

SYNOPSIS OF NORTH-AMERICAN  
INVERTEBRATES.

XVIII. THE AMPHIPODA.<sup>1</sup>

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THE present key is restricted to the species of amphipod Crustacea of the Atlantic coast of North America. The amphipod fauna of the Pacific coast is very imperfectly known and a key to the forms already described would include only a small proportion of the numerous species of that region. The species from the Arctic regions of the American continent are also not included. Most of these are circumpolar in their distribution and only those are described which range into the region covered. The majority of the known species of eastern North America are, however, representatives of this circumpolar fauna and are found also on the northern coast of Europe and Asia. The amphipod fauna of Labrador is very similar to that of Norway, the differences naturally becoming greater as we pass southward along the shores of the two continents. Nevertheless there are not a few species common to the Mediterranean and the southern coast of New England. The tendency of some writers to describe a species as new when met with for the first time in North America has therefore resulted in the production of many synonyms.

While the labors of several English, German, Danish, and Norwegian naturalists have made the amphipod fauna of Arctic America fairly well known, we have almost no information concerning the Amphipoda of the southern portion of our own coast. The veteran American naturalist, Thomas Say, has described a few species from the shores of the southern states, but no successor has followed in his footsteps. Prof. Smith in the important Report upon the Invertebrate Animals of Vineyard Sound by Smith and Verrill made a list of the Amphipoda of southern New England and described several new species, and

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subsequently he added considerably to our knowledge of the amphipods of northern New England and Labrador. Since the publication of Prof. Smith's papers only a few forms have been made known from any portion of the eastern coast of America. Stimpson in his *Marine Invertebrata of Grand Manan* instituted several supposed new species, described after the fashion of that versatile zoölogist, with very unequal degrees of fulness; some of the species are very well characterized while the description of others is so meagre their recognition is practically impossible. Many of Stimpson's species are identical with forms previously described from Europe or Arctic America.

Most of the species included in this key will be found more fully described and figured in a paper by the writer on the Amphipoda of southern New England, which is now in course of publication. The specimens I have secured at Wood's Hole, Mass., and the collections of the U. S. National Museum, the U. S. Fish Commission, the Boston Society of Natural History and several smaller collections which were kindly sent me for examination have afforded several new species and many others which were heretofore not known to occur on the New England coast. While it may be unfortunate that a specific name at its first introduction to the public is unaccompanied by full description and figures, such a procedure is unavoidable in a key of this kind and it will not be long, I trust, before more extended descriptions and figures of the new species here mentioned will appear.

Many of the numerous families of the Gammaridea which have been proposed appear to me to be based upon very inadequate foundations, and I find it practically impossible to separate them all by an analytical key. As it would not be feasible to present the needed changes in classification in this paper, even were I prepared to venture upon such a task, I have disregarded the so-called family ties in dealing with this group and have prepared a key leading directly to the genera. Following previous contributors to this series of papers on North American Invertebrates I have adopted the following symbols to designate geographical regions.

A. Arctic America to Cape Cod.

M. Cape Cod to Hatteras.

S. Hatteras to Florida.

The Amphipoda may be defined as malacostracous Crustacea with a well-defined head, no carapace, sessile and usually compound eyes, a thorax of seven segments, and an abdomen consisting typically of six segments and a telson. The gills are borne on the inner side of the basal joints of the thoracic legs. The first three abdominal appendages are fitted for swimming; the last three pairs are very different from the preceding ones and are directed backward and fitted for springing. The eggs are carried in a marsupial pouch under the thorax of the female.

The term peræopod is here used to designate the thoracic legs behind the first two pairs, or gnathopods.

The Amphipoda fall into three main divisions which may be separated as follows :

- Abdomen well developed.
  - Head generally large with very large eyes. Maxillipeds without palps. Hyperiidea.
  - Head and eyes generally not of unusual size. Maxillipeds with palps. Gammaridea.
- Abdomen rudimentary. First thoracic segment fused with the head.
  - Amphipoda of aberrant structure . . . . . Caprellidea.

Tribe HYPERIIDEA:

Head generally large and tumid with very large eyes. Maxillipeds devoid of palps, the basal segments fused together in the middle line. Coxal plates small. Last two segments of the abdomen coalesced. Uropods usually with laminate rami.

The Hyperiidea are exclusively pelagic. Many species have the peculiar habit of living within the bodies of marine animals such as medusæ, ctenophores and salpæ. Like most pelagic organisms the species of this group have usually a wide range. To insure including all the species liable to be found off the Atlantic coast of North America would involve an extensive treatment of this division of the Amphipoda; only a few of the more common species, therefore, are here described. Full descriptions and figures of most of the known species of this group may be found in Bovallius' excellent Monograph of the Amphipoda Hyperiidea. All the species here mentioned belonging to the family Hyperiidae are described and figured in Sars' Crustacea of Norway. The other species in the key are treated of by Dr. Stebbing in the Amphipoda of the Voyage of the Challenger.

## KEY TO THE SPECIES.

- A. Antennæ retractile in depressions on the under side of the head.  
 Head produced in front into a long rostrum. Basal joints of the fourth and fifth peræopods thin and weak; fifth peræopods small.  
 Oxycephalidæ.  
 Second antennæ in the male five-jointed, wanting in the female. A dorsal carina from the rostrum to the tip of the telson. Proximal part of head tumid, almost covered by the large eyes; outer margin of the head serrate. A lateral carina on the rostrum, thorax, and first three segments of the abdomen. First three abdominal segments with a pair of acute projections at the lateral angles, the margins of the upper projection finely serrate. Basal joints of the third and fourth peræopods broad, coarsely serrate in front and finely serrate on the very convex posterior margin.  
*Oxycephalus clausi* Bovallius. M.
- AA. Antennæ carried on the anterior side of the head. Head not attenuate in front.
- B. Head not large; eyes covering only a small part of the head; first antennæ with the first joint of the flagellum very large and compressed, the terminal joints minute. . . . . *Vibilia*.  
 The species of this genus are somewhat difficult to determine without full descriptions and figures and the reader had best consult the monograph of Bovallius above referred to. Several species occur off the Atlantic coast of North America.
- BB. Head large and tumid, the large eyes covering a large portion of the surface.
- C. Eyes divided into an upper and a lower portion. No mandibular palp. Fifth peræopods normal. . . . (Phronimidae).  
 Head about as deep as the length of the first six segments of the thorax. Lateral angles of the first three abdominal segments acuminate. Gnathopods small simple, the carpus distally produced. Third peræopods enlarged and chelate or subchelate, the hand very variable in form and differing with age and sex. Often found in the tests of *Salpa* and *Pyrosoma*. . . . *Phronima sedentaria* (Forsk.) A. M.
- CC. Eyes not divided. Fifth peræopods reduced or transformed. Uropods devoid of rami, the peduncles laminate (Phrosinidæ).  
 First and second gnathopods simple. First three pairs of peræopods subchelate, the third very large and stout, the carpus very broad with the lower margin nearly straight and armed with 6 or 7 teeth; propodus slender, slightly curved, closing against the toothed edge of the carpus; dactyl slender, scarcely half the length of the propodus. . . . *Anchylomera blossevillii* Edw. M.

CCC. Eyes not divided. Uropods with rami.

D. Inner ramus of the uropods fused with the peduncle.  
No mandibular palp . . . . . (Cystisomidæ).  
Head large, the upper half or more covered by the large eyes, the lower margin dentate. First two thoracic segments fused. Body with a median dorsal carina; posterior margins of most of the segments dentate. Gnathopods small, complexly subchelate, the margins of the carpal process and propodus acutely serrate. Attains a length of four inches. Transparent. . . . . *Cystisoma spinosum* (Fabr.) A. M. S.

DD. Inner ramus of the uropods free. Head very large, tumid, the sides entirely covered by the large eyes. Flagellum of both pairs of antennæ long and multi-articulate in the male, but short and unjointed in the female. Mandibles with a palp (Hyperiidæ).

E. Carpal joint of both gnathopods produced distally as far as the tip of the propodus . . . Hyperoche. Second antennæ in the female much smaller than the first. Gnathopods almost naked. Carpus of the first two peræopods narrow, the posterior margin acute and serrate. Carpal process of both gnathopods narrowly triangular, somewhat exceeding the propodi, and serrulate above.

*Hyperoche tauriformis* (Bate), A.

EE. Carpal joint of both gnathopods not produced or not so much so as in Hyperoche.

F. Third peræopods much elongated. Second and third peræopods with the carpus much dilated. . . . . Euthemisto.  
Body compressed, carinated, the last two thoracic and first two abdominal segments with a posterior upturned tooth. Carpal joints of the first two peræopods oblong-oval, widest near the middle, furnished posteriorly with short, unequal setæ. Third peræopods not greatly exceeding the others. Usual length 12 mm. . *E. compressa* (Goes), A. M.  
Body carinated above, the last two thoracic segments with posterior recurved teeth. Carpus of the first peræopods most dilated near the base where the posterior margin is strongly convex. Third peræopods greatly elongated, the carpus very narrow, much longer than the propodus, and pectinated in

- front with spines which increase in length toward the distal end where they may equal the diameter of the joint. Usual length, 15 mm. . . . *E. bispinosa* (Boeck), A. M. Back not carinated, with no dorsal spines. Carpi of first peræopods not widest near the base and furnished posteriorly with elongated setæ. Dactyl of the elongated third peræopods with a tuft of spinules near the base. 45 mm. . . . *E. libellula* (Mandt), A.
- FF.* Last three peræopods of subequal length. Carpus of the first and second, peræopods of the usual form.
- G.* Propodi of the last three peræopods greatly elongated. Antennæ subequal in the female. . . . Parathemisto. Body rounded above. Gnathopods hirsute, the first not distally produced; carpus of the second pair produced beyond the middle of the propodus. *P. oblivia* (Kröyer), A.
- GG.* Propodi of the three posterior peræopods not greatly elongated. Antennæ very small in the female. Head much deeper than long, flattened in front. *Hyperia*. Gnathopods sparingly setose, the carpus of the first pair produced into a prominent lobe; carpal lobe of the second pair reaching beyond the middle of the propodus. Often found in Aurelia. . . . *H. galba* (Mont.), A. M. Gnathopods thickly setose. Carpus of the first pair scarcely produced distally, that of the second not produced nearly to the middle of the propodus. Often found in Cyanea. *H. medusarum* (Müll.), A. M.

## Tribe GAMMARIDEA.

Head and eyes usually not greatly enlarged. Maxillipeds with palps, the basal lobes not fused together in the middle. Coxal plates generally well developed. Abdomen not reduced in size, the last two segments with rare exceptions free.

## KEY TO THE SPECIES.

- A.* Eyes four, sometimes apparently only two (Haploops), or rarely absent, each with a simple lens. Last two segments of the abdomen fused together. Gnathopods slender. Terminal peræopods quite different from the preceding ones, the basal joint enlarged and distally produced behind into a ciliated lobe. Telson cleft. . . . (Ampeliscidæ).
- B.* Lower eyes apparently absent. Basal joint of posterior peræopods not greatly expanded. Telson deeply cleft. . . . Haploops.
- C.* No long dorsal setæ. Basal joint of posterior peræopods distally narrowed. . . . . *H. tubicola* Lillg. A.
- CC.* Back with fascicles of long setæ. Basal joint of posterior peræopods not distally narrowed. No corneal lenses.
- D.* Distal lobe of the posterior peræopods reaching about to the middle of the merus. Antennæ in the female subequal and much over half the length of the body. 13 mm. . . . . *H. setosa* Boeck, A.
- DD.* Distal lobe of the basal joint of the posterior peræopods scarcely reaching beyond the ischium. First antennæ in the female markedly shorter than the second and less than half the length of the body. 19 mm. . . . . *H. robusta* Sars, A.
- BB.* Lower eyes plainly visible.
- C.* Telson elongated and cleft nearly to the base. . . . Ampelisca.
- D.* Postero-lateral angle of the third abdominal segment produced into an acuminate process.
- E.* Head about as long as the first three segments of the thorax. Posterior peræopods with the basal lobe nearly transverse below; the carpus not strongly produced anteriorly. *A. macrocephala* Lillg., A. M. Posterior peræopods with the basal lobe obliquely truncated below, the carpus produced anteriorly. Head much shorter than the first three segments of the thorax.
- A. eschrichti* Kröyer, A. (= *A. ingens* Bate).
- DD.* Postero-lateral angle of the third abdominal segment not produced.
- E.* Merus of the posterior peræopods distally produced posteriorly nearly to the middle of the carpus. Body much compressed, telson narrow.
- A. compressa* sp. nov., M.
- Body not unusually compressed. Telson broad.
- A. agassizi* (Judd), M.
- EE.* Merus of posterior peræopods not produced

posteriorly, basal joint of the usual width, obliquely truncated below.

*A. spinipes* Boeck, A. M.

CC. Telson short, seldom cleft to the middle. . . . Byblis.

Lower margins of the anterior coxal plates serrated. Body with stellate pigment cells. . . . *B. serrata* Smith, M.

Lower margin of the anterior coxal plates not serrated.

*B. gaimardi* Krüyer, A.

AA. Two compound eyes, or rarely the eyes rudimentary or absent.

B. First antennæ shorter than the second. Mandibles devoid of a palp.

Terminal uropods with a single uniaarticulate ramus. Telson short and thick. Body compressed. . . . (Orchestiidae).

C. First antennæ exceeding the tip of the peduncle of the second pair; aquatic forms. . . . Allorchestes.

First antennæ nearly three fourths as long as the second which are scarcely a third the length of the body.

*A. littoralis* St., A. M.

CC. First antennæ much shorter than the peduncle of the second: terrestrial forms.

D. First gnathopods in both sexes subchelate. . . Orchestia.

First antennæ not quite reaching the tip of the penultimate segment of the second. Hand of the second gnathopods of the male with a notch near the posterior end of the palm. Carpus of the posterior peræopods in the adult male much swollen. Common under masses of seaweed near the shore. Very active.

*O. agilis* Smith, A. M. S.

First antennæ reaching slightly beyond tip of the penultimate joint of the second. Hand of the second gnathopods of the male oval, the palm regularly curved, with a slight prominence at the posterior end but not notched. Common around salt marshes.

*O. palustris* Smith, A. M. S.

DD. First gnathopods simple in the female: large species.

Talorchestia.

Second antennæ in the male about as long as the body. Hand of the second gnathopods in the male oblong, the palm with a large lobe near the middle and a large prominence at the posterior end. Very common on sandy beaches.

*T. longicornis*. (Say), A. M.

Second gnathopods in the male about a third as long as the body. Hand of the second gnathopods of the male subovate, distally widened, the palm evenly con-

vex with no lobe near the middle, but defined posteriorly with a prominence. Habitat similar to that of the preceding species.

*T. megalophthalma* (White), M.

BB. Without the combination of characters of B.

C. First two pairs of peræopods devoid of spinning glands.

D. Last pair of peræopods much longer than the preceding ones, with the dactyl very long and styliform. Eyes nearly contiguous above near the end of the projecting front . . . . . (Ediceridæ).

E. Carpus of the anterior gnathopods devoid of a prominent posterior lobe. . . . . Parædiceros. Rostrum horizontally produced and abruptly deflexed at the tip which forms only a slight angle inferiorly. Second gnathopods narrowly oval, the palm longer than the upper part of the posterior margin of the hand; posterior process of the carpus reaching the end of the palm. Telson oblong, truncated at the tip. Attains 22 mm.

*P. lynceus* (Sars), A.

EE. Carpus of the anterior peræopods prolonged into a long lobe which extends behind the hand.

Monoculodes.

F. Eyes near the base of the deflexed rostrum.

*M. demissus* St., A.

FF. Eyes in front of the base of the rostrum.

Second gnathopods with the carpal process scarcely extending beyond middle of palm; palm about as long as the upper part of the posterior margin of the hand.

*M. edwardsi*, sp. nov. M.

Second gnathopods with the carpal process extending much beyond middle of palm; palm shorter than the upper part of the posterior margin of the hand.

*M. borealis* Boeck, A.

DD. Without all the characters of D.

E. Rostrum produced into a hood over the antennæ.

Penultimate peræopods much longer than the last pair . . . . . (Phoxocephalidæ).

F. Palp of the first maxillæ two-jointed.

Harpinia.

Lower margins of coxal plates fringed with plumose setæ. Eyes wanting. Infero-lateral angle of the third abdominal segment pro-

- duced into a long upturned spine. Basal joint of the last peræopods with about five more or less distinct serrations. Gnathopods of nearly equal size and of similar form. . . . *H. plumosa* (Kr.) A. M.
- FF.* Palp of the first maxillæ one-jointed.
- G.* Second gnathopods markedly larger than the first. . . . Phoxocephalus. Eyes imperfectly developed. Coxal plates with simple marginal setæ. Infero-lateral angle of the third abdominal segment rounded.  
*P. holbölli* (Kr.), A. M.
- GG.* First and second gnathopods of equal size. . . . Paraphoxus. Eyes well-developed. Basal joint of posterior peræopods oval, not coarsely serrate. Legs spiny; merus of third peræopods broader than long.  
*P. spinosus* sp. nov. M.
- EE.* Without all the characters of E.
- F.* Body compact, with well developed coxal plates. Mandibles not denticulated, and furnished with a three-jointed palp. First antennæ with a short, thick base and a secondary flagellum. Second gnathopods elongated, slender, flexible, with the ischium elongated and the hand small and furnished with dense patches of short setæ: dactyl rudimentary (Lysianassidæ).
- G.* Telson entire. . . . Lysianopsis. First gnathopods simple. Infero-lateral angle of the third abdominal segment rounded. Color white.  
*L. alba* sp. nov., M.
- GG.* Telson more or less deeply cleft.
- H.* Infero-lateral angle of the third abdominal segment not produced.

- I. Anterior coxal plates much less than twice as deep as their segments.  
Euryoporeia.  
Eyes expanding below into two diverging lobes. Telson long, deeply cleft, conically tapering. Attains 62 mm. . . *E. gryllus* (Mandt), A.
- II. Anterior coxal plates twice as deep as their segments.  
J. Anterior gnathopods slender; carpus elongated; propodus narrow.  
Tryphosa.  
Eyes narrowly reniform. Hand of first gnathopods tapering distally, palm transverse. L. 7 mm. . Abundant.  
*T. pinguis* (Boeck), A. M.
- JJ. Anterior gnathopods rather stout. Carpus not elongated.  
Tryphosella.  
Eyes very large, somewhat widened below. Fourth abdominal segment with a deep dorsal depression behind which is an angular prominence. Infero-lateral angle of third abdominal segment nearly a right angle. Propodus of first gnathopods shorter than the carpus. . . . . *T. höringii* (Boeck), A.  
HH. Infero-lateral angle of the third abdominal segment produced into an acute projection.
- I. Telson short, not cleft to the middle.  
J. Anterior gnathopods not subchelate. . . . . Menigrates.  
Posterior peræopods very short, the basal joints very large, ovate, merus much expanded. Rami of terminal uropods naked.  
*M. obtusifrons* Boeck, A.
- JJ. Anterior gnathopods subchelate. . . . . Onesimus.  
Lateral lobes of head obtuse. Hand of anterior gnathopods much longer than the carpus, slightly curved; palm nearly transverse and finely denticulated. . . . . *O. edwardsii* (Kr.). A.
- II. Telson cleft to beyond the middle.  
J. Infero-lateral angle of the third abdominal segment produced into a small tooth. . . . . Hoplonyx.  
Hand of first gnathopods distally tapering; palm transverse. Lateral lobes of head only slightly projecting and rounded. Upper part of eyes narrow. Attains 18 mm.  
*H. cicada* (Fabr.), A. M.
- JJ. Infero-lateral angle of the third abdominal segment produced into a large upturned tooth above which is a deep marginal sinus.
- K. Eyes imperfect or wanting. . . . . Centromedon.  
Lateral lobes of the head drawn out into a narrow sharp process. Last pair of peræopods shorter than the preceding pair, the basal joint subquadrate and longer than the succeeding ones. Antennæ of subequal length. L. 5 mm. . . . . *C. pumilus* (Lillg.), A.
- KK. Eyes well developed.

- L.* Basal joints of the first antennæ distally produced above ; secondary flagellum small. . . . Hippomedon.  
Tooth of infero-lateral angle of the third abdominal segment broad, with a broadly rounded sinus above. Basal joint of the posterior peræopods coarsely serrate behind. . . . *H. serratus* sp. nov. M.
- LL.* Basal joints of the first antennæ not distally produced above ; secondary flagellum well developed. . . . Anonyx.  
Eyes large, elongated and expanded below. Hand of first gnathopods scarcely tapering distally, the palm transverse. Telson nearly rectangular, cleft nearly to base. . . . *A. nugax* (Phipps), A. M.
- FF.* Without all the characters of F.
- G.* Terminal uropods uniramous or wanting.
- H.* Ramus of terminal uropods two-jointed. . . . (Stenothoidæ).
- I.* Mandibles with a palp. . . . Metopa.  
Antennæ of subequal length. Coxal plates very large, the fourth pair longer than deep. Hand of second gnathopods in the male with a large sinus near the posterior end of the palm, the corresponding sinus in the hand of the female much smaller. . . . *M. groenlandica* Hansen, A. M.
- II.* Mandibles without a palp. . . . Stenothœ.
- J.* Length exceeding 5 mm. Carpus of first gnathopods nearly twice as long as broad, the margins parallel. . . . *S. pellata* Smith, A.
- JJ.* Less than 5 mm in length.  
Fourth pair of coxal plates enormously developed and more or less ovate in form. . . . *S. cypris* sp. nov., M.  
Fourth pair of coxal plates not unusually large for the genus, not ovate. . . . *S. minuta* sp. nov., M.
- HH.* Ramus of terminal uropods one-jointed.
- I.* Body slender, elongated. Ramus of terminal uropods much longer than the peduncle. . . . Neohela.  
Eyes well developed. Both antennæ longer than the body. Peræopods very long and slender. . . . *N. phasma* Smith, A.
- II.* Body depressed, moderately stout. Coxal plates small. Antennæ shorter than the body. . . . Unciola.  
Peduncle of terminal uropods produced distally into a lobe which extends about to the tip of the short ramus. . . . *U. irrorata* Say, A. M.
- HHH.* Terminal uropods wanting.  
Body slender ; coxal plates very small. . . . Dulichia.

First antennæ a little longer than the second and about as long as the body, secondary flagellum minute, three-jointed. Hand of second gnathopod of the male with a long thumb-like process above the middle and a spine at the end of the palm. . . . *D. porrecta*, Bate. A.

GG. Terminal uropods biramous.

H. Anterior gnathopods with the carpus and propodus forming a chela.

Leucothœ.

Antennæ of subequal length. Carpus of the large second gnathopods extending behind the hand to the upper end of the palm. Telson narrow and conically tapering.

*L. spinicarpa* (Abildg.), A.

HH. Not as in H.

I. Carpus of the gnathopods joined in front of the proximal end of the propodus. . . . Eusirus. Last thoracic and first two abdominal segments produced posteriorly into a dorsal spine. Telson cleft about to the middle.

*E. cuspidatus* Kr. A.

II. Carpus joined in the usual manner.

J. Peræopods devoid of dactyls and peculiarly modified for digging. Haustorius.

Three posterior peræopods dissimilar with the joints above the propodus much expanded. Carpus of the first two peræopods with a large rounded posterior lobe; propodus widened distally and rounded. Telson much wider than long and bilobed.

*H. arenarius* (Slabber) A. M.

JJ. Peræopods with dactyls.

K. First antennæ with an accessory flagellum.

L. Terminal uropods flattened and projecting beyond the others. Gnathopods subchelate, larger in the male than in the female, the second pair usually larger than the first. Mouth parts normal. Telson small, flattened, cleft or emarginate. . . . (Gammaridæ).

M. Inner ramus of terminal uropods scale-like, rudimentary. First antennæ longer than the second. Melita.

Carpus of first gnathopods as broad as long; hand short and stout.

*M. parvimana* sp. nov., M.

Carpus of first gnathopods much longer than

broad; hand narrow. Posterior margins of the abdominal segments produced into teeth. Terminal uropods much elongated.

*M. dentata* (Kr.), A. M.

Carpus of first gnathopods much longer than broad; hand narrower and shorter than the carpus. Posterior margins of the abdominal segments not produced into teeth.

*M. nitida* Smith, M.

*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. Dorsal carina high and produced posteriorly on the segments along the middle of the body into compressed spinous processes. Tip of telson narrow, the cleft very small.

*G. homari* (Fabr.), A.

Dorsal carina not produced posteriorly at the ends of the segments. Antennæ stout, subequal. Telson broad at the tip which has a rounded emargination.

*G. angulosa* (Rathke), A. M.

*NV.* Telson deeply cleft.

*O.* Last three segments of the abdomen with fascicles of spines.

*P.* Abdomen dorsally carinated.

Carinogammarus.

First three abdominal segments produced behind into acute teeth.

*C. mucronatus* (Say), M.

*PP.* Abdomen not dorsally carinated, the first three segments not produced behind into teeth. . Gammarus.

*Q.* Inner ramus of terminal uropods much less than half the length of the outer. Eyes long and narrow. Infero-lateral angle of the third abdominal segment nearly right angled.

*G. marinus* Leach, A. M.

*QQ.* Inner ramus of terminal uropods over half as long as the outer. Fourth abdominal segment

with median and lateral fascicles of spines. Terminal uropods stout, armed with clusters of strong spines, the inner ramus reaching nearly to the tip of the first joint of the outer. Infero-lateral angle of the third abdominal segment produced. Very common.

*G. locusto* (Linn.), A. M. Fourth abdominal segment with median but no lateral fascicles of spines. Rami of terminal uropods narrowly lanceolate, fringed with long hairs, the inner ramus nearly as long as the outer. Anterior pairs of peræopods fringed with long hairs. Found on the shore and abundantly at the surface.

*G. annulatus* Smith, M.  
(= *G. natator* Smith).

*OO.* Last three segments of the abdomen without fascicles of spines, although there may be spiniform projections from the posterior margins of the segments.

*P.* Posterior margins of the abdominal segments armed with teeth or spines. Gnathopods feeble.

Melphidippa.

First three abdominal segments produced posteriorly into three strong spines with smaller denticles between and below them. Legs very long and slender, the posterior pairs with the basal joints not expanded. Telson cleft about to the middle.

*M. spinosa* (Goes), A.

*PP.* Body smooth above.

*Q.* Terminal uropods short and stout.  
Elasmopus.

Second antenna about as long as the peduncle of the first. The three posterior peræopods with the basal joints expanded, the merus and carpus expanded, especially in the male. Terminal uropods projecting but little beyond the others, the rami short and broad.

*E. lewis* (Smith), M.

QQ. Terminal uropods elongated.  
Mæra.

Coxal plates small. Basal joints of the posterior three peræopods long and narrow. Rami of terminal uropods narrow, elongated, and subequal.

*M. dana* (St.), A.

LL. Not with all the characters of L.

M. Head with a prominent deflexed rostrum separated from the sides by a deep lateral sinus. Fourth coxal plates usually smaller than the preceding ones. Gnathopods feeble, the carpus elongated. Telson much elongated . . . . (Syrrhoïdæ).

N. Eyes large and coalescent above. . . . Syrrhoë.  
Rostrum perpendicularly deflexed. Posterior margins of first three abdominal segments sharply serrated. Basal joints of the posterior three pairs of peræopods deeply serrated behind. Telson cleft nearly to the base. . . . . *S. crenulata* Goes, A.

W. Eyes round and scarcely coalescent above.  
Tiron.

A small accessory eye below each large eye. Last three abdominal segments produced posteriorly into a large median spine but not serrated on the posterior margin.

*T. acanthurus* Lillg., A.

MM. Not with all the characters of M.

N. Body spiny; secondary flagellum minute.

Rhachotropis.

Last two thoracic and first four abdominal segments with a posterior median dorsal spine, the first four abdominal segments hav-

ing a smaller additional spine near the middle. A lateral marginal spine on the last two thoracic and first three abdominal segments. Rostrum long. Hands of a similar oval form. Telson cleft in its posterior third. . . . *R. aculeata* (Lepechin), A.

AV. Not as in N.

O. Terminal uropods enormously enlarged, the inner ramus rudimentary. Second uropods with the peduncle expanded into a lobe much larger than the quadrate, distally serrated rami. Body depressed.

*Chelura terebrans* Phil. M.

OO. Not as in O.

P. Coxal plates enormously developed; body tumid. No mandibular palp. . . . Stegocephalus. Margins of the first five coxal plates presenting an evenly rounded contour. Rostrum prominent, deflexed, with a deep sinus below. Infero-posterior angle of the basal joint of the last peræopods produced and acute. Telson cleft beyond the middle, strongly tapering in distal half. . . . *S. inflatus* Kr., A. M.

PP. Coxal plates of ordinary size. Mandibles with a palp. Last pair of peræopods shorter than the preceding ones, the basal joint enormously expanded and fringed with plumose setæ; basal joints of preceding pairs narrow.

Pontoporeia.

Fourth abdominal segment with a peculiar, upturned, bifurcated process. . . . *P. femorata* Kr., A.

PPP. Coxal plates rather small. Mandibles with a palp. Last three pairs of peræopods of similar form and increasing in length posteriorly. First few segments of the flagellum of the first antennæ fused together in the

- male. . . . . Pardalisca.  
 Third and fourth abdominal segments with a pair of posterior dorsal projections; fifth segment with a single median spine-like process. Eyes very large.  
*P. abyssi* Boeck, A.
- KK.* First antennæ with no accessory flagellum.
- L.* Maxillipeds with the palp small and two-jointed. Parasitic. Thorax broad and tumid. . . Laphystius. Head with a broad truncated rostrum. Eyes round. Fourth coxal plates pointed below. Peræopods of subequal length and furnished with strong curved dactyls. Found on several species of fish.  
*L. sturionis* Kr., A. M.
- LL.* Not as in *L.*
- M.* Telson cleft.
- N.* First gnathopods rudimentary. . . . Batea. Anterior coxal plates large. Telson cleft nearly to the middle. First gnathopods represented only by the coxal plate and basal joint. A minute species found among hydroids. . . . *B. secunda* sp. nov. *M.*
- NV.* First gnathopods not rudimentary.
- O.* First three pairs of coxal plates pointed below. Body with a median dorsal crest. Head with a very prominent rostrum.
- P.* Body with prominent tubercles on either side of the dorsal crest.  
 Epimeria.  
 Dorsal crest extending from the first segment of the thorax to the fourth segment of the abdomen.  
*E. loricata* Sars, A. M.
- PP.* Body devoid of tubercles. Anterior gnathopods very slender and subchelate. Telson not deeply cleft.  
 Acanthonotosoma.  
 Dorsal crest on the posterior thoracic and first two abdominal segments produced posteriorly into spines. Postero-inferior angle of third abdominal segment divided into two prominent lobes the

margin of the lower of which and sometimes also the upper is serrated. . . *A. serratum* (Fabr.), A. Dorsal crest not produced posteriorly into spines.

*A. inflatum* (Kr.), A.

*OO.* First three pairs of coxal plates not pointed below.

*P.* No mandibular palp. Gnathopods similar. Two last segments of the abdomen completely fused together.

Dexamine.

First four abdominal segments with a prominent pointed dorsal projection at the posterior end.

*D. thea* Boeck, A. M.

*PP.* Mandibles with a palp. Body devoid of dorsal spinous processes. Gnathopods slender; hands narrow. . . . Pontogeneia. Telson cleft to beyond the middle. Terminal uropods with flattened lanceolate rami of subequal length. Eyes large. Both antennæ elongated and furnished with calceolæ in the male.

*P. inermis* (Kr.), A. M.

*MM.* Telson not cleft.

*N.* Body dorsally carinated.

*O.* Abdomen with tubercles or spines on either side of the dorsal carina.

*P.* Body thickly armed with very long and narrow spines. . . Acanthozone. Thorax with five rows of long spines. First thoracic segment with a large horizontal spine projecting over the head. Posterior margins of abdominal segments armed with several spines. Telson tapering to a narrow, truncated tip.

*A. cuspidata* (Lepechin), A.

*PP.* Body tuberculated but not armed with long spines. . . . Pleustes. Dorsal carina extending from first thoracic to fifth abdominal segment. Rostrum

large. Hands oval, almost alike in form.  
Sides of the abdomen tuberculated.

*P. panoplus* (Kr.), A.

OO. Body devoid of tubercles or spines except in the mid-dorsal line and at the infero-lateral angles of the abdominal segments. Antennæ long.

Paramphithœ.

Anterior abdominal segments and a variable number of the posterior thoracic segments produced into a large compressed spinous projection in the mid-dorsal line.

*P. pulchella* (Kr.), A.

Only the first two abdominal segments produced posteriorly into a spinous process. Telson oblong, distally rounded. . . *P. bicuspis* (Kr.), A. M.

AA. Body without a prominent dorsal carina.

O. Antennæ with calceolæ. Last peduncular joint of the first antennæ with a terminal lobe.

P. Dorsal spines on some of the segments of the body. . . . Halirages.

Eyes large, oval. Last thoracic and first two abdominal segments with a dorsal posteriorly directed spine. *H. fulvocinctus* (Sars), A.

PP. No dorsal spines. . . Calliopus.  
First and second gnathopods nearly equal; hands ovate. Eyes large. Telson oblong, distally rounded.

*C. læviusculus* (Kr.), A. M.

OO. Antennæ without calceolæ. No terminal lobe of the last peduncular joint of the first antennæ.

P. First antennæ longer than the second.  
Sympleustes.

First three abdominal segments with a posterior dorsal prominence. Second gnathopods stout, hand distally widened, armed with several short stout spines around the posterior end of the oblique, somewhat

excavated palm. Peraeopods short, stout and subequal. Telson oblong, distally rounded.

*S. latipes* (Sars), A.

Abdominal segments not elevated posteriorly. First three coxal plates with a small tooth at the infero-posterior angle. Infero-posterior angle of the third abdominal segment furnished with a small tooth. Second gnathopods much less stout than in *latipes*, the hand narrower. Peraeopods slender.

*S. glaber* (Boeck), A.

*PP.* First antennæ shorter than the second. Gnathopods small. Coxal plates not large.

Apherusa.

Infero-lateral margin of the third abdominal segment serrated. Hand of second gnathopods oval.

*A. gracilis* sp. nov., M.

Infero-lateral margin of third abdominal segment serrated. Eyes very large. Second gnathopods oblong, the palm oblique, the posterior margin nearly straight. Infero-lateral angle of the head produced into a prominent spine.

*A. megalops* Sars, A.

*CC.* First two pairs of peraeopods with spinning glands.

*D.* Terminal uropods uniramous.

*E.* Mandibular palp one-jointed. . . Siphonæcetes. Head with a long acute rostrum. Eye situated on the lateral lobe of the head which is contracted at the base. Second antennæ longer than the body. Length 6 mm.

*S. cuspidatus* Smith, M.

*EE.* Mandibular palp two-jointed. . . Corophium. Second antennæ enormously developed in the male, the penultimate joint armed with an up-turned tooth at the antero-inferior angle. Second gnathopods simple, the merus joined along the entire posterior margin of the carpus and fringed with very long hairs. Last peraeopods

- very much longer than the preceding pairs.  
Length 4 mm. . . . *C. cylindricum* G (Say), M.
- EEE. Mandibular palp three-jointed. Second gnathopods of the male greatly enlarged, the carpus produced below the propodus with which it forms a sort of chela. Body depressed; coxal plates small.
- F. Last two pairs of uropods uniramous.  
Cerapus.  
Ramus of last two uropods much shorter than the peduncle. Telson short, bilobed. Lives in tubes which are carried about by the animal. . . . . *C. tubularis* Say, M.
- FF. Only the terminal uropods uniramous.  
Erichthonius.  
Carpus of second gnathopods in the male nearly three times as long as broad across the middle, the lower process armed with a tooth near the middle; propodus about half as long as the carpus; dactyl much shorter than the propodus. Length about 4 mm.  
*E. minax* (Smith), M.  
Carpus of second gnathopods in the male much less than three times as long as broad across the middle. Propodus much over half the length of the carpus. Length 7 mm.  
*E. rubricornis* (St.), A. M.
- DD. Terminal uropods biramous.
- E. Propodus of second gnathopods not subchelate.  
Ptilocheirus.  
Hand of first gnathopods widest across the distal end, the palm nearly transverse. Second gnathopods slender, the anterior margin fringed with very long plumose setæ. L. 15 mm. Common. . . . *P. pinguis* St., A. M.
- EE. Propodus of second gnathopods chelate or subchelate.
- F. Terminal uropods with short, hooked rami.
- G. First antennæ with an accessory flagellum.
- H. Hand of the second gnathopods of the male very large and having a thumb-like process arising from near the base of the lower side. Coxal plates small. . . . Jassa.  
Hand of second gnathopods of the

male oblong, longer than the rest of the appendage; thumb long; a tooth at lower end of the palm. First two peræopods with the merus much widened and produced at the antero-distal angle into a large rounded lobe.

*J. marmorata* sp. nov., A. M.

HH. Hand of the second gnathopods of the male not as in *Jassa*.

I. Antennæ rather stout, densely setiferous posteriorly; flagella with few segments. . . . . *Ischyrocerus*.  
 Second gnathopods in the male with a long, slender, basal joint; hand long, narrow, curved, of nearly the same width throughout, the concave posterior margin thickly setose and terminating inferiorly in a stout tooth. Attains 10 mm. . . . . *I. anguipes* Kr., A. M.

II. Antennæ slender, with multiarticulate flagella. . . . . *Grubia*.  
 Coxal plates large. First antennæ as long as the body, the slender flagellum nearly three times as long as the peduncle; secondary flagellum small, not longer than the first two joints of the primary one. Gnathopods in the male elongated and fringed with long plumose hairs. Length 13 mm. . . . . *G. compta* (Smith), M.

GG. First antennæ devoid of a secondary flagellum. . . . . *Amphithæ*.

Second antennæ subpediform; flagellum often shorter than the last joint of the peduncle. Anterior gnathopods with the hand short and stout. Length 18 mm. . . . . *A. rubricata* (Mont.), A. M.

(= *A. manculata* St. and *A. valida* Smith).

Second antennæ with the flagellum generally longer than the last joint of the peduncle. First gnathopods with the carpus and hand narrow and very much elongated; palm very short, transverse; dactyl when closed projecting far beyond the end of the palm. Length 9 mm. Common. Color variable. . . . . *A. longimana* Smith, M.

FF. Terminal uropods with narrow rami devoid of terminal hooks.

G. Second gnathopods much larger than the first. First antennæ with no accessory flagellum. . . . . *Podoceropsis*.

Antennæ subequal. First gnathopods

with the hand narrowly oval, a little shorter and narrower than the carpus; dactyl long, closing against nearly the entire posterior margin of the hand. Hand of the second gnathopods stout; palm excavated.

*P. nitida* (St.) A. M.

(= *Xenoclea megacheir* Smith).

GG. First gnathopods much larger than the second. First antennæ with an accessory flagellum.

H. Second gnathopods in the male complexly subchelate. Microdeutopus. First gnathopods of the male with the carpus very stout, the inferior lobe armed with three or four stout teeth; propodus about half as long as the carpus, the lower margin furnished with two blunt teeth.

*M. gryllotalpa* Costa. A. M.

First gnathopods in the male with the carpus elongated, the inferior lobe narrowly triangular, acute, with a small tooth near the base of the outer margin; propodus with a low prominence along the distal portion of the lower margin.

*M. danmonensis* (Bate), A. M.

III. Second gnathopods of the males simply subchelate. Autonæ.

First gnathopods of the male stout; hand broadly subovate. Hand of second gnathopods a little longer than broad, shorter than the carpus. Last pair of peræopods much longer than the preceding ones. Length 7 mm. *A. smithi* sp. nov., M.

Tribe **Caprellidea.**

Head fused with the first segment of the thorax. Abdomen rudimentary. Second gnathopods larger than the first. Usually gills are present only on the third and fourth segments of the thorax. Anterior pairs of peraeopods usually wanting. No pleopods. Uropods rudimentary or wanting.

The Caprellidea comprise two families, the Caprellidæ and the Cyamidæ, or whale lice.

Family **Caprellidæ.**

Body elongated, cylindrical. First thoracic segment separated from the head by a dorsal depression. Antennæ elongated, the first generally much longer than the second. Posterior peraeopods prehensile.

KEY TO THE SPECIES.

- A. Mandibles with a palp. . . . . *Æginella*.  
 Second gnathopods of the male elongated, the hand produced into a tooth in front of the dactyl; a tooth at the upper end of the palm; a narrow tooth below the middle of the palm which is separated from a broad prominence below by a narrow sinus. Second antennæ scarcely half the length of the first pair. *A. longicornis* (Kr.), A. M. The typical form of this species has the body smooth. In the variety *spinossissima* (*Ægina spinossissima* Stimpson) the body is thickly armed with slender spines. Intermediate forms occur which connect the two varieties.
- AA. Mandibles devoid of a palp. . . . . *Caprella*.
- B. Body smooth or nearly so.
  - C. Body with short and thick segments. Head with a horizontally directed spine. . . . . *C. geometrica* Say, M.
  - CC. Segments of the body more or less elongated. Head devoid of a horizontally directed spine.
    - D. Second gnathopods of the male with the basal joint short (very much shorter than the hand).  
 Second gnathopods of the male joined nearly at the posterior end of the segment. A ventral spine between the bases of the second gnathopods. Two first segments of the thorax much elongated in the adult male. . . . . *C. æquilibra* Say, A. M.
    - Second gnathopods of the male joined not so far back although sometimes situated behind the middle of the segment. No ventral spine between the gnathopods.  
*C. septentrionalis* Kr., A.

- DD. Second gnathopods of the male with the basal joint elongated and narrow. Last thoracic segments sometimes with small dorsal elevations. Body slender. . . . . *C. linearis* (Linn.), A.
- BB. Body tuberculated or spiny.  
 Body stout, armed above with large pointed tubercles which in some specimens may become obsolescent. Antennæ short and stout. Second gnathopods of the male with short and broad basal joint; hand ovate or suboval, armed with a large tooth at upper end of the palm, a narrow tooth below the middle separated by a narrow sinus from a prominence below.  
*C. stimpsoni* Bate (*C. robusta* St.), A.