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CONTRIBUTIONS FROM THE BIOLOGICAL LABORATORY OF THE BUREAU OF FISHERIES,  
AT WOODS HOLE, MASSACHUSETTS.

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THE AMPHIPODA OF SOUTHERN NEW ENGLAND.

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By S. J. HOLMES, Ph. D.,  
*Assistant Professor of Zoology, University of Wisconsin.*



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INTRODUCTION.

The present paper includes descriptions of all the species of Amphipoda known to occur on the southern coast of New England. In addition, many species have been described which thus far have been found on the New England coast only north of Cape Cod; but it is probable that many of these will subsequently be discovered within the territory covered by this report.

Many of the species of Amphipoda of southern New England were described by Professor Smith in Verrill and Smith's valuable report on the Invertebrate Animals of Vineyard Sound, published in 1873. I have been able, however, to add materially to the number of species mentioned in this work, both by the description of several new species and the discovery of many others heretofore known only from other localities. In the perplexities and difficulties involved in the classification of amphipods, I have received great assistance from Doctor Stebbing's report on the Amphipoda of the Voyage of the Challenger and the volumes on the Amphipoda in Sars's Crustacea of Norway. Only by working through a mass of miserable and fragmentary description, which it falls to the lot of every systematist to peruse, is one qualified properly to appreciate such thorough and scholarly productions as these two works.

I have not thought it necessary to include an extensive synonymy of the species described, and only those references have been given which are necessary properly to connect the descriptions with work that has been done before. A bibliography is added which lists the principal papers dealing with the amphipod fauna of the region covered and of adjacent territory.

It is a pleasure to acknowledge the courtesies received during the preparation of this paper from Dr. H. C. Bumpus, formerly director of the laboratory of the Bureau of Fisheries at Woods Hole, Mass. My thanks are due also to the Boston Society of Natural History for the loan of many valuable specimens, to Prof. J. S. Kingsley for several specimens borrowed from Tufts' College, and to Prof. S. I. Smith, of Yale University, for the opportunity to examine the types of some of his species.

Valuable aid was received both in the way of specimens and literature from the United States National Museum and the Bureau of Fisheries, and is gratefully acknowledged. The photographs of the species illustrated in the plates were taken in the zoological laboratory of the University of Michigan.

The Amphipoda are found in practically all parts of the ocean. Many species are confined to near the shore, where they live among rocks and seaweeds. Others are strictly pelagic in habit, such as most of the Hyperiidea, which occur, often in very great numbers, at or near the surface of the open ocean. The Gammaridea also occur in great abundance, especially in the Arctic regions, where they assume, as a rule, a larger size than in more southern waters.

Little that is definite is known concerning the rôle played by the Amphipoda in the bionomic relations of marine life, but there can be small doubt that it is an important one. In addition to living upon the seaweeds and the bodies of dead animals, amphipods actively prey upon smaller forms of life. In turn, they fall victims to the rapacity of higher organisms. They are preyed upon by many kinds of fishes, of whose food they constitute a not inconsiderable proportion. The variety of their habitats and the great abundance they sometimes attain render them important elements in the food supply of many higher marine animals.

#### GENERAL CHARACTERS OF THE AMPHIPODA.

Malacostraca, in which the body is divided into a head, a thorax of seven free segments, and an abdomen, which consists typically of six segments and a telson; no carapace; eyes sessile and usually compound; gills in the form of sacs attached to the inner side of the first joint of the thoracic legs; first three pairs of abdominal appendages fitted for swimming; the last three pairs very different from the preceding ones in structure, directed backward, and adapted for springing.

With the exception of the terrestrial sand-fleas, belonging to the Orchestiidae, all of the Amphipoda are aquatic and the great majority of the species marine.

#### EXTERNAL STRUCTURE OF AMPHIPODA.

In order to facilitate the identification of species by those who may not be familiar with this group of Crustacea, I have inserted the following account of those structural features which are commonly used in classification:

*Divisions of the body.*—The body of an amphipod crustacean is divisible into three principal parts—head, thorax, and abdomen. The segments composing the head are indistinguishably fused, and there is some difference of opinion regarding the number of segments of which the head is constituted. It is certainly as many as six; according to Della Valle, and to some others, it is seven; and Westwood puts the number as high as nine. But there is not, I believe, sufficient evidence, either anatomical or embryological, to justify us in recognizing more than seven cephalic segments, if, indeed, that many. The term head, as Doctor Stebbing has remarked, is one of rather loose application. What is termed the head in the Amphipoda corresponds to the head plus the first thoracic segment in the Decapoda. In most of the Amphipoda the head is very sharply marked off from the thorax. In one group, however, the Caprellidea, the first thoracic segment is more or less completely fused

with the head, but the line of union is usually clearly indicated on the outer surface. The thorax is composed of seven free segments, each of which, except in some of the Caprellidea, bears a pair of appendages. The abdomen in the typical Amphipoda consists of six segments and a small terminal appendage, the telson, which perhaps represents an additional segment. The segments of the abdomen are usually free, but in some forms the last two may be fused. In the Caprellidea the abdomen is reduced to a mere rudiment.

*Eyes.*—The eyes of amphipods are sessile and generally compound. In the Ampeliscidæ there are instead of two compound eyes usually four eyes, each with a simple corneal lens. The eyes of the Hyperiidæ are frequently of enormous size, covering most of the surface of the head. In *Phronima* they are distinctly separated into upper and lower divisions.

*First antennæ.*—The first antennæ are composed of a basal portion, or peduncle, which never consists of more than three joints and a terminal, usually multiarticulate, flagellum. A secondary flagellum is often present, but is generally of small size.

*Second antennæ.*—The peduncle of the second antennæ consists typically of five joints. In the second joint occurs the opening of the antennal gland, which is generally indicated by a conical prominence. The flagellum is generally long and slender, but in some forms it is short and stout and employed in locomotion. Both pairs of antennæ bear setæ, and often olfactory clubs and peculiar slipper-shaped appendages called calceoli.

*Upper lip.*—This is a plate articulated in front of the mandibles. Its form varies greatly in different groups.

*Mandibles.*—The mandibles of amphipods are strong and adapted for cutting and grinding. On the outer surface is inserted the palp, which never consists of more than three joints and may be reduced to two or even one. In many forms it is absent entirely. The inner edge of the mandibles is generally divided into teeth. Below the principal cutting edge is usually a smaller secondary plate, which is movably articulated and generally dentate. On the concave surface of the mandible there is usually a large molar tubercle with a roughened, rasping surface. In some forms (Lyssianassidæ) the molar tubercle may be small or absent. The right and left mandibles commonly differ in structure.

*Lower lip.*—This consists of two principal lobes fused for a certain distance in the middle line.

*First maxillæ.*—The first maxillæ consist of an inner plate, an outer plate, and a palp. The inner plate is smaller than the outer and is frequently very much reduced in size, or absent. The outer plate is elongated and tipped with a row of stout, curved, and usually denticulated or pectinate spines, which are employed in mastication. The palp consists of two joints or less. In *Orchestia* and some other genera it is absent.

*Second maxillæ.*—The second maxillæ are slender and weak and consist of a basal piece, upon which are joined an inner and an outer plate. These are generally flexible and setose on the margins.

*Maxillipeds.*—The maxillipeds consist typically of an inner plate, an outer plate, and a palp. The first joints of the right and left maxillipeds are fused in the middle

line. The inner and outer plates are formed by the anterior expansion of the second and third joints, respectively; the remaining joints, four in number or less, constitute the palp. Both inner and outer plates are frequently furnished with stout spines, which are employed in mastication.

*Thoracic legs.*—The first two pairs of thoracic legs differ considerably in structure from the succeeding appendages and are designated gnathopods. The remaining five pairs are called the peræopods. Each thoracic appendage consists of seven joints, which may be designated, counting from the articulation with the body, as the coxal plate, basal joint, ischium, merus, carpus, propodus, and dactyl. The first joint or coxal plate is joined so as to permit only a small amount of lateral movement, and lies mainly outside the following joints, so that it apparently does not form a part of the appendage. The basal joint is elongated. The ischium, except in the posterior gnathopods of the Lysianassidæ, is short. The three following joints vary greatly in their relative development in the different groups. The terminal joint or dactyl is usually in the form of a claw. Only very rarely is it absent (*Haustorius*, *Bathyporeia*). The gnathopods usually have the propodus in the form of a hand, and are adapted for grasping objects, although in many forms they are also employed in ordinary locomotion. The structure and relative size of the gnathopods vary exceedingly in different groups. In some cases the dactyl closes against a thumb-like process of the hand, as in the claw of the lobster, and in such cases the gnathopods are said to be chelate. Usually the dactyl closes against one margin of the hand, the palm, and then the gnathopods are said to be subchelate. Marked sexual differences are common in structure as well as in the size of the gnathopods, and in several species (*Jassa*, some *Orchestias*) a dimorphism occurs in the second gnathopods of the male. The genus *Batea* is unique in having the first gnathopods in a rudimentary form.

*Peræopods.*—The first two pairs of peræopods are usually of similar form and nearly equal size. They are generally smaller and less stout than the following pairs and have a narrow basal joint. Their coxal plates, like those of the gnathopods, are generally large. The dactyls in nearly all amphipods point backward. In many genera which Della Valle unites under the family "Corofidi" the first two pairs of peræopods contain glands which may extend from the second into the fifth joint and which produce a sticky fluid which is discharged through a duct opening at the tip of the dactyl. This fluid, which hardens into a sort of web as it is drawn out of the duct, is used in the construction of tubes or nests in which the animal takes up its abode. The following three pairs of peræopods usually have small coxal plates and broad basal joints. They are generally of unequal size and in many genera are very dissimilar in form. The dactyls usually point forward.

*Abdominal appendages.*—The abdominal appendages of amphipods fall under two very different types. The anterior three pairs, the pleopods, are adapted for swimming. Each consists of a single basal piece which bears two multiarticulate rami, which are furnished with long, plumose setæ on both sides of each joint. The two basal pieces of each pair are held together by a series of coupling spines on the lower portion of the inner margin. The three posterior pairs of appendages, or the uropods, are firm in texture and comparatively immobile. They all point posteriorly and are closely approximated. Each consists of a basal piece, or peduncle, and two

rami, which are generally uniarticulate, although in some forms the outer ramus consists of two joints of which the terminal one is usually small. Both peduncle and rami are generally armed with strong spines along the upper margins and at the tip. The terminal pair of uropods is frequently quite different in form as well as size from the preceding pairs. The outer ramus is sometimes greatly elongated while the inner one is rudimentary (*Melita*, *Niphargus*, and a few other genera). In many genera the inner ramus is completely lacking (*Orchestia*, *Corophium*, the Stenothoidæ). A great many amphipods, on the other hand, have the outer ramus of all the uropods shorter than the inner one. Very rarely (*Cerapus*) the second uropods are uniramous as well as the third. In *Pereionotus* the uropods are reduced to two pairs. The Caprellidæ, owing to the rudimentary condition of the abdomen, possess at most two pairs of abdominal appendages, and these much reduced in size. In some members of this group the abdomen is entirely devoid of appendages.

*Gills.*—The gills of amphipods are in the form of flattened sacs which depend from the inner side of the coxal plates of the thoracic legs. They are usually confined to the last six pairs of thoracic appendages, but are lacking in different segments in different groups.

*Marsupial pouch.*—The eggs of the Amphipoda are carried in a pouch under the thorax of the female. This pouch is formed by overlapping lamellæ which arise inside the base of the second to the fifth thoracic appendages. In some forms there are less than four plates, but it is very rare that there are five. Each lamella is generally more or less spatulate in form and bears on the margins very long plumose setæ, which serve to hold the plates together.

The following abbreviations are used in connection with the figures in the text:

<i>ant</i> <sub>1</sub> .....	first antenna.	<i>p</i> .....	peræopod.
<i>ant</i> <sub>2</sub> .....	second antenna.	<i>T</i> .....	telson.
<i>gn</i> .....	gnathopod.	<i>ur</i> .....	uropod.

### Tribe HYPERIIDEA.

Head generally large, often with enormously developed eyes; maxillipeds with the inner plates coalesced; palp wanting; gnathopods not very large, coxal plates small; last two abdominal segments fused.

The Hyperiidea are pelagic forms and are often found in association with medusæ, or, more rarely, other pelagic animals. The species often have a very wide range, and it would not be surprising, therefore, if forms were met with off the coast of New England which had previously been recorded only from a far distant locality. Nearly all the known species of Hyperiidea are fully described and figured in the excellent Monograph of the Amphipoda Hyperiidea by Prof. Carl Bovalius. The species that have been met with near the coast of southern New England are described below.

### Family HYPERIIDÆ.

Head very large and tumid, the sides entirely occupied by the enormous eyes; antennæ short and with undivided flagella in the female; with long multiarticulate flagella in the male; mandibles with a palp; gnathopods simple, subchelate, or complexly subchelate; peræopods not greatly modified; uropods biramous, with flattened lanceolate rami.

Peræopods subequal in length.

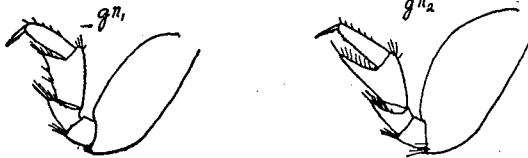
Carpal lobe of the first gnathopods short or absent.....HYPERIA

Carpal lobe of the first gnathopods as long as the propodus.....HYPEROCHE

Third peræopods markedly longer than the others.....EUTHEMISTO

**Hyperia galba** (Montagu.)

Body tumid; antennæ in the female scarcely half as long as the depth of the head, the first a little longer than the second; in the adult male both antennæ may exceed half the length of body; first gnathopods with carpus produced at the postero-inferior angle into a triangular pointed lobe; second gnathopods with carpus produced into a narrow triangular lobe at the postero-inferior angle extending to or beyond the middle of propodus; pereopods almost devoid of setæ; rami of terminal uropods narrowly ovate-lanceolate; telson triangular-ovate, acute. Length, 15 mm. Arctic specimens may attain a length of 20 mm.



*Hyperia galba*, male. After Sars.

Arctic regions; Norway; British Isles; France; Greenland; off Cape Breton, Nova Scotia; Grand Manan; Gulf Stream, longitude 110° 9' N., latitude 68° 52' W.; Eastport, Me.; Salem and Woods Hole, Mass.

Found commonly in *Aurelia*.

**Hyperia medusarum** (Müller).

This species is closely allied to *H. galba*, but may be distinguished by the following characters: The gnathopods are larger and densely setose on the sides, while in *galba* they have almost no setæ on the surface; the postero-inferior angle of the first gnathopods is not produced, and that of the second is not produced as far as the middle of the propodus; the posterior margins of the first and second pereopods are well furnished with setæ. Length, 15 mm.

Arctic regions; Norway; Greenland; Labrador (Packard); Bass Harbor (on *Cyanea*).

Often found in *Cyanea* and *Aurelia*.

It is very probable that this species will be found as far south as Woods Hole, although I have no knowledge of its occurrence south of Cape Cod. Its usual host, *Cyanea*, is often taken farther south. Professor Smith reports two species of *Hyperia* from Vineyard Sound. It is quite probable that they were this and the preceding species.

**Hyperoche abyssorum** (Boeck).

Body rounded above, more tumid in the female than in male; second antennæ in female much smaller than first, the latter very much shorter than the depth of head; flagellum of second antennæ not much longer than peduncle; both pairs of antennæ much elongated in male; gnathopods of similar form; carpus in both pairs produced into a long acute lobe which extends below the propodus to or beyond its distal end; first two pereopods with carpus compressed, the posterior edge acute, denticulated and produced at lower end into a tooth; three posterior pereopods subequal and not much longer than first two, but with long and slender dactyls and narrower carpi; telson triangular-ovate, not reaching the middle of peduncle of terminal uropods. Length, 5-6 mm. Arctic specimens, according to Sars, may attain a length of 15 mm. All of the specimens of this species which I have examined are of small size.

Arctic regions; Norway; Greenland; Labrador; Albatross station 2029; Domino Harbor.

**Euthemisto compressa** (Goës).

Body carinated above, the carina on last two segments of thorax and the first two of abdomen produced posteriorly in adults into a tooth. First antennæ in adult female about as long as the head is deep, the tip curved downward; carpus of first gnathopods broad, but not produced at the postero-inferior angle; propodus about as long as carpus and about twice as long as dactyl; second gnathopods with carpus produced below propodus nearly to the tip; dactyl slender, but little over half the length of propodus; carpus of first and second pereopods expanded, rather narrowly but regularly oval, the posterior margin furnished with several long and stout setæ; propodus narrow, curved, little tapering, and closing against the carpus; third pereopods longer and stouter than the posterior two pairs, which reach but little farther than middle of propodus of the former; anterior margin of propodus armed with about ten setæ and minutely pectinated with very short setæ; dactyl over one-fifth the length of pro-



podus and devoid of setæ; outer ramus of uropods much shorter than inner; telson not one-fourth the length of peduncle of terminal uropods.

Length, 12-30 mm., the latter attained by Arctic specimens.

Norway (Sars); Arctic Ocean; Greenland; Jeffries Bank, Labrador; off Marthas Vineyard, *Albatross* stations 914, 2029, 2095, 2101, 2255.

This species, like the following one, is often taken in large quantities at the surface. Frequently many hundred specimens are taken without a single adult, or numerous adults may be taken without finding a single immature individual. The teeth on the dorsal side of the thorax and abdomen are often absent entirely in the young of both species.

#### ***Euthemisto bispinosa* (Boeck).**

Body carinated above, the carina on last two thoracic segments produced posteriorly in adults into a tooth; antennæ about as in *compressa*; first pereopods with carpus irregularly oval, much broader than in *compressa*, the posterior margin bulging strongly backward near the proximal end and furnished with several rather weak setæ; carpus of second pereopods oval, broader than in *compressa*, the setæ on posterior margin much as in first pair; third pereopods large, much elongated; carpus markedly stouter in the basal half; propodus very narrow, elongated and straight, anterior margin furnished with but few setæ, mainly on proximal portion and pectinate with minute spinules which increase in length toward distal end, where they may equal or exceed the diameter of the joint; dactyl devoid of setæ and less than one-fifth the length of propodus; uropods and telson as in preceding species.

Arctic Ocean; Finmark; Greenland; off Nova Scotia (Stebbing); Gulf of Maine; Vineyard Sound; *Grampus* station 89; Long Island.

#### **Family PHRONIMIDÆ.**

Very deep head, on the sides and top of which are located the large eyes; antennæ attached to anterior side of head, the flagellum of both pairs multiarticulate in the male; second antennæ rudimentary in the female; no mandibular palp.

#### ***Phronima sedentaria* (Forskål).**

Several specimens of this species, from various points off the coast of New England, were examined. They were usually found in tests of *Salpa*. The species is very extensively distributed over both the Atlantic and the Pacific oceans. The variations due to differences of age and sex are very great and have given rise to much confusion and the formation of many synonyms.<sup>a</sup>

#### **Tribe GAMMARIDEA.**

Head rather small, with eyes rarely of very large size; body usually compressed; maxillipeds with inner plates free and furnished with a palp.

The Gammaridea include the typical Amphipoda. Both the Hyperideæ and the Caprellideæ are to be regarded as aberrant groups, highly specialized in relation to their peculiar habits of life. The Gammarideæ comprise by far the greater number of species of amphipods. The group is one of great diversity, and its proper subdivision is attended with unusual difficulties. There are extremely wide differences of opinion regarding the limits of the families into which it should be divided. In the elaborate monograph of the Gammarideæ by Della Valle, all the genera are grouped into ten families; Sars distinguishes twenty-five families in the fauna of Norway alone, and several new families have been instituted by Doctor Stebbing. At present a large number of families is proposed without being grouped into anything that approaches a satisfactory system. In the present paper I have not attempted the task of grouping the genera into families, as it was not really necessary for the purpose in hand, and have inserted a key which enables one to pass directly to the genera.

<sup>a</sup>I subjoin a list of species of Hyperideæ examined from regions somewhat beyond the one covered by this paper.

*Parathemisto oblivio* (Krøyer); *Albatross* stations 2029 and 2101.

*Cystisoma spinosum* (Fabricius), a single specimen; *Albatross* station 2199.

*Oxycephalus clausi* (Bovallius); *Albatross* station 2095.

*Anchylotomera Blossevillii* (Milne-Edwards); Gulf Stream, several specimens.

*Vibilia viatrix* (Bovallius); a single specimen from off Newport.

An undetermined species of *Thyropus* is reported by Professor Smith as having been taken off Gay Head.

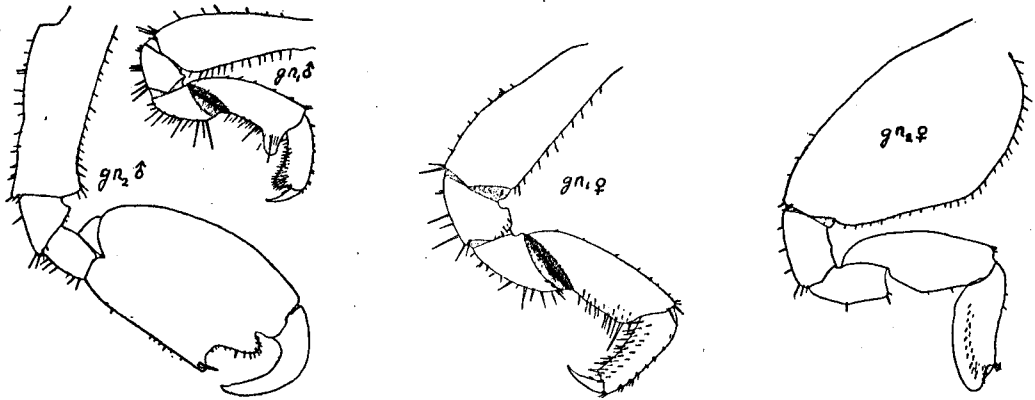
*Key to the genera of Gammaridea.*

- A. Eyes four, sometimes apparently only two (*Haploops*), each with a simple lens (*Ampeliscidæ*).  
 Terminal uropods extending much beyond the others; telson oblong, deeply cleft ..... *AMPELISCA*, p. 479  
 Terminal uropods extending but little beyond the others; telson short and broad, not deeply cleft ..... *BYBLIS*, p. 482
- AA. Two compound eyes, or, rarely, the eyes rudimentary or absent.
- B. First antennæ much shorter than the second; mandibles devoid of a palp; terminal uropods with a single unarticulate ramus (*Orchestiidae*).  
 C. First antennæ exceeding the tip of the peduncle of the second pair; aquatic forms ..... *ALLORCHESTES*, p. 472  
 CC. First antennæ much shorter than the peduncle of the second; terrestrial forms.  
 First gnathopods in both sexes subchelate ..... *ORCHESTIA*, p. 469  
 First gnathopods simple in the female ..... *TALORCHESTIA*, p. 468
- BB. Without the combination of characters of B.
- C. First two pairs of paræopods devoid of spinning glands.  
 D. Last pair of paræopods much longer than the preceding ones, with the dactyl very long and styliform; eyes nearly contiguous above, near the end of the projecting front (*Ediceridae*).  
 Carpus of the anterior gnathopods devoid of a prominent posterior lobe ..... *PARGICEROS*, p. 487  
 Carpus of the anterior gnathopods prolonged into a long lobe which extends behind the hand ..... *MONOCULODES*, p. 487
- DD. Without all the characters of D.
- E. Rostrum produced into a hood over the antennæ. Penultimate paræopods much longer than the last pair (*Phoxocephalidae*).  
 F. Palp of the first maxillæ two-jointed ..... *HARPINIA*, p. 478  
 FF. Palp of the first gnathopods one-jointed.  
 Second gnathopods markedly larger than the first ..... *PHOXOCEPHALUS*, p. 477  
 First and second gnathopods of equal size ..... *PARAPHOXUS*, p. 477
- EE. Rostrum not as in E.
- F. Mandibles not denticulated; palp three-jointed; first antennæ with a short, thick base and a secondary flagellum; coxal plates deep; second gnathopods elongated, slender, flexible, with the ischium elongated and the hand small and furnished with dense patches of short setæ; dactyl rudimentary (*Lysianassidae*).  
 G. Telson entire ..... *LYSIANOOPSIS*, p. 475  
 GG. Telson deeply cleft.  
 H. Postero-lateral angle of the third abdominal segment not produced ..... *TRYPHOSA*, p. 473  
 HH. Postero-lateral angle of the third abdominal segment produced into a small tooth ..... *HOPLONYX*, p. 474  
 HHH. Postero-lateral angle of third abdominal segment produced into a large upturned tooth, above which is a deep marginal sinus.  
 Basal joints of first antennæ distally produced above; secondary flagellum small. *HIPPOMEDON*, p. 473  
 Basal joints of first antennæ not so produced; secondary flagellum well developed ..... *ANONYX*, p. 472
- FF. Without the combination of characters of F.
- G. Terminal uropods with a single ramus.  
 H. Ramus of terminal uropods one-jointed; first gnathopods massive, the second small ..... *UNCIOLA*, p. 520  
 HH. Ramus of terminal uropods two-jointed (*Stenothoidæ*).  
 Mandibles with a palp ..... *METOPA*, p. 483  
 Mandibles without a palp ..... *STENOTHOË*, p. 484
- GG. Terminal uropods biramous; abdomen with the last three segments free.  
 H. Anterior gnathopods with the carpus and propodus forming a chela ..... *LEUCOTHOË*, p. 486  
 HH. Not as above.  
 I. Carpus of the gnathopods joined in front of the proximal end of the propodus ..... *EUSIRUS*, p. 493  
 II. Carpus joined in the usual manner.  
 J. Paræopods devoid of dactyls and peculiarly modified for digging ..... *HAUSTORIUS*, p. 476  
 JJ. Paræopods with dactyls.  
 K. First antennæ with an accessory flagellum.  
 L. Terminal uropods flattened, projecting beyond the others. Gnathopods larger in the male than in the female, the second pair generally larger than the first; telson small, flattened, cleft, or emarginate (*Gammaridae*).  
 M. Inner ramus of the terminal uropods scale-like, rudimentary; first antennæ longer than the second ..... *MELITA*, p. 504  
 MM. Inner ramus of terminal uropods not rudimentary, although often considerably smaller than the outer.  
 N. Telson only slightly emarginate; thorax and abdomen dorsally carinated ..... *GAMMARELLUS*, p. 508  
 NN. Telson deeply cleft.  
 O. Last three segments of the abdomen with fascicles of spines.  
 First three abdominal segments produced behind into acute teeth. *CARINOGAMMARUS*, p. 503  
 First three abdominal segments not so produced; abdomen not dorsally carinated ..... *GAMMARUS*, p. 500

- OO. Last three segments of the abdomen without fascicles of spines, although there may be spiniform projections from the posterior margins of the segments.  
Terminal uropods with comparatively short and broad rami.  
Posterior pereopods stout..... ELASMOPUS, p. 507  
Terminal uropods elongated; posterior pereopods rather slender..... MERA, p. 525
- LL. Not with all the characters of L.  
M. Body spiny; secondary flagellum minute..... RHACHOTROPIS, p. 493  
MM. Not as above.  
Coxal plates enormously developed; body tumid; no mandibular palp.. STEGOCEPHALUS, p. 482  
Mandibles with palp; fourth abdominal segment with an upturned process; coxal plates of ordinary size..... PONTOPOREIA, p. 476
- KK. First antennae with no secondary flagellum.  
L. Maxillipeds with the palp small and two-jointed; parasitic; thorax rather broad and tumid..... LAFYSTIUS, p. 492
- LL. Not as above.  
M. Telson cleft.  
N. First gnathopods rudimentary..... BATEA, 499  
NN. First gnathopods not rudimentary.  
O. First three pairs of coxal plates pointed below; body with prominent spines or tubercles and a median dorsal crest; head with a very prominent rostrum.  
Body with prominent tubercles on either side of the dorsal crest..... EPIMERIA, p. 491  
OO. First three coxal plates not pointed below.  
Fourth abdominal segment with a posterior dorsal prominence; no mandibular palp..... DEXAMINE, p. 498  
Fourth abdominal segment without a posterior dorsal prominence; mandibular palp three-jointed..... PONTOGENEIA, p. 476
- MM. Telson not cleft.  
N. Body dorsally carinated.  
O. Abdomen with tubercles or spines on either side of the dorsal carina.  
P. Postero-lateral margins of the abdominal segments with very large spines..... ACANTHOZONE, p. 491  
PP. Postero-lateral margins of the abdominal segments with tubercles but no large spines..... PLEUSTES, p. 488  
OO. Abdomen devoid of tubercles or spines, except at the postero-dorsal and postero-lateral angles..... PARAMPHITHOE, p. 489
- NN. Body without a prominent dorsal carina.  
O. Antennae with calceoli; last peduncular joint of the first antennae with a terminal lobe.  
Dorsal spines on some of the body segments..... HALIRAGES, p. 495  
No dorsal spines..... CALLIOPIUS, p. 494  
OO. Antennae without calceoli; no terminal lobe on the last peduncular joint of the first antennae.  
First antennae longer than the second..... SYMPLEUSTES, p. 490  
First antennae shorter than the second..... APHERUSA, p. 495
- GGG. Terminal uropods biramous, inner ramus minute. Last three segments of the abdomen fused.  
Uropods remarkably modified..... CHELURA, p. 508
- CC. First two pairs of pereopods with spinning glands.
- D. Terminal uropods uniramous.  
E. Mandibular palp one-jointed..... SIPHONOCETES, p. 522  
EE. Mandibular palp two-jointed..... COROPHIUM, p. 521  
EEE. Mandibular palp three-jointed  
Last two pairs of uropods uniramous..... CERAPUS, p. 517  
Penultimate pair of uropods biramous. Second gnathopods larger than the first..... ERICITHONIUS, p. 518
- DD. Terminal uropods biramous.  
E. Propodus of the second gnathopods not subchelate..... PTILOCHEIRUS, p. 522  
EE. Propodus of the second gnathopods chelate or subchelate.
- F. Terminal uropods with short hooked rami (Podoceridae).  
G. First antennae with a secondary flagellum.  
H. Hand of the second gnathopod of the male very large, and having a thumb-like process arising from near the base of the posterior side..... JASSA, p. 511  
HH. Second gnathopods of the male not as in Jassa.  
Antennae rather stout, densely setiferous posteriorly, flagella with few segments..... ISCHYROCERUS, p. 513  
Antennae slender, with multiarticulate flagella..... GRUBIA, p. 510
- GG. First antennae without secondary flagellum..... AMPHITHOE, p. 509
- FF. Terminal uropods with narrow rami devoid of terminal hooks.  
G. Second gnathopods much larger than the first, first antennae with no accessory flagellum.. PODOCEROPSIS, p. 524  
GG. First gnathopods much larger than the second, first antennae with a secondary flagellum.  
Second gnathopods of the male complexly subchelate..... MICRODEUTOPUS, p. 514  
Second gnathopods of the male simply subchelate..... AUTONOË, p. 516

*Talorchestia longicornis* (Say).

Eyes large; first antennæ but little exceeding the penultimate joint of peduncle of the second, flagellum about as long as preceding basal joint, and composed of about six segments; second antennæ long, in males sometimes as long as the body, last joint of peduncle armed with short spinules and longer than all preceding joints; flagellum longer than peduncle; epimera not so high as their segments, the lower margins short-setose; first gnathopods in male with the fifth joint produced at the infero-distal angle into a long, rounded lobe; sixth joint gently widening distally, the infero-distal angle produced and rounded; palm transverse; claw projecting much beyond the palm; second gnathopods in male with hand oblong, large, and thick; anterior margin evenly rounded, the posterior nearly straight; palm oblique, the posterior angle produced; middle part of palm with a broad, convex lobe; finger short, strongly curved at tip, closing on the inner side of a prominence at outer end of palm; in the female the first gnathopods resemble those of the male, but there is no prominent lobe on the fifth joint, and the sixth joint is not distally widened nor produced into a lobe at the infero-distal angle; second gnathopods weak, second joint much widened and strongly convex in front; hand oblong, the lower end rounded; dactyl minute and located on the margin some distance above



*Talorchestia longicornis*. Woods Hole, Mass. The gnathopods of the male are drawn to a smaller scale than those of the female.

end of hand; third pereopods very short, the second joint as wide as long; first uropods extending slightly beyond second, rami subequal and about equal to peduncle; in the second pair the rami are longer than the peduncle and the inner rami are considerably longer than the outer; ramus of last uropods about as long as peduncle, but much narrower; telson triangular, fleshy, emarginate at tip, and furnished with a median dorsal groove.

General color whitish, with often a row of brown spots along the middle of the back. Antennæ reddish or pink at the base, flagella blue; propodi of the posterior pereopods bluish.

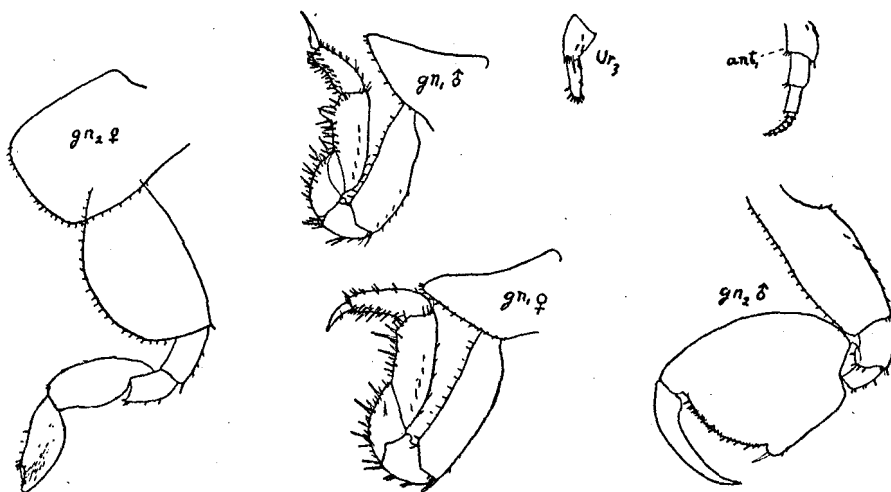
Length, 2 cm.

Cape Cod to New Jersey.

This species is commonly very abundant on sandy beaches. In the daytime these sand fleas lie quiet in their burrows, which are generally some distance above high tide mark. Their presence is indicated by small holes in the sand. The burrows are only a few inches deep, the depth depending largely upon how far the animal has to dig in order to reach moist sand. When dug out in the daytime *Talorchestia* is rather sluggish and apparently dazed. It often curls up and lies quiet as if feigning death and may even be picked up and handled in some cases without betraying signs of animation. When aroused it commonly makes a few leaps, when, especially if it alights upon loose sand, it lies quiet for a short time and then begins to burrow. At night it comes out of its burrows and may be seen in large numbers running over the seaweed recently washed ashore, which affords its principal food. Then it is very alert and is able to detect one's approach at a distance of several yards. It is strongly attracted to light and gathers around a lantern in swarms. In fact, the easiest way to procure large numbers of this species is to take a lantern into their midst at night, placing it in the middle of a large blanket or sheet. The *Talorchestia* that congregate about the lantern may then be gathered in quantity and preserved.

*Talorchestia megalophthalma* (White).

Eyes very large, covering greater part of head; first antennæ with the three joints of peduncle of subequal length; flagellum much shorter than peduncle; second antennæ much as in *T. longicornis*, but shorter; first gnathopods in male much as in preceding species; fifth joint with a prominent inferior lobe; sixth joint narrowing somewhat from the base to within a short distance from the distal end, where it is widened into a rounded posterior lobe; second gnathopods of male with a large, more or less ovate hand, with anterior margin evenly convex and the much shorter posterior margin nearly straight; palm oblique, evenly convex, spinulose, with a prominence bearing a strong spine at the posterior end; first gnathopods of female with no prominent inferior lobe and the sixth joint tapering distally and not produced at lower end; second gnathopods of female closely resembling those of *T. longicornis*; second abdominal segment produced into a small, acute, triangular process at infero-distal



*Talorchestia megalophthalma*. Woods Hole, Mass. The second gnathopods of the male are drawn to a smaller scale than the other parts.

angle; first uropods with rami equal and about equal to peduncle; second pair with rami longer than peduncle, inner ramus the longer; third pair with ramus slightly longer than peduncle.

Color whitish.

Length, 15 mm.

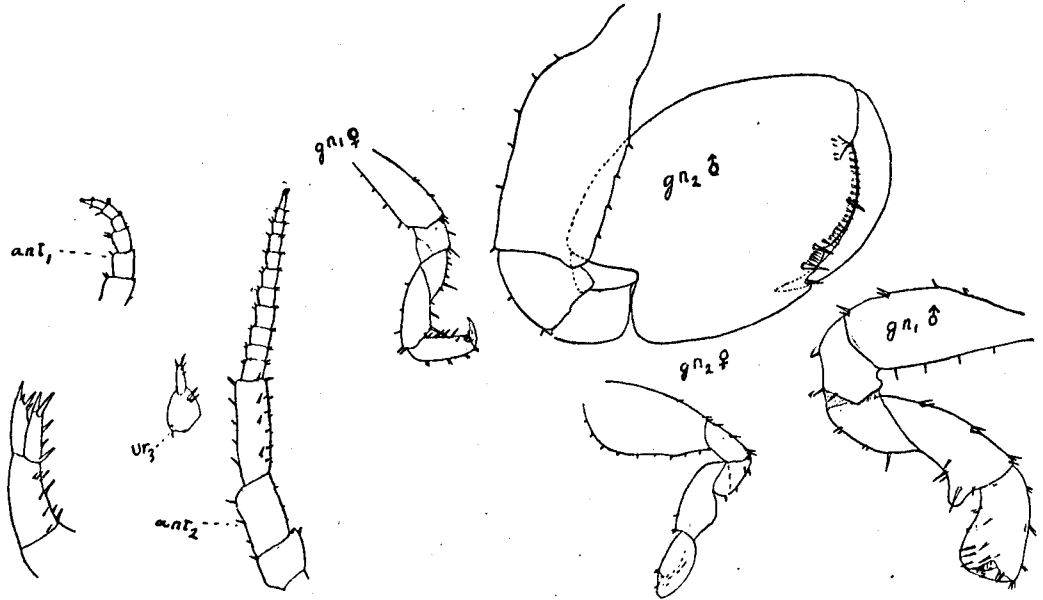
Casco Bay, Maine; Provincetown (Rathbun); Cape Cod to New Jersey.

This species is much less common than *longicornis*, but lives in similar situations. It is readily distinguished by its large eyes and the shape of the second gnathopods in the male. The specimen which was named *Orchestia megalophthalmus* by White and from which Bate drew his description came from an unknown locality. Owing to Bate's imperfect description and poor figure, it might be doubted whether the specimens referred to *megalophthalma* by Smith really belong to this species. Through the kindness of Mr. Bell, I have been able to compare specimens from Woods Hole, Mass., with the type specimen, which is preserved in the British Museum. Although the type is badly mutilated, I am convinced that the specimens from Woods Hole, which I brought for comparison, belong to the same species.

*Orchestia agilis* Smith.

Eyes prominent; antennules scarcely reaching penultimate joint of peduncle of antenna; flagellum shorter than peduncle; antennæ scarcely half the length of body; peduncle stout in the male, last joint a little longer than preceding one; flagellum shorter than peduncle and composed of 10-15 short, compressed joints; first gnathopods of male with carpus produced below into a large, rounded lobe; propodus shorter than carpus, distally widened, the infero-posterior angle produced into a large

rounded lobe, the distal margin forming a palm against which the finger closes; a deep notch between this lobe and base of finger; second gnathopods of male with propodus very large and stout; palm very oblique, convex, and notched a short distance within the posterior angle, which is a little produced; "the margin, when viewed laterally, shows a broad lobe next the base of the dactylus and two small, rounded lobes near the posterior angle, the tip of the finger resting between the small lobes." In the female neither carpus nor propodus is furnished with a lobe, although the posterior margin of the former is somewhat produced below the middle; second gnathopods of female with propodus oblong, rounded below, and furnished on the anterior margin with a minute dactyl which does not reach the lower end; merus and carpus in posterior pereopods of adult male swollen; rami of first



*Ocrhestia agilis*. The antennæ and uropode are drawn to a different scale from the other parts, and the gnathopods of the male are drawn to a larger scale than those of the female. Specimens from Woods Hole.

uropods markedly shorter than peduncle; those of second uropods subequal to peduncle; ramus of posterior uropods several times narrower than the thick peduncle but nearly as long; telson narrowly rounded behind or more or less pointed, spinulose.

Length, 1 cm.

General color, olive brown; antennæ red or reddish brown; legs, coxal plates, and after portions of the body of a bluish color.

Bay of Fundy to New Jersey.

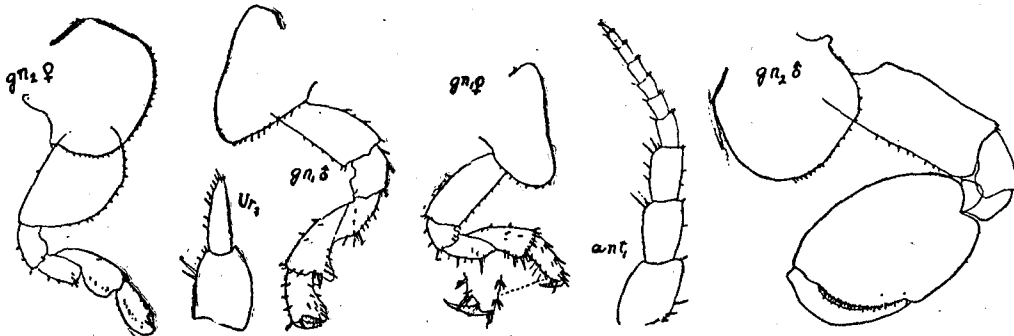
This species is exceedingly abundant under the masses of seaweed near the shore. It is seldom found so far up on the beach as *Talorchestia*, and is much more active during the daytime. Its specific name is very appropriate, as it hops with the greatest rapidity and, in relation to its size, to a remarkable distance. It is by far the most active of all the sand fleas of the region. When masses of seaweed are upturned the air sometimes fairly swarms with these amphipods. Like *Talorchestia* this species lives mainly upon seaweed, although it seems to be quite omnivorous and will not disdain animal food. It is seldom found under masses of drift that are not damp, or if so it is buried some distance in the sand. *O. agilis* will bear immersion for over a week in sea water, as I have determined by experiment, and is able to swim, when necessary, as if to the manner born. Occasionally I have found specimens on piles at a considerable distance from the shore—fortunate survivors, doubtless, of forms overtaken by the waves and carried out to sea. Like *Talorchestia longicornis* this species is strongly attracted to the light, although under certain conditions it may become negatively phototactic.

For details concerning the phototactic reactions of this and other species of amphipods, reference may be made to my paper on Phototaxis in the Amphipoda (American Journal of Physiology, vol. 5, p. 211).

This is undoubtedly the species referred to as *Orchestia gryllus* (Bosc), by Stimpson, and possibly also by De Kay and Say. Bosc's original description, however, does not enable one to decide whether he had specimens of this or some other species of *Orchestia*. His description and figure apply to *palustris* Smith, as well as to the above, although his statements that *gryllus* "se trouve en grande quantité," and that "elle saute par le moyen de sa queue et glisse sur la sable, par le même moyen, avec une rapidité dont on ne se fait pas une idée," would more naturally be made concerning *agilis* than *palustris*.

#### *Orchestia palustris* Smith.

First antennæ reaching a little beyond tip of penultimate basal joint of second antennæ, the three basal joints of subequal length; flagellum nearly or quite as long as peduncle; second antennæ with penultimate basal joint two-thirds as long as the last one; flagellum longer than peduncle; second, third, and fourth epimera quadrate, rather broader than deep; first gnathopods of male much as in *agilis*, the carpus having a prominent rounded inferior lobe and the propodus distally widened and



*Orchestia palustris*. Woods Hole. First antenna and third uropod drawn to a larger scale than the other parts.

produced into a rounded lobe at the infero-posterior angle; second gnathopods of male with hand oval, palm very oblique and evenly convex and spinous, the posterior end defined by a small prominence within which the tip of the dactyl closes; otherwise the palm forms an even curve with the posterior margin of the hand; dactyl fitting closely to the palm. First gnathopods in female much as in *agilis*, carpus somewhat produced and rounded at the infero-posterior angle; second gnathopods of female also resembling those of *agilis*, but the second joint broader and much more strongly and evenly convex in front. Infero-posterior angles of second and third abdominal segments produced into triangular acute points; rami of first uropods shorter than peduncle, those of second pair subequal to the peduncle; ramus of last pair equalling or exceeding peduncle and relatively larger than in *agilis*; telson with a posterior notch, the lobes rounded, spinulous.

Length, 18 mm.

Color olive brown to olive green; some individuals reddish brown; antennæ reddish brown.

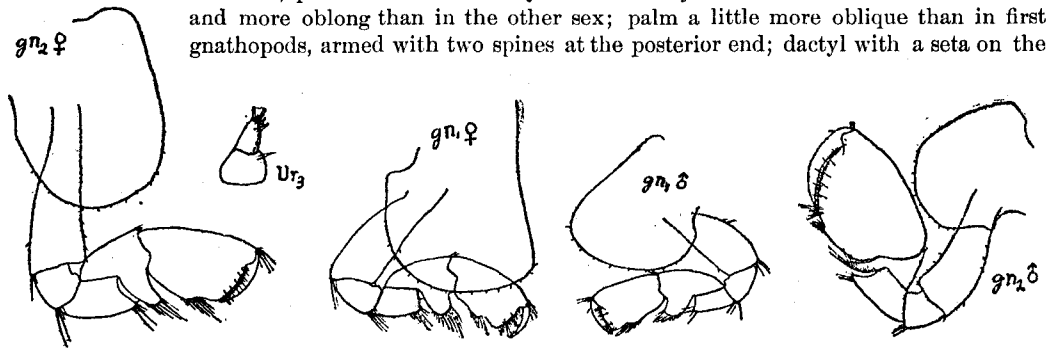
Cape Cod to New Jersey; coast of Texas.

This species is readily distinguished from *agilis* by its larger size, longer antennules, less robust hand on the second gnathopods of the male, the palm of which is not lobed, and the differently shaped second joint in the gnathopods of the female. Its habitat is also different, as it is found commonly around salt marshes, often far from the shore, among grass and weeds or under objects of various kinds which afford concealment. It crawls and runs more readily than *agilis* and is not so ready to hop.

*Allorchestes littoralis* Stimpson.

*Hyale littoralis* Smith, Rept. U. S. Fish Com. 1871-72, p. 556.

Eyes oblong or reniform, their distance apart being less than their shortest diameter; first antennæ about three-fourths the length of second, the three joints of peduncle of subequal length; flagellum a little longer than peduncle and composed of 9-13 joints; second antennæ less than half the length of body; last joint of peduncle a little longer than preceding one, the lower side furnished with a large tuft of fine plumose hairs. First gnathopods much alike in the two sexes, third and fourth joints of subequal length, the latter produced distally into a prominent setose angle; fifth joint with posterior lobe oblong, rounded, and thickly setose; hand oblong, widening distally; palm slightly convex and nearly transverse, the posterior angle armed with two short but rather stout spines; posterior margin with a setose convexity a little distal to the middle; finger closely fitting the palm, inner margin with two or three short setæ; a single short seta on outer margin near base. Second gnathopods stout in the male; the second joint elongated and concave anteriorly, sparingly furnished with small spines on both margins; third joint about as wide as long; fourth joint about twice the length of preceding and strongly produced below into a pointed lobe; fifth joint with posterior lobe very long and narrow; hand large, roughly oval; palm oblique and evenly convex with two short, stout spines at its posterior extremity; posterior margin with a small setose convexity near the palm; finger much as in the first pair. In the female the second, third, and fourth joints of the second gnathopods resemble those of the male; posterior lobe of fifth joint not nearly so narrow and the hand smaller and more oblong than in the other sex; palm a little more oblique than in first gnathopods, armed with two spines at the posterior end; dactyl with a seta on the



*Allorchestes littoralis*. Woods Hole, Mass.

outer margin near the base as in the male. First and second uropods with rami subequal to peduncle; first pair with peduncle armed above with two rows of three or four spines each; last spine of inner row enormously developed; about two-thirds the length of rami and pointing backward; each ramus with two spines on upper margin and a cluster at the tip; peduncle of second uropods with a few spines above; rami with two spines on upper margin and a cluster at the tip; peduncle of third uropods very short and stout, with a single stout spine on the upper margin; ramus as long as peduncle but much narrower; the tip furnished with a cluster of spines. Telson deeply bilobed.

Length, 6 mm.

General color, green to olive brown; antennæ reddish brown; eyes black.

Grand Manan to Long Island Sound.

Found under rocks rather high up on the beach; in fact, this species shows an approach to a terrestrial habit, as it can with some difficulty walk upright while out of water and hops very readily like the species of the preceding genera.

*Anonyx nugax* (Phipps).

Eyes large, dilated below, larger in the male than in the female; first antennæ in the female with secondary flagellum over half the length of primary one; second antennæ considerably longer than first; in the male both pairs of antennæ longer than in the female and the secondary flagellum of first



pair not half the length of primary one; first gnathopods rather stout, hand long, subrectangular; palm transverse; hand of second gnathopods oblong-oval, about half as long as carpus. densely setose, the minute dactyl articulated near middle of distal margin; last two pairs of pereopods nearly equal in length and considerably longer than third; postero-lateral angles of third abdominal segment ending in a triangular acute projection, above which is a deep sinus; fourth abdominal segment with only a slight dorsal depression; terminal uropods with lanceolate rami furnished with marginal spines and setose on inner edges; inner ramus but little longer than basal portion of outer; telson oblong, cleft nearly to base, a small spinule at the tip of each lobe.

Arctic specimens may attain a length of 40 mm. (Sars). The New England representatives of this species are not often half that length.

Extensively distributed throughout the Arctic Ocean; found in the North Atlantic, Norway, Iceland, Greenland, Behring Sea, Labrador. Common off the coast of New England and often found in great abundance near Woods Hole.

#### *Tryphosa pinguis* (Boeck).

*Anonyx pinguis* Boeck, Bémärken Norske Amphip., p. 662, 1860.  
*Orchomenella pinguis* Sars, Crust. Norway, p. 67, pl. 24, fig. 2, 1891.

A plump, firm, and compact species. Eyes elongated; antero-lateral corners of head produced and narrowly rounded; first antennæ short, first joint of flagellum elongated; second antennæ much longer than first, especially in the male; coxal plates very large, first four pairs more than twice as deep as their segments; fifth pair much deeper than wide, posterior part of lower margin produced into a rounded lobe; carpus of first gnathopods with a narrow posterior lobe; hand oblong, distally tapering; palm nearly transverse; hand of second gnathopods oblong, postero-distal angle produced; posterior pereopods short, basal joints broadly suboval; postero-lateral angles of third abdominal segment rounded, the margin above the angle minutely crenulated or nearly smooth; fourth abdominal segment with a rather deep dorsal depression near anterior end; terminal uropods with inner ramus not exceeding basal portion of outer one; telson distally tapering and cleft to beyond the middle.

Color, whitish.

Length, about 7 mm.

Arctic regions; Norway; Greenland; Labrador; New England. Often taken in abundance near Woods Hole. It is not rarely

found in company with *Anonyx nugax*.

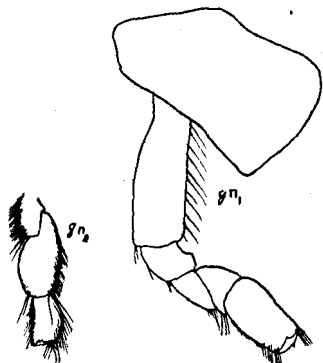
This species is closely allied to *T. minuta*, but differs from it in having narrower eyes, stouter first gnathopods with a much narrower posterior carpal lobe, and in the crenulated posterior margins of the third abdominal segment. The forms from New England previously referred to *Orchomene minuta* doubtless belong to this species.

#### *Hippomedon serratus* Holmes, new species.

Female: Eyes oblong, rather narrow; lateral lobes of head triangular, subacute; first basal joint of first antennæ produced distally into a lobe which reaches as far as tip of third joint; second joint distally produced into a much shorter lobe; first joint of flagellum as long as the eight remaining joints; lower margin fringed with long hairs; secondary flagellum three-jointed; second antennæ scarcely half the length of body, penultimate joint of peduncle about two-thirds length of terminal one; flagellum about twice the length of peduncle; first four coxal plates fully twice as deep as their segments, the first distally expanded, concealing the mouth parts; second and third coxal plates about



*Anonyx nugax*. After Sars. *cp*<sub>3</sub>, Side of third abdominal segment. Second gnathopods enlarged.



*Tryphosa pinguis*. Vineyard Sound.

three times as deep as wide, convex in front and concave behind; fourth pair markedly deeper than wide; first gnathopods with hand narrow, distally tapering, somewhat curved backward and about two-thirds length of carpus; palm pectinate with fine spines and not clearly defined above; dactyl about half length of palm; second gnathopods with hand longer than broad, densely ciliated and not exceeding half length of carpus; first and second pereopods with merus produced below nearly to middle of carpus; dactyl fully two-thirds length of narrow and somewhat incurved propodus; posterior margin of basal joint of last pereopods with large, acute serrations; serrations on basal joints of third and fourth pereopods very much smaller; dorsal margin of third abdominal segment quite sud-



*Hippomedon serratus*, female. Newport, R. I. The second antennæ were broken in the specimen drawn.

denly deflected near posterior end; postero-lateral angles of this segment strongly produced and upturned much as in *H. propinquus* Sars.; fourth abdominal segment with a dorsal carina; last uropods projecting beyond first pair, rami about twice length of peduncle; telson cleft to beyond middle, the lobes pointed.

In the male the first antennæ are a little longer and have more numerous joints than in the female, and the second antennæ are nearly as long as the body.

Length, 12 mm.

Newport, R. I. Off Cape Ann, 36 feet.

This species differs from *H. denticulatus* in the broader and much less abruptly upturned process at the postero-lateral angles of the third abdominal segment. From *H. propinquus* and *H. holbölli* it differs in having a larger lobe on the first basal joint of the first antennæ and in the form of the hand of the first gnathopods. In both these species the hand is widest near the middle and strongly convex behind; in our species the hand tapers from the base and is slightly concave behind. *Serratus* differs from all three of the species mentioned in having coarser serrations on the posterior margin of the basal joint of the last pair of pereopods.



*Hoplonyx cicada*. Angle of third abdominal segment and telson.

#### *Hoplonyx cicada* Fabricius.

Eyes narrow above, the lower part dilated; lateral corners of head rounded; first antennæ about as long as head and first two thoracic segments, secondary flagellum nearly as long as primary one and composed of about seven joints; second antennæ much longer than first; first four coxal plates more than twice as deep as their segments; fifth pair nearly as deep as wide; first gnathopods slender, the ischium twice as long as wide; propodus as long as carpus, scarcely tapering distally; palm oblique; second gnathopods with propodus oblong, about half as long as carpus; postero-lateral angles of third abdominal segment produced into a small tooth; fourth abdominal segment with only a slight dorsal depression; telson nearly twice as long as wide, tapering somewhat distally, and cleft nearly to the base, a minute spinule at tip of each lobe.

Length, about 15 mm.

Extensively distributed in the Arctic regions; Norway; British Isles; Iceland; Greenland; Labrador; New England. Often taken in considerable numbers near Woods Hole. Ranges from 20 to over 600 fathoms.

The eyes, which are pale in alcoholic specimens, contain in life a bright red pigment.

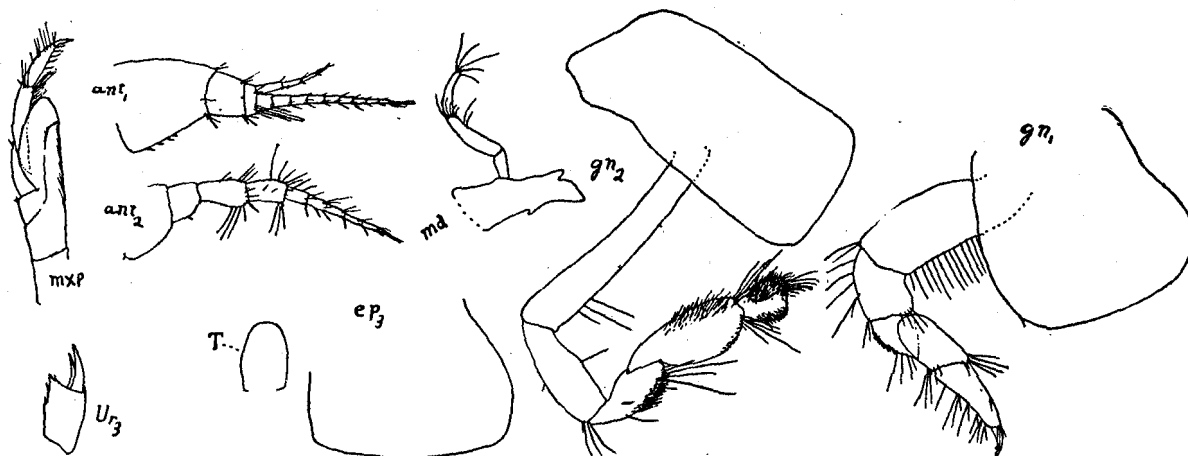
**LYSIANOPSIS** Holmes, new genus.

Antennæ short and differing little in the two sexes; mandibles edentate, furnished with a three-jointed palp behind the middle, and a small molar process nearer the cutting edge than the base of palp; first maxillæ with narrow inner plate furnished with two apical setæ; palp two-jointed; maxillipeds with inner plate narrow and extending beyond middle of outer one; outer plate oval, the inner margin devoid of spines; palp narrow; anterior gnathopods rather stout, simple; second gnathopods slender; propodus short, setose, with a minute dactyl near middle of distal margin; postero-lateral angle of third abdominal segment rounded; uropods normal; telson entire.

This genus is closely allied to *Lysianella*, but differs from it in not having the penultimate joint of the second antennæ expanded, in having the first gnathopods simple instead of subchelate, and in having the outer ramus of the terminal uropods consisting of a single joint.

**Lysianopsis alba** Holmes, new species.

Lateral corners of the head produced into a triangular subacute lobe; first antennæ short, first basal joint stout, longer than the next two; flagellum a little longer than the peduncle and composed of about ten joints; secondary flagellum about half length of primary one and composed of about four joints; second antennæ about as long as first; flagellum about as long as peduncle; mandibles each with a small molar tubercle; palp joined a little behind middle; first maxillæ with the inner plate narrow and furnished with two setæ at the apex; second maxillæ setose at the tip and ciliated on



*Lysianopsis alba*. Eel Pond, Woods Hole, Mass. *ep*<sub>3</sub>, Side plate of third abdominal segment.

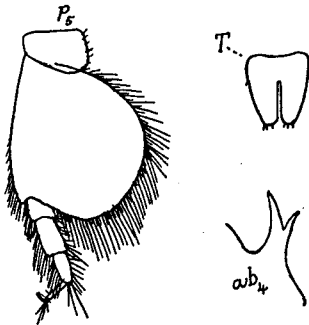
the inner margins. Inner plate of the maxillipeds furnished with plumose setæ on the inner margin and armed with a few short teeth at the tip; outer plate devoid of spines or setæ and serrated or crenulated on the inner margin; first gnathopods stout; propodus tapering distally to the rather stout dactyl; second gnathopods with the propodus subcordate; the three posterior pereopods increasing rapidly in length posteriorly, the last pair quite long and slender and having the posterior margin of the basal joint serrated; similar serrations on the two preceding pairs, but less pronounced; fourth abdominal segment slightly indented on dorsal side; first uropods extending backward farther than second, and these exceeding the third; peduncle of terminal uropods very stout, longer than the styliform rami and produced into a triangular projection at distal end of upper margin; telson oblong, entire, distally rounded.

Color white; eyes black. The yellow or orange gonads may often be seen through the integument. Sometimes specimens are of a yellowish color.

Length, 6 mm. Type No. 29246, U. S. Nat. Mus.

Found commonly in the mud in the Eel Pond at Woods Hole. Specimens were also taken off Nobska.

This species has the habit of lying very quiet for a long time with its body strongly flexed. When disturbed it starts quickly and swims vigorously for a time and then comes to a very sudden stop with its body flexed and lies quiet as before. Unlike most amphipods it is little affected by light, but contact with a solid body causes it quickly to stop when swimming and lie still. It has a strong propensity to get under any object it meets. Individuals coming in contact often try to get under each other.



*Pontoporeia femorata*. After Sars.  
ab<sub>4</sub>, Dorsal side of fourth abdominal segment.

#### *Pontoporeia femorata* Kröyer.

Eyes reniform, red in life; first antennæ about as long as the second; first peduncular joint a little longer than the next two; flagellum shorter than peduncle; secondary flagellum minute, two-jointed; flagellum of second antennæ a little shorter than peduncle; first four coxal plates of nearly equal depth, setose below, a small tooth on the postero-inferior angle of the first three; carpus of first gnathopods very broad, projecting in front of propodus, and furnished with a broad, setose lobe behind; propodus broadly subovate, the posterior margin bulging outward near the base; second gnathopods with propodus narrow, a little shorter than carpus; postero-

inferior angle produced so that the hand is almost chelate; last pair of peræopods with basal joint very broad, rounded and strongly setose behind and longer than rest of appendage; fourth abdominal segment with a prominent bifurcated spinous projection in mid-dorsal line; telson somewhat longer than broad and cleft to beyond the middle.

Length, 14 mm.

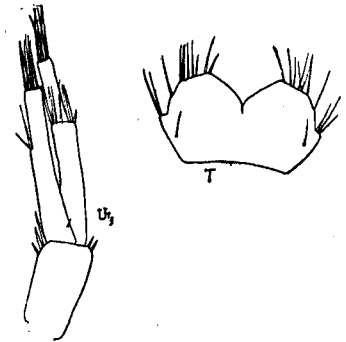
Circumpolar; Norway (Sars); Greenland; Labrador.

I have found several specimens of this species in the collection of the Boston Society of Natural History, but they had no label giving their locality. It is probable that, like most of the other specimens in the collection, they came from somewhere on the New England coast.

#### *Haustorius arenarius* (Slabber).

*Lepidactylus dityscus* Say, Jour. Acad. Nat. Sci. Phila., Vol. I, 1818, p. 380.

Head with a short, triangular rostrum; eyes small, nearly round; both pairs of antennæ short; peduncle of first pair with numerous plumose setæ; secondary flagellum over half as long as primary; last two joints of peduncle of second antennæ compressed and much dilated, the lower margins fringed with long, plumose setæ; penultimate joint several times larger than the last one and produced into a rounded lobe at antero-inferior angle; flagellum not exceeding peduncle; first four coxal plates increasing successively in size, the first three concave behind, strongly convex in front and tapering below to a rather obtuse point; fourth coxal plate larger than the others, concave behind, strongly convex in front and broadly rounded below; gnathopods rather small, carpus widened at middle, larger than propodus, which is very thickly setose and bears a small terminal dactyl which is much reduced in the second gnathopods; first two pairs of peræopods similar, carpus much dilated, being produced into a very large, rounded posterior lobe, which is furnished on the margin with several spines; propodus more or less pyriform, flattened, constricted toward the base, the rounded extremity armed with several spines; third peræopods with basal joint, merus and carpus much dilated, propodus narrow; fourth peræopods much larger than third, with the same joints dilated, the small and narrow



*Haustorius arenarius*. Off Marthas Vineyard.

propodus joined to posterior angle of the quadrate carpus; fifth pereopods large, the basal joint much enlarged, wider than long, merus short, produced posteriorly into a large lobe which is over twice as wide as long; carpus much dilated; propodus much larger than in the preceding pairs. The three posterior segments of the abdomen small. First uropods with a very stout peduncle, which is bent upward, the upper margin armed with several stout spines and concave except near the base, where there is a prominence surmounted by an unusually stout spine, the first of the series, in front of which (proximally) are several long setae; rami narrow, unequal; terminal uropods with rami about twice length of peduncle, inner ramus the larger and two-jointed; telson broad, divided into two lobes, which are setose on outer and distal margins.

Length, 18 mm.

Georgia to Cape Cod (Smith); off Marthas Vineyard; Holland (Slabber); Norway (Boeck); France; British Isles.

I have examined specimens from North Devon, England, and have satisfied myself of their specific identity with our American forms.

#### *Phoxocephalus hölbölli* (Kröyer).

*Phoxus kröyeri* Stimpson, Marine Invert. Grand Manan, p. 53, 1853.

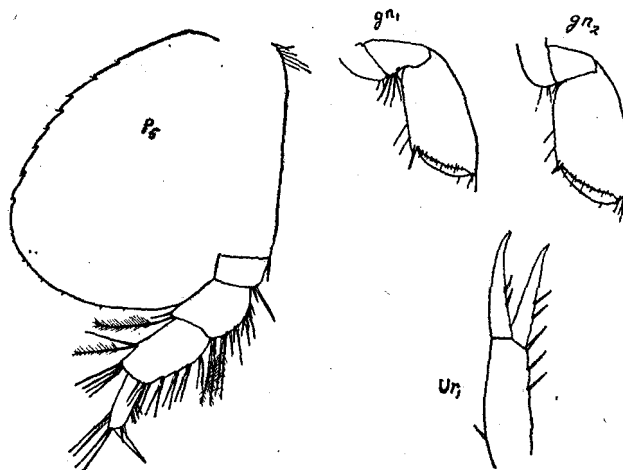
Head with the rostral broad triangular, about equaling peduncle of first antennae; eyes small and imperfectly developed; first antennae shorter than second and not as long as head, first joint of peduncle thick, about as long as next two and having a triangular process at distal end; flagellum six-jointed and nearly as long as peduncle; secondary flagellum three-jointed and a little over half length of primary one; second antennae with penultimate joint expanded, furnished with several spines on surface and distal end and several long setae on lower margin; flagellum six-jointed and shorter than peduncle; first four coxal plates deeper than wide and much deeper than their segments, lower margins setose; first gnathopods nearly as large as second; basal joint curved forward; hands of both pairs of gnathopods oblong, slightly widened distally, the palm oblique, evenly convex, and terminated distally with a triangular tooth, at the side of which is inserted a strong spine; first and second pereopods with merus much wider than carpus and nearly twice as long; propodus narrow, of about same width throughout; dactyl about one-fourth length of propodus; third pereopods with basal joint very broad and about two-thirds as long as rest of appendage; last pereopods with basal joint very large, serrated posteriorly and fully as long as all the other joints; postero-lateral angles of third abdominal segment narrowly rounded; terminal uropods with rami subequal in the male, narrowly lanceolate and furnished with plumose setae; in the female inner ramus devoid of setae and much shorter than the outer; telson cleft nearly to base into two narrow lobes.

Length, 5 mm.

Arctic regions; Norway; British Isles; France; Iceland; Greenland; Labrador; Grand Manan (Stimpson); Vineyard Sound in deep water (Smith).

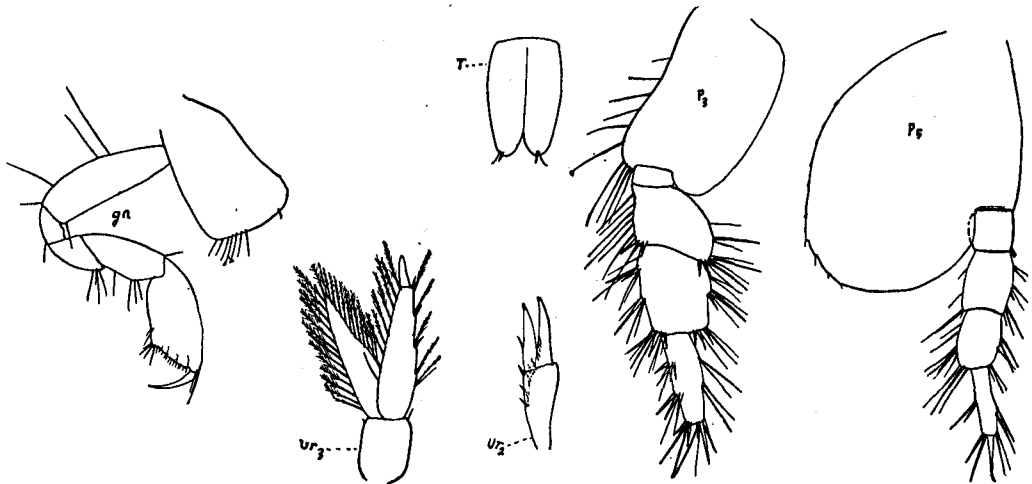
#### *Paraphoxus spinosus* Holmes, new species.

Male: Rostrum projecting beyond the first basal joint of first antennae; eyes very large; second antennae with slender flagellum over half length of body; first four coxal plates increasing successively in length and furnished below with several simple setae; first pair expanded distally first and second



*Phoxocephalus hölbölli*, female. Grand Manan.

gnathopods very nearly alike; hand oblong, slightly widened distally with an oblique, gently convex palm which terminates posteriorly in a rounded elevation furnished with a few slender spines; first and second peræopods with carpus scarcely half as long as merus and about two-thirds the length of the very narrow propodus; dactyl nearly straight and over half length of propodus; third peræopods with basal joint oblong, slightly concave in front and slightly convex behind; merus a little wider than long; carpus quadrate, broadly expanded, armed with stout spines; propodus much narrower than carpus, but about as long, armed in front with three fascicles of stout spines; dactyl slender, over half length of propodus; fourth peræopods stouter than in *oculatus*; carpus shorter than merus or propodus, and, like those joints, armed with fascicles of strong spines; dactyl styliform; fifth peræopods with basal joint expanded much as in *oculatus*; merus slightly longer than carpus; dactyl slender, the tip turned slightly forward; posterior margin of lateral expansions of third abdominal segment furnished with several setæ; first uropods with rami nearly as long as peduncle, the inner ramus with usually a single spine near middle and the outer with two or three spines on the basal half of upper



*Paraphoxus spinosus*, male. Newport, R. I.

margin; second uropods reaching about to middle of rami of first pair; third uropods extending far beyond the first; rami furnished with plumose setæ on both margins, outer ramus with a few short spines on outer side; telson longer than broad, the lobes distally rounded.

Type No. 29241, U. S. Nat. Mus.

Length, 4.5 mm. Newport, R. I., taken by S. D. Judd.

Numerous specimens were examined, but they were apparently all males and unfortunately the terminal joints of the first antennæ had in all cases been broken off. In the type species of *Paraphoxus* (*P. oculatus*) the two pairs of antennæ in the female are of nearly equal length, the eyes of the female are very much smaller than those of the male, and the terminal uropods smaller, much more unequal in size, and devoid of the marginal plumose setæ found in the male. It is probable that similar sexual differences will be found to occur in the present species.

This species may be distinguished from *oculatus* by its stouter appendages. In the third peræopods the merus is relatively shorter and broader and the carpus broader than in *oculatus*; the joints of the fourth peræopods are much stouter and armed with strong spines. In *oculatus*, according to Sars's figure in the *Crustacea of Norway*, there are no setæ on the posterior margin of the lateral expansions of the third abdominal segment.

#### **Harpinia plumosa** (Krøyer).

*Phoxus fusiformis* Stimpson, *Marine Invert. Grand Manan*, p. 57, 1853.

Rostral hood extending beyond the antennular peduncle, eyes wanting; first antennæ nearly as long as head, first basal joint larger than the next two and bearing a few large plumose setæ at distal end of lower margin; second joint produced somewhat at distal end of lower side, where it bears

several large, plumose setae; flagellum shorter than peduncle and composed of about six joints; secondary flagellum over half the length of primary one and composed of about five joints; second antennae slightly longer than first, the penultimate basal joint broadly expanded and rounded below, where it bears about seven large, plumose setae and several curved spines; flagellum shorter than peduncle and composed of 5-7 joints; first four coxal plates much deeper than their segments and fringed below with long, plumose setae; first and second gnathopods of nearly equal size; hands oval; palm oblique and defined posteriorly by a prominence; posterior peraeopods with the widely expanded basal joint produced and rounded below, and coarsely dentate on the posterior margin with a few irregular and sometimes obscure teeth; postero-lateral angle of third abdominal segment produced into a slender, slightly upturned spine; telson about as broad as long, the lobes distally rounded.

Length, 7 mm.

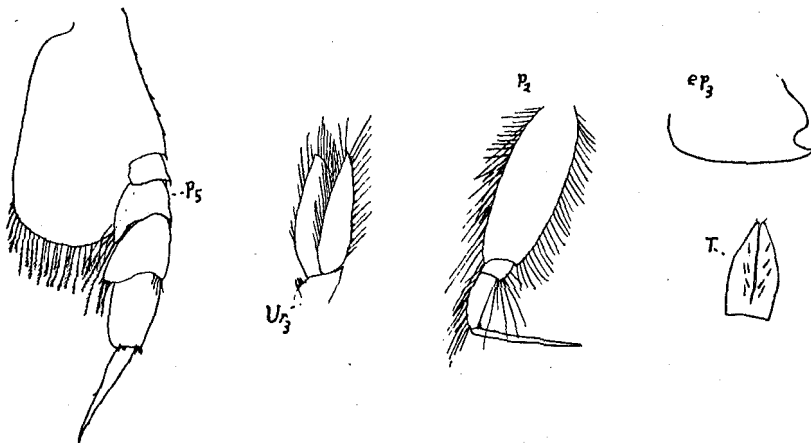
Arctic regions; Norway; Greenland; Grand Manan; *Albatross* station 2212.

***Ampelisca macrocephala* Lilljeborg.**

*Pseudophthalmus pelagicus* Stimpson, Marine Invert. Grand Manan, p. 57, 1858.

*Ampelisca* sp. Smith, Rept. U. S. Fish Com. 1871-2, p. 561, pl. IV, fig. 17.

Head about as long as first three segments of thorax; eyes surrounded with bright-red pigment; lower corneal lens at antero-lateral angle of head; first antennae in the female often shorter than peduncle of second pair; second antennae of the female scarcely exceeding half the length of body,



*Ampelisca macrocephala*, female. Woods Hole, Mass. *ep*<sub>3</sub>, Side plate of third abdominal segment.

last segment of peduncle shorter than preceding one; first pair of coxal plates distally widened and extending as far forward as the eyes; propodus of first gnathopods oblong, about as long as carpus; that of second gnathopods about half as long as carpus; dactyl of first and second peraeopods considerably larger than the two preceding joints combined; last peraeopods with basal joint broadly rounded below; ischium broader than long; merus deeply concave below, and produced into a pointed setose lobe at the lower posterior angle; carpus more or less heart-shaped; lower posterior angle more produced than corresponding anterior one and armed with several spines; propodus oblong; lower posterior angle rounded and slightly produced; dactyl slender, often a little longer than propodus; postero-lateral angle of third abdominal segment with a long, acute, slightly upturned projection, above which is a rounded sinus followed by a rounded lobe; fourth abdominal segment in the female with a slight dorsal depression followed by a carina, which ends abruptly at the posterior end; penultimate uropods with outer ramus armed near tip with a very long spine.

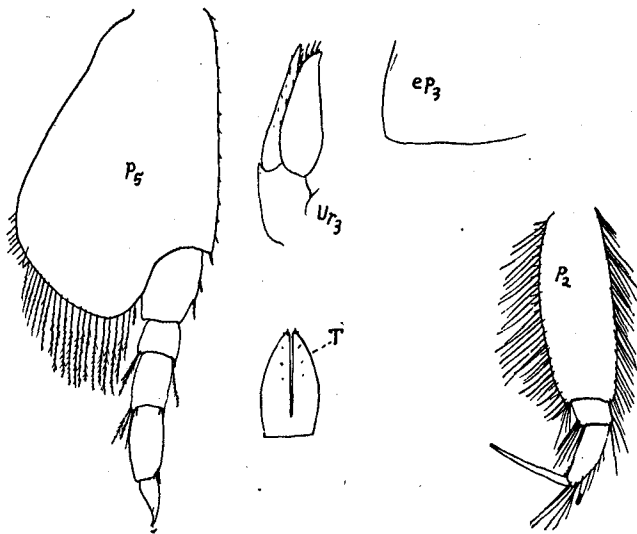
Length, 15 mm.

Woods Hole; Newport; Spanish Bay; Cape Ann; Casco Bay, Maine; off Halifax; Grand Manan. Specimens taken from near Woods Hole differ from those figured in Sars's *Crustacea* of Norway

in that the first pair of coxal plates project a little farther forward, the dactyl of the last pair of peræopods is as long as, or a little longer than, the propodus, and the dactyls of the first and second peræopods are a little larger. At first I was inclined to regard the Woods Hole forms as constituting a species distinct from, but very closely allied to *macrocephala*, but a comparison of them with specimens taken at various places along the coast farther north led me to consider them as not specifically distinct. The specimens from north of Cape Cod present gradations between those found at Woods Hole and the forms figured by Sars, so that none of the differences enumerated are constant.

***Ampelisca spinipes* Boeck.**

First antennæ of female a little longer than peduncle of second pair; second antennæ less than half the length of body; last two joints of peduncle of subequal length. First antennæ in the male very much longer than in the female, being over one-third the length of body; second pair exceeding



*Ampelisca spinipes*, female. Near Woods Hole, Mass. *ep<sub>3</sub>*, Side plate of third abdominal segment.

length of body and with last joint of peduncle much longer than preceding one; propodus of first gnathopods nearly as long as carpus and somewhat bulging on proximal portion of posterior margin; second gnathopods slender, the narrow carpus nearly twice as long as the propodus; dactyl of first and second peræopods about as long as two preceding joints combined; last pair of peræopods with ischium nearly twice as long as wide, much longer than the nearly square merus; carpus subrectangular, elongated; propodus longer than carpus or dactyl; postero-lateral angle of third abdominal segment not produced, and forming nearly a right angle; fourth abdominal segment of the male with a prominent dorsal carina which ends abruptly posteriorly; the following segment deeply indented above; the corresponding features of the female

are much less pronounced; no long terminal spine on outer ramus of penultimate uropods; terminal uropods thickly setose in the male but nearly devoid of setæ in the female.

General color, whitish; a rose-colored or light-purplish spot in the first coxal plate; a few other spots of the same color may occur on other parts of the body.

Length, 14 mm.

Woods Hole; Long Island Sound; Newport; Norway (Sars); France.

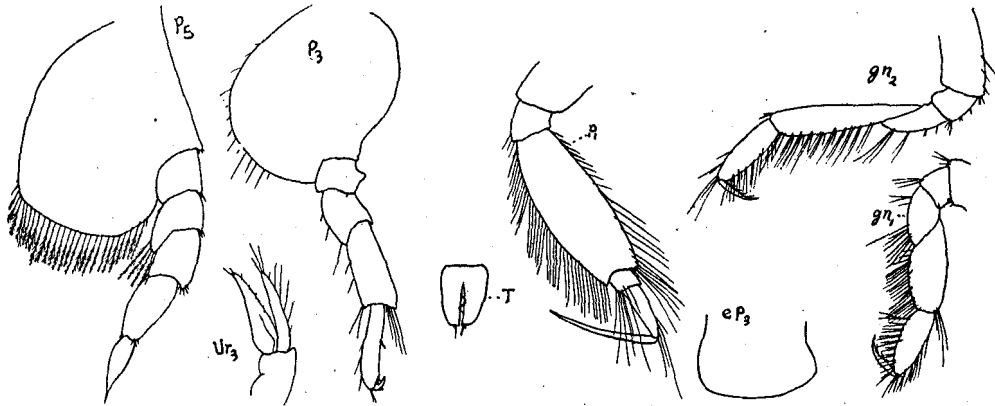
The male differs from the female in having longer second antennæ, with the terminal joint of the peduncle relatively longer, the last basal joint being only a little longer than the preceding one in the female; in having the lower side of the peduncle of the first antennæ and the upper side of the peduncle of the second furnished with numerous tufts of short setæ; in having the fourth abdominal segment with a deeper depression on the proximal portion of the upper side and a more prominent dorsal carina, and in having the terminal uropods more strongly ciliated.

***Ampelisca compressa* Holmes, new species.**

Body strongly compressed and generally strongly flexed; head markedly shorter than first three segments of thorax; first antennæ shorter than peduncle of second pair; third joint of peduncle a little shorter than first; flagellum only a little longer than peduncle, second antennæ slender, over half length of body in female, and much longer than body in adult male; peduncle in male over a third length of body, last joint a little shorter than preceding one; first four coxal plates higher than their



segments, the first considerably expanded below; first and second pereopods with dactyl slender and longer than two preceding joints. Posterior pereopods with basal joint widely expanded; ischium as broad as long; merus with a posterior lobe extending to middle of carpus. Postero-lateral angle of third abdominal segment broadly rounded; fourth abdominal segment in both sexes with a prominent dorsal crest which increases in height posteriorly and carries a pair of short setae on its posterior mar-



*Ampelisca compressa*. Vineyard Sound. *ep*<sub>3</sub>, Side plate of third abdominal segment.

gin; terminal uropods similar in two sexes, furnished with only a few short spinules and setae; outer ramus of nearly same width throughout its length; telson about two-thirds as wide as long, lobes rather obtuse distally, but with inner angles subacute.

Length, 6 mm.

Vineyard Sound; Newport; off Block Island; Long Island Sound.

This is the most common species of *Ampelisca* in the regions around Woods Hole. It is apparently easily obtained in large quantities, as I have examined several bottles containing thousands of specimens of this species with scarcely any other amphipods.

#### *Ampelisca agassizi* Judd.

*Byblis agassizi* Judd, Proc. U. S. Nat. Mus., Vol. XVIII, 1895, p. 599, figs. 9, 10a-f, 11a-c.

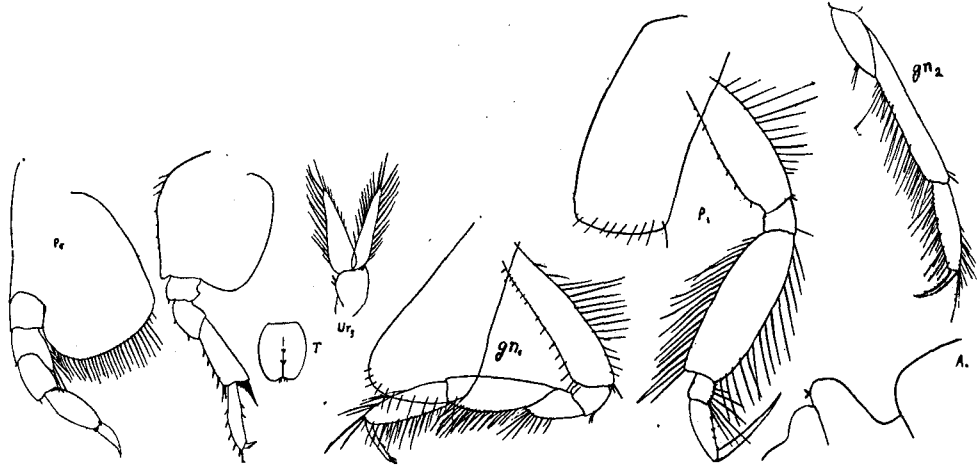
Male: Head about as long as first three segments of thorax; eyes normal; first antennae scarcely half length of body; the first joint of peduncle scarcely twice as long as thick, the second nearly twice as long as first and about three times length of third; first two or three joints of flagellum with rather long setae on lower side, the remaining segments narrow, elongated, and furnished with very short setae; lower sides of first two joints of peduncle furnished with tufts of very short hairs; second antennae exceeding length of body; antepenultimate and penultimate joints of peduncle with tufts of short hairs above; last peduncular joint about as long as preceding one; first gnathopods with distal end of coxal joint widened, and about two-thirds as long as carpus; dactyl of first and second gnathopods about as long as two preceding joints; last pereopods with basal joint broad and produced below nearly to tip of merus, lower margin rounded; merus produced distally on posterior side as far as middle of carpus; propodus fusiform, longer than carpus; postero-lateral angle of third abdominal segment rounded; fourth abdominal segment constricted at base, the posterior portion furnished with a high rounded median dorsal crest, the following abdominal segment with a dorsal indentation; terminal uropods extending beyond the others by about half the length of their rami, the rami setose on both margins and not serrated; telson longer than wide, cleft nearly to base, sides convex and lobes distally rounded, each furnished with a pair of short setae.

Length, about 7 mm.

Described from Mr. Judd's type specimens (No. 18919) obtained from the U. S. National Museum.

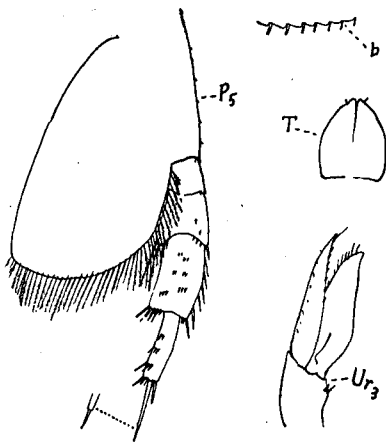
This species is, in some respects, intermediate between *Byblis* and *Ampelisca*, but its affinities are

mainly, I believe, with the latter genus. The form of the mandibular palp is like that of the type species of *Byblis*, but the broad second joint of this appendage, which is said to characterize *Ampelisca*, is not a generic character of much importance. In *Ampelisca spinipes*, for example, this joint is only



*Ampelisca agassizi*. A, dorsal margin of the 3d, 4th, and 5th segments of the abdomen. Drawings made from one of Mr. Judd's type specimens.

slightly widened, although it is broader than in *Byblis*. *A. agassizi* agrees with *Ampelisca* and differs from *Byblis* in that the telson is much longer than broad and cleft nearly to the base, in the form of the last pair of peraeopods, and in the fact that the terminal uropods project much beyond the preceding ones and have no serrations on the opposing margins of the rami.



*Byblis serrata*. Woods Hole, Mass. b, Lower margin of first coxal plate in the male.

Length, 11 mm.

Woods Hole; Newport.

A description of the sexual differences in this species is given by Judd (Proc. U. S. Nat. Mus., Vol. XVIII, p. 596, 1896).

#### *Byblis serrata* Smith.

Body and appendages furnished with scattered pigment cells; first antennæ much longer than peduncle of second; second antennæ shorter than body in the female, but longer than body in the male, last joint of peduncle a little shorter than preceding one; lower margins of anterior pairs of coxal plates serrated, the serrations prominent and acute in the female but blunt in the male; dactyls of first two peraeopods about as long as the propodi; posterior lobe of basal joint of last pair of peraeopods reaching about to tip of carpus; posterolateral angle of third abdominal segment rounded; fourth abdominal segment in male with a dorsal depression, behind which is a prominent, rounded carina; these features much less pronounced in the female; first and third uropods extending backward to about the same distance, second pair not reaching so far; telson pointed, cleft to the middle.

#### *Stegocephalus inflatus* Kröyer.

A large species, easily recognizable from its tumid form and enormous coxal plates. Head partly concealed and pointing downward, with a flattened, triangular rostrum and a prominent, subacute process between bases of antennæ; antennæ short, of nearly equal length; first pair very stout, with

first joint of peduncle somewhat longer than both the other two, third joint much wider than long; flagellum thick and tapering, secondary flagellum minute; peduncle of second antennæ much more slender than that of first and a little longer than the flagellum; thorax tumid, first five coxal plates taken together forming an almost semicircular plate; the second, third, and fourth much deeper than their segments; first and second gnathopods small, similar, subchelate hands narrow; basal joint of last pereopods much enlarged, postero-inferior angle acute or subacute; fourth abdominal segment with a dorsal depression; telson acute, with a narrow posterior incision extending beyond the middle.

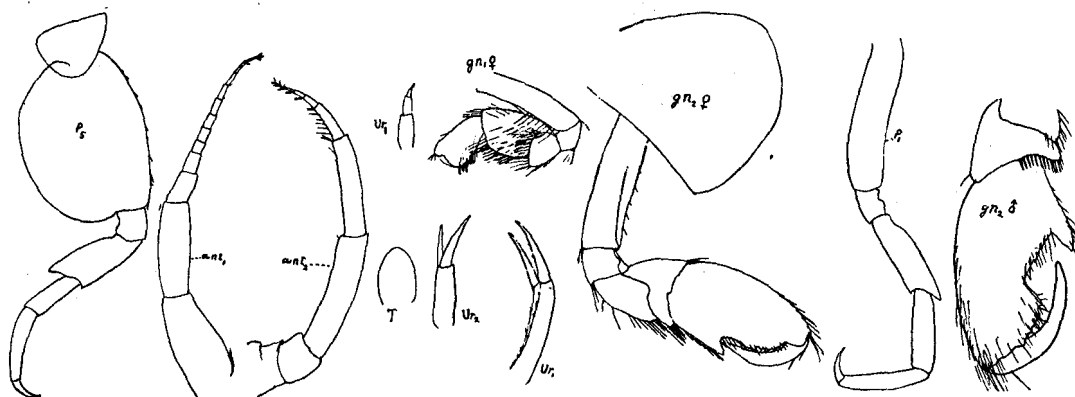
This species is said by Hansen to attain a length of 47 mm.

Extensively distributed in the Arctic and North Atlantic oceans. I have examined specimens taken at Grand Manan (100 fathoms); Eastport; off Head Harbor, Me. (100 fathoms); and near Woods Hole.

**Metopa greenlandica** Hansen.

*Stenothoë clypeata* Stimpson, Marine Invert. Grand Manan, p. 51, 1853.

Female: Eyes nearly round; antennæ of nearly equal length; peduncle of first with first two joints of subequal length, third joint about a third the length of second; flagellum shorter than peduncle and composed of about nine joints; peduncle of second antennæ much longer than that of first, last



*Metopa greenlandica*. Eastport, Me.

joint a little shorter than preceding one but somewhat longer than the flagellum, which consists of about six joints, of which the first is much the longest; second, third, and fourth coxal plates very large and of subequal depth, second produced forward as far as eyes and broadly rounded in front; fourth coxal plate longer than deep, subquadrate with rounded angles, and about equal in length to three segments of thorax; mandibles with first joint of palp short, second expanded, a little over twice as long as wide, the inner margin setose; third joint small, scarcely a third the length of second and not half so wide; maxillipeds with inner plates distally rounded and nearly reaching extremity of the following joint, which is slightly produced at inner distal angle into a rudimentary outer plate; palp large, first three joints of nearly equal size; fourth joint in the form of a large incurved claw; first gnathopods small, basal joint narrow, carpus large, longer and broader than hand and setose on surface and both margins; hand narrowed toward base, palm transverse; second gnathopods with carpus produced into a narrow, posterior lobe; hand large, oblong, palm convex and dentate, ending above in a sinus which lies just within the base of a large tooth; first two pereopods slender, devoid of spines; last two pereopods with basal joints much dilated, especially in last pair; first uropods with rami shorter than peduncle; second pair with longer ramus nearly equal to peduncle; single ramus of terminal uropods about equal to peduncle, and pointed apical division of ramus nearly as long as basal part; telson oblong, the extremity narrowly rounded.

The color is described by Stimpson as "bright yellow; in the young pale bluish. Eyes conspicuous, red."

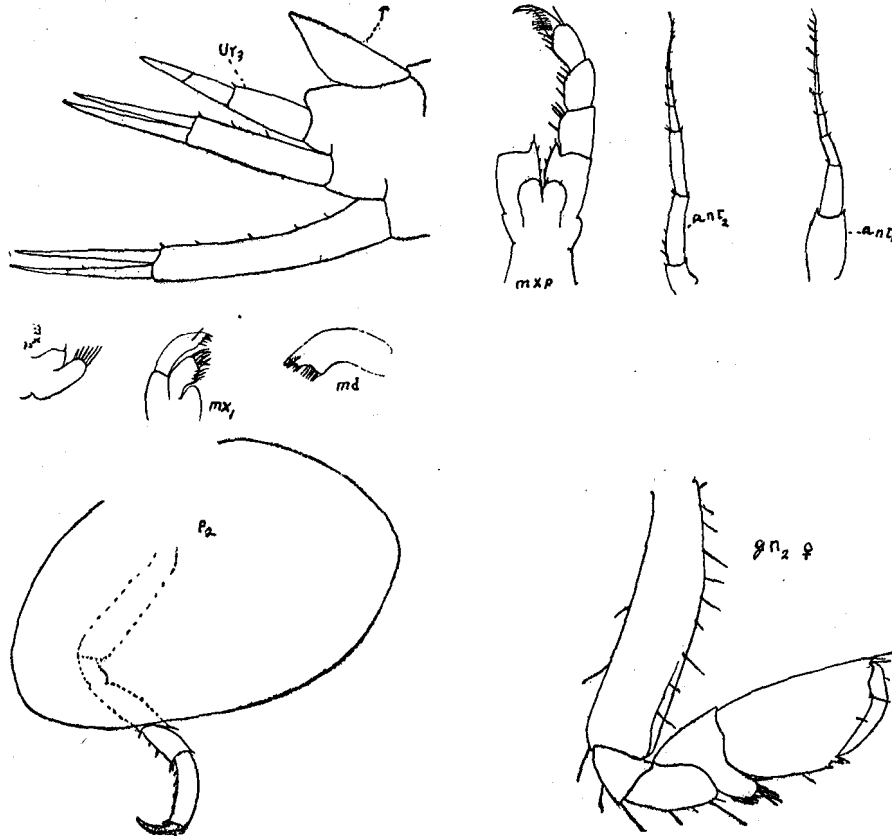
Length, 7 mm.

Grand Manan (Stimpson); Eastport, Me.; *Albatross* stations 2057 and 2062; Greenland (Hansen).

In the male of this species the second joint of the first antennæ is relatively somewhat longer than in the female; the second gnathopods are stouter, the ischium has a prominent anterior lobe, the hand is oblong with a large pointed process above the middle, the proximal portion of the palm is nearly straight and dentate, with a deep sinus between it and the pointed process.

*Stenothoë cypris* Holmes, new species.

Eyes round; antennæ of subequal length and about one-third the length of body; peduncle of first pair with first joint very stout and nearly as long as the next two; third joint a little over half as long as second; flagellum subequal to peduncle and composed of six to eight joints; peduncle of second antennæ more slender and much longer than that of first, the last two joints of subequal length;



*Stenothoë cypris*. The antennæ and peræopods are drawn to a different scale from the other parts. Woods Hole, Mass.

flagellum shorter than peduncle and composed of about six joints. No mandibular palp; inner plate of first maxillæ small, outer armed with five mostly pectinated spines on distal margin and having numerous short setæ on inner side; palp one-jointed, incurved, with about five spines at distal end; outer plate of second maxillæ much longer than inner and furnished with six setæ on rounded distal margin; inner plate of maxillipeds very small and rounded; outer plate represented by a small process on inner angle of ischium; first gnathopods simple; propodus tapering distally; coxal plate well developed; second gnathopods larger than first; coxal plate fairly large; basal joint bent forward and armed with several slender spines on anterior margin and a very few on posterior one; carpus produced behind into a long, distally rounded lobe, which bears a few very stout pectinate setæ; hand oblong, widest near distal end; palm oblique with a stout spine near its distal end; coxal plate of first peræopods small, that of second enormous, broader than deep, more or less ovate in outline, and equal in length to about six segments of body; first uropods with peduncle longer than the subequal

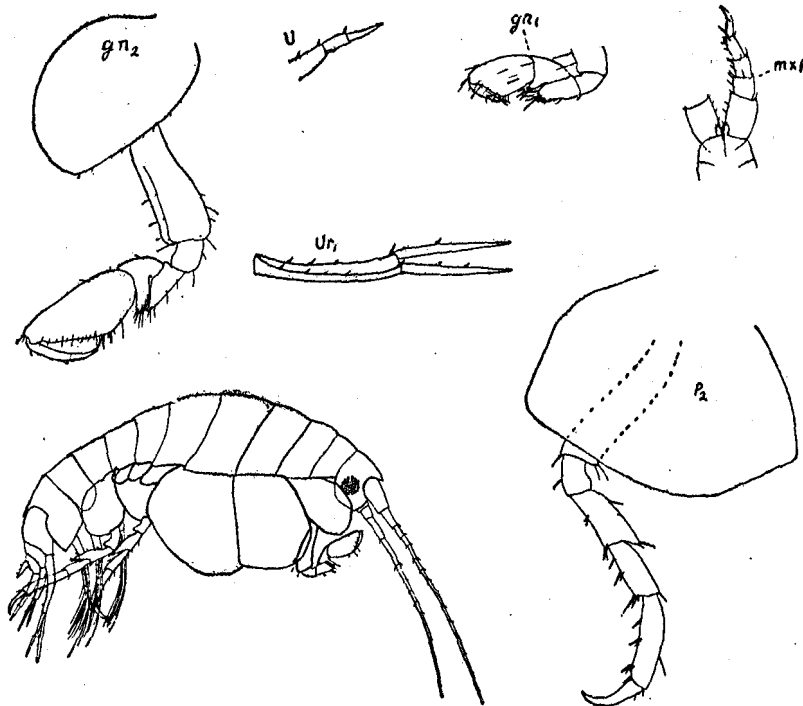
lanceolate rami; rami of second uropods nearly as long as peduncle; the single ramus of terminal uropods about equal or a little exceeding peduncle, and with terminal and basal segments of subequal length; telson entire, acute; in the male the palm of the hand of second gnathopods somewhat more oblique than in the female and furnished with several spines. Body pellucid; first segment more or less rose colored above, a row of rose-colored or sometimes brownish spots or bars along middle of back; eyes rose colored; joints of peduncle of antennæ yellowish at tip; a dark bar across tip of abdomen and base of uropods; gills with a tinge of rose color.

Length, 2 mm.

This species was taken in material obtained from piles at Woods Hole, Mass., September, 1900, and among masses of *Pennaria* from Grassy Island. It is easily recognized by its enormous fourth coxal plates, which give the animal an appearance much like some of the Cladocera. All of the thoracic legs, when drawn up to the body, are entirely concealed by the large coxal plates. This species swims in an irregular, jerky manner, and after swimming but a short distance suddenly stops, flexes the body, and drops to the bottom. Its motions in the water resemble those of the ostracod *Cypris*.

*Stenothoë minuta* Holmes, new species.

Eyes round; antennæ of subequal length and a little over half length of body; first joint of first pair very much thicker than second and nearly as long as second and third; flagellum slender, about



*Stenothoë minuta*. Woods Hole, Mass.

twelve-jointed, furnished with short setæ and olfactory clubs; second antennæ with last two joints of peduncle of nearly equal length, flagellum with somewhat fewer joints than in first pair; mandibles without palp, the cutting edge divided into numerous teeth; first maxillæ with inner plate small and bearing a single large seta near distal end; outer plates with five stout spines at distal end, one of which is quite short, and a single, stout, pointed seta at outer end of spine row; inner margin furnished with short setæ; palp two-jointed, distal end of second joint furnished with a few spines and setæ; maxillipeds with inner plates minute, distally rounded, and having two short setæ each on distal end; outer plates absent, ischium having but a minute angular point at inner angle; first two joints of palp

of equal length and about as broad as long; third joint nearly as long as first and second; last joint claw-like, strongly incurved, inner margin pectinated from very near base to tip, spines decreasing in length distally; first gnathopods with coxal plates reduced; basal joint with a few slender spines on anterior margin; merus rounded below, where it is furnished with four spine-like setae and several much shorter setae; carpus produced posteriorly into a small rounded lobe, which has about three large, spine-like setae at its distal end; hand nearly twice as long as wide; palm very oblique and minutely pectinated like inner margin of dactyl; second gnathopods larger than first, coxal plate large, oval in outline with one side flattened; basal joint more or less sigmoid; merus produced below into an acute angle; carpus with a narrow, distally rounded posterior lobe which bears numerous short, stiff setae and three large setae at the tip; hand widest across distal end of palm; palm oblique, only slightly curved, not pectinated, distal end armed with two or three pairs of spines; pereopods of subequal length, posterior pairs with basal joints considerably expanded, and merus rather broad and produced downward at postero-inferior angle; dactyls of all pereopods large; first uropods long and slender with lanceolate rami subequal and nearly equal to peduncle; outer ramus of second uropods markedly shorter than inner; the single ramus of terminal uropods about as long as peduncle; basal division a little shorter than conical terminal one and armed with a spine at distal end of upper margin; peduncle with a spine above near middle and a spine at distal end; telson flattened, oblong, pointed, entire, with three small spines near lateral margins.

Found upon piles and among seaweed at Woods Hole.

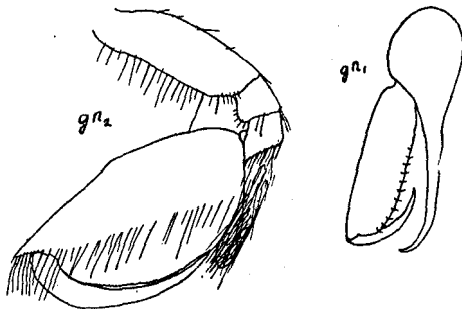
Pellucid, marked with scattered reddish-brown spots. A reddish-brown band across end of abdomen. Thorax in some specimens crossed with red bands. Eyes bright red.

Length, about 2½ mm. Type No. 29245, U. S. Nat. Mus.

#### *Leucothoë spinicarpa* Abildgaard.

*Leucothoë grandimana* Stimpson, Marine Invert. Grand Manan, p. 51, 1853. Bate, Cat. Amphip. British Mus. p. 157, pl. XXIX, fig. 4, 1862.

Rostrum very short and obtuse; eyes broadly oval, red; antennae of subequal length and less than half as long as body; peduncle of first antennae with first joint about as long as second and produced into small acute lobe at distal end of lower side;



*Leucothoë spinicarpa*, female. Grand Manan.

third joint not a fourth as long as second; flagellum scarcely two-thirds length of peduncle and composed of about 16 joints; second antennae with last joint of peduncle shorter than preceding one but a little longer than flagellum; first four coxal plates a little deeper than their segments, the first produced forward and rounded or truncated in front; carpus of first gnathopods produced into a slender, tapering process which is as long as propodus and is upturned at its distal end; propodus of nearly same width throughout, minutely serrated below, and furnished with a series of evenly spaced curved setae; dactyl slender, curved, and between one-third and one-half length of propodus; second gnathopods with the carpal process extending as far as palm; hand large, especially in the male; oval in outline, with a sharp process above base of dactyl; palm minutely denticulated or serrulate; postero-lateral angle of third abdominal segment produced into a small tooth; telson narrow, elongate, acuminate.

Length, 15 mm.

Arctic regions; east side of the Atlantic from Norway to the Mediterranean and the Azores; Greenland (Hansen); Grand Manan (Stimpson).

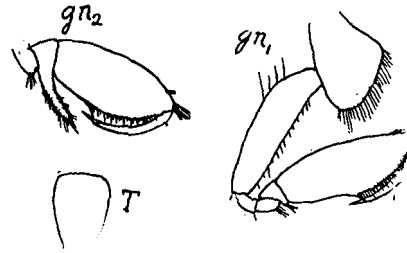
A specimen examined from Grand Manan, the type locality of Stimpson's *L. grandimana*, was found to agree perfectly with the description and figures of *spinicarpa* given in Sars's Crustacea of Norway. I have also compared this specimen with several specimens of *spinicarpa* received from Great Britain through the kindness of the Rev. T. R. R. Stebbing.

*Parædiceros lynceus* (M. Sars).

*Ediceros lynceus* M. Sars, Oversigt Norsk-Arctiske Region Krebsdyr., p. 25.

*Monoculodes nubilatus* Packard, Mem. Bos. Soc. Nat. Hist., Vol. I, pt. 2, 1867, p. 298, pl. VIII, fig. 4.

Eyes oblong, contiguous, situated near end of blunt rostrum; first antennæ about half as long as second, which are not a third the length of body and have peduncle and flagellum of subequal length; first four coxal plates large, the first produced forward in the middle; second and third subrectangular, much deeper than wide; fourth about as broad as deep; fifth rather large, with anterior and posterior divisions equal; body smooth, without spines; first four abdominal segments with more or less of a median dorsal carina; lateral wings of first three abdominal segments with lower margins broadly rounded, setose, and devoid of any angular projections or teeth; first two gnathopods of subequal size; first pair with carpus very small, pointed behind, but not produced into a prominent lobe; hand gradually narrowing toward base, palms long, oblique, convex, with a spine at its distal end, fingers very narrow, fully half as long as hand; carpus of second gnathopods produced into a long, narrow, setose lobe which lies close to posterior margin of hand and extends as far as distal end of palm; hand oval, palm evenly curved, with a spine at its upper end; rami of first uropods shorter than peduncle; those of second about equal to peduncle, while those of terminal pair much exceed peduncle; margins of rami armed with a very few distant spines; telson oblong, rounded at tips.



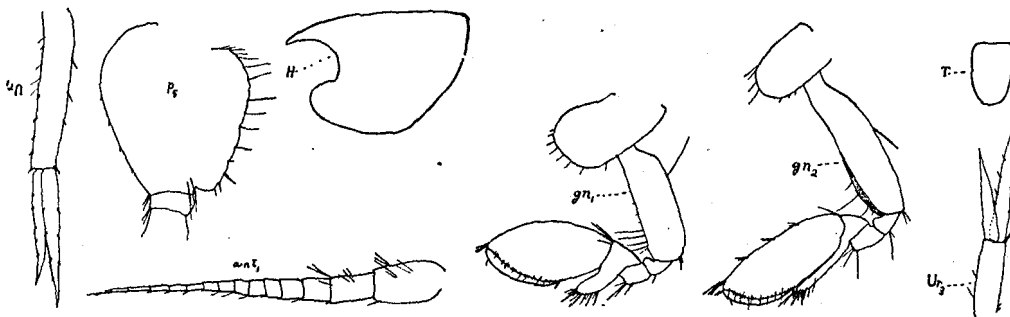
*Parædiceros lynceus*, female. After Sars.

Length, 18 mm.

Arctic and North Atlantic oceans; Norway; Greenland (Hansen); Labrador (Packard, Smith); south of Halifax, Nova Scotia, in 85 fathoms (Stebbing); Grand Manan; Eastport, Me.; off Cape Ann, 25 fathoms.

*Monoculodes edwardsi* Holmes, new species.

Rostrum triangular, rounded above, and curved downward, reaching about to tip of first joint of antennular peduncle; antero-lateral lobes of head broadly rounded; eyes at base of and but little upon rostral projection; first antennæ but slightly exceeding peduncle of second; first joint of peduncle about as long as next two; flagellum considerably longer than peduncle and composed of about 14 joints; second antennæ over half length of body; last joint of peduncle as long as the two preceding ones; flagellum about twice length of peduncle and composed of numerous (over 60) short articulations;



*Monoculodes edwardsi*. Near Woods Hole, Mass. H, head; the eyes were so indistinct in the specimen drawn that no attempt was made to figure them.

mandibles with second joint of palp bent inward, third joint about equal to second in length and setose at tip and on inner margin nearly to base; inner lobes of lower tip well developed; inner plate of first maxillæ suboval, with two setæ at tip; outer plate with eight spines, some of which are furcate; first joint of palp longer than broad; second joint spatulate, setose distally and on distal third of inner margin and having two setæ on distal third of outer margin; maxillipeds with inner plates small, oblong, not reaching the distal end of first joint of palp, distal end rounded and furnished with

about eight setæ; outer plates reaching only a little beyond middle of broad second joint of palp, inner margins armed with about ten strong spines, which increase rapidly in length toward distal end, where there are two setæ, which form a continuation of the spine row; outer margin without setæ; palp large, terminal joint a stout, nearly straight claw; coxal plates unusually small; first gnathopods with carpal lobe long, distally setose; hand oval, palm evenly convex, a little larger than posterior margin of hand, and furnished with a spine at distal end; second gnathopods with carpal lobe slender, extending along posterior side of hand as far as palm; hand oblong, palm about as long as posterior margin of hand and armed with a spine at distal end; propodi of first and second pereopods short, with several tufts of very long setæ on both margins; dactyls over half length of propodi; third and fourth pereopods with merus broad and produced into an obtuse triangular lobe at postero-inferior angle; dactyls over half length of propodi; last pereopods with basal joint nearly as wide at base as it is long; propodus longer than merus or carpus, and about equaling styliform dactyl; third abdominal segment with postero-lateral angles rounded; rami of first uropods shorter than peduncle; those of last uropods a little longer than peduncle; telson oblong, distally rounded.

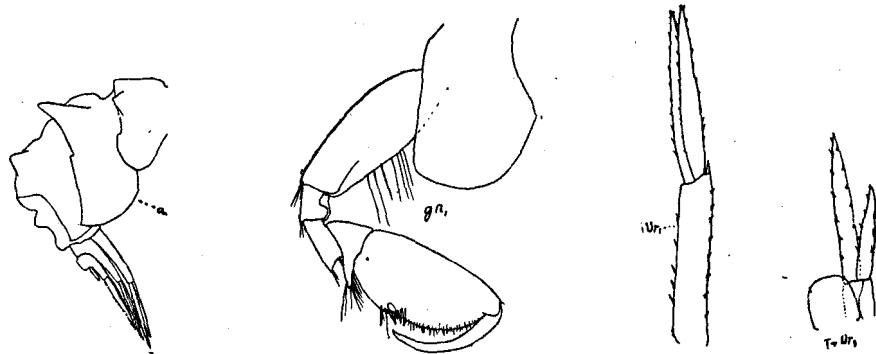
Length of specimen examined, 9 mm.

Described from a single specimen taken by Mr. V. N. Edwards at Woods Hole, Mass., along with specimens of *Calliopius levisculus* and *Gammarus*. The eyes could not be seen with distinctness. Several smaller specimens, which were taken by Mr. Judd at Newport, were examined. In several of these the rostrum was curved downward more strongly than in the specimen figured. Type No. 29243, U. S. Nat. Mus.

***Pleustes panoplus* (Krøyer).**

*Amphithonotus cataphractus* Stimpson, Marine Invert. Grand Manan, p. 52, 1853.

Rostrum well developed, triangular, acute, concave above, furnished with a median ridge below, and curved slightly downward; eyes rounded, convex, situated widely apart; antennæ short, scarcely half length of thorax and of subequal length; first joint of first pair a little longer than next two and



*Pleustes panoplus*. Labrador. a, Abdomen and uropods.

very much thicker; flagellum larger than peduncle; last two joints of peduncle of second antennæ of subequal length; flagellum a little shorter than peduncle; thorax broad, with a median dorsal carina on all segments; lateral margins of segments produced into a ridge, which in last three or four segments is produced posteriorly into a tooth; a tooth on posterior margin of last two thoracic segments on either side of dorsal carina; first three segments of abdomen furnished with a median dorsal keel which decreases in height posteriorly; a carina on either side of the middle on all abdominal segments, represented on the first segment by a tooth on the posterior margin, on the second segment by a large flattened tooth which projects behind the posterior margin, on the third by a ridge which is produced into a tooth near the middle, on the fourth by a ridge which is elevated near its anterior and at its posterior end; a small tooth on posterior margin of first two abdominal segments below lateral carina; postero-lateral angles of second and third segments of abdomen acute; first four coxal plates large,



deeper than long, and deeper than their respective segments, the fourth deeply excavated at upper posterior angle; last three coxal plates acute behind, first two (fifth and sixth) ridged along lower side; mandibles with second joint of palp twice length of first and almost as long as third; first maxillæ with outer plate but little longer than its breadth at base and armed distally with nine denticulous spines; second joint of palp over twice length of first, and armed around tip and on distal third of inner margin with eight or nine very short spines; maxillipeds with inner plates broad and very short, not quite reaching distal end of outer part of ischium; outer plates small, oblong, not quite reaching tip of first joint of palp; fourth joint of palp claw-like, smooth; gnathopods of subequal size and similar form; merus with postero-inferior angle acute; carpus with a very narrow, setose posterior lobe; propodus large, subovate, palm convex; dactyl, when closed, fitting into a small pocket at upper end of palm; outer ramus of posterior uropods markedly shorter than inner; telson subquadrate, with broadly rounded posterior angles.

Stimpson describes the color of this species as "very variable, generally dark reddish or brown, variegated, and mottled with white. Some specimens were of a uniform deep purple, others pure white. Eyes yellowish or vermilion colored, with a black dot in the middle."

Length, 15 mm.

Stimpson states that this species, when disturbed, "rolls itself up and remains quiescent, as if feigning death. \* \* \* When in motion this animal preserves an erect posture, like the isopods, with its tail bent up underneath. It seldom swims, but makes powerful leaps by means of its well-developed caudal stylets."

Grand Manan (Stimpson), taken "in 10 fathoms on a sandy bottom inside of Duck Island ledge"; Henley Harbor, Labrador, "at a depth of 4 fathoms among weeds" (Packard); Gulf coast of Labrador (Smith); Eastport, Me.

My description and figures of this species are taken from a single imperfect specimen from Eastport, Me., collected by Professor Packard and belonging to the Boston Society of Natural History.

#### **Paramphithoë pulchella** (Kröyer).

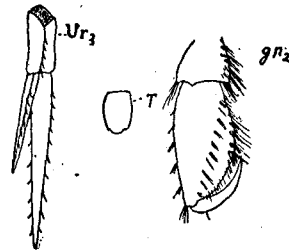
*Paramphithoë euacantha* Sars, Norske Nordhavs-Exped., p. 168, t. xiv, fig. 3, 1885.

Thorax and first three abdominal segments with a prominent dorsal crest which on posterior segments of thorax and first three segments of abdomen is produced posteriorly into large, oblique, compressed spines. In some specimens the dorsal carina appears as far forward as the first thoracic segment, but the first three segments and often the fourth have no posterior spinous projection; fourth abdominal segment with a triangular compressed elevation above, but no true spine; postero-lateral angles of second and third abdominal segments (and to a less extent the first also) produced into an acute tooth; head with a broad obtuse rostrum and projecting, subacute lateral angles; eyes broadly oval or nearly round; first antennæ nearly as long as body, first basal joint as long as next two; second antennæ seldom much over half length of first; first coxal plates tapering to a subacute point below, the three following ones with lower margin rounded; gnathopods similar; hand oblong, widening somewhat distally; palm oblique, smooth except for a minute tooth not far from middle; the three posterior pereopods nearly equal; terminal uropods slender, outer ramus a little over half length of inner one; telson oblong, distally rounded, with a minute projection on either side of tip.

Length 17 mm.

Widely distributed in the Arctic Ocean; Greenland (Kröyer); Norway (Sars); Labrador (Grand Manan).

The specimen figured approaches the form described by Sars as *P. euacantha*, but which that author subsequently concluded, in agreement with Hansen, was "only an excessively developed variety" of *pulchella*.



*Paramphithoë pulchella*. After Sars.

**Sympleustes latipes** (M. Sars).

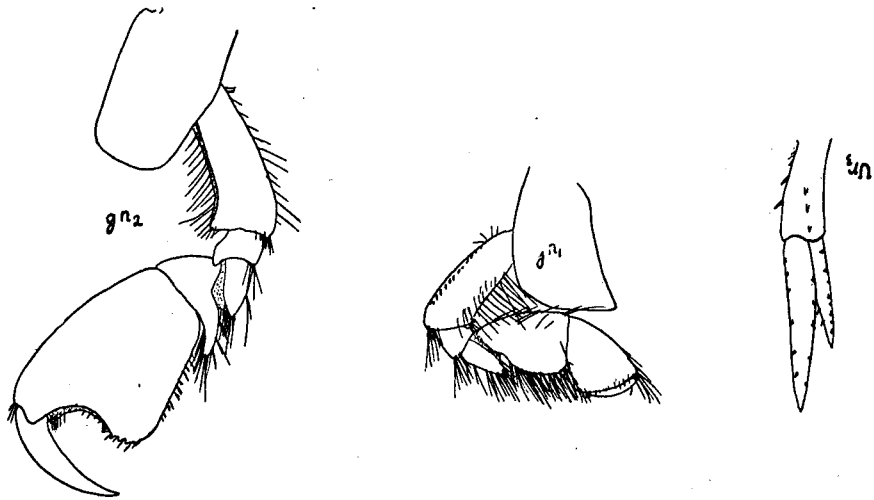
*Calliope ossiani* Bate, Cat. Amphip. Brit. Mus., p. 149, pl. xxviii, fig. 3, 1862.

*Calliope fmgalli* Bate & Westwood, British Sessile-eyed crustacea, Vol. I. p. 263.

*Parapleustes latipes* Sars, Crust. Norway, Vol. I, p. 360, 1895.

*Sympleustes latipes* Stebbing, Ann. Mag. Nat. Hist. (7), Vol. IV, 1899, p. 209.

Head produced into a small rostrum; eyes light colored in alcohol; first antennæ over half length of body, first joint of peduncle longer than second; third joint much narrower than second and scarcely half as long, and not having a prominent lobe at inferior distal angle; second antennæ much shorter than first and more slender, peduncle about reaching tip of peduncle of first pair and nearly as long as flagellum; first gnathopods small, quite strongly setose especially on posterior margins of merus and carpus; merus produced below into a rather narrowly rounded lobe, carpus larger than hand, hand narrowed toward base, distal end of oblique palm furnished with a few spines, second gnathopods very much larger than first; carpus short, produced posteriorly into a long narrow lobe which is curved downward; hand large and stout oblong, widening distally to palm, which is trans-



*Sympleustes latipes*. Grand Manan.

verse, somewhat concave in the middle, distal end broadly rounded and furnished with several short but stout spines; peræopods stout, the last three pairs with basal joints considerably expanded and similar in form, and merus joints dilated and produced at postero-inferior angle into a triangular projection which extends downward beyond middle of next joint; first three segments of abdomen and, to a less extent, last segment of thorax somewhat elevated posteriorly and more or less carinate; postero-lateral angles of second and third abdominal segments produced into a small acute tooth; uropods all extending backward to about the same point; rami nearly equal to peduncle in first pair and of nearly equal length. In second and third pairs inner ramus much longer than outer and exceeding peduncle; telson ovate with subacute or acute tip.

Length, 15 mm.

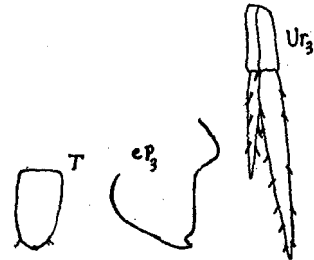
Grand Manan, 45 fathoms, one specimen; Greenland; Norway; British Isles

**Sympleustes glaber** (Boeck).

*Sympleustes glaber* Stebbing, Ann. Mag. Nat. Hist. (7), Vol. IV, 1899, p. 209.

Body smooth and evenly rounded; head with a small rostrum and very prominently projecting and somewhat upturned lateral angles; eyes somewhat irregularly rounded; first antennæ about two-thirds length of body, first joint of peduncle larger than next two and having a spine-like process on lower side of distal margin; second antennæ shorter than first, last joint of peduncle shorter than preceding one; flagellum larger than peduncle; first four coxal plates deeper than wide and consider-

ably deeper than their segments, the first three with a small but conspicuous denticle at the postero-inferior angle; first and second gnathopods of not very unequal size (the first a little smaller), and of similar form; merus with a spiniform projection at the postero-inferior angle; carpus subtriangular with a posterior setose lobe which is more prominent in the second gnathopod than in the first; hand much larger than the three preceding joints, oblong-oval in outline, palm evenly curved; margin laminate and furnished with a short tooth, or spine, near the middle, and two fascicles of stout spines, one behind the other, at distal end; dactyl evenly tapering, smooth within, and furnished with two or three setae near tip; when closed, the dactyl fits between the spines of the distal end of the palm; three posterior pereopods with basal joint large, oval, and serrated on posterior margin; postero-inferior angle of merus produced strongly downward; postero-lateral angles of third abdominal segment with a small, somewhat upturned tooth, a short distance above which is a convexity of the posterior margin; uropods rather slender, last pair with inner ramus nearly twice as long as outer; telson nearly twice as long as wide and distally rounded.



*Sympleustes glaber*. After Sars. *cp3*, Side plate of the third abdominal segment.

Length, 6 mm.

Greenland, Iceland, Spitzbergen, Norway (Sars).

A single imperfect specimen was examined, which was taken by Hyatt and Van Vleck from Eastport, Me. It agrees perfectly with the description and figures of this species in Sars' Crustacea of Norway, except that the lateral lobes of the head are rounded instead of acute.

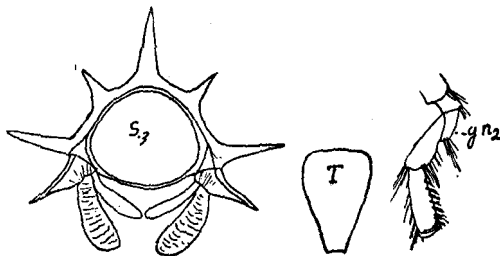
***Epimeria loricata* Sars.**

*Epimeria cornigera* Verrill (not Fabricius).

Head produced into a long rostrum which is rounded above and curved downward; eyes nearly round, protruding; antero-lateral angle of head produced and acute; first antennae shorter than second, first joint of peduncle wide, longer than next two; flagellum over twice length of peduncle; second antennae scarcely half length of body; last joint of peduncle two-thirds length of preceding one; thoracic segments with a median crest which becomes higher posteriorly, and is continued upon first four segments of abdomen, posterior ends of crest of each segment becoming successively more acute toward posterior end of body; two rows of tubercles on either side of median crest extending from the first thoracic to third abdominal segment; in lower row but one tubercle to each segment, and in the upper row one tubercle to each thoracic segment, but three upon each of first three segments of abdomen; coxal plates very large, first three narrow, acute below, antero-lateral angle of fourth and postero-lateral angle of fifth coxal plates strongly produced, acute, and bent outward; first two gnathopods similar in size and shape; hand oblong, small, palm only slightly oblique; third and fourth pereopods with basal joints deeply excavated behind, forming grooves with sharp margins; fifth pereopods shorter than fourth, basal joint laminately expanded behind, narrowing in distal half; uropods with flattened subequal lanceolate rami which are larger than peduncles; telson broad, with a triangular notch at tip.

Length, 30 mm.

Arctic regions and North Atlantic Ocean; New England, off Head Harbor, 50 fathoms.



*Acanthozone cuspidata*. After Sars. *S3*, The third segment of the thorax.

***Acanthozone cuspidata* (Lepechin).**

Body covered with numerous large spines. On the thorax the spines are arranged in five rows, one median dorsal row of very large spines, a lateral row of large nearly horizontal spines on either margin, and a row between these and the median dorsal spines; first thoracic segment with a large spine projecting nearly horizontally over the head; first three abdominal segments with a very large median spine and several spines on either

side upon posterior margin; fourth segment with a small median spine and, as in the fifth segment, with a recurved hook at the postero-inferior angle; rostrums small; first basal joint of first antennæ produced distally into a spine; first three coxal plates acuminate below, first bent forward; fourth with two inferior spinous projections; gnathopods similar, hand long, narrow, with a short, nearly transverse palm; basal joints of three posterior peræopods with two large spinous processes on posterior margin; telson narrowly truncated at tip.

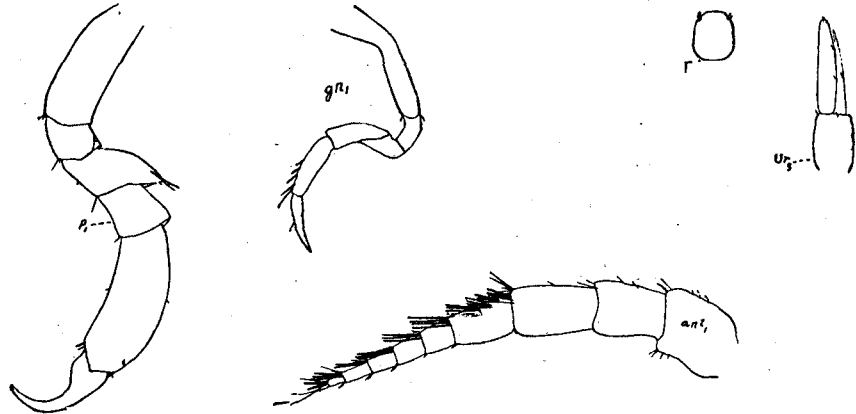
Length, 19 mm.

Widely distributed in the Arctic regions; Greenland; Labrador; Grand Manan; Eastport, Me.; off Cape Ann.

This is one of the most peculiar and striking of the Amphipoda of our coast and is easily distinguished from all the other forms by the abundance and large size of its spines.

*Lafystius sturionis* Krøyer.

Body robust, depressed; head short and broad, with a broad and obtuse rostrum; eyes rather small, nearly round, and containing few facets; first antennæ slightly longer and much stouter than the second, less than half the length of the body; the three joints of peduncle of nearly equal length, the second a little the shortest; flagellum seldom longer and often shorter than peduncle and composed of six or seven segments, which are furnished with long olfactory clubs; second antennæ weak, peduncle



*Lafystius sturionis*, male. Woods Hole, Mass.

not much thicker than flagellum, the latter composed of five or six elongate segments; maxillipeds with very narrow inner plates, which bear two or three setæ on inner margin and a pair of small setæ at tip; the large outer plate pectinated and furnished with a few large setæ distally; the small two-jointed palp not reaching tip of outer plate; thorax tumid, first two segments shorter than others, coxal plates small; first gnathopods small, very slender, simple propodus very narrow, dactyl styliform nearly straight and a little irregular in outline; second gnathopods small, joints, except the first, short, hand produced and rounded at postero-inferior angle, dactyl bifid at tip; peræopods well-developed and of not very unequal length, merus of first and second pairs dilated and produced downward in front; propodus in all peræopods large and stout, dactyls large, smooth, hook-like; in the first pair the propodus is stouter, and the dactyl stouter and more curved than in succeeding peræopods; uropods armed with very few spines; rami narrow, nearly equal to peduncle in first pair, a little longer than peduncle in second pair, and very much longer than peduncle in third.

Length, 6 mm.

From the mouth of a goose-fish, *Lophius americanus*, taken in Vineyard Sound (Smith); "From the back of a skate (*Raja laevis*) in the Bay of Fundy" (Smith); Halifax, "parasitic on *Cottus*" (Stebbing); Scandanavian coast (Sars and others); Mediterranean, on *Lophius piscatorius*, (Della Valle); British Isles.

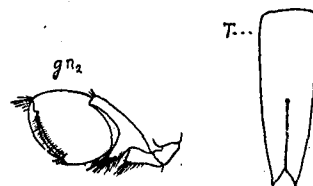
The above description with the figures accompanying it were taken from specimens obtained from goose-fish taken near Woods Hole.

*Eusirus cuspidatus* Kröyer.

Head with a short, pointed rostrum, which is rounded above and curved downward; eyes reniform, pale in alcoholic specimens; first antennæ scarcely half length of body; second segment as long as first and over twice the length of third; secondary flagellum minute, one-jointed; second antennæ nearly as long as first; last joint of peduncle nearly as long as preceding one; flagellum a little shorter than peduncle; first four coxal plates of subequal depth, the first produced forward and rounded at lower angle; second and third equal, twice as deep as wide, rounded below; fourth nearly as wide as deep, deeply excavated at upper posterior angle; first and second gnathopods subequal in size and similar in form, carpus attached near middle of anterior margin of hand, a narrow process extending down posterior margin half way to palm; palm long, evenly curved, defined posteriorly by a small prominence; dactyl long, slender, fitting closely to palm; first and second pereopods slender and elongate; three posterior pairs increasing successively in length, posterior margins of expanded basal joints serrate; last segment of thorax and first two segments of abdomen with a median dorsal spine at posterior end; the first four segments of abdomen and to a less extent the last segment of thorax with a median dorsal carina; fourth segment with a marked depression above a little in front of middle; postero-lateral angle of third segment of abdomen produced and acute; that of fourth segment broadly rounded and armed with numerous upturned serrations; much less evident serrations on the postero-lateral margins of first two segments; uropods extending backward to nearly the same point; peduncle of first pair with a large spine on outer side of distal extremity; outer ramus relatively much shorter than inner in second uropods than in first or third; telson long, narrow, flattened, grooved above, with a narrow fissure at posterior end which extends nearly to middle.

Length, 17 mm.

Norway; Arctic regions; Greenland; Grand Manan.



*Eusirus cuspidatus*. After Sars.

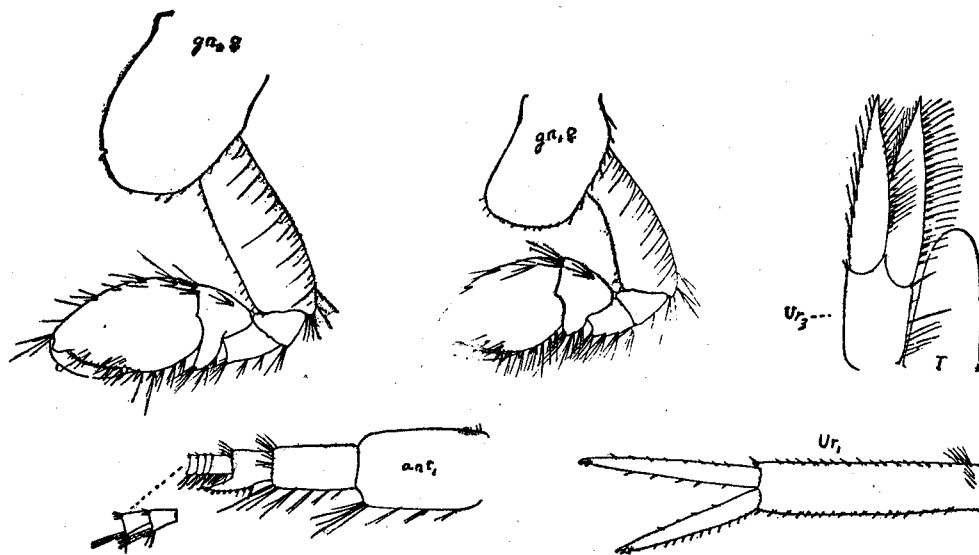
*Rhachotropis aculeata* (Lepechin).

Head with a prominent, acuminate rostrum which is slightly curved downward; eyes prominent, tenuid, their inner ends obtusely pointed; a rounded prominence between posterior ends of eyes; first antennæ nearly as long as second, first basal joint thick, flattened; third joint about one-third length of second, which is shorter than first; flagellum subequal to base; thorax broad, last two segments with three strong spines on posterior margin, last segment considerably longer than preceding ones; first five segments devoid of spines with exception sometimes of a trace of a spine on the mid-dorsal line of fifth; coxal plates small, first strongly produced in front and incurved at its anterior angle; fourth and fifth with a short longitudinal eminence on outer surface; first two gnathopods similar; carpus short, with a narrow posterior lobe; hand large, ovate, a prominence at upper end of the evenly convex palm; all of the pereopods with slender, elongate, slightly-curved dactyls, basal joints of fourth and fifth pairs with a large tooth on proximal portion of posterior margin; last pereopods much longer than others, basal joint much expanded proximally, the posterior margin strongly sinuous with a large tooth at lower end; first three abdominal segments flattened at sides, with three longitudinal dorsal carinæ, each of which ends on the posterior margin of its segment in a spine, the middle carina having a smaller spine near the middle of each segment; fourth segment with a median carina furnished with two spines as in preceding segments, a small lateral carina on either side which bears no spine and does not reach posterior margin of the segment; telson narrowly triangular with a broad groove, apex cut with a long narrow incision.

Several specimens taken off the coast of New England measured from 20 to 28 mm. A large specimen from the Arctic Ocean received from Doctor Stebbing measured 38 mm. This is one of the largest of our species of amphipods, and is extensively distributed in the Arctic regions. It is reported from Labrador by Packard and Smith and by the latter also from northern New England. I have examined specimens collected off Cape Ann in 25 fathoms, which is as far south as I have any knowledge of its occurrence. It is found in rather deep water.

*Calliopius læviusculus* (Kröyer).

Head with a small, triangular rostrum; eyes rather large, reniform; first antennæ somewhat shorter than second, the first basal joint considerably thicker and a little longer than second, third joint with inferior process long and narrow and furnished below with about eight calceolæ; flagellum a little longer than peduncle, joints very short at base but distally longer than broad and produced at antero-inferior angle; each joint with a pair of calceolæ and several olfactory setæ on the lower side and a few very short setæ above; second antennæ about two-fifths the length of body; last two basal joints of subequal length, the penultimate reaching as far as penultimate basal joint of first antennæ; flagellum subequal to peduncle, joints not produced below and each furnished with a pair of calceoli on median side; first four coxal plates deeper than broad, about as deep as their segments, and increasing successively in length, the first produced at anterior angle; first two gnathopods of similar form and of nearly equal size, the second a little the larger, with lobe on posterior side of carpus longer and narrower; hands ovate, palm very oblique with a row of stout spines on outer side which begins a little beyond middle of palm and a little above its distal end; gnathopods of male similar to those of female, but stouter; merus of first two peræopods strongly produced downward at anterior angle; merus of three posterior peræopods strongly produced downward at posterior angle, that of last pair more dilated than in preceding ones; first three abdominal segments more or less protruding at



*Calliopius læviusculus*. In connection with the antenna, two of the more distal segments of the flagellum are shown.

posterior end, especially in older specimens; postero-lateral angles of second and third segments with a small tooth; second, third, and fourth, and often, but to a less extent, the first, segments more or less indented above near base; first uropods with outer ramus markedly shorter than inner, which is somewhat shorter than peduncle; both margins of both rami and peduncle armed with numerous short spines; peduncle of second uropods relatively much less narrow than that of first, somewhat shorter than inner ramus; outer margin armed with about five spines, inner with several more; outer ramus much shorter than inner; both margins of both rami armed with numerous short spines; terminal uropods extending beyond the others; rami flattened, lanceolate, subequal, much longer than peduncle, with both margins of each furnished with numerous spines and plumose setæ; telson oblong, slightly tapering and rounded at tip.

Length, 16 mm.

Narragansett Bay (Judd); Vineyard Sound (Smith); Woods Hole; Gloucester; Grand Manan; Halifax; Labrador; Greenland; Arctic regions; Norway; British Isles.

I have examined numerous specimens and find transitional stages between forms which Sars describes as *Calliopius rathkei* and those he refers to *læviusculus*. Smaller specimens usually present the characteristics of *rathkei*.

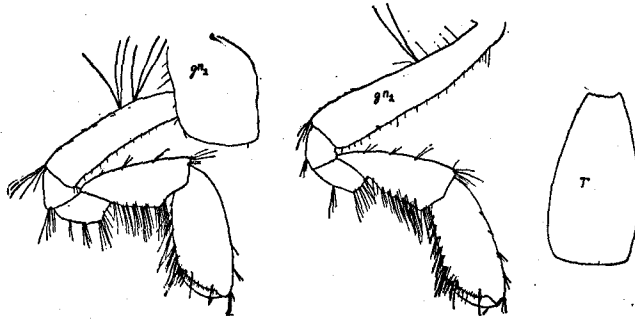
*Halirages fulvocinctus* (M. Sars).

*Pherusa tricusps* Stimpson, Proc. Acad. Nat. Sci. Phila. 1862, p. 139.

*Atylus (Parámphithoe) inermis* (Kroyer fide Boeck) Packard, Mem. Soc. Nat. Hist., Vol. I, 1867, p. 298, pl. 8, figs. 3-8b.

Head with a small, downwardly curved rostrum; eyes large, broadly reniform, pale in alcoholic specimens; both pairs of antennæ long and slender, the first, which is usually a little the longer, often exceeding length of body; peduncle of first antennæ with first joint longer and stouter than second; third joint shorter than the second, with its antero-inferior angle produced into a laminate, pointed process which is furnished below with calceoli, as are also the lower margins of second and of basal portion of third segment; segments of flagellum with calceoli on lower side of each; second antennæ with last two basal joints subequal, penultimate one reaching distal end of peduncle of first antennæ; flagellum and last two joints of peduncle with calceoli along upper margin; first four coxal plates of moderate size, scarcely as deep as their segments, the fourth about as wide as long and concave

behind; last segment of thorax and first two segments of abdomen produced posteriorly in mid-dorsal line into a large spine; lateral portion of first abdominal segment broadly rounded below, with a minute cusp a little behind middle of lower margin; postero-lateral angle of second abdominal segment projecting as a small tooth, above which the posterior margin presents an angular prominence; postero-lateral angle of third abdominal segment with a prominent tooth, above which the posterior margin bears a large up-



*Halirages fulvocinctus*. Ipswich Bay, Mass.

turned tooth; margin between these two teeth serrated; gnathopods small, nearly equal in size and of similar form; basal joint elongate, curved forward in the first and a little backwards in the second; carpus long, a little broader relatively and a little more obliquely truncated at postero-distal angle in first than in second pair; hands narrow, palm oblique, with a row of four spines on outer side at distal end; uropods with flattened, narrow rami; first two pairs with outer ramus markedly shorter than inner and tip of each ramus armed with a cluster of spines; second uropods markedly shorter than first or third, third extending backward only a little farther than first; rami of third uropods of nearly equal length and over twice length of peduncle, much broader than those of preceding uropods, and lanceolate in form, terminating not in a cluster of spines but in an acute tip; telson oblong, tapering distally, concave above, tip with a shallow emargination.

The color, according to M. Sars, is "a pellucid yellowish-white marked with rings of brownish-yellow in the posterior dorsal margin of each segment; antennæ with brownish rings; eyes red."

Length, 17 mm.

Arctic regions; Labrador (Packard, Smith); "south of Halifax, Nova Scotia; latitude 43° 3' N., longitude 63° 39' W.; depth 85 fathoms" (Stebbing); Ipswich Bay, 27 fathoms.

In some of the specimens which I have examined the first antennæ are shorter than the second, while in others they are longer, sometimes exceeding the length of the body, as described by M. Sars.

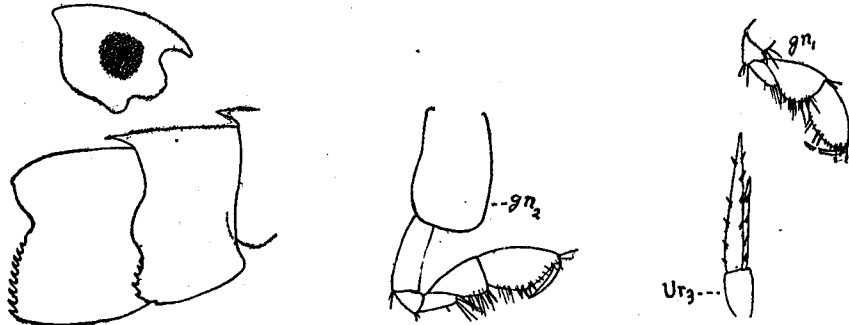
*Apherusa gracilis* Holmes, new species.

Head with front obtuse, curved downward; eyes large, pale in preserved specimens; lateral corners of head rounded; first four coxal plates well developed, much higher than their segments, the first somewhat expanded distally, fourth about as wide as deep and slightly emarginate posteriorly; gnathopods similar; carpus in first pair a little wider than propodus, evenly rounded and setose posteriorly; hand oblong-oval, scarcely longer than carpus; palm evenly convex and not sharply marked off from posterior margin and bearing a pair of spines near the end; second gnathopods with carpus subtriangular, much less convex posteriorly than in first gnathopods; hand oblong, longer and broader than carpus, widest near upper end of palm, where there are a few spines; first two segments of abdo-

men with a dorsal posterior spine; third segment rather abruptly bent downward at posterior end but not produced into a spine; postero-lateral margin of second abdominal segment with convexity near the middle, below which are several upturned teeth which are continued around the rounded lower angle; postero-lateral margin of third segment of abdomen armed with several prominent upturned teeth; uropods elongated, last pair with the longer ramus nearly three times length of peduncle and armed with five or six spines on the inner and four or five spines on the outer margin; outer ramus about two-thirds length of inner and armed with four spines on outer margin; telson oblong, entire, and distally rounded.

Length, 5 mm. Type No. 29242, U. S. Nat. Mus.

Described from two rather imperfect specimens taken off Gay Head, Marthas Vineyard. The flagella and last basal joint of first antennæ were broken off; first basal joint of these appendages longer and stouter than second, as in the other species of this genus; second antennæ shorter than body; last two joints of peduncle of subequal length and joints of flagellum narrow, sparingly setose



*Apherusa gracilis*. Gay Head. The figures on the left represent the head and the first three segments of the abdomen.

and devoid of calceolæ; terminal joint of mandibular palp considerably shorter than preceding one and with inner margin slightly concave and outer margin convex. Anterior portion of first three abdominal segments crossed by a light band. Body and appendages with numerous dark pigment cells. Eyes red.

From *Apherusa jurinii* and *A. borealis* this species differs in having the postero-lateral margin of the third abdominal segment armed with numerous teeth. From *A. bispinosa* it differs in that the carpus and propodus of the first and second gnathopods are much shorter and broader, and in having no large tooth at the upper end of the row of dentations on the postero-lateral margins of the third abdominal segment. It presents the same points of difference from *A. megalops*, besides having smaller eyes and having the lateral corners of the head rounded instead of produced and acute. It approaches *A. tridentata* in the armature of the sides of the abdomen, but differs from that species in having the carpus of both gnathopods very much broader, in having the outer ramus of the terminal uropods relatively shorter, and in not having the posterior margin of the telson serrated.

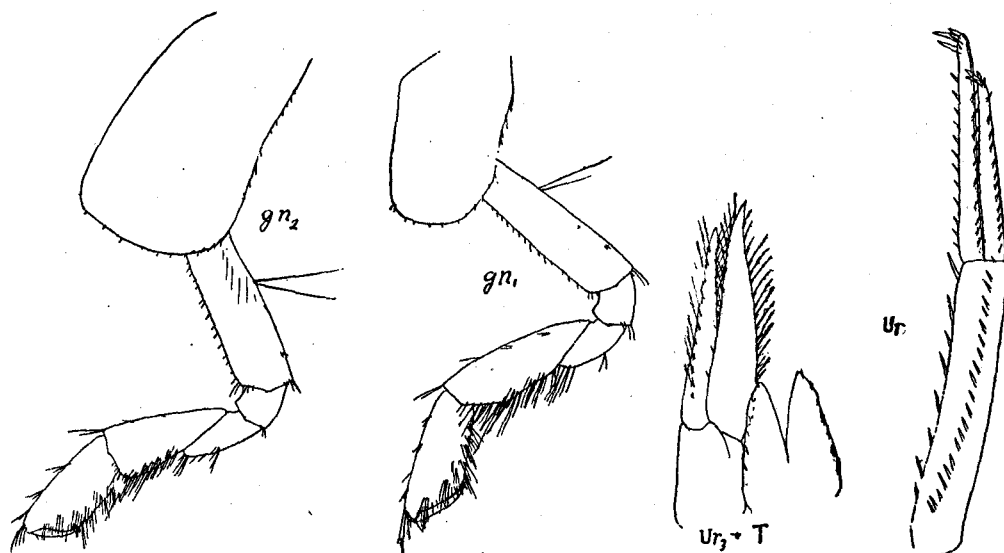
#### **Pontogeneia inermis (Kröyer).**

*Iphimedia vulgaris* Stimpson, Marine Invert. Grand Manan, p. 53, 1853.

Rostrum narrow, prominent, but not large; antero-lateral angle of head acute; eyes rather large, broadly reniform, fading to a pale color in alcoholic specimens; antennæ slender, first somewhat shorter than the second, with first two joints of peduncle of subequal length, the third two-thirds length of second; flagellum slender, over twice length of peduncle; second antennæ over half length of body; last two basal joints subequal; flagellum over twice length of peduncle; flagella of both pairs of antennæ furnished with short setæ, and on first are small groups of olfactory hairs on alternate joints; first four coxal plates about as deep as their segments, first three deeper than wide and of similar form; gnathopods small, of nearly equal size and of similar form, the narrow basal joints of each with numerous very short setæ on anterior margin and a few very long setæ posteriorly; carpus of first pair long and narrow, longer than propodus, obliquely truncated at postero-inferior angle, posterior mar-



gin furnished with several tufts of setæ, in each of which is one or more very thick plumose setæ and several more slender simple ones; hand oblong, narrow, narrowing somewhat toward base; palm oblique, nearly straight, with a row of three spines on outer margin around distal end; an oblique row of two or three spines on inner surface of hand near distal end of palm; several gnathopods with carpus narrowly triangular, not truncated at posterior inferior angle, posterior margin with about eight transverse rows of stout plumose setæ; lower margin with a few simple setæ; hand oblong, palm oblique, a row of three or four spines on both inner and outer surfaces of hand near distal end of palm; dorsal side of abdomen more or less protruding, especially in older specimens, at posterior end of third and fourth segments; fourth segment indented slightly near base; first two uropods with outer rami markedly shorter than inner; peduncle of first slender, longer than inner ramus, armed with about eight spines on inner margin and many more smaller spines on outer; both margins of both rami with numerous short spines; a cluster of large spines at tip of each ramus; peduncle of second uropods shorter than inner ramus, with five to seven spines on outer margin and about four on inner; rami much as in first



*Pontogeneia incrimis*. Grand Manan.

pair, but with much fewer marginal spines; third uropods extending beyond second, rami flattened lanceolate, the inner somewhat longer and broader at base than outer one and about twice length of peduncle; both margins of both rami furnished with numerous spines and plumose setæ; telson cleft nearly to base, the lobes subacute.

Nearly colorless, with scattered spots of purplish; antennæ with a few transverse purplish bars. Eyes reddish or reddish brown.

Length, 11 mm.

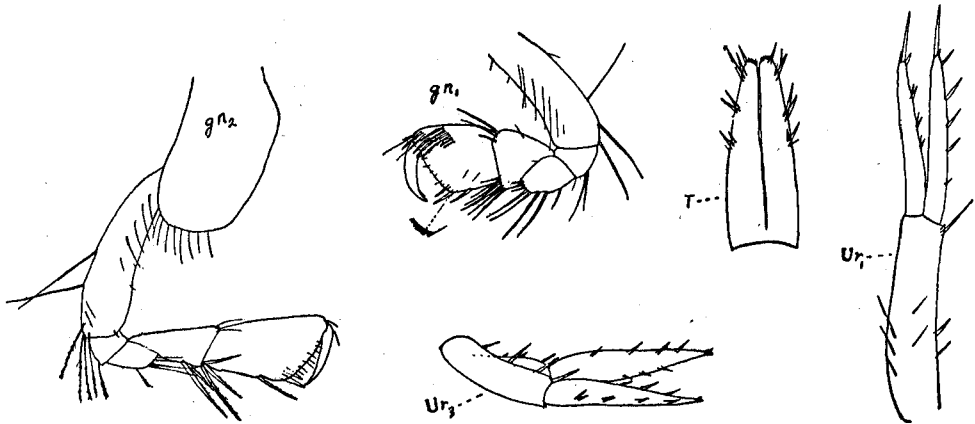
Vineyard Sound (Smith); Grand Manan (Stimpson); Halifax; Bay of Fundy to Greenland (Smith); Arctic Ocean; Norway (Sars).

Found commonly in tide pools and often taken at the surface. It is often associated with *Calliopis laviusculus*.

The antennæ of the males of this species are provided with a number of very large calceoli. These organs occur on the peduncles of both pairs of antennæ, but are absent in the flagella. In several specimens examined there were 5-7 calceoli on the lower side of the second joint of the peduncle of the first antennæ and four or five on the lower side of the third joint. On the second antennæ the calceoli are on the upper inner margin of the last two basal joints. In the specimens examined the penultimate basal joint carried 7-8 calceoli, and the last basal joint 6 or 7. I have found no calceoli upon the antennæ of the females. These organs are very large and conspicuous, and are in the shape of an urn with a very wide and flaring mouth. Each is situated upon a prominence to which it is united by a short stalk. Both the outer and inner surfaces of these organs are beautifully striated.

**Dexamine thea** Boeck.

Head produced into a small rostral projection; eyes nearly round, margin of the head in front of each produced into an acute angular process; first antennæ over half length of body; first joint of peduncle rather stout, nearly two-thirds length of slender second joint, which is about three times the length of third; flagellum slender, with 12-16 elongated segments; second antennæ (at least in female) much shorter than first; last two joints of slender peduncle of subequal length; flagellum not much (if any) exceeding peduncle, and composed of 5-9 elongated joints; mandibles much as in *D. spinosa*; under lip with very small inner lobes; first maxillæ with inner plate very small, subovate, and terminated with a single seta; outer plate with about eleven dentate and furcate terminal spines; palp unarticulate, distally widened and furnished with several terminal setæ, the inner margin devoid of setæ or possessing a single one; second maxillæ as in *D. spinosa*; maxillipeds with inner plate short and rather broad, the transverse distal margin furnished with about six large setæ; outer plate very large, overlapping the palps, inner margin minutely denticulated toward distal end, the distal half (or less) of inner side furnished with about six stout spines which increase in length and become set farther from the edge toward the tip; palp scarcely exceeding tip of outer plate; dactylus absent; first four coxal plates well developed, much deeper than broad, but not much deeper than their segments; lower margins setose; first gnathopods rather stouter but shorter than second; carpus short, subtriangular; hand rather broader than carpus; palm oblique, finely pectinated, rounded distal end armed with two stout spines; second gnathopods with carpus narrowly triangular,



*Dexamine thea*. Woods Hole, Mass.

furnished with a tuft of large setæ at lower posterior angle and another near middle of posterior margin; hand regularly widening toward distal end; palm oblique, finely pectinated rounded posterior angle armed with two stout spines; hand and carpus taken together forming a narrow, elongated triangle; peræopods very spiny, dactyls narrow, over half the length of propodi; basal joint of penultimate pair much expanded; posterior margin serrated and strongly bulging backward; basal joint of last pair not expanded, linear; first four segments of abdomen each larger than any of the thoracic segments, and armed dorsally with a strong posterior spine; postero-lateral angle of third segment produced and acute; second uropods much shorter than first or third, rami like those of first, with an elongated terminal spine and several lateral spines; terminal uropods extending a little beyond first, the rami flattened, subequal, lanceolate, devoid of a terminal spine, and nearly twice the length of peduncle; telson much elongated, extending nearly to tip of posterior uropods, cleft nearly to base, lobes denticulated at tip and furnished with about three tufts of spines near lateral margins and one or more spines at distal end.

Length of specimens examined, scarcely 3 mm. Adult specimens examined by Sars measured 4 mm.

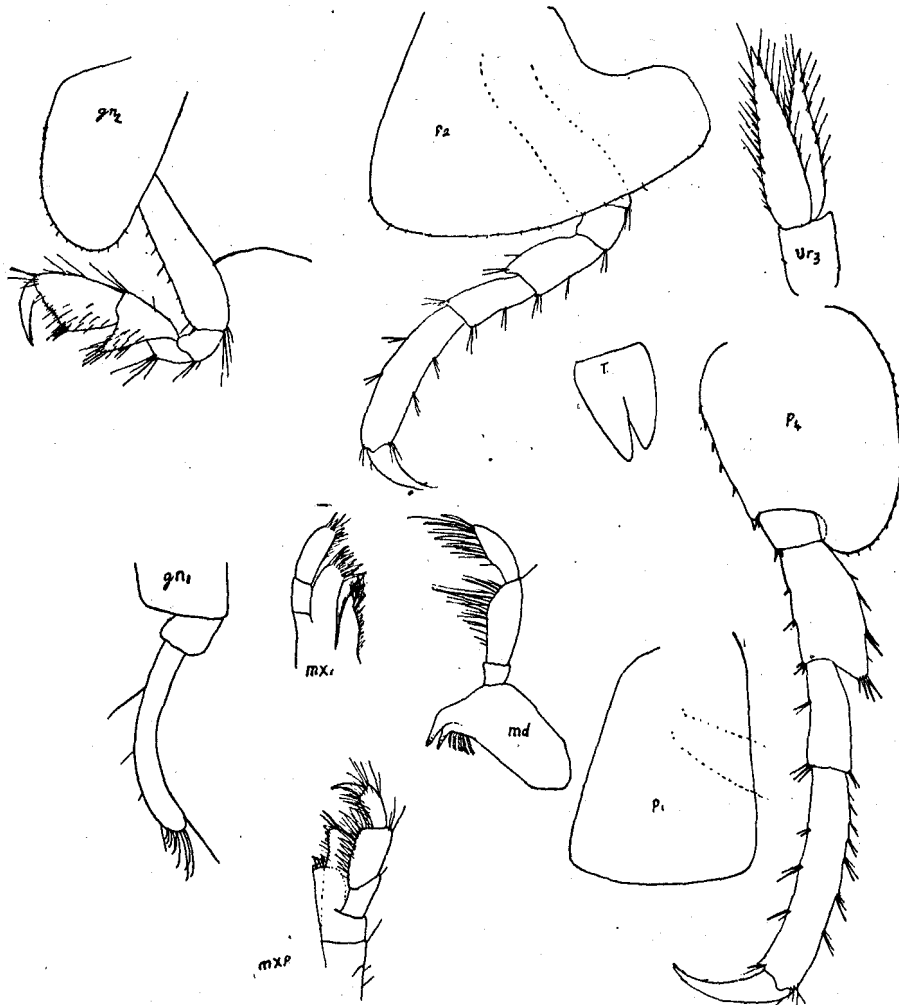
Norway (Sars); British Isles; France; Woods Hole, Mass.

Described from several specimens taken at Woods Hole, June 25, 1900. The females were carrying eggs.

This species is closely allied to *D. spinosa*, the type of the genus, but is of much smaller size and has the basal joint of the posterior peraeopods very much narrower, much fewer joints in the antennae, smaller and differently shaped eyes, and much fewer spines on the inner margin of the outer plate of the maxillipeds. The hand of the first gnathopods is a little stouter and has the palm somewhat less oblique than in the specimen of *thea* figured in Sars's *Crustacea of Norway*, but in every other feature the Woods Hole specimens agree perfectly with Sars's description and figures.

***Batea secunda* Holmes, new species.**

Female: Head with a rather prominent narrow rostrum; eyes well developed; first antennæ nearly as long as second, first joint of peduncle much stouter and a little longer than second; third joint



*Batea secunda*. Woods Hole, Mass.

small, less than half the length of second; flagellum consisting of about 18 elongate segments which are furnished with well-developed setæ and, on alternate members, with olfactory clubs; second antennæ nearly half as long as body, last two joints of peduncle of nearly equal length; peduncle about as stout as that of first antennæ and composed of elongate joints; mandibles with a well-developed molar

tubercle, dentate primary and secondary cutting plates, and a spine row composed of five stout, irregularly serrate spines; palp with third joint about three-fourths the length of second; last two joints strongly setose on inner margin; lower lip with rather small inner lobes; first maxillæ with inner plate narrow, furnished with three plumose setæ—one at tip and two near distal end of ciliated inner margin; palp two-jointed, distal extremity nearly transverse and armed with several strong spines and setæ; maxillipeds with inner plates well developed, extending a little beyond first joint of palp; distal end broadly rounded, furnished with several short plumose setæ and three short stout teeth near the middle line; outer plate about equaling second joint of palp, furnished with a few odontoid processes on distal part of inner margin and two or three stout plumose setæ at distal end; terminal joint of palp claw-like; first gnathopods consisting of rudiments of coxal plate and basal joint, former very small, latter curved, distally rounded, and furnished with several curved setæ around tip; coxal plates of three following appendages well developed and about as deep as their segments; first gnathopods rather slender; carpus with a large, triangular posterior lobe; hand with palm oblique, only slightly curved and minutely denticulated; dactyl with four spinous projections on inner margin behind tip; second peræopods with coxal plate broader than deep and deeply excavated at upper posterior angle; the three posterior peræopods increasing successively in length, basal joints broad, last pair considerably longer than preceding; claws of all the pairs large, strongly curved, and having a small seta near distal end of inner margin; the posterior margin of third abdominal segment with several upturned teeth above the rounded postero-lateral angles; first two pairs of uropods with rami styliform, outer ramus considerably shorter than inner; second uropods not extending nearly so far backward as first or third; third uropods with rami flattened, lanceolate, over twice the length of peduncle, margins of both armed with numerous short spines and plumose setæ; telson deeply cleft.

Length, 5 mm. Type No. 29244, U. S. Nat. Mus.

Several specimens were taken near Woods Hole during the summer of 1900. Some were dredged by the *Fish Hawk* in about 25 fathoms, and others were obtained off Nobska, at a depth of about 6 fathoms. The body and coxal plates in the living specimens were marked with blue or purplish pigment spots, formed by small clusters of hexagonal pigmented cells of the hypodermis. Sometimes the blue or purple color of these spots is replaced by a reddish brown, and in some specimens neither kind of spots occurs. There are also branched pigment cells on the body and appendages, which are dark in transmitted light, but silvery green in reflected light. The flagella of both pairs of antennæ are blue or purplish and the peduncles may contain branched pigment cells. The eyes are brownish. When placed in a dish of sea water the animals swim for only a short distance and then curl up and drop to the bottom.

The genus *Batea* was first established by Fritz Müller to contain a species found on the coast of Brazil (See Ann. and Mag. Nat. Hist. (3), vol. 15, p. 276, pl. x, 1865). The genus has not, up to this time, been met with north of the equator. It differs from all the other genera of the Gammaridea in the rudimentary character of the first gnathopods which in both the type species, *B. catharinensis* and the present one, consist of only the coxal and basal joints. Our species agrees quite closely with the one described by Müller, but has the coxal joint of the first gnathopods much smaller and fewer tooth-like processes on the inner margin of the outer plates of the maxillipeds. As in *catharinensis*, the eyes are larger and the antennæ longer in the male than in the female, and the first and second peræopods are furnished with long plumose setæ only in the male sex. In one male specimen in my collection the second antennæ exceed the length of the body.

#### **Gammarus locusta** (Linnaeus).

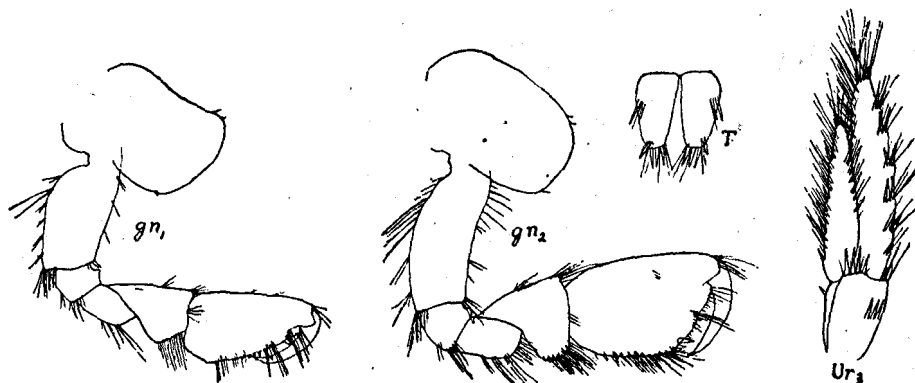
*Gammarus ornatus* Edwards, Ann. Sci. Nat. t. xx, 1830, p. 367, pl. 10, figs. 1-10.

Body rather slender and compressed; eyes elongated, reniform, nearly reaching anterior margin of short lateral lobes of head; first antennæ a little longer and more slender than second and often (generally in females) shorter than half the length of body, the first joint a little longer than the second, which is twice the length of the third; secondary flagellum longer than second joint of peduncle and about 8-jointed; peduncle of second antennæ stout, the last two joints of subequal length; flagellum shorter than peduncle; first gnathopods of male with hand elongated (much longer than carpus), tapering from near the base, posterior margin continuous with palm, which is somewhat uneven, armed with a stout spine near the middle and a large spine with a row of several smaller ones above it at distal end; second gnathopods of male with hand much larger than in first, about twice

length of carpus, subquadrate in outline; palms somewhat oblique and uneven, sharply marked off from the posterior margin, armed with a stout spine near middle and a large spine followed by several smaller ones near distal end; in the female the gnathopods are smaller than in the male and more nearly equal in size and shape; in the first pair the hand is not so narrow as in the male; hand of second pair resembles in shape that of male, palm less oblique than in first gnathopods; postero-lateral angles of second and third abdominal segments produced and acute; the margin above the angles generally furnished with short setæ; the three posterior segments with a median projection bearing a fascicle of spinules and a lateral fascicle on either side; last pair of uropods with both rami stout, inner nearly as long as first joint of outer; inner margin armed with about four stout spines; outer margin of outer uropods armed with about six groups of stout spines; telson with a group of two or three spines near base and three on apical margin, with another spine near the latter close to outer margin.

Color, olive brown to reddish brown, the margins of the segments colored a little more deeply than the other parts. Above the bases of the pleopods and first pair of uropods is a red, orange, or pink spot, produced by an aggregation of globules. Some of the globules are highly colored, while others are nearly or quite colorless. There is usually also a long patch of colored globules along the intestine.

Length, about 25 mm. Arctic specimens, according to Sars, attain a length of 48 mm.



*Gammarus locusta*, male. Woods Hole, Mass.

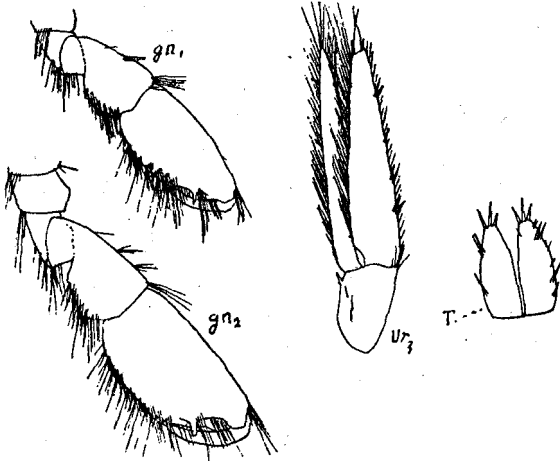
The distribution of this species is very extensive, reaching throughout practically the whole of the circum-boreal region. On the eastern side of the Atlantic it extends into the Mediterranean Sea, and on the western side all along the New England coast and probably considerably further south. In the Pacific Ocean it extends from Bering Strait down the coasts, both of Asia and North America, for a considerable distance. This is the species of amphipod decidedly most often met with in collections from New England. It is abundant near the shore, but ranges into a depth of over 50 fathoms.

#### *Gammarus annulatus* Smith.

*Gammarus natalor* Smith, Rept. U. S. Fish Com. 1871-2, p. 558.

Eyes more or less reniform, broader than in *locusta*; antennæ often not more than one-third the length of body; first pair shorter than second, with second joint of peduncle only a little shorter than first and the third half the length of second; secondary flagellum nearly half the length of primary, peduncle of the second antennæ longer than flagellum, the last joint a little longer than preceding one; both pairs of antennæ with very long, fine, plumose hairs; first four pairs of coxal plates very deep, the lower margins of anterior three fringed with long hairs; first gnathopods in the male with hand narrowly oval, palm uneven, very oblique and continuous with posterior margin of hand, armed near the center with a stout spine, a pair of stout spines near distal end, above which is a double row of smaller blunt spines; hand of second gnathopods of male oblong, broader than that of first pair, with palm less oblique, concave in the center where the large spine is situated, and armed with a double row of spines at the distal end, the two rows being unequal in size and in number of spines; in the female the hands of both gnathopods are less stout than in the male, and are nearly equal in

size and similar in shape. The palm in the first pair is, however, more oblique than in the second, and in both pairs the palms are more even than in the



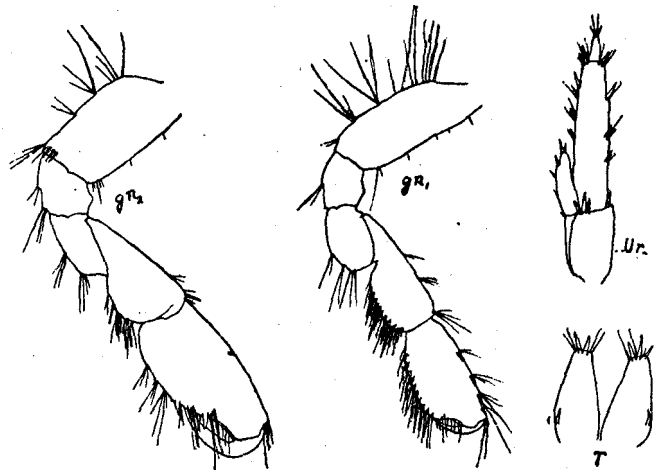
*Gammarus annulatus*, male. Woods Hole, Mass.

Length, 15 mm. Abundant in Vineyard Sound; Gloucester. This species of *Gammarus* is peculiar on account of its habitat at the surface, where it is often taken in great numbers.

Professor Smith has kindly sent me the types of his *Gammarus annulatus*. They prove to be the same species as the one he has described as *Gammarus natator*.

#### *Gammarus marinus* Leach.

Body slender; lateral lobe with a rather deep emargination below; eyes reniform; first antennæ about half as long as body; second basal joint a little shorter than first, but twice the length of third; flagellum long and slender; second, arary flagellum about 7-jointed and scarcely half as long as peduncle; second antennæ shorter than first; last two joints of peduncle of subequal length, flagellum longer than peduncle; first four coxal plates not large, the fourth deeper than broad; first gnathopods in the male somewhat stouter and larger than the second; carpus about three-fourths the length of hand; hand narrowly oval; palm very oblique, continuous, with posterior margin a little concave in the middle, where there is a stout spine on the outer side which is the first of a row of three spines, the last one of which is near distal end of palm; second gnathopods of the male with carpus a little longer than hand; posterior margin with 10-12 short transverse rows of long setæ; hand subrectangular, about twice as long as wide, posterior margin densely clothed with long setæ arranged in about 13 transverse rows, palm oblique, concave in the middle; first gnathopods of the female nearly as large as those of the male and resembling them in form; first pair stouter than second, hand subquadrate, broader than in



*Gammarus marinus*, male. Woods Hole, Mass.

the male sex and have laminate edges marked with fine vertical lines; pereopods slender, first and second pairs armed with only a very few weak spines but furnished with long slender hairs, which are especially abundant on posterior margins of carpus and merus; last three pairs with fascicles of spines; postero-lateral angles of second and third abdominal segments produced and acute; fifth and sixth abdominal segments with both median and lateral fascicles of spines; third segment with only a median fascicle; last uropods elongated, rami narrowly lanceolate, the margins furnished with long, plumose hairs; outer margin of outer ramus with several spines, the terminal article narrow and tapering to an acute tip; inner ramus equaling or exceeding end of first joint of outer, both margins armed with a few spines; telson with a variable number of spines near outer margin and several at the tip.

the male; palm oblique, but not nearly so much so as in the male, and devoid of median concavity, being gently and evenly convex. In the second gnathopods the carpus is both longer and broader than the hand, which is much like that of the male in shape, but is more nearly rectangular, with palm almost transverse and gently and evenly convex; postero-lateral angles of the second and third abdominal segments not produced nor sharp-pointed; three fascicles of spines on each of the three posterior abdominal segments, the spines on each segment being arranged in two rows which converge anteriorly; terminal uropods with outer ramus large, both margins armed with three to five fascicles of stout spines; inner ramus small, often less than one-third the length of outer; telson with three spines at the tip of each half and one on a pair of spines close to outer margin near base.

Length, 15 mm.

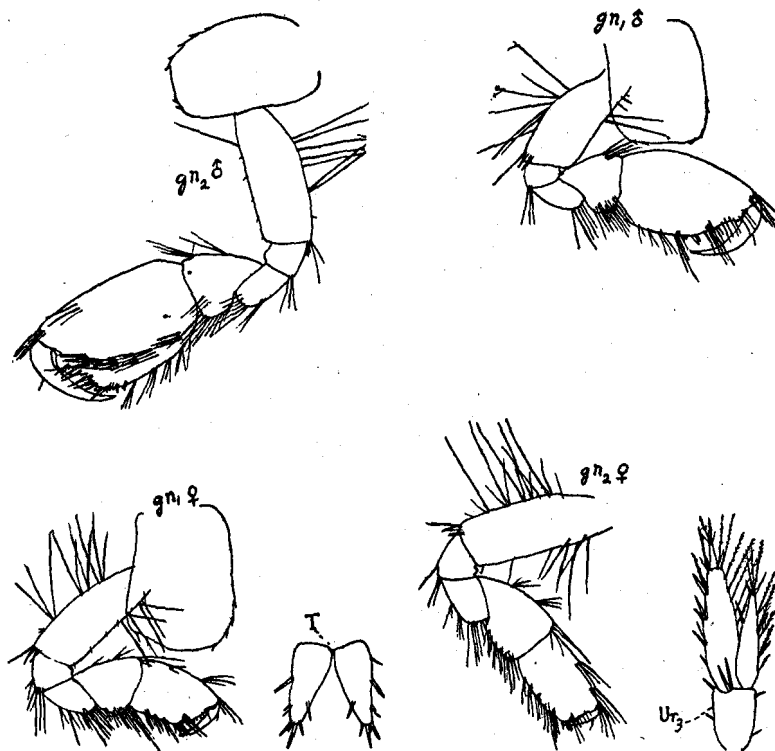
This species is found under stones at low tide. It has been taken at New Haven, various places in Vineyard Sound and Buzzards Bay, Newport, and Woods Hole.

A comparison of specimens from New England with specimens of *Gammarus marinus* Leach, from North Devon, England, shows a similarity in all essential respects between forms from these two remote localities. In specimens from our coast the second gnathopod is a little smaller relatively to the first than in the specimens examined from England.

*Carinogammarus mucronatus* (Say).

*Gammarus mucronatus* Say, Jour. Acad. Nat. Sci. Phila., Vol. I, 1818, p. 376.

Eyes reniform; first antennæ a little longer than second; first joint of peduncle longer than second; third joint about three-fifths the length of preceding one; flagellum about twice the length of peduncle;



*Carinogammarus mucronatus*. Great Egg Harbor, N. J.

secondary flagellum not half the length of peduncle and composed of three or four joints; second antennæ with flagellum about equal to peduncle and composed of about ten oblong joints; first four coxal plates deep; the first one oblong, of similar shape to the second and third; fourth deeper than

wide; first gnathopods in male stout, smaller than second; carpus not quite half as long as hand; hand narrowly oval; palm uneven, very oblique, continuous with posterior margin; hand of second pair oblong, with the two sides nearly parallel; palm oblique, with a laminate cross-striated edge which is concave near the middle, a cluster of spines around the distal end. In the female the gnathopods are of nearly equal size; hand of first pair subquadrate, with anterior margin quite convex; palm oblique and quite evenly convex, with a few slender spines around posterior end; hand of second gnathopods oblong, nearly rectangular; palm nearly transverse, evenly convex, with a few slender spines around distal end, where it becomes more sharply curved; posterior margin of first three abdominal segments produced backward in the mid-dorsal line into a prominent acute tooth; last three segments with fascicles of spines; telson with three terminal and a few lateral spines on each division.

General color olive green. A reddish spot above bases of first four abdominal appendages formed as in *Gammarus locusta*.

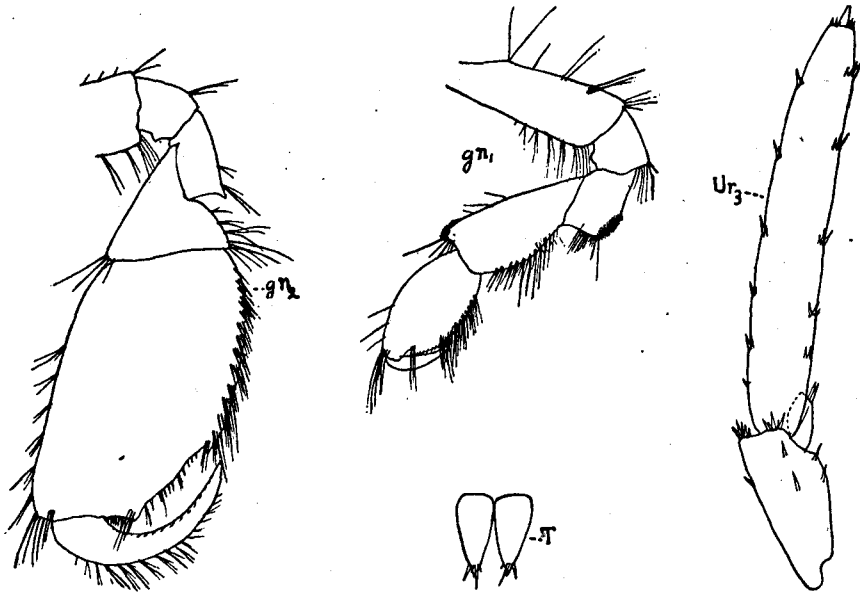
Length, 6 mm.

Cape Cod to Florida; Alabama (Herrick); often in brackish water.

**Melita dentata** (Kröyer).

*Gammarus purpuratus* Stimpson, Marine Invert. Grand Manan, p. 55, 1853.

Body much compressed; eyes round or oval; first antennæ much longer than second; second joint of peduncle longer than first and about four times the length of third; secondary flagellum about five-jointed; peduncle of second antennæ long and slender; last joint a little shorter than preceding



*Melita dentata*, male. Narragansett Bay.

one; flagellum shorter than peduncle; first four coxal plates deeper than their segments, the fourth deeper than wide; first three with a small tooth at postero inferior angle; first gnathopods of male with hand and carpus of subequal size, a dense tuft of very short setæ on posterior side of merus and anterior side of carpus near distal end; hand oval; palm quite evenly convex, very oblique and continuous, with posterior margin of hand above it, which it about equals in length; second gnathopods of the male with a very large, strong hand, palm very oblique, with a large triangular tooth near lower end and terminated above by a large spine tooth, the space between the two teeth convex in the middle and armed with short spines. In the female the first gnathopods closely resemble those of the male; carpus longer relatively than in the other sex and hand of similar shape though smaller in size;



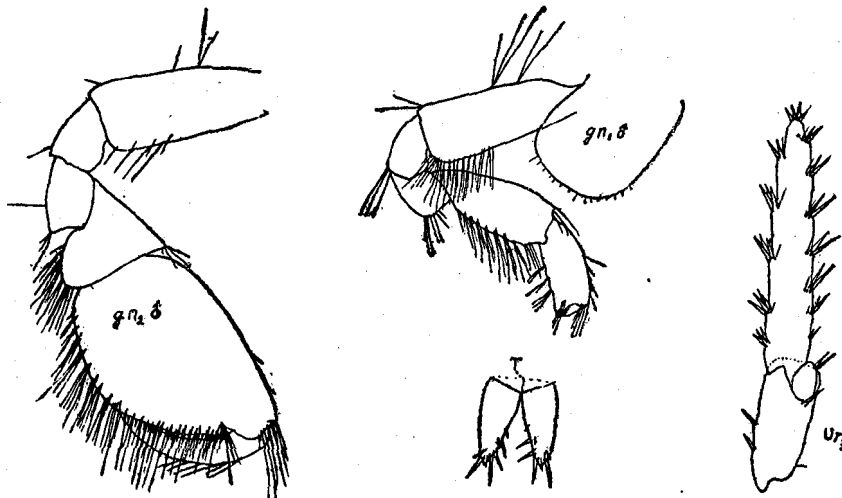
no prominent tooth near lower side of palm, margin of palm serrated and defined above by a spine tooth as in the male; pereopods slender and elongate, with basal joints large, oblong, and serrated on posterior margin; posterior margins of abdominal segments produced into teeth, the median one of which is the largest, the median tooth on the fourth segment being largest of all; posterior uropods elongated, outer ramus with sides nearly parallel to near the tip and armed on inner side with four or five and on the outer with five or six fascicles of short spines whose length is less than the diameter of the ramus; the median one of the group of terminal spines is much stouter than the others; inner ramus minute; each lobe of telson terminating in an acute point, on inner side of which is a large and a small spine and on outer a spine or seta.

Length, 16 mm.

This species is extensively distributed in the Arctic Ocean, extending down the eastern side of the Atlantic along a large portion of the coast of Norway and on the western side to Buzzards Bay, and perhaps farther. Several specimens were dredged by the *Fish Hawk* in Rhode Island waters. In some specimens the spines on the posterior uropods are larger than in the one figured. The depth range of this species, according to Sars, is from 10 to 15 fathoms.

**Melita nitida** Smith.

Body slender, compressed; eyes small and round; first antennæ two-thirds the length of body or more; second joint of peduncle longer than first and nearly twice the length of third; flagellum longer than peduncle; secondary flagellum three-jointed in adults, not longer than third joint of



*Melita nitida*. Woods Hole.

peduncle; second antennæ shorter than first, last joint of peduncle nearly as long as preceding joint; flagellum shorter than peduncle, joints furnished with whorls of long setæ, like those on last joint of peduncle; first four coxal plates deeper than their segments, first three oblong; first gnathopods much alike in the two sexes; carpus longer and broader than the hand, which is oblong, somewhat curved backward; palm about one-third the length of the nearly transverse distal margin of the hand; finger short, much curved, very thick at base, and articulated in the middle of distal margin of hand; hand of second gnathopods in male large, oval, palm evenly convex, about as long as posterior margin above it, with which it forms an almost continuous curve; tip of finger closing against inner side of hand; hand of second gnathopods of female much like that of male, but smaller in size; basal joints of last three pereopods large, oblong, armed with short spines in front and serrated behind; posterior margins of abdominal segments not dentate nor produced; fifth segment with several spines on posterior margin on either side of mid-dorsal line; last uropods long; inner ramus minute, situated in a sinus of peduncle; outer ramus of much the same form as in the preceding species and armed on either side



scale-like, subovate, outer ramus acute, single-jointed, and scarcely twice the length of peduncle; telson small and cleft to a little beyond the middle.

Length, 12 mm. Type No. 29240, U. S. Nat. Mus.

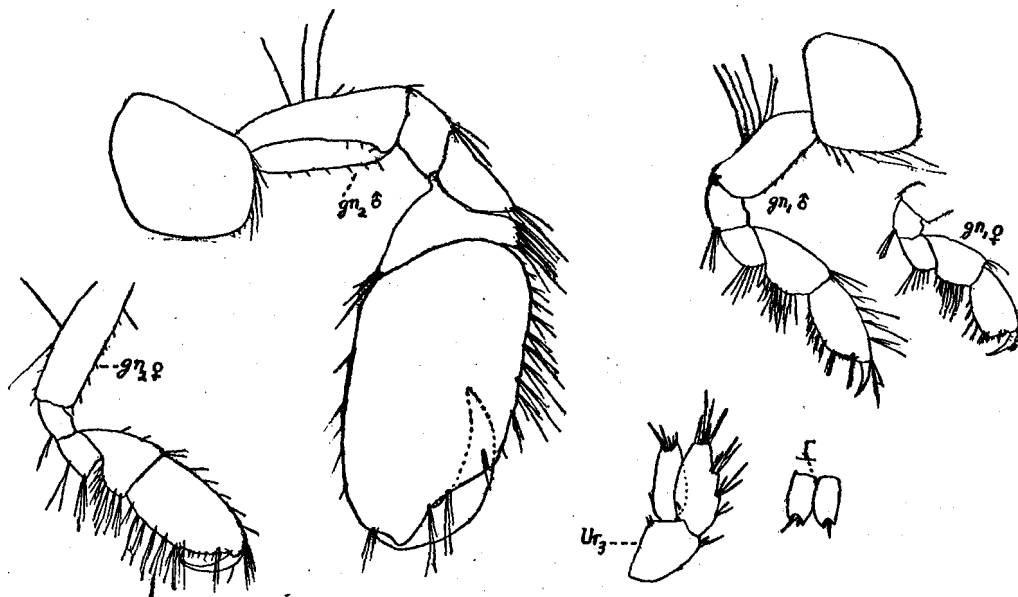
Described from a single specimen taken by S. D. Judd, at Newport, R. I.

This species differs from most of the species of *Melita* in having smaller second gnathopods, smaller terminal uropods, and more elongated propodi on the peraeopods, but possesses no characters which exclude it from the genus.

***Elasmopus lævis* (Smith).**

*Mera lævis* Smith, Rept. U. S. Fish Com. 1871-2, p. 559.

Eyes nearly round; first antennæ rather stout and about two-thirds the length of body; third joint of peduncle about two-thirds the length of second, which is subequal to the first; flagellum about as long as peduncle, segments rather short; secondary flagellum not half as long as last joint of peduncle and consisting of two oblong joints and a minute very short terminal joint; second antennæ scarcely longer than peduncle of first pair and slender, flagellum shorter than peduncle and consisting of about



*Elasmopus lævis*. Woods Hole, Mass.

eight joints. First four coxal plates not deeper than their segments; fourth about as broad as deep. First gnathopods in male with hand oblong, subequal to carpus; palm quite oblique and evenly convex. Second gnathopods of male very large, carpus scarcely one-fourth the length of hand; much broader than long, with a narrow posterior lobe; hand oblong, the opposite sides nearly parallel, palm oblique, smooth; a row of four or five spines near base of finger on a ridge just within margin of palm; the stout finger closes not against palm but into an excavation on inner side of hand; a conical tooth at upper end of this excavation. Hand in first gnathopods of female much like that of the male, but the palm nearly transverse. Second gnathopods much smaller than in the male, oblong in shape, somewhat resembling first gnathopods of the male; palm oblique, armed with two rows of spines along its entire length and with a pair of larger spines at distal end; finger more nearly straight than in the male; more evenly tapering and closing against the palm. Merus and carpus much expanded in last two peraeopods of male; terminal uropods projecting beyond others, rami short, broad, inner one narrower than outer and a little shorter, with a small spine near base of inner margin; outer ramus with three fascicles of stout spines on outer margin; tips of both rami truncated and armed with numerous spines; telson with lobes oblong, notched at the tip, where there is one or two spines.

Body olive brown to grayish, marked with numerous small rounded lighter colored spots and a series of larger light spots along mid-dorsal line. Pigment scattered as in *Melita nitida*. In specimens with much gray pigment the legs are barred with dark bands; in others these bands may be scarcely visible. The extreme tips of the basal joints of both antennæ are light colored; eyes black.

Length, 10 mm.

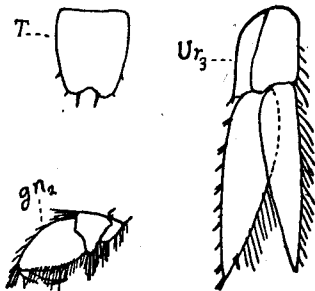
New Jersey; Long Island Sound; Vineyard Sound (Smith); Provincetown (Rathbun); Woods Hole, Mass.

Found under rocks and among seaweed at low tide.

**Gammarellus angulosus** (Rathke).

*Amathilla angulosa* Boeck, Amphip. boreal. arct., p. 137, 1870.

Head with rather large oblong or reniform eyes; lateral angles rounded; rostrum very short; antennæ rather stout, subequal, scarcely half the length of body; peduncle of first pair with joints



*Gammarellus angulosus*, female. After Sars.

decreasing successively in length and width; flagellum longer than peduncle; secondary flagellum four-jointed; second antennæ with flagellum larger than peduncle, segments, like those of first pair, furnished with a terminal circlet of sensory clubs; body with a dorsal carina which extends from head to near end of abdomen, not so high as in *G. homari* and not extended as a posterior projection from the end of each segment; first four coxal plates rather small, not so deep as their segments, quadrate in form and increasing successively in size from first to fourth; gnathopods, aside from coxal plates, of almost exactly same form and size; hand narrowly ovate; palm setose and armed with four or five fascicles of strong spines; three posterior peræopods of nearly equal length; dactyls of all pairs similar and furnished with a single prominent seta near the distal end of lower side; postero-lateral angles of first three abdominal segments rounded; terminal uropods with rami flattened, lanceolate,

broader than in *G. homari*, the margins furnished with spines and plumose setæ; outer ramus a little larger than inner one; telson nearly as broad as long and slightly emarginate at tip.

Length, 10 mm.

Norway (Sars); British Isles; France; Nahant; Casco Bay, Me.

*G. angulosus* is closely allied to *G. homari*, but differs from it in being of smaller size, in having no posterior projections from the dorsal side of body segments, in having shorter and stouter antennæ, and in the shorter telson. *G. homari* has been reported from Grand Manan under the name of *Gammarellus sabinii* by Stimpson. Another species, *Gammarellus macrophthalmus*, is described by Stimpson from the same locality. It is said to be very closely allied to the preceding species (*G. sabinii*) in color and general appearance. The back, however, is carinated only at the abdomen, which readily distinguishes it. The appendicular branches of the superior antennæ are minute, and scarcely perceptible. Eyes very large, subreniform, near each other; epimera small; caudal stylets of first pair as large as those of second, both with their outer rami shorter and narrower than the inner ones; last pair with broad, lancet-shaped rami, shorter than in *G. sabinii*. Color sometimes bright crimson, but usually mottled red and flake white; very variable. Length 0.5 inch; of the inferior antennæ, which are longest, 0.2. Were it not that Stimpson states that in *macrophthalmus* the back is carinated only at the abdomen and describes the secondary flagellum of the first antennæ as "minute, and scarcely perceptible," I should be inclined to regard this species and *angulosus* as identical.

**Chelura terebrans** Philippi.

Body robust, somewhat depressed; head tumid; antennæ shorter than half the length of thorax; second antennæ with flagellum consisting of a large oblong joint, setose on the edges, and one or two minute terminal joints; coxal plates small, diminishing in depth posteriorly; third abdominal segment with a median dorsal posteriorly directed spine-like projection, which is very large in the male; last three abdominal segments coalesced; uropods peculiarly modified for boring, the first pair lying under the abdomen and having a long peduncle with two short rami; second uropods subdorsal, peduncle

with an immense dorsally projecting lobe, broad and coarsely serrated in the female, but oblong, serrated, and thickly setose on the margin in the male; rami short, quadrilateral, distally serrate; terminal uropods very large, inner ramus minute, outer narrowly oval in the female but narrow and much elongated in the male.

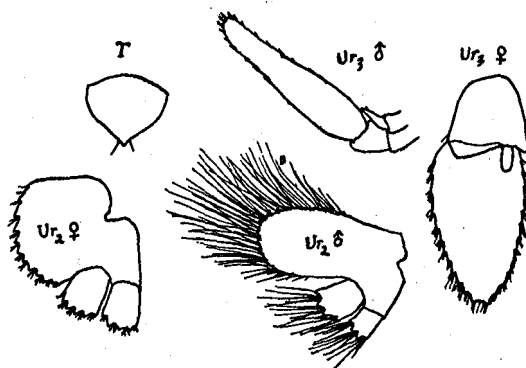
Length to tip of telson, 5-6 mm.

Extensively distributed along the coast of Europe; from Norway to the Mediterranean; east coast of the United States (Smith).

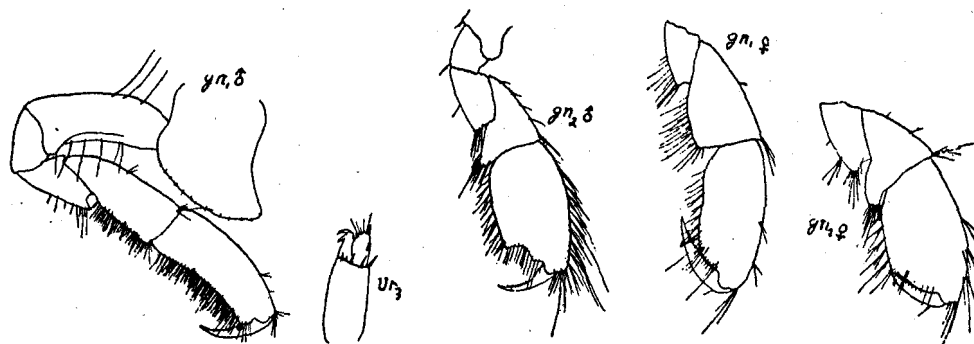
This species, like the isopod *Limnoria*, has the habit of boring in timber and is very destructive to piles and other submerged woodwork.

***Amphithoë longimana* Smith.**

Body rather slender; eyes round and red in life; first antennæ slender, about as long as body; second basal segment longer than first, and nearly twice as long as third; second antennæ stouter than first, especially in the male, and somewhat shorter; peduncle much elongated, and about twice the length of the flagellum; first five coxal plates much deeper than their segments; the first strongly produced at anterior angle, and concave on superior free margin, the three following plates oblong; gnathopods in male well developed, first pair unusually elongated; carpus long and narrow; propodus three or more times as long as wide, as broad as carpus and about as long; palm short, transverse; dactyl large and projecting when closed, far beyond the palm; both carpus and propodus have the posterior margin thickly covered with rather short setæ; second gnathopods with carpus subtriangular, much shorter than propodus; propodus oblong, much wider than in first pair; palm oblique, concave, posterior angle prominent. Gnathopods in the female comparatively small; propodus of the first pair oblong, longer than carpus; palm oblique



*Chelura terebrans*. After Sars. The third uropods of the male are drawn to a smaller scale than the other parts.



*Amphithoë longimana*. Woods Hole, Mass.

and rounded posteriorly, where it is armed with a strong spine; dactyl projecting beyond palm, but not nearly so far as in the male; in second gnathopods carpus produced posteriorly into a narrow, distally setose lobe; hand oblong, shorter and broader than in first pair; palm oblique, defined posteriorly by a slight projection and a strong spine; none of the angles of abdominal segments produced posteriorly; terminal uropods with rami of subequal length and not more than half as long as peduncle.

Color very variable, ranging from dark reddish to light green.

Length, 9 mm.

Woods Hole, Mass.; Vineyard Sound; Long Island Sound (Smith); New Jersey.

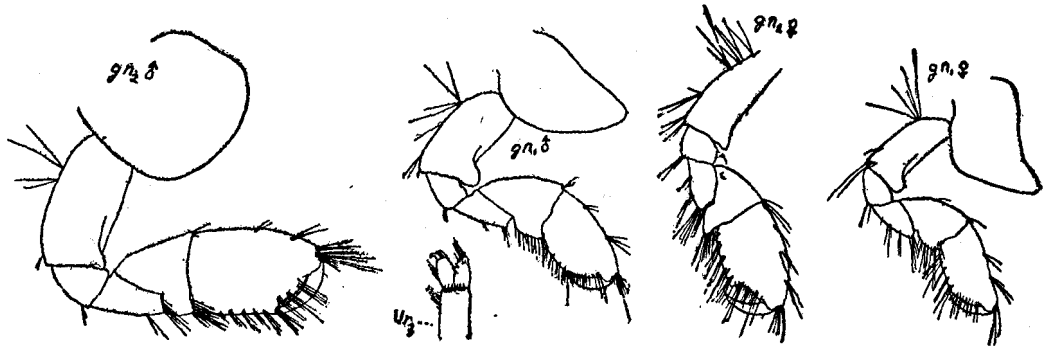
The habits, color variations, and general natural history of this species I have described at length in a previous paper (*Biological Bulletin*, vol. 1, 1901, pages 165-193).

**Amphithoë rubricata** (Montagu).

*Amphithoë maculata* Stimpson, Marine Invert. Grand Manan, p. 53, 1853.

*Amphithoë valida* Smith, Rept. U. S. Fish Com. 1871-72, p. 563.

A stout, robust species; eyes rather small, circular to oval in outline; first antennæ sometimes exceeding half the length of body, especially in the female; second basal joint about as long as first and twice as long as third; flagellum generally longer than peduncle and slender. Second antennæ stout, especially in the male, in which they may nearly equal the first pair in length; flagellum short and thick, composed of few joints, often less than half the length of peduncle; coxal plates deeper than their segments, the first strongly produced at anterior angle, which is narrowly rounded; second coxal plate broad, produced, and very broadly rounded at anterior angle; first gnathopods in the male stout, basal joint broad and produced into a prominent lobe at inferior angle; hand oblong, palm oblique convex, posterior angle rounded and armed with a spine; second gnathopods with basal joint broad, inferior lobe relatively smaller and more acute than in first pair; hand rather stout, with a terminal tuft of plumose setæ; palm oblique, proximally convex and distally somewhat concave, posterior angle produced; in female, carpus of first gnathopods shorter than in male, and hand narrower but otherwise quite similar in form; hand of second gnathopods resembling that of male, but not so



*Amphithoë rubricata*. Arichat Cape.

densely setose at the tip, and the posterior end of the palm has a strong spine; posterior angles of three anterior abdominal segments rounded; terminal uropods more than half the length of peduncle.

Color varying from green to reddish; generally a row of light-colored spots along mid-dorsal line, one spot to each segment.

Length, 20 mm.

Found under rocks and amongst seaweed at low tide; specimens are often found in tubes covered with sand or bits of algae. Whole coast of Norway (Sars); England; France; Azores; Labrador; Bay of Fundy; Grand Manan (Stimpson); Woods Hole; Newport, R. I.

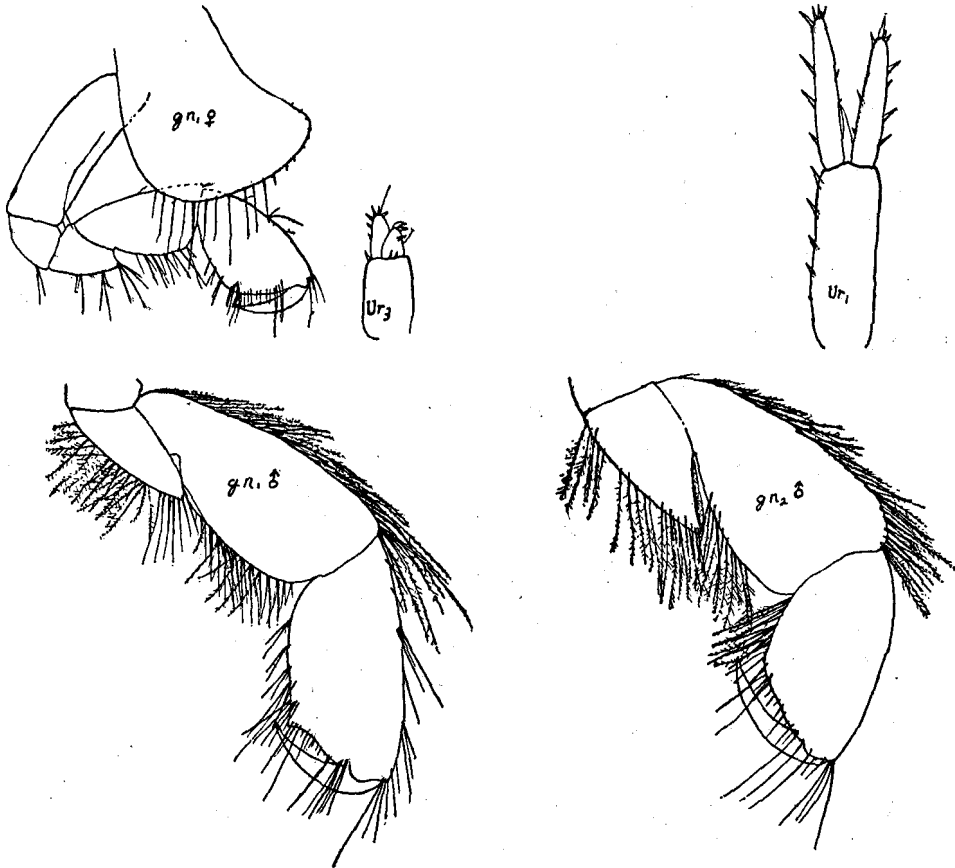
I have compared American forms with specimens of this species from England. Specimens sent to the U. S. National Museum by Professor Smith under the name *Amphithoë valida*, and which I have examined, agree well with Professor Smith's description of that species, which is certainly identical with *A. rubricata*.

**Grubia compta** (Smith).

*Amphithoë compta* Smith, Rept. U. S. Fish Com. 1871-72, p. 564.

Body more robust than in *Amphithoë longimana*, but less so than in *A. rubricata*; eyes round, red in life; first antennæ sometimes as long as body; second basal joint a little longer than first, and about three times as long as third; flagellum slender, elongated; a small two-jointed secondary flagellum not longer than last joint of peduncle; second antennæ rather slender, nearly as long as first; flagellum slender and elongate; anterior coxal plates oblong, much deeper than their segments, anterior pair not produced forward so much as in preceding species; gnathopods in the male much elongated and with both margins furnished with long plumose hairs; first pair about as large as second; merus produced downward into a large triangular process, which is excavated anteriorly to receive carpus; carpus considerably larger and slightly broader than hand; hand oval; palm oblique, nearly straight, rounded at posterior end, where it is armed with a strong spine; second gnathopod merus produced downward

into a jointed process, carpus narrower than in first pair, propodus oblong; palm oblique, sinuous, with a projecting posterior angle, but no terminal spine; gnathopods in the female of nearly equal size, of similar form, and very small in comparison with those of male; merus of both pairs produced, but not so much so as in the male; carpus and propodus in both not very unequal in size; propodus narrowed at proximal end and widened distally; palm oblique, rounded posteriorly, where it is armed with a spine; postero-lateral angles of second and third abdominal segments with a triangular acute



*Grubia compta*. Woods Hole, Mass.

tooth; first pair of uropods with a large spine on distal end of peduncle, which is about two-fifths the length of the rami; terminal uropods with rami unequal, outer or shorter one scarcely half the length of peduncle; inner ramus with spines at the tip and on inner margin.

Color variable, much as in *Amphithoë longimana*.

Length, 12 mm.

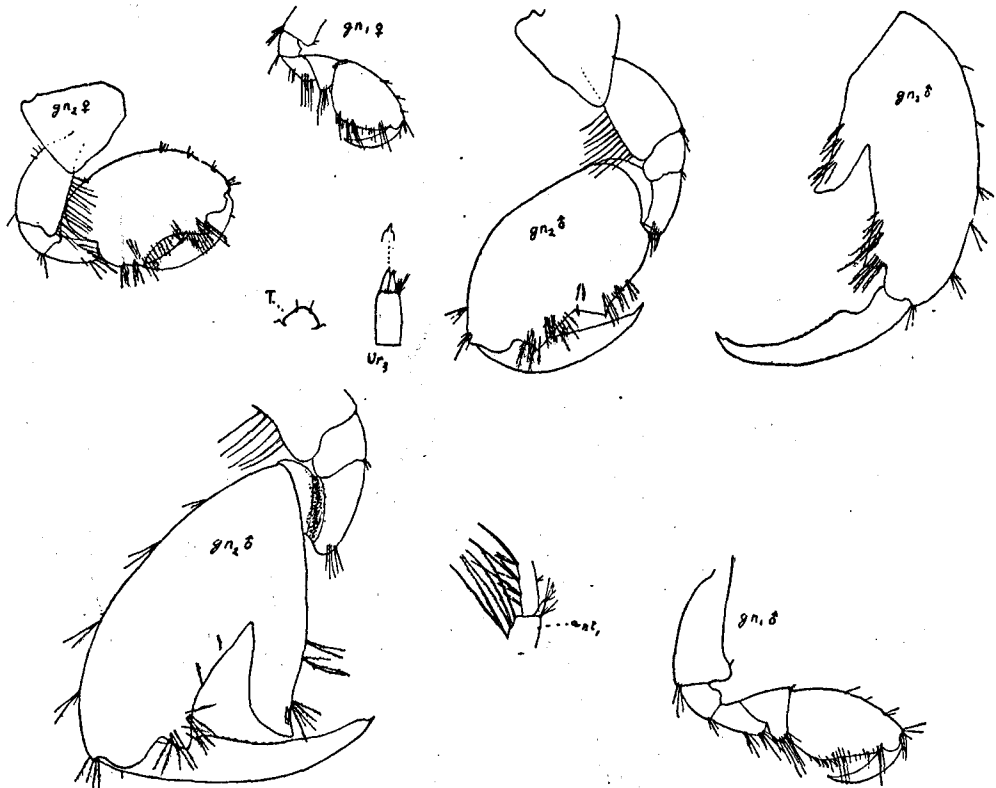
North Carolina to Cape Cod (Smith); Woods Hole, common in the Eel Pond.

Found among algae and eel grass.

***Jassa marmorata* Holmes, new species.**

Closely allied to *J. pulchella*; rostrum small and broadly triangular; eyes round, on prominent lateral lobes; both pairs of antennae stout, first shorter than second, its first basal joint much shorter than second, which is a little longer than third; flagellum not much longer than last joint of peduncle and composed of five or six joints, of which the first may be as long as all the rest; secondary flagellum minute one-jointed; second antennae very stout, last joint of peduncle a little longer than preceding one; flagellum short, about three-fifths the length of last joint of peduncle, and composed

of two or three joints, of which the first is much the longest; lower margins of both pairs of antennæ clothed with long setæ; first gnathopods in both sexes with hand ovate, broader in female than in male; palm very oblique, with a row of three spines around its upper end; second gnathopods with hand enormously developed and produced at upper end of palm into a long, narrow process; a triangular tooth near lower end of palm; second gnathopods in the female much smaller than in the male, the hand stout, oval in general outline, anterior margin very convex; palm concave, with a large triangular tooth near the lower end; two short, stout spines just above upper end of palm; merus of first and second pereopods much dilated and produced downward in front; peduncle of first uropods with a



*Jassa marmorata*. Three different forms of the second gnathopods of the male are shown. Narragansett Bay.

largespine on lower apex which is nearly half the length of the rami; third uropods with peduncle twice the length of rami; telson broader than long, rounded or subacute behind, with a minute spine and one or more setæ on either side.

This species is conspicuously mottled. The ground color is reddish, which is interrupted with large light-colored spots. There is a light spot or band on the head behind the eye; first thoracic segment mostly colored, but the second light, except in the mid-dorsal line and occasionally on the sides; third and fourth segments mostly colored, and the fifth with a broad median blotch; a median dorsal band extending through the following segments, with a lighter band on either side; both antennæ crossed by rather wide bars of color.

Length of a large male, 10 mm.

I have compared this species with specimens of *Jassa pulchella*, from North Devon, England, which were received through the kindness of the Rev. T. R. R. Stebbing. There is a striking similarity in the general appearance and color-marking of the two species. Both pairs of antennæ are, however, much stouter in *marmorata*; the flagellum of the first pair is not so elongate and is composed of fewer and very much stouter joints and has the first joint much longer. The second antennæ differ considerably in their flagella, which are composed of six joints in the specimens of *pulchella* that



were examined, while in our species they are composed of but two. The large hands of the males are much alike in the two species, but are somewhat narrower and with a more slender dactyl and basal process in *pulchella*.

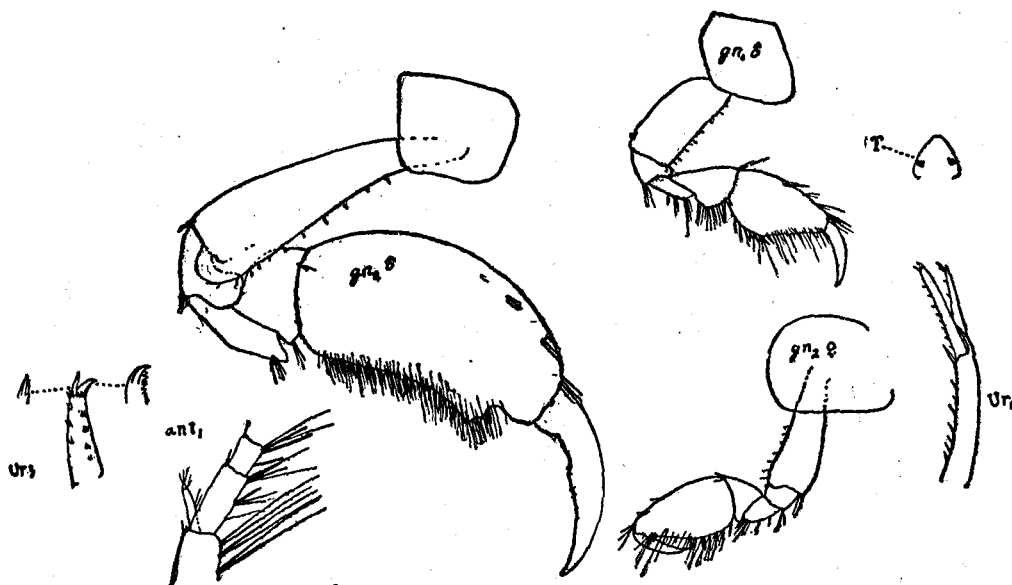
There is an apparent dimorphism among the males of this species, similar to that which is said to occur in European species of the same genus. The different forms of the males of *Jassa pulchella* have been regarded by Boeck and Hoek as due to age. Nebeski, however, does not share this view, since he finds that the two forms of the male are often of equal size. An examination of quite a large number of males of *marmorata* of different ages shows that the changes in form of the large chelipeds are correlated with different stages of growth. In the small males the hands resemble those of the females. In the largest males the hand is elongated, as shown in the figure, and furnished with a long basal projection. Among males of intermediate size this projection is of variable length, but never so large as in the largest specimens. The fact that the two types of hand are found in individuals of about equal size may be accounted for on the supposition that the one form is younger than the other and has not passed through the requisite number of molts to attain the final form, but has grown more rapidly. The rate of growth depends largely on food supply, which may vary considerably in different situations. One individual might easily attain the size of another without having passed through so many periods of molting.

*Ischyrocerus anguipes* Kröyer.

*Cerapus fucicola* Stimpson, Marine Invert. Grand Manan, p. 48, fig. 34, 1853.

*Podocerus fucicola* Smith, Rept. U. S. Fish Com. 1871-72, p. 566.

Male: Eyes nearly round; first antennæ considerably shorter than second; second joint of peduncle a little longer than third and nearly twice as long as first; flagellum shorter than last two joints of



*Ischyrocerus anguipes*. Marblehead Beach, Mass.

peduncle; secondary flagellum very small, consisting of an elongate joint and a minute terminal joint; second antennæ stout and elongate, last two joints of peduncle of subequal length; flagellum shorter than last joint of peduncle, and composed of five or six joints, of which the first is longest; terminal joints with curved spines; first four coxal plates subquadrate, about as deep as long and as high as their respective segments; first gnathopods small, basal joint broad; carpus rounded and setose behind; hand subovate, palm very oblique and nearly straight, a row of four or five spines beginning near end of palm and extending along posterior margin of hand, finger with inner margin acutely serrate; second gnathopods large, much elongated, basal joint narrow, elongate, gradually widening distally and curved forward, lower anterior angle produced downward into a rounded lobe; ischium

produced anteriorly into a prominent rounded lobe, as in first gnathopods; merus with pointed process at infero-posterior angle; carpus very much larger than in *marmorata*, with an angular posterior projection which bears a tuft of setæ; hand elongate, thickened, curved backward, devoid of a basal process, posterior margin somewhat concave and densely fringed with rather short, plumose setæ; a blunt projection near infero-posterior angle of hand; peduncle of first uropods with a spine at distal end, which is less than half the length of rami; terminal uropods with rami very small, scarcely one-fourth the length of peduncle; telson triangular, with rounded apex. In the female the second antennæ are much smaller than in the male, being only a little longer and but little stouter than the first pair, and the body is broader in the middle; second, third, and fourth coxal plates larger and relatively deeper, being somewhat deeper than long; first gnathopods resembling those of male, but with basal joint narrower; second gnathopods very much smaller than in the male, basal joint relatively broader, and widening more toward distal end; merus broadly rounded and setose below; carpus subtriangular, short, produced behind into a setose lobe; hand narrowly ovate; palm slightly sinuate, the upper extremity with a pair of stout spines, between which the tip of the finger closes; one or more stout spines and five or six tufts of setæ above these on posterior margin of hand.

Length, 10 mm.

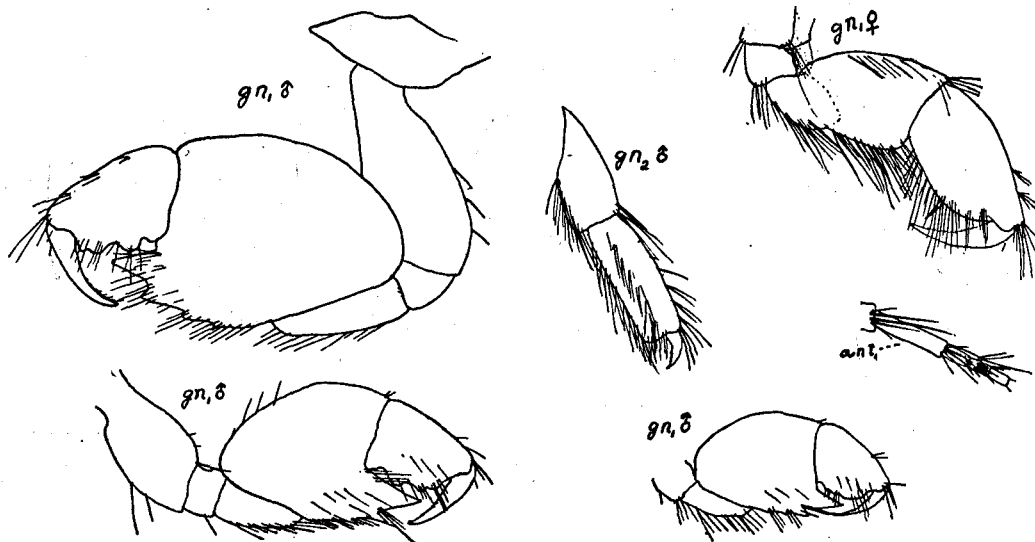
Norway (Sars); Greenland (Krøyer); Labrador; Iceland; Siberian polar sea; Grand Manan (Stimpson); Bay of Fundy (Smith); Marblehead Beach. Professor Smith states that "this species was dredged by Professor Verrill in 4 to 5 fathoms off Watch Hill, R. I., in April, 1873." It seems to be rare on the southern coast of New England.

According to Stimpson, "the color varies from light olive or greenish to light crimson. Eyes usually white. The articles of the antennæ are sometimes alternately red and white." Professor Smith states that some of the specimens taken at Watch Hill "had a transverse dorsal band of red or orange on each segment, and similar ones on the epimera, and were minutely speckled with dark brown; the antennæ and legs were annulated with white and light red or orange.

#### *Microdeutopus gryllotalpa* Costa.

*Microdeutopus minax* Smith, Rept. U. S. Fish. Com. 1871-2, p. 665.

Eyes nearly round; first antennæ a little over half the length of body, second joint of peduncle longer than first and over twice as long as third; flagellum longer than peduncle; secondary flagellum



*Microdeutopus gryllotalpa*. Eel Pond, Woods Hole, Mass. Three different stages of development of the large gnathopods of the male are shown.

much shorter than last joint of peduncle and consisting of one joint, with sometimes a minute terminal knob-like joint; second antennæ about two-thirds as long as first but considerably stouter; peduncle

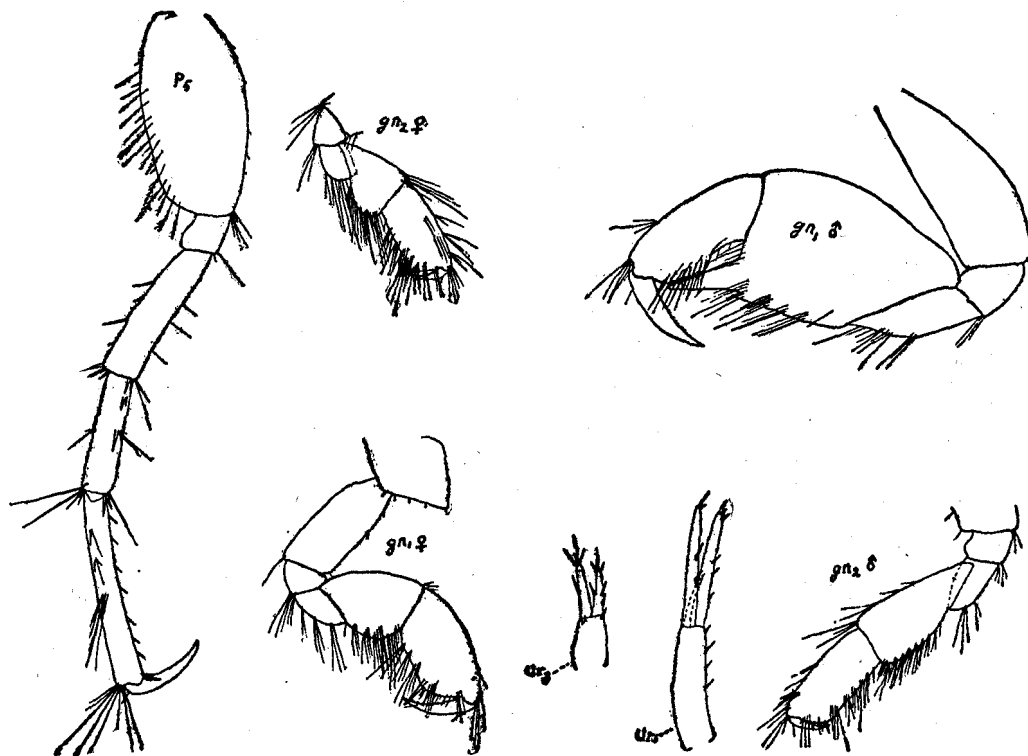
elongated, last two joints of subequal length, terminal one being usually slightly shorter; flagellum rather thick and shorter than last joint of peduncle; coxal plates not as deep as their segments; first gnathopods in male very large and powerful; carpus enormously developed, broadly suboval in outline and produced at postero-distal angle into a lobe which projects beneath the propodus and bears two large teeth; behind the latter two smaller teeth on posterior margin; propodus about two-thirds as broad as long, posterior margin with two or three irregular tuberculiform prominences; first gnathopods in the female simply subchelate; carpus about two-thirds as wide as long; posterior margin rather long and thickly setose; propodus a little narrower than carpus but about as long; palm oblique, evenly convex, with a spine at the posterior end; dactyl serrate within; second gnathopods with carpus narrow with a rather long ciliated posterior margin which is nearly straight; carpus rectangular, over three times as long as wide; palms transverse; dactyl stout, serrated within; terminal peræopods about reaching tip of uropods; first uropods with a long spine at distal end of peduncle which extends nearly to middle of rami; telson oblong, distally rounded.

Length, 8 mm.

European coast from Norway to the Mediterranean; Long Island Sound and Vineyard Sound (Smith); Provincetown (Rathbun); Woods Hole, common in the Eel Pond.

***Microdeutopus danmonensis* (Bate):**

Eyes nearly round; first antennæ over half the length of body, first segment somewhat shorter than head, not so stout as in preceding species; second segment markedly longer than first and over



*Microdeutopus danmonensis*. Woods Hole, Mass.

twice the length of third; flagellum slender, longer than peduncle; secondary flagellum about as long as last joint of peduncle and composed of two long segments, and usually a minute terminal knob-like segment; second antennæ about two-thirds as long as first, peduncle elongate, more slender than in *orullotalva*; last basal joint not longer than preceding one but equaling or exceeding flagellum; first

gnathopods in male more slender than in *gryllotalpa*, the carpus narrower and produced at postero-distal angle into a narrow triangular process which extends beyond middle of propodus; posterior margin with usually one or more small teeth behind this process; propodus much narrower than in *gryllotalpa*, being fully twice as long as wide, basal half of lower margin smooth; distal part with a low projection; first gnathopods of female similar to those of *gryllotalpa*, but with a shorter carpus and slightly narrower propodus; second gnathopods differing more in the two sexes than in the preceding species; carpus in male elongated, with a slightly curved posterior margin; hand narrower than carpus and nearly as long, over twice but scarcely three times as long as wide, with the palm somewhat oblique; carpus in the female shorter than in the male and with posterior margin strongly convex; hand much as in the male, but slightly shorter; posterior peræopods extending much beyond the uropods; uropods much as in *gryllotalpa*.

Length, 6 mm.

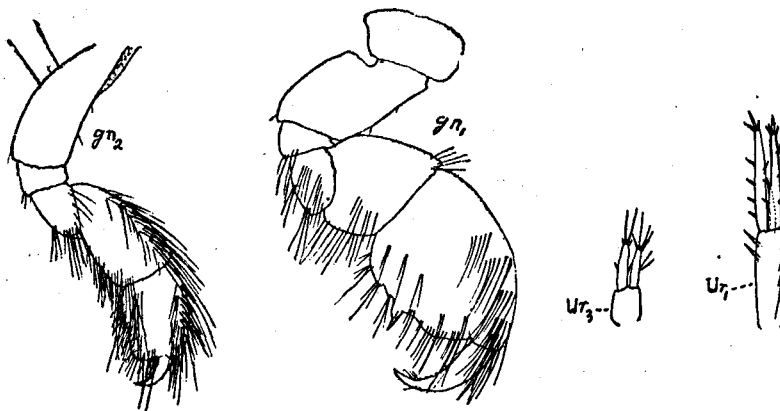
Norway (Sars); British Isles (Bate); Woods Hole, Mass., common in the Eel Pond along with the preceding species.

This species is readily distinguished from the preceding one by the two-jointed secondary flagellum of the first antennæ, by the more slender first gnathopods of the male and their entirely different carpal process, the less elongated hand of the second gnathopods, and the longer and more slender terminal peræopods.

***Autonoë smithi* Holmes, new species.**

*Autonoë* sp. Smith, Rept. U. S. Fish Com. 1871-2, p. 562.

Eyes round; first antennæ nearly as long as body; first joint of peduncle about as long as head and about two-thirds as long as second, which is nearly three times the length of third; flagellum slender, longer than peduncle; secondary flagellum scarcely as long as third joint of peduncle and consisting of two elongate joints and a minute terminal knob-like joint; second antennæ about two-thirds as long as



*Autonoë smithi*. Woods Hole, Mass.

first, subpediform; peduncle elongate, penultimate basal joint extending forward as the penultimate basal joint of antennules, and about equaling preceding joint in length; flagellum stout, six or seven jointed, shorter than last joint of peduncle, its first joint about as long as all succeeding ones; coxal plates small, margins furnished with a few distant setæ, the first four subquadrate, much broader than deep; first gnathopods large and stout, coxal plate somewhat more irregular in outline than in the following pairs of appendages; stout basal joint not more than twice as long as wide, abruptly narrowed near proximal end to about half the width of lower portion; carpus very thick, about as wide as long; hand broadly and irregularly ovate in outline; palm sinuous, convex below and concave above, its thin margin furnished with numerous minute blunt teeth, its upper end defined by a large tooth at the base of which is inserted a stout spine; two prominences on the short posterior margin of hand above this tooth; second gnathopods with carpus oblong, longer than hand; hand oblong, strongly convex in front, slightly narrowed beyond middle; palm transverse, convex; a spine at rounded posterior angle,

thin margin of palm finely pectinated; dactyl armed within with about six short, oblique spines; first two pereopods with basal joints narrow and elongated; ischium longer than broad, carpus narrower than merus and slightly tapering toward either end; dactyl slender, a little over half the length of propodus; third pereopods short, fourth much longer, last pair very long and slender; postero-lateral angles of first three abdominal segments rounded and not produced; first uropods narrow, rami subequal to peduncle in length, latter with a long, narrow spine projecting from distal end below rami; rami of second uropods a little longer than peduncle, the latter furnished as in first pair with a long spine at distal end, which extends to about half the length of rami; rami of third uropods subequal and nearly twice the length of peduncle, which is devoid of a terminal spine; telson wider than long, distally rounded.

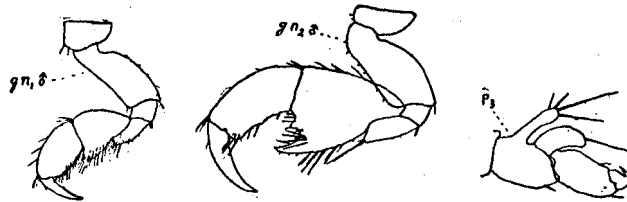
Body and coxal plates with blackish pigment, the fifth thoracic segment lighter than the others; abdomen lighter than thorax; legs transparent and almost devoid of pigment; body and appendages with a diffuse reddish-brown coloration, which is deeper on the large hand, becoming more intense toward the tip and on the base of the dactyl; dorsal side of body crossed with purple, orange, or rose-colored bars; both pairs of antennæ very beautifully and conspicuously marked with spots of red, pink, or orange, these spots on the peduncles of both antennæ at the bases of the setæ, on the flagellum of first antennæ; they are regularly arranged, a pair of oblong spots being separated by a colorless longitudinal interval on each joint. Eyes black.

Length, 6 mm.

Vineyard Sound (Smith) "in tubes in masses of a compound ascidian (*Amouroucium pellucidum* Verrill) in 3 to 8 fathoms."

#### *Cerapus tabularis* Say.

Head with a small rostrum and a faint dorsal carina; first and second antennæ subequal in length, and in the male a little over half the length of body; first segment of first antennæ stout, laterally compressed, furnished below with a carina which is more prominent near the base; second and third segments subequal; flagellum three-jointed and about as long as last joint of peduncle; second antennæ with flagellum three-jointed and nearly as long as last peduncular segment; coxal plates broader than deep; first gnathopods with carpus produced



*Cerapus tabularis*. After Smith.

downward at postero-distal angle into a small lobe; propodus oblong, narrower than carpus, but about as long; palm oblique, spinulose; second gnathopods in male with carpus furnished at its postero-inferior angle with a large, acute tooth, above which is a rounded sinus separating the latter from a small rounded tooth; propodus oblong, slightly incurved, nearly as long as carpus, inner margin irregular; dactyl large and stout; second gnathopods in female similar to first pair; third pereopods very small; merus with a long spatulate lobe on posterior margin; carpus articulated to posterior margin of merus above distal end of latter, and produced greatly beyond articulation of oblong propodus; dactyl short and broad with an abruptly recurved hook-like tip; second uropods small, about as large as outer ramus of first pair, ramus very short and furnished with a terminal hook; terminal uropods much like preceding pair but stouter; telson twice as broad as long, distally emarginate, the two lobes rounded and armed above with minute hooks.

Length, 4.4 mm.

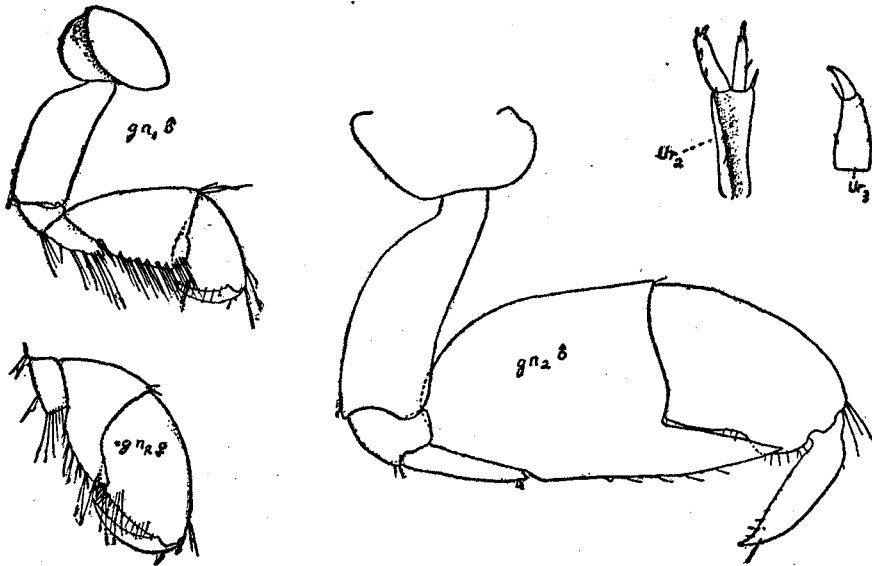
Great Egg Harbor, New Jersey (Say); Vineyard Sound, in masses of the compound tunicate *Amouroucium pellucidum*, and in Noank Harbor, Connecticut (Smith).

This species has the peculiar habit of carrying the tubes in which it dwells, unlike most of the tube-dwelling amphipods which live in a fixed abode. A full description of the structure of this interesting species and several observations on its habits is given by Professor Smith. (Trans. Conn. Ac. Arts and Sci., vol. 4, pp. 269-277, pl. 2, figs. 1-6.)

*Erichthonius rubricornis* (Stimpson).

*Cerapus rubricornis* Stimpson, Marine Invert. Grand Mann, p. 47, fig. 33, 1853. Bate, Cat. Amphip. Brit. Mus., p. 265, pl. XLV, fig. 4, 1862. Smith, Rept. U. S. Fish Com., 1871-2, p. 565, pl. IV, fig. 18, *Erichthonius difformis* Smith (not Milne-Edwards), Trans. Conn. Acad. Sci., Vol. IV, 1880, p. 278.

Eyes nearly round; the lateral lobes of head projecting strongly forward; first antennæ but little longer than second, first joint shorter than head, a little over half the length of second which is subequal to third; flagellum short; second antennæ with last basal joint a little longer than preceding one; flagellum short, and furnished like peduncle with long setæ on lower margin; first gnathopods with merus produced below into a triangular process; carpus large, widening distally; hand smaller than carpus, narrowed at base, about two-thirds as broad as long, palm a little convex and cut into minute, narrow, acute teeth; finger armed within with a few short spines with a few smaller spines or acute denticulations between them; second gnathopods in male very large; carpus produced below propodus into a large acute process; propodus oblong, with a prominence near the distal end of lower margin; in the female the carpus produced into a lobe which extends below propodus about as far as tip of closed dactyl; hand ovate, palm very oblique, convex, armed above with a few pairs of spines between which the dactyl closes; first and second peræopods short, basal joints large subovate, though more



*Erichthonius rubricornis*. Newport, R. I.

convex in front; merus expanded and produced downward in front; dactyl long and slender; last pair of peræopods considerably longer than preceding; second and third uropods with margins acute and cut into minute narrow, acute serrations; third uropods with ramus subconical, curved, shorter than peduncle and having two or three short spines at the tip; telson emarginate, lobes armed with numerous, very short, hook-like spines.

"Color on the back dark, mottled gray; epimera blackish; terminal articles of the four antennæ bright red; hands yellowish." (Stimpson.)

Length, 9 mm.

Labrador; Grand Manan; Bay of Fundy; whole coast of New England; common near Woods Hole.

This species lives in flexible tubes composed of sand or mud stuck together with a small amount of adhesive, web-like material. According to Stimpson the tubes occur attached to rocks or other objects, generally in large groups. This species is found in shallow water, but Professor Smith states that it may extend to a depth of 100 fathoms or more. It is more common north than south of Cape Cod. South of Cape Cod it has been reported from Vineyard Sound by Smith. I have taken it at

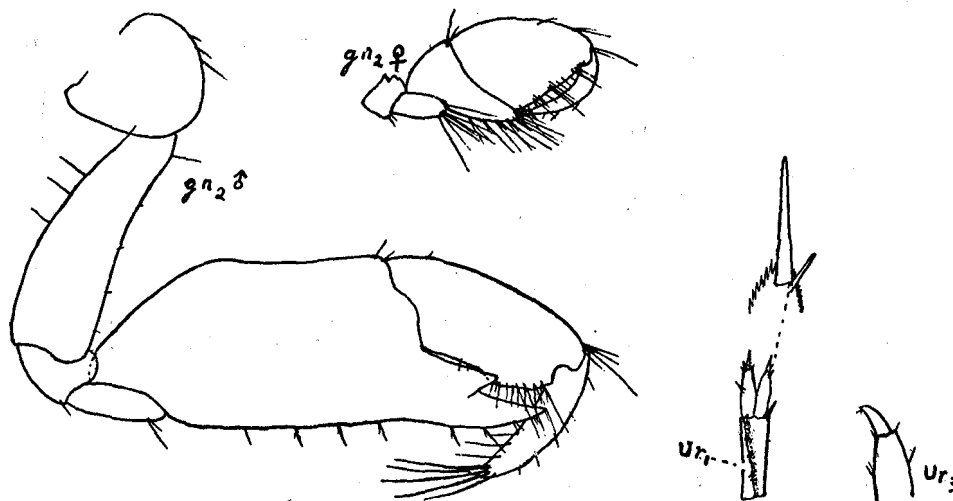
Woods Hole and have received specimens from Newport; and a large number of individuals in their tubes were dredged in Narragansett Bay by the *Fish Hawk* in November, 1899. The latter were all of small size.

This species differs from *difformis* Milne-Edwards, with which it has been united, in that the carpus of the second gnathopods of the male is much broader and stouter, the carpal process being shorter, broader, and devoid of a tooth on the upper margin, and that the propodus is much stouter and has no prominent tubercle near the base of the lower margin; the basal joints of the first and second pereopods are much broader than in *difformis*. *Rubricornis* more closely resembles *E. hunteri*, but the propodus of the second gnathopods in the male in that species has the lower margin straight, more or less laminate, and interrupted by a sharp incision in the middle—a feature not shown in the present species.

***Erichthonius minax* (Smith).**

*Cerapus minax* Smith, Rept. U. S. Fish Com. 1871-2, p. 565.

Eyes large, nearly round; antennæ of subequal length; last two joints of peduncle of first pairs subequal; flagellum about as long as peduncle, much longer than in the preceding species; second antennæ more slender than in *rubricornis* and not furnished below with so many nor such long setæ; flagellum nearly



*Erichthonius minax*. Gnathopods of male and female drawn to same scale.

as long as peduncle; first gnathopods short, carpus large, distally widening, setose behind; hand much as in *rubricornis*, the dactyl acutely serrulate within; second gnathopods in male very large, merus very small; carpus elongated, produced below propodus into a very large acute process, which has a very large tooth on its upper edge; propodus narrower than in *rubricornis*, with a low elevation near distal end of lower margin; dactyl with long setæ at tip; second gnathopod of female very much like those of preceding species; first uropods projecting beyond second and third, peduncle slender and much longer than rami; inner margin of peduncle of second uropods with acute serrations; margins of rami of second and third uropods acutely serrate, the serrations being larger on inner rami, terminal uropods and telson much as in the preceding species.

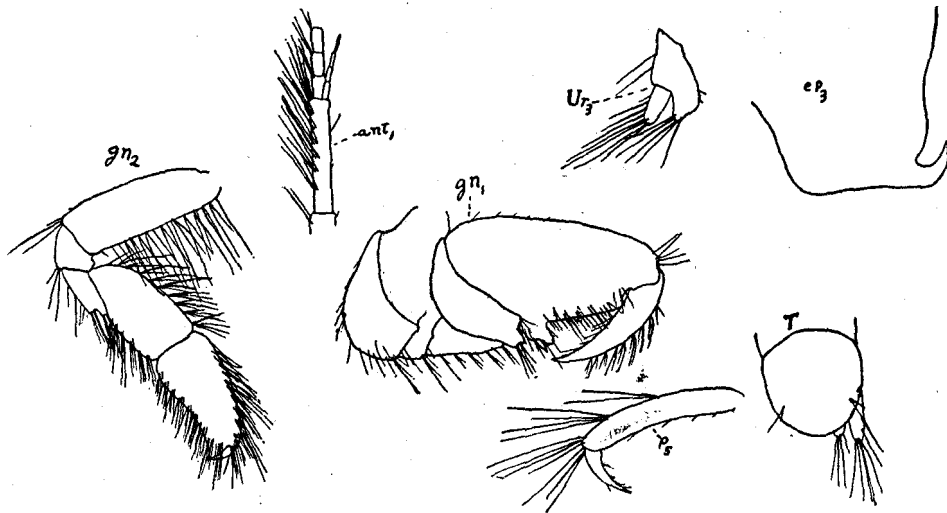
This species is more closely allied to *E. difformis* than the preceding one; it differs from that species in having no tooth on the inner margin of the propodus of the large hand of the male, in having a large tooth near the middle of the upper side of the large carpal process instead of a small or obsolescent one near the tip, in having much broader basal joints on the first and second pereopods, and in having longer and more slender terminal pereopods.

Length, 6 mm.

Long Island Sound; Vineyard Sound (Smith); common at Woods Hole in the Eel Pond; off Gay Head; Great Egg Harbor, New Jersey.

*Unciola irrorata* Say.

Body depressed; eyes nearly round; head produced into an acute rostrum; antennæ of subequal length and over half the length of body; peduncles elongate, that of first pair not so long as peduncle of second and much more slender, with second joint nearly twice the length of first and third; flagellum of first antennæ much shorter than peduncle; secondary flagellum consisting of four joints and shorter than last basal joint; peduncle of second antennæ very stout in the adult male and laterally compressed at the base, antepenultimate joint with a rounded anterior lobe, penultimate joint high at base, but tapering distally, armed within with a row of spines and in some specimens having an inferior lobe at proximal end; last joint subcylindrical or only slightly tapering, nearly as long as but much narrower than the preceding one; flagellum often not longer than last basal joint; in the female the second antennæ much more slender than in the male, and but little compressed laterally at base; penultimate joint scarcely tapering; last basal joint and flagellum much as in the male; anterior gnathopods very stout, of similar form in both sexes; basal joint very thick and hollowed out anteriorly to receive the carpus and hand; carpus short, appearing as if forming a part of the hand; hand with carpus irregularly ovate, a process at upper end of palm carrying a stout spine; second gnathopods small, hand oblong, widest at the base where it is as broad as the carpus, narrowing distally; palm short, nearly



*Unciola irrorata*, male. Off Fishers Island. *ep*<sub>3</sub>, Third abdominal segment.

transverse, intero-posterior angle of hand produced, posterior margin above this angle concave; both margins of carpus and hand and anterior margin of basal joint furnished with tufts of long setæ; last pair of pereopods much longer than others; dactyl long and slender; all of the coxal plates much broader than high and the posterior ones produced at posterior angle, as are also the segments above them; sides of first and second abdominal segments produced below into an acute posterior tooth; postero-lateral angle of third segment produced into a large, strongly upturned hook; uropods short; peduncle of first pair with a short spine or tooth projecting backward from posterior end beneath the rami; inner posterior angle with a strong spine; rami about two-thirds the length of peduncle; peduncle of second pair with a strong spine at inner posterior angle, but no terminal spine or tooth beneath rami; terminal uropods small; ramus short, not half the length of peduncle; inner posterior angle of peduncle produced into a lobe which extends posteriorly as far as tip of ramus, giving the appendage the appearance of being two-branched; telson rather large and rounded behind.

Color in life usually bright red. The red is generally mottled with white and occasionally individuals are met with which have very little red color. The first segment of the thorax is more colored than the others. Bases of both antennæ red with orange; flagella, with a double row of red spots, one pair to each segment.

Length, 15 mm.



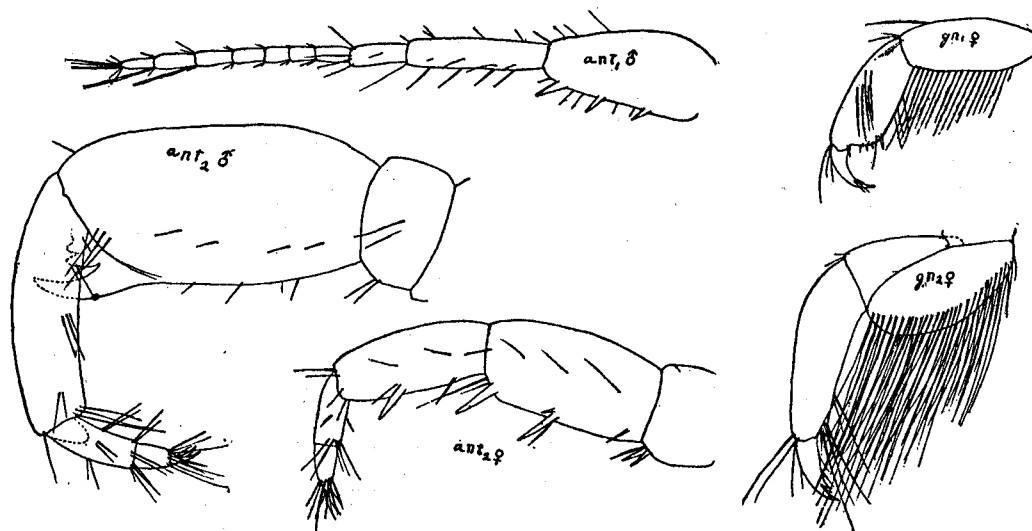
Great Egg Harbor, New Jersey (Say); Connecticut to Bay of Fundy (Smith); Nova Scotia; Labrador; Greenland; Spitzbergen; Norway.

Ranges in depth from low tide mark to over 500 fathoms. Found in great abundance almost everywhere along the New England coast.

This species in life is beautifully colored. The body is mottled with bright crimson; head with a broad median band of crimson which is bifurcated in front; first segment of thorax more colored than the others; a row of small crimson spots on either side of the mid-dorsal line; bases of both pairs of antennæ crowned with orange; flagella with double rows of crimson spots, a pair to each segment; large hand with crimson blotches.

*Corophium cylindricum* (Say).

Antennæ of nearly equal length in the female and about half as long as body; peduncle of first pair with first joint rather stout, a little longer than second, and armed below with three or four spines; third joint scarcely half as long as second; flagellum somewhat shorter than peduncle; second antennæ stout; very large in the male, the thick fourth joint produced into a large upturned spine at distal end of lower margin, above which are two teeth; fifth joint subcylindrical, scarcely



*Corophium cylindricum*. Woods Hole, Mass.

half as thick as preceding one, distal end produced into a lobe on one side; flagellum shorter than preceding joint of peduncle, three-jointed, first joint longer than second, third joint minute, bearing two curved terminal spines and numerous setæ; the second antennæ in the female with peduncle quite different from that of the male, although the flagellum is much the same in both sexes; fourth joint less stout relatively than in the male, devoid of large curved spine at distal end, and armed with two or three large spines on lower side; in last joint lobe at distal end slight or absent and lower margin armed with one or more strong spines; first gnathopods with carpus and hand of subequal size, the former fringed behind with long plumose setæ; hand oblong; palm nearly transverse, rounded behind, where it bears a prominent spine; several smaller spines near margin of palm; finger with a small subterminal spine; second gnathopods with merus articulated below carpus as far as distal end of the latter and fringed with two rows of very long, plumose setæ; propodus long, somewhat tapering, not chelate, infero-posterior angle produced into a tooth; finger with one or two spines on lower margin behind tip; first and second peræopods subequal, merus expanded to twice the width of succeeding joints; dactyl slender, gently curved, about as long as propodus; fifth peræopods slender, nearly twice the length of preceding ones, both margins of subovate basal joint with long, plumose setæ; propodus nearly four times as long as the curved dactyl and furnished with a tuft of very long setæ at tip; first

uropods extending beyond the others; rami about half the length of peduncle; ramus of terminal uropods flattened, broadly ovate, the margins furnished with long setæ.

Specimens taken in the Eel Pond at Woods Hole had the body marked with purplish-brown pigment cells; a dark, transverse band across the posterior end of each segment and another near the middle; anterior portion of head dark. Peduncles of both antennæ with a few pigment cells near the base; rest of body pellucid with sometimes a tinge of reddish-brown on the antennæ; eyes black.

Length, 3-4 mm.

New Jersey (Say); New Jersey to Vineyard Sound (Smith); Provincetown (Rathbun).

This species lives in soft tubes, although it is often found free. It is common among hydroids, seaweed, on piles, and on eel-grass. Its tubes may be found in abundance on the eel-grass, especially near the roots. A very common species.

#### ***Siphonœcetes cuspidatus* Smith.**

"Male: Head produced into a long, slender, acute rostrum, and each side between the antennula and antenna into a long lobe, rounded at the end where the eye is situated, and contracted toward the base. Antennula reaching about to the middle of the fourth segment of the peduncle of the antenna; segments of the peduncle equal in length; flagellum scarcely longer than a segment of the peduncle, and composed usually of five segments. Antenna a little longer than the body; third segment of the peduncle a little longer than any segment of the peduncle of the antennula; fourth segment nearly twice as long as the third; last segment nearly one-half longer than the third; flagellum a little shorter than the last segment of the peduncle. Legs much like Krøyer's figures of *S. typicus*, those of first pair with the carpus twice as long as broad; propodus slightly narrower and a little longer than the carpus, the posterior edge furnished with long hairs and several stout spines. Legs of the second pair much stouter. Posterior caudal stylets with the terminal process fully as long as the ramus itself; the ramus as broad as long, the extremity obtusely rounded and furnished with very long hairs; telson broader than long, transversely elliptical. In the female the antennæ and second pair of legs are more slender than in the male.

In alcoholic specimens the antennulæ are marked with narrow bands of black or dark brown upon each segment of the flagellum and at both ends of the second and third segments of the peduncle, and the antennæ are obscurely branded or tinged with a lighter color.

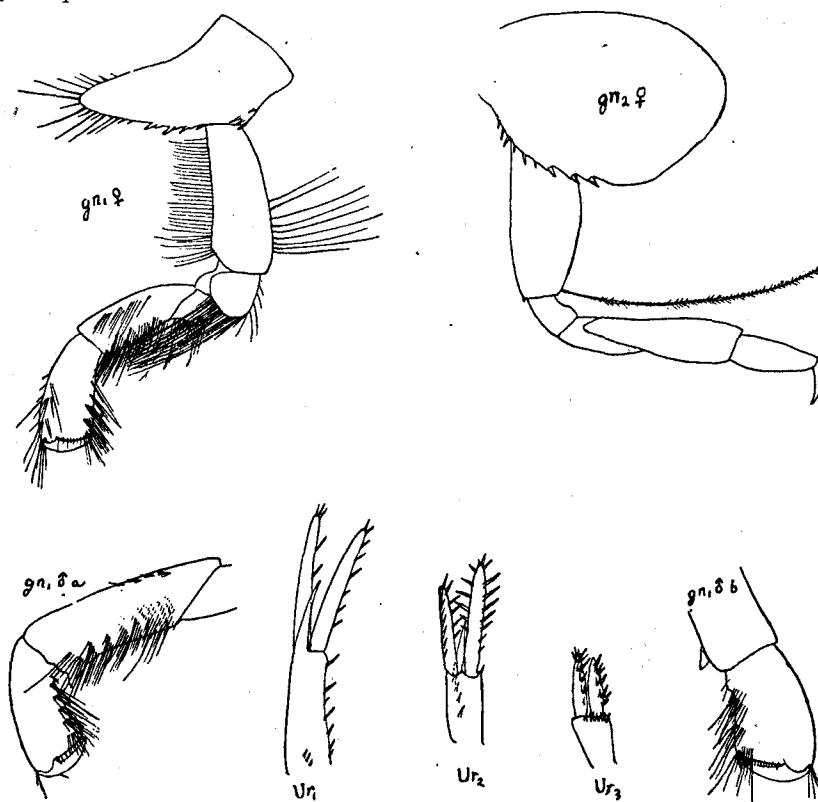
Length, about 6 mm. Inhabits tubes constructed of grains of sand. In deep water off Vineyard Sound and Buzzards Bay."

I have not met with this species, and have therefore simply quoted Professor Smith's description.

#### ***Ptilocheirus pinguis* Stimpson.**

Body thick; eyes oval or nearly reniform; first antennæ about half the length of body; first basal joint nearly as long as second, which is nearly three times the length of third; flagellum slender, longer than peduncle; secondary flagellum composed of about seven joints; second antennæ about two-thirds as long as first pair, subpediform; flagellum a little longer than last joint of peduncle, but not nearly so long as last two; coxal plates of first four peræopods well developed, deeper than their segments, their lower margins strongly setose and their postero-lateral angles with a few spine-bearing serrations; first gnathopods with coxal plates much smaller than in the following three pairs and very much produced forward so as to reach anterior end of head; anterior margin and a portion of posterior margin of basal joint furnished with long setæ; lower margin of ischium and posterior margins of merus, carpus, and, to a less extent, the propodus furnished with setæ, those on ischium being especially long; carpus elongate; hand subquadrate, widening distally, palm nearly straight and slightly oblique, with a spine at its posterior angle; first gnathopods in the male larger and stouter than in the female; basal joint thicker, relatively longer and stouter, and furnished with a stout, spine-like process near distal end of lower margin, which is absent in the female; propodus a little wider than in the female and coxal plate larger; propodus held bent inward so that it stands nearly at right angles to the carpus; second gnathopods longer than first; coxal plate suboval in form, projecting much beyond the others in the adult male but not in the female; basal joint with anterior margin densely fringed with very long, slender setæ; carpus narrow and elongate, much exceeding propodus; propodus narrow, not chelate, tapering toward distal end; both margins of carpus and

propodus fringed with tufts of setæ; first and second pereopods equal; merus much longer and wider than carpus, which is wider than the slender, tapering propodus; dactyl slender, nearly straight, about three-fourths the length of propodus; last three pairs with basal joints broad; third pair short, about half the length of fifth; third abdominal segment about as long as two preceding ones combined; posterior margins of fourth and fifth abdominal segments with a row of spines on either side of mid-dorsal line; uropods projecting backward about equally far; peduncles nearly as long as rami, those of first and second pairs with a long spine at distal end beneath the rami; rami very spiny; telson broader than long, posterior margin produced backward and rounded in the middle, a spine-like eminence above each postero-lateral angle, and in front of each eminence an oblique row of four or five closely set spines.



*Ptilochetrus pinguis*.  $gn_1 \sigma a$  shows the propodus of the male oblique to the carpus as it naturally stands;  $gn_1 \sigma b$  shows the propodus drawn after being flattened down. In the second gnathopod of the female the setæ are not drawn, only one being inserted to show the length attained by the setæ on the anterior margin of the basal joint.

The dark pigment of this species is very well preserved in alcoholic specimens. The antennæ and legs are devoid of pigment except on the basal joints of the last three pairs of pereopods. The head is pigmented above. The thoracic segments are crossed by pigmented bars, the large first segment of the male having a round, comparatively clear spot on either side. In each pigmented bar on the thorax is often a narrow transverse light-colored band connecting light spots on either side. Pigment occurs also upon the coxal plates. The eyes in alcoholic specimens are black. There is considerable variation in the amount of pigment as well as in the color pattern.

Length, 13 mm.

Grand Manan (Stimpson); "Common on the whole coast of New England upon muddy bottoms, and north to Labrador. In depth it extends down to 150 fathoms, and probably much farther." (Smith.) This species is one of the most abundant of the New England Amphipoda. I have

examined specimens from numerous localities along the New England coast and farther north. It is often associated with *Unciola irrorata* and species of *Ampelisca*.

Besides the characters mentioned in the description, the males may be distinguished from the females by the greater width of the anterior end of the thorax, the much longer first thoracic segment, which is about equal to the two succeeding segments, and has a large, round, light-colored spot on each side. The coxal plate of the second gnathopods is especially prominent in large males and has a shallow groove on the outer side. This plate in the female is larger than the others, but does not project much, if any, below them. Stimpson states that the first and second antennæ are about equal in the male and that the first are longer than the second in the female. Most of the males I have examined resembled the females in having the first antennæ longer than the second pair.

In his Catalogue of Amphipodous Crustacea in the British Museum, Bate gives what purports to be a description of a male of this species which was sent him by Doctor Stimpson. The description and the figures drawn from this specimen indicate that it was really a female. I find that the marsupial plates in several females that were examined are very small and of unusual form. Bate had but one specimen of this species, and he probably overlooked the marsupial plates, as one might readily do in a cursory examination, and concluded, therefore, that his specimen was a male.

#### *Podoceroopsis nitida* (Stimpson).

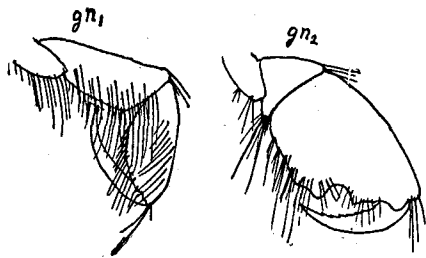
*Podocerus nitidus* Stimpson, Marine Invert. Grand Manan, p. 45, 1853.

*Podoceroopsis excavata* (Bate) Mœnert, Naturhist. Tidsskr. (3), Vol. XI, p. 152, 1877.

*Xenoclea megachir* Smith, Trans. Conn. Acad. Sci., Vol. III, 1874, p. 32, pl. IV, figs. 1-4.

Eyes rounded-oval, situated at the base of and partly upon the pointed lateral lobes of head; antennæ of nearly equal length, somewhat exceeding half the length of body, and strongly setose; peduncle of first pair subequal to flagellum; second joint of peduncle longer than third, which is

slightly longer than first; flagellum consisting of 12-16 joints; second antennæ with last two joints of peduncle of subequal length; flagellum a little shorter than peduncle; anterior five coxal plates somewhat deeper than wide, and deeper than their segments; fifth pair with large anterior lobe as deep as in preceding pairs; first gnathopods with carpus a little longer than hand and about as wide; hand oblong, more or less fusiform, and furnished with a very large dactyl which closes against nearly the whole posterior margin of hand; second gnathopods much stouter than first; ischium with a rather prominent anterior lobe; carpus subtriangular, rather short, with a small, setose posterior process; hand broad-



*Podoceroopsis nitida*, female. Eastport, Me.

ly oval, stout, palm oblique, with a deep, rounded excavation near the middle, at either end of which is an angular prominence, the posterior prominence being followed by a smaller, more rounded eminence and furnished on inner side with a strong spine; posterior margin of hand furnished with about five tufts of setæ; postero-lateral angles of third abdominal segment with a very small projection; first uropods with peduncle considerably longer than rami, and furnished with a strong spine projecting beneath the rami at the distal end; third uropods with rami nearly equal to peduncle, the outer slightly the shorter.

Length, 7 mm.

Grand Manan (Stimpson); Eastport, Me.; Norway (Sars); British Isles (Bate); Rhode Island.

This species is described from a single female specimen taken by Hyatt and Van Vleck at Eastport, Me. I have no doubt of its identity with Stimpson's *Podocerus nitidus*, described originally from Grand Manan. In Stimpson's description the second gnathopods are said to have "a short spine on the second article [ischium] in front." What was referred to as a spine was doubtless the small anterior lobe of this joint, as the existence of a true spine in this situation would be a quite unusual occurrence among the Amphipoda. There is no doubt, I believe, that the species subsequently described by Bate from the coast of Northumberland, England, as *Nania excavata* is the same as this species. The specimen from Eastport agrees well with Bate's description, and also with the description and figures of *excavata* in Sars's "Crustacea of Norway." The posterior gnathopods of the male are described by Sars as "very powerfully developed, with the propodus large and oval in form, not

nearly twice as long as it is broad, palm having in the middle a deep sinus defined by two projecting lobes, the posterior of which is acute, the anterior subtruncate at the tip, dactylus very strong and curved."

NOTES ON EXTRALIMITAL SPECIES OF GAMMARIDEA.

The following species were found in the collections sent me for examination:

*Menigrates obtusifrons* Boeck, Grand Manan.

*Monoculodes borealis* Boeck, five specimens in a bottle labeled *Monoculodes nubilatus* Packard, Labrador. There was also a specimen of *Parædiceros lynceus* in the bottle. The *nubilatus* of Packard is, I believe, synonymous with the latter species, as it has been ranked by Professor Smith. *M. borealis* may prove identical with *M. demissus* Stimpson, but the latter is so poorly described that the identification is very uncertain.

*Ampelisca eschrichti* Krøyer, Caribou Island, 8 fathoms. This specimen was in Packard's collection and named *A. pelagica* Stimpson.

*Haploops tubicola* Lilljeborg, Chat Bay, Labrador, 30 fathoms. In Packard's collection, together with *Byblis gaimardi* Krøyer. The bottle containing these specimens was labeled *Ampelisca gracilis* Packard.

*Haploops robusta* Sars. Grand Manan; Bay of Fundy, and Albatross station 2572, together with *H. tubicola*.

*Haploops setosa* Boeck, Albatross station 2055.

*Byblis gaimardi* Krøyer, Eastport, Me., besides the locality mentioned above.

*Melphidippa spinosa* (Goes), Eastport, Me.

*Mæra danæ* (Stimpson) (*Leptochoë danæ* Stimpson), Eastport, Me.

*Dulichia porrecta* Bate, Eastport, Me.

Tribe CAPRELLIDEA.

Head fused with the first thoracic segment; second gnathopods larger than first; anterior peræopods generally wanting; posterior pairs prehensile; gills usually confined to third and fourth thoracic segments; abdomen rudimentary.

The Caprellidea are divided into two families, the Caprellidæ and the Cyamidæ. The latter family is composed of species parasitic upon the skin of whales. Only the Caprellidæ, therefore, come within the scope of this paper.

Mandible with palp ..... ÆGINELLA  
Mandible devoid of a palp.....CAPRELLA

Æginella longicornis (Krøyer).

*Ægina spinosissima* Stimpson, Marine Invert. Grand Manan, p. 65, 1853.

Body slender, smooth, or armed with numerous spines; head often furnished with a pair of dorsal spines; eyes small; first antennæ long, last joint of peduncle nearly as long as preceding one; flagellum shorter than peduncle; second antennæ extending but little beyond penultimate basal joint of first pair, last joint of peduncle longer than preceding one; flagellum shorter than last joint of peduncle and two-jointed; hand of first gnathopods with palm nearly straight, extending to the proximal end of hand where it is defined by a spine; second gnathopods with basal joint more or less dentate in front and produced below into an acute lobe; ischium and merus with an acute inferior process; hand with a triangular tooth at upper end of palm; a narrow tooth below the middle separated from a triangular eminence below by a narrow sinus; distal end of hand produced into a tooth above the base of dactyl; anterior pair of abdominal appendages two-jointed.

Length, 16 mm.

Siberia; Greenland; Labrador; Grand Manan; Eastport, Me.; Ipswich Bay; Narragansett Bay; Woods Hole.

The development of the spines on the body is very variable. In some specimens they may be reduced to small tubercles, while in others they may be entirely absent. There seem to be all gradations between forms which are very spiny and forms in which the body is smooth.

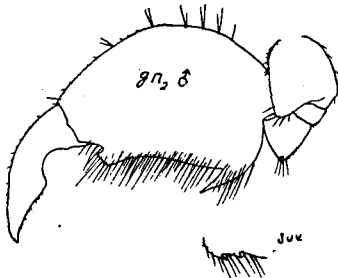


*Æginella longicornis*,  
var. *spinosissimus*.  
After Sars.

For this reason I have finally decided to follow Mayer in ranking *spinosissima* Stimpson as a variety of *longicornis* Kröyer. I believe that Boeck's *Algina echinata* is the same as Stimpson's *A. spinosissima*, although Sars, Hansen, and Ortmann agree in uniting *Algina spinifera* (Bell) with Stimpson's species. I have examined several specimens from Labrador and New England, including some from very near the type locality of *spinosissima*, and they agree perfectly with Stimpson's description, and also the description and figures of *A. echinata* given by Boeck and by Sars in his *Crustacea of Norway*. None of the forms I have seen agree with the description and figures of *Algina spinifera* (Bell) given in Sars's *Crustacea of the Norwegian North Atlantic Expedition*.

#### Caprella geometrica Say.

Body unusually robust and devoid of tubercles on spines; head with a large spine pointing anteriorly; antennæ stout, first pair much less than half the length of body, second joint much stouter than third and nearly twice as long; flagellum shorter than peduncle and composed of about twelve segments; second antennæ in adult male about two-thirds as long as first and fringed below with numerous long hairs; hand of first gnathopods with palm straight and armed with a pair of spines at the well-defined upper angle; second gnathopods in adult male, very short and stout, basal joint several times smaller than hand; hand tumid, strongly convex in front; palm strongly setose, with a strong spine at posterior end and a blunt tooth or tubercle near base of finger; gills nearly round; three posterior pereopods stout, carpus as wide as long and about a third the length of propodus; palms of propodi extending nearly to base and defined above by a pair of spines; lower margins of third and fourth thoracic segments produced into laminae.



*Caprella geometrica*. juv., Prehensile angle of the 2nd gnathopod of a young male. The larger figure is drawn from a larger male from Woods Hole, Mass.

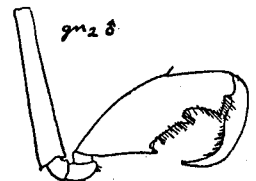
The color is very variable. Some individuals are nearly colorless; others are uniformly reddish in color, and others again may be variously mottled.

Length of an adult male, 15mm.

This is one of the most common species of amphipod on the southern coast of New England. It is more rare north of Cape Cod, and I have not met with it at all as far north as Maine. Southward it extends to Virginia and perhaps farther. The females do not differ greatly from the males in the form of the body, but they are of much smaller size and have the second antennæ, as in young male, nearly as long as the first; the second gnathopods are relatively smaller and more slender, the basal joint being several times longer than broad; the hand is more like that of the first gnathopods than in the male; the palm has only a small projection armed with a spine at the upper end, and is devoid of a prominent tubercle near the base of the dactyl. As in the other species of the genus, the young males differ in several respects from the adults; the antennæ are more nearly equal in length and the first and second joints of the first pair are less tumid; the gills are more oval in outline; the hand of the second gnathopods is less stout; there are two spinous projections instead of one near the upper end of the palm, and the tubercle near the base of the dactyl is small or absent. This species has been united with *C. acutifrons* Latreille, by Mayer. The two varieties of *acutifrons* which Mayer designates *carolinensis* and *virginia* doubtless belong to the same species that Say described as *geometrica*. The differences between these varieties are small and are for the most part such as occur between individuals of different ages. These varieties, however, present certain differences from the typical form of *acutifrons*, which appear to be constant, and it seems best, therefore, to retain for them the name given by Say.

#### Caprella linearis Linnæus.

Body rather slender, smooth above except on some of the posterior segments, which may be furnished with tubercles or even short spines; eyes small, round; first antennæ stout, about half the length of body; joints of the peduncle finely ciliated in adult male; first and third basal joints subequal and shorter than second; flagellum shorter than peduncle; second antennæ sometimes longer than peduncle of first in female,



*Caprella linearis*. After Sars.

but much shorter in adult male; second gnathopods in female attached in front of middle of segment; hand oval; palm defined above by a spine-bearing projection and bearing a tooth near the lower end; second gnathopods in the male longer than in the female; basal joint relatively narrower and armed, as in the female, with an acute triangular projection at lower end; hand elongated; palm defined above with a spine-bearing projection; a tooth below the middle separated by a rounded sinus from a triangular projection below; posterior peræopods rather stout, propodi narrow, palm about two-thirds as long as posterior margin and defined above by a projection bearing a pair of spines; penes medium, first two thoracic segments in adult males becoming much elongated, equaling in length the succeeding segments of the body.

Length, 16 mm.

European coast to France; Greenland and Labrador (Ortmann); Casco Bay, Me., and Portsmouth, N. H. (Mayer); Grand Manan; off Head Harbor to Salem, Mass.; Annisquam, Mass.; off Montauk Point.

*Caprella septentrionalis* Kröyer.

Body moderately stout, smooth above except for a few low tubercles on posterior segments; head with a dorsal prominence but no spine; eyes small, round; first antennæ about half the length of body in the male, a little shorter in the female; first joint of peduncle slightly longer than third but much shorter than first; flagellum shorter than peduncle; second antennæ shorter than first; second gnathopods rather short and stout, basal joint much shorter than in *linearis*; hand in the female oval, a spine-bearing process at upper end of palm, a small tooth near distal end of palm, hand in the male longer and narrower than in the female, with teeth similarly placed but with a larger triangular prominence at lower end of palm.

Length, 25 mm.

Arctic regions; northern parts of the European coast; Greenland (Kröyer); Labrador (Smith, Packard); Eastport, Me.

The New England representatives of this species are stout and have the first segments of the thorax shorter than the form figured in Sars's crustacea of Norway, and more nearly approaching some of the several varieties of this species described by Mayer.

*Caprella stimpsoni* Bate.

Body robust, armed with numerous large, thick spines; head with a large, often bifid, spine or tubercle above; first thoracic segment scarcely longer than deep, somewhat concave above, with a pair of spines in front of and a single spine behind the depression; usually a large spine near middle of second, third, and fourth thoracic segments, and a spine at either end, with smaller spines or tubercles between; second gnathopods with hand and often merus studded with small tubercles.

Norway; Grand Manan (Stimpson); Eastport, Me. Mayer also has examined specimens from the latter locality, which were sent to him by Professor Packard under the name of *Caprella robusta* Stimpson. Some of the specimens I have examined from Eastport were collected by Packard and similarly named by him. All gradations occur between strongly spinous specimens and forms in which the spines are reduced to low tubercles.

The following names may be regarded as synonyms of this variety:

*Caprella robusta* Stimpson (nomen preoc.).

*Caprella punctata* Boeck.

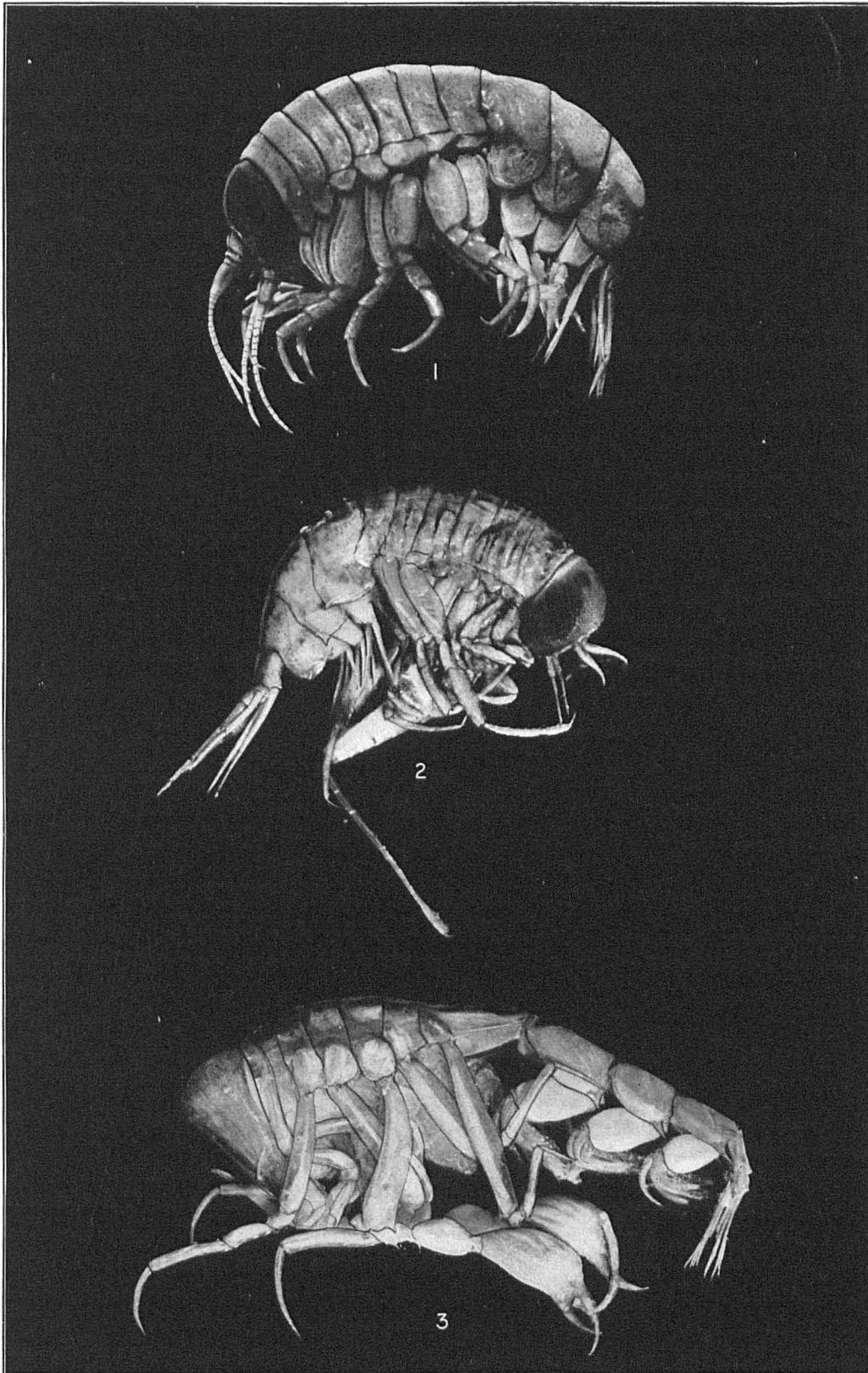
*Caprella septentrionalis* forma  $\delta$ , *polyceros* Mayer.

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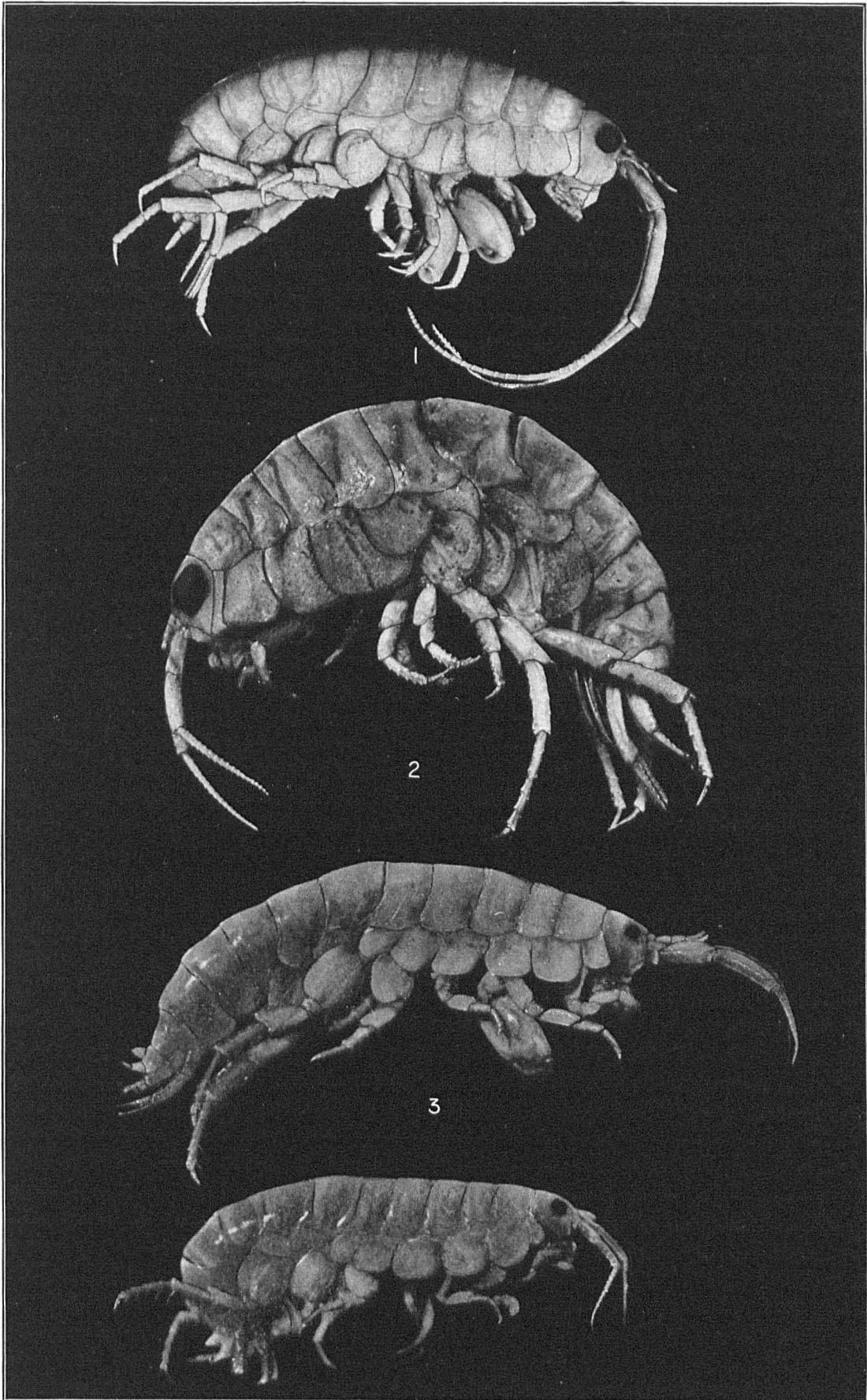
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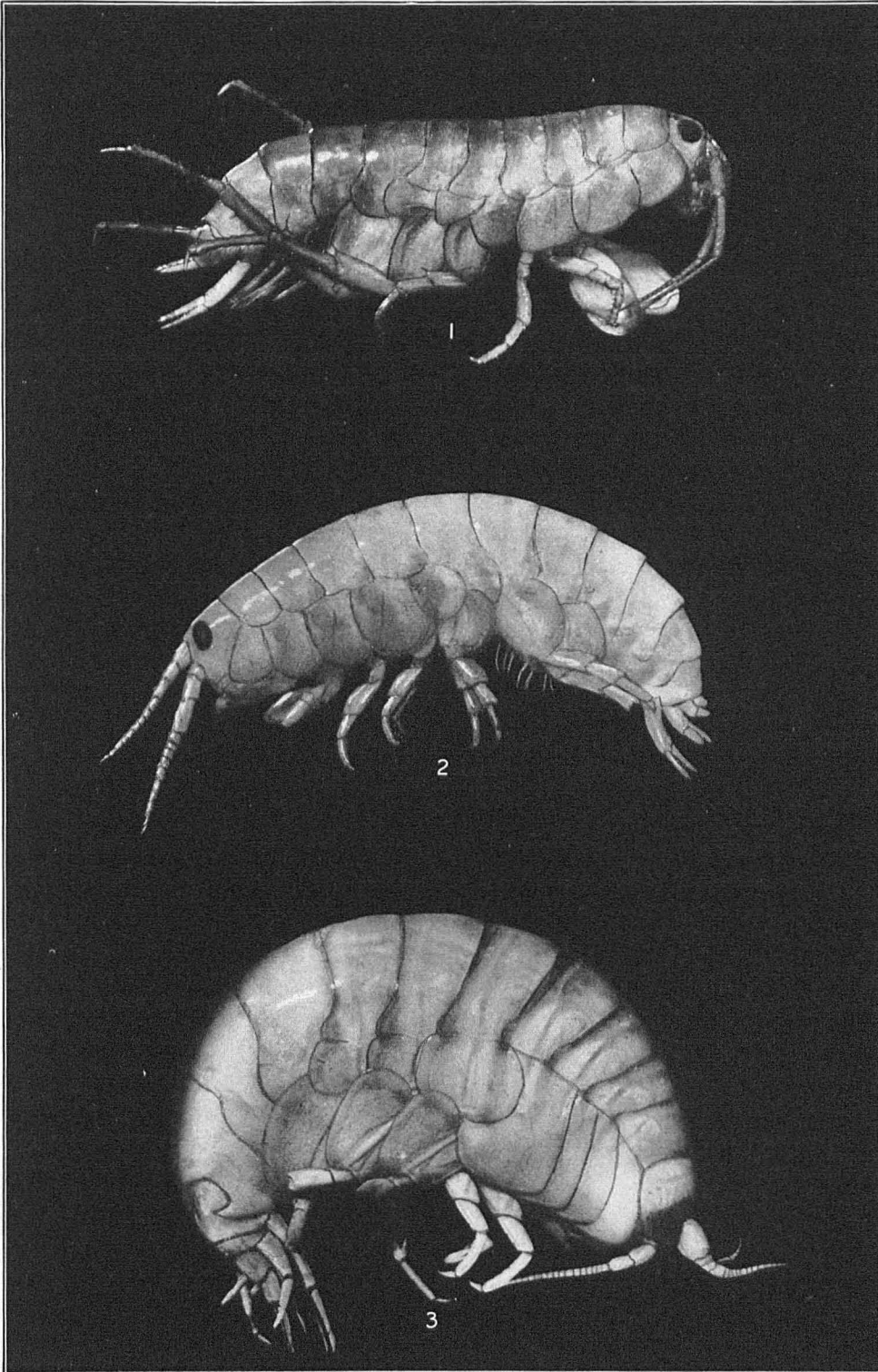
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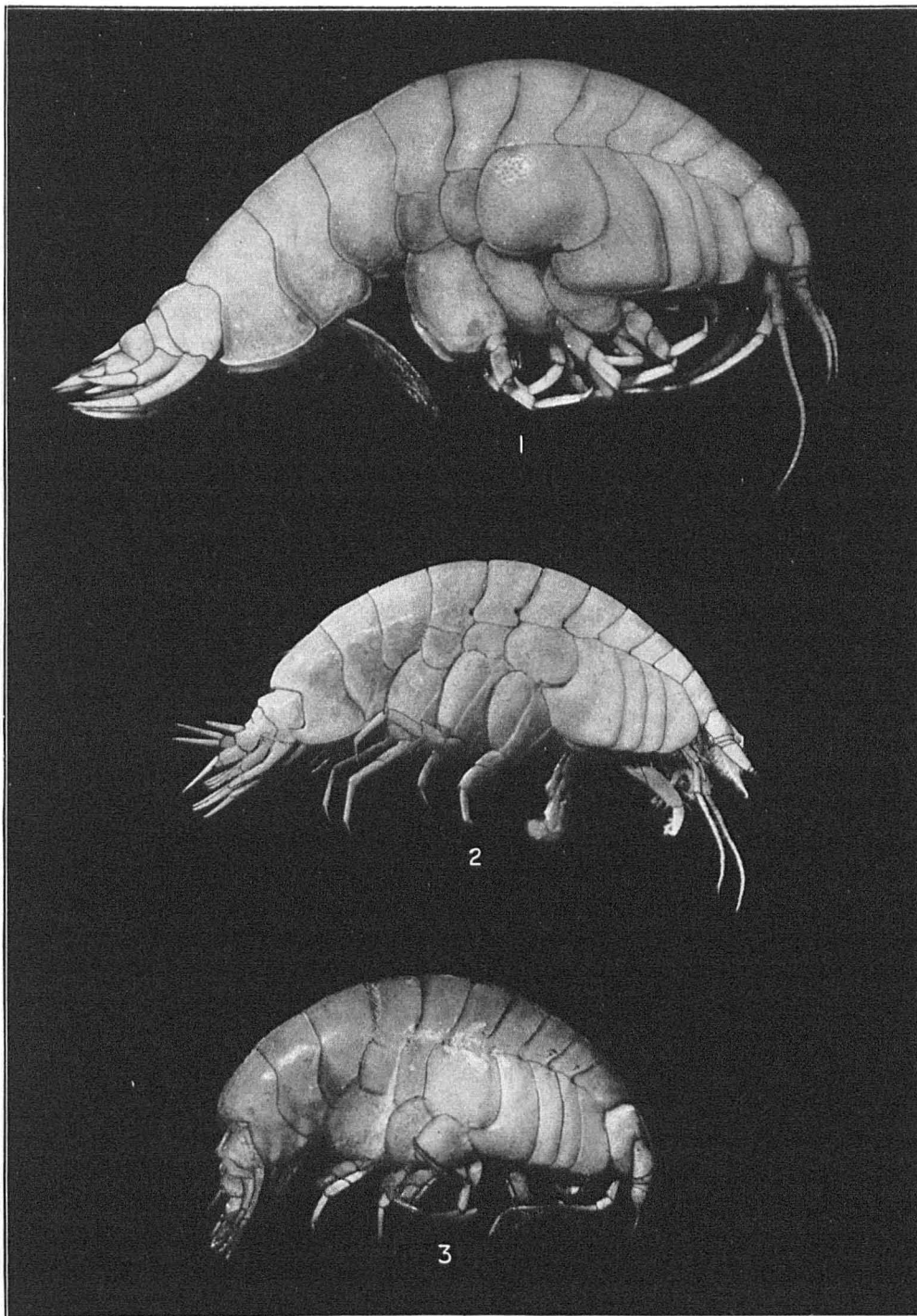
1. *Hyperia galba*. Grand Manan. In many individuals the antennae are much longer than in the one photographed.
2. *Euthemisto bispinosa*. Vineyard Sound. In larger specimens the dorsal spines are much more prominent than in the one photographed.
3. *Phronima sedentaria*. Grand Manan.



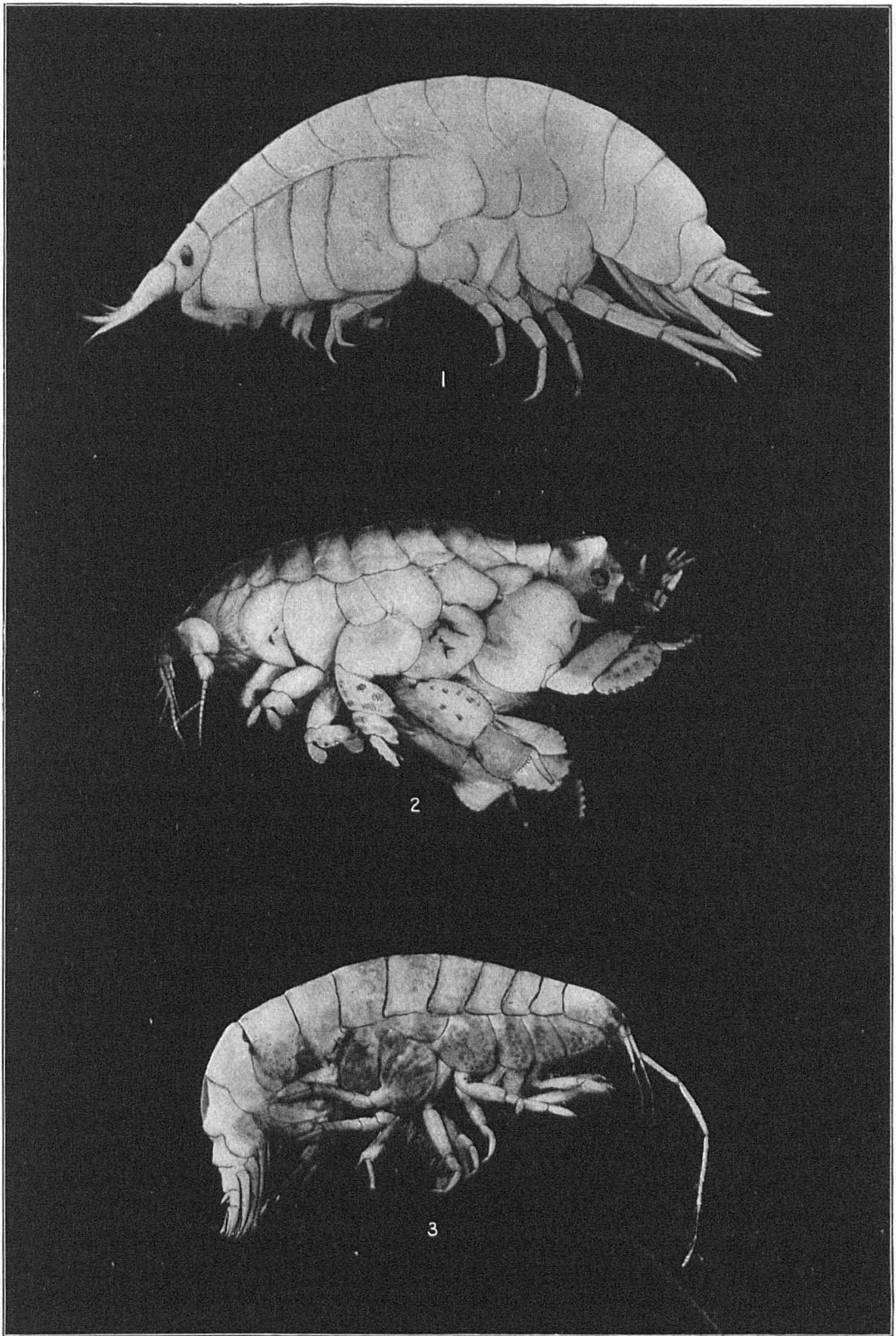
1. *Talorchestia longicornis*. Adult male from Woods Hole, Mass.  
2. *Talorchestia megalophtalma*. Female from Woods Hole.  
3. *Orchestia agilis*. Upper figure male, lower female. Woods Hole.



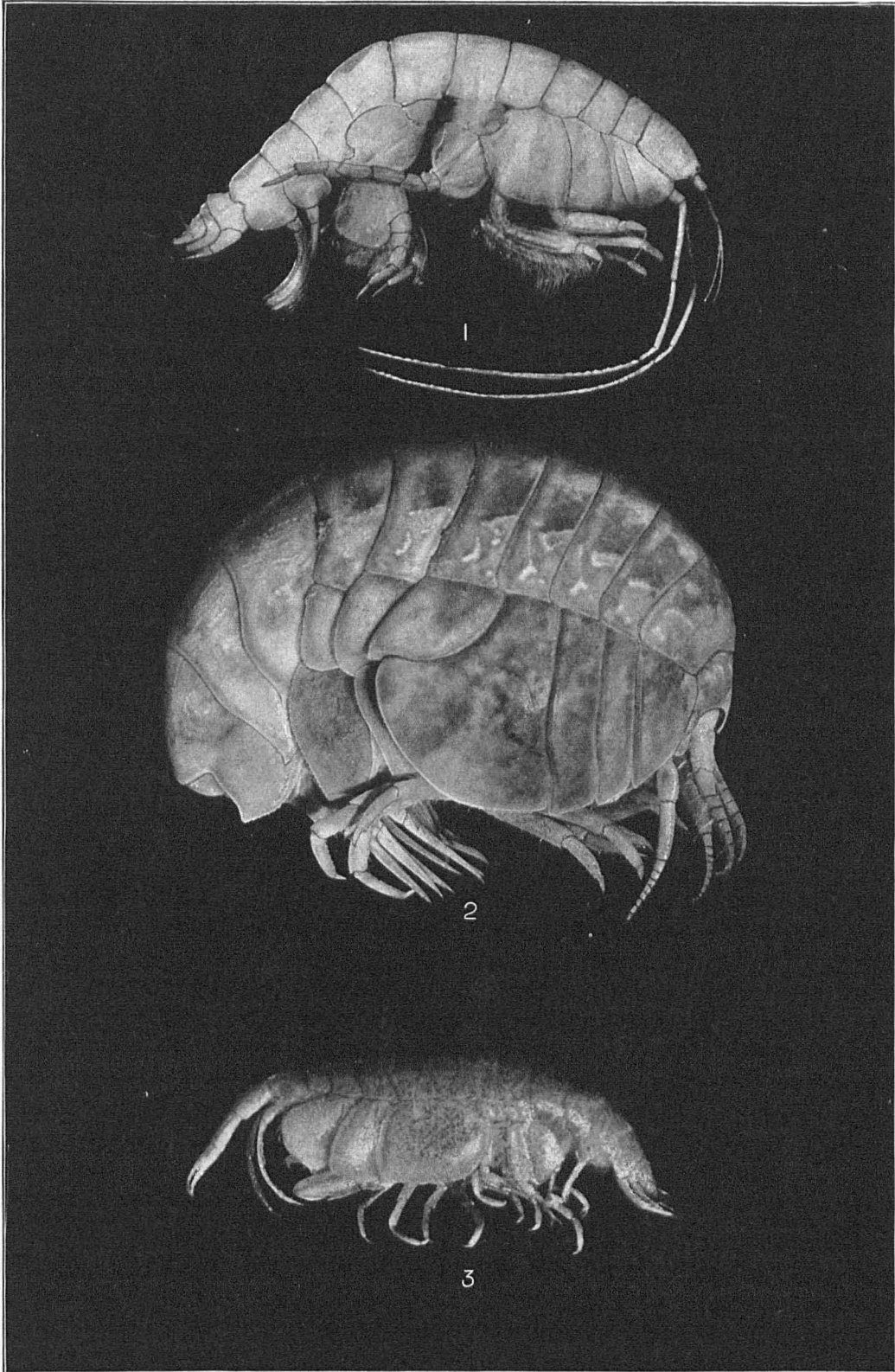
1. *Orchestia palustris*, male. Woods Hole.  
2. *Hyale littoralis*. Woods Hole.  
3. *Anonyx nugax*. Vineyard Sound.



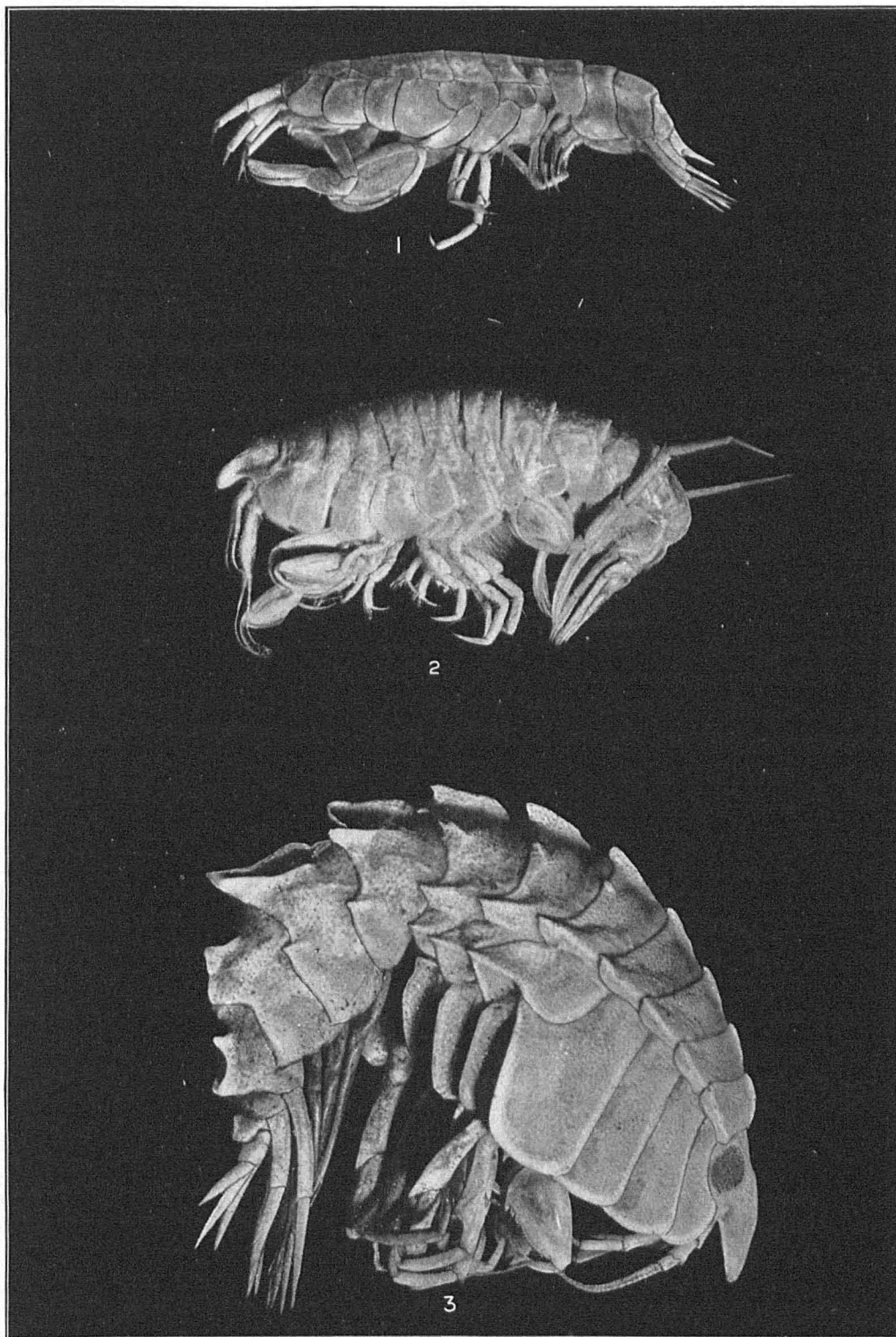
1. *Hoplonyx cicada*. Vineyard Sound.
2. *Hippomedon serratus*. Type specimen, from Newport, R. I.
3. *Tryphosa pinguis*. Vineyard Sound.



1. *Lysianopsis alba*. Woods Hole.  
2. *Haustorius arenarius*. Off Marthas Vineyard.  
3. *Byblis serrata*. Woods Hole.

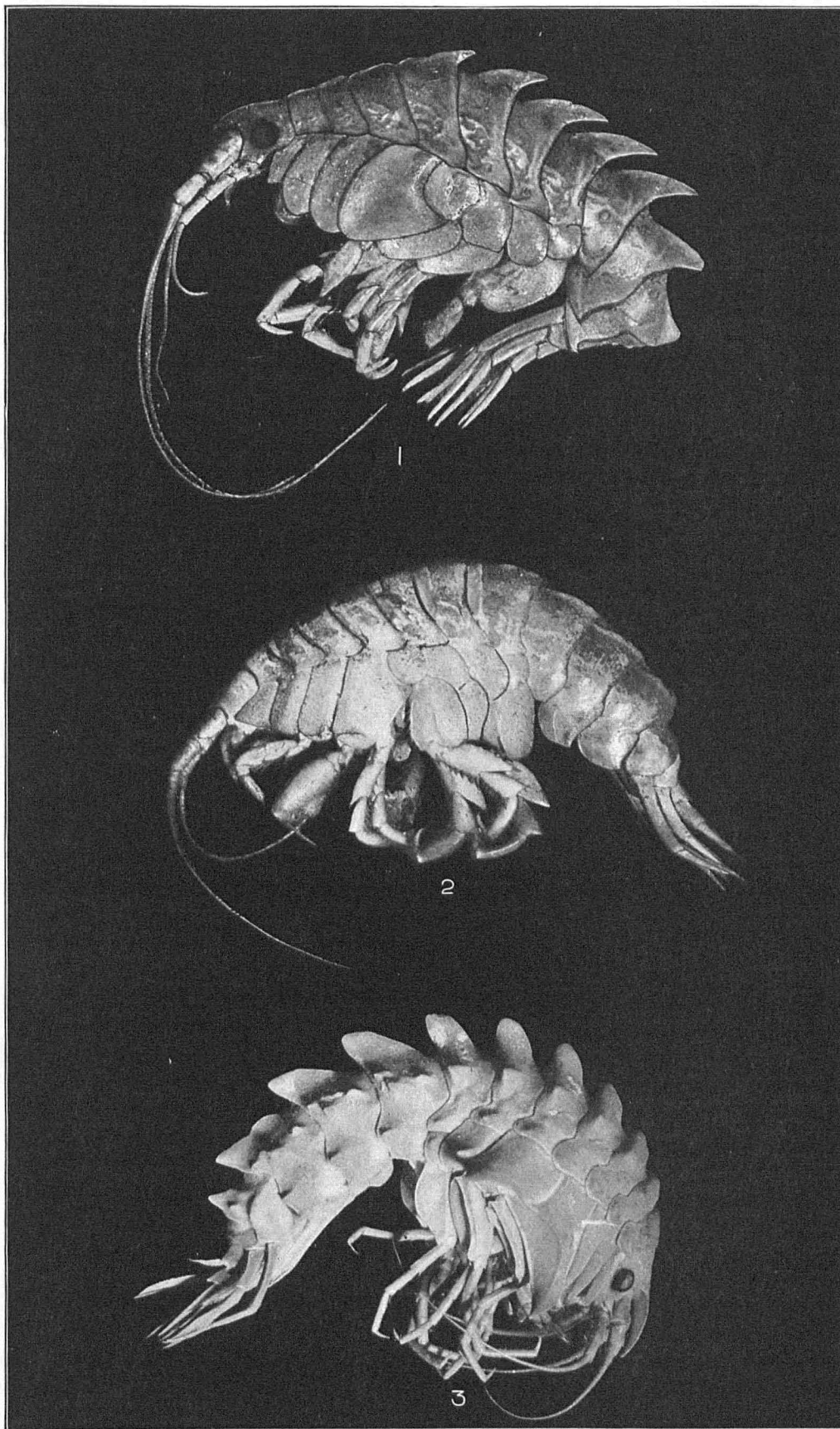


1. *Ampelisca compressa*. Near Woods Hole.  
2. *Stegoccephalus inflatus*. Off Head Harbor, Maine.  
3. *Metopa groenlandica*. Albatross Station 2057.

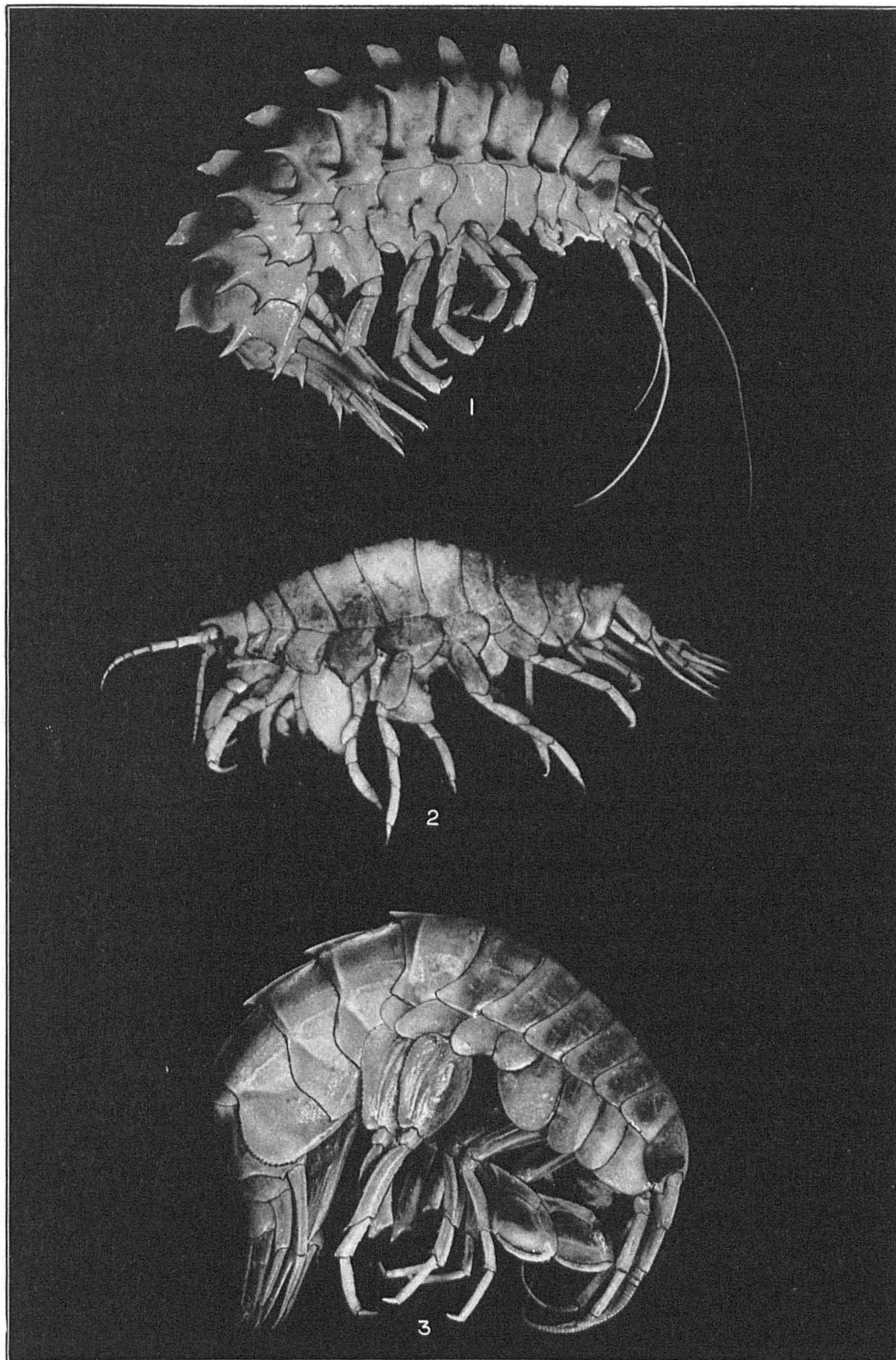


1. *Leucothoë spinicarpa*. Grand Manan.  
2. *Parædiceros lynceus*. Off Cape Ann, Massachusetts.  
3. *Pleustes panoptus*. Grand Manan.

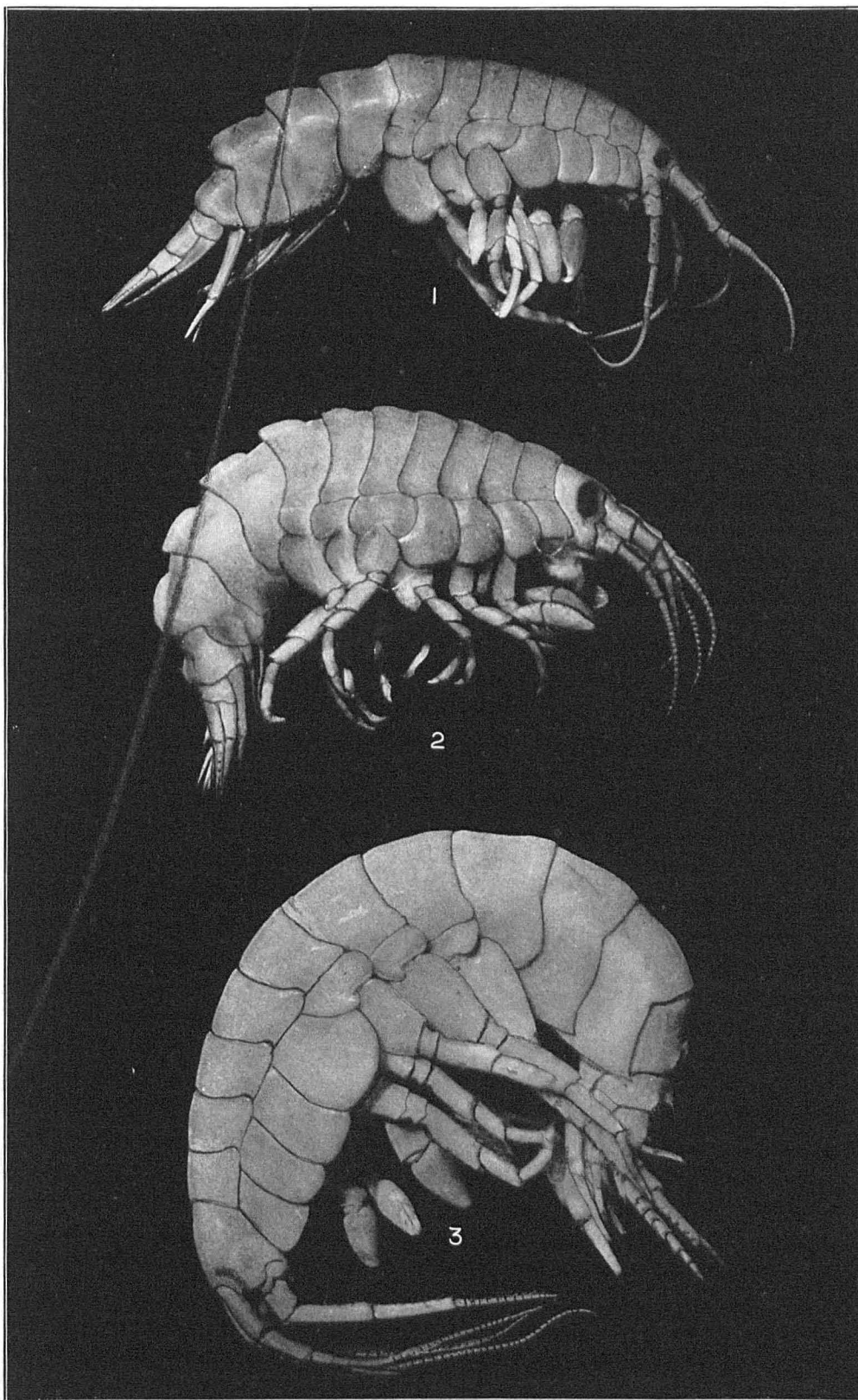




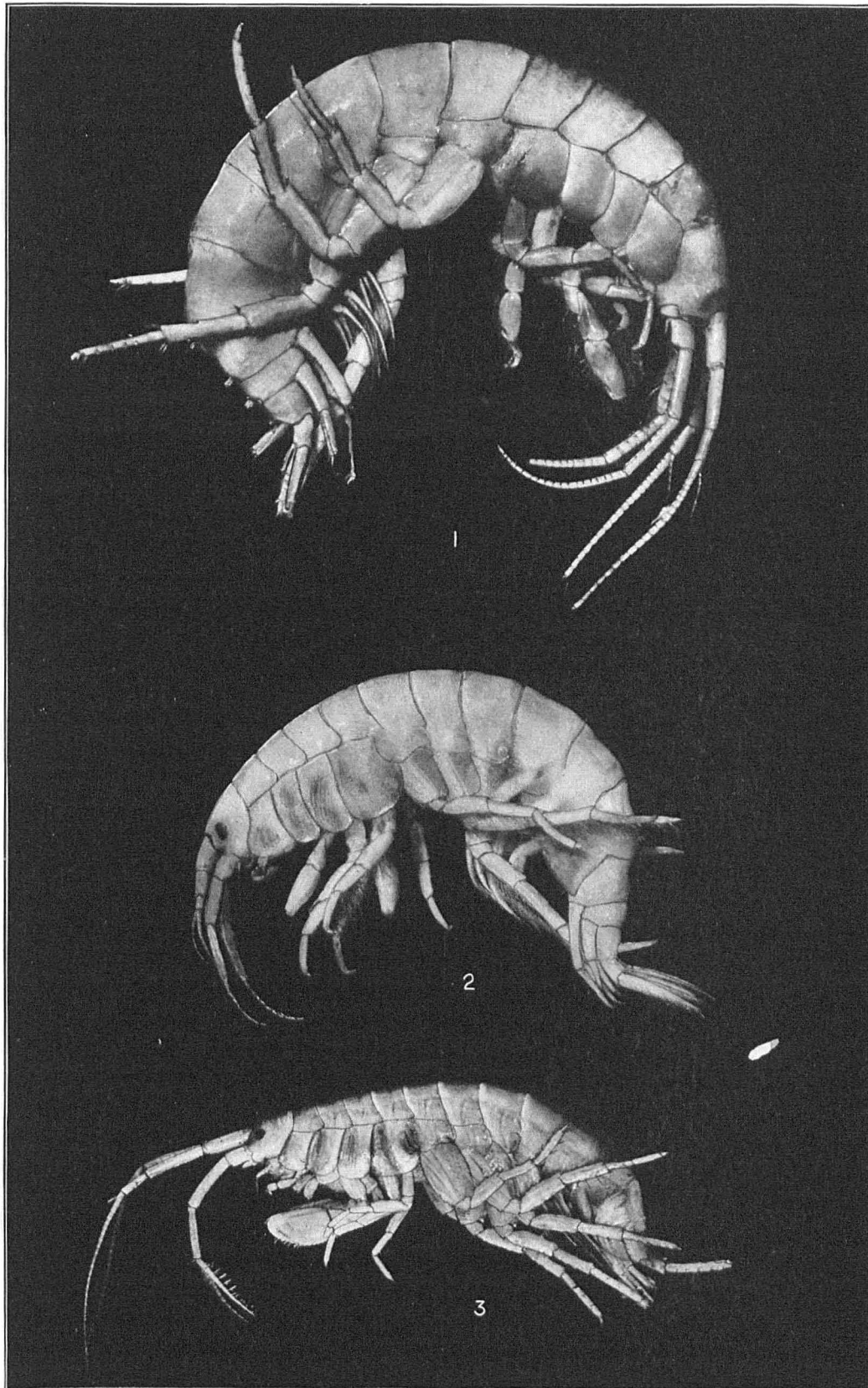
1. *Paramphithoë pulchella*. Grand Manan.  
2. *Symplestes latipes*. Grand Manan.  
3. *Epimeria toricata*. Off Head Harbor, Maine.



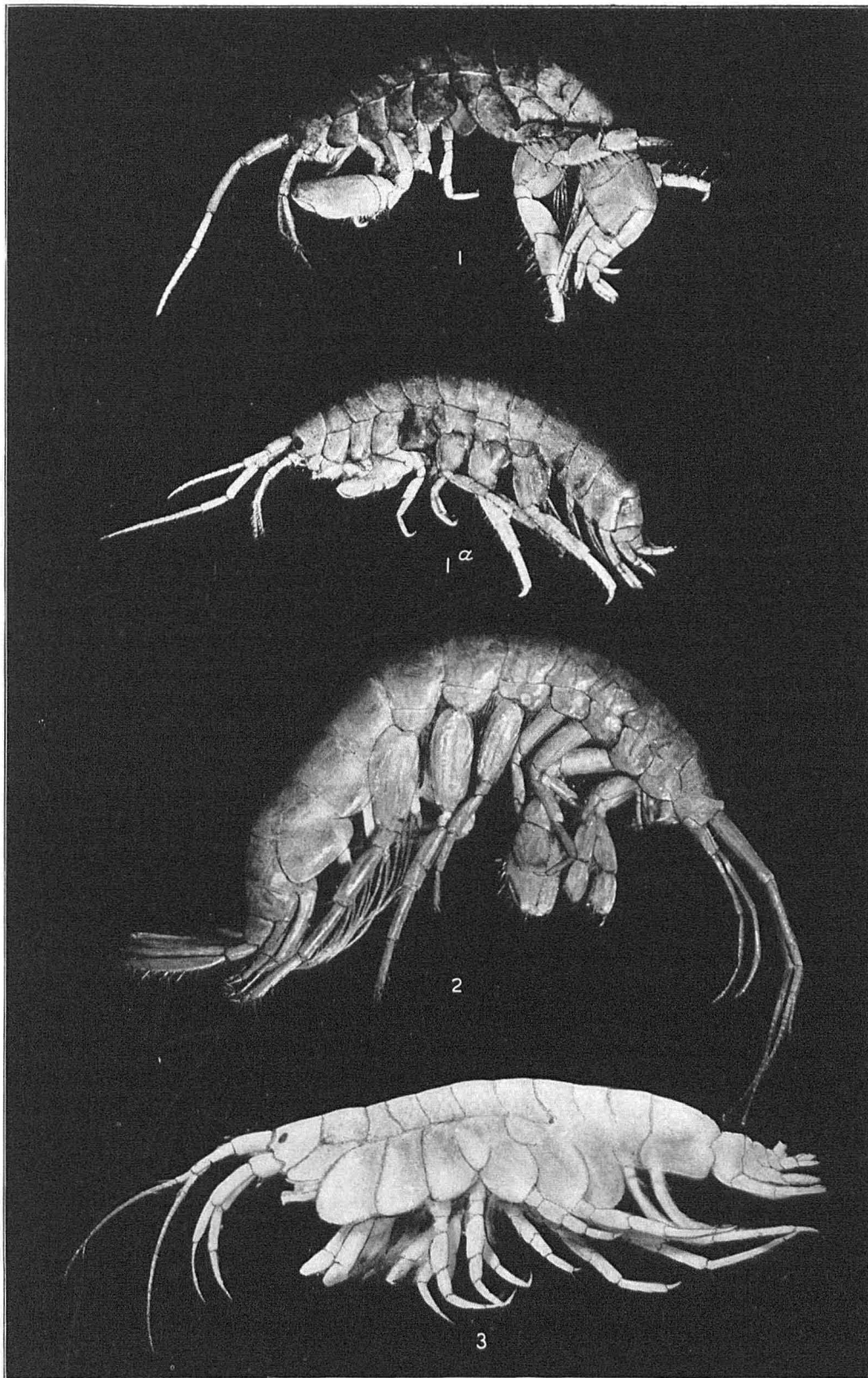
1. *Acanthozone cuspidata*. Eastport, Me.  
2. *Lafystius sturionis*. Woods Hole.  
3. *Eusirus cuspidatus*. Grand Manan.



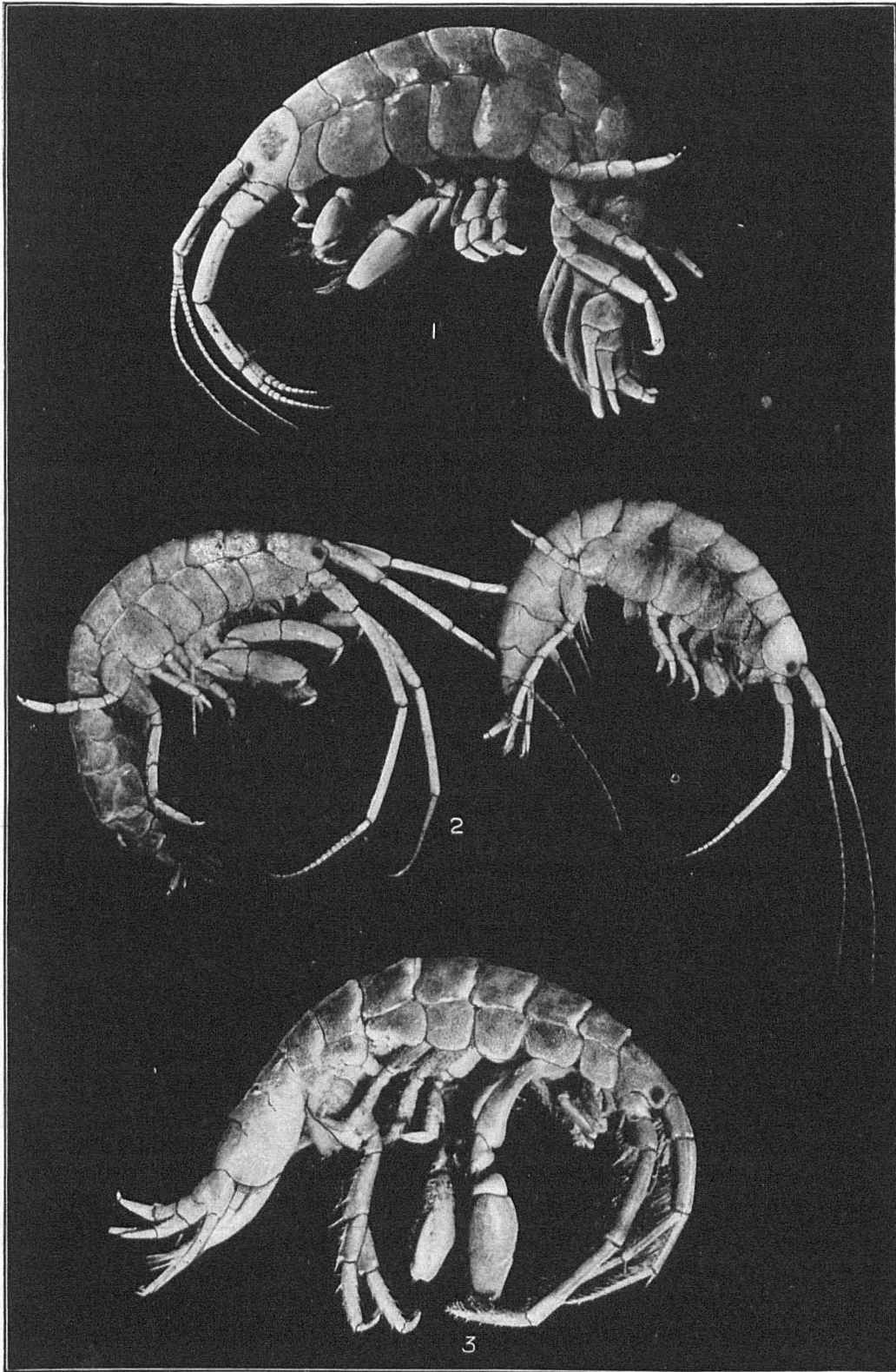
1. *Calliopius leviusculus*. Vineyard Sound.  
2. *Gammarellus angulosus*. Near Woods Hole.  
3. *Gammarus locusta*. Near Woods Hole.



1. *Gammarus marinus*. Woods Hole.  
2. *Gammarus annulatus*. Vineyard Sound.  
3. *Melita nitida*. Woods Hole.



1. *Elasmopus lacris*, male. (a) Female. Woods Hole.  
2. *Mara danae*. Eastport, Me.  
3. *Ptilocheirus pinguis*. Vineyard Sound.



1. *Amphithoë rubricata*. Near Woods Hole.  
2. *Amphithoë longimana*. Right figure a female, left a male. Woods Hole.  
3. *Ischyrocerus anguipes*, male. Marblehead Beach, Massachusetts.