; *a*, abdomen; *b*, lateral view; *c*, gnathopod 2.

DISTRIBUTION.—Type-locality: 38°10′ N., 64°20′ W. (see remarks).

Other records: North Sea; Netherlands; Belgium; Portugal; between Portugal and the Azores; Mediterranean coast of Spain; Gulf of Lione; St. Raphael, France; Naples, Italy; Aegean Sea; 38°20′ N., 16°04′ W.; between Tokyo and Honolulu; Sea of Japan; Korean Strait; West coast of Kyushu, Japan.

New records: Algeria; off Casablanca, Morocco; off Martha's Vineyard, Mass.; Ocean City, N.J.; Cape Hatteras and Beaufort, N.C.; off Key West, Fla.; Havana, Cuba; 43°09′ N., 151°52′ W.

REMARKS.—Mayer (1890) described this species as a variety of his compound species *Caprella acutifrons* (see p. 33). This species is composed of 20 varieties or forms, many of which should be considered full species by modern criteria (see Dougherty and Steinberg, 1953). *C. andreae* differs from the other forms of this compound species by the convexity of the propodus of pereopods 5–7. It appears to be ecologically isolated from the other members of the group by its habit of usually attaching to floating objects such as driftwood, buoys, and plants. It has also been found among the incrustations on the backs of the sea turtles, *Thalassochelys* and *Chelonia*, which were

collected in the Mediterranean Sea, off Havana, Key West, and Beaufort, North Carolina.

Ruffo (1938) cites this species as occurring off Brazil and Guiana; however, in personal correspondence he has advised me that he was referring to *C. acutifrons s. lato* and not specifically to *C. andreae*.

Mayer's specimens from his localities 3–7 were obtained from the Copenhagen Museum. I have selected a lectotype and an allolectotype from locality 4, 38°10′ N., 64°20′ W.

Caprella bermudia Kunkel, 1910

Caprella bermudia Kunkel, 1910, pp. 108–110, fig. 42.

Remarks.—Kunkel's description of this species is inadequate to separate it from *C. equilibra*. It has not been included under *C. equilibra* because I have not been able to examine the type material. Inquiries at most of the larger museums in Europe and North America have not revealed their location.

Caprella danilevskii Czerniavski, 1868

Figures 10, 11, 55

Caprella Danilevskii Czerniavski, 1868, pp. 92–93, pl. 6, figs. 21–34.—Mayer, 1882, p. 54; 1890, pp. 58–60, pl. 5, fig. 44, pl. 7, figs. 12–13, 54; 1903, p. 99.—Tichy, 1911, pp. 1131, 1133, 1134.—Zernov, 1913, p. 68.—Arimoto, 1930, pp. 50–51, fig. 5.—S. Carausu, 1956, pp. 131, 132.

Caprella Danilewskii.—Sovinskii, 1880, pp. 88, 100–101.—d'A. Thompson, 1901, p. 41.—Chevreux and Fage, 1925, pp. 454–455, fig. 432.—Ruffo, 1941, p. 125; 1946, p. 53.

Caprella inermis [not Grube] Haswell, 1880, p. 348, pl. 23, fig. 3; 1882, p. 314; 1884 (1885), p. 1000.—Mayer, 1882, p. 71, figs. 26–29; 1890, p. 75.—Oliveira, 1940, p. 139.—Guiler, 1954, pp. 532–533, fig. 1.

Caprella danilevskii.—Stebbing, 1888, pp. 1264–1267, pl. 145; 1910b, p. 653.—Kunkel, 1910, pp. 110–111.—Zernov, 1913, p. 233.—Barnard, 1916, pp. 280–281; 1937, pp. 134, 197.—Hale, 1929, pp. 232–233, fig. 228.—Hiro, 1937, pp. 312–313, pl. 22, fig. 6.—Utinomi, 1943a, p. 275; 1943b, p. 284, fig. 4; 1943c, p. 289; 1947, p. 73.—Edmondson and Mansfield, 1948, pp. 216–218, fig. 8.—Stschapova, Mokyovsky, and Pasternak, 1957, p. 87.

Caprella Danilevkii.—Monterosso, 1915, pp. 15–16.

Caprella danilewskii.—Carausu and Carausu, 1942, p. 82, fig. 8d.—Costa, 1960a, pp. 99, 100.

Diagnosis.—Propodus of pereopods 5–7 with numerous setae but lacking grasping spines; in males both pairs of gills elliptical, long axis usually parallel to body, in female gills on pereonite 3 usually as in males; abdomen of male with hooked papillae at tip of appendage, that of female with small palplike appendage bearing seta at medial base.

Description.—Body smooth, cephalon of large males with very small anterior projection. Length of largest male 9 mm, female 7 mm, smallest ovigerous female 4.5 mm.

Antenna 1 and 2 typical of genus.

Mouthparts typical of genus; lacinia mobilis of right mandible with 1 tooth, apical margin smooth or minutely serrate.

Propodus of gnathopod 1 with 2 proximal grasping spines, grasping margin of dactylus serrate. Propodus of gnathopod 2 in males elongate

FIGURE 10.—*Caprella danilevskii*, male; *a*, labium; *b*, lateral view; *c*, antenna 1; *d*, abdomen; *e*, gnathopod 2; *f*, gnathopod 1; *g*, pereopod 5; *h*, left mandible; *i*, right mandible; *j*, maxilla 2; *k*, maxilla 1; *l*, maxilliped.

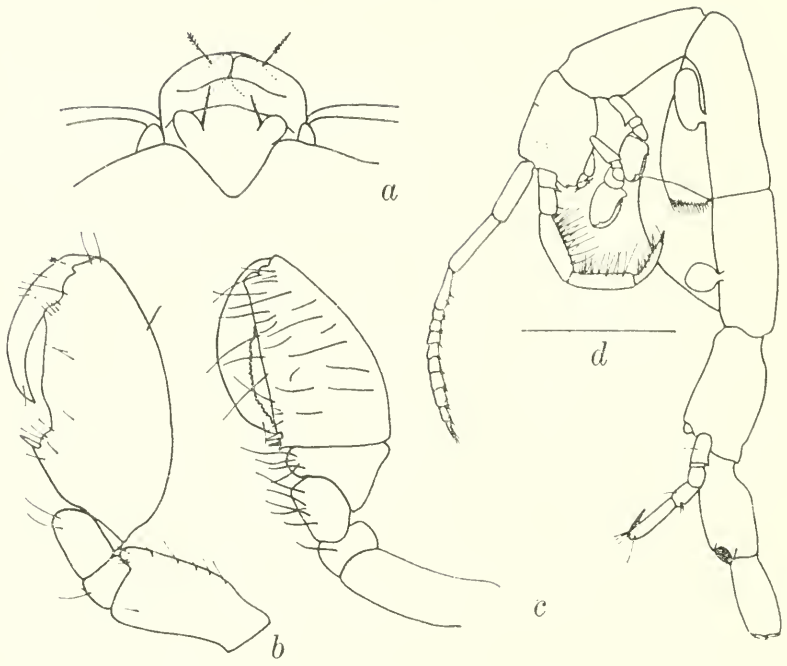

FIGURE 11.—*Caprella danilevskii*, female; *a*, abdomen; *b*, gnathopod 2; *c*, gnathopod 1; *d*, lateral view.

with posion tooth at midlength, rectangular tooth distally; dactylus less than one-half length of propodus; in females propodus with proximal poison tooth and distal rectangular tooth; dactylus more than one-half length of propodus.

Gills 3 and 4 in males and 3 in females elliptical, long axis usually parallel to body; gill 4 in females oval or elliptical.

Propodus of pereopods 5–7 without distinct grasping spines, palmar margin usually with numerous stout setae; grasping margin of dactylus serrate.

Abdomen of male typical of genus except for hooked papillae at tip of appendage, female with small palplike appendage.

VARIATION.—The shape of the gills is variable. In males the long axis is usually parallel to the body; however, either or both may occasionally be at various angles to the body. In the females either or both of the gills may have the long axis parallel to the body or may be at any angle. In small males the poison tooth on the propodus of gnathopod 2 may be more proximal than midlength; however, the dactylus remains quite short. The palm of the propodus of pereopods 5–7 varies in setation from numerous stout setae to very few.

Distribution.—Type-locality: Black Sea.

Other records: Bay of Biscay; Mediterranean coast of France; Mediterranean and Adriatic coasts of Italy; Sicily; Ukranian and Roumanian Black Sea; Cherchell, Algeria; Rufisque, Senegal; South Africa; South Arabian coast; Bermuda; Rio de Janeiro, Brazil; Oahu, Hawaii; S. Sakhaline; Pacific coast of Hokkaido and Honshu, Japan; Amakusa Tomioka and Okinojima, Kyushu, Japan; Sea of Japan; Korean Straits; Southeastern Australia; Coles Bay, Tasmania.

New records: Virginia Key, Key Biscayne, and Matheson Hammock, Fla.; Loggerhead Key, Tortugas; St. Croix, Virgin Islands; Trinidad.

Remarks.—This species is quite widespread and pantropical in its distribution. It has been collected on sea grass, the phaeophytes *Cystoseira* and *Sargassum*, and the bryozoan *Bugula*.

C. danilevskii is easily distinguished from the other species of *Caprella* in the western North Atlantic by its unusual gill shape, its distinctive abdomen, and the short dactylus of the male gnathopod 2.

Caprella equilibra Say, 1818

Figures 12, 13, 55

Caprella equilibra Say, 1818, pp. 391–392.—de Kay, 1844, p. 41.—White, 1847, p. 92.—Gibbes, 1848, p. xvi; 1849, p. 23.—Stebbing, 1888, pp. 1254–1256; 1910a, p. 466; 1910b. p. 653.—Kunkel, 1910, pp. 106–108, fig. 4.—Barnard, 1916, p. 281; 1930, p. 440; 1932, p. 300.—Schellenberg, 1928, p. 678.—Procter, 1933, p. 256.—Edmonson and Mansfield, 1948, pp. 214–216, fig. 7.—Ricketts and Calvin, 1952, p. 68.—Dougherty and Steinberg, 1953, pp. 44, 47; 1954, pp. 170, 171.—Day and Morgan, 1956, p. 303.—Steinberg and Dougherty, 1957, pp. 273–274, figs. 1–2.—Johnson, 1965, appendix 2, p. 2, appendix 3, p. 4; 1966, appendix 2, p. 2.—McCain, 1965, pp. 193–194, fig. 1b, f; 1966, p. 92.—Johnson and Juskevice, 1965, p. 39.

Caprella Januarii Króyer, 1842–43, pp. 499–504, pl. 6, figs. 14–20.—Dana, 1853, pp. 819–820; 1855, pl. 55, fig. 2.—Herklots, 1861, p. 43.

Caprella Esmarkii Boeck, 1861, pp. 674–675; 1871a, p. 275 (195); 1873–76, pp. 693–694, pl. 32, fig. 5.

Caprella laticornis Boeck, 1861, pp. 675–676; 1871a, p. 274 (194); 1873–76, pp. 689–691, pl. 32, fig. 10.

Caprella aequilibra.—Bate, 1862, pp. 362–363, pl. 57, fig. 5; 1887, pl. 175.—Bate and Westwood, 1868, pp. 71–73.—Parfitt, 1873, p. 251.—Gamroth, 1878, pp. 101–126, pls. 8–10.—Haller, 1879a, p. 232; 1879b, p. 404.—Mayer, 1882, pp. 45–48, pl. 1, fig. 7, pl. 2, figs. 1–11, pl. 4, figs. 20–25, pl. 5, figs. 16–18; 1890, pp. 48–50, pl. 2, figs. 42–43, pl. 4, figs. 35–37, pl. 6, figs. 18a, 37; 1903, pp. 89–92, pl. 3, figs. 29–34, pl. 7, figs. 66–69; 1912, pp. 4, 5.—Marion, 1883, p. 49.—Miers, 1884, p. 320.—Carus, 1885, p. 388.—Haswell, 1884 (1885), pp. 999–1000.—de Guerne, 1886, p. xliii.—Norman, 1886, p. 26; 1905a, p. 26; 1905b, p. 85.—Thomson and Chilton, 1885 (1886), p. 142.—Chevreux, 1887a, p. 335; 1898, p. 483; 1900, p. 120.—Barrois, 1888, pp. 58, 77.—G. Sars, 1895, pp. 663–664, pl. 238, fig. 3.—d'A. Thompson, 1901, p. 41.—Graeffe, 1902, p. 19.—Hutton, 1904, p. 261.—Marine Biol. Assoc., 1904, p. 242; 1931, p. 198; 1957, p. 233.—Norman and Scott, 1906, pp. ix,

99.—Scott, 1906, p. 175.—Sinel, 1906 (1907), p. 222.—Tichy, 1911, p. 1134.—Thomson, 1913, p. 245.—LaFollette, 1914, pp. 224–225, pl. 5.—Briggs, 1914 (1915), pp. 79–80.—Kunkel, 1918, pp. 180–181.—Thomson and Anderton, 1921, p. 113.—Galdiano, 1924, p. 392.—Chevreux and Fage, 1925, pp. 455–456, fig. 433.—Schellenberg, 1926, p. 470.—Johnson and Snook, 1927, pp. 280–281, fig. 235.—Stephensen, 1927a, p. 150; 1927c, p. 355; 1928, p. 386, fig. 92 (13); 1929a, pp. 180–181, figs. 43–336; 1929b, p. 34; 1942, pp. 439, 502, 503.—Fischetti, 1932, pp. 1–28, figs. 1–5.—Oldevig, 1933, p. 269, fig. 3.—MacGinitie, 1935, p. 701.—Pirlot, 1939, p. 78.—Fiorencis, 1940, pp. 13–14, figs. 3–4, pl. 1, figs. 3, 4, 7.—Milne, 1940, p. 72.—Oliveira, 1940, p. 139.—Bertrand, 1941, pp. 12, 13, 14, 15, 16.—McDougall, 1943, pp. 363, 370.—Hewatt, 1946, pp. 196, 199, 201, 204.—Ruffo, 1946, p. 53.—Utinomi, 1947, p. 72.—Ellis, 1950, p. 13.—Reid, 1951, pp. 283, 289.—Guiler, 1952, p. 31; 1954, p. 532.—Tuzet and Sanchez, 1952, pp. 26–36, fig. 1–1&2, fig. 2, fig. 3.—Duke Univ. Mar. Lab., 1953, p. 22.—Belleudy, 1958, pp. 355–356.—Costa, 1960a, pp. 99, 100.—Luther and Fiedler, 1961, p. 158, pl. 24.—Peyrot and Trilles, 1964, pp. 1–28, figs. 1–19.

Caprella ultima Bate, 1862, pp. 364–365, pl. 57, fig. 9.

Caprella monacantha Heller, 1866, pp. 54–55, pl. 4, figs. 17–19.—Stalio, 1877, pp. 1125–1126.—Stossich, 1881, p. 230.

Caprella obtusa Heller, 1886, p. 54, pl. 4, fig. 16.—Stalio, 1877, p. 1390.—Stossich, 1881, p. 230.

Caprella megacephala A. Edwards, 1868, pp. 89–91, pl. 20, fig. 12.

Caprella aeguilibra.—Bate, 1878, p. 510.

Caprella caudata Thomson 1878 (1879), p. 246, pl. 10, fig. D–5.—Mayer, 1882, pp. 71–72; 1890, p. 76.

Caprella obesa [not van Beneden] Haswell, 1880, pp. 348–349, pl. 24, fig. 1; 1882, p. 314.

Caprella AEquilibra.—Chevreux, 1888, p. 351.

Caprella linearis [not Linnaeus].—Barrois, 1888, pp. 56–57, 77.—Chevreux, 1899, p. 484 [in part].—Chevreux and Fage, 1925, pp. 456–457, fig. 434 [in part].—Pearse, 1936, p. 193.—Wells, 1961, p. 247.

Caprella mendax Mayer, 1903, p. 114, pl. 5, figs. 9–11, pl. 8, fig. 22.

Diagnosis.—Basis of gnathopod 2 less than one-half length of pereonite 2, propodus without small proximal accessory tooth; pereonite 2 usually with spine between insertions of gnathopods 2; pereonites 1–2 elongated in large males.

Description.—Body smooth except for spine between insertions of gnathopod 2, caphalon flattened anteriorly. Length of largest male 22 mm, largest female 12 mm, smallest ovigerous female 6.4 mm.

Large males with articles 2–3 of peduncle of antenna 1 slightly shorter than antenna 2, article 3 subequal in length to article 2, article 1 less than one-half length of article 2, articles of peduncle expanded. In females and small males peduncle of antenna 1 sometimes shorter than antenna 2.

Mouthparts typical of genus, lacinia mobilis of right mandible 5-toothed.

Propodus of gnathopod 1 with 2 proximal grasping spines, grasping margin of dactylus and propodus serrate. Basis of gnathopod 2 short

and stout, anterodistal margin produced into triangular projection; ischium and merus with posterodistal margin pointed in larger males; palm of propodus with numerous setae, single proximal grasping spine, distally with large rectangular tooth and slightly proximal tooth.

Gills ovate to elliptical, more ovate in larger males.

FIGURE 12.—*Caprella equilibra*, male; *a*, lateral view; *b*, labium; *c*, maxilla 2; *d*, maxilla 1; *e*, abdomen; *f*, pereopod 5; *g*, maxilliped; *h*, gnathopod 1.

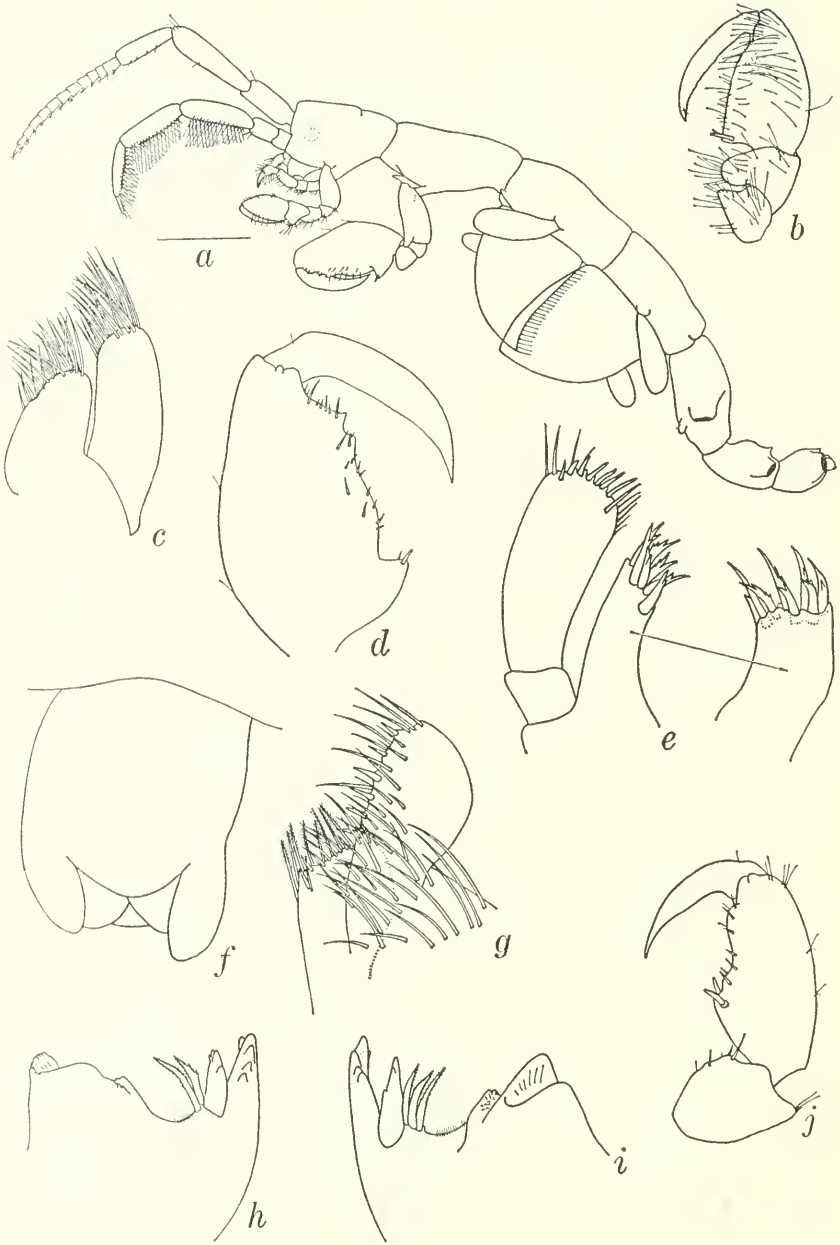

FIGURE 13.—*Caprella equilibra*, female; *a*, lateral view; *b*, gnathopod 1; *c*, maxilla 2; *d*, gnathopod 2; *e*, maxilla 1; *f*, abdomen; *g*, inner and outer lobes of maxilliped; *h*, right mandible; *i*, left mandible; *j*, pereopod 6.

Propodus of pereopods 5–7 robust with 2 proximal grasping spines, palm expanded slightly near grasping spines and with numerous setae.

Abdomen of male and female typical of genus.

Variation.—In the western North Atlantic this species is constant in most of its characters; however, a variant occurs along the coast of Virginia, North Carolina, and South Carolina in which the spine between the insertions of gnathopods 2 is reduced or absent. In this variant the propodus of the pereopods is less robust and the body not quite so stout as in the typical *C. equilibra*.

Off Virginia this variant was taken on *Leptogorgia*. This association may have some relation to the reduction of the spine and stoutness of the pereopods since *C. penantis* taken from *Leptogorgia* showed a loss of grasping spines on the propodus of the pereopods (p. 35).

Distribution.—Type locality: South Carolina. ". . . I found them common in the bay of Charleston, particularly at Sullivan's island, on the two species of Gorgonia so common in the salt water creeks of our southern coast" (Say, 1818).

Other records: Sweden and Norway to the Mediterranean Sea including the British Islands; Black Sea [?]; Azores; tropical West Africa; St. Helena Island; South Africa; Madagascar; Mid-North Atlantic and Sargasso Sea; Bermuda; east coast of United States from Connecticut to Georgia (Procter, 1933, cites this species from Mount Desert Region, Maine); Port Aransas, Texas; Puerto Cabello, Venezuela; Cabo Frio and Rio de Janeiro, Brazil; Mid-South Atlantic off Brazil; Mar del Plata, Argentina; Valparaiso, Chile; Taboga Island, Panama; between Panama and the Galapagos Islands; California; Hawaii; Nagasaki, Mukaijima, and Saganoseki, Japan; Philippine Islands; Cook Strait; New South Wales, Victoria, Fremantle, Australia; New Zealand; Tasmania; Hong Kong; Singapore, Malaysia.

New records: Fernandina, entrance to St. Johns River, St. Augustine, Daytona, Cape Kennedy, off Ft. Lauderdale, Biscayne Bay, and Panama City, Fla.; Grand Isle, La.; Galveston and Port Isabel Tex.; Trinidad; Sacco Sao Francisco and Nictherey, Brazil; Estera de la Luna, Sonora, Mexico; Vancouver Island, British Columbia.

Remarks.—Large males of this species are easily distinguished from the other species of *Caprella* by the large peduncular articles of antenna 1 and the long pereonites 1 and 2. In both males and females the cephalon is flattened anteriorly and in the typical form a spine is present between the insertions of gnathopods 2. The non-spined variant resembles other species of *Caprella* but can be identified by the short stout basis of gnathopod 2 and the other characters which are present in the typical form.

C. equilibra has been collected from various habitats including sea grass, red and green algae, sponges, hydroids, stylasterines,

alcyonarians, bryozoans, and colonial ascidians. It was also taken from the egg mass of a blue crab and from the gut of a sea bass *Centropristis*. This species ranges in depth from the surface to ?3000 m (McCain, 1966).

In an aquarium it was preyed upon by the grass shrimp *Palaemonetes*, the blenny *Blennius*, and the small (2 mm) snail *Astyris* was observed severing the cephalon from a large male (12 mm). When *C. equilibra* was offered small pieces of bivalves or bryozoans it would accept them readily. It was also observed catching small gammaridean amphipods such as *Ampithoe* and *Jassa* and also several small polychaetes. Initially the prey was seized in gnathopod 1 and then brought to the mouthparts. Gnathopod 2 was seldom used in the capture of prey and even when it was used, the prey was quickly passed to gnathopod 1.

Caprella linearis (Linnaeus, 1767)

FIGURES 14, 22, 51

Cancer linearis Linnaeus, 1767, p. 1056; 1769, pp. 445–446; 1788, p. 2992; 1793, p. 501.—J. Fabricius, 1793, pp. 517–518.

Onisci Scolopendroidis Pallas, 1772, p. 80, pl. 4, fig. 15a–c.

Squilla lobata Müller, 1776, p. 197.

Squilla quadrilobata Abildgaard, 1788, pp. 21–22, pl. 56, figs 4–6.

Gammarus quadrilobatus.—Abildgaard, 1789, p. 58, pl. 114, figs. 11–12.

Cancer (*Gammarellus*) *lincaris*.—Herbst, 1793 ,pp. 142–144, pls. 9a, 10b.

Cancer Linnearis.—Linnaeus, 1800, p. 761.

Caprella linearis.—Bosc, 1801–02, p. 156; 1830, p. 126, pl. 15, fig. 5.—Latreille, 1802–03, pp. 324–326, pl. 57, figs. 2–5; 1803, p. 333; 1816, p. 434.—Desmarest, 1823, p. 364; 1825, p. 278.—Johnston, 1835, pp. 671–672, fig. 71.—Drapiez, 1837, p. 353.—H. Edwards, 1840, pp. 106–107.—Goodsir, 1842, p. 190, pl. 3, figs. 8–9.—White, 1847, pp. 91–92; 1850, pp. 59–60; 1857, pp. 214–215.—Cocks, 1849, p. 83.—Williams, 1854, pp. 301–312, pl. 17, fig. 6.—Gosse, 1855, p. 131, fig. 223.—Bate, 1856, p. 60; 1857, p. 151; 1862, p. 353, pl. 55, fig. 7; 1878, p. 509; 1887, p. 175.—Leydig, 1860, p. 283.—van Beneden, 1861, p. 145.—McAndrew, 1861, p. 28.—[?] Dohrn, 1866, pp. 245–250, pl. 13b.—Bate and Westwood, 1868, pp. 52–56.—Müller, 1869, pp. 40–41.—Metzger, 1869–70 (1871), p. 32; 1875, p. 278.—Boeck, 1871a, pp. 273 (193)–274 (194).—Iarzynsky, 1870, p. 316.—Parfitt, 1873, p. 250.—M'Intosh, 1874, p. 272.—Maitland, 1874, p. 245.—Meinert, 1877–78, pp. 168–171; 1880, p. 495; 1890, p. 184.—Hoek, 1879, pp. 97–161, pl. 5, figs. 1–8, 11–13, pl. 6, fig. 2, pl. 7, figs. 1–3, 11–14; 1883–84, pp. 532, 533; 1889, p. 231.—Delage, 1881, p. 153.—Mayer, 1882, pp. 58–62, figs. 17–19, pl. 4, fig. 32; 1890, pp. 63–65; 1903, pp. 109–113, pl. 4, figs. 27–35, pl. 8, figs. 19–21.—Pelsenner, 1883, p. CXXXI; 1886, p. 218.—Schneider, 1883, p. 30; 1891, pp. 111, 122; 1924 (1926), pp. 59–60.—Blanc, 1884, pp. 88–91, pl. 5, figs. 122–129.—Koehler, 1884 (1885), pp. 98–99, 117; 1885, pp. 27, 61.—Wagner, 1885, p. 169.—Fowler, 1886, p. 218.—de Guerne, 1886, p. XLIII.—Norman, 1886, p. 26; 1902, p. 483; 1905a, p. 26; 1905b, p. 85; 1907, p. 370; 1908 (1909), p. 463.—G. Sars, 1886, pp. 69, 89; 1895, pp. 657–658, pl. 236.—[?] Thomson and Chilton, 1886, p. 142.—Bonnier, 1887, pp. 354–356.—Chevreux, 1887, p. 335; 1898, p. 484.—Robertson, 1886–87 (1888), pp. 71–72.—Scott, 1887

(1888), p. 250; 1897, p. 141; 1906, pp. 174–175.—Chevreux and Bouvier, 1893, p. 143.—Lameere, 1895, p. 570.—[?] Ohlin, 1895a, pp. xvii, xix, 62–63; 1895b, p. 486.—Walker, 1895, p. 319; 1898, p. 170.—Walker and Hornell, 1896, p. 55.—Gadeau de Kerville, 1900 (1901), p. 184.—Sokolowsky, 1900, p. 162, pl. 3, fig. 16.—Ortmann, 1901, p. 155.—d'A. Thompson, 1901, p. 41.—Whiteaves, 1901, p. 219.—Lönnberg, 1902 (1903), p. 50.—[?] Hutton, 1904, p. 261.—Marine Biol. Assoc., 1904, p. 242; 1931, p. 198; 1957, p. 234.—Holmes, 1904 (1905), pp. 526–527.—M. Rathbun, 1905, pp. 7, 78.—Norman and Scott, 1906, pp. x, 98.—Reibisch, 1906, pp. 217–218, 219, 220, 221, 222, 229, 230, 233.—Sinel, 1906 (1907), p. 222.—Brüggen, 1907, p. 238.—Norman and Brady, 1910, pp. 75–76.—Nordgaard, 1911 (1912), p. 24.—Massy, 1911 (1912), pp. 7, 22, 34, 42, 43, 45, 51, 68, 70, 73, 82, 169.—Sumner, Osburn, and Cole, 1911 (1913), p. 657.—Tattersall, 1913, pp. 20, 22.—Derjugin, 1915, pp. 453, 456; 1928, p. 282.—Björck, 1915, p. 35; 1916, p. 9.—Chumley, 1918, pp. 52, 85, 165.—Kunkel, 1918, pp. 177–178, fig. 54.—Funke, 1922, p. 197.—Chevreux and Fage, 1925, pp. 456–457, fig. 434 [in part].—Derjavin, 1927, p. 14.—Stephensen, 1927a, p. 149; 1927b, p. 13; 1928, pp. 382–384, fig. 92 (1–4); 1929a, p. 179, fig. 333; 1929b, pp. 19, 34; 1935, p. 118; 1940, p. 73; 1942, pp. 436–437, 502, 503; 1944b, p. 159.—Johansen, 1930, p. 94.—Shoemaker, 1930, p. 353 (135).—[?] Arimoto, 1931, pp. 13–14, fig. 9.—Gurjanova, 1931, p. 201; 1964, p. 313.—Oldevig, 1933, pp. 264–266.—Procter, 1933, p. 256.—Dons, 1935, p. 110.—Schellenberg, 1942, pp. 237–238, fig. 197.—Dahl, 1946, p. 22.—[?] Utinomi, 1947, p. 75.—Stock and Bolklander, 1952, pp. 3–4.—Bousfield, 1956b, p. 145; 1958, p. 315.—Brunel, 1961, p. 7.—Toulmond and Truchot, 1964, p. 35.

Caprella Linearis.—Leach, 1814, p. 404.—Risso, 1816, p. 130.—Couch, 1864, p. 98.

[?]*Caprella Punctata* Risso, 1816, pp. 130–131; 1826, p. 102.—Carus, 1885, p. 389.

Caprella laevis Goodsir, 1842, pp. 189–190, pl. 3, figs. 4–5.—White, 1847, p. 92; 1850, p. 60; 1857, p. 215.—Gosse, 1855, p. 131.—Bate, 1856, p. 60.

[?]*Caprella phasma* [not Montagu].—Rathke, 1843, pp. 94–96.

[?]*Caprella acuminifera* [not Leach].—Rathke, 1843, p. 96.

[?]*Caprella scolopendroides* [not Lamarck].—Rathke, 1843, p. 97.

Caprella lobata.—Bate, 1856, p. 60; 1857, p. 151; 1862, p. 354, pl. 55, fig. 8; 1878, p. 509; 1887, p. 175.—Bate and Westwood, 1868, pp. 57–59.—Parfitt, 1873, p. 250.

Caprella linearis f. *gullmarensis* Mayer, 1903, p. 112, pl. 8, fig. 20.

Caprella linearis f. *distalis* Mayer, 1903, p. 113, pl. 4, figs. 27–28.

Diagnosis.—Body smooth or with only few spines, peduncle of antenna 1 usually with numerous setules, ratio of total length to length of basis of gnathopod 2 usually less than 13.0, inner surface of gnathopod 2 with small tooth adjacent to poison tooth.

Distribution.—Type-locality: "Habitat in Oceano Europaeo" (Linnaeus, 1767).

Other records: Siberian Polar Sea to 140° E.; Murman coast; Spitsbergen; Norway to France; British Islands; Faeroe Islands; Iceland; coast of North America from Labrador to Connecticut; [?]Kamchatka, Japan, and New Zealand.

New records: The material available to me does not extend the range of this species.

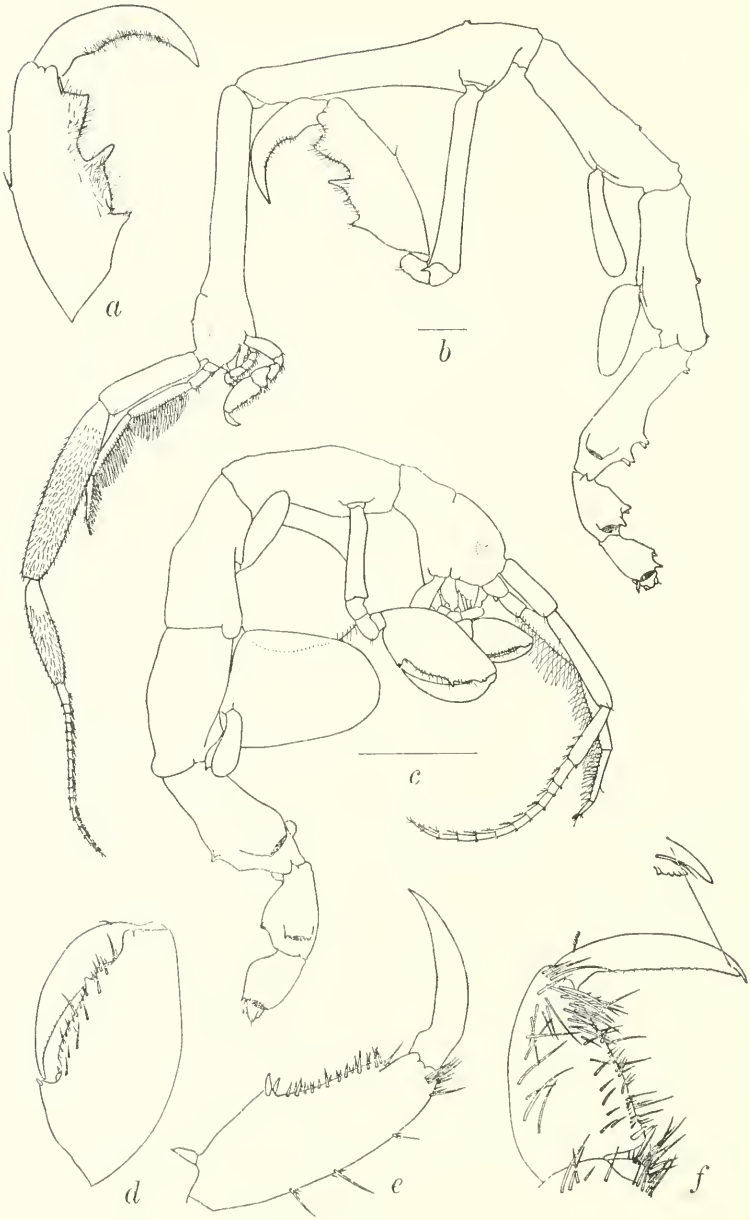

FIGURE 14.—*Caprella linearis; a*, male gnathopod 2; *b*, male lateral view; *c*, female lateral view; *d*, female gnathopod 2; *e*, female pereopod 6; *f*, female gnathopod 1.

Remarks.—The appendages of *C. linearis* are quite similar to those of *C. septentrionalis* and are discussed under the latter species.

C. linearis does not appear to be specific in its habitat, having been collected from brown, green, and red algae, sea grass, sponges, hydroids, alcyonarians, and tunicates. Ohlin (1895a) reported it from an *Asterias* collected off Newfoundland. This report may refer to *C. unica* since the body form and most of the appendages of these species are quite similar and *C. unica* has been collected off Newfoundland. Mayer (1903) also reported *C. linearis* from an asteroid, *Solaster*, which was collected off Scotland.

C. linearis has been taken from the surface to a depth of several hundred meters.

Caprella longimanus Stimpson, 1853

Caprella longimanus Stimpson, 1854 (1853), p. 44.—Whiteaves, 1901, p. 220.—Bate, 1862, pp. 360–361.

Caprella longimana.—Mayer, 1882, p. 66; 1890, p. 73.

Remarks.—A caprellid from Grand Manan was described by Stimpson as

> Body with a few spines along the back of each segment. Superior antennae rather stout and twice as long as the inferior ones, which are very slender. Hands very long and rather broad, with two or three teeth along the inner edge; the arms to which they belong are placed on the thickened posterior part of the second segment. Color light-yellowish brown. Eyes red. Length about three-fourths of an inch.

From this description it is impossible to tell to which species Stimpson is referring. It might be *C. septentrionalis* because of the mention of a few dorsal spines, but several other species bear spines.

Caprella penantis Leach, 1814

Figures 15, 16, 51

[?]*Cancer Atomos* Linnaeus, 1767, p. 1056; 1769, pp. 446–447; 1788, pp. 2992–2993; 1793, p. 501; 1800, p. 761.—Pennant, 1777, p. 21, pl. 12, fig. 32.

Caprella Penantis Leach, 1814, p. 404.

Caprella acutifrons Latreille, 1816, p. 433.—[?] Desmarest, 1823, p. 363; [?] 1825, p. 277.—[?] Drapiez, 1837, p. 353.—[?] H. Edwards, 1840, p. 108.—[?] White, 1847, p. 92; [?] 1850, p. 60; [?] 1857, p. 216.—[?] Cocks, 1849, p. 83.—[?] Gosse, 1855, p. 131.—[?] Bate, 1856, p. 60; [?] 1862, p. 356, pl. 56, fig. 6; [?] 1878, p. 509; [?] 1887, p. 175.—[?] Bate and Westwood, 1868, pp. 60–62.—[?] Parfitt, 1873, p. 250.—[?] Maitland, 1874, p. 245.—[?] Stalio, 1877, p. 1125.—[?] Haller, 1879a, p. 232; [?] 1879b, p. 404.—Mayer, 1882, pp. 48–50, pl. 1, fig. 9, pl. 2, figs. 12–22, pl. 4, figs. 26–28, pl. 5, figs 15, 22, 23 [in part]; 1890, pp. 50–57, pl. 2, figs. 34–41, pl. 4, figs. 52–71, pl. 7, figs. 16–17 [in part]; 1903, pp. 79–89, pl. 3, figs. 4–28, pl. 7, figs. 62–65 [in part].—[?] Delage, 1881, pp. 131–132, 155, pl. 10, figs. 11–12.—Stossich, 1881, p. 230.—[?] Marion, 1883, p. 49.—[?] Carus, 1885, p. 388.—[?] Norman, 1886, p. 26; [?] 1905a, p. 26; [?] 1905b, p. 85; [?] 1907, p. 370; [?] 1908 (1909), p. 463.—[?] Pelseneer, 1886, p. 218.—[?] Bonnier, 1887, p. 353.—[?] Chevreux, 1887a,

pp. 318, 335; [?] 1888, p. 33; [?] 1898, p. 483; 1900, pp. 119–120.—[?] Barrois, 1888, pp. 57–58, 77.—[?] Vosseler, 1889, p. 159.—[?] Walker and Hornell, 1896, p. 54.—[?] Gadeau de Kerville, 1898, p. 348; [?] 1900 (901), p. 184.—[?] Walker, 1898, p. 170.—[?] Beaumont, 1900, p. 795.—[?] d'A. Thompson, 1901, p. 41.—M. Rathbun, 1905, pp. 7, 77–78.—[?] Norman and Scott, 1906, pp. vii, 99.—[?] Sinel, 1906 (1907), p. 222.—Chilton, 1910 (1911), pp. 546, 567.—[?] Monterosso, 1915, p. 15, fig. 3.—[?] Galdiano, 1924, p. 392.—Richards, 1929, p. 84; 1938, p. 213, pl. 24, fig. 7.—Cowles, 1930, p. 351.—[?] Mar. Biol. Assoc., 1931, p. 198; [?] 1957, p. 233.—Barnard, 1932, p. 300; 1965, p. 209.—Procter, 1933, p. 256.—[?] MacGinitie, 1935, p. 701.—Schellenberg, 1938, pp. 95, 98.—[?] Ricketts and Calvin, 1939, pp. 70–71; [?] 1952, p. 68.—[?] Bertrand, 1941, pp. 12, 13, 14.—Pearse, Humm, and Wharton, 1942, p. 184.—Dexter, 1944, p. 356.—[?] MacKay, 1945, p. 205.—[?] Hewatt, 1946, pp. 194, 196, 199, 200, 201, 202, 204.—[?] Ruffo, 1947, p. 129.—Edmondson ad Mansfield, 1948, pp. 212–214, fig. 6.—Ferguson and Jones, 1949, p. 442.—[?] Stephensen, 1949, p. 54.—Hedgpeth, 1950, pp. 77–78.—Ellis, 1950, p. 13.—[?] Tuzet and Sanchez, 1952, pp. 26–36, figs. 1–3, 1–4, 1–5, fig. 4.—Duke Univ. Mar. Lab., 1953, p. 22.—[?] Macnae, 1953, p. 1032.—Bousfield, 1956b, p. 145; 1958, pp. 315, 321.—Menzel, 1956, p. 41.—Pearse and Williams, 1951, p. 143.—[?] Stschapova, Mokyovsky, and Pasternak, 1957, p. 87.—[?] Costa, 1960a, pp. 99, 100.—Wells, 1961, pp. 247, 249.—[?] Toulmond and Truchot, 1964, p. 35.

Caprella geometrica Say, 1818, pp. 390–391.—de Kay, 914, p. 41.—White, 1847, p. 92.—Gibbes, 1848, p. xvi; 1849, p. 23.—Bate, 1862, p. 357, pl. 56, fig. 8.—Verrill and Smith, 1873, pp. 316–317, 480, 567, pl. 5, fig. 20.—Uhler, 1879, pp. 26–27.—R. Rathbun, 1880 (1881), p. 121.—Norman, 1886a, p. 26; 1905, p. 26.—Holmes, 1904 (1905), p. 526.—Paulmier, 1905, p. 168, fig. 38.—Kunkel, 1918, pp. 178–180, fig. 55.—Sumner, Osborn, and Cole, 1911 (1913), pp. 132, 134, 135, 657, chart 102.—Pearse, 1913, p. 378. LaFollette, 1914, pp. 222–223, pl. 1–3.—Allee, 1922, p. 58; 1923, p. 213.—Wood and Wood, 1932, p. 18.—McCain, 1965, pp. 194–196, figs. 1c,g, 2a–f.

Caprella Pennantii.—[?] Johnston, 1835, p. 671.—[?] Bate, 1856, p. 60; [?] 1857, p. 151.—[?] McAndrew, 1861, p. 28.—[?] Couch, 1864, p. 97.

[?] *Caprella spinifrons* Nicolet, 1849, p. 253.—Mayer, 1882, p. 70; 1890, p. 74.—Reed, 1897, p. 11 (4).

[?] *Caprella obesa* van Beneden, 1861, pp. 99, 146.

Caprella Acutifrons.—[?] Herklots, 1861, p. 43.

[?] *Caprella novae-zealandiae* Kirk, 1878, pp. 465–466; 1878 (1879), p. 393.—Thomson, 1879, p. 330.

[?] *Caprella Novae-Zealandiae.*—Mayer, 1882, pp. 71–72; 1890, p. 76.

[?] *Caprella penantii.*—Bate, 1887, p. 175.

Caprella acutifrons f. *tabida* Mayer, 1890, pp. 54–55, pl. 2, fig. 36, pl. 4, figs. 52, 61.

Caprella acutifrons f. *neglecta* Mayer, 1890, p. 55, pl. 2, fig. 37, pl. 4, figs. 57–58, 67; 1903, p. 80.—Utinomi, 1943a, pp. 273–274, figs. 2a, 3a; 1943b, pp. 282–283, fig. 2; 1943c, p. 284, fig. 1; 1947, p. 72.

[?] *Caprella acutifrons* f. *gibbosa* Mayer, 1890, p. 55, pl. 2, fig. 39, pl. 4, figs. 55, 69.

Caprella acutifrons f. *carolinensis* Mayer, 1890, p. 56, pl. 2, fig. 40, pl. 4, figs. 59, 65.

[?] *Caprella acutifrons* f. *lusitanica* Mayer, 1890, p. 56, pl. 4, figs. 53, 66.

Caprella acutifrons f. *virginia* Mayer, 1890, p. 56, pl. 2, fig. 41, pl. 4, fig. 60.

Caprella acutifrons f. *natalensis* Mayer, 1903, p. 81, pl. 3, figs. 22, 23.—Arimoto, 1930, pp. 48–49, fig. 3.—Hiro, 1937, p. 312, pl. 22, fig. 5.—Stephensen, 1949, pp. 53–54, 56.

Caprella acutifrons f. *porcellio* Mayer, 1903, pp. 81–82.

Caprella acutifrons f. *testudo* Mayer, 1903, p. 82.—Chevreux and Fage, 1925, p. 452, fig. 430t.
Caprella acutifrons f. *angusta* Mayer, 1903, p. 82, pl. 3, fig. 4.
Caprella acutifrons f. *tibada* Mayer, 1903, p. 80.
Caprella penantis.—Stebbing, 1910b, p. 653.—[?] Hale, 1929, pp. 233–234.—[?] Schellenberg, 1931, pp. 266, 272.
Caprella penantis f. *natalensis*.—Stebbing, 1910a, pp. 465–466.—Barnard, 1916, pp. 281–282.
Caprella penantis f. *porcellio*. —Stebbing, 1910a, p. 466.
Caprella angusta.—Dougherty and Steinberg, 1953, pp. 44, 47; 1954, p. 171.—Johnson and Juskevice, 1965, p. 38.
Caprella carolinensis.—Steinberg and Dougherty, 1957, pp. 270–273, figs. 3–7.

DIAGNOSIS.—Cephalon with anteriorly directed triangular projection; peduncle of antenna 1 not inflated; basis of gnathopod 2 shorter than pereonite 2; pereopods concave, grasping spines proximal.

DESCRIPTION.—Body smooth except cephalon with anteriorly directed triangular projection. Length of largest male 14 mm, largest female 12 mm, smallest ovigerous female 4 mm.

Peduncle of antenna 1 not inflated, flagellum with up to 15 articles. Antenna 2 usually longer than peduncle of antenna 1.

Mouthparts typical of genus, lacinia mobilis of right mandible toothed but indistinctly 5-toothed.

Propodus of gnathopod 1 with 2 proximal grasping spines, grasping margin of dactylus and propodus serrate. Propodus of gnathopod 2 with proximal poison tooth, palm concave in males and slightly convex in females with distal elevated rectangular projection; grasping margin of dactylus serrate.

Gills usually ovate, occasionally elliptical.

Propodus of pereopods 5–7 usually with pair of proximal grasping spines, pereopods increasing in length from 5 to 7.

Abdomen of male and female typical of genus.

VARIATION.—In the area around Alligator Harbor, Fla., *C. penantis* taken on *Leptogorgia* showed a reduction or loss of grasping spines on the propodus of pereopods 5–7. Approximately 90 percent of the specimens taken during the summer of 1966 lacked grasping spines and remaining 10 percent had either 1 or 2 grasping spines. Other specimens of this species taken during that summer on algae and hydroids had the usual pair of grasping spines. It is interesting to note that *C. equilibra* taken on *Leptogorgia* off Virginia showed a reduction or loss of the ventral spine between the insertions of gnathopods 2.

As I illustrated in 1965 (p. 195, fig. 2a–f) the shape of the propodus of gnathopod 2 changes with an increase in the size of the individual. In smaller individuals of approximately 4 or 5 mm, gnathopod 2 resembles gnathopod 1 and bears a pair of grasping spines. As the

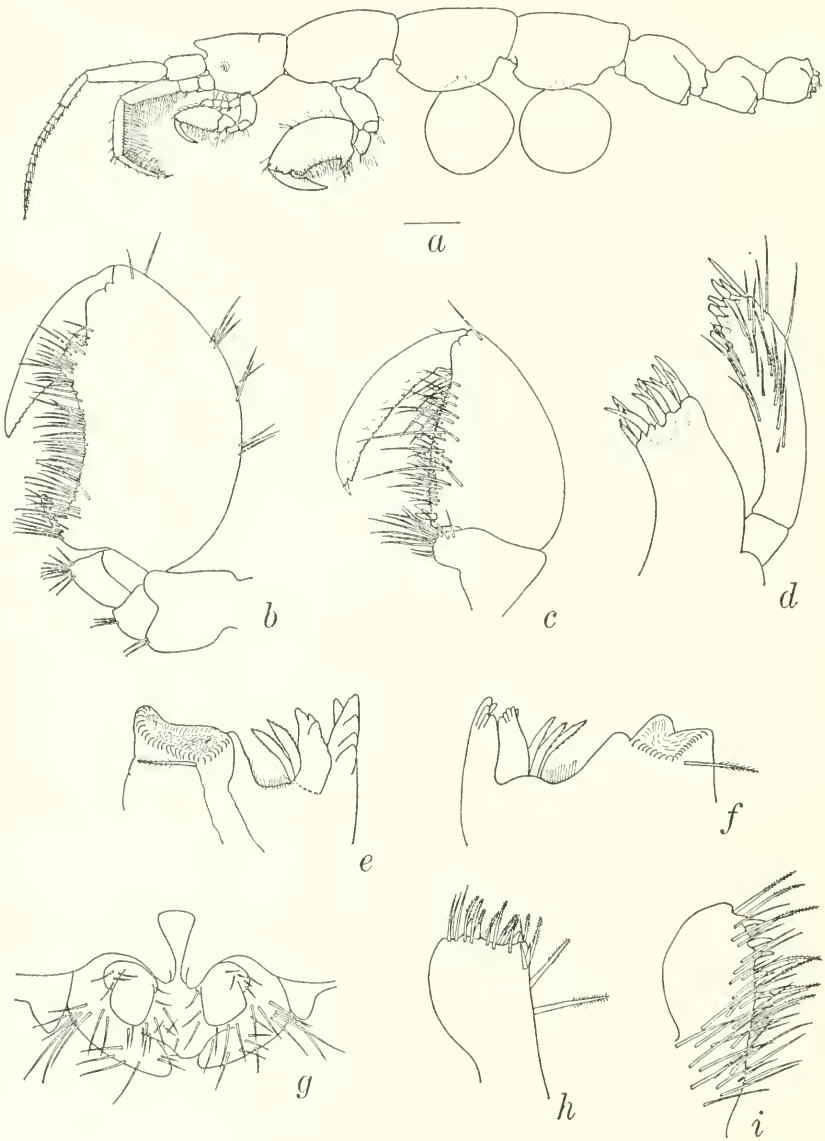

FIGURE 15.—*Caprella penantis*, male; *a*, lateral view; *b*, gnathopod 2; *c*, gnathopod 1; *d*, maxilla 1; *e*, right mandible; *f*, left mandible; *g*, abdomen; *h*, inner lobe of maxilliped; *i*, outer lobe of maxilliped.

individual increases in size there is a progressive loss of 1, then of both spines, and a notch develops in the palm.

Stoutness of the body and the degree of pleural development appear to be a function of growth, larger individuals having a robust body and well-developed pleura.

DISTRIBUTION.—Type-locality: Devonshire Coast, England.

Other records: Atlantic coast of France, Spain, and Portugal; British Islands; Azores; Atlantic coast of North America from Nova Scotia and Gulf of St. Lawrence to Georgia; Alligator Harbor, St. Georges Sound, and Apalachee Bay, Fla.; Galveston, Freeport, Port Aransas, and Port Isabel, Tex.; Safety Islands; Tristan da Cunha and Gough Island; South Africa; California; Hawaii; Kyushu and Honshu, Japan; Formosa Strait; Hong Kong; New Zealand; New South Wales, Australia.

New records: Savannah Beach and Sapelo Island, Ga.; Fernandina Beach, Mayport, St. Augustine, Marineland, Ft. Pierce, Key West, Sarasota Bay, Tampa Bay, Dunedin, Panama City, and Destin, Fla.; Ocean Springs, Miss.; Cayenne, French Guiana.

REMARKS.—In Mayer's last two monographs (1890, 1903), he names 20 varieties or forms of the *Caprella acutifrons* group. Of

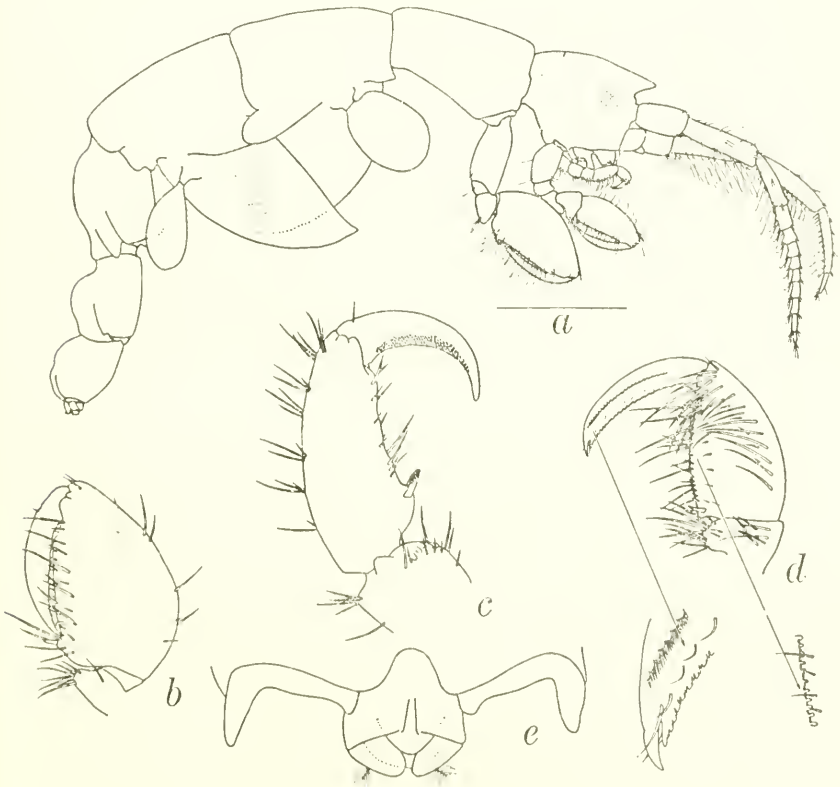

FIGURE 16.—*Caprella penantis*, female; *a*, lateral view; *b*, gnathopod 2; *c*, pereopod 7; *d*, gnathopod 1; *e*, abdomen.

these, *C. acutifrons* f. *angusta* (1903), *borealis* (1903), *incisa* (1903), and *verrucosa* (1903) (=*C.verrucosa* Boeck, 1871b) have since been given specific rank. In the present paper one other variety, *C. acutifrons* f. *andreae*, is accorded specific rank, leaving 14 varieties in question.

The varieties *C. acutifrons* f. *typica* (1890), *minor* (1890), *tabida* (1890), and *tibada* (1903) differ from the remaining varieties primarily by the distal position of the poison tooth on the palm of the propodus of gnathopod 2. Mayer recognized *C. acutifrons* f. *typica* and *minor* from Rio de Janeiro, Brazil, the latter variety being based on a smaller individual than the former. Krøyer (1842–43) described *C. dilatata* from Rio de Janeiro. All of the above-mentioned varieties should be assigned to *C. dilatata*. Juveniles of this species bear a small proximal tooth on the palm of gnathopod 2, which is very short and spinelike and is not present on individuals larger than approximately 8 mm.

In 1903 Mayer changed the 1890 variety *tabida* to *tibada* and recognized *C. tabida* Lucas, 1849, as a different variety. *C. acutifrons* f. *tabida* (1903) (=*C. tabida* Lucas, 1849), *C. acutifrons* f. *simulatrix* (1903), *C. pilimana* Dougherty and Steinberg, 1953, and *C. obtusifrons* Utinomi, 1943c, differ from the remaining varieties by the lack of a poison tooth on the palm of gnathopod 2. Specimens of the first two varieties and of *C. obtusifrons* have not been examined so I cannot make any statement on their validity.

Caprella acutifrons f. *cristibrachium* (1903) lacks a triangular projection on the cephalon and the shape of gnathopod 2 is quite different from that of the other members of the *C. acutifrons* group. It is doubtful that it is a variety of this group and probably should be given specific rank.

The remaining varieties, *C. acutifrons* f. *carolinensis* (1890), *virginia* (1890), *testudo* (1903), *gibbosa* (1890), *lusitanica* (1890), *natalensis* (1903), *porcellio* (1903), and *neglecta* (1890), are quite similar in the shape of gnathopod 2 and general body form. In the first five varieties the palm of the propodus of gnathopod 2 is quite setose and in the last three varieties and *C. angusta* the palm is scarcely setose. I have been unable to find other distinguishing characters for these varieties, so I have tentatively assigned them to the species *C. penantis*.

Dougherty and Steinberg (1953) gave *C. acutifrons* f. *angusta*, *incisa*, and *verrucosa* specific rank. These varieties occur together on the California coast and have been collected simulatneously from the same hydroid. Since they are sympatric and no morphological intergradations were observed, all of these varieties cannot be ascribed to the same species. I agree with Dougherty and Steinberg's decision to give them specific rank; however, they do not state how *C.*

angusta differs from the typical *C. penantis*. Specimens of *C. angusta* have been compared with specimens which Mayer identified as *C. acutifrons* f. *natalensis* and *neglecta* and with specimens which I earlier (1965) identified as *C. geometrica*. With the exception of the setose versus nonsetose palm of gnathopod 2, I can find no variation which is not ascribable to size differences. I have therefore synonymized *C. angusta* with the typical *C. penantis*.

The specimens from Cayenne, French Guiana, belong to that portion of *C. penantis* which bears almost no setae on the palm of gnathopod 2. It might well be that *C. penantis* could be divided into two subspecies on the basis of the setation of gnathopod 2; however, material from Chile, Australia, and New Zealand would have to be examined since Nicolet's name *C. spinifrons* or possibly Kirk's name *C. novae-zealandiae* would probably have priority over one of Mayer's varietal names. Material is not available to me from these areas so I have refrained from naming subspecies.

Kirk's (1878) description of *C. novae-zealandiae* agrees with that of *C. penantis*, and he states that his species is close to *C. geometrica*. Thomson and Chilton (1885, 1886) synonymized *C. novae-zealandiae* with *C. equilibra;* however, Kirk states "Cephalon furnished with a spinous tooth directed forwards." It seems unlikely that Kirk could have been referring to *C. equilibra*, so I have synonymized his species with *C. penantis*.

In my synonymy, when a reference to the variety of *C. acutifrons* or *C. penantis* is not indicated, this lack of designation is indicated by a question mark in brackets before the author or date. Such records are not included in the distribution of this species, so it is possible that *C. penantis* might also be found as far north as Spitsbergen, the Mediterranean Sea, the Falkland Islands, Chile, Cook Strait, and the Bering Sea.

This species is probably the most common caprellid along the east coast of the United States. It occurs in such abundance from Long Island to Chesapeake Bay that I have had several reports that it is a pest to swimmers. One report from Sinepuxent Bay, Md. stated that *C. penantis* fastens itself to the exposed parts of swimmers' bodies and either bites or sucks, causing an irritation that forms a blister which lasts for a week or more. Such an irritation might be caused by the associated hydroids and not by the caprellid itself, but this possibility has not been verified.

C. penantis is quite nonspecific in its habitat preference and has been taken on various red and brown algae, sea grass, sponges, hydroids, alcyonarians, zoantharians, and bryozoans. Chilton (1911) reports that this species was collected from a coconut which was washed ashore; I have found it clinging to the spines of the echinoid

Arbacia and on hydroids which were attached to the carapace of the spider crab *Libinia*.

Caprella sanguinea Gould, 1841

Caprella sanguinea Gould, 1841, pp. 335–336.—de Kay, 1844, p. 41.—Stimpson, 1854 (1853), p. 44.—Bate, 1862, p. 360.—Mayer, 1882, p. 67; 1890, p. 73.—Whiteaves, 1901, p. 219.

Remarks.—This species from Massachusetts was described by Gould as:

. . . an inch in length, entirely crimson except its black eyes. The head is blunt, the lower antennae ciliated and extending to the second segment, and the upper ones to the third segment; first two segments nearly as long as the three next, and about one third of the whole length; on the middle of the first is a spine; two last segments short and heart-shaped. Hands having a long curved finger; an imperfect thumb on the second pair of legs; a tubercule at the base of the ovate carpus, and a small spine at the middle. This might be called *C. sanguinea*, from its color, which it retains in spirits.

Like Stimpson's *C. longimanus*, this species is unidentifiable and it might also belong to *C. septentrionalis*.

Caprella scaura Templeton, 1836

Figures 17, 18, 55

Caprella scaura Templeton, 1836, pp. 191–192, pl. 20 fig. 6.—H. Edwards, 1840, p. 107.—Bate, 1862, p. 355, pl. 56, fig. 4.—Mayer, 1882, p. 65; 1890, pp. 70–73, pl. 4, figs. 40–51, pl. 6, fig. 41, pl. 7, figs. 2, 35–36 [in part]; 1903, pp. 117–120, pl. 5, figs. 13–18, pl. 10, fig. 11 [in part].—Walker, 1916, p. 346.—Barnard, 1925, pp. 371–372.—Hale, 1927, p. 315; 1929, p. 234, fig. 229.—Arimoto, 1931, pp. 16–18, pl. 3, figs. 1–6.—Hiro, 1937, pp. 314–315, fig. 3, pl. 22, figs. 11–12.—Day and Morgan, 1956, p. 303.

Caprella nodosa Templeton, 1836, pp. 192–194, pl. 21, fig. 7.—H. Edwards, 1840, p. 108.—Bate, 1862, p. 357, pl. 56, fig. 7.

Caprella cornuta Dana, 1853, pp. 816–817; 1855, pl. 54, fig. 5.—Bate, 1862, p. 356, pl. 56, fig. 5.—Mayer, 1882, p. 68.—Chilton, 1921, pp. 90–91, fig. 4.—Oliveira, 1940, p. 139.

Caprella cornuta f. *obtusirostris* Dana, 1853, p. 817; 1855, pl. 54, fig. 6.

Caprella attenuata Dana, 1853, pp. 817–819; 1855, pl. 55, fig. 1.—Bate, 1862, p. 364, pl. 57, fig. 7.—Mayer, 1882, pp. 67–68, figs. 24–25; 1890, p. 73.—Haswell, 1885, p. 1000.

Caprella attenuata f. *subtenuis* Dana, 1853, pp. 818–819; 1855, pl. 55, fig. 1c.

Caprella scaura f. *typica* Mayer, 1890, p. 71, pl. 4 figs. 48–49; 1903, p. 118.—Miyadi and Masui, 1942, p. 10.—Utinomi, 1947, p. 77.

Caprella scaura f. *diceros* Mayer, 1890, p. 71; 1903, p. 118.—Miyadi and Masui, 1942, p. 10.—Utinomi, 1943a, p. 279; 1943b, p. 285, fig. 5; 1947, p. 77.

Caprella scaura f. *cornuta* Mayer, 1890, pp. 71–72, pl. 4, figs. 50–51; 1903, pl. 118.

Caprella scaura f. undetermined Mayer, 1903, p. 120.

Caprella scaura f. *hamata* Utinomi, 1947, p. 77, fig. 7.

Diagnosis.—Cephalon with anteriorly directed spine, pereonites 1–2 elongate in males, basis of gnathopod 2 approximately length of pereonite 2.

DESCRIPTION.—Body with anteriorly directed cephalic spine, female with variously developed spines on pereonites 1–7. Length of largest male 21 mm, female 12 mm, smallest ovigerous female 6 mm.

Antenna 1 usually longer than one-half body length, flagellum with as many as 9 fused articles in males, up to 4 in females. Length of antenna 2 variable.

Mouthparts typical of genus, lacinia mobilis of right mandible not distinctly 5-toothed.

Propodus of gnathopod 1 with 2 proximal grasping spines, grasping margin of dactylus and propodus serrate. Propodus of gnathopod 2 elongate in males, palm with 2 strong teeth and distal rectangular projection; female propodus not so elongate as male, palm with proximal spine, small distal tooth and distal rectangular projection.

Gills elliptical.

Propodus of pereopods 5–7 with 2 proximal grasping spines.

Abdomen of male and female typical of genus except with raised medial projection.

VARIATION.—The females with the most pronounced dorsal body spination had 1 knob at the posterior of pereonite 1, 1 pair of knobs above the gills on pereonites 3 and 4, 1 knob at the posterior of pereonite 4, 2 pairs of knobs at midlength of pereonite 5, 1 pair of knobs at midlength of pereonite 6, and a pair of knobs at the posterior of peronite 7. This spination showed varous degrees of reduction from this pattern with the knob at the posterior of pereonite 4 usually being present. The males occasionally bore 2 pairs of knobs at midlength of pereonite 5 and a pair of knobs at midlength of pereonite 6.

The number of fused articles in the flagellum of antenna 1 varied from 6–9 in males and from 2–4 in females. Mayer used this character for separating *C. scaura* f. *cornuta* from *C. scaura* f. *typica* and *diceros* since *C. scaura* f. *cornuta* does not have fused articles in the flagellum of antenna 1.

DISTRIBUTION.—Type-locality: Riviere Noire, Mauritius.

Other records: St. Croix and St. Barthélemy, Virgin Island; Vitoria, Rio de Janeiro, and 28° S., Brazil; South Africa; Mejillones, Chile; Cumberland Bay, Isla Más a Tierra; Honshu, Kyushu, and the Inland Sea, Japan; Vladivostok; Sydney and Kangaroo Island, Australia.

New records: Cocos Island, Costa Rica; off Mayagüez, Puerto Rico; Ilha Sao Sebastiao and Santa Catarina, Brazil; False Bay, South Africa.

REMARKS.—Mayer (1890, 1903) described 6 varieties of *C. scaura* to which Utinomi (1947) added a seventh, *C. scaura* f. *hamata*. Mayer's varieties *C. scaura* f. *typica* (1890), *diceros* (1890), *cornuta* (1890),

FIGURE 17.—*Caprella scaura*, male; *a*, lateral view; *b*, gnathopod 1; *c*, maxilla 2; *d*, maxilla 1; *e*, gnathopod 1; *f*, right mandible; *g*, abdomen; *h*, left mandible; *i*, inner and outer lobes of maxilliped.

FIGURE 18.—*Caprella scaura*, female; *a*, lateral view; *b*, inner and outer lobes of maxilliped; *c*, gnathopod 2; *d*, maxilla 1; *e*, abdomen; *f*, gnathopod 1; *g*, righ mandible; *h*, left mandible.

and Utinomi's *C. scaura* f. *hamata* do not bear a ventral spine between the insertions of gnathopods 2 as do Mayer's varieties *californica* (1890), *scauroides* (1903), and *spinirostris* (1890).

Dougherty and Steinberg (1953) separated *C. scaura* f. *californica* as a distinct species and reestablished Stimpson's (1857) name *C. californica*. This action was justified; however, they did not state what should be done with the other two varieties which bear the ventral spine. These varieties are closely related and appear to be limited to the North Pacific. No material of the Asian varieties is available to me and I am not able to comment on their taxonomic position. The synonymy, therefore, includes only those references which refer to those varieties which do not bear the ventral spine.

Barnard (1925) considered *C. laevipes* Mayer, 1903, a synonym of *C. scaura*. *C. laevipes* appears to be distinct from *C. scaura* since the pereopods do not bear grasping spines and Barnard's synonymy has not been followed.

The Caribbean material appears to be most closely related to *C. scaura* f. *typica* which has previoulsy been taken from St. Croix and St. Barthélemy.

C. scaura has been taken on red and brown algae, sea grass, bryozoans, and on a sea urchin.

Caprella septentrionalis Krøyer, 1838

Figures 19–22, 51

Squilla lobata [not Müller].—O. Fabricius, 1780, pp. 248–249.

Caprella septentrionalis Krøyer, 1838, p. 318; 1842–43, pp. 590–596, pl. 8, figs. 10–19.—Boeck, 1861, p. 677; 1870, p. 276 (196); 1873–76, pp. 696–698.—Bate, 1862, p. 355, pl. 56, fig. 3.—Goës, 1866, p. 534.—Packard, 1867, p. 297.—Lütken, 1875, p. 159.—Schiødte, 1875, p. 224, pl. 5, figs. 1–8.—Norman, 1876, p. 209; 1886, p. 26; 1902, p. 483; 1905a, p. 26.—Miers, 1877b, p. 139; 1880, p. 69.—Meinert, 1877–1878, pp. 171–172; 1880, p. 495; 1890, pp. 184–185.—M. Sars, 1858 (1859), p. 150.—Hoek, 1882, p. 65.—Mayer, 1882, pp. 62–64, figs. 20–22; 1890, pp. 65–68, pl. 2, figs. 26–33, pl. 4, fig. 31, pl. 6, fig. 38; 1903, pp. 120–123, pl. 5, figs. 19–21, pl. 8, fig. 24.—Stuxberg, 1882, p. 764; 1887, p. 73.—Schneider, 1883, p. 30; 1884, pp. 130–131; 1891, pp. 111, 122; 1924 (1926), p. 60.—Koelbel, 1886, p. 42.—G. Sars, 1886, pp. 69, 89; 1895, pp. 659–660, 700, pl. 237, fig. 1.—Hansen, 1887b, pp. 173–174.—Vosseler, 1889, p. 159.—Pfeffer, 1889 (1890), pp. 87, 94.—Klinckowström, 1892, p. 90.—Ohlin, 1895a, pp. 63–64, xvii, xix; 1895b, p. 486.—Vanhöffen, 1897, pp. 202, 203, 213.—Scott, 1899, p. 81; 1901, pp. 267–268.—Ortmann, 1901, pp. 155–156.—d'A. Thompson, 1901, p. 42.—Lönnberg, 1902 (1903), p. 50.—Holmes, 1904 (1905), p. 527.—Nordgaard, 1905, p. 185.—M. Rathbun, 1905, pp. 7, 78–79.—M. Grieg, 1907, p. 527.—Brüggen, 1909, p. 43.—Stephensen, 1913a, pp. 223–225; 1913b, p. 68; 1916, p. 295; 1927a, pp. 148–149; 1927b, p. 13; 1928, pp. 384–386, fig. 92 (5–10); 1929a, pp. 179–180, fig. 334; 1929b, pp. 20, 34; 1933, pp. 60, 77; 1935, p. 188; 1940, pp. 73–74; 1942, pp. 439–441, 502, 503; 1944b, pp. 136–137, 148, 159, 162.—Björck, 1915, p. 36.—Derjugin, 1915, pp. 453, 456; 1928, p. 282.—Oldevig,

1917, p. 40; 1933, pp. 266–269, fig. 1–2 (p. 267), figs. 1–3 (p. 268).—J. Grieg, 1925, p. 22.—Johansen, 1925, p. 204; 1930, p. 94.—Shoemaker, 1926, p. 11; 1930, pp. 353 (135)–354 (136).—Gurjanova, 1929b, p. 70; 1931, p. 201.—Dons, 1935, p. 110.—Dunbar, 1942, p. 42; 1954, pp. 784, 788.—Schellenberg, 1942, p. 238, fig. 198.—Dahl, 1946, p. 22.—Utinomi, 1943c, pp. 296–297, fig. 10; 1947, p. 78.—Stock and Bolklander, 1952, p. 4.—Bousfield, 1956a, p. 32; 1956b, p. 144; 1958a, p. 321; 1962, p. 53.—Bousfield and Leim, 1958, p. 18.—Brunell, 1961, p. 7.—Prefontaine and Brunel, 1962, p. 256.

Caprella cercopoides White, 1852, p. cevii, fig. 1.

Caprella robusta Stimpson, 1854 (1853), p. 44.—Mayer, 1882, p. 66; 1890, p. 73.

Caprella punctata [not Risso] Boeck, 1861, pp. 676–677; 1871a, p. 277 (197); 1873–76, pp. 698–699, pl. 32, fig. 11.—Norman, 1886, p. 26; 1905a, p. 26.—G. Sars, 1886, pp. 69, 89; 1895, pp. 660–661, 700–701, pl. 237, fig. 2, pl. 8, fig. 3.—Brüggen, 1907, p. 238.—Nordgaard, 1911 (1912), p. 24.—Stephensen, 1928, p. 385, fig. 92 (8); 1933, pp. 60, 77; 1940, p. 74; 1942, pp. 442–443, 504, 505; 1944a, p. 50; 1944b, p. 159.

Caprella Septentrionalis.—Herklots, 1861, p. 43.

Caprella Stimpsoni Bate, 1862, p. 361.—Whiteaves, 1901, p. 220.

[?] *Caprella hystrix* [not Krøyer].—Bate and Westwood, 1868, pp. 63–64.—M'Intosch, 1874, p. 272.—Koehler, 1884 (1885), pp. 112, 117; 1885, pp. 54, 61.—Bate, 1887, p. 175.—Bonnier, 1887, p. 354.—Robertson, 1886–87 (1888), p. 72.—Walker, 1895b, p. 475.—Norman, 1905b, p. 85.—Norman and Scott, 1906, p. 99.

Caprella longicornis Boeck, 1871a, pp. 274 (194)–275 (195); 1873–76, pp. 691–693, pl. 32, fig. 7.

Caprella Lovéni Boeck, 1871a, p. 276 (196); 1873–76, pp. 694–696, pl. 32, fig. 8.—Meinert, 1877–78, p. 171.—G. Sars, 1895, pp. 662–663, pl. 238, fig. 2.—Stephensen, 1928, pp. 385–386, fig. 92 (10).

[?] *Caprella hystryx.*—Bate, 1878, p. 509.

Caprella septentrionalis f. *typica* Mayer, 1890, p. 66.

Caprella septentrionalis f. *longicornis* Mayer, 1890, p. 66, pl. 2, figs. 26–27, 33, pl. 4, fig. 31.

Caprella septentrionalis f. *nodigera* Mayer, 1890, p. 66.

Caprella septentrionalis f. *polyceros* Mayer, 1890, p. 66, pl. 2, fig. 32.

Caprella septentrionalis f. *parva* Mayer, 1890, p. 66, pl. 2, figs. 28–31.

Caprella monoceros G. Sars, 1895, pp. 661–662, pl. 238, fig. 1.—Ohlin, 1895a, pp. viii, xiii, xvii, xix, 64–65.—Nordgaard, 1905, p. 185.—Stephensen, 1928, p. 385, fig. 92 (9); 1933, pp. 60, 77; 1940, p. 74; 1942, pp. 442, 504, 505; 1944b, p. 159.

Caprella septentrionalis f. *spinigera.*—Hansen, 1895, p. 130.

Caprella stimpsoni.—Holmes, 1904 (1905), p. 527.

Caprella septentrionalis longicornis.—M. Rathbun, 1905, pp. 7, 78–79.

Caprella septentrionalis stimpsoni.—M. Rathbun, 1905, p. 7, 79.

Caprella septentrionalis polyceros.—M. Rathbun, 1905, p. 7, 79.

Caprella septentrionalis lovéni.—Stephensen, 1929a, p. 180, fig. 334.

Caprella septentrionalis monoceros.—Stephensen, 1929a, p. 180, fig. 334.

Caprella septentrionalis punctata.—Stephensen, 1929a, p. 180, fig. 334.

Caprella septentrionalis f. *monoceros.*—Oldevig, 1933, p. 266, fig. 2 (p. 267).

Caprella septentrionalis f. *punctata.*—Oldevig, 1933, p. 266, fig. 3 (p. 268).

Caprella septentrionalis f. *lovéni.*—Oldevig, 1933, p. 266, fig. 2 (p. 268).

Caprella lovéni.—Stephensen, 1940, p. 74; 1942, pp. 441, 504, 505; 1944b, p. 159.

Diagnosis.—Body usually with numerous spines and tubercles, peduncle of antenna 1 rarely with setules, ratio of total length to

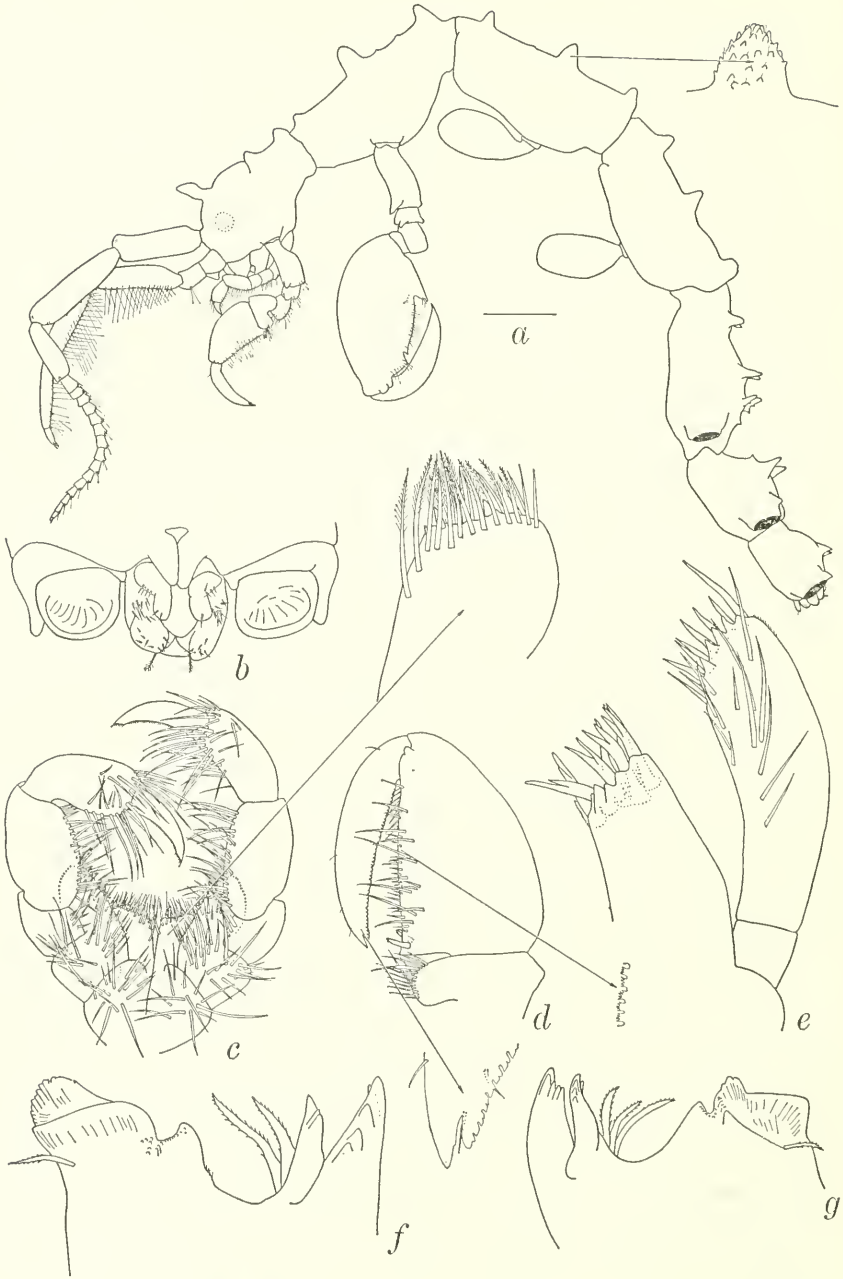

FIGURE 19.—*Caprella septentrionalis*, male; *a*, lateral view; *b*, abdomen; *c*, maxilliped; *d*, gnathopod 1; *e*, maxilla 1; *f*, right mandible; *g*, left mandible.

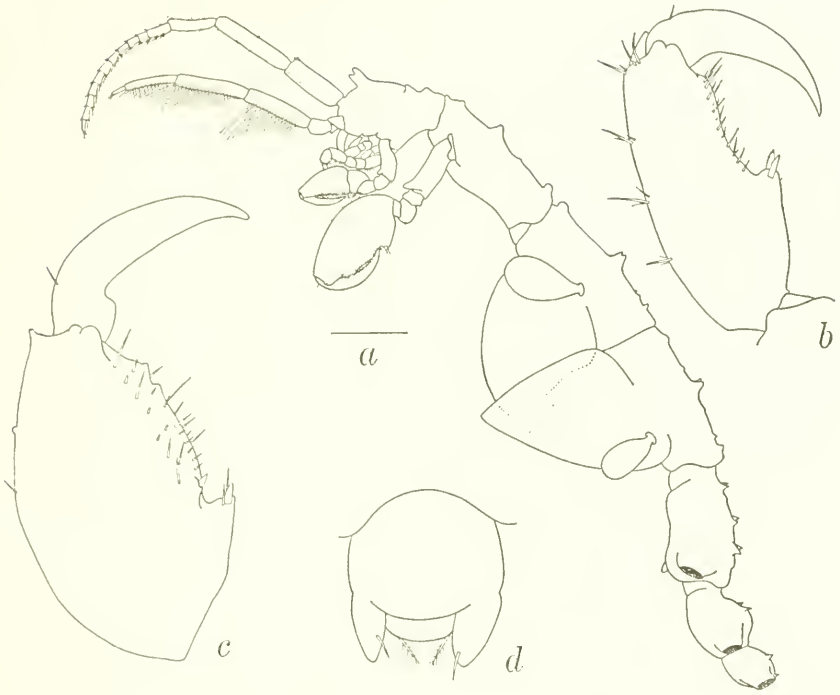

FIGURE 20.—*Caprella septentrionalis*, female; *a*, lateral view; *b*, pereopod 7; *c*, gnathopod 2; *d*, abdomen.

length of basis of gnathopod 2 usually greater than 13.0, inner surface of gnathopod 2 with small tooth adjacent to poison tooth.

DESCRIPTION.—Body spination variable. Length of largest male 20 mm, largest female 20 mm, smallest ovigerous female 9 mm.

Peduncle of antenna 1 occasionally with dense setules. Length of antenna 2 longer or shorter than peduncle of antenna 1.

Mouthparts typical of genus, right lacinia mobilis 5-toothed.

Propodus of gnathopod 1 with 2 proximal grasping spines, grasping margin of dactylus and propodus serrate. Palm of propodus of gnathopod 2 with proximal poison tooth and small tooth on inner surface, distally with small tooth, notch, and rectangular projection, anterodistal margin occasionally with projection; basis short and robust.

Gills usually elliptical, occasionally oval and inflated.

Propodus of pereopods 5–7 with pair of proximal grasping spines.

Abdomen of male and female typical of genus.

VARIATION.—Body spination varies from quite spinose to almost as smooth as in *C. linearis*. Usually the cephalon is furnished with at least a single spine.

The ratio of the total length to the length of the basis of gnathopod 2 varies slightly as illustrated in figure 22.

Distribution.—Type-locality: "It seems to be common in the Greenland seas***, but is not mentioned by Sabine and Ross**** . . . .***Sydproven, Julianchaab, Fiskenaesset, Godthaab and Nenertalik are those places from which it has been sent." (Translated from Krøyer, 1838)

Other records: Murman coast; Novaya Zemlya; White Sea; N. Russia; Norway to France and British Islands; Faeroe Islands; Jan Mayen; Iceland; East and West Greenland; Baffin Bay and Davis Straits; coast of North America from Hudson Bay to Maine.

New records: Many localities south to Georges Bank.

Remarks.—This species occupies almost the same habitat as *C. linearis*. It has been taken in the stomachs of the pollock *Pollachius* (Scott, 1901) and the rock cod *Gadus* (Johansen, 1925). It ranges in depth from the surface to 1026 m.

As evidenced by the long synonymy, this species exhibits a variety of body forms. Mayer (1890, 1903) viewed these forms as variants of the same species; however, Stephensen (1928, 1940) treated several of these forms as distinct species or subspecies. The material available to me of this species is quite large and intergradations between the forms are numerous. No geographical isolation of these forms is evident and therefore they probably represent only infrasubspecific variants. Perhaps ecological data would reveal some other type of isolating mechanism, but type of datum is not available to me.

Figure 21 is a variant of this species, which was collected in Casco Bay, Maine. It corresponds to G. Sar's (1895) concept of *C. monocera* and to Mayer's *C. septentrionalis* f. *longicornis*. In common with *C. linearis* it bears numerous setules on the peduncle of antenna 1 and has elongated pereonites 1 and 2. Since the females of *C. linearis* and *C. septentrionalis* are frequently indistinguishable and the gnathopods are quite similar, this variant caused concern over the distinctiveness of these species because it might represent a hybrid. In figure 22 the ratio of the total length to the length of the basis of gnathopod 2 is plotted. The variant and males and females of *C. septentrionalis* are not significantly different in this character; however, they are significantly different from both the males and females of *C. linearis*. Relying on this character, the females of the two species can be separated and it justifies the inclusion of the variant within *C. septentrionalis*. The problem of the possible species distinctiveness of Mayer's varieties and Stephensen's species and subspecies is still unresolved, and its solution will probably not be found until ecologic and genetic studies can be carried out.

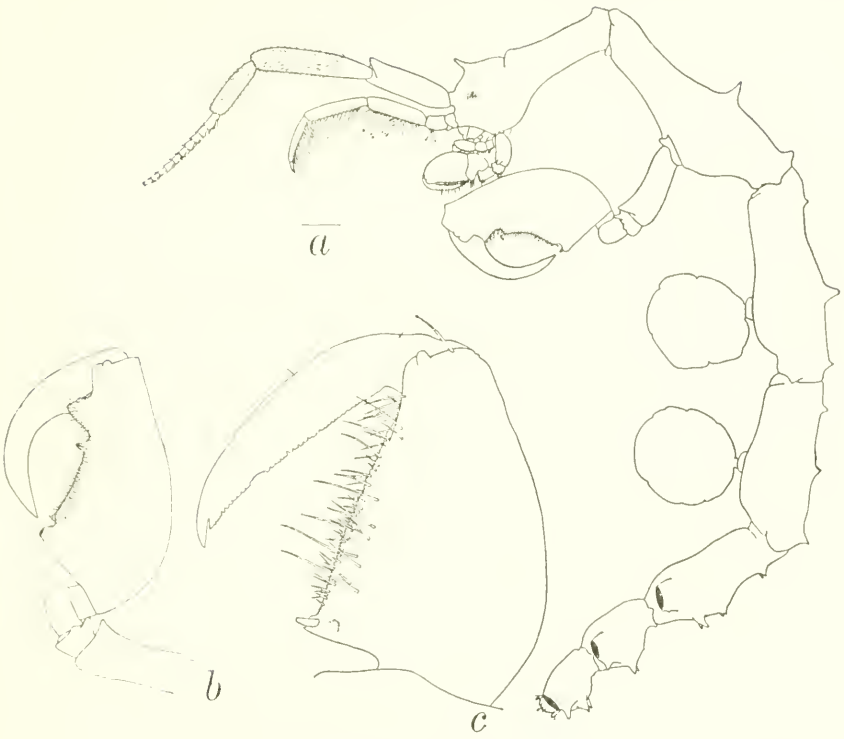

FIGURE 21.—*Caprella septentrionalis*, male variant; *a*, lateral view; *b*, gnathopod 2; *c*, gnathopod 1.

Caprella unica Mayer, 1903

FIGURES 23, 24, 55

Caprella unica Mayer, 1903, p. 127, pl. 5, fig. 39.—M. Rathbun, 1905, pp. 7, 79. *Caprella grahami* Wigley and Shave, 1966, pp. 289–296, figs. 1–5.

DIAGNOSIS.—Cephalon without anteriorly directed triangular projection, propodus of pereopods 5–7 with few setae but without grasping spines.

DESCRIPTION.—Body smooth to spiny. Length of largest male 18 mm, largest female 8 mm, smallest ovigerous female 5 mm.

Peduncle of antenna 1 with or without dense setules in male, female lacking setules.

Mouthparts typical of genus except dactylus of maxilliped palp quite robust, right lacinia mobilis 5-toothed.

Propodus of gnathopod 1 with 2 proximal grasping spines. Gnathopod 2 similar to *C. linearis* and *C. septentrionalis*.

Propodus of pereopods 5–7 without grasping spines and with only few short setae.

Abdomen typical of genus.

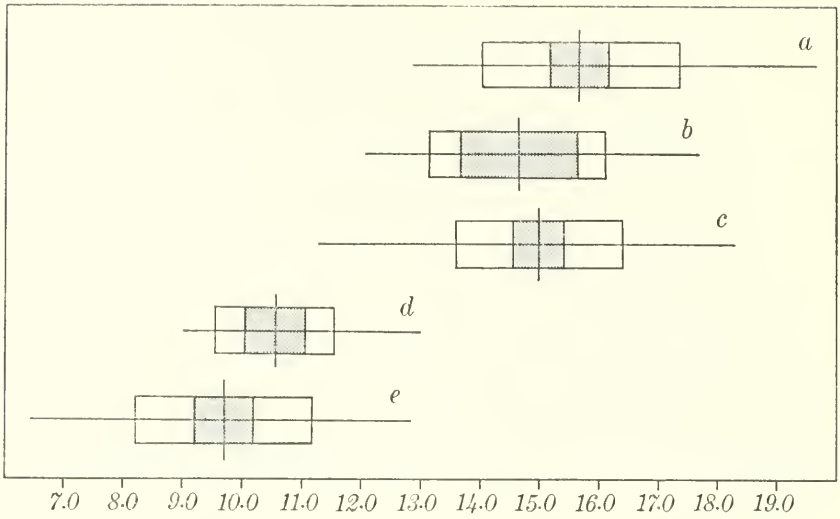

FIGURE 22.—Ratio of total length divided by length of basis of gnathopod 2; *a*, *Caprella septentrionalis*, males, n=47; *b*, *C. septentrionalis*, variant males, n=10; *c*, *C. septentrionalis*, females, n=42; *d*, *C. linearis*, females, n=16; *e*, *C. linearis*, males, n=34. Vertical line represents the range, horizontal line the mean, stippled area two standard errors either side of the mean, and white rectangle one standard deviation either side of the mean.

VARIATION.—The body of this species varies in the amount of spination, larger individuals tending to be less spinose (compare figs. 23c, 24a, 24b). The peduncle of antenna 1 shows some variability in the density of setules; larger males tend to develop more setules.

DISTRIBUTION.—Type-locality: *Albatross* sta. 2253, 40°34′30″ N., 69°50′45″ W., 59 m.

Other records: Southeastern New England, Long Island Sound, Vineyard Sound, Great Harbor in Woods Hole, passage between Vineyard Sound and Buzzards Bay, Cape Cod Canal; 0.3 to 25 m.

New records: St. John's, Newfoundland; Casco Bay, Maine; off Cape Cod, 40°–43° N., 65°–72° W.; 37°31′ N., 74°52′ W.

REMARKS.—Wigley and Shave (1966) give an excellent description of *C. grahami* which they thought to be distinct from *C. unica* due to the presence of spines on the dorsal surface of the latter species. Mayer based his description of *C. unica* upon a single immature male which was quite spiny; however, recent material collected from the area near the type-locality has yielded numerous specimens which intergrade between the smooth and spiny forms. Since the other characters of these two species agree quite closely and intergrades are present between the two body forms, *C. grahami* is suppressed as a junior synonym of *C. unica*.

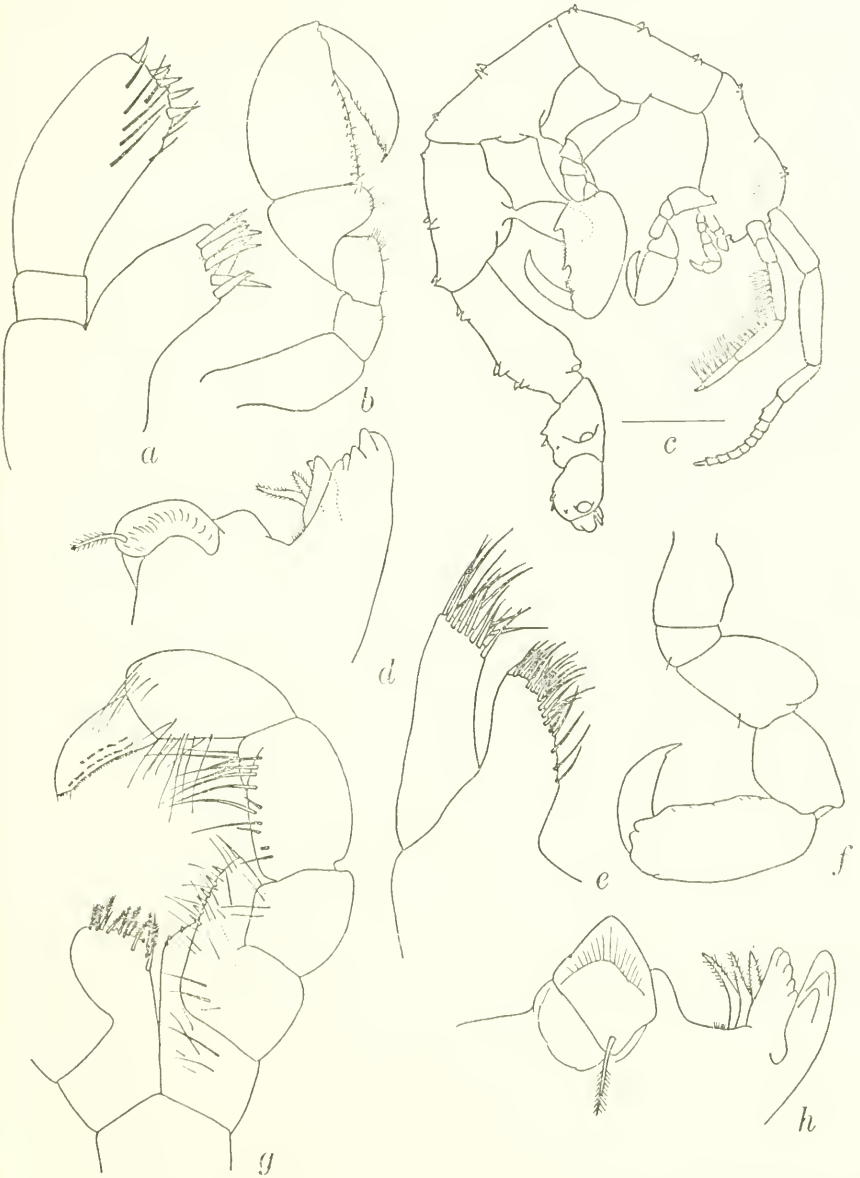

FIGURE 23.—*Caprella unica*, male holotype; *a*, maxilla 1; *b*, gnathopod 1; *c*, lateral view; *d*, right mandible; *e*, maxilla 1; *f*, pereopod 6; *g*, maxilliped; *h*, right mandible.

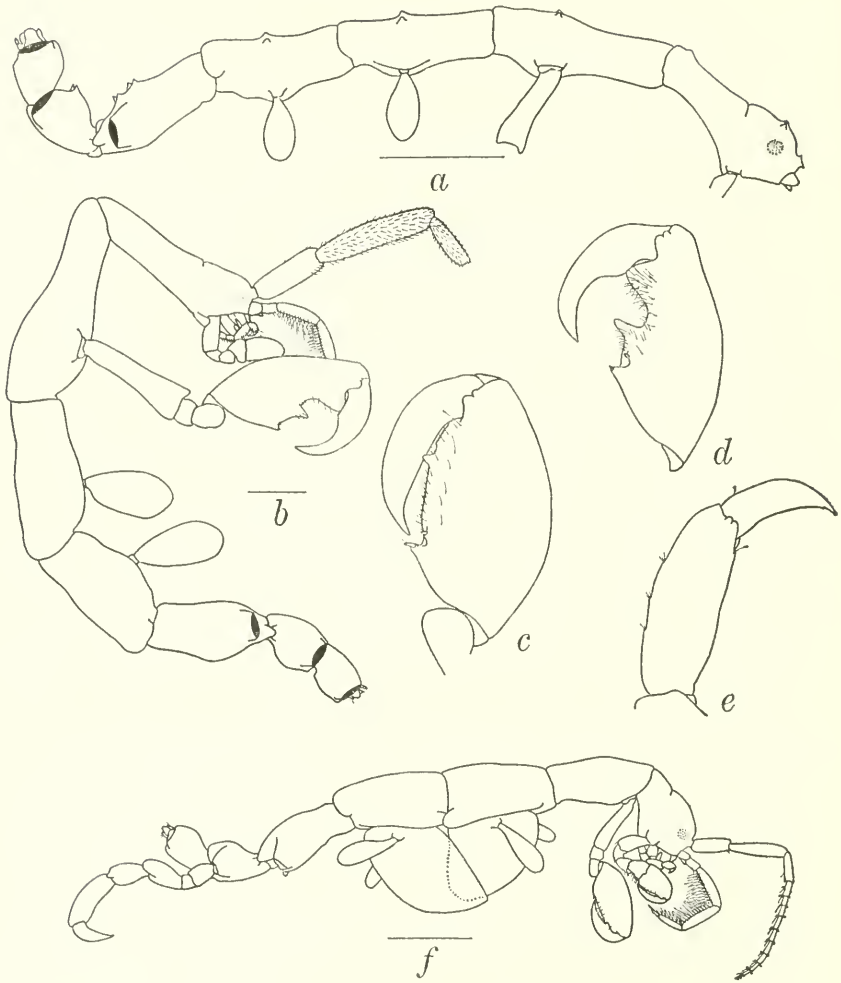

FIGURE 24.—*Caprella unica; a*, lateral view of male with intermediate spination; *b*, lateral view of male holotype of *C. grahami; c*, female gnathopod 2; *d*, male gnathopod 2; *e*, female pereopod 7; *f*, lateral view of female allotype of *C, grahami.*

C. unica has been reported on two species of starfishes, *Asterias forbesi* (Desor) and *Asterias vulgaris* Verrill. This association with echinoderms is unusual and has been found for *Pariambus typicus* (Krøyer) on *Asterias* and *Solaster* (Chevreux and Fage, 1925), *Aeginella spinosa* on *Brisinga* (Mayer, 1903), *Caprella linearis* on *Asterias* (Ohlin, 1895a, probably *C. unica*, p. 33), *Phtisica marina* on *Asterias* (Meinert, 1880), and I have found *C. penantis* clinging to the spines of *Arbacia* and *C. scaura* on an unidentified urchin.

Deutella Mayer, 1890

Flagellum of antenna 2 biarticulate, swimming setae absent; mandibular palp 3-segmented, setal formula for terminal article 1–x–1, 1, or 2, molar present; outer lobe of maxilliped larger than inner lobe; gills on pereonites 3 and 4; pereopods 3 and 4, 2-segmented, pereopod 5, 6-segmented, inserted at the posterior of pereonite 5; abdomen of male with pair of appendages and pair of setose lobes, female with pair of lobes, with or without setae.

Type-species: *Deutella californica* Mayer, 1890 (by monotypy, subsequently designated by Dougherty and Steinberg, 1953).

Remarks.—The genus *Deutella* is presently composed of 4 species; *D. californica* Mayer, 1890; *D. incerta* (Mayer, 1903); *D. mayeri* Stebbing, 1895; and *D. venenosa* Mayer, 1890. Steinberg and Dougherty (1957) state they believe *Luconacia incerta* belongs to *Deutella* because differences between the two genera seem minor. The differences to which they refer are the lack of a definitive palmar surface on the propodus of pereopod 5 and the presence of swimming setae in *Luconacia*. There exist, however, several more important differences which are presented in table 1. It can be seen that the genus *Luconacia* differs from *Deutella* except for the serrate lacinia mobilis which *D. mayeri* shares with *L. incerta*. The remaining differences seem sufficient to separate *Deutella* and *Luconacia;* therefore, the genus *Luconacia* has been reestablished.

Deutella mayeri and *D.* sp. Mayer, 1890, differ from the other species of the genus in having only 1 or 2 setae on the terminal article of the mandibular palp. *D. mayeri* exhibits many similarities with the species of *Paracaprella*, particularly *P. tenuis* which sometimes bears a small 3-segmented palp with a terminal seta. *D. mayeri*

Table 1.—*Taxonomic characters separating* Deutella *and* Luconacia

	Deutella californica	*Deutella mayeri*	*Deutella venenosa*	*Luconacia incerta*
Apical setae on terminal article of maxilliped and projection on penultimate article	present	present	present	absent
Terminal article of mandibular palp	no knobs 1–x–1	no knobs 1 or 2	no knobs 1–x–1	knobs 1–x–1
Tip of male abdominal appendage	no papillae fringe	no papillae no fringe	no papillae no fringe	papillae fringe
Female abdomen	lobes	lobes	lobes	no lobes
Insertion of pereopod 5	posterior	posterior	posterior	midlength
Right lacinia mobilis	5-toothed	serrate	5-toothed	serrate

and Mayer's *D.* sp. may represent intergrades between the two genera. Since the mandibular palp of *D. mayeri* is not reduced in size as it is in *Paracaprella*, I have chosen to leave this species in *Deutella*, although its position is questionable.

If *D. mayeri* and Mayer's *D.* sp. are disregarded because of their apparent divergence from the other species of *Deutella*, then *Luconacia* and *Deutella* are separated geographically, *Luconacia* being restricted to the Atlantic and *Deutella* to the Pacific.

Deutella californica Mayer, 1890

FIGURE 52

Deutella californica Mayer, 1890, pp. 27–28, pl. 1, figs. 3–4, pl. 3, figs. 15–16, pl. 5, fig. 18.—Dougherty and Steinberg, 1953, p. 44; 1954, pp. 169, 171, fig. 82f.—Steinberg and Dougherty, 1957, pp. 279–281, figs. 15, 21–23, 28.—Gardella, 1962, pp. 1–2.—Johnson and Juskevice, 1965, p. 39.—Johnson, 1966, appendix 4, p. 4.

REMARKS.—This species was originally described by Mayer from Cape Mendocino, Calif. and later reported from Monterey Bay by Dougherty and Steinberg. Steinberg and Dougherty (1957) reported it as occurring at ". . . probably Port Aransas, Texas." The material they examined undoubtedly belongs to *D. californica;* however, no additional material of this species has been collected in the western North Atlantic, and it is probable that this species is not a member of the caprellid fauna of that area.

D. californica can be distinguished from *D. mayeri* by its 1-x-1 setal formula for the terminal article of the mandibular palp, the 5-toothed lacinia mobilis on the right mandible, and the single dorsal cephalic spine. For a description and figures of this species, consult Steinberg and Dougherty (1957).

Deutella mayeri Stebbing, 1895

FIGURES 25, 26, 52

Deutella mayeri Stebbing, 1895, pp. 400–402, pl. 15a.—Mayer, 1903, pp. 44–45.

DIAGNOSIS.—Body without spines.

DESCRIPTION.—Body smooth, anterolateral margin of pereonite 2 with triangular projection. Length of largest male 4 mm, female 3 mm.

Mandible with 3-segmented palp, 1 or 2 setae on terminal article, penultimate article with single distal setae. Left mandible with 5-toothed incisor, 5-toothed lacinia mobilis, setal row of 3 serrate setae. Right mandible with 5-toothed incisor, apically serrate lacinia mobilis, setal row of 2 serrate setae. Palp of maxilla 1 with 3 or 4 apical spines and several setae, outer lobe with 4 or 5 apical spines. Inner lobe of maxilla 2 with 4 or 5 apical setae, outer lobe with 5 or 6 apical setae.

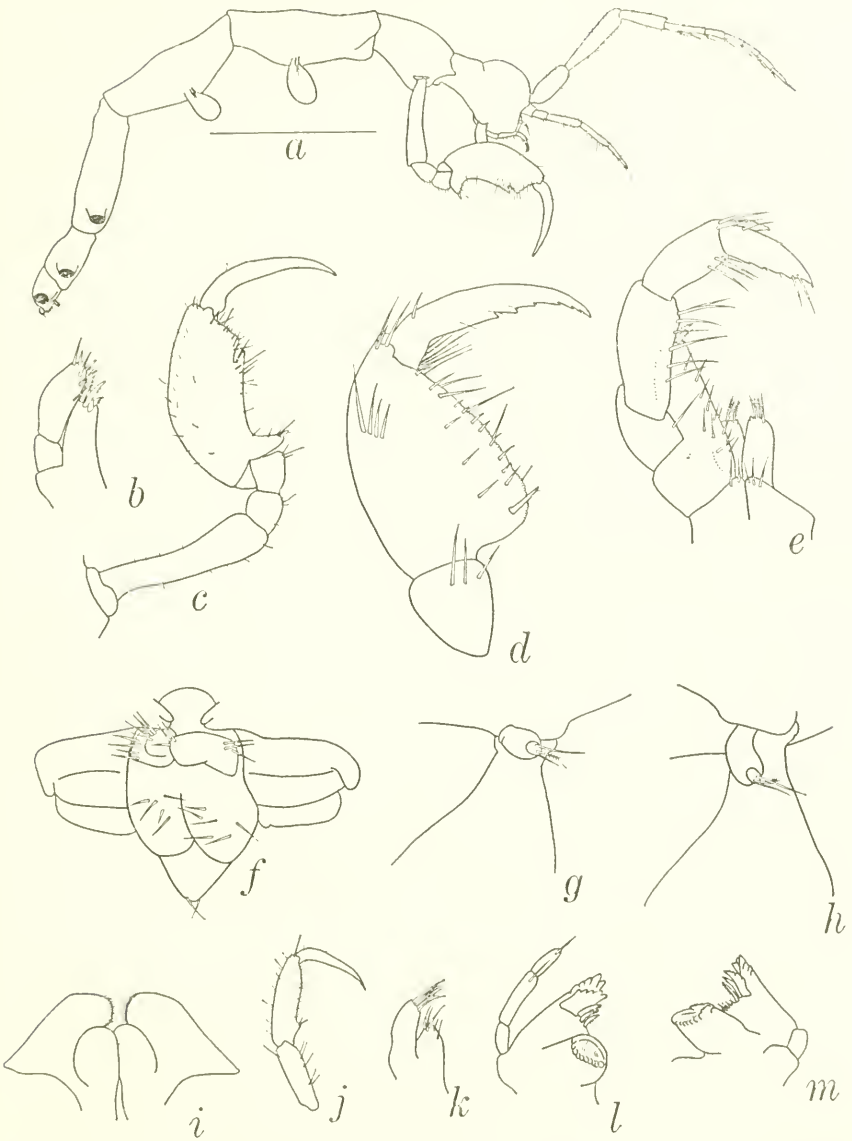

FIGURE 25.—*Deutella mayeri*, male; *a*, lateral view; *b*, maxilla 1; *c*, gnathopod 2; *d*, gnathopod 1; *e*, maxilliped; *f*, abdomen; *g*, pereopod 4; *h*, pereopod 3; *i*, labium; *j*, pereopod 5; *k*, maxilla 1; *l*, left mandible; *m*, right mandible.

Outer lobe of maxilliped with 2 apical setae, 1 plumose and 1 nonplumose seta, and several medial setae; inner lobe with 3 or 4 apical setae of which 2 or 3 plumose; terminal article of palp with 2 or 3 distal setae, penultimate article with distal triangular projection.

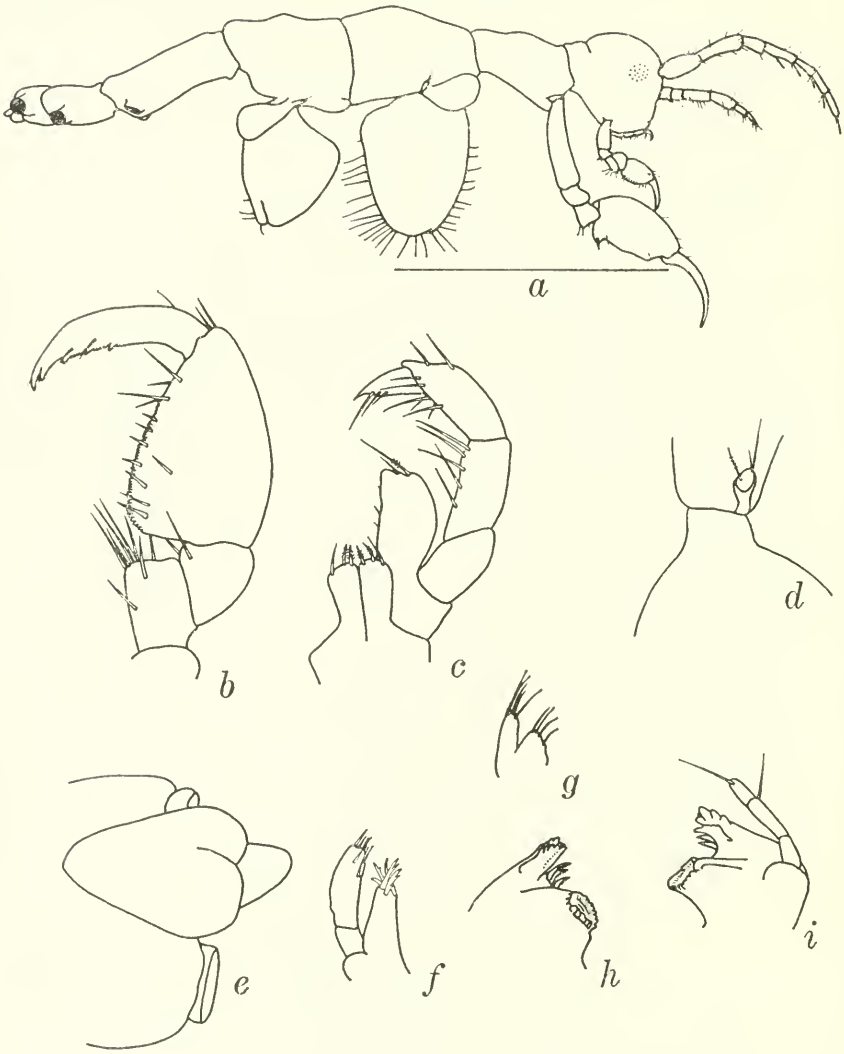

FIGURE 26.—*Deutella mayeri*, female; *a*, lateral view; *b*, gnathopod 1; *c*, maxilliped; *d*, pereopod 3; *e*, abdomen; *f*, maxilla 1; *g*, maxilla 2; *h*, left mandible; *i*, right mandible.

Propodus of gnathopod 1 triangular with 1 proximal grasping spine; grasping margins of dactylus and propodus serrate, dactylus with distinct teeth on grasping margin. Palm of propodus of gnathopod 2 with proximal grasping spine, distal tooth and notch at midlength; dactylus smooth.

Terminal article of pereopods 3 and 4 with 1 plumose and 2 non-plumose setae. Pereopods 5–7, 6-segmented, palm of propodus with pair of proximal grasping spines.

Abdomen of male with pair of appendages and pair of setose lobes, female with pair of nonsetose lobes.

DISTRIBUTION.—Type-locality: Antigua, West Indies.

New records: Bahía Fosforescente, Puerto Rico.

Fallotritella, new genus

Flagellum of antenna 2 biarticulate, swimming setae absent; mandibular palp 3-segmented, setal formula for terminal article 1-x-1, molar absent; outer lobe of maxilliped larger than inner lobe; gills on pereonites 3 and 4; pereopods 3 and 4, 1-segmented, pereopod 5, 6-segmented; abdomen of male and female with pair of lobes.

Type-species: *Fallotritella biscaynensis*, new species (by present designation).

REMARKS.—This new genus is closely related to *Tritella* Mayer, 1890, and *Triliropus* Mayer, 1903, but differs from these by the lack of a molar on the mandible, having the inner lobe of the maxilliped rounded instead of flattened, and by the lack of setae on the dactylus of the maxillipedal palp. Table 2 summarizes the differences between these genera.

TABLE 2.—*Taxonomic characters separating* Fallotritella, Tritella, *and* Triliropus

	Fallotritella biscaynensis	*Tritella laevis, pilimana, ornata*	*Tritella tenuissima*	*Triliropus uncinatus*
Swimming setae on antenna 2	absent	present	absent	absent
Inner lobe of maxilliped	round	flat	flat	flat
Dactylus of maxilliped with setae	no	yes	yes	?
Grasping spines on propodus of pereopods 5–7	5 usually absent, 6 and 7 proximal	midlength or proximal	proximal	absent
Insertion of pereopod 5	posterior	posterior	midlength	posterior to midlength

Tritella tenuissima Dougherty and Steinberg, 1953, differs from the other species of *Tritella* in that swimming setae are lacking on antenna 2 and pereopod 5 is inserted near midlength on pereonite 5. These characters are found in *Triliropus*, and *Tritella tenuissima* should probably be transferred to this genus; however, since I have not examined specimens of *Triliropus* I will refrain from making the transfer at this time.

The generic name is derived from the Latin term "fallo," meaning false, in combination with *Tritella*, the name of a closely allied genus.

Fallotritella biscaynensis, new species

FIGURES 27, 28, 53

DIAGNOSIS.—Since this genus is monotypic, the characters of the genus are diagnostic for the species.

DESCRIPTION.—Male holotype: Body spinose. Cephalon with single dorsal anteriorly directed spine. Pereonite 1 with single posterodorsal spine. Pereonites 2–4 with trace of dorsal spine at midlength and with posterodorsal spine. Pereonites 5–7 without spines. Length 4 mm.

Antenna 1 approximately length of pereonites 2–4, flagellum of 11 articles. Antenna 2 approximately length of peduncle of antenna 1.

Mandibular palp 3-segmented, setal formula for terminal article 1–5–1. Mandibles with 5-toothed incisor, lacinia mobilis toothed, 2 accessory plates on right mandible and 3 on left, 2 setae present. Palp of maxilla 1 with 2 apical and 2 medial setae, outer lobe with 6 serrate spines. Outer lobe of maxilliped with 3 apical setae and 1 seta at midlength on medial margin, inner lobe rounded with 2 apical setae; dactylus of palp slightly curved with grasping margin serrate.

Propodus of gnathopod 1 triangular with 2 proximal grasping spines; grasping margins of dactylus and propodus not serrate, dactylus with single tooth and seta at tip. Propodus of gnathopod 2 with proximal grasping spine and distal notch, basis approximately length of pereonite 2.

Gills elliptical and sometimes held with long axis parallel to body.

Pereopods 3 and 4, 1-segmented with single seta at tip. Pereopod 5 inserted posteriorly on pereonite 5, propodus without grasping spines. Propodus of pereopods 6 and 7 with 2 proximal grasping spines.

Abdomen with pair of setose lobes, 2 setae on anterior end of abdomen; penes large and medial.

Female allotype: Body spinose. Cephalon with single dorsal anteriorly directed spine. Pereonite 1 with single posterodorsal spine. Pereonite 2 with trace of pair of dorsal spines at midlength and with single posterodorsal spine. Pereonites 3 and 4 with pair of dorsal spines at midlength and single posterodorsal spine. Pereonite 5 with trace of dorsal spine at midlength. Pereonites 6–7 without spines. Length 2.5 mm.

Antenna 1 approximately length of pereonites 3–5, flagellum of 5 articles. Antenna 2 approximately length of peduncle of antenna 1.

Mouthparts as in male except setal formula for terminal article of mandibular palp 1–4–1.

Gnathopod 1 as in male. Gnathopod 2 as in male except propodal notch absent.

Gills as in male.

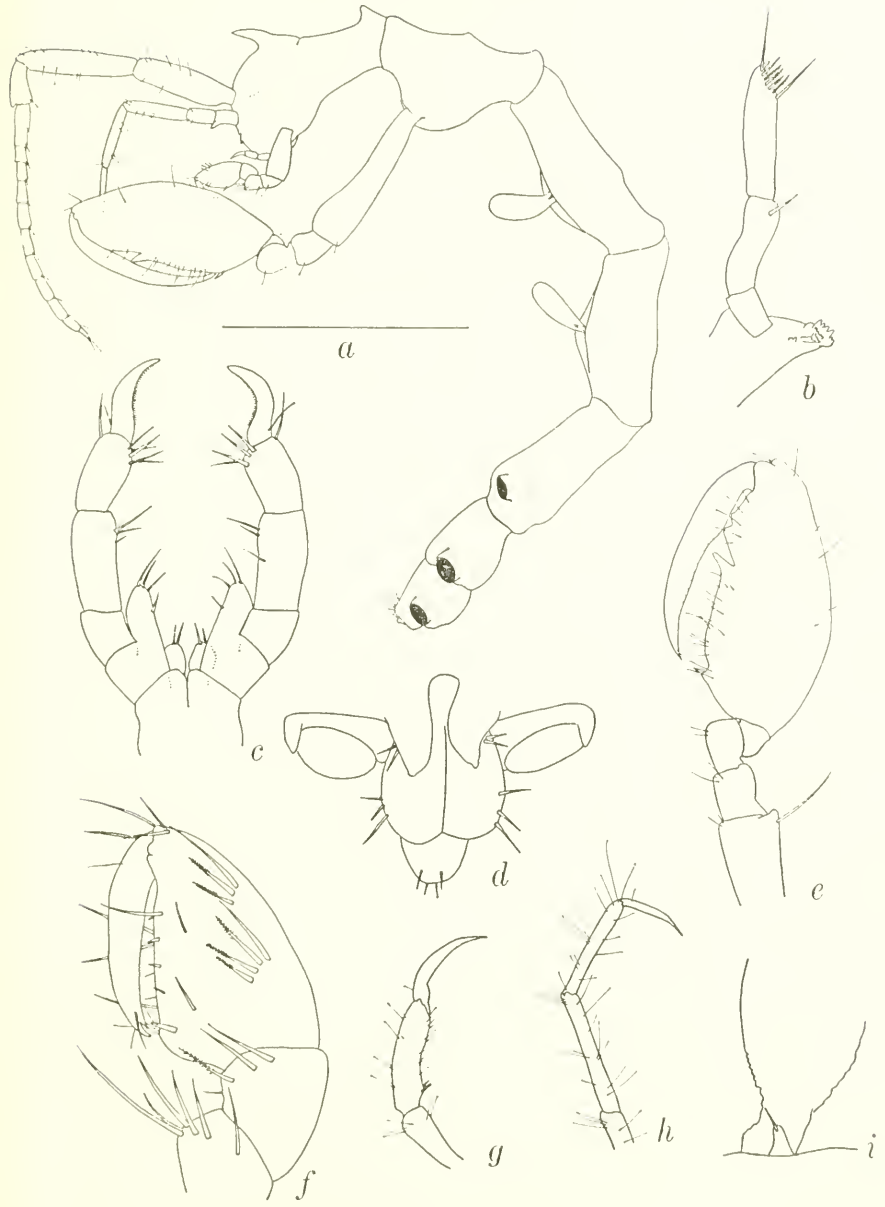

FIGURE 27.—*Fallotritella biscaynensis*, male holotype; *a*, lateral view; *b*, left mandible; *c*, maxilliped; *d*, abdomen; *e*, gnathopod 2; *f*, gnathopod 1; *g*, pereopod 6; *h*, pereopod 5; *i*, pereopod 3.

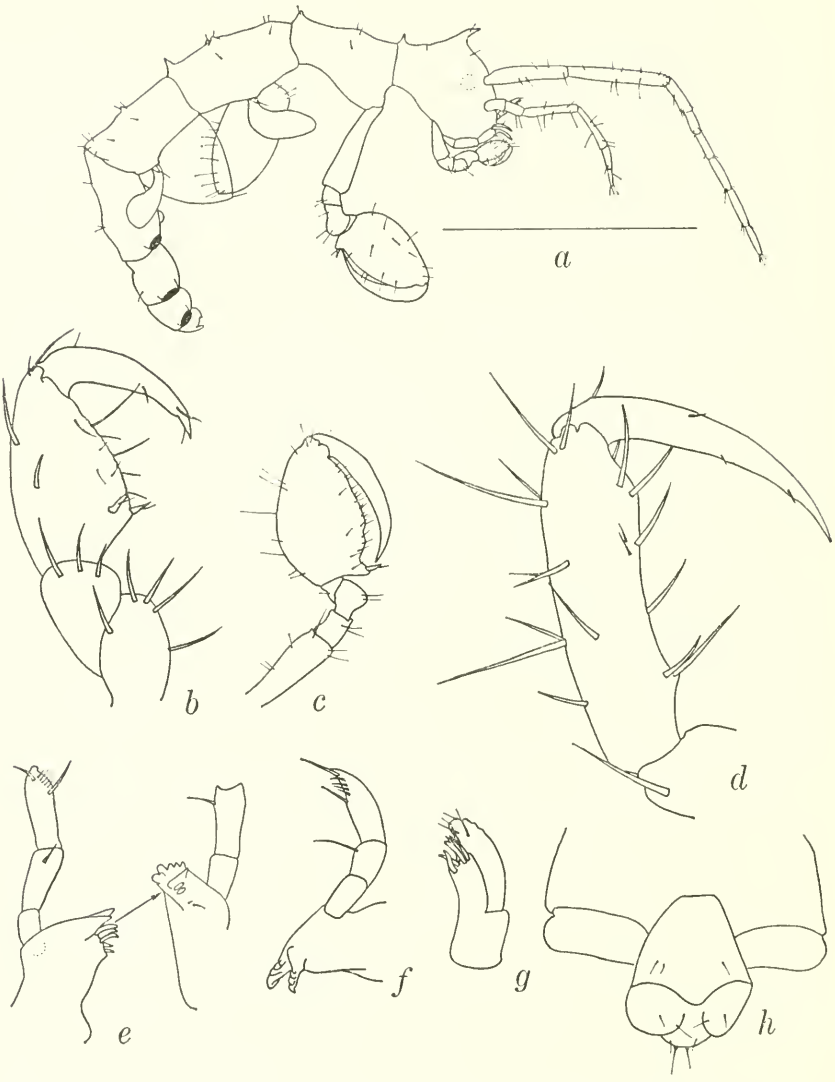

FIGURE 28.—*Fallotritella biscaynensis*, female allotype; *a*, lateral view; *b*, gnathopod 1; *c*, gnathopod 2; *d*, pereopod 5; *e*, right mandible; *f*, left mandible; *g*, maxilla 1; *h*, abdomen.

Pereopods as in male.

Abdomen similar to male except lobes separated by slight medially raised area.

VARIATION.—The holotype was the largest male specimen. The smallest ovigerous female was 3 mm; however, the allotype had an empty brood pouch at 2.5 mm.

The degree of spination of the dorsal surface of the pereonites varied considerably. The most spiny specimens had 1 posterior spine on perenoite 1, 2 at midlength, and 1 posterior spine on pereonites 2–4, and 2 spines at midlength on pereonite 5. Some of the specimens showed different degrees of reduction of these spines, usually losing the spines at midlength first.

In some of the specimens, grasping spines were present on the propodus of pereopod 5.

The mouthparts were rather consistent. The setal formula for the terminal article of the mandibular palp varied only from 1–3–1 to 1–5–1, and the outer lobe of the maxilliped occasionally had a seta at midlength on the medial margin in addition to 3 apical and 1 seta on the middle of the anterior surface.

Distribution.—Type-locality: Key Biscayne, Fla., on bridge pilings in Bear Cut, 2 m, July 15, 1966, 1 male holotype USNM 120179.

Other records: Bermuda, Oct. 10, 1960, 1 male paratype USNM 120188. Soldier Key, Fla., Jan. 27, 1961, 1 male paratype USNM 120186. Hummelinck sta. 1413, East of Soldier Key, Fla., 2 m, Sept. 5, 1963, 1 male paratype USNM 120184. Soldier Key, Fla., 1–2 m, July 16, 1966, 2 male paratypes USNM 120185. Key Largo, Fla., July 9, 1966, 1 female allotype USNM 120180. Long Key, Fla., May 11, 1961, 1 male paratype USNM 120183. Tortugas, 1 female paratype USNM 120182. *Freelance* sta. 85–56, west shore of lagoon near Oyster Pond Landing, Barbuda, Apr. 6, 1956, 2 female paratypes USNM 120187. *Freelance* sta. 47–56, off Pigeon Island, St. Lucia, 1–3 m, Mar. 22, 1956, 1 male paratype USNM 120181.

Remarks.—This species is named for Key Biscayne, Fla., where the holotype was collected. The only habitat records for this species are from red algae. It is difficult to detect this species since it is quite small and usually is covered with detritus.

Hemiaegina Mayer, 1890

Flagellum of antenna 2 biarticulate, swimming setae absent; mandibular palp absent, molar present; outer lobe of maxilliped larger than inner lobe; gills on pereonites 3 and 4; pereopods 3 and 4, 1-segmented, pereopod 5, 6-segmented; abdomen of male and female with pair of biarticulate appendages.

Type-species: *Hemiaegina minuta* Mayer, 1890 (by monotypy).

Hemiaegina minuta Mayer, 1890

Figures 29, 30, 50

Hemiaegina minuta Mayer, 1890, p. 40, pl. 1, figs. 25–27, pl. 3, figs. 32–35, pl. 5, figs. 52–53, pl. 6, figs. 13, 33–34, pl. 7, fig. 4; 1903, p. 65, pl. 6, fig. 75.—Arimoto, 1930, pp. 45–47, fig. 2.—? Barnard, 1937, pp. 134, 198.—Utinomi,

1947, p. 70.—Edmondson and Mansfield, 1948, pp. 206–207, fig. 3.—Steinberg and Dougherty, 1957, pp. 281–283, figs. 8–11, 13, 29.—McCain, 1965, p. 192.

Hemiaegina quadripunctata Sundara Raj, 1927, pp. 126–127, pl. 18.

DIAGNOSIS.—Since this genus is monotypic, the characters of the genus are diagnostic for the species.

DESCRIPTION.—Body smooth except for pair of ventral spines between insertions of gnathopods 2. Length of largest male 4 mm, female 3.2 mm, smallest ovigerous female 2.7 mm.

Antenna 1 approximately length of pereonites 1–4. Antenna 2 slightly longer than peduncle of antenna 1.

Left mandible with 5-toothed incisor, 5-toothed lacinia mobilis, setal row absent, numerous setules present between molar and lacinia mobilis. Right mandible similar to left except lacinia mobilis apically serrate instead of 5-toothed. Palp of maxilla 1 with 2 or 3 apical spines and 1 seta, outer lobe with 6 spines. Outer lobe of maxilla 2 with 4 or 5 apical setae, inner lobe with 3–5 apical setae. Outer lobe of maxilliped with 2 apical setae, 1 seta near midlength of medial margin, and larger specimens with 1 or 2 proximal setae on medial margin; inner lobe with 2 setae and 1 small spine; dactylus of palp with serrate grasping margin.

Propodus of gnathopod 1 with 1 small proximal grasping spine on medial surface and large proximal knob covered with small projections, dactylus not serrate on grasping margin. Propodus of gnathopod 2 with proximal grasping spine, distal notch with slightly proximal spine, and distal bilobed tooth.

Gills elliptical.

Pereopods 3 and 4, 1-segmented with 2 or 3 apical setae. Palm of propodus of pereopods 5–7 concave with 5 or 6 proximal knobs, each with small spine.

Abdomen of male and female with pair of biarticulate appendages, dorsal lobe bilobed.

DISTRIBUTION.—Type-locality: Off Amoy, China, at a depth of 15–46 m.

Other records: Off Virginia; Port Aransas, Texas; Oahu, Hawaii, Tateyama, Honshu, Japan; 1°42.5′ S., 130°47.5′ E.; region of Fremantle, Australia; Krudadai Island, India; South Arabian coast.

New records: Several localities near Bermuda; off Cape Hatteras, N.C.; Elliot Key, Fla.; Loggerhead Key, Tortugas; 29°44′ N., 88° 23.5′ W.; St. John, Virgin Islands; False Bay, South Africa; Bora Bora.

REMARKS.—This species is easily identified by the unusual hexagonal outline of the pereonites when viewed dorsally. When viewed in this position the gnathopods 1 are usually held in a posteriorly

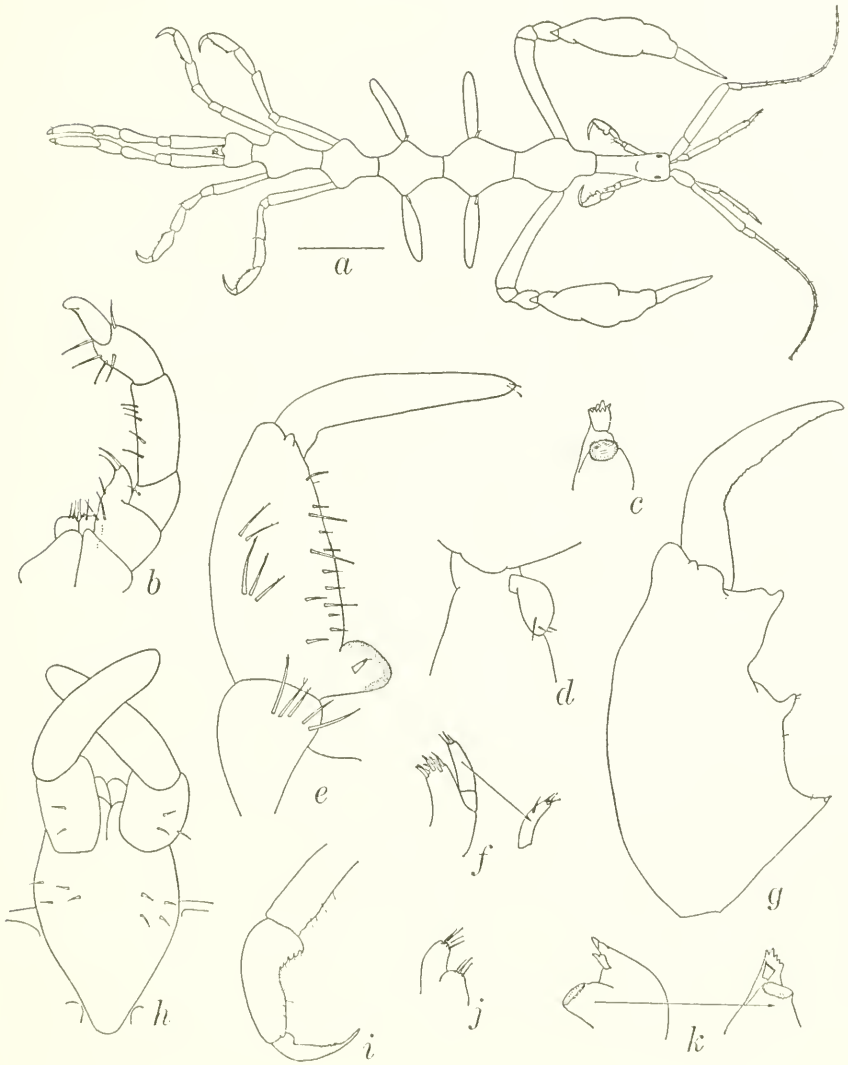

FIGURE 29.—*Hemiaegina minuta*, male; *a*, dorsal view; *b*, maxilliped; *c*, left mandible; *d*, pereopod 4; *e*, gnathopod 1; *f*, maxilla 1; *g*, gnathopod 2; *h*, abdomen; *i*, pereopod 7; *j*, maxilla 2; *k*, right mandible.

directed position and gnathopods 2 are held away from the body (figs. 29a, 30a).

I have designated a lectotype from Mayer's type-series which is deposited in the Copenhagen Museum.

H. minuta has been taken in plankton tows and from *Sargassum*.

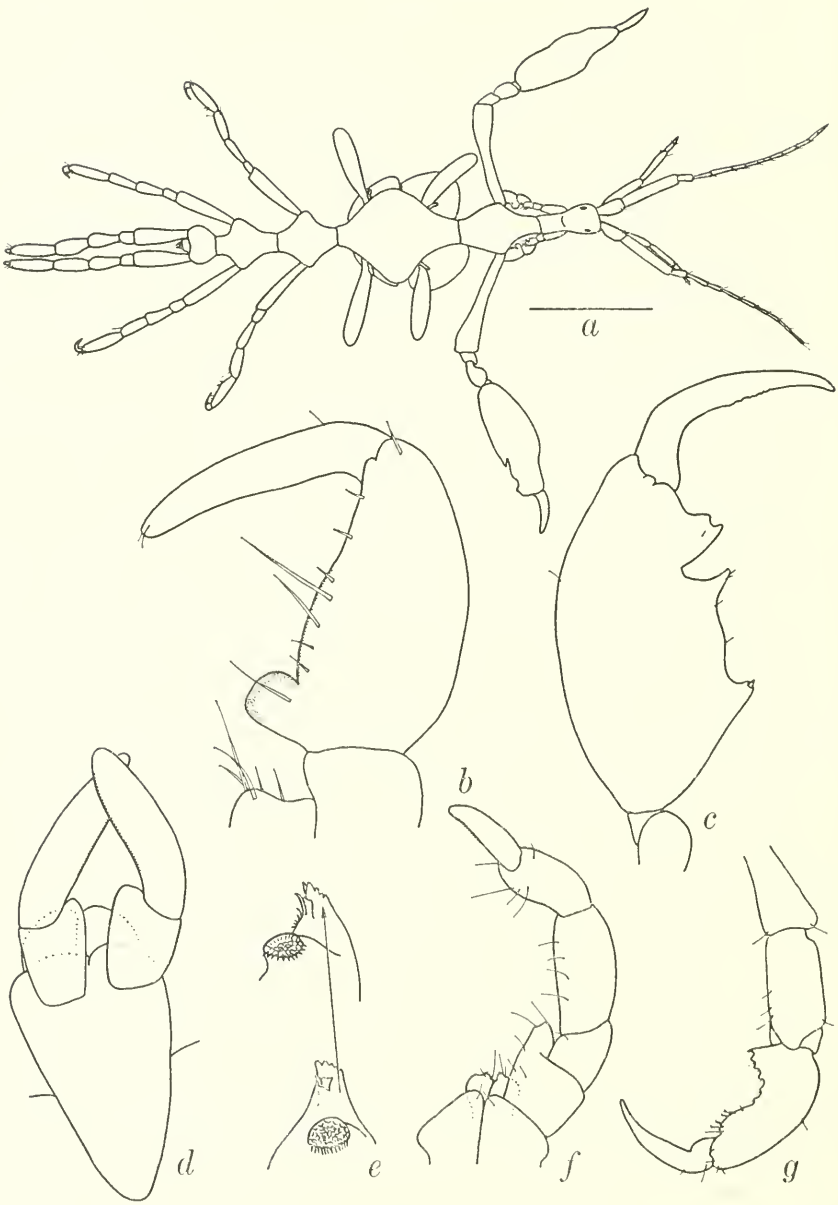

FIGURE 30.—*Hemiaegina minuta*, female; *a*, dorsal view; *b*, gnathopod 1; *c*, gnathopod 2; *d*, abdomen; *e*, left mandible; *f*, maxilliped; *g*, pereopod 7.

Hemiproto, new genus

Flagellum of antenna 2, 2- to 4-segmented, swimming setae absent; mandibular palp 3-segmented, setal formula for terminal article 1–1 or 1–x–1, molar absent; outer lobe of maxilliped equal to inner lobe; gills on pereonites 2–4; pereopods 3 and 4, 6-segmented, pereopod 5, 5-segmented; abdomen of male with 2 pairs of small uniarticulate appendages and pair of nonsetose lobes, female with 1 pair of uniarticulate appendages.

Type-species: *Hemiproto wigleyi*, new species (by present designation).

Remarks.—This new genus is closely related to *Protomina* Mayer, 1903, in that the males of both genera have 2 pairs of abdominal appendages; however, in *Protomina* the appendages are biarticulate and positioned near the posterior part of the abdomen and in *Hemiproto* the appendages are uniarticulate, one positioned near midlength and one anteriorly.

Another character which these genera share is the elongation of the carpus of gnathopod 2. This character is not unique to the 2 genera since a slight elongation occurs in *Phtisica antillensis* and is probably not of generic significance.

Hemiproto lacks a molar on the mandible; however, Mayer did not describe all of the mouthparts for his species, including *Protomina*. Since specimens of *Protomina* are not available to me, I cannot be certain that this character is useful for separating these 2 genera.

The generic name is a combination of Greek terms, "hemi" meaning half, referring to the number of articles in the abdominal appendages as compared with *Phtisica* and *Protomina*, and "protos" meaning first, which was the original name previously used for *Phtisica*.

Hemiproto wigleyi, new species

Figures 31, 32c–e, 50

Diagnosis.—Since this genus is monotypic, the characters of the genus are diagnostic for the species.

Description.—Male holotype: Body smooth. Length 7.5 mm.

Antenna 1 approximately length of body, flagellum of 9 articles. Antenna 2 approximately as long as articles 1 and 2 of antenna 1, flagellum of 4 articles.

Mouthparts as in *Phtisica marina* except setal formula for terminal article of mandibular palp 1–2–1 and outer lobe of maxilla 1 with 4 extremely toothed spines and 2 nontoothed spines.

Propodus of gnathopod 1 triangular with 4 proximal grasping spines, 1 large and slightly proximal to others, grasping margin finely serrate; dactylus not serrate. Propodus of gnathopod 2 with 3 grasping spines, 1 large and slightly proximal to others, grasping margin with numerous

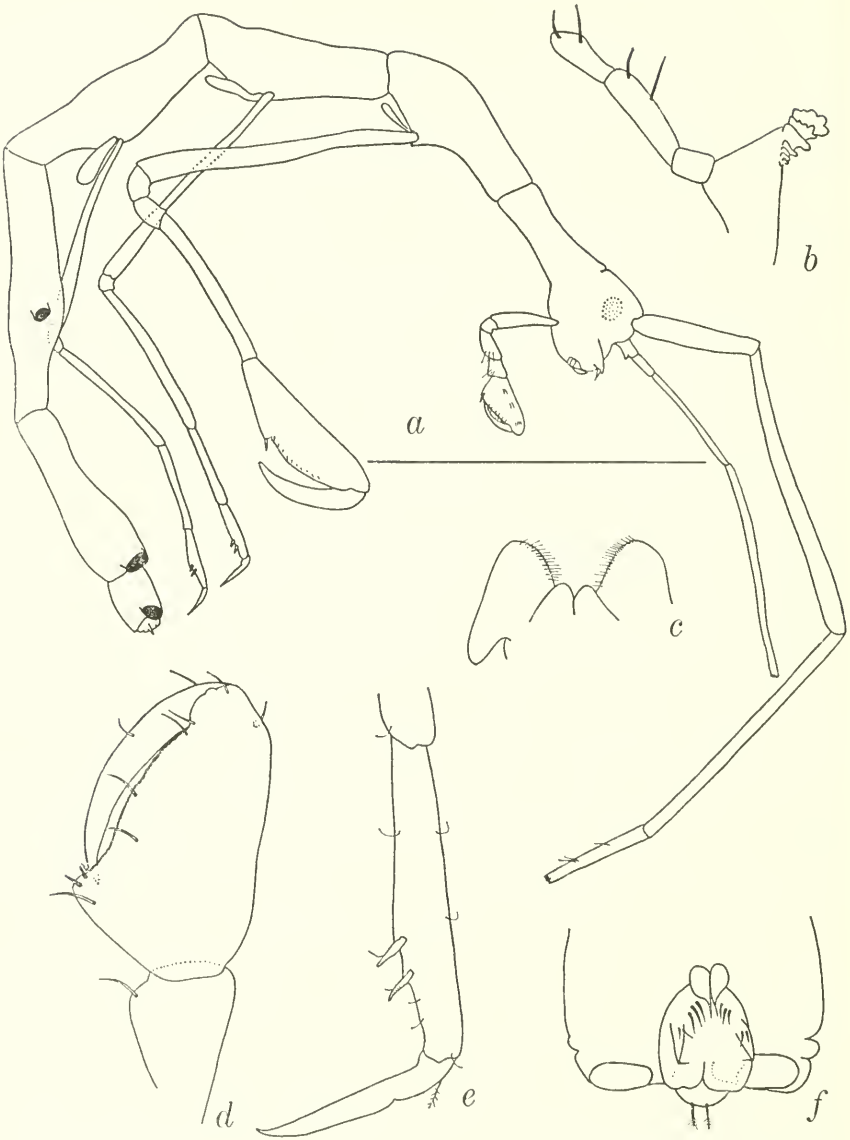

FIGURE 31.—*Hemiproto wigleyi*, male paratype; *a*, lateral view; *b*, left mandible; *c*, labium; *d*, gnathopod 1; *e*, pereopod 4; *f*, abdomen.

small spines and 4 or 5 small elevations on distal portion; carpus elongate, slightly shorter than basis.

Gills on pereonites 2–4, gill on pereonite 2 smallest.

Pereopods 3 and 4, 6-segmented, propodus with 2 or 3 grasping spines. Pereopod 5, 5-segmented propodus without grasping spines. Pereopods 6 and 7 missing.

Abdomen with 2 pairs of small uniarticulate appendages and pair of nonsetose lobes, posterior appendage pair with hooked seta at tip, anterior appendage pair pyriform with seta at tapered tip.

Female allotype: Body smooth. Length 4.4 mm.

Antenna 1 approximately length of body, flagellum of 7 articles. Antenna 2 extending slightly beyond articles 1 and 2 of antenna 1, flagellum of 4 articles.

Mouthparts as in male except setal formula for terminal article of mandibular palp 1–1–1.

Gnathopod 1 similar to male. Propodus of gnathopod 2 similar to male except without elevations on distal part.

Gills as in male.

Pereopods as in male.

Abdomen with pair of uniarticulate appendages and pair of lobes.

Variation.—The setal formula for the terminal article of the mandibular palp varies from 1–1 to 1–2–1. The number of articles in the flagellum of antenna 1 varies from 6 to 11 and in antenna 2 from 2 to 4. Pereopods 3 and 4 occasionally have 3 grasping spines instead of the usual 2.

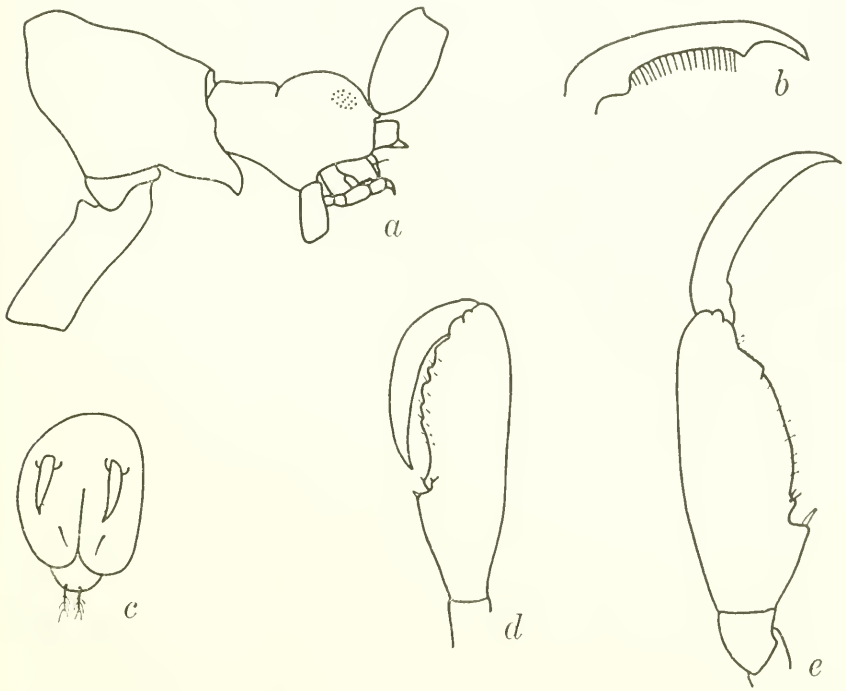

Figure 32.—*a* and *b*, *Paracaprella pusilla*, large male; *a*, pereonites 1 and 2; *b*, dactylus of gnathopod 2; *c-e*, *Hemiproto wigleyi*; *c*, abdomen of female allotype; *d*, gnathopod 2 of male holotype; *e*, gnathopod 2 of female allotype.

Distribution.—Type-locality: Hancock Atlantic Exped. sta. A32–39, 3 mi. N. of Coche Island, Venezuela, 35–60 m, Apr. 15, 1939, 1 male holotype USNM 120167, 1 female allotype USNM 120168, 7 male and 6 female paratypes USNM 120169.

Other records: *Gosnold* sta, 1556, off Ft. Lauderdale, Fla. (26° 10.6′ N., 80° 04.2′ W.), 32 m, May 26, 1964, 1 male paratype USNM 120170.

Remarks.—The specific name is in honor of Roland L. Wigley of the U.S. Bureau of Commercial Fisheries Laboratory at Woods Hole; Wigley collected one of the paratypes.

Luconacia Mayer, 1903

Flagellum of antenna 2 biarticulate, swimming setae absent; mandibular palp 3-segmented, setal formula for terminal article 1–x–1 with knobs, molar present; outer lobe of maxilliped larger than inner lobe; gills on pereonites 3 and 4; pereopods 3 and 4, 2-segmented, percopod 5, 6-segmented and inserted near midlength on pereonite 5; abdomen of male with pair of appendages and pair of lobes, female with no appendages or lobes.

Type-species: *Luconacia incerta* Mayer, 1903 (by monotypy).

Remarks.—For a summary of the differences separating this genus from *Deutella* see the remarks under *Deutella* (p. 53).

Mayer (1903) states that antenna 2 of *Luconacia* bears swimming setae. Setae are present on antenna 2 but are no more developed than in many other genera he considered as not bearing swimming setae.

Luconacia incerta Mayer, 1903

Figures 33–35, 52

Luconacia incerta Mayer, 1903, pp. 49–50, pl. 2, figs. 11–14, pl. 6, figs. 73–75, pl. 9, fig. 21, 40, 57.—M. Rathbun, 1905, pp. 7, 76.—Sumner, Osburn and Cole, 1911 (1913), p. 656.

Protellopsis stebbingii Pearse, 1908, pp. 30–32, fig. 4; 1912, p. 379.—Kunkel, 1910, pp, 111–113, fig. 43.

Deutella incerta.—Steinberg and Dougherty, 1957, pp. 281, 285–286.

Diagnosis.—Since this genus is monotypic, the characters of the genus are diagnostic for the species.

Description.—Body spination variable. Length of largest male 9 mm, largest female 8 mm, smallest ovigerous female 3 mm.

Mandibular palp 3-segmented, setal formula for terminal article from 1–3–1 to 1–10–1. Left mandible with 5-toothed incisor, 5-toothed lacinia mobilis, setal row of 3 serrate setae. Right mandible with 5-toothed incisor, serrate lacinia mobilis, setal row of 2 serrate setae. Palp of maxilla 1 with 4 apical spines and several medial setae, outer lobe with 5 or 6 apical spines. Inner lobe of maxilla 2 with 4 or 5

apical setae, outer lobe with 5–7 apical setae. Outer lobe of maxilliped with 1 apical seta, 2 setae in notch near apical end of medial margin, and several setae on middle of anterior surface; inner lobe with 2 plumose and 2 nonplumose setae; grasping margin of terminal article of palp serrate.

Propodus of gnathopod 1 triangular with 2 grasping spines; grasping margins of dactylus and propodus serrate, dactylus usually with

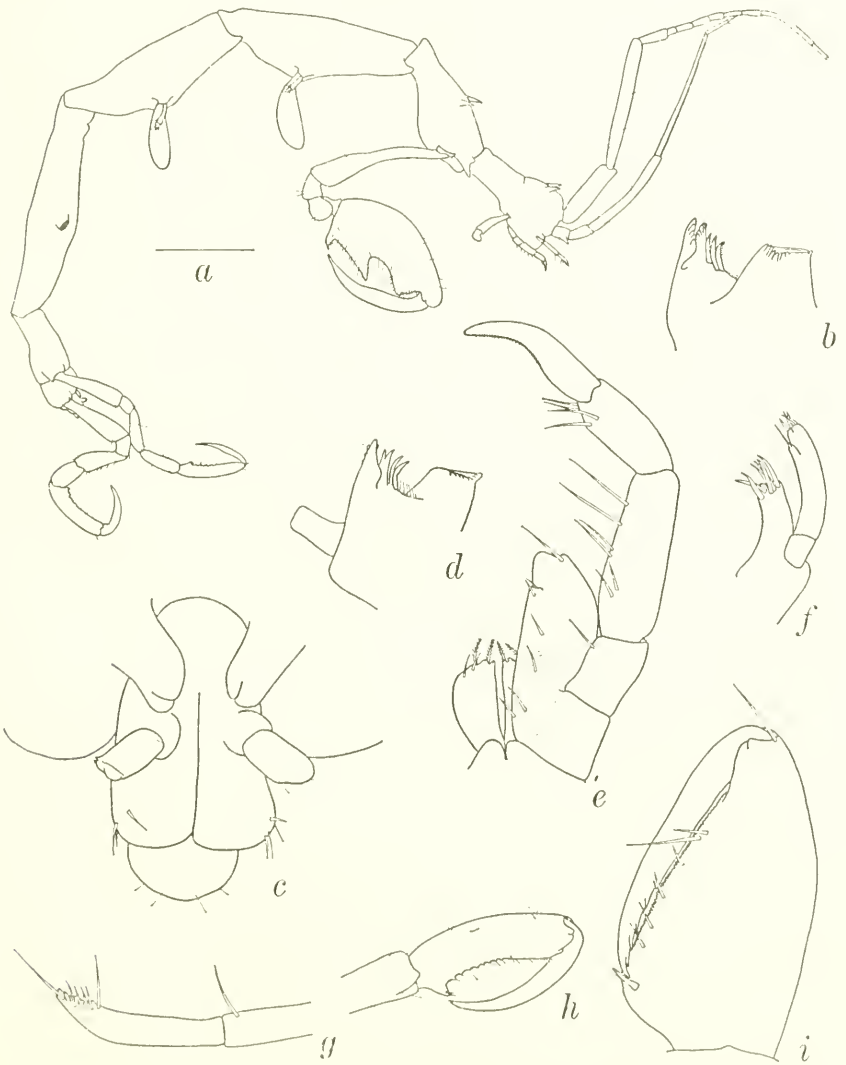

FIGURE 33.—*Luconacia incerta*, male lectotype; *a*, lateral view; *b*, left mandible; *c*, abdomen; *d*, right mandible; *e*, maxilliped; *f*, maxilla 1; *g*, terminal article of mandibular palp; *h*, pereopod 7; *i*, gnathopod 1.

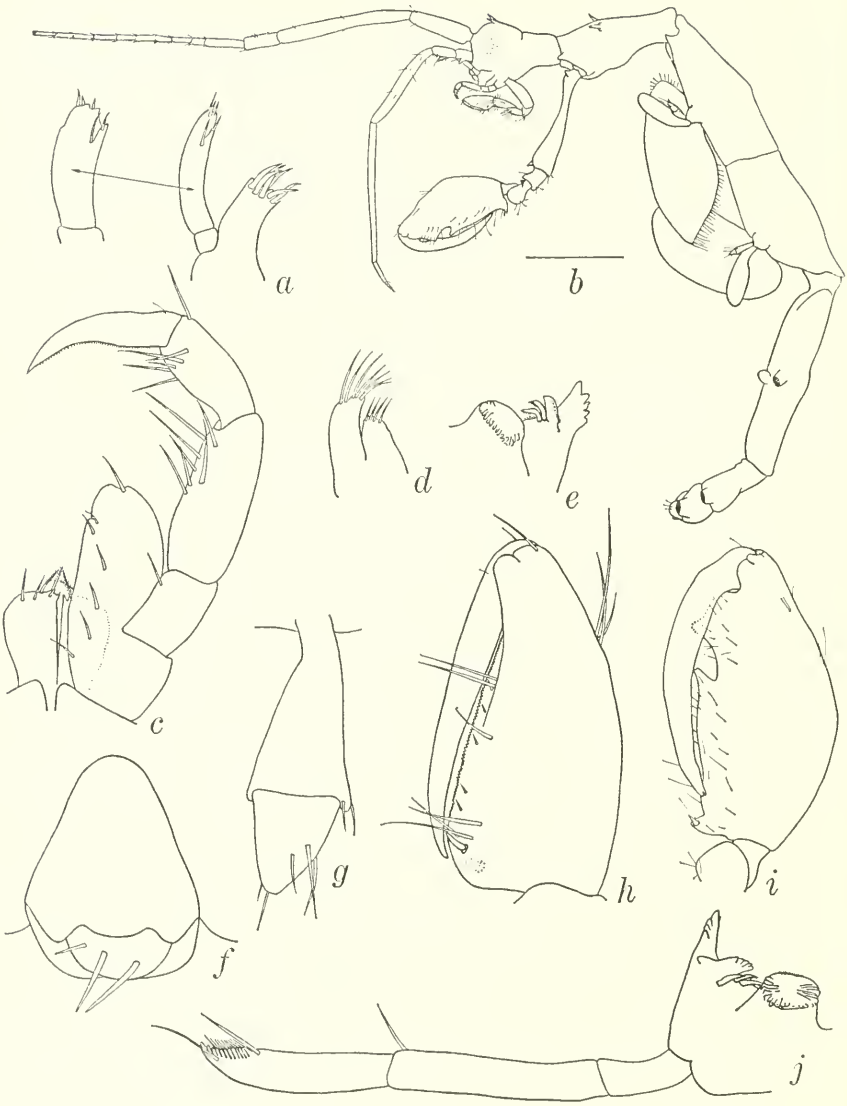

FIGURE 34.—*Luconacia incerta*, female; *a*, maxilla 1; *b*, lateral view; *c*, maxilliped; *d*, maxilla 2; *e*, right mandible; *f*, abdomen; *g*, pereopod 3; *h*, gnathopod 1; *i*, gnathopod 2; *j*, left mandible.

distinct teeth on grasping margin. Propodus of gnathopod 2 with proximal grasping spine and well-developed tooth at midlength, palm setose; dactylus smooth. Smaller individuals show progressively less spination (fig. 35), but the anterolateral projection of pereonite 2 and the pleural projections tend to remain distinct.

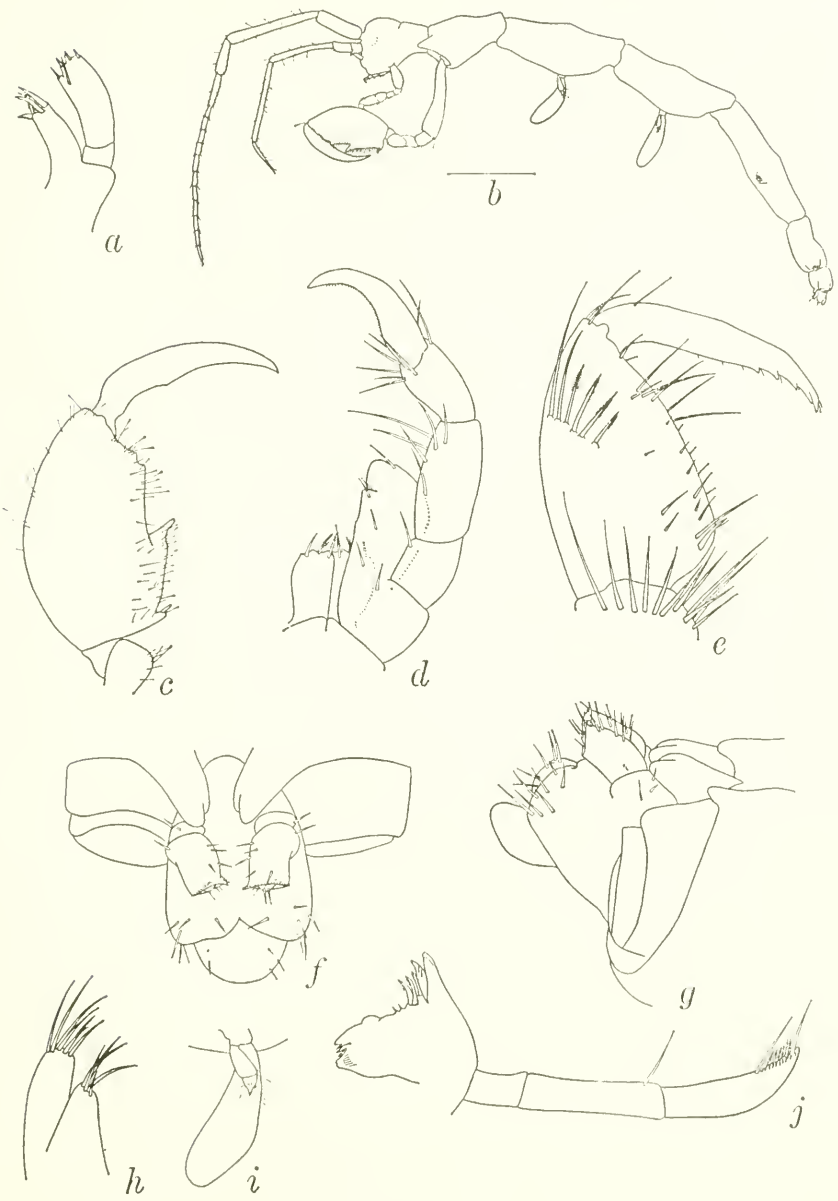

FIGURE 35.—*Luconacia incerta*, small male; *a*, maxilla 1; *b*, lateral view; *c*, gnathopod 2; *d*, maxilliped; *e*, gnathopod 1; *f*, abdomen, ventral view; *g*, abdomen, lateral view; *h*, maxilla 2; *i*, pereopod 3; *j*, left mandible.

A small male from St. John's bears the normal pair of cephalic spines, but the body is otherwise different in spination. The pair of dorsal spines at midlength on pereonite 2 are represented by a single long spine. It also bears a single dorsoposterior spine and the anterolateral projections are absent. Pereonites 3 and 4 bear a single large dorsal spine at midlength, a single dorsoposterior spine, and pleural development is indistinct. Pereopod 4 is uniarticulate. The other characters of this specimen agree with those of *L. incerta*.

Distribution.—Type-locality: Off Mobile Bay, Ala., *Albatross* sta. 2387, 29°24′ N., 88°04′ W., 59 m, 1 male lectotype, 1 male paralectoypte USNM no. 26000.

Other records: Woods Hole, Mass.; Bermuda; Straits of Florida; several localities between the mouth of the Mississippi River and Cedar Keys, Fla.

New records: Many occurrences from Woods Hole to Key Largo, Fla.; Port Aransas and Port Isabel, Tex.; off Yucatan; Virgin Islands; Barbuda; Barbados; Isla de Margarita; Aruba.

Terminal article of pereopods 3 and 4 setose, basal article sometimes with distal setae. Pereopods 5–7, 6-segmented, propodus without palmar surface on pereopod 5; pereopods 6 and 7 more robust than pereopod 5, propodus with pair of proximal grasping spines.

Abdomen of male with pair of uniarticulate appendages and pair of setose lobes, appendage with small apical papillae surrounded by fringe of small teeth; female abdomen without distinct lobes.

Variation.—This species varies considerably in the degree of body spination. Larger individuals bear a pair of dorsal cephalic spines, a pair of dorsal spines at midlength, and an anterolateral projection on pereonite 2 and an anterolateral pleural projection on pereonites 3 and 4 of the male and on pereonite 3 of the female.

Remarks.—I have designated a lectotype from *Albatross* sta. 2387. The remaining syntypical series of Mayer's are now designated as paralectotypes and their localities are as follows: USNM 26001, 1 male and 1 female from *Albatross* sta. 2389, 29°28′ N., 87°56′ W., 49 m; USNM 9709, 1 female from *Albatross* sta. 2390, 29°27′30″ N., 87°48′30″ W., 55 m; and USNM 26002, 1 juvenile female from Vineyard Sound at Woods Hole.

This species is widely distributed in the temperate and tropical areas of the western North Atlantic and has occasionally been taken in plankton tows. It has been collected on mangrove roots, *Sargassum*, *Thalassia*, sponges, hydroids, alcyonarians, and ascidians.

Mayerella Huntsman, 1915

Flagellum of antenna 2 biarticulate, swimming setae absent; mandibular palp 3-segmented, setal formula for terminal article 1,

molar present; outer lobe of maxilliped larger than inner lobe; gills on pereonites 3 and 4; pereopods 3 and 4, 2-segmented, pereopod 5, 2- or 3-segmented; abdomen of male with pair of uniarticulate appendages and pair of lobes, female with pair of lobes.

Type-species: *Mayerella limicola* Huntsman, 1915 (by monotypy).

Remarks.—This genus is now composed of 2 species, *M. limicola* and *M. reduncа* n. sp. The number of articles in pereopod 5 of the new species varies from 2 to 3 and the generic definition has been altered to include this variation.

Mayerella limicola Huntsman, 1915

Figures 36, 50

Mayerella limicola Huntsman, 1915, pp. 39–42, pls. 5–6.—Procter, 1933, p. 256.

Diagnosis.—Abdominal appendage of male approximately length of penes; propodus of gnathopod 2 with proximal grasping spine and notch at midlength.

Description.—Body smooth. Length of largest male 7 mm, no females examined.

Peduncle of antenna 1 approximately length of pereonite 3. Antenna 2 somewhat longer than peduncle of antenna 1.

Mandibular palp 3-segmented, setal formula for terminal article 1. Left mandible with 5-toothed incisor, 5-toothed lacinia mobilis, setal row of 3 serrate setae. Right mandible with 5-toothed incisor, lacinia mobilis toothed but not distinctly 5-toothed, setal row of 2 serrate setae, molar present. Outer lobe of labium winglike, more robust than in most species of *Caprella*. Palp of maxilla 1 with 4 apical spines, 1 medial seta; outer lobe with 7 apical spines. Outer lobe of maxilla 2 with 7 apical setae, inner lobe with 5 apical setae. Outer lobe of maxilliped with 1 apical seta, 1 middistal seta set in notch, and several setae on anterior surface; inner lobe with 4 apical setae; dactylus of palp serrate on grasping margin.

Propodus of gnathopod 1 triangular with 1 proximal grasping spine, grasping margin of propodus and dactylus serrate. Propodus of gnathopod 2 with proximal grasping spine and notch at midlength.

Gills small, elliptical.

Pereopods 3 and 4, 2-segmented, terminal article with 1 or 2 setae. Pereopod 5, 3-segmented, terminal article with 3 or 4 short setae. Pereopods 6 and 7, 6-segmented, propodus with numerous setae on palmar margin and occasionally with 1 grasping spine, dactylus slender and tapering.

Abdomen of male with pair of uniarticulate appendages of approximately length of penes and pair of lobes, penes medial.

Variation.—The males varied in the presence or absence of the single grasping spine on pereopods 6 and 7. The number of setae on

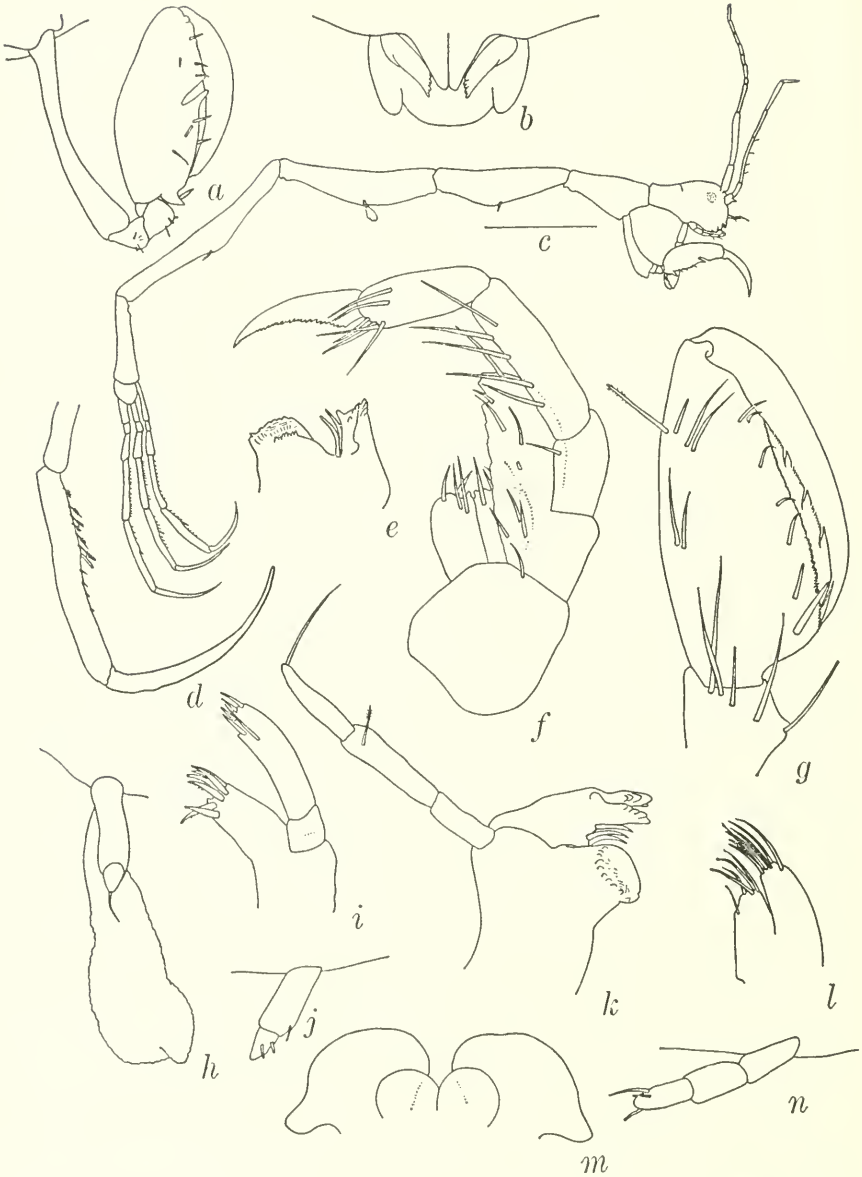

FIGURE 36.—*Mayerella limicola*, male; *a*, gnathopod 2; *b*, abdomen; *c*, lateral view; *d*, pereopod 6; *e*, right mandible; *f*, maxilliped; *g*, gnathopod 1; *h*, pereopod 4; *i*, maxilla 1; *j*, pereopod 3; *k*, left mandible; *l*, maxilla 2; *m*, labium; *n*, pereopod 5.

the terminal articles of pereopods 3 and 4 varied from 1–4, of which 1 was sometimes plumose. The number of setae on the inner lobe of the maxilliped varied from 3 to 4.

DISTRIBUTION.—Type-locality: St. Croix River, New Brunswick, at a depth of 9–18 m.

Other records: Several localities in the Bay of Fundy to a depth of 91 m; Mount Desert Region, Maine.

New records: 44°00′ N., 68°15′ W., 101 m; 39°54′30″ N., 70°20′00″ W., 713 m.

REMARKS.—The 3 males available to me were taken from greater depths than the material which was examined by Huntsman. I have been unable to examine Huntsman's type material but my specimens agree closely with his description and figures.

Thus far this species has been collected only in the Gulf of Maine to Cape Cod region.

Mayerella reduncа, new species

FIGURES 37, 38, 50

DIAGNOSIS.—Abdominal appendage of male much longer than penes propodus of gnathopod 2 with grasping spine proximal of midlength and notch distal.

DESCRIPTION.—Male holotype: Body smooth. Length 7 mm.

Antenna 1 approximately length of pereonites 2 and 3, flagellum of 9 articles. Antenna 2 little more than one-half length of antenna 1.

Mandibular palp 3-segmented, terminal article and penultimate articles each with single seta. Left mandible with 5-toothed incisor, 5-toothed lacinia mobilis, setal row of 3 serrate setae. Right mandible with 5-toothed incisor, lacinia mobilis toothed but not distinctly 5-toothed, setal row of 2 serrate setae. Palp of maxilla 1 with 3 apical spines and 2 setae, outer lobe with 7 serrate spines. Outer lobe of maxilliped with 2 apical setae and several setae on anterior surface and several proximal setae, medial margin serrate; inner lobe with 2 plumose and 2 nonplumose setae; dactylus of palp wide at base, grasping margin serrate with subterminal seta.

Propodus of gnathopod 1 triangular with 1 proximal grasping spine; grasping margins of propodus and dactylus serrate. Propodus of gnathopod 2 slender and elongate, grasping spine proximal to midlength, notch distal, basis two-thirds length of pereonite 2.

Gills oval or elliptical, third pair larger than fourth.

Pereopods 3 and 4, 2-segmented, terminal article with single seta. Pereopod 5, 3-segmented, terminal article with 4 setae. Pereopods 6 and 7 missing.

Abdomen with pair of long uniarticulate appendages recurving at tip; lobes setose, not distinctly separated medially.

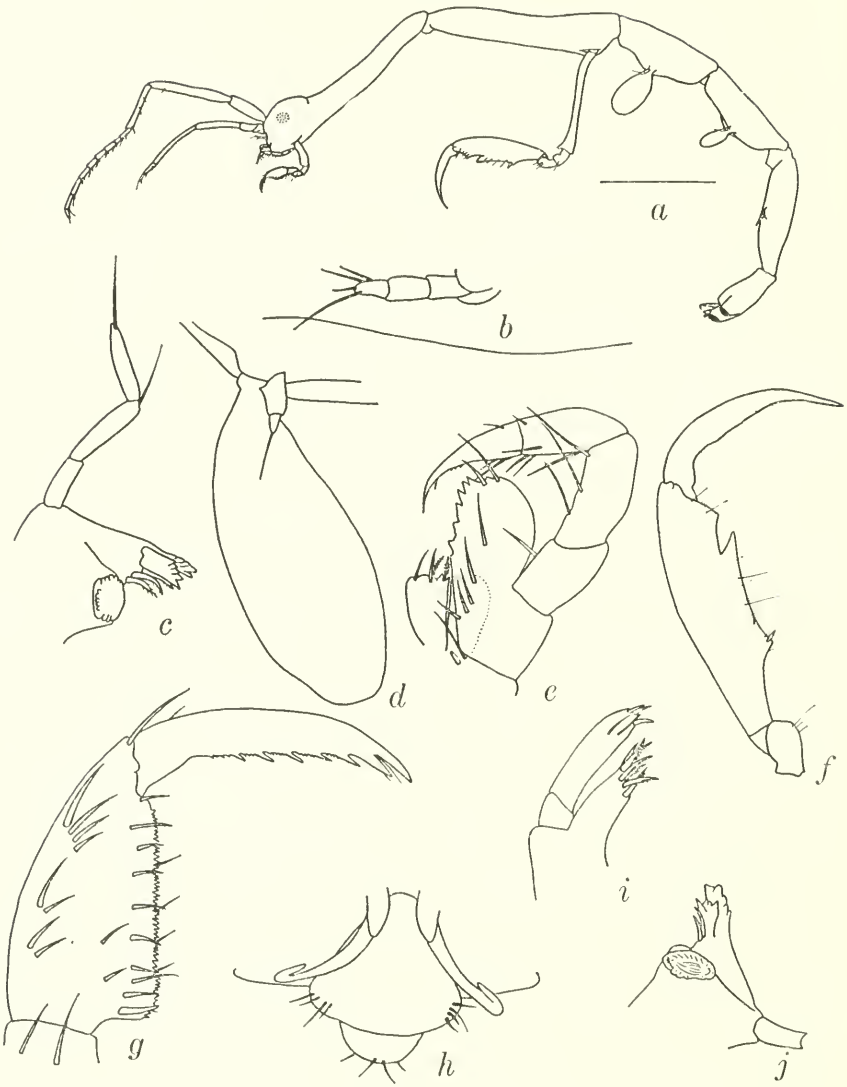

FIGURE 37.—*Mayerella reduncа*, male holotype; *a*, lateral view; *b*, pereopod 5; *c*, left mandible; *d*, pereopod 3; *e*, maxilliped; *f*, gnathopod 2; *g*, gnathopod 1; *h*, abdomen; *i*, maxilla 1; *j*, right mandible.

Female allotype: Body smooth. Length 2.25 mm.

Antenna 1 approximately length of pereonites 2 and 3, flagellum of 4 articles. Antenna 2 almost length of antenna 1.

Mouthparts as in male except dactylus of maxillipedal palp without subterminal seta.

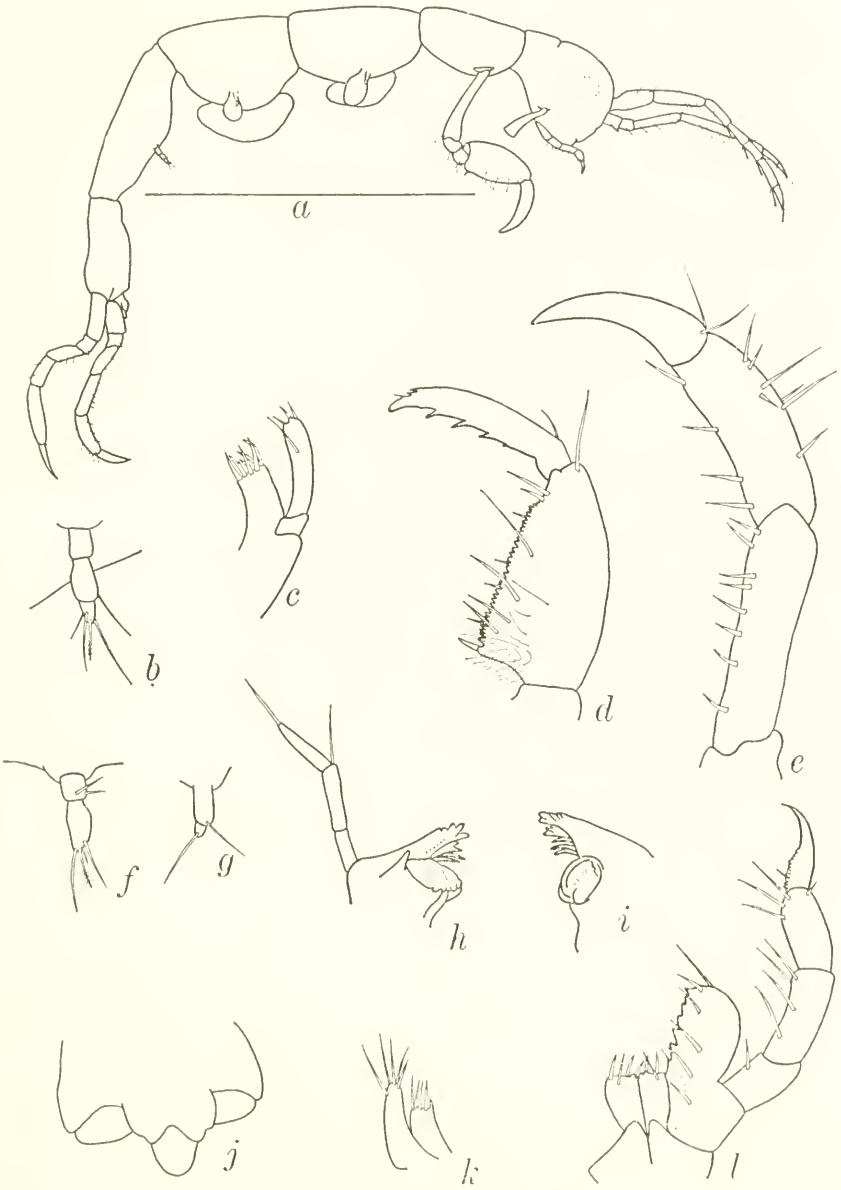

FIGURE 38.—*Mayerella redunca*, female; *a*, lateral view; *b*, pereopod 5; *c*, maxilla 1; *d*, gnathopod 1; *e*, pereopod 6; *f*, pereopod 5; *g*, pereopod 4; *h*, right mandible; *i*, left mandible; *j*, abdomen; *k*, maxilla 2; *l*, maxilliped (*d* and *f-l* of allotype; *a-b* and *e* of paratype).

Gnathopod 1 as in male. Propodus of gnathopod 2 with proximal grasping spine, palm smooth and slightly convex.

Gills as in male.

Pereopods 3–5 as in male except penultimate article of pereopod 5 with 1 seta and pereopod 5, 2-segmented instead of 3-segmented. Propodus of pereopods 6 and 7 without grasping spines but with several setae, dactylus wide at base.

Abdomen with pair of nonsetose lobes.

Variation.—The only additional specimen of this species which was available is a 3.5 mm female with a well-developed brood pouch. This specimen agrees closely with the female allotype except the dactylus of the left side of the maxillipedal palp bears a small subterminal seta while the side does not and also pereopod 5 is 3-segmented.

Distribution.—Type-locality: Hancock Atlantic Exped. sta. A32–39, 3 mi. N. of Coche Island, Venezuela, 10°50′ N., 63°54′ W., 35–60 m, Apr. 15, 1939, 1 male holotype USNM 120176, 1 female allotype USNM 120177, 1 female paratype USNM 120178.

Remarks.—I have placed this species in the genus *Mayerella* with some hesitation. It agrees with the generic definition of *Mayerella* in all characters which are currently in use; however, the abdomen of this species is quite different from *M. limicola*. The penes are not as long and are separated from one another, the appendages are quite long and recurved at their tips, and the lobes are not distinctly separated.

The species name is derived from the Latin term "reduncus," meaning curved back, referring to the recurving of the tip of the abdominal appendage.

Metaprotella Mayer, 1890

Flagellum of antenna 2 biarticulate, swimming setae absent; mandibular palp 3-segmented, setal formula for terminal article 1-x-y-1, molar present; outer lobe of maxilliped larger than inner lobe; gills on pereonites 3 and 4; pereopods 3 and 4, 1-segmented, pereopod 5, 6-segmented; abdomen of male with pair of appendages and pair of lobes, female with pair of lobes; pereonites 6 and 7 fused.

Type-species: *Protella haswelliana* Mayer, 1882 (by monotypy).

Metaprotella hummelincki, new species

Figures 39, 40, 50

Metaprotella spec. Mayer, 1903, p. 43.

Diagnosis.—Body smooth except for 2 small humps dorsal to insertion of gnathopod 2, pereopods 3 and 4 approximately one-fourth length of gills; male abdominal appendage with papillae at tip.

DESCRIPTION.—Male holotype: Body smooth except for pair of small dorsal humps above insertion of gnathopods 2. Length 7 mm.

Antenna 1 longer than body length, flagellum broken. Antenna 2 approximately length of first 2 articles of peduncle of antenna 1.

Mandibular palp 3-segmented, setal formula for terminal article 1-10-1-1. Left mandible with 5-toothed incisor, 5-toothed lacinia mobilis, setal row of 3 serrate setae. Right mandible with 5-toothed incisor, lacinia mobilis toothed but not distinctly 5-toothed, setal row of 3 serrate setae, molar with large tooth on incisor side. Palp of maxilla 1 with 6 apical spines and 2 setae, outer lobe with 4 serrate spines and 3 nonserrate spines. Outer and inner lobes of maxilla 2 with 7 apical setae. Outer lobe of maxilliped with 3 apical setae and 2 setae in notch at midlength of medial margin, medial and lateral margins with numerous setules; inner lobe with 4 plumose and 2 nonplumose apical setae; palp with distal serrations.

Propodus of gnathopod 1 triangular with single grasping spine, grasping margins of dactylus and propodus serrate. Propodus of gnathopod 2 with proximal grasping spine and notch at midlength with slightly proximal tooth, palm moderately setose; basis approximately length of pereonite 2.

Gills elliptical.

Pereopods 3 and 4 approximately one-fourth length of gills with 5 or 6 apical setae. Pereopods 5–7 missing.

Abdomen with pair of appendages bearing fringe of setae and papillae at tip and with distinct pair of lobes bearing single seta.

Female allotype: Body as in male. Length 4.5 mm.

Antenna 1 longer than body, flagellum of 12 articles. Antenna 2 approximately length of peduncle of antenna 1.

Mouthparts as in male except palp of maxilla 1 with 4 apical spines and 4 setae, inner lobe of maxilliped with 4 plumose and 1 nonplumose setae, and outer lobe of maxilliped with 2 apical setae.

Gnathopod 1 similar to male. Propodus of gnathopod 2 with proximal grasping spine, palm without notch.

Gills as in male.

Pereopods as in male.

Abdomen with pair of lobes, each with 1 seta.

VARIATION.—In smaller individuals antenna 1 is much shorter than the body length and antenna 2 is as long as the peduncle of antenna 1. The setal formula for the terminal article of the mandibular palp varies from 1–2–1–1 to 1–12–1–1. The apical setae on the outer lobe of the maxilliped varies from 1 to 3 and on the inner lobe the number of nonplumose apical setae may be 1 or 2.

DISTRIBUTION.—Type-locality: Magueyez Canal, La Parguera, Puerto Rico, net haul close to bottom, Feb. 22, 1959, 1 male holotype

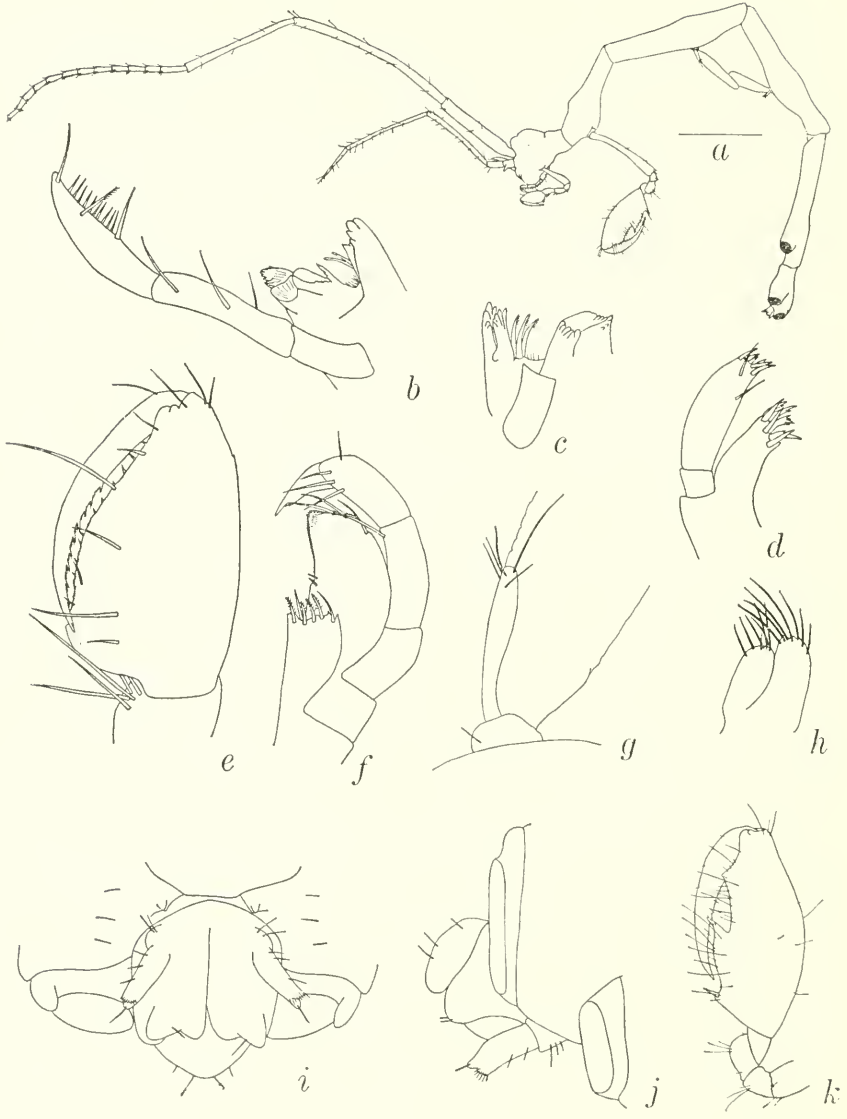

FIGURE 39.—*Metaprotella hummelincki*, male holotype; *a*, lateral view; *b*, right mandible; *c*, left mandible; *d*, maxilla 1; *e*, gnathopod 1; *f*, maxilliped; *g*, pereopod 3; *h*, maxilla 2; *i*, abdomen, ventral view; *j*, abdomen, lateral view; *k*, gnathopod 2.

USNM 120171, 1 female allotype USNM no. 120172, 3 male and 2 female paratypes USNM no. 120173.

Other records: St. Croix, Virgin Islands.

New records: Smithsonian Roebling Exped. sta. 124, Siguanea Bay, Isle of Pines, Cuba, 4–7 m, Apr. 12, 1937, 2 male and 5 female para-

FIGURE 40.—*Metaprotella hummelincki*, female allotype; *a*, lateral view; *b*, maxilliped; *c*, pereopod 3; *d*, gnathopod 2; *e*, left mandible; *f*, right mandible; *g*, maxilla 1.

types USNM 120174. Hummelinck sta. 1423a, Bahía Fosforescente, Puerto Rico, 1 m, Sept. 17, 1963, 1 female paratype USNM 120175. St. John, Virgin Islands, 29 m, Mar. 17, 1906, 1 female paratype Copenhagen Mus. St. Croix, Virgin Islands, 7 m, Feb. 19, 1906, 5 male, 5 female, and 2 juvenile paratypes Copenhagen Mus.

Remarks.—The genus *Metaprotella* was hitherto composed of 7 species, *M. africana* Mayer, 1903; *M. danae* (Kossmann, 1880); *M. excentrica* Mayer, 1890; *M. haswelliana* (Mayer, 1882); *M. makrodactylos* Stebbing, 1910a; *M. problematica* Mayer, 1890; and *M. sandalensis* Mayer, 1898. All of these species have spiny bodies or at least a cephalic spine with the exception of *M. problematica* which is almost smooth. *M. hummelincki* differs from *M. problematica* in that the latter species does not bear the papillae at the tip of the male abdominal appendage and the inner margin of the outer lobe of maxilliped is toothed and not covered with setules.

Mayer (1903) gave a short description of a *Metaprotella* sp. from St. Croix. He stated that perhaps this species belonged to *M. problematica;* it differs, however, in having oval gills instead of rod shaped. The gills in *M. hummelincki* are elliptical or cylindrical. Thus, I cannot be certain that *M. hummelincki* is the species to which Mayer's *M.* sp. should be referred. It is unlikely that another species of *Metaprotella* is present in the Caribbean and since *M. hummelincki* has been collected from St. Croix, Mayer's *M.* sp. has provisionally been assigned to this species.

The species name is in honor of P. Wagenaar Hummelinck of the Zoölogisch Laboratorium in the Netherlands, who kindly supplied me with some of the material upon which this species is based.

The only habitat record available for this species is from *Thalassia.*

Paracaprella Mayer, 1890

Flagellum of antenna 2 biarticulate, swimming setae absent; mandibular palp 0- to 3-segmented, when 3-segmented articles reduced as compared to *Deutella,* setal formula for terminal article 1, molar present; outer lobe of maxilliped larger than inner lobe; gills on pereonites 3 and 4; pereopods 3 and 4, 2-segmented, pereopod 5, 6-segmented; abdomen of male with pair of appendages and pair of lobes, female with pair of lobes.

Type-species: *Paracaprella pusilla* Mayer, 1890 (by monotypy).

Remarks.—See remarks of *Deutella* on p. 53.

Paracaprella pusilla Mayer, 1890

Figures 32a–b, 41, 42, 53

Paracaprella pusilla Mayer, 1890, p. 41, pl. 1, figs. 28–30, pl. 3, figs. 45–47, pl. 5, figs. 48–49, pl. 6, fig. 10; 1903, p. 67, pl. 2, figs. 36–37, pl. 7, fig. 52.—Schel-

lenberg, 1928, pp. 677–678, 1939, pp. 136–137.—Edmondson and Mansfield, 1948, pp. 208–209, fig. 4.—Barnard, 1955, p. 99—Day and Morgan, 1956, p. 303.—Steinberg and Dougherty, 1957, pp. 283–284, figs. 16, 19, 24, 30.—McCain, 1965, p. 193.

Caprella nigra Reid, 1951, pp. 283–284, 289, fig. 58.

Diagnosis.—Males with large triangular projection on anteroventral margin of pereonite 2; basis of gnathopod 2 short and expanded with proximal knob on posterior margin, propodus with shallow rounded notch at midlength.

Description.—Male lectotype: Body smooth on dorsal surface; anteroventral margin of pereonite 2 with large triangular projection; pleura developed on pereonites 3 and 4, weaker on pereonite 4. Length 3.5 mm.

Peduncle of antenna 1 setose, usually longer than antenna 2. Antenna 2 without swimming setae but densely setose.

Mandibular palp not present, probably represented by single seta. Left mandible with 5-toothed incisor, 5-toothed lacinia mobilis, setal row of 3 serrate setae. Right mandible with 5-toothed incisor, apically serrate lacinia mobilis, setal row of 2 serrate setae. Palp of maxilla 1 with 3 apical spines and 1 lateral seta, outer lobe with 6 apical spines. Outer and inner lobes of maxilla 2 with 4 apical setae. Maxilliped missing.

Propodus of gnathopod 1 with 1 proximal grasping spine, grasping margin of dactylus and propodus serrate. Basis of gnathopod 2 shorter than propodus, expanded with distal knob on posterior margin; propodus with proximal grasping spine and notch at midlength with slightly proximal tooth; dactylus with proximal and distal knobs bearing numerous setae between knobs.

Gills missing.

Pereopods 3 and 4, 2-segmented, terminal article small with 2 setae. Pereopods 5–7 missing.

Abdomen with pair of appendages and pair of setose lobes, appendages with setae at base and on tip.

Female: Body smooth except for small projection on anteroventral margin of pereonite 2 and pleura only slightly developed. Length of largest female 5 mm, smallest ovigerous female 4 mm.

Antennae and mouthparts similar to male, maxilliped as in *P. tenuis*.

Gnathopod 1 similar to male. Basis of gnathopod 2 short but not expanded and without proximal knob as in male; propodus similar to male except without notch.

Gills subovate.

Pereopods 3 and 4 as in male. Propodus of pereopods 5–7 with pair of proximal grasping spines, pereopod 5 much smaller than pereopods 6 and 7.

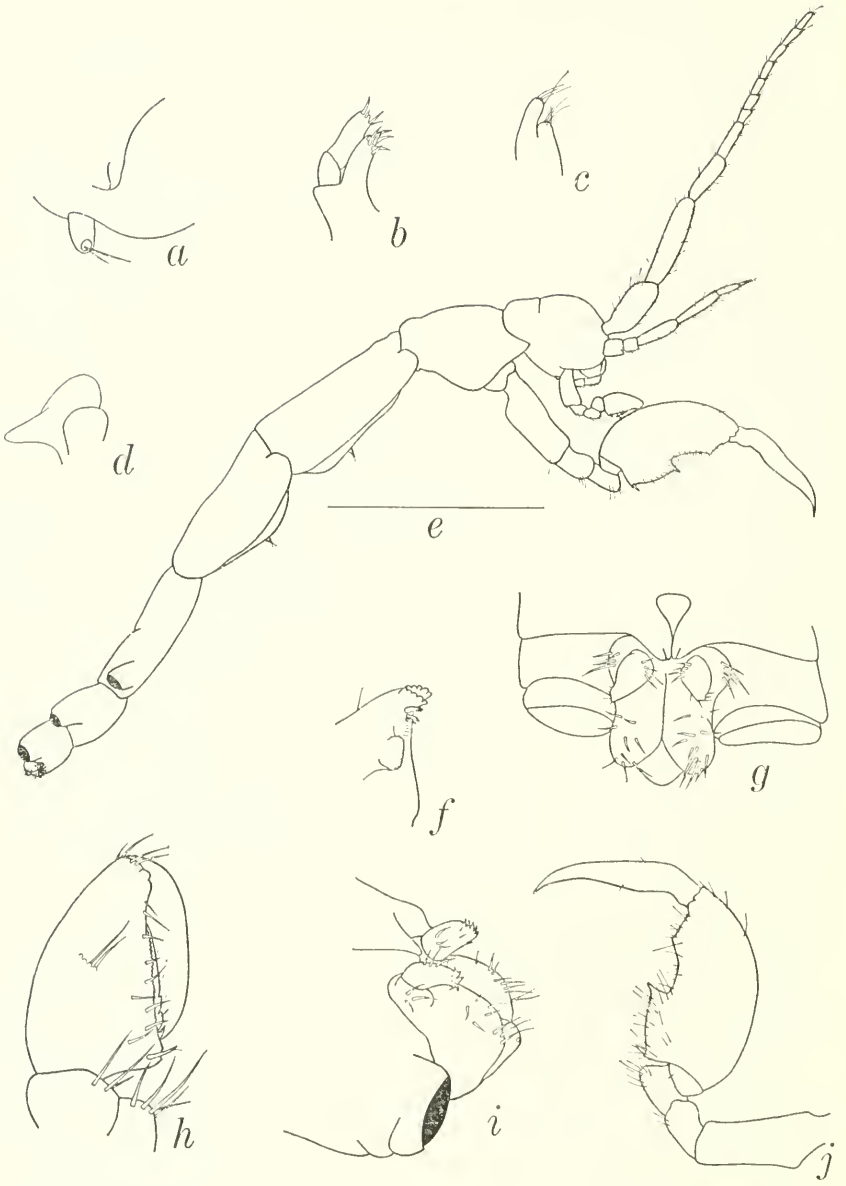

FIGURE 41.—*Paracaprella pusilla*, male lectotype; *a*, pereopod 4; *b*, maxilla 1; *c*, maxilla 2; *d*, labium; *e*, lateral view; *f*, left mandible; *g*, abdomen, ventral view; *h*, gnathopod 1; *i*, abdomen, lateral view; *j*, gnathopod 2.

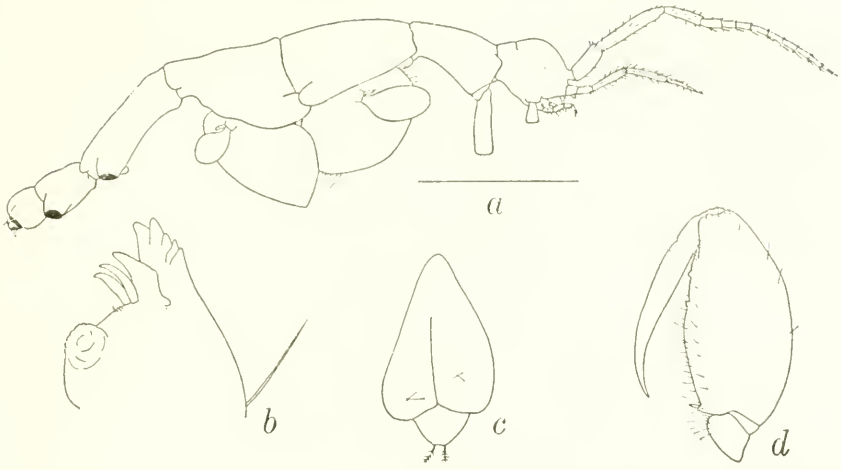

FIGURE 42.—*Paracaprella pusilla*, female; *a*, lateral view; *b*, right mandible; *c*, abdomen; *d*, gnathopod 2.

Abdomen with pair of lobes bearing 1 or 2 setae.

VARIATION.—The largest male of this species was approximately 6 mm and it bore a very large projection on the anteroventral margin of pereonite 2 (fig. 32a). This projection becomes quite large in the larger males and may be almost absent in small males; however, even in small males it is sharp pointed and not rounded as in *P. tenuis*

The depth of the notch on the propodus of gnathopod 2 varies from very slight in small males to very deep in large males.

DISTRIBUTION.—Type-locality: Rio de Janeiro, Brazil.

Other records: Suez Canal; Ft. Lauderdale, Fla.; Port Aransas, Tex.; Kingston, Jamaica; Martinique; Brazil at 28° S.; tropical West Africa; Malembe, Congo; Durban, South Africa; Dar es Salaam, Tanzania; Hawaii; Amoy, China.

New records: Lake Worth, Virginia Key, Key Biscayne, Sarasota Bay, St. Petersburg, and Panama City, Fla.; Grand Isle, La.; Port Isabel, Tex.; St. Thomas, Virgin Islands; Guadeloupe; Margarita; Curacao.

REMARKS.—The males of *P. pusilla* differ markedly from those of *P. tenuis* by the large sharp-pointed projection on the anteroventral margin of pereonite 2, the proximal knob on the basis of gnathopod 2, and the presence of setae on the dactylus of gnathopod 2. Setae are occasionally present on the dactylus of large males of *P. tenuis* but this is not generally the case. A projection is present on the anterior margin of pereonite 2 in large males of *P. tenuis*, but its position is usually more dorsal, and it is more rounded than in *P. pusilla*.

The females of these two species are difficult to distinguish; however, the projection on the anterior margin of pereonite 2, although small in *P. pusilla*, is still smaller in *P. tenuis*, and the basis of gnathopod 2 is slightly longer in females of *P. tenuis* than in females of *P. pusilla*.

P. pusilla has been taken from mangrove roots, sea grass, hydroids, and ascidians.

A lectotype has been designated from the syntypical series which is deposited in the Copenhagen Museum.

Paracaprella tenuis Mayer, 1903

FIGURES 43, 44, 53

Paracaprella tenuis Mayer, 1903, p. 68, pl. 2, figs. 34–35, pl. 7, figs. 51, 58.—M. Rathbun, 1905, pp. 7, 77.—Sumner, Osburn, and Cole, 1911 (1913), p. 657.—McCain, 1965, pp. 192–193, figs. 1d–e, 2g–k.

Paracaprella simplex Mayer, 1903, p. 68, pl. 2, figs. 38–39, pl. 7, figs. 53–57.—Cowles, 1930, p. 351.—Ferguson and Jones, 1949, p. 442.

Deutella abracadabra Steinberg and Dougherty, 1957, pp. 277–279, figs. 14, 17, 18, 20, 27.

DIAGNOSIS.—Males with small triangular projection on anterolateral margin of pereonite 2; basis of gnathopod 2 not expanded and without proximal knob; propodus with large nonrounded notch at midlength.

DESCRIPTION.—Body smooth on dorsal surface, anterolateral margin of pereonite 2 with small rounded projection, pleura on pereonite 3 generally well developed, pleura on pereonite 4 present but usually weakly developed. Length of largest male 7 mm, largest female 5 mm, smallest ovigerous female 3 mm.

Antenna 1 approximately length of pereonites 1–3; flagellum of males with 7–10 articles, females with 5–8. Antenna 2 slightly shorter than peduncle of antenna 1, both antennae with numerous short setae.

Mandibular palp 0- to 3-segmented, terminal article of palp usually with 1 seta. Mandibles as in *P. pusilla*. Maxilla 1 as in *P. pusilla* except outer lobe with 5 or 6 spines. Outer lobe of maxilliped with 1 or 2 apical setae, inner margin with numerous setae; inner lobe apically rounded with 4–6 apical setae; penultimate article of palp with process, terminal article with several setae at tip.

Propodus of gnathopod 1 with 1 proximal grasping spine, grasping margin of dactylus and propodus serrate. Propodus of gnathopod 2 similar to *P. pusilla* but notch at midlength more triangular and deeper in large males than in *P. pusilla*, dactylus usually tapered but occasionally similar to *P. pusilla*.

Gills subovate.

Pereopods 3 and 4, 2-segmented, terminal article small with 2 or 3 setae, basal article with 1 or 2 setae. Propodus of pereopods 5–7

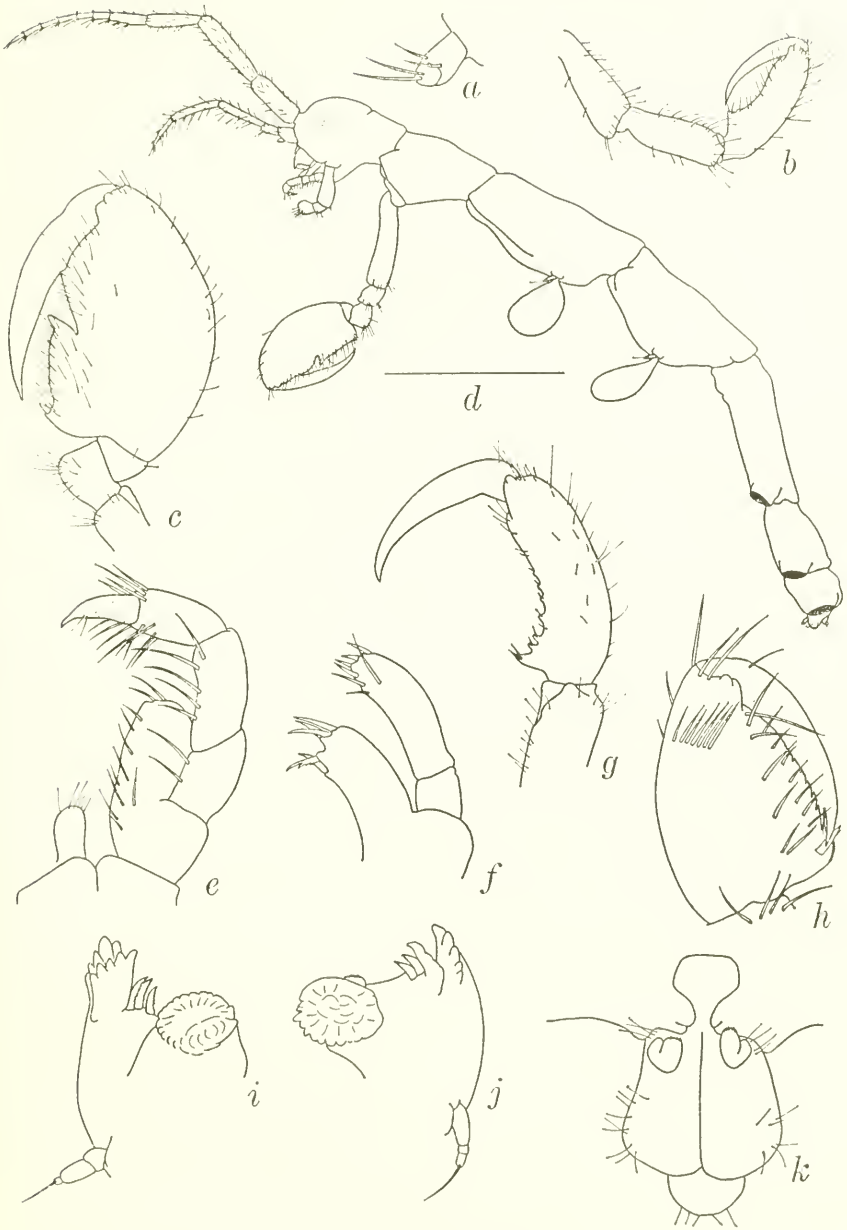

FIGURE 43.—*Paracaprella tenuis*, male; *a*, pereopod 3; *b*, pereopod 5; *c*, gnathopod 2; *d*, lateral view; *e*, maxilliped; *f*, maxilla 1; *g*, pereopod 7 (drawn to same scale as pereopod 5); *h*, gnathopod 1; *i*, left mandible; *j*, right mandible; *k*, abdomen.

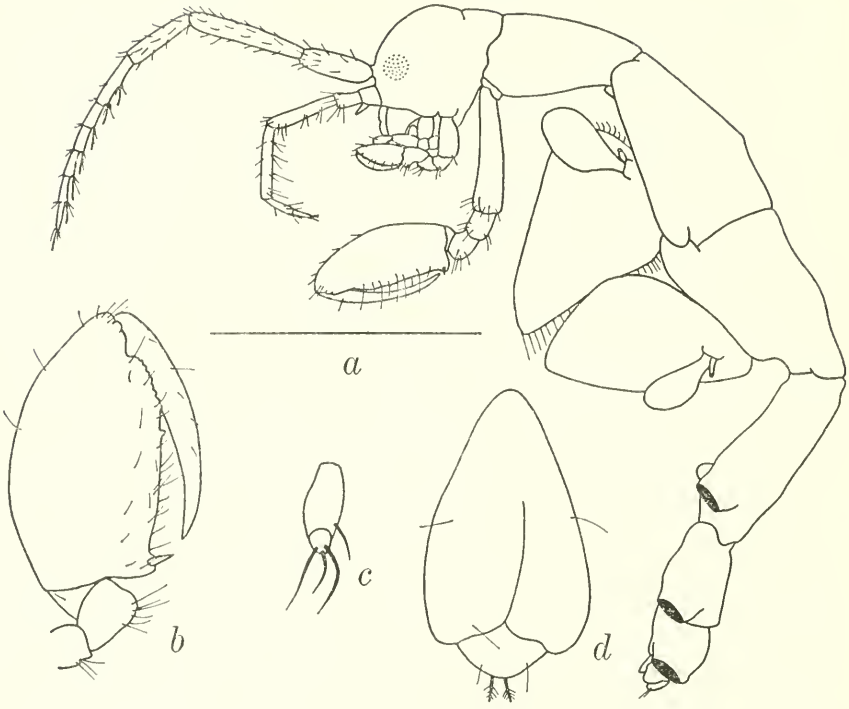

FIGURE 44.—*Paracaprella tenuis*, female; *a*, lateral view; *b*, gnathopod 2; *c*, pereopod 4; *d*, abdomen.

with pair of proximal grasping spines, pereopods 6 and 7 with several proximal knobs on palm, each bearing small spine, pereopod 5 smaller than 6 and 7 (fig. 43b and g, drawn at same scale).

Abdomen of male and female similar to *P. pusilla*.

VARIATION.—The development of the projection on the anterolateral margin of pereonite 2 and pleura on pereonites 3 and 4 is related to size as in *P. pusilla*, larger males having larger projections and well-developed pleura.

The mandibular palp varies from a small hump bearing a terminal seta to a 3-segmented palp with a seta on the terminal article. In no specimens were the palps reduced to a single seta as in *P. pusilla*.

DISTRIBUTION.—Type-locality: Woods Hole, Massachusetts.

Other records: Gulf of St. Lawrence; Penneville, Maine; Great Egg Harbor, N.J.; Chesapeake Bay, Va.; Sapelo Island, Ga.; Alligator Harbor, Fla.; Ship Island, Miss.

New records: Numerous localities between the Gulf of St. Lawrence and Sapelo Island, Ga.; Cumberland Sound, Fernandina, Tampa Bay, and Pensacola Bay, Fla.; Galveston Bay, Corpus Christi Bay, and Port Isabel, Tex.

Remarks.—The characters which separate this species from *P. pusilla* are presented under the remarks of the latter species.

P. tenuis has been collected from various red and brown algae, sea grass, sponges, hydroids, alcyonarians, bryozoans, and from hydroids attached to the carapace of the spider crab *Libinia*. This species has the peculiar habit of curling when preserved, which makes it relatively easy to sort from the other caprellid species.

Pariambus typicus f. *cumana* (Mayer, 1903)

Podalirius typicus f. *cumana* Mayer, 1903, p. 65, pl. 10, figs. 6–7.
Podalirius typicus f. *camana*.—Monterosso, 1915, p. 7.
Pariambus typicus f. *Cumana*.—Chevreux and Fage, 1925, p. 442.

Remarks.—Mayer described this form of *Pariambus typicus* from "Strand von Cumae" which Chevreux and Fage took to be Cuma, Venezuela. In Mayer's faunal list at the end of his "Siboga"report (1903), he does not mention *P. typicus* in the material from the West Indies and South America so it is probable that he was referring to Cumae, Italy, instead of Cuma, Venezuela.

Phtisica Slabber, 1769

Flagellum of antenna 2, 2- to 5-segmented, swimming setae absent; mandibular palp 3-segmented, setal formula for terminal article 1–x–1 or 1, molar absent; outer lobe of maxilliped equal to inner lobe; gills on pereonites 2–4; pereopods 3 and 4, 6-segmented, pereopod 5, 5-segmented; abdomen of male with 3 pairs of appendages, female with 2 pairs of appendages, pair of lobes and raised anterior projection.

Type-species: *Phtisica marina* Slabber, 1769 (by monotypy).

Remarks.—The generic name was probably derived from the Greek word "phthisikos" meaning consumptive; however, Slabber does not give the derivation and therefore the original orthography should be retained.

Phtisica antillensis (Mayer, 1903)

Figures 45, 54

Proto antillensis Mayer, 1903, p. 21, pl. 1, fig. 4, pl. 6, fig. 21.

Diagnosis.—Carpus of gnathopod 2 longer than merus, propodus broad medially with grasping spines at midlength.

Description.—Male holotype: Body smooth. Length 1.5 mm.

Antenna 1 approximately one-half body length, flagellum of 3 articles. Antenna 2, three-fourths length of antenna 1, flagellum of 2 articles.

Terminal article of mandibular palp with 2 setae. Mandibles similar to *P. marina* with incisor, lacinia mobilis, and 2 additional plates; setal row less developed than in *P. marina*. Outer lobe of

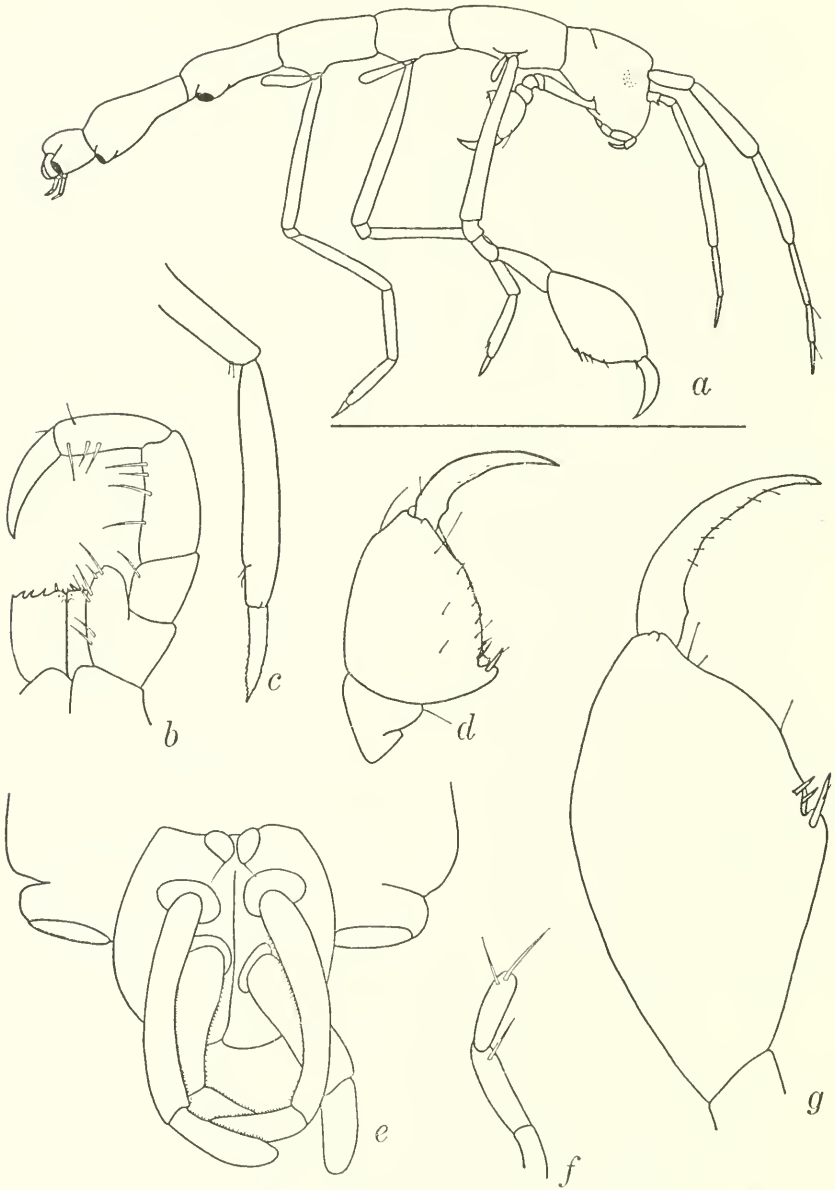

FIGURE 45.—*Phtisica antillensis*, male holotype; *a*, lateral view; *b*, maxilliped; *c*, pereopod 4; *d*, gnathopod 1; *e*, abdomen; *f*, terminal article of mandibular palp; *g*, gnathopod 2.

maxilliped with 2 apical setae, 2 setae distal yet slightly proximal to apical setae, and 2 proximal setae; inner lobe almost as large as outer with 1 large spine and several indistinct spines, anterodistal corner of medial margin with 3 large spines.

Propodus of gnathopod 1 triangular, approximately as wide at base as long, with 3 proximal grasping spines. Propodus of gnathopod 2 broad at midlength with 3 grasping spines at midlength.

Gills on pereonites 2–4, gill on pereonite 2 smaller than those on 3 and 4.

Pereopods 3 and 4, 6-segmented, propodus smooth except for pair of small spines in distal notch, dactylus short and wide at base.

Abdomen with 3 pairs of appendages, posterior 2 pairs biarticulate, anterior pair uniarticulate with single seta at tip.

DISTRIBUTION.—Type-locality: St. Thomas, Virgin Islands, at a depth of 18–27 m.

REMARKS.—The above description is based on the young male holotype and only specimen of this species which is deposited in the Copenhagen Museum. The mouthparts and abdomen agree with those of *P. marina*, and there can be little doubt that this species belongs to the genus *Phtisica*. For differences between this species and *P. marina* see the discussion of the latter species.

Phtisica marina Slabber, 1769

FIGURES 46, 47, 54, 56

Squilla acaudata pedibus quatuordecim . . .—Gronovius, 1760, p. 39, pl. 5, figs. 8–10.

Phtisica marina Slabber, 1769, pp. 79–83, pl. 10, figs. 1–3.—Stebbing, 1888, p. 32.—Chevreux and Bouvier, 1893, p. 142.—G. Sars, 1895, pp. 646–648, pl. 223.—Walker, 1895a, p. 319; 1898, p. 170.—Walker and Hornell, 1896, p. 54.—Scott, 1897, p. 141; 1901, p. 267; 1906, p.174.—Gadeau de Kerville, 1898, p. 348; 1900 (1901), p. 184.—Chevreux, 1898, p. 483; 1900, pp. 118–119; 1901 (1902), p. 696.—Beaumont, 1900, p. 795.—Norman, 1902, p. 483; 1907, p. 370; 1908 (1909) p. 463.—Marine Biol. Assoc., 1904, p. 241; 1931, p. 198.—Norman and Scott, 1906, pp. ix, 98.—Norman and Brady, 1910, p. 75.—Stebbing, 1901a, p. 468.—Nordgaard, 1911 (1912), p. 24.—Chichkoff, 1912, p. xxxv.—Barnard, 1916, pp. 283–284.—Chumley, 1918, pp. 34, 165.—Schneider, 1924 (1926), pp. 58–59.—Schellenberg, 1926, p. 465; 1927, pp. 721–722, fig. 104.—Stephensen, 1927a, pp. 145–146; 1927b, p. 13; 1928, pp. 378–380, fig. 91 (1–10); 1929a, pp. 176–177, fig. 328; 1929b, pp. 19, 34; 1935, p. 118; 1942, pp. 428–429, 502, 503; 1944b, p. 159.—Borcea, 1931, p. 677.—Schijfsma, 1931, p. 26.—Fage, 1933, pp. 113, 115, 117, 119, 125, 126, 127, 225.—Oldevig, 1933, p. 261, fig. 1.—Pirlot, 1939, p. 78.—Fiorencis, 1940, pp. 11–12, fig. 1, pl. 1, figs. 1–2.—Goodhart and Harrison, 1940, p. 109.—Bertrand, 1941, p. 16.—A. Carausu, 1941, p. 11.—Carausu and Carausu, 1942, pp. 79–80.—Dahl, 1946, p. 22.—Ruffo, 1946, p. 53.—Enequist, 1949, pp. 392, 402.—Rancurel, 1949, p. 168.—Spooner, 1950, p. 253.—Reid, 1951, pp. 281–282, 289.—Ruffo and Wieser, 1952, p. 21.—S. Carausu, 1956, p. 132.—Costa, 1960a, pp. 99, 100; 1960b, p. 104; 1961, p. 271.—Gottlieb, 1960,

pp. 161, 163, 164.—Toulmond and Truchot, 1964, p. 34.—McCain, 1966, p. 92.

Squilla ventricosa Müller, 1776, p. 197.—Abildgaard, 1788, pp. 20–21, pl. 56, figs. 1–3.

Cancer (*Gammarellus*) *ventricosus*.—Herbst, 1793, pp. 144–145, pl. 36, fig. 11a, b.

Caprella ventricosa.—Bosc, 1801–02, p. 156.—Latreille, 1802–03, p. 327; 1803, p. 333.

Proto Pedata Leach, 1814, p. 433.

Cancer Gammarus pedatus.—Montagu, 1915, pp. 6–7, pl. 2, fig. 6.

Leptomera rubra Lamarck, 1818, p. 172.

Proto——.—Latreille, 1818, p. 9, pl. 336, fig. 38.

Leptomera pedata.—Lamarck, 1818, pp. 172–173.—Guérin, 1829–44, p. 25, pl. 28, fig. 3. —H. Edwards, 1840, p. 109.—Krøyer, 1842–43, pp. 607–613, pl. 7, figs. 13–23.—Rathke, 1843, pp. 97–98.—Gosse, 1855, p. 131, fig. 224.—Liljeborg, 1856, p. 132.—Maitland, 1874, p. 245.

Proto pedatus.—Fleming, 1823, pp. 296–297.—Johnston, 1835, pp. 672–674, fig. 73.—Couch, 1864, p. 99.

Proton pedatum.—Desmarest, 1823, p. 363, pl. 46, fig. 3; 1825, pp. 276–277, pl. 46, fig. 3.—Bouchard-Chantereaur, 1823, p. 18.

Cancer (*Leptomera*) *rubra*.—Latreille, 1836, p. 217.

Cancer (*Leptomera*) *pedata*.—Latreille, 1836, p. 217.

Leptomera ventricosa.—H. Edwards, 1840, p. 110.

Proto pedatum.—W. Thompson, 1944, p. 435.—White, 1847, p. 92.—Cocks, 1849, p. 83.

Proto pedata.—White, 1850, p. 61; 1857, p. 218.—Bate, 1856, p. 60; 1857, p. 151; 1862, p. 382; 1862, pp. 349–350, pl. 55, fig. 1; 1878, p. 508; 1887, p. 175.—Boeck, 1861, p. 670.—McAndrew, 1861, p. 28.—Bate and Westwood, 1868, pp. 38–41.—Brady and Robertson, 1869, p. 361.—Parfitt, 1873, p. 250.—Haller, 1879a, p. 230; 1879b, p. 398.—Hoek, 1879, various pp., pl. 5, fig. 10, pl. 7, figs. 15–16, pl. 8, figs. 1–3.—Delage, 1881, pp. 132–133, 153, pl. 10, fig. 7.—Fowler, 1886, p. 217.—Schneider, 1891, pp. 111, 122.—Walker, 1895b, p. 474.—Ussing, 1952, pp. 45–47.

Proto elongatus Dana, 1853, pp. 45–47.

Proto Goodsirii Bate, 1856, p. 60; 1857, p. 151; 1862, p. 350, pl. 55, fig. 2; 1887, p. 175.—White, 1857, p. 218.—McAndrew, 1861, p. 28.—Bate and Westwood, 1868, pp. 42–43.—Boeck, 1871a, p. 268 (188); 1873–76, pp. 671–672, pl. 32, fig. 2.—Delage, 1881, pp. 132–133, 153, pl. 10, fig. 7.—Bonnier, 1887, p. 349.—Robertson, 1886–87 (1888), p. 70.—Walker, 1895b, p. 475.

Naupredia tristis van Beneden, 1861, pp. 97–99, 146, pl. 17.—Maitland, 1874, p. 246.—Pelseneer, 1886, p. 218.

Proto elongata.—Bate, 1862, p. 350, pl. 55, fig. 3.

Proto ventricosa.—Boeck, 1871a, pp. 268 (188)–269 (189); 1873–76, pp. 672–674, pl. 32, fig. 3.—Metzger, 1875, p. 278.—Meinert, 1880, pp. 494–495.—Mayer, 1882, pp. 22–25, pl. 1, fig. 1, pl. 3, figs. 16–29, pl. 4, figs. 12–13, pl. 5, figs. 1–5; 1890, pp. 12–13, pl. 3, figs. 4–5, pl. 5, figs. 3–6, pl. 6, fig. 1, pl. 7, fig. 1; 1903, pp. 20–21, pl. 6, fig. 23.—Blanc, 1884, pp. 85–87, pl. 5, figs. 115–121.—Collin, 1884, p. 21.—Carus, 1885, p. 387.—Henderson, 1885, p. 311.—Guerne, 1886, p. XLIV.—Gadeau de Kerville, 1886 (1887), p. 82.—Bonnier, 1887, pp. 349–350.—Chevreux, 1887a, pp. 317, 335; 1888, p. 34.—Barrois, 1888, pp. 55–56, 76.—Robertson, 1886–87 (1888), pp. 69–70.—Scott, 1887 (1888), p. 250.—Hoek, 1889, pp. 232–233.—Meinert, 1890, p. 183.—Gourret, 1892, pp. 16, 25.—Lameere, 1895, p. 570.—Sovinskii,

1895, pp. 255–256; 1898, pp. 502, 511, 512, 513, 514.—Sokolwsky, 1900, p. 161, pl. 3, fig. 15.—d'A. Thompson, 1901, p. 41.—Graeffe, 1902, p. 19.—Lönnberg, 1902 (1903), p. 50.—Tattersall, 1913, pp. 20, 22.—Monterosso, 1915, pp. 3–6.—Oliveira, 1940, p. 140.—S. Carausu, 1956, p. 133.

Proto Goodsiri.—Stebbing, 1876, p. 78.—Haller, 1879a, p. 231; 1879b, pp. 398–399, pl. 22, figs. 23–25.—Hansson, 1882 (1883), p. 77.—Chevreux, 1887b, p. 579; 1888, p. 34.

Proto Ventricosa.—Meinert, 1877–78, pp. 166–168.

Leptomera pedata (*Gammarus*).—M. Sars, 1858 (1859), p. 150.

Proto goodsiri.—Stebbing, 1879, p. 521.—Chevreux, 1887a, pp. 318, 335.

Proto brunneovittata Haller, 1879a, p. 231; 1879b, pp. 399–400, pl. 22, figs. 19–22.—Mayer, 1882, p. 25; 1890, p. 14.—Carus, 1885, p. 387.

Gammarus pedatus.—Abildgaard, 1789, pp. 33–34, pl. 101, figs. 1–2.

Phthisica marina.—Norman, 1886, p. 26; 1905, p. 26.—Allen and Todd, 1900, pp. 166, 174, 203.—Björck, 1915, p. 35.—Chevreux and Fage, 1925, pp. 434–436, fig. 422.—Schellenberg, 1942, pp. 234–235, fig. 192.—Marine Biol. Assoc., 1957, pp. 232–233.

Proto spec. Mayer, 1903, p. 21.

Phthisica acaudata.—Reibisch, 1906, pp. 214–216, 219, 220, 221, 222, 229, 230, 232, 233.—Zernov, 1913. pp. 68, 127, 233.

Phtisica acaudata.—Tichy, 1911, pp. 1125–1127, 1133, 1134.—Borcea, 1931, p. 702.—Carausu, 1956, p. 132.

Phytisca marina.—Crawshay, 1912, p. 351.

Phtysica acaudata.—Borcea, 1934, p. 404.

Phtisica antillensis [not Mayer].—Pequegnat, 1966, p. 25.

Diagnosis.—Carpus of gnathopod 2 shorter than merus, propodus with greatest width proximal and with proximal grasping spines.

Description.—Body smooth. Length of largest male 14 mm, largest female 13 mm, smallest ovigerous female 3.7 mm.

Antenna 1 variable in length from one-half to length of body. Antenna 2 approximately equal in length to peduncle of antenna 1, flagellum of 3–5 articles.

Mandibular palp 3-segmented, setal formula for terminal article varies from 1–1–1 to 1–6–1. Left mandible with 5-toothed incisor, 5-toothed lacinia mobilis, 2 additional plates, setal row of 7 or 8 short blunt setae and 3 longer apically serrate setae. Right mandible with 5-toothed incisor, lacinia mobilis smooth, 2 additional plates, setal row of 6 or 7 short setae and 2 longer apically serrate setae. Outer lobe of labium winglike, both lobes quite setose. Palp of maxilla 1 with 3 or 4 apical spines of which 2 sometimes serrate and with 3 or 4 proximal setae, outer lobe with 6 apical spines which become bifid or serrate in larger individuals. Outer lobe of maxilliped with 1 apical seta, 1 short apical spine, and 2–5 proximal setae along medial margin; inner lobe as long as outer lobe and nearly fused along medial margins, mediodistal corner with 1 very large serrate spine, 1 small spine, and 1 slightly lateral marginally serrate spine, lateral margin of lobe sometimes toothed; article 2 of palp robust.

Propodus of gnathopod 1 triangular with 4 or 5 grasping spines, grasping margin without serrations but with numerous short spines; dactylus not serrate. Propodus of gnathopod 2 with 1 large and 1 small proximal grasping spine, palm with numerous short spines and few setae.

Gills elliptical, gill on pereonite 2 smallest.

Pereopods 3 and 4, 6-segmented, palm of propodus with 3 short spines. Pereopod 5, 5-segmented, palm of propodus without spines, dactylus approximately one-half propodus length, basis approximately twice propodus length. Pereopods 6 and 7, 6-segmented with 2 proximal grasping spines, 1 medial spine, and 1 distal spine.

Abdomen of male with 2 pairs of biarticulate appendages and pair of pyriform appendages, each pyriform appendage terminating in seta; female with 2 pairs of biarticulate appendages, pair of lobes, and anterior raised projection.

Variation.—Included in description.

Distribution.—Type-locality: No locality given.

Other records: Northern Norway to the Mediterranean Sea; British Islands; Azores; Canary Islands; Mediterranean and Black Seas; tropical West Africa; South Africa; 25°26′30″ N., 80°02′ W.; Rio de Janeiro, Brazil.

New records: Numerous localities from off Cape Hatteras, N.C. to the Tortugas and the west coast of Florida to Panama City; St. John, Virgin Islands; Cubagua and Margarita Islands, Venezuela; Cape la Vela, Colombia.

Remarks.—Gronovius (1760) described a caprellid which he called "*Squilla* acaudata pedibus quatuordecim . . ." and included several figures which appear to be *P. marina*, Reibisch (1906) believed that Gronovius' paper followed the rules of binomial nomenclature so he chose to use the name *P. acaudata*. It appears that the term acaudata was used in a descriptive rather than a nominal sense, so I have chosen to use Slabber's name which meets the requirements for validity.

The genus *Phtisica* is presently composed of 3 species, *P. antillensis* (Mayer, 1903), *P. marina* Slabber, 1769, and *P. tuberculata* (Guiler, 1954). In his description of *P. tuberculata*, then *Proto tuberculata*, Guiler states that his species has gills on pereonites 3 and 4 and that the abdomen bears 2 pairs of rudimentary appendages. These characters are not consistent with the generic characteristics of *Phtisica*, and it would seem that P. *tuberculata* should be placed in a different genus, perhaps *Paraproto;* however, material of this Tasmanian species is not available to me and such a change is not possible at this time.

Mayer (1903) gives a description of a *Proto* spec., stating that it differs from *P. marina* because the first pair of abdominal append-

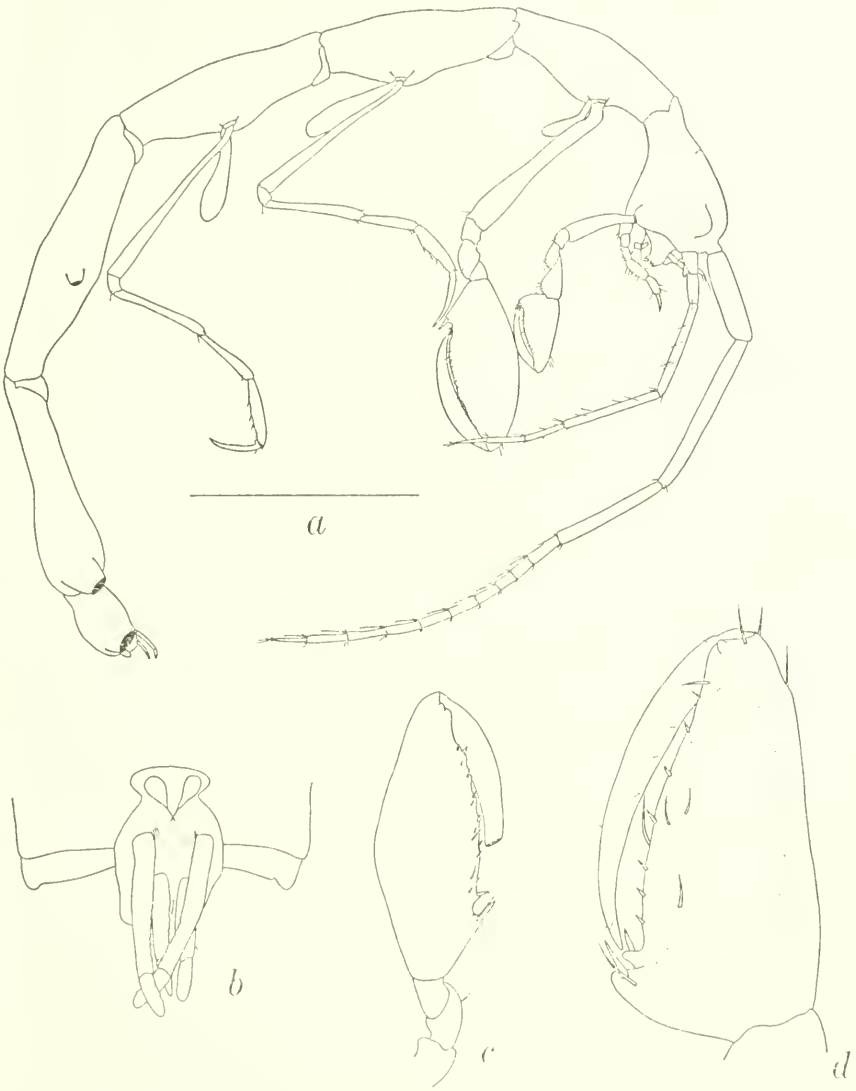

FIGURE 46.—*Phtisica marina*, male; *a*, lateral view; *b*, abdomen; *c*, gnathopod 2; *d*, gnathopod 1.

ages are strikingly small. I have examined the material upon which his description was based but I cannot agree that these appendages are any smaller than in *P. marina*, so this species is included in the synonymy of *P. marina*.

Phtisica marina differs from *P. antillensis* in that the carpus of gnathopod 2 is longer than the merus and the propodus of gnathopod 2 is expanded at midlength in the latter species.

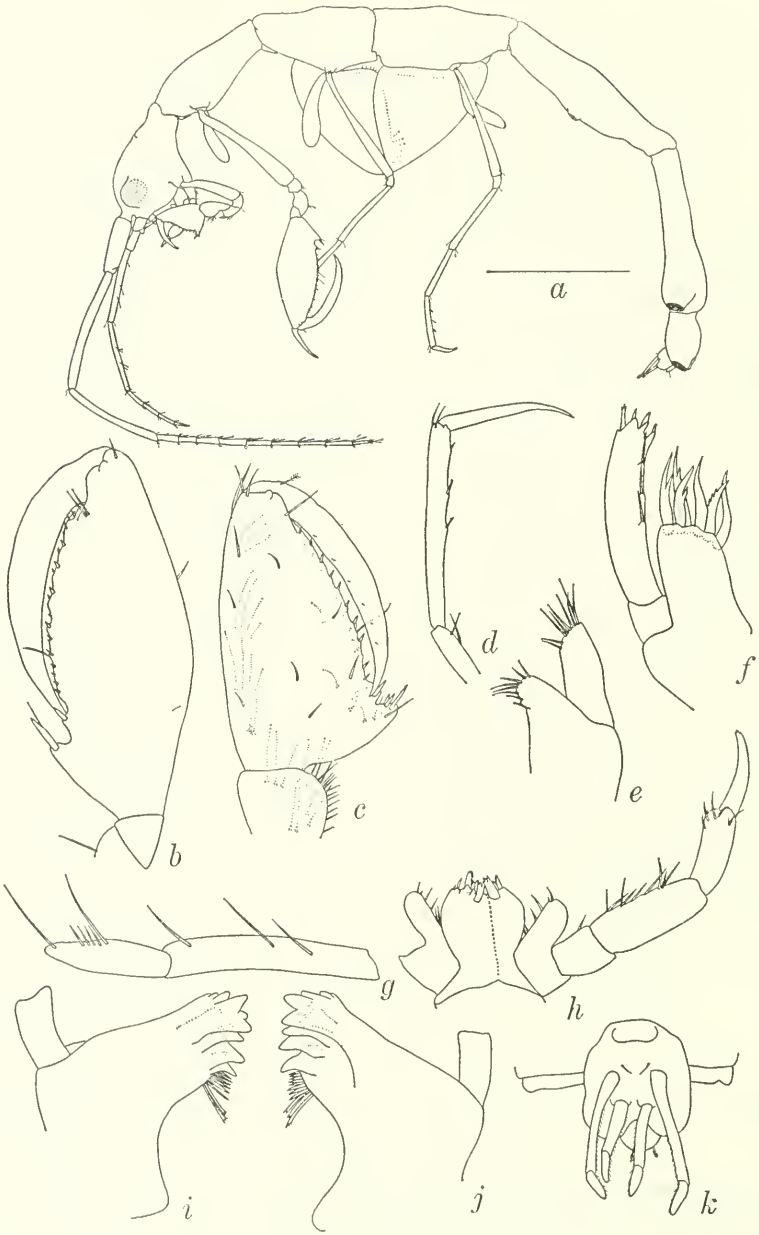

FIGURE 47.—*Phtisica marina*, female; *a*, lateral view; *b*, gnathopod 2; *c*, gnathopod 1; *d*, pereopod 3; *e*, maxilla 2; *f*, maxilla 1; *g*, terminal articles of mandibular palp; *h*, maxilliped; *i*, right mandible; *j*, left mandible; *k*, abdomen.

P. marina is widely distributed in the warmer parts of the Atlantic. It has been collected in plankton tows (fig. 56) at the surface and Stephensen (1927a) reports this species from a depth of 660 m. The habitat does not seem specific because it has been reported on green and brown algae, sea grass, sponges, hydroids, and bryozoans. Boeck (1873–76, p. 671) reports this species on the sea turtle *Chelonia;* however, he cites van Beneden, 1861, as the authority. Van Beneden's record was for *Caprella andreae* and not *Phtisica.* It has also been found among the hydroids and algae which were attached to the carapace of the spider crab *Maja.* Meinert (1880) cites this species as occurring on the starfish *Asterias.* There are several records of this species from the guts of fishes such as the blenny, *Blennius,* cod *Gadus* dragon net, *Callionymus,* and the skate, *Raja.*

Costa (1960b) reports that *P. marina* is predatory on *Caprella acanthifera.* Costa states the *P. marina* grasps the prey with gnathopod 2 and the prey seems almost incapable of violent movement. It seems, therefore, that some venom may be introduced by the poison tooth.

Proaeginina Stephensen, 1940

Flagellum of antenna 2 biarticulate, swimming setae absent; mandibular palp 3-segmented, setal formula for terminal article 1–x–1, molar present; outer lobe of maxilliped larger than inner lobe; gills on pereonites 3 and 4; pereopods 3 and 4 absent, pereopod 5, 6-segmented; abdomen of male and female with 2 pairs of appendages.

Type-species: *Parvipalpus norvegicus* Stephensen, 1931 (by monotypy).

Remarks.—Stephensen (1931, 1940, 1942) stated that the flagellum of antenna 2 is uniarticulate; however, both of the Iceland specimens and the Cape Cod specimen which were available to me bear a small article at the tip of the flagellum which is clearly defined by a suture. In Stephensen's (1944a, p. 46) list of the important characters of new genera described since Mayer's (1903) last monograph, he stated that the number of setae on the terminal article of the mandibular palp of *Proaeginina* is greater than 2. Although true, I have altered the generic description to include the 1–x–1 setal formula and have also included the biarticulate flagellum on antenna 2.

Proaeginina norvegica (Stephensen, 1931)

Figures 48, 54

Parvipalpus norvegicus Stephensen, 1931, pp. 1–7, figs. 1–3.

Proaeginina norvegica.—Stephensen, 1940, pp. 70–72, fig. 8; 1942, pp. 433, 502, 503, figs. 68–69; 1944a, pp. 49–50; 1944b, p. 159.—McCain, 1966, p. 92.

Diagnosis.—Since this genus is monotypic, the characters of the genus are diagnostic for the species.

Description.—Body smooth and quite slender, cephalon separated from pereonite 1 by faint suture; however, not articulated. Length of largest male 32 mm, largest female 23 mm.

Articles in flagellum of antenna 1 variable in number, increasing with increasing size of individual. Flagellum of antenna 2 biarticulate, terminal article very small.

Mandible with 3-segmented palp, setal formula for terminal article varying from 1–5–1 to 1–27–1. Left mandible with 5-toothed incisor, 5-toothed lacinia mobilis, setal row of 3 serrate setae. Right mandible with 5-toothed incisor, lacinia mobilis apically serrate, setal row of 2 serrate setae. Palp of maxilla 1 with 4–7 short apical spines and 3 or 4 setae on anterior surface; outer lobe with 7 apical spines, tending to bifurcate with increased size of individual. Inner and outer lobes of maxilla 2 variably setose. Outer lobe of maxilliped with 2 apical setae, 1 long apical spine, and 3–7 small marginal spines; inner lobe with 2 small spines, 6–12 apical setae of which 0–10 plumose; dactylus of palp serrate at tip.

Propodus of gnathopod 1 triangular with 2 proximal grasping spines, grasping margins of dactylus and propodus serrate. Propodus of gnathopod 2 with proximal poison tooth, grasping margin slightly serrate proximally; dactylus not serrate.

Pereopods 5–7, 6-segmented, propodus of male pereopod 5 with pair of distal grasping spines, propodus of pereopods 6–7 of male and female without grasping spines.

Abdomen of both male and female with 2 pairs of biarticulate appendages.

Variation.—A comparison of a male and female (32 and 23 mm respectively) from *Thor* sta. 57 near Iceland with the small female (7.5 mm) from off Cape Cod showed that no variation exists which cannot be accounted for by increased size of the animal. The setal formula for the terminal article of the mandibular palp in the Cape Cod female was 1–5–1 for the left mandible and 1–6–1 for the right mandible. In the *Thor* female the setal formula for both mandibles was 1–27–1 and for the male it was 1–21–1. Six nonplumose setae are present on the inner lobe of the maxilliped of the Cape Cod female, 8 or 9 on the *Thor* male, of which 3 or 4 are plumose, and 12 on the *Thor* female with 10 plumose.

Distribution.—Type-locality: Rognsund, off NE. corner of the Island of Stjernøy (N. Norway, about 70°40′ N.), at a depth of 200–350 m.

Other records: Iceland, 63°21′ N., 16°22′ W., 500–560 m; Davis Straits, 63°06′ N., 56°00′ W., 2258 m, and 61°50′ N., 56°21′ W., 2702 m.

New record: Off Cape Cod, 42°00′ N., 68°34′ W., 174 m.

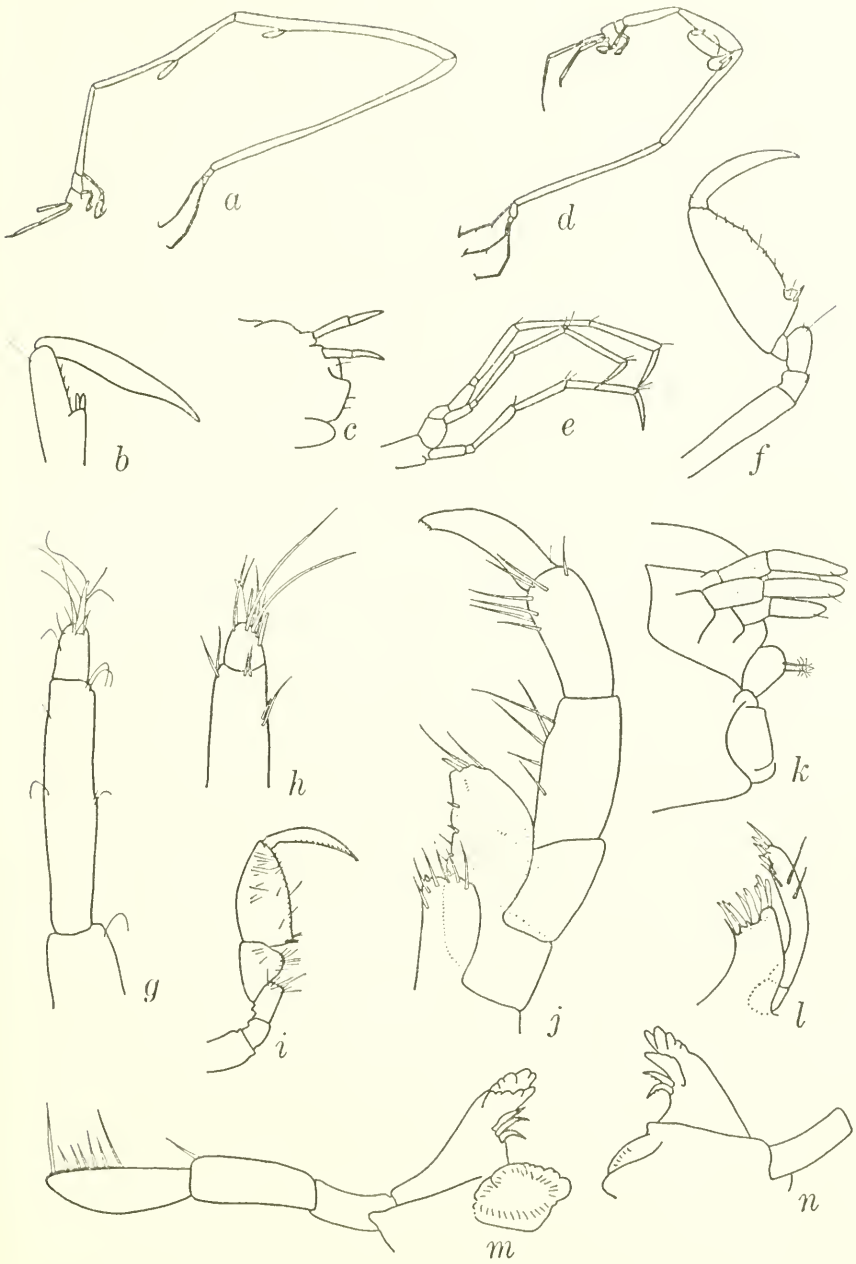

FIGURE 48.—*Proaeginina norvegica; a,* male lateral view; *b,* pereopod 5; *c,* female abdomen, lateral view; *d,* female lateral view; *e,* pereopods 6 and 7; *f,* gnathopod 2; *g,* terminal articles of antenna 2; *h,* terminal articles of antenna 2 (*Thor* female); *i,* gnathopod 1; *j,* maxilliped; *k,* abdomen, lateral view; *l,* maxilla 1; *m,* left mandible; *n,* right mandible (*a-e* after Stephensen, 1942; *f-g* and *i-n* of small female).

Pseudaeginella Mayer, 1890

Flagellum of antenna 2 biarticulate, swimming setae absent; mandible with 3-segmented palp, setal formula for terminal article 1–3–1, molar?; outer lobe of maxilliped larger than inner lobe; gills on pereonites 3 and 4; pereopods 3 and 4 absent, pereopod 5, 6-segmented; abdomen of male and female without appendages.

Type-species: *Aeginella tristanensis* Stebbing, 1888 (by monotypy).

Pseudaeginella antiguae Barnard, 1932

FIGURE 51

Pseudaeginella tristanensis [not Stebbing].—Stebbing, 1895, p. 402.—Mayer, 1903, p. 59.

Pseudaeginella antiguae Barnard, 1932, p. 301.

REMARKS.—This species was described by Mayer (1903) and Stebbing (1895) as *P. tristanensis* from specimens collected in Antigua, West Indies. Barnard later changed the name of these specimens to *P. antiguae* with the following comment:

> In view of these specimens it becomes very unlikely that the sepcimens (Stebbing says one; Mayer says two) from Antigua are conspecific. The female according to Mayer (1903, p. 59) has the head spine and single medio-dorsal spines on segments 1–3, but also *paired* rounded tubercles in the middle of segments 3 and 4. For this species I therefore propose the name *antiguae*.

P. tristanensis does not have paired rounded tubercles at the mid-length of pereonites 3 and 4 and therefore Barnard is probably correct in his separation of these two species.

Barnard's figures of *P. tristanensis* bear a remarkable similarity to *Fallotritella biscaynensis;* however, none of the references mentioned appendages in *Pseudaeginella* on pereonites 3 and 4 and I must presume their absence. It may be found that appendages are present on pereonites 3 and 4 in the two species of *Pseudaeginella;* if so, then *Fallotritella* would probably fall as a junior synonym of this genus. Material of *Pseudaeginella* was not available to me, and the location of the type material is not known to me.

Ecology

Most caprellids seem to be very nonspecific as to the substrate upon which they live; however, most need something to which they can cling and therefore are not found on bare sandy or muddy bottoms. Species such as *Caprella equilibra* and *Caprella penantis* have been collected on various algae, sea grasses, sponges, hydroids, stylasterines, alcyonarians, zoantharians, bryozoans, ascidians, and in several unusual habitats. Some caprellids, however, do have a fairly specific habitat preference. *Caprella unica* is associated with the starfishes *Asterias forbesi* and *A. vulgaris* and indeed shows an adapta-

tion for this habitat by the loss of spination and setation of pereopods 5–7, which would definitely be a hinderance when moving over the highly pedicellate surface of the starfish. For other species associated with echinoderms, see p. 52.

Caprella andreae is found attached to floating objects and plants and has even been collected from the fouling on the backs of sea turtles. This species seems to be limited to this type of environment and to my knowledge has not been collected attached to benthic substrates.

Phtisica marina was found in many of the U.S. Bureau of Commercial Fisheries vessel M/V *Theodore N. Gill* plankton samples and appears to be a regular member of the Carolinian coastal water plankton from Cape Hatteras to southern Flordia (fig. 56) *P. marina* lacks a molar on the mandible which may reflect an adaptation to feeding in its planktonic environment. Several other species have occasionally been taken in plankton tows including *Hemiaegina minuta* and *Luconacia incerta*; however, these species have a molar on the mandible.

The feeding habits of several west coast species of *Caprella* and *Metacaprella* were reviewed by Saunders (1966). She found the bulk of their diet consisted of diatoms, but they also consumed some crustaceans and perhaps also fed on detritus. Since the mouthparts of most of the species of *Caprella* are very similar, they must have similar feeding habits. As noted on p. 30, I have observed *Caprella equilibra* feeding on several gammaridean amphipods and polychaetes. Harrison (1939) reviewed the habits of several caprellids. He stated that the caprellids close the antennae down over the prey and then gnathopod 2 grasps the prey, soon paralyzing it with the poison spines. The prey is then shredded by the mouthparts, after which the appendages are cleaned for bits of debris.

Caprellids are not infrequent members of the food chains of many bottom feeding fishes and have been found in the guts of the sea bass, *Centropristis*, the blenny, *Blennius*, the pollock, *Pollachius*, the rock cod, *Gadus*, the dragon net, *Callionymus*, and the skate, *Raja*. Aquarium observations on several species showed that they were prey for grass shrimps, anemones, and even the small gastropod, *Astyris*. Caprellids will probably be found to be prey for many other bottom feeding fishes and larger Crustacea.

Zoogeography

The western Atlantic is rather poor in number of caprellid species compared to similar areas in the Pacific. Utinomi (1947), Mayer (1930), and Arimoto (1934) cite over 60 species which occur in Japa-

nese waters (approximately 20° of latitude) whereas only 26 species are found in the western North Atlantic (approximately 50° of latitude). This paucity of species in the North Atlantic was observed by Mills (1965) for the gammaridean genus *Ampelisca*. He stated that intertidal species may be few because of winter ice scouring and that perhaps sharp temperature zonation and a wide range of temperatures do not favor the differentiation of stenothermal species. Many of the caprellid species in the temperate zone of the western North Atlantic are almost cosmopolitan in their distribution and appear to be highly elastic eurythermal and euryhaline species. For example, *Caprella penantis* is found in most parts of the Atlantic and Pacific from the boreal to the tropical zone and in salinities ranging from full sea water to as low as 10 °/₀₀.

Table 3 summarizes the known distribution of the caprellids of the western North Atlantic (figs. 50–55). In general they correspond to

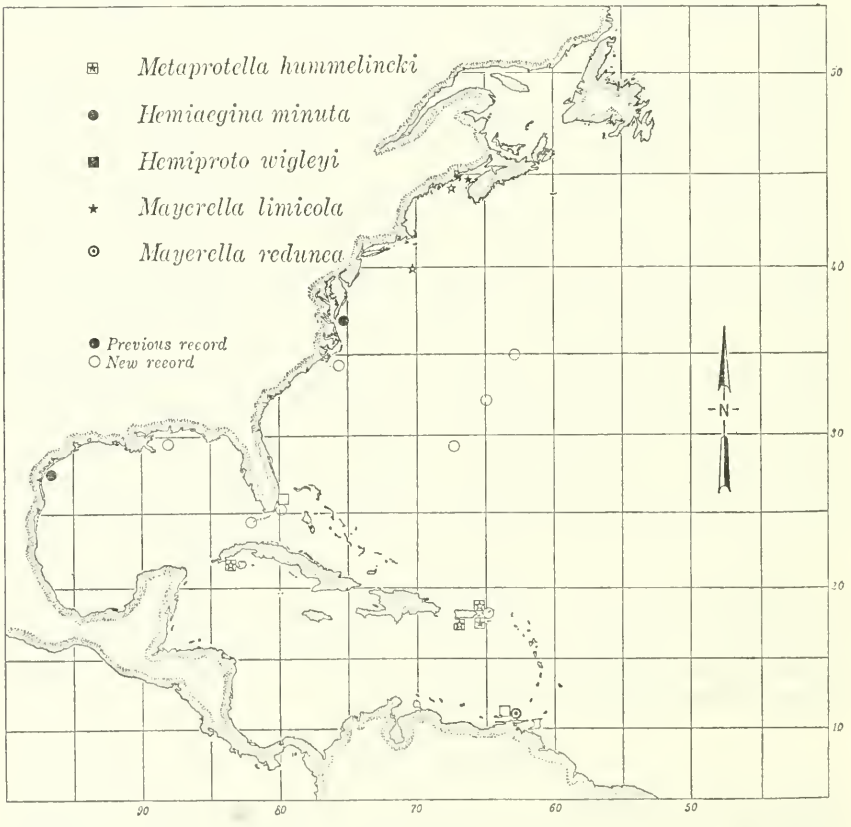

FIGURE 50.—Distribution records of *Hemiaegina minuta*, *Hemiproto wigleyi*, *Mayerella limicola*, *Mayerella redunca*, and *Metaprotella hummelincki* in the western North Atlantic.

the faunal provinces of Johnson (1934) as modified by Hedgpeth (1953) with the exception that a truly boreal fauna is not evident. Cerame-Vivas and Gray (1966) reviewed these zoogeographic provinces and divided the continental shelf fauna of North Carolina into three assemblages, extending the Caribbean province to just north of Cape Hatteras for the outer shelf. These provinces and examples of their caprellid composition are summarized as follows:

1. Arctic province (north of Newfoundland)—*Aeginella spinosa* and *Proaeginina norvegica*.

2. Boreal province (Newfoundland to Cape Cod). This province has no endemic caprellids with the possible exception of *Mayerella limicola* and receives contributions from the Arctic and Transatlantic provinces.

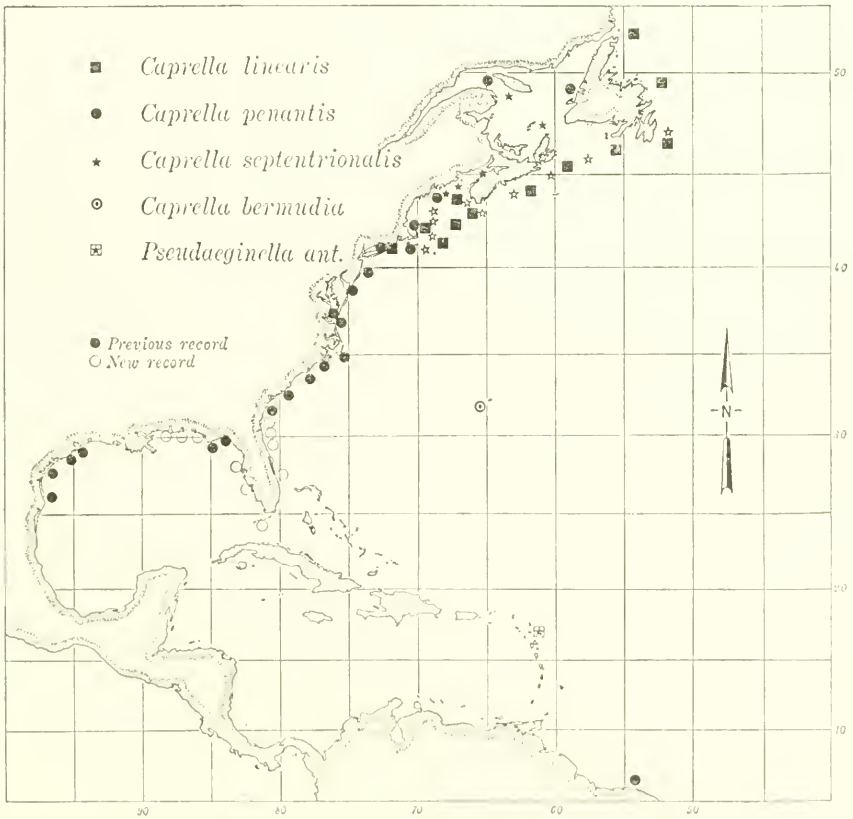

FIGURE 51.—Distribution records of *Caprella bermudia*, *Caprella linearis*, *Caprella penantis*, *Caprella septentrionalis*, and *Pseudaeginella antiguae* in the western North Atlantic.

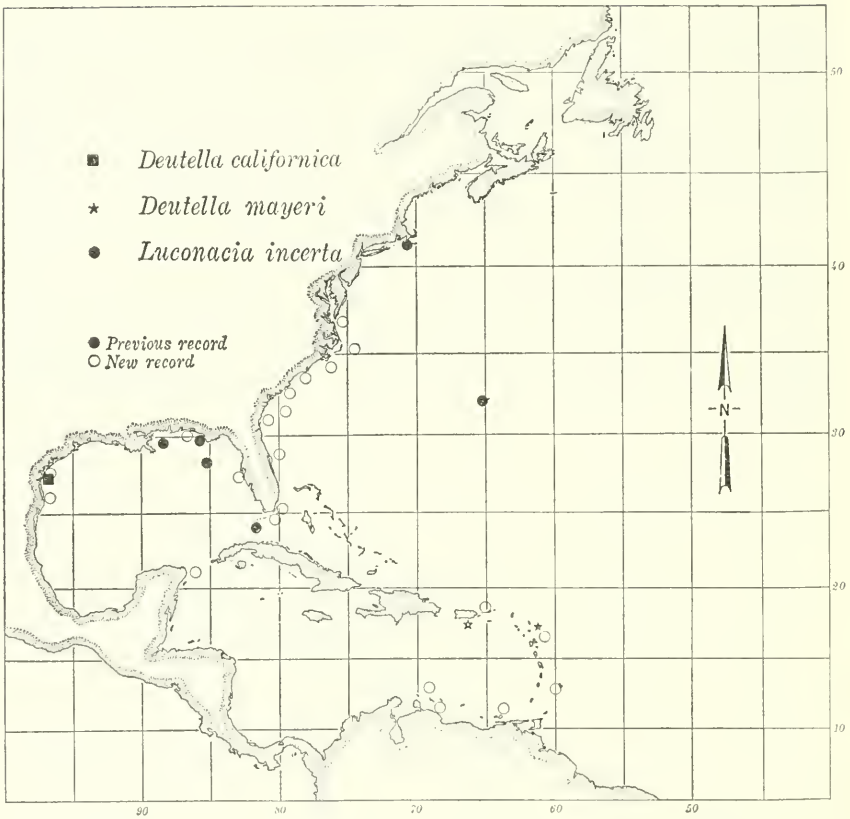

FIGURE 52.—Distribution records of *Deutella californica*, *Deutella mayeri*, and *Luconacia incerta* in the western North Atlantic.

3. Transatlantic province: (A) Virginian province (Cape Cod to Cape Hatteras). No caprellid is restricted to this province, yet Cape Hatteras does appear to be a southern barrier for the cold-water species *Aeginina longicornis* and a northern barrier for the warm-water species *Phtisica marina*. (B) Carolinian province (Cape Hatteras to Cape Kennedy and Tampa Bay to the southern tip of Texas). As in the case of the Virginian province, no caprellid species is restricted to this area. If considered together the Virginian and Carolinian provinces can be characterized by species such as *Paracaprella tenuis* and *Caprella penantis*. The transatlantic province seems to be an area of mixing of the Caprellidae with only 1 endemic form.

4. Caribbean province (from Cape Kennedy and Tampa Bay into the tropics, outer shelf to just north of Cape Hatteras, and Bermuda). Many endemic species such as *Fallotritella biscaynensis* and *Hemiproto wigleyi*.

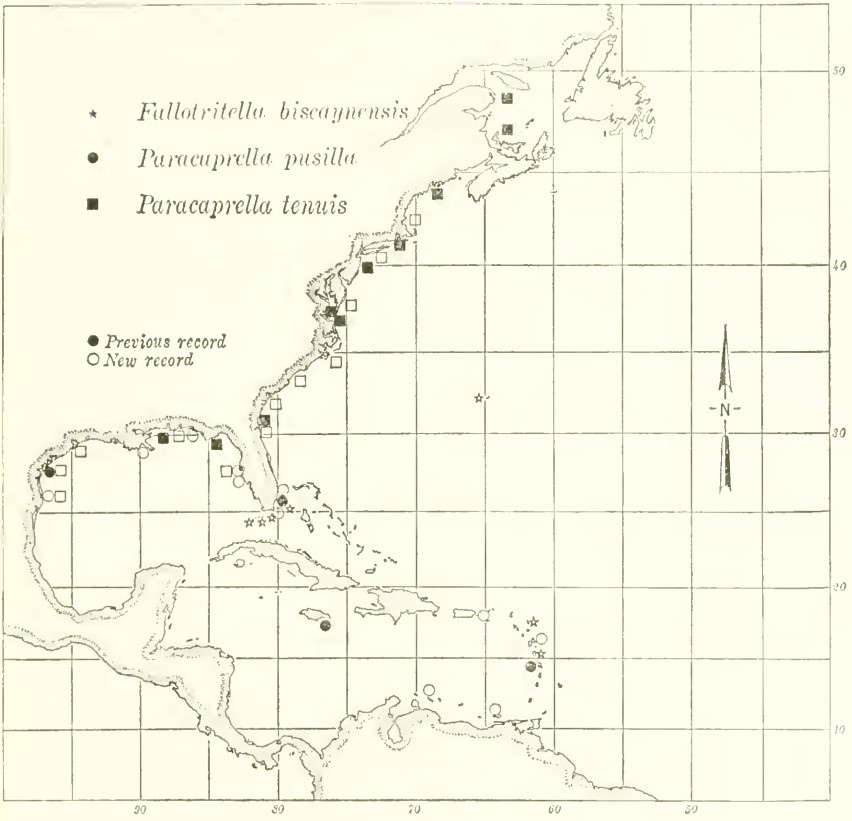

FIGURE 53.—Distribution records of *Fallotritella biscaynensis*, *Paracaprella pusilla*, and *Paracaprella tenuis* in the western North Atlantic.

The distribution of *Paracaprella tenuis* is interesting since it shows the disjunct distribution pattern which Hedgpeth (1953) cites for *Littorina irrorata* and several other organisms. Hedgpeth points out that this disjunct distribution arose during the interglacial periods of the Pleistocene when Florida was submerged and counter currents probably arose across the shoals which "made possible the dispersal of northern species into the Gulf of Mexico . . . ".

Hedgpeth (1953) states that the conditions are such in the northern Gulf of Mexico to allow mixing of temperate and tropical faunas with a low number of endemic species. This general statement is true for the Caprellidae since no northern Gulf caprellid is endemic and that area receives contributions from both the temperate and tropical areas.

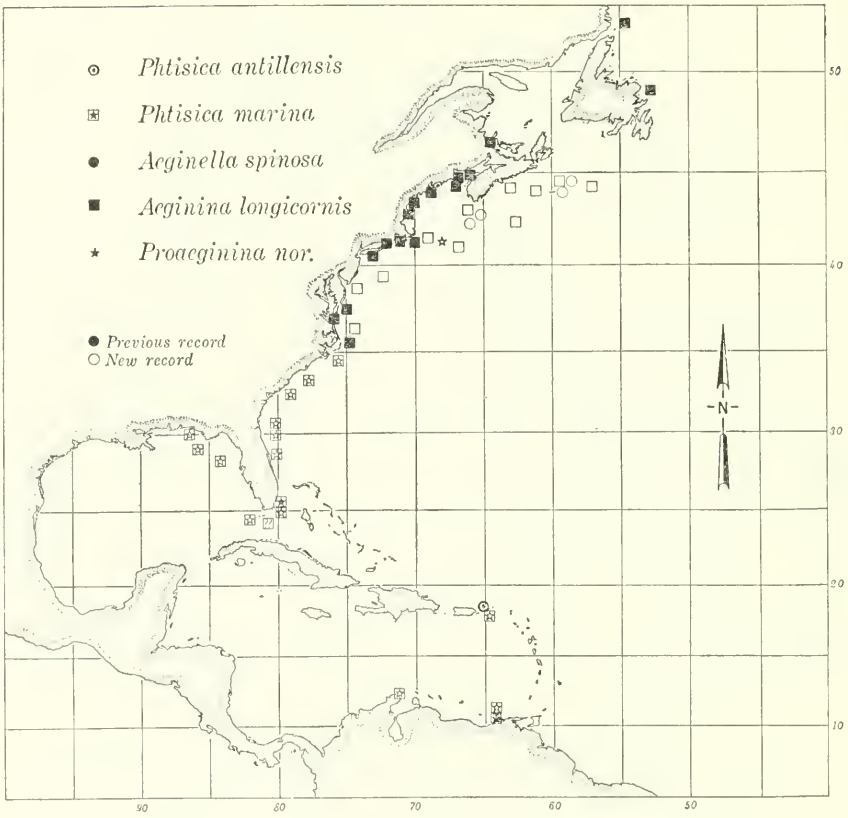

FIGURE 54.—Distribution records of *Aeginella spinosa*, *Aeginina longicornis*, *Phtisica antillensis*, *Phtisica marina*, and *Proaeginina norvegica* in the western North Atlantic.

Mayer (1903, p. 133) expresses the opinion that Caprellidae are quite rare in the shallow water of the West Indies. Contrary to this opinion, 14 species of caprellids are reported from the Caribbean in this paper. Most of the caprellids of the area are fewer in number of individuals and smaller than those of the northern provinces. This might explain why so few species have previously been reported from the Caribbean.

The caprellids are remarkably widespread in their distribution. Many species are almost cosmopolitan, a fact which seems anomalous in view of their limited swimming ability and the absence of a planktonic larval stage. Mayer (1882, p. 90; 1890, p. 101; 1903, p. 134) attributes this wide distribution to transportation on ship bottoms and floating objects. Several species are associated with floating objects and plants and some, as *Caprella andreae*, appear to be limited

to this type of pelagic environment. Some species, particularly *Phtisica marina,* are at least transient members of the plankton. In view of these semipelagic habitats, it is not too remarkable that these organisms are spread over very large areas.

TABLE 3.—*Known distribution of Caprellidae in the western North Atlantic*

	N. of Newfoundland	Newfoundland to Cape Cod	Cape Cod to Cape Hatteras	Cape Hatteras to Cape Kennedy	Tampa Bay to Texas	Cape Kennedy to Key West to Tampa Bay	Caribbean	Bermuda
Aeginella spinosa	x	x						
Aeginina longicornis	x	x	x					
Caprella andreae			x	x		x		
C. bermudia								x
C. danilevskii						x	x	x
C. equilibra			x	x	x	x	x	x
C. linearis	x	x	x					
C. penantis		x	x	x	x	x	x	
C. scaura							x	
C. septentrionalis	x	x						
C. unica	x	x	x					
Deutella mayeri							x	
D. californica					x			
Fallotritella biscaynensis						x	x	x
Hemiaegina minuta			x	x	x	x	x	x
Hemiproto wigleyi						x	x	
Luconacia incerta			x	x	x	x	x	x
Mayerella limicola		x	x					
M. redunca							x	
Metaprotella hummelincki							x	
Paracaprella pusilla					x	x	x	
P. tenuis		x	x	x	x			
Phtisica antillensis							x	
P. marina				x	x	x	x	
Proaeginina norvegica	x	x						
Pseudaeginella antiguae							x	

Relationship Between the Amphipod Suborders Gammaridea and Caprellidea

The Caprellidea appear to have arisen from a podocerid type of gammaridean. Generally considered primitive caprellids such as *Cercops* share many characters in common with the Podoceridae, and a comparison of the figures of the podocerid *Neoxendice* (fig. 49a) and the caprellid *Cercops* (fig. 49c) shows the overall general similarity of body forms.

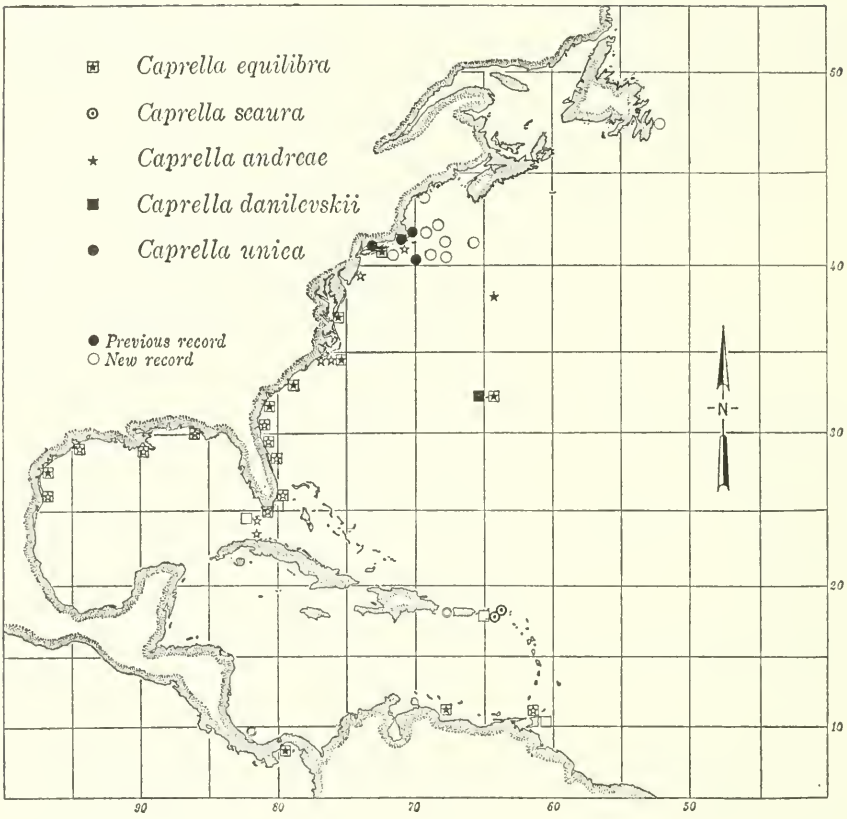

FIGURE 55.—Distribution records of *Caprella andreae*, *Caprella danilevskii*, *Caprella equilibra*, *Caprella scaura*, and *Caprella unica* in the western North Atlantic.

Recently, Kudrjaschov and Vassilenko (1966) described a new family, Caprogammaridea, which they thought formed a link between the Gammaridea and Caprellidea. They placed this family within the Gammaridea due to the following characters: The cephalon is not fused with pereonite 1; small coxal plates are present on all pereonites except 3 and 4; the abdomen consists of 5 free somites and bears 3 pairs of biramous pleopods and 2 pairs of uniramous uropods; and the abdomen bears a small telson. In order to place this important link between the 2 suborders in the Gammaridea, I believe that it would be necessary to alter significantly the definition of the Gammaridea. Stebbing (1906) defines this suborder as Amphipoda which have the:

Head not fused with 1st segment of peraeon. Palp of maxilliped 2- to 4-jointed. Peraeon with 7 pairs of legs; 5 or 6 segments of peraeon with branchial vesicles; 4 segments of female with marsupial plates; 1st joint of gnathopods 1, 2 and of

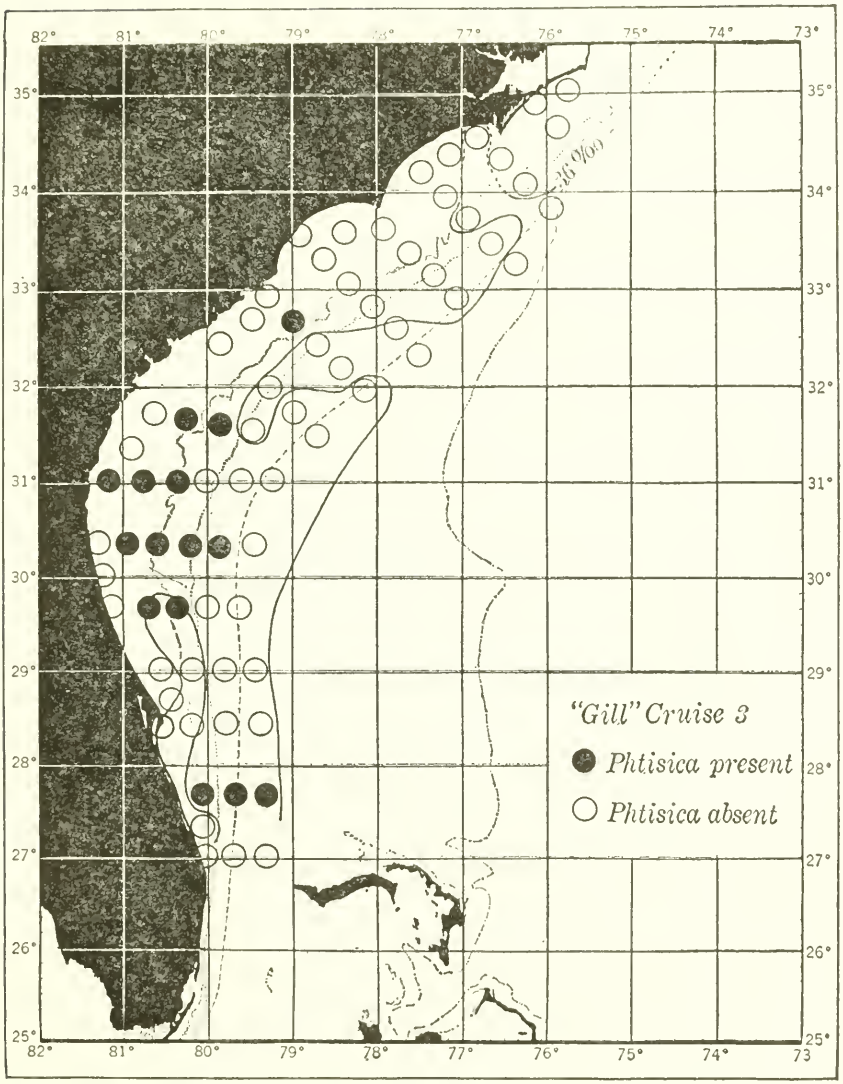

FIGURE 56.—Distribution of *Phtisica marina* in plankton samples taken on cruise 3 of the M/V *Theodore N. Gill.*

peracopods 1–5 forming or united to well developed side-plates. Pleon consisting usually of 7 free segments, carrying 3 pairs of pleopods and usually 3 pairs, at least 1 pair, of uropods; uropod 1 always with 2 rami. Eyes varying in size and form, 0–4 in number. Hepato-pancreatic tubes 4, rarely 2; rectal glands 2 or 1, sometimes rudimentary. Heart with 3 pairs, rarely 1 pair, of ostia. Nerve-chain with 4 ganglia in pleon-segments 1–4.

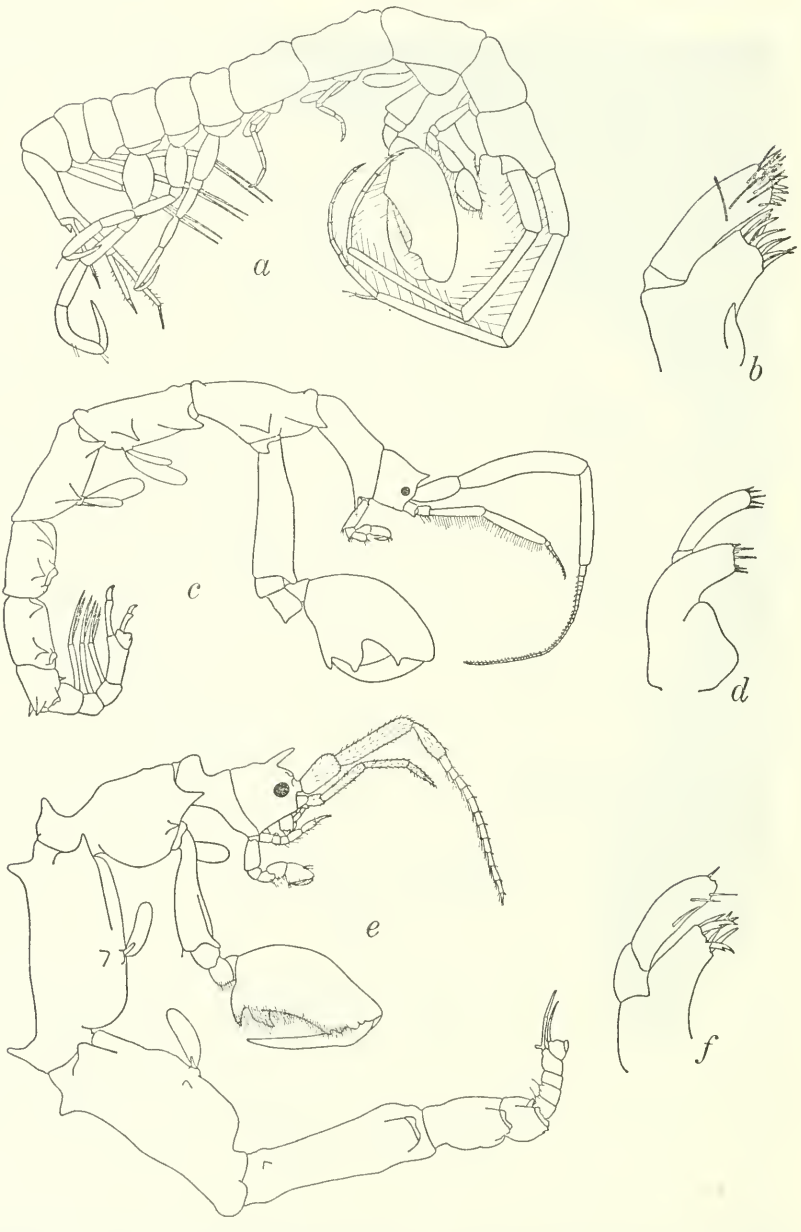

FIGURE 49.—*a* and *b*, *Neoxenodice caprellinoides*, male: *a*, lateral view; *b*, maxilla 1; *c* and *d*, *Caprogammarus gurjanovae*, male: *c*, lateral view; *d*, maxilla 1; *e* and *f*, *Cercops holbolli*, male holotype: *e*, lateral view; *f*, maxilla 1 (*a* after Schellenberg, 1926; *c* and *d* after Kudrjaschov and Vassilenko, 1966).

Stebbing (1906) defines the Caprellidae as Amphipoda which have the:

Head fused with 1st segment of peraeon. Palp of maxilliped 1- to 4-jointed. Peraeon often with fewer than 7 pairs of legs; 2, rarely 3, segments of peraeon with branchial vesicles; 2 segments in female with marsupial plates; 1st joint of gnathopods and peraeopods wanting. Pleon and its legs rudimentary. Eyes small, 1 pair. Hepato-pancreatic tubes 2, rectal glands none. Heart with 3 pairs of ostia. Posterior ganglia of nerve-chain very small, none situated in pleon.

The following facts should be considered before placing this important link in the Gammaridea:

1. No gammaridean bears rudimentary appendages on pereonites 3 and 4; however, in *Neoxenodice* they are reduced though normally segmented. *Caprogammarus* (fig. 49c) bears 2 [? 1]-segmented appendages on the pereonites and the reduction of these appendages is in the Caprellidea.

2. Gammarideans have at least 4 pairs of gills with the exception of *Neoxenodice* which has 3 pairs. *Caprogammarus* bears only 2 pairs as is common in the Caprellidea.

3. Gammarideans have at least 4 pairs of incubatory plates, although the number is not known for *Neoxenodice*. *Caprogammarus* bears only 2 pairs as is common in the Caprellidea.

4. Most caprellids do bear small coxal plates on pereonites 1 and 2 and 5–7 which, as in *Cercops* and *Aeginella*, are as well if not better developed than in *Caprogammarus* (fig. 3f).

5. Some rather advanced caprellid genera such as *Aeginella* and *Proaeginina* have only a partial fusion of the cephalon with pereonite 1 and the suture between them is quite distinct.

6. The abdomen of *Cercops* consists of 5 somites and bearing in the male what could be considered 2 pairs of very rudimentary pleopods and 2 pairs of uropods.

7. Maxilla 1 of gammarideans always bears an inner lobe (fig. 49b) which is absent in the Caprellidea (fig. 49f). *Caprogammarus* was described as bearing an inner lobe (fig. 49d). The only irreconciliable differences between the Caprogammaridae and the Caprellidea are the presence of a telson, biramous pleopods, and an inner lobe on maxilla 1 in *Caprogammarus*. The telson of *Caprogammarus* is very small and may represent the dorsal anal lobe which is sometimes quite large in the Caprellidea. The inner lobe in the figures of maxilla 1 of *Caprogammarus* seems to be of quite unusual shape and is even larger than that of *Neoxenodice*. It might be that the figures are not of an actual lobe but of some distortion caused during dissection. Regrettably, I have not been able to obtain specimens of *Caprogammarus* so I must rely on Kudrjaschov and Vassilenko's description and figures. The biramous pleopods and the inner lobe of maxilla 1

are not as important in my opinion as the other characters mentioned above, which *Caprogammarus* shares with the Caprellidea.

For these reasons, I am placing *Caprogammarus* in the family Caprellidae. It might be argued that since the genera *Neoxenodice–Caprogammarus–Cercops* form a fairly even gradation between the Gammaridea and the Caprellidea that merging of the suborders would be justified. To do this, however, one would have to take into consideration splitting the family Caprellidae into several families to place it on the same level as gammaridean families. This probably could be done be restricting the family Caprellidae to those forms which have quite reduced abdomens and by using the family Caprogammaridae for those transitional forms such as *Caprogammarus* and *Cercops*. In my opinion the Caprellidae are too poorly known to make such a revision at this time and consideration should be given to details of the mouthparts of members of all the genera involved prior to a reorganization of familial taxa.

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