

# CANADIAN ATLANTIC FAUNA

## 10. ARTHROPODA

### 10m. DECAPODA

BY

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WITH FIGURES

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## CANADIAN ATLANTIC FAUNA

### DECAPODA

The Decapoda are the most conspicuous of the Crustacea, being the largest and most varied.

The carapace coalesces dorsally with all the thoracic somites and overhangs on each side, enclosing the branchial chamber in which the gills are concealed. It may be produced in a rostrum, which is often reduced to a short, broad, frontal plate. The thoracic sterna are usually clearly distinguishable. The eyes are prominent, set on movable stalks. The antennules have the three segments of the peduncle always distinct. The first three pairs of thoracic limbs are differentiated from the others as maxillipeds; the remaining five pairs, though typically ambulatory, are in part modified for purposes other than locomotion; usually one or more pairs are chelate.

The Decapoda occur from the shore to deep water; many are pelagic. They frequent all sorts of bottom and are often commensal with other animals.

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## KEY TO THE GENERA

1. (28) Body usually compressed. Legs generally slender, basis and ischium never fused, only one fixed point in the carpo-propodal articulation. Abdominal limbs 1-5 present, used for swimming. (NATANTIA—shrimp-like Crustacea).
2. (3) Second maxillipeds normal. **PASIPHAEA.** (p. 5).
3. (2) Second maxillipeds with short seventh article, usually applied as a strip to end of sixth.
4. (7) Mandibles imperfectly cleft. Exopods usually present on all or some legs. First two pairs of legs substantially similar, of moderate size, chelate, wrist undivided.
5. (6) Endopod of first maxilliped three-segmented. Body compressed, abdomen carinate. (Fig. 2). **ACANTHEPHYRA.** (p. 6).
6. (5) Endopod of first maxilliped two-segmented. Body cylindrical, abdomen not carinate. (Fig. 3). **HYMENODORA.** (p. 6).
7. (4) Mandibles deeply cleft or simple. Exopods nearly always absent from legs. First two pairs of legs more or less unlike.
8. (19) First legs not subchelate. Mandibles rarely simple. Basis at least of second maxillae well developed.
9. (12) First two pairs of legs slender. (Figs. 4-7).
10. (11) No exopod on outer maxilliped. **PANDALUS.** (p. 7).
11. (10) An exopod on outer maxilliped. **DICHELOPANDALUS.** (p. 9).
12. (9) First two pairs of legs not both slender.
13. (18) Second wrist subdivided.
14. (15) Second wrist divided into seven segments. (Figs. 8-20). **SPIRINTOCARIS.** (p. 10).
15. (14) Second wrist divided into fewer than seven segments.
16. (17) Second wrist divided into three segments (Fig. 22c). **LATREUTES.** (p. 18).
17. (16) Second wrist divided into two segments. (Fig. 21). **CARIDION.** (p. 18).
18. (13) Second wrist undivided. (Fig. 23). **PALAEONETES.** (p. 19).
19. (8) First legs often subchelate. Mandibles simple. Inner lobes of second maxillae reduced.
20. (27) Second legs chelate.
21. (26) Fourth and fifth legs with terminal article not dilated, not natatorial.
22. (25) Second legs subequal in length to rest.
23. (24) Carapace without strong sculpture. (Fig. 24). **CRAGO.** (p. 20).
24. (23) Carapace with very strong sculpture. (Fig. 25). **SCLEROCRANGON.** (p. 20).
25. (22) Second legs much shorter than rest. (Fig. 26). **PONTOPHILUS.** (p. 21).
26. (21) Fourth and fifth legs with terminal article dilated, natatorial. **ARGIS.** (p. 21).
27. (20) Second legs simple, non-chelate. (Fig. 29). **SABINEA.** (p. 22).
28. (1) Body generally depressed. Legs strong, basis and ischium almost always fused in first pair, generally in the others, two fixed points in the carpo-propodal articulation. Abdominal limbs 1-5 often reduced or absent, not used for swimming. (REPTANTIA—lobster- and crab-like Crustacea).
29. (30) Third legs like first, either chelate or simple and cylindrical. (Fig. 30). **HOMARUS.** (p. 23).

30. (29) Third legs unlike first, never chelate.
31. (42) Carapace not fused with epistome. Abdomen anomurous, that is, showing traces of some function other than that of reproduction, or macrurous.
32. (37) Abdomen symmetrical, sixth limbs adapted for swimming.
33. (34) Body depressed. Abdomen bent, a transverse suture on telson. (Fig. 31).  
**MUNIDOPSIS.** (p. 24).
34. (33) Body not depressed. Abdomen straight, no transverse suture on telson.
35. (36) No suture on exopod of last limb. (Fig. 32). **AXIUS.** (p. 25).
36. (35) A suture on exopod of last limb. (Fig. 33). **CALOCARIS.** (p. 25).
37. (32) Abdomen asymmetrical, sixth abdominal limbs when present adapted for holding the body in hollow objects. (Figs. 34, 38)
38. (41) Abdomen soft and twisted, sixth limb present. Carapace firm before, soft behind, rostrum reduced.
39. (40) No paired appendages except uropods on abdomen of either sex. Exopods of all maxillipeds flagellate. **PAGURUS.** (p. 26).
40. (39) Paired appendages other than uropods on first and second segments of male. Exopods of first maxillipeds non-flagellate. **PARAPAGURUS.** (p. 28).
41. (38) Abdomen bent under thorax. Bodycrab-like, carapace firm all over, rostrum spiniform. (Fig. 39). **LITHODES.** (p. 29).
42. (31) Carapace fused with epistome at least at sides. Abdomen brachyurous, small, straight, symmetrical, bent under thorax, and without biramous limbs on sixth segment.
43. (58) Fore part of body broad, rostrum reduced or wanting.
44. (57) Palp of outer maxilliped articulating at or near antero-internal angle of merus.
45. (50) Legs distinctly adapted for swimming. (Figs. 40-42).
46. (49) Carapace with a long lateral spine. (Fig. 41).
47. (48) Abdomen of male triangular. **PORTUNUS.** (p. 30).
48. (47) Abdomen of male  $\perp$ -shaped. **CALLINECTES.** (p. 30).
49. (46) Carapace without a long lateral spine. (Fig. 42). **OVALIPES.** (p. 31).
50. (45) Legs not adapted for swimming.
51. (52) Antennules fold lengthwise. **CANCER.** (p. 32).
52. (51) Antennules fold obliquely.
53. (56) First and second lateral teeth coalesced. Eyes fitting closely in orbits. (Fig. 46).
54. (55) Carapace subhexagonal, front arcuate. **NEOPANOPE.** (p. 33).
55. (54) Carapace squarish, broad behind, front truncate. **RHITHROPANOPEUS.** (p. 24).
56. (53) First and second lateral teeth not coalesced. Orbits large, open below. (Fig. 47).  
**GERYON.** (p. 34).
57. (44) Palp of outer maxilliped not articulating at or near antero-internal angle of merus.  
**PLANES.** (p. 35).
58. (43) Fore part of body narrow, forming a distinct rostrum.
59. (62) Supraocular eave not in close contact with postocular process.
60. (61) Carapace about as long as broad. Chelipeds much shorter than ambulatory legs. (Fig. 49). **CHIONOECETES.** (p. 36).
61. (60) Carapace much longer than broad, rostrum elongate. (Fig. 50). **HYAS.** (p. 36).
62. (59) Supraocular eave in close contact with postocular process. Rostrum involute. (Fig. 53). **LIBINIA.** (p. 38).

NOTE.—The numbers placed after the specific names in the text refer to the numbered articles in the list of literature. Those in heavy type refer to articles containing descriptions or figures of the species.

## PASIPHAEIDAE

Rostrum short or wanting, often represented by a postfrontal (gastric) tooth or spine. Mandibles lacking molar process, consisting of incisor process alone, with or without palp of one or two segments. Exopodites present on all thoracic legs and on third or external maxillipeds, rudimentary or wanting on second maxillipeds but often forming chief part of first maxillipeds. First two pairs of legs similar, ending in elongate chelae with long, slender fingers, and stouter than remaining three pairs, which are undersized and imperfectly formed.

Genus **PASIPHAEA** Savigny.

Body strongly compressed. Rostrum wanting, represented by a postfrontal gastric spine or tooth. Frontal margin of carapace with orbits but slightly excavate and imperfectly defined. Mandibles without palp.

**P. multidentata** Esmark. 12. (*P. tarda* G. O. Sars not Kröyer.) (Fig. 1).

Postfrontal gastric spine cuneiform, ascendent, projecting. Telson forked.

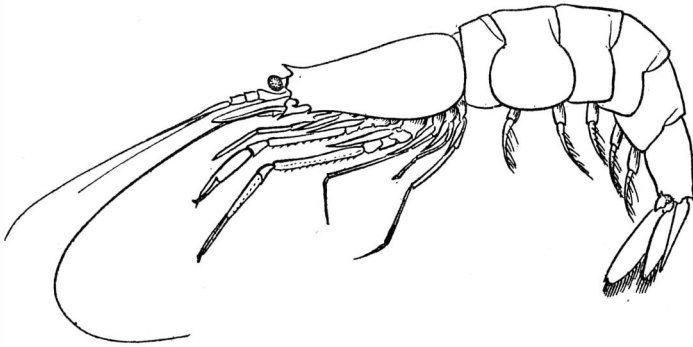


Fig. 1. *Pasiphaea multidentata* Esmark, from the side. (after Smith).

A long spine on scaphocerite. Base of second pereopod with 7 to 12 spines. Almost colourless. Length 53 to 110 mm.

Depth 100 to 525 fathoms. Cape Breton Island to Marthas Vineyard, Massachusetts; northwestern Europe.

## OPLOPHORIDAE (Hoplophoridae)

Rostrum moderately or well developed. Mandible with stout, three-jointed palp and with incisor and molar process distinct but almost confluent; molar

process small. Eight pairs of thoracic appendages with well developed exopodites. First two pairs of legs ending in small but well formed chelae; last three pairs of moderate length, subequal.

Genus **ACANTHEPHYRA** Milne Edwards.

Body compressed. Rostrum rarely short, usually long; armed with teeth above and below. Endopodite of first maxillipeds composed of three segments; two inner distal lobes of second maxilla narrow and projecting beyond basal lobe. Abdomen more or less carinate; carinae of some segments ending posteriorly in a tooth or spine. Eggs small and numerous.

**A. purpurea** A. Milne Edwards 13, 14, 15. (*A. agassizii* Smith). (Fig. 2).

Rostrum armed dorsally throughout its length, formula  $\frac{5-11}{3-7}$ . Eyes wider than eyestalks. Carapace and first abdominal somite not carinate dorsally; sixth

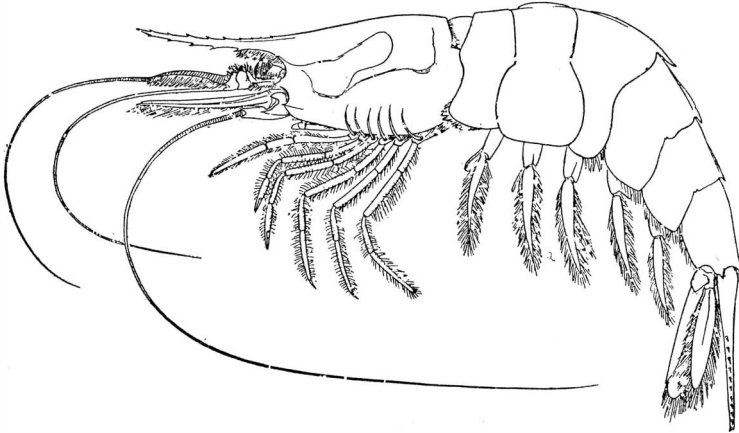


Fig. 2. *Acantheephyra purpurea* A. Milne Edwards, ♂, from the side. (after Smith).

somite carinate. Branchiostegal spine prominent and buttressed by an evident carina. Colour brilliant scarlet lake tending to carmine about hepatic region, fringes of setae more vermilion. Length 40 to 120 mm.

Depth 105 to 2949 fathoms. Iceland and Davis Strait to Caribbean Sea; east and south Atlantic; southern Europe; Indian and Pacific Oceans.

Genus **HYMENODORA** Sars.

Body almost cylindrical; carapace compressed only in dorsal part, forming a sharp, high, median keel. Rostrum usually short, rarely long, armed with teeth above only. Endopodite of first maxillipeds composed of only two segments; two inner distal lobes of second maxilla rather broad and not projecting beyond basal lobe. Abdomen not carinate. Eggs usually of considerable size.

**H. glacialis** (Buchholz). 8, 11, 15. (Fig. 3).

Carapace arcuate, dorsal carina having 4 to 6 small teeth partly on rostrum;

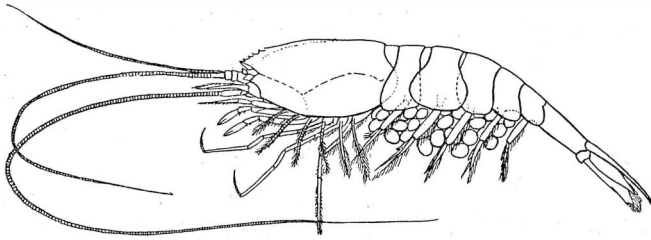


Fig. 3. *Hymenodora glacialis* (Buchholz), ovigerous ♀, from the side. (after G. O. Sars).

rostrum very short, pointed. Eyes subconical, opaque white. Antennular peduncle short, basal article largest, outer flagellum longer and stouter than inner. Antennal scale one-third longer than antennular peduncle, broadest in middle, outer margin ending in a tooth, flagellum more than twice length of body. Two pairs of chelipeds alike, dactyls shorter than palm. Dactyls of next two pairs long, tapering; of last pair linear, densely clothed with hair. Telson dilated at tip which is armed with 7 spines, the two outer ones very long and divergent. Colour blood red. Length 40 to 83 mm.

Depth 137 to 2949 fathoms. Newfoundland Banks to Virginia; Greenland, western Europe and Africa, Spitzbergen, Pacific coast of America.

## PANDALIDAE

Rostrum laterally compressed, long, armed with teeth or spines. Mandibles with incisor process and palp of two or three segments. First pair of legs slender, usually simple, but often only apparently so, being microscopically chelate. Second pair long, slender, chelate, carpus segmented.

Genus **PANDALUS** Leach.

Rostrum long, prominent, armed above with spines in great part movable, below with fixed rigid teeth; rostrum continued back on carapace as a median dorsal carina. Antennules not longer than carapace. Mandible with three-jointed palp. External maxillipeds without exopodite. Legs of second pair unequal, carpus much segmented.

Synopsis of species:

1. (2) Third and fourth segments of abdomen armed with a median spine. Carpus of right leg of second pair with about 25 annulations. (Fig. 4). **P. borealis**.
2. (1) Third and fourth segments of abdomen without spine.
3. (4) Carpus of right leg of second pair with about 5 annulations. Antennal scale narrow, spine extending well beyond blade. (Fig. 6). **P. propinquus**.
4. (3) Carpus of right leg of second pair with about 20 annulations. Antennal scale of good width, spine reaching about to end of blade. (Fig. 5). **P. montagui**.



**P. borealis** Kröyer. 8, 10, 12. (Fig. 4).

Rostrum about one and three-fourths times as long as carapace, slightly arched above eyes, terminal half slightly ascending; slender, armed with  $\frac{12-16}{6-9}$  spines of which 3 or 4 are on carapace; all but the most anterior (1-3) of the

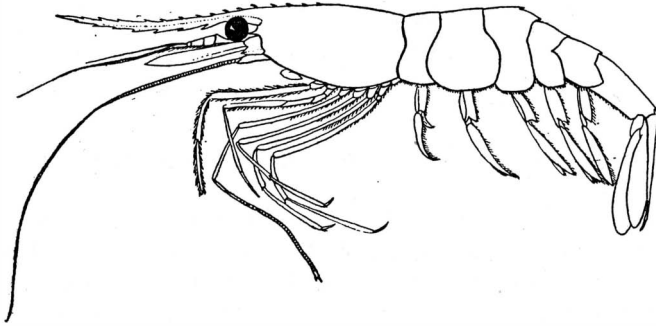


Fig. 4. *Pandalus borealis* Kröyer, from the side. (after Kröyer).

superior spines are movable; tip bifid; posterior of dorsal spines lies between middle and anterior third of carapace; anterior spine at least as far forward as distal third of rostrum. Blade of antennal scale exceeds spine and is narrowly separated from it. Carpus of

left second leg with about 58 annulations. Third segment of abdomen in part compressed and carinated forming a short spine or spine-tipped lobe in front of posterior margin. Colour, thickly sprinkled with small red stellate spots, closer on tail; flagella of antennulae banded with narrow white and broad red rings; of antennae deep red. Length from 70 to 135 mm.

Depth 20 to 495 fathoms. Greenland to Cape Cod; circumpolar; Bering Sea to Columbia River; Japan; northern Europe.

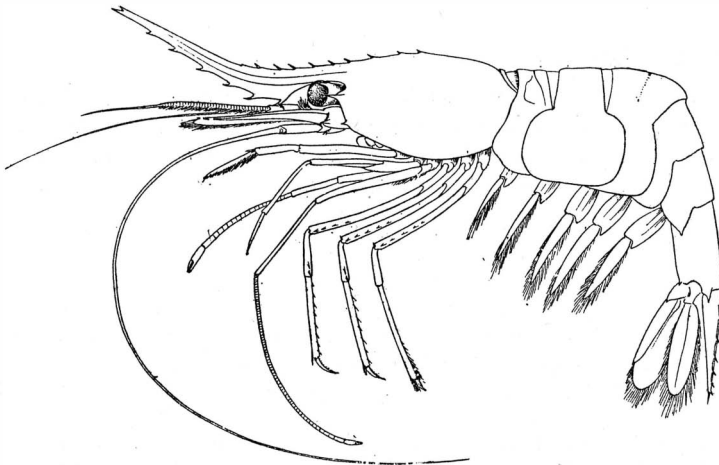
**P. montagui** Leach. 10, 12, 15. (Fig. 5). (*P. annulicornis* Leach, *levigatus* Stimpson).

Fig. 5. *Pandalus montagui* Leach, ♀, from the side. (after Smith).

Rostrum slender, one and two-fifths to one and a half times as long as carapace; distal two-thirds ascending; dorsal spines reach to or in front of middle; tip bifid; spines  $\frac{10-12}{6-7}$ ; dorsal spines movable, 3-5 on carapace. Carpus of left second leg with about 74 annulations. Colour deep red obliquely transverse bars on carapace and abdomen. Length from 50 to 110 mm.

Depth, 3 to 430 fathoms. Greenland to Rhode Island; Iceland; northern Europe.

**P. propinquus** G. O. Sars. 13, 14, 15. (Fig. 6).

Carapace high in middle. Rostrum strongly upturned; spines  $\frac{9-11}{7-8}$ , 3 on carapace, all superior spines movable except one at tip, behind which two-thirds

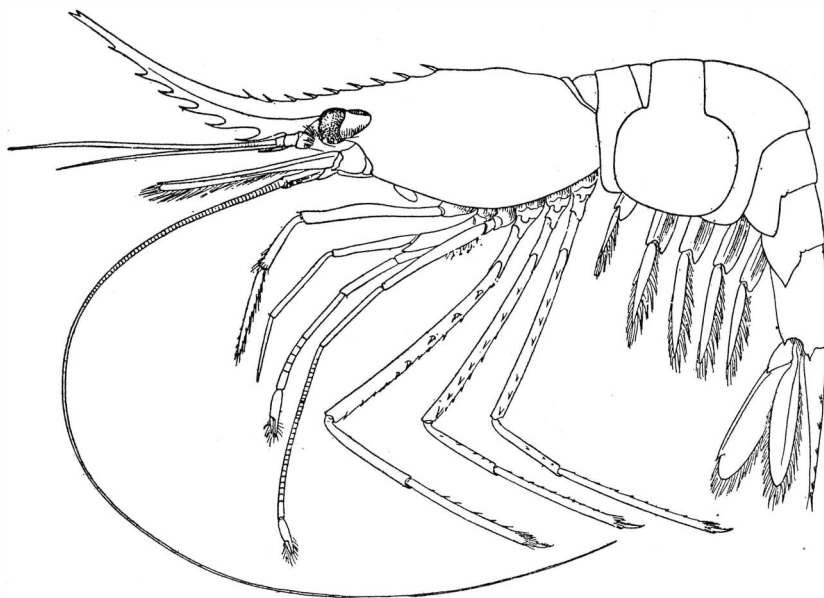


Fig. 6. *Pandalus propinquus* G. O. Sars, ♀, from the side. (after Smith).

of the edge is unarmed; posterior spine at anterior two-fifths of carapace. Antennal scale narrowing rapidly to extremity. Carpus of left second leg with about 29 annulations. Colour, translucent, dorsally bright red, colour not arranged in bands; rostrum yellowish toward apex. Length from 50 to 110 mm.

Depth, 34 to 1089 fathoms. Grand Bank of Newfoundland and southeast of Halifax to Capes of Delaware; Davis Strait; Iceland; northwestern Europe.

Genus **DICHELOPANDALUS** Caullery.

Differs from *Pandalus* in having an exopodite on the external maxillipeds.

**P. borealis** Kröyer. 8, 10, 12. (Fig. 4).

Rostrum about one and three-fourths times as long as carapace, slightly arched above eyes, terminal half slightly ascending; slender, armed with  $\frac{12-16}{6-9}$

spines of which 3 or 4 are on carapace; all but the most anterior (1-3) of the superior spines are movable; tip bifid; posterior of dorsal spines lies between middle and anterior third of carapace; anterior spine at least as far forward as distal third of rostrum.

Blade of antennal scale exceeds spine and is narrowly separated from it. Carpus of

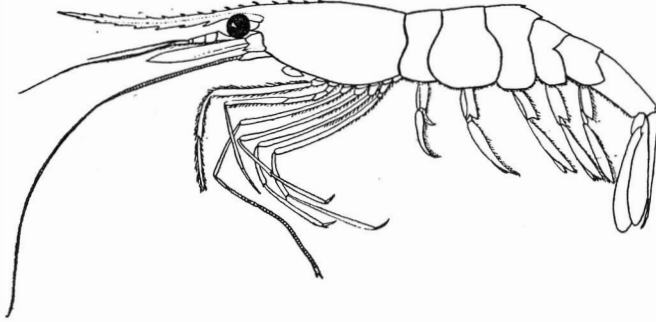


Fig. 4. *Pandalus borealis* Kröyer, from the side. (after Kröyer).

left second leg with about 58 annulations. Third segment of abdomen in part compressed and carinated forming a short spine or spine-tipped lobe in front of posterior margin. Colour, thickly sprinkled with small red stellate spots, closer on tail; flagella of antennulae banded with narrow white and broad red rings; of antennae deep red. Length from 70 to 135 mm.

Depth 20 to 495 fathoms. Greenland to Cape Cod; circumpolar; Bering Sea to Columbia River; Japan; northern Europe.

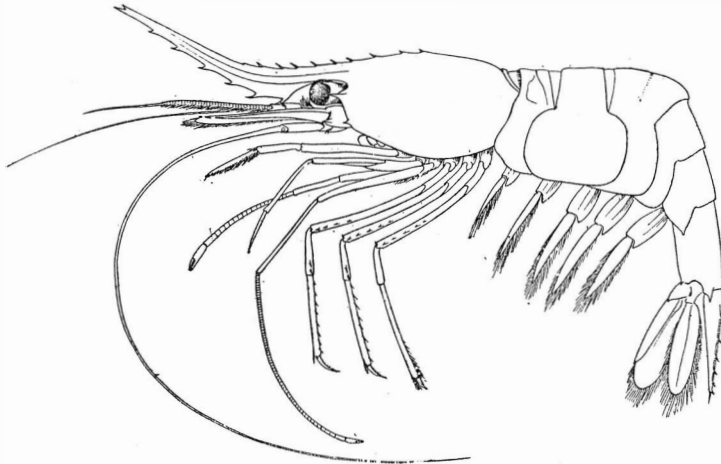
**P. montagui** Leach. 10, 12, 15. (Fig. 5). (*P. annulicornis* Leach, *levigatus* Stimpson).

Fig. 5. *Pandalus montagui* Leach, ♀, from the side. (after Smith).

Rostrum slender, one and two-fifths to one and a half times as long as carapace; distal two-thirds ascending; dorsal spines reach to or in front of middle; tip bifid; spines  $\frac{10-12}{6-7}$ ; dorsal spines movable, 3-5 on carapace. Carpus of left second leg with about 74 annulations. Colour deep red obliquely transverse bars on carapace and abdomen. Length from 50 to 110 mm.

Depth, 3 to 430 fathoms. Greenland to Rhode Island; Iceland; northern Europe.

**P. propinquus** G. O. Sars. 13, 14, 15. (Fig. 6).

Carapace high in middle. Rostrum strongly upturned; spines  $\frac{9-11}{7-8}$ , 3 on carapace, all superior spines movable except one at tip, behind which two-thirds

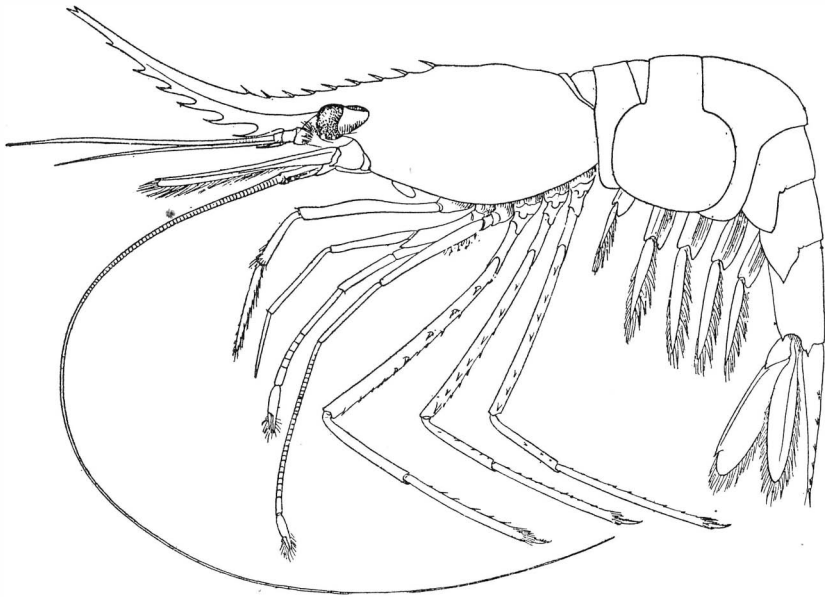


Fig. 6. *Pandalus propinquus* G. O. Sars, ♀, from the side. (after Smith).

of the edge is unarmed; posterior spine at anterior two-fifths of carapace. Antennal scale narrowing rapidly to extremity. Carpus of left second leg with about 29 annulations. Colour, translucent, dorsally bright red, colour not arranged in bands; rostrum yellowish toward apex. Length from 50 to 110 mm.

Depth, 34 to 1089 fathoms. Grand Bank of Newfoundland and southeast of Halifax to Capes of Delaware; Davis Strait; Iceland; northwestern Europe.

Genus **DICHELOPANDALUS** Caullery.

Differs from *Pandalus* in having an exopodite on the external maxillipeds.

**D. leptocerus** (Smith). 8, 13, 14. (Fig. 7).

Rostrum from about one and a third to nearly twice as long as carapace, distal two-thirds curved upward, spines  $\frac{11-13}{6-8}$ ; superior spines movable; usually only two on carapace, posterior one considerably in front of

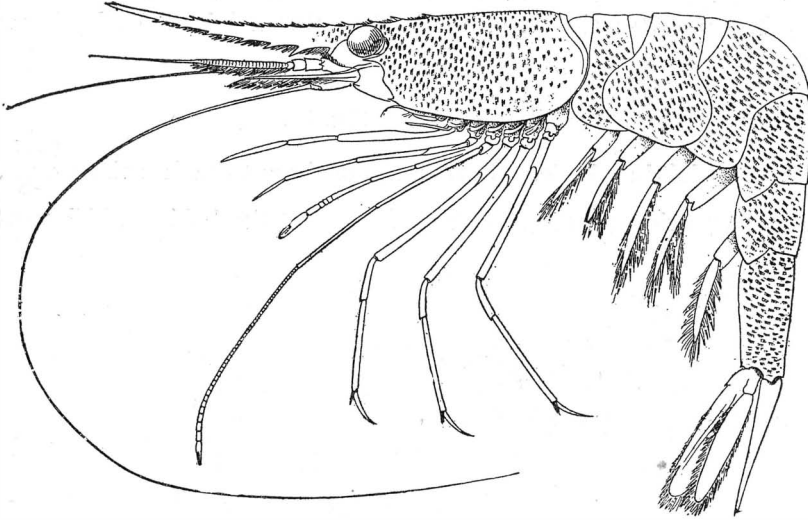


Fig. 7. *Dichelopandalus leptocerus* (Smith), ♀, from the side. (after Smith).

middle; one spine near tip, with a considerable space behind it unarmed. Carpus of left second leg with 52 to 64 segments. Length from 50 to 98 mm.

Depth, 7 to 430 fathoms. Newfoundland Banks to North Carolina; Shumagin Bank, Alaska.

## HIPPOLYTIDAE

Rostrum toothed, laterally compressed, usually well developed, sometimes much reduced. First pair of legs chelate, moderately stout, stouter and usually shorter than second pair. Second pair chelate, slender, equal, carpus segmented.

Genus **SPIRONTOCARIS** Bate. (*Hetairus* Bate).

Carpus of second pair of legs consisting of seven segments; mandible with incisor process and palp of two articles.

### Synopsis of species:

1. (14) One or more supra-orbital spines present.
2. (9) One supra-orbital spine.
3. (4) First and second abdominal segments laterally armed with slender spines. (Fig. 8).  
**S. groenlandica.**

4. (3) First three abdominal segments laterally rounded, unarmed.
5. (6) Rostrum as long as antennular peduncle, in young exceeding first segment and usually second. (Fig. 9). **S. polaris.**
6. (5) Rostrum not exceeding first segment of antennular peduncle.
7. (8) Rostrum unarmed below. Size small. (Fig. 10). **S. microceros.**
8. (7) Rostrum with a subterminal spine below. Size larger. (Fig. 11). **S. zebra.**
9. (2) Two supra-orbital spines.
10. (11) Dorsal spines not reaching posterior third of carapace. (Fig. 12). **S. phippisii.**
11. (10) Dorsal spines continued to or onto posterior third of carapace.
12. (13) Midrib of rostrum prominent, terminating in a spine projecting well beyond lower limb of rostrum. (Fig. 13). **S. liljeborgii.**
13. (12) Midrib very prominent, terminating in a spine which does not project beyond lower limb of rostrum. (Fig. 14). **S. spina.**
14. (1) No supra-orbital spines.
15. (20) Rostrum about as long as or longer than rest of carapace, extending forward beyond anterior margin of carapace by more than twice length of eyestalk.
16. (17) Terminal half (at least) devoid of spines above. No superior rostral spine in front of eye. (Fig. 15). **S. fabricii.**
17. (16) Terminal half of rostrum with spines (in part at least). (Fig. 16.)
18. (19) Rostrum not exceeding acicle. **S. gaimardii.**
19. (18) Rostrum exceeding acicle. **S. gaimardii belcheri.**
20. (15) Rostrum shorter than rest of carapace.
21. (22) Upper and lower limbs of rostrum deep, both convex. Rostrum about twice as long as eye. (Fig. 18). **S. macilenta.**
22. (21) Upper and lower limbs not both convex; usually no spines on lower margin. Rostrum scarcely if at all longer than eye.
23. (24) Rostrum not reaching second segment of antennular peduncle; armed with 2 to 5 (usually 3 or 4) spines above. (Fig. 19). **S. pusiola.**
24. (23) Rostrum reaching second segment of antennular peduncle; armed with 7 to 9 teeth above. (Fig. 20). **S. stoneyi.**

**S. groenlandica** (J. C. Fabricius). 4, 6, 8, 12. (Fig. 8). (*aculeata* O. Fabricius).

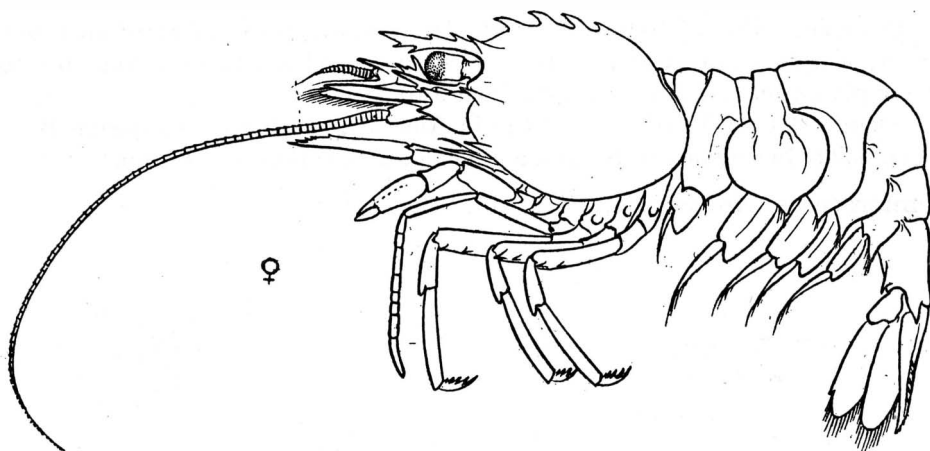


Fig. 8. *Spirontocaris groenlandica* (J. C. Fabricius), ♀, from the side. (after Smith).

Dorsal carina reaching to posterior margin of carapace, armed with four large spines. Rostrum slender, nearly horizontal, sharp pointed, spines  $\frac{2-3}{2-3}$ . One large and usually one or two smaller spines on lateral margin of abdominal segments 1 to 6. Six to seven pairs of spinules on telson. Colour usually brownish red but may show all stages to dull brownish green. Length from 22 to 85 mm.

Depth, 1 to 117 fathoms. Greenland to Rhode Island; Arctic America; Bering Sea to Puget Sound and Okhotsk Sea; Norway.

**S. polaris** (Sabine). 4, 6, 8, 12. (Fig. 9). (*Helairus tenuis*, *debilis* and *gairmardii* Bate, *Hippolite polaris* Ross, *Hippolyte projecta* Bate ♂).

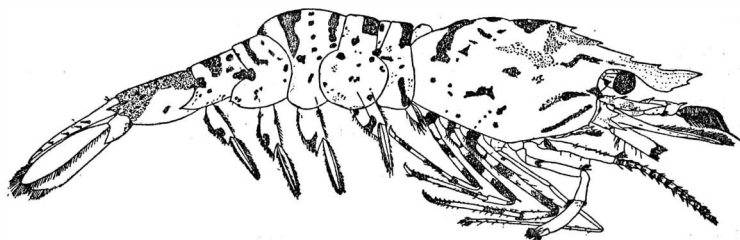


Fig. 9. *Spirontocaris polaris* (Sabine), ♀, from the side, showing colour pattern. (after Leim).

Dorsal carina not reaching posterior margin of carapace; spines when present are on anterior third of carapace and small as on rostrum, usually about three. Rostrum horizontal or slightly upturned, lower limb typically deepest in middle, margin arcuate; a variation with slender rostrum lacks superior spines and lower limb is reduced in length and depth; spines  $\frac{0-8}{1-5}$ . Abdominal segments 1 to 4 with lateral margins rounded, 4 and 6 armed with a spinule, 5 with a spine. From 7 to 9 pairs of spinules on telson; proximal third unarmed. Colour, scattered orange red areas over carapace and abdomen, colour due to closely placed minute dots. Length from 9 to 58 mm.

Depth, 3 to 283 fathoms. Atlantic America, south to Chesapeake Bay; circumpolar; Bering Sea to Kadiak and Okhotsk Sea; northern Europe.

**S. microceros** (Kröyer). 4. (Fig. 10).

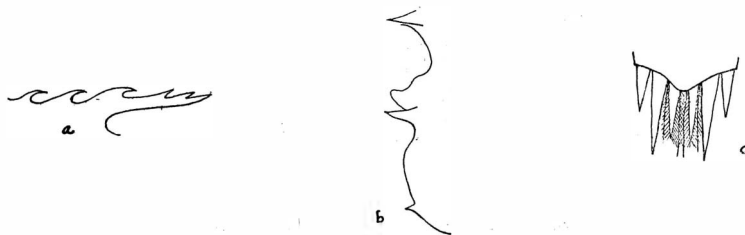


Fig. 10. *Spirontocaris microceros* (Kröyer). (after Kröyer). (a) Rostrum from the side. (b) Anterior margin of left side of carapace. (c) Extremity of telson, from above.

Rostrum very short, not overreaching eye, horizontal, awl-shaped; spines  $\frac{5}{0}$ ; two of these on carapace. Supraorbital spine very strong. Antennules of male unusually long, equal to half body length, of female scarcely one-third body length. Outer maxillipeds extend to apex of acicle. Four pairs of dorsal spinules on telson. Length from 10 to 21 mm.

Southern Greenland; Misaine Bank, off Cape Breton Island, 45 fathoms.

**S. zebra** Leim. 6. (Fig. 11).

Carapace high, rostrum inclined downward, exceeding eyes, spines  $\frac{4-5}{1}$ , two of these on carapace; inferior spine near tip giving it a bifid look. Colour, banded dorso-ventrally with bright brownish red to orange; intermediate areas bluish on carapace, whitish on abdomen. Length from 32 to 49 mm. Perhaps not distinct from *S. microceros*.

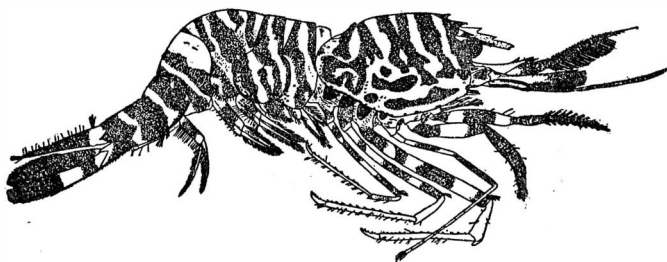


Fig. 11. *Spirontocaris zebra* Leim, ♀, from the side, showing colour pattern. (after Leim).

Depth, 10 to 30 metres. New Brunswick; Nova Scotia.

**S. phippisii** (Kröyer). 4, 6, 8, 12. (Fig. 12). (*Hippolyte turgida* Kröyer, *H. vibrans* Stimpson).

Female.—Rostral formula  $\frac{7-12}{4-7}$ , 4 or 5 spines on carapace; midrib slightly inclined upward, nearly straight; upper limb diminishing gradually toward tip; lower limb deeper, triangular, spines on distal half; tip acute, a little beyond peduncle of antennula. Antennular scale reaches end or nearly end of second segment of peduncle; second and third segments very short. Antennal peduncle falls short of middle of scale; scale short and broad, subequal in length to rostrum.

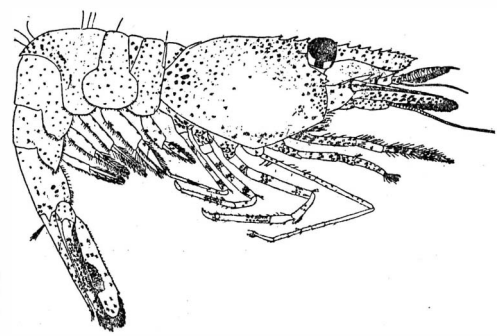


Fig. 12. *Spirontocaris phippisii* (Kröyer), ♀, from the side, showing colour pattern. (after Leim).

Male.—Rostrum horizontal or



deflexed, very slender, spines small, appressed. Peduncle of antennulae more elongate than in female, basal scale extending to middle of second segment.

Colour semi-translucent, specked and irregularly mottled with obscure brownish-red on carapace and appendages. Length 11.5 to 37.5 mm.

From 5 to 125 fathoms. Atlantic coast of America southward to Cape Cod; circumpolar; Bering Sea to British Columbia; northern Europe.

**S. liljeborgii** (Danielssen). 8, 12, 15. (Fig. 13). (*Hippolyte securifrons* Norman).

Carapace armed for two-thirds its length with about five large denticulate

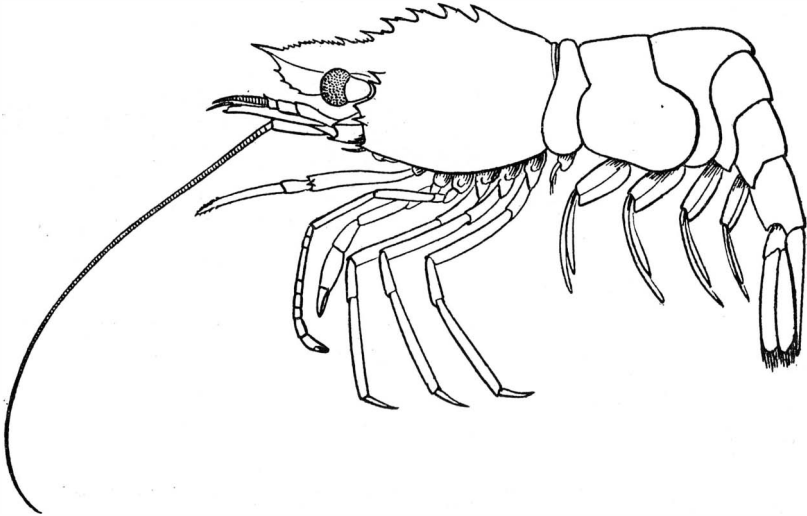


Fig. 13. *Spirontocaris liljeborgii* (Danielssen), ♀, from the side. (after Smith).

spines. Rostrum ascending to a long point, reaching about as far as antennal acicle; upper and lower limbs deep, margins arcuate, upper margin armed with many small spines, lower with about four.

Dactyls of ambulatory legs four or more times as long as wide at base, tip simple, ventral spinules weak. Lateral margins of first three abdominal segments broadly rounded, of next three segments acutely pointed. Colour, brilliant crimson spotted with canary yellow. Length from 40 to 55 mm.

Depth, 8.5 to 452 fathoms. Ungava to Delaware Bay; Arctic Alaska, northern Europe.



Fig. 14. *Spirontocaris spina* (Sowerby). Carapace of ♀, from the side. (after M. J. Rathbun).

**S. spina** (Sowerby). 4, 6, 8, 12. (Fig. 14). (*Hippolyte sowerbaei* Leach).

Carapace carinate and dentate for nearly whole length. Rostrum short—much shorter usually than carapace, twice as long as eyestalks, not exceed-

ing acicle,—high, truncate or apex with lunate incision; teeth of lower margin small, upper margin usually with two larger and many smaller serrulate spines not counting four to six large spines on carapace. Formula  $\frac{9-33}{2-5}$  (average 18-20 above). Of the supraorbital spines one is larger and behind and above the other. Antennules in female equal to a fifth, in male to a third length of body; basal spine very long, equal to peduncle. Outer maxillipeds reach apex of antennal acicle. Dactyls of ambulatory legs two and a half or three times as long as wide at base, tip biunguiculate, ventral spinules prominent. Third abdominal segment bluntly carinate, ending posteriorly in a hooked spine produced above fourth segment. Colour, usually translucent and thickly mottled and spotted with bright red, brownish red and white. Length from 19 to 59 mm.

Depth, 5 to 255 fathoms. Atlantic America southward to Marthas Vineyard; circumpolar; Bering Strait to Alaska Peninsula; northern Europe.

**S. fabricii** (Kröyer). 4, 6, 12. (Fig. 15).

Rostrum rather large, extending to apex of acicle and to tip of antennal flagellum and exceeding rest of carapace but little; unarmed for greater part

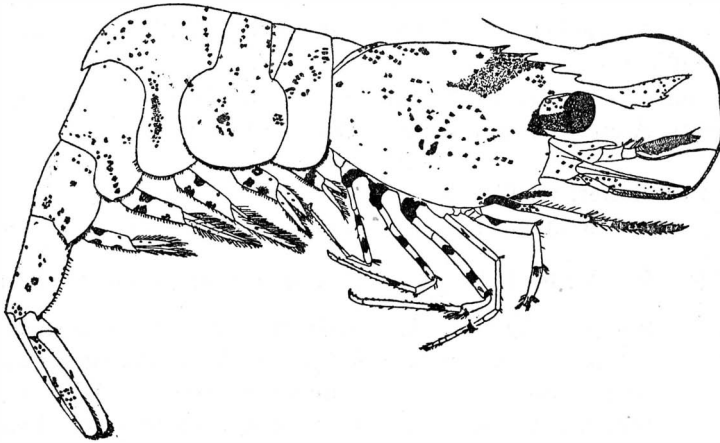


Fig. 15. *Spirontocaris fabricii* (Kröyer), ♀, from the side, showing colour pattern. (after Leim).

above, dorsal spines all or nearly all on carapace proper; formula  $\frac{2-6}{1-5}$ , 0-2 on rostrum. Acicle exceeds apex of outer maxillipeds. Four pairs of dorsal spinules on telson. Colour white ground spotted with deep bright red. Length from 19 to 53 mm.

Low water to 125 fathoms. Greenland to Cape Cod and Arctic Alaska, thence through Bering Sea to Siberia and British Columbia.

**S. gaimardii** (Milne Edwards). 4, 6, 12. (Fig. 16). (*Hippolyte gibba* Kröyer ♂).

Rostrum shorter than antennal scale, scarcely if at all longer than carapace; horizontal in male, upturned in female, bladelike; formula  $\frac{5-10}{2-7}$ , usually  $\frac{6-8}{2-4}$ ,

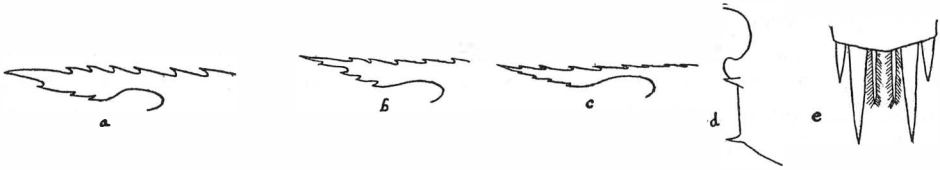


Fig. 16. *Spirolocaris gaimardii* (Milne Edwards). (after Kröyer). (a) and (b) Rostra of ♀♀, from the side. (c) Rostrum of ♂, from the side. (d) Anterior margin of left side of carapace. (e) Extremity of telson from above.

2-3 on carapace. Antennules in female scarcely one-fourth length of body, exceeding tip of acicle; in male longer, the thickened portion of outer flagellum exceeding acicle. Acicle broad, about four-fifths as long as carapace. Outer maxillipeds do not reach apex of acicle. Third abdominal segment compressed, without a backward projecting lobe in female, but with an angular lobe or, in the old, a hooked spine in male. Colour, translucent slightly tinged with greenish-brown. Length from 15 to 85 mm.

Depth, near low water to 89 fathoms. Arctic Ocean to Boston Harbour, Massachusetts; Arctic Alaska; northern Europe; Iceland.

**S. gaimardii belcheri** (Bell). 8. (Fig. 17).



Fig. 17. *Spirolocaris gaimardii belcheri* (Bell), ♀, middle of abdomen from left side. (after unpublished drawing by Smith).

Rostrum longer than carapace, anterior half ascending in female; formula  $\frac{8-12}{3-5}$ , 2 to 4 spines on carapace. In male, 8 or 9 superior spines. In female, third abdominal segment laterally compressed in its posterior part forming an angular median lobe seen in profile above extremity; in male, this lobe is more prominent, hooked and pointed; young without lobe. Length, from 27 to 85 mm.

Depth, 3.5 to 75 fathoms. Greenland to Labrador and Arctic Alaska and Siberia, thence south to Sitka; Kara Sea and Nova Zembla.

**S. macilenta** (Kröyer). 4, 6, 12. (Fig. 18).

Body and appendages slender. Rostrum scarcely reaches tip of peduncle of antennules, ascending, upper and lower limbs thin, dorsal edge

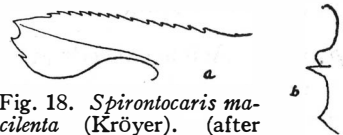


Fig. 18. *Spirolocaris macilenta* (Kröyer). (after Kröyer). (a) Rostrum, from the side. (b) Anterior margin of left side of carapace.

strongly arcuate and serrate with minute spines, anterior portion expanded below, armed near tip; rostral formula  $\frac{9-16}{1-4}$ , 0-3 spines on carapace. Antennal flagellum considerably longer than body. Telson very slender, three pairs of dorsal spines, terminal spines 6. Length from 21 to 68 mm.

Depth, 15 to 110 fathoms. Arctic and Atlantic coasts of America as far south as Halifax; Bering Sea to Okhotsk Sea.

**S. pusiola** (Kröyer). 4, 6, 8, 12. (Fig. 19).

Rostrum very short, horizontal, spines  $\frac{2-5}{0-1}$ , 1-2 on carapace. Outer flagellum of antennules equalling or exceeding inner. Outer maxilliped overreaching acicula. In male, antennular peduncle and outer maxilliped much longer than in female. Terminal spines of telson normally six. Colour, only a few deep red to orange red spots scattered over whitish background. Length from 9 to 28 mm.

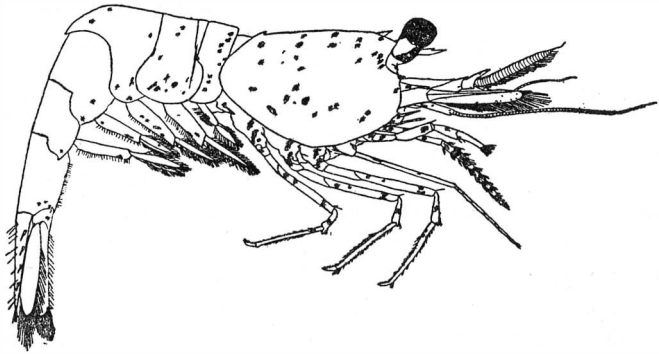


Fig. 19. *Spirotoncaris pusiola* (Kröyer), ♂, from the side, showing colour pattern. (after Leim).

Low water to 159 fathoms. Gulf of St. Lawrence to Chesapeake Bay; Bering Island; southern Alaska to British Columbia; northern Europe; Iceland.

**S. stoneyi** Rathbun. 8. (Fig. 20).

Slender. Rostrum about half as long as rest of carapace, formula  $\frac{7-9}{0-1}$ , no spines above near tip, 1 or 2 on carapace; tip pointed, usually a spine below near tip. Antennular peduncle reaching middle of antennal scale; this scale as long as carapace, spine reaching as far as blade; antennal

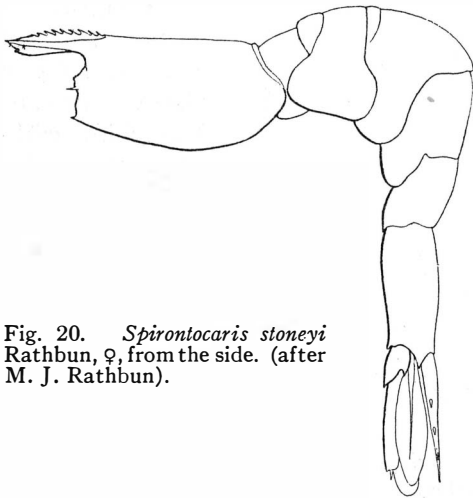


Fig. 20. *Spirotoncaris stoneyi* Rathbun, ♀, from the side. (after M. J. Rathbun).

peduncle reaching a little beyond first segment of antennular peduncle. Maxillipeds very slender. Palm of first pair of legs widening distally, only a little longer than fingers. Sixth abdominal segment over one and a half times as long as fifth and as long as telson. Length, from 13 to 20 mm.

Depth, 7 to 20.5 fathoms. Labrador, at Shoal Tickle, southeast of Nain; Bering Strait and Bering Sea.

Genus **CARIDION** Goës.

Carpus of second pair of legs consisting of two segments. Mandible with palp of three articles. Last article of maxillipeds cylindrical, ciliated, ending in a few spines.

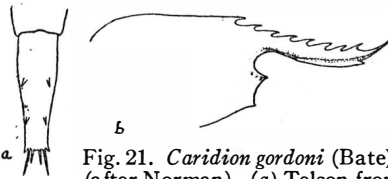


Fig. 21. *Caridion gordonii* (Bate). (after Norman). (a) Telson, from above. (b) Rostrum, from the side.

**C. gordonii** (Bate). 7, 12, 13. (Fig. 21).

Rostrum long, inclined downward to middle and upward toward tip, dental formula  $\frac{7-8}{1}$ , not more than two teeth

behind orbit. Below orbit a tooth on anterior margin of carapace. Antennules considerably exceed antennal scales. First

pair of legs about as long as second, fingers of both elongate, curved; third, fourth and fifth pairs longer and slenderer. Third segment of abdomen not produced behind nor differing from other segments, two pairs of spines on dorsal surface of telson. Colour reddish. Length 19 to 27 mm.

Depth, 20 to 168 fathoms. Bay of Fundy to Chesapeake Bay; northern Europe.

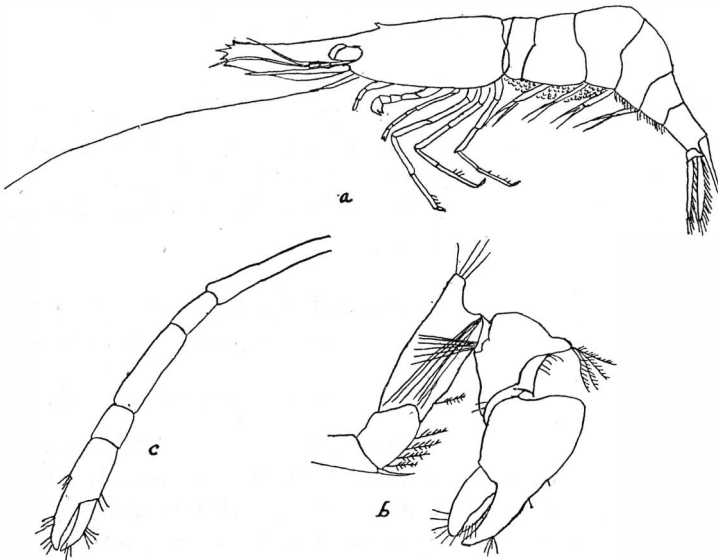


Fig. 22. *Latreutes fucorum* (J. C. Fabricius), ♀. (after Bate). (a) Side view. (b) First leg. (c) Second leg.

Genus **LATREUTES** Stimpson.

Carpus of second pair of legs consisting of three segments. Mandibles without cutting edge or palp. Rostrum more than half length of carapace.

**L. fucorum** (J. C. Fabricius). 3. (Fig. 22). (*L. ensiferus* Milne Edwards).

Body slender, strongly bent in the middle; a median gastric spine; extremity of rostrum serrate; five to eight small spines at antero-lateral angle of carapace. Dactyli of last three pairs of legs biunguiculate. Length 10 to 15 mm.

On Sargasso weed off Nova Scotia; common in the North Atlantic following the Gulf Stream.

## PALAEEMONIDAE

Rostrum well developed, laterally compressed, armed with teeth. Antennules with three flagella, owing to cleavage of one almost or quite to the base. Mandibles with incisor process and with or without palp of three segments. First pair of legs chelate, shorter than second. Second pair equal and chelate, carpus segmented, chelae generally larger than in first pair.

Genus **PALAEEMONETES** Heller.

Rostrum prominently toothed above and below. Carapace furnished with antennal and branchiostegal spine, but without hepatic spine. Mandible without palp.

**P. vulgaris** (Say). 10, 12. (Fig. 23).

Carpus of second leg in female shorter than palm or rarely just about as long as palm, in male as long as palm and about one-third of fingers together.

Rostrum formula  $\frac{8-9}{2-5}$ , 2 dorsal teeth on carapace; last dorsal tooth is almost

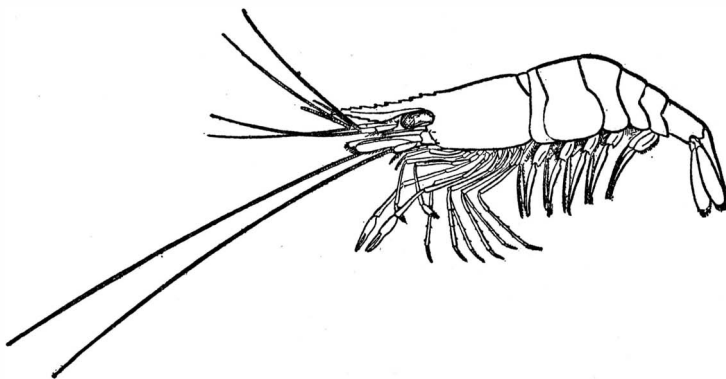


Fig. 23. *Palaemonetes vulgaris* (Say), ♂, from the side. (after Smith).

always as near or nearer tip than penultimate tooth is to last tooth. Colour, whitish, almost pellucid, with a few dark points, eyes dark, peduncles spotted with yellow. Length 18 to 40 mm.

Shallow water. Cape Breton Island; Cape Cod to Florida to Louisiana.

## CRAGONIDAE (Crangonidae of most authors)

Rostrum when present generally small, usually dorsally flattened, without teeth. Eyes free except in *Argis*. Mandibles without incisor or palp. First pair of legs subchelate, stouter than second. Second pair slender, equal, minutely chelate or simple, carpus unsegmented.

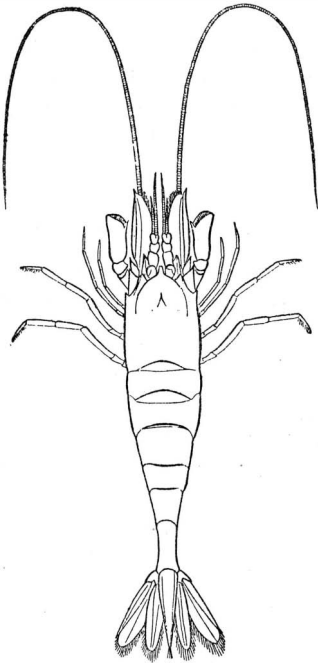


Fig. 24. *Crago septemspinosus* Say, southward to ♂, from above. (after Smith).

Genus **CRAGO** Lamarck.

Rostrum very short, more or less dorsally flattened. Carapace without strong sculpture. Eyes free. Dactyls of fourth and fifth pairs of legs more or less flattened.

**C. septemspinosus** Say. 8, 10, 12. (Fig. 24).

Carapace with one median spine. Blade of antennal scale with anterior margin retreating toward inner angle; spine as long as or longer than distal width of blade. Manus of first pereopod less than three and a half times as long as wide. Fifth and sixth segments of abdomen not carinate, sixth sulcate below. Colour, more or less speckled with gray, imitating closely the colour of sand. Length 40 to 70 mm.

Low-water mark to 50 fathoms. Gulf of St. Lawrence to east Florida; Arctic Alaska to Shumagins.

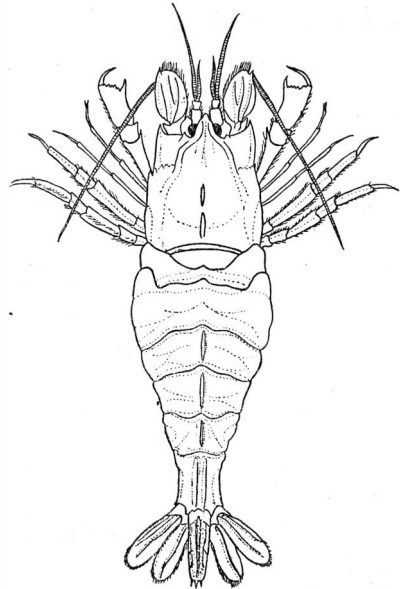


Fig. 25. *Sclerocrangon boreas* (Phipps), from above. (after Milne Edwards).

Genus **SCLEROCRANGON** G. O. Sars.

Body with rough and thickly encrusted integuments. Carapace arcuate above, rostrum with an ax-shaped expansion below. Second pair of legs slender, elongate, hand narrow, fingers very short. Inner lamella of pleopods much shorter than outer.

**S. boreas** (Phipps). 3, 8, 12. (Fig. 25).

Carapace one-fifth longer than wide; three spines on dorsal carina; a tuberculated branchial carina armed with an anterior spine. Rostrum triangular acute, tip horizontal.

Blade of antennal scale produced much beyond spine. Hand twice as long as wide or more. First five abdominal segments with median dorsal carina, sixth with a double carina; pleura with one spine each. Colour bright red, marked with spots of reddish brown. Length 40 to 120 mm.

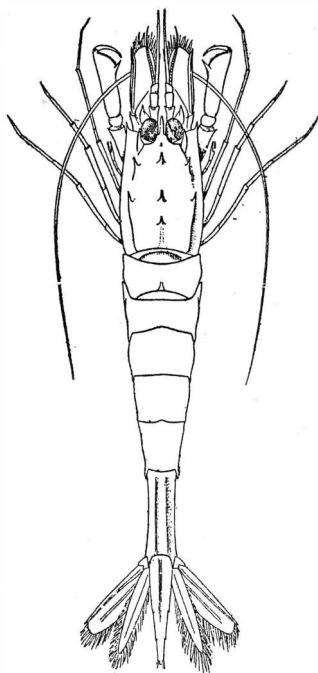


Fig. 26. *Pontophilus norvegicus* (M. Sars), ♀, from above. (after Smith).

Depth 0 to 140 fathoms. Labrador to Cape Cod; east and west Greenland, Arctic Ocean, Arctic Alaska to Aleutians and northeast Siberia.

Genus **PONTOPHILUS** Leach.

Pereiopods of second pair much shorter than the rest, carpus and chela together not longer than merus. Branchiae six or seven; inferior apices turned backwards.

**P. norvegicus** (M. Sars), 12, 13, 15. (Fig. 26).

Rostrum long and narrow, projecting beyond line of spiniform outer angles of orbits, ending in an acute point and armed near middle with a pair of small lateral spinules. Carapace with two lateral keels, upper with two spines, lower with one; three abdominal segments dorsally smooth. Colour, dorsal surface with large and small spots of dark red or rust-colour and occasional yellowish-white dots. Length 40 to 80 mm.

Depth 30 to 500 fathoms. Cape Breton Island to Long Island; Greenland, Iceland, northern and western Europe, Spitzbergen.

Genus **ARGIS** Kröyer. (*Nectocrangon* Brandt).

Rostrum wanting. Eyes nearly concealed by carapace. Dactyls of fourth and fifth pairs of legs dilated, natatorial.

**Argis dentata**

(Rathbun) 8, 12.

(Fig. 27).

Two median spines on carapace, besides the marginal one. A blunt carina runs backward from orbit nearly to posterior margin. Spine of antennal

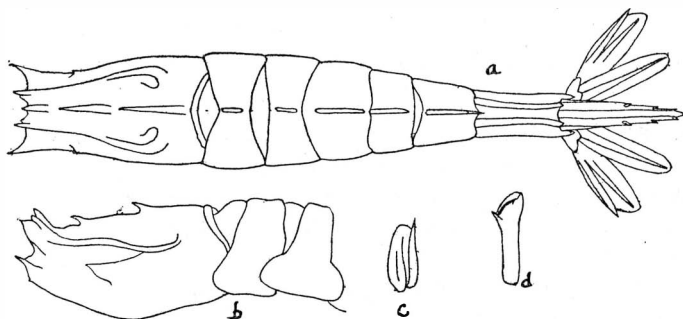


Fig. 27. *Argis dentata* (Rathbun), ♀. (after M. J. Rathbun). (a) From above. (b) From the side. (c) Acicle. (d) Chela.



scale exceeds blade. Hands from three and a half to four times as long as width of palm. A sharp median carina on abdominal segments 1 to 5, two carinae on segment 6, each ending in a small sharp tooth or spine, segments 5 and 6 with a small spine at postero-inferior angles. Length 30 to 120 mm.

Depth 6 to 96 fathoms. Greenland to Nova Scotia; Bering Sea to British Columbia; east Siberia.

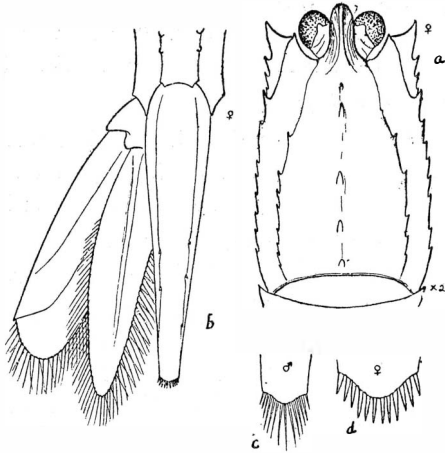


Fig. 28. *Sabinea septemcarinata* (Sabine), from above. (after Smith). (a) Carapace and eyes of ♀. (b) Extremity of abdomen of ♀. (c) Tip of telson of ♂. (d) Tip of telson of ♀.

***S. septemcarinata*** (Sabine). 12. (Fig. 28).

Rostrum short, hardly exceeding eyes, tip obtusely rounded, lateral margins unarmed. Carapace with three denticulated carinae on each side. Abdomen dorsally carinated. Telson subtruncate, armed with eight or more spines or stout setae. Colour, varied red and white above, white below. Length 40 to 72 mm.

Depth, 5 to 133 fathoms. Mouth of the St. Lawrence River to Massachusetts Bay; Arctic Ocean and northern Europe.

***S. sarsii*** Smith. 12, 14, 15. (Fig. 29).

Differs from the preceding as follows: Rostrum reaching beyond eyes, tip acute. Telson acute, one or two spines on each side. Length 30 to 80 mm.

Depth 40 to 388 fathoms. Newfoundland to Gulf of Maine; Davis Strait, Iceland, northern Europe.

Genus **SABINEA** Owen.

Pereiopods of second pair simple, non-chelate. Mandibles without palp.

Synopsis of species:

1. (2) Rostrum obtuse. (Fig. 28). ***S. septemcarinata***.
2. (1) Rostrum acute. (Fig. 29). ***S. sarsii***.

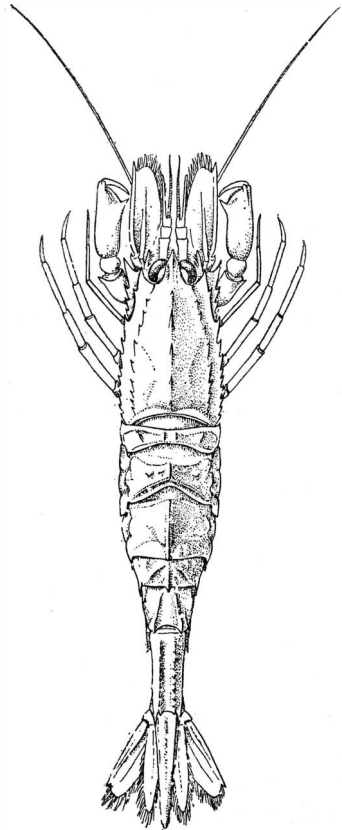


Fig. 29. *Sabinea sarsii* Smith, ♀, from above. (after Smith).

## HOMARIDAE

Carapace subcylindrical, with a pronounced rostrum. Outer antennae with a long multiarticulate flagellum. Segments of pleon dorsally imbricated. Outer branch of uropods with a transverse suture. Epipodal plates large, having a well developed podobranchial plume attached to all trunk-legs except last pair.

Genus **HOMARUS** Weber.

Eyes no wider than eyestalks, subglobose. Antennal scale spinelike, not reaching end of peduncle. First pair of trunk-legs large, robust, markedly unequal.

**H. americanus** Milne Edwards.  
10, 12. (Fig. 30).

Rostrum long, narrow, granulate or slightly spinous above, having on each side two or three large conical teeth or spines and armed below near the point with one or two conical teeth. Hands enormous, broad, swollen, one a little compressed outside, with pincers elongate, compressed and armed with four tubercles on inner border, one or two on lower surface near the preceding and a sixth on upper surface near posterior end of external border; the other hand, rounded everywhere, extremely thick, fingers very short and stout and armed with one more tooth on inner border and one more on lower surface. Colour above dark bluish-green, mottled and speckled with darker spots, merging into dusky yellow or orange on sides of carapace and blades of tail fin; spines of chelipeds and rostrum, margins of chelae, and antennular and antennal flagella red; walking legs clear bluish-green. Length, up to 23.75 inches (60 cm.); weight, up to 34 pounds.

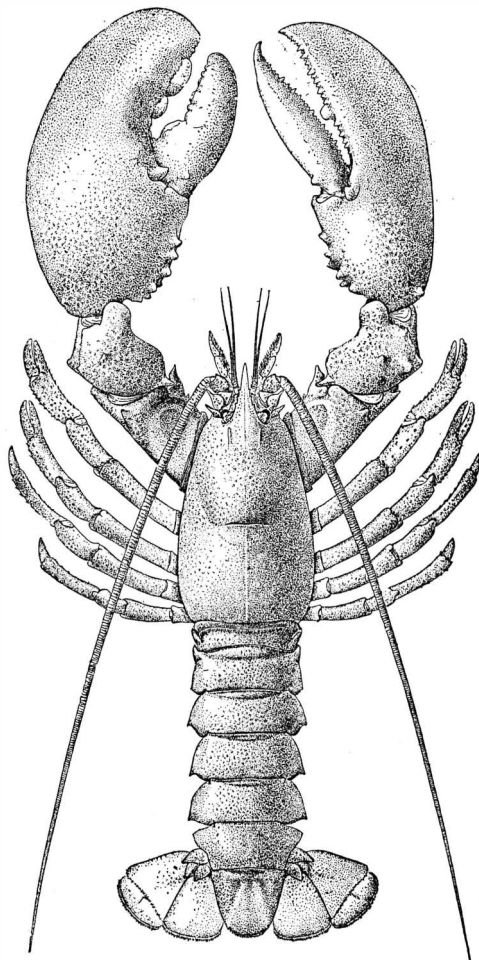


Fig. 30. *Homarus americanus* Milne Edwards, ♂, from above. (after R. Rathbun).

Shallow water to more than 100 fathoms. Labrador to North Carolina.

## GALATHEIDAE

Body shrimp-like. Abdomen bent upon itself but not folded up against thorax; tail-fan well developed, adapted for swimming. First legs chelate, greatly elongated, slender. Antennal peduncle four-jointed, owing to fusion of true second and third joints; flagellum long.

Genus **MUNIDOPSIS** Whiteaves.

Rostrum well developed, sometimes a small supra-antennal tooth or spine on either side but never a long supraorbital spine. Eyes opaque, non-faceted, devoid of pigment. Integument very strongly calcified. Carapace generally quite flat, more or less quadrilateral in outline, dorsal surface usually rugose, sometimes spinose, but occasionally glabrous, and either prominently or obscurely tuberculated.

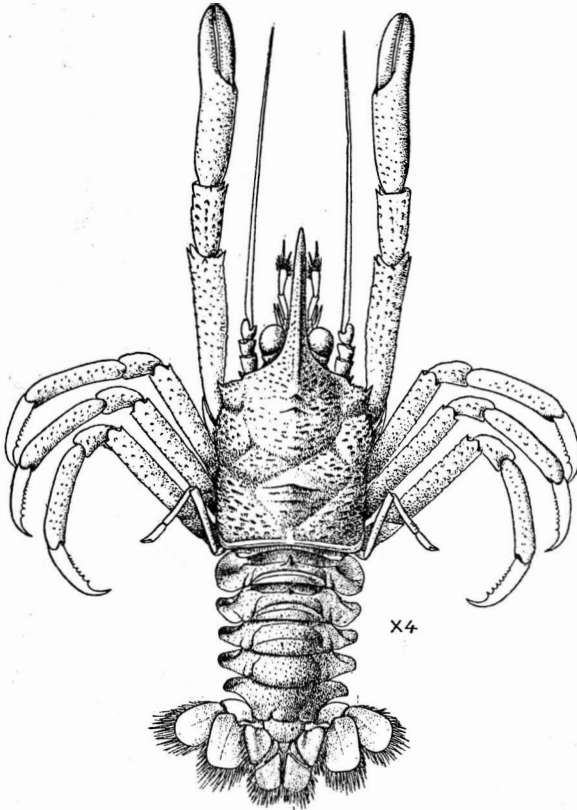


Fig. 31. *Munidopsis curvirostra* Whiteaves, ♂, from above. (after Smith).

**M. curvirostra** Whiteaves. 13, 14, 18. (Fig. 31).

Antennules short, not reaching end of rostrum. Antennae equal in length to carapace. Carapace longer than broad, a straight spine at anterior angles directed obliquely outward; surface plicate, two median spines. A median spine on first and second segments of abdomen. Chelipeds as long as or longer than carapace. Length 16 to 40 mm.

Depth, 75 to 1290 fathoms. Gulf of St. Lawrence to Cape Fear, North Carolina.

## AXIIDAE

Body shrimp-like. Abdomen extended, abdominal pleura large, tail-fan well developed, adapted for swimming. First pair of legs chelate, subequal; second pair small, chelate, equal; last three pairs simple. Antennal peduncle five-jointed; antennal scale present as a movable, at times microscopic, thorn-like structure between second and third joints of peduncle; an immovable thorn on second joint outside scale.

Genus **AXIUS** Leach.

Body compressed in front of cervical groove so that the back shows a platform either flat or convex, often marked at edges and along middle line by ridges, continued on rostrum at about same level and without a steep fall; with or without pleurobranches, and with no suture on exopod of last limb. Antennal thorns present.

**A. serratus** Stimpson. 12, 16. (Fig. 32).

Flat area of back and cervical groove well marked. Rostrum triangular, pointed. No teeth on gastric region back of base of rostrum. Antennal thorns large. Eyes pigmented. Upper border of palm in both chelipeds of first pair thin and strongly carinated. Pleurobranches on legs 2-4. Abdomen broad and depressed, expanding laterally in middle, much broader than carapace. Length from 40 to 100 mm.

Depth, 10 to 55 fathoms. Bay of Fundy to Long Island Sound.

Genus **CALOCARIS** Bell.

Body almost cylindrical, back arched so that its middle point is considerably higher than base of rostrum; a toothed ridge extends backwards from each edge of rostrum toward the distinct cervical groove which it does not meet; a low but distinct carina runs from rostrum along median line of gastric region and sometimes further. Eyes without pigment. No pleurobranches. A suture on exopod of last limb. Hermaprodite.

**C. macandreae** Bell. 2, 12. (Fig. 33).

Median carina in hinder part of carapace well developed, extending from cervical suture to posterior margin. Rostrum upcurved, reaching very nearly to end of antennular peduncle; lateral margins armed proximally with two spines

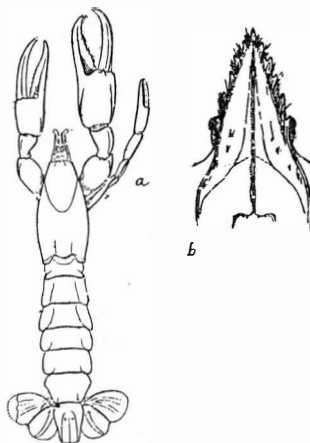


Fig. 32. *Axius serratus* Stimpson, ♂. (a) Type specimen from above, lacking rostrum. (b) Front of a perfect specimen enlarged. (a, after Smith; b, from drawing of specimen in U.S. National Museum).

and continued on gastric area as prominent divergent ridges which are armed with two similar spines. Penultimate article of antennal peduncle almost twice as long as second and about three times as long as fifth. Chelipeds of first pair not slender, dactyl about twice as long as palm, merus with a row of 5 or 6 teeth on lower border. Colour delicate pink or pale rose. Length from 15 to 46 mm.

Depth, 25 to 700 fathoms. Gulf of St. Lawrence; Iceland; Europe.

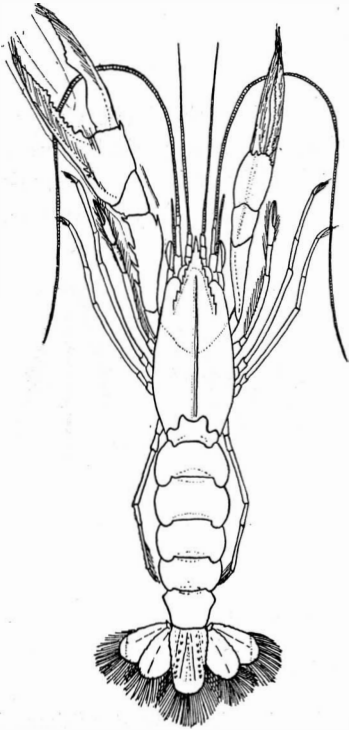


Fig. 33. *Calocaris macandreae* Bell, hermaphrodite, from above. (after Bouvier). The left cheliped has been turned to show outer side.

## PAGURIDAE

Hermit crabs. Abdomen soft without trace of segmentation, straight, twisted or spirally coiled; some appendages obsolete, remainder much reduced; tail-fan adapted for holding body in hollow objects. Fore part of carapace firm, hind part soft. First pair of legs chelate; fourth pair unlike third.

Genus **PAGURUS** Fabricius. (*Eupagurus* of authors).

No paired appendages except uropods on abdomen of either sex. Outer maxillipeds widely separated at base; exopodites of all three pairs of maxillipeds flagellate. Chelipeds usually dissimilar and unequal, the right much the larger. Fourth pair of legs subchelate.

### Synopsis of species:

1. (4) Left hand, or chela, with upper surface horizontal and not divided into two facets separated by a ridge.
2. (3) Both chelipeds long and narrow. (Fig. 35). **P. longicarpus.**
3. (2) Both chelipeds stout and broad. (Fig. 34). **P. acadianus.**
4. (1) Left hand with upper surface divided by a ridge into two facets oblique to each other.
5. (6) Left hand with outer margin inflexed, a well defined ridge in middle with one principal row of spines; larger face concave. (Fig. 36). **P. kröyeri.**
6. (5) Left hand with outer margin arcuate, not strongly ridged, a double row of spines on crest at middle, larger face convex. (Fig. 37). **P. pubescens.**

**P. acadianus** Benedict. 10, 12, 15. (Fig. 34).

Eye-stalks stout. Acicle slender, without serrate outer edge. Chelipeds granulate, granules sharp. Carpus of right cheliped armed with short spines, the larger ones in the inner marginal row; chela about one-third longer than

carpus; dactyl usually longer than palm. Left cheliped much smaller, width of chela at base one-half its length. Carpal and propodal joints of ambulatory legs spiny above; dactyls curved and twisted, not grooved on outer margin. Colour, upper surface of hands near prehensile edges of fingers and along middle of palm, tinged with red; stripes of red on three distal articles of ambulatory legs. Entire length, 60 to 160 mm.

Low-water to 265 fathoms. From Grand Bank of Newfoundland and Gulf of St. Lawrence to mouth of Chesapeake Bay.

**P. longicarpus** Say. 10, 14, 15. (Fig. 35).

A narrow species. Right cheliped much longer and stouter than left, sub-cylindrical, palm short, minutely granulate, fingers short, hooked at tips; carpus as long as chela to middle of finger, with small scattered tubercles and two rows of larger spinous ones. Left cheliped of similar form but with broader, non-hooked fingers. Second and third pereopods slender, extending about as far as major cheliped. Colour, body dark reddish brown, fingers gray or whitish. Entire length 40 to 60 mm.

Minas Basin, Nova Scotia; from Casco Bay, Maine, to Gulf of Mexico.

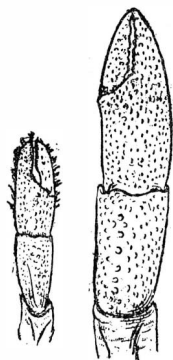


Fig. 35. *Pagurus longicarpus* Say, ♂, left and right cheliped. (after prints in U.S. National Museum).

red, legs ochraceous. Entire length, 60 to 160 mm.

Depth, 3 to 300 fathoms, southward. Greenland to Stellwagen's Bank; northern Europe.

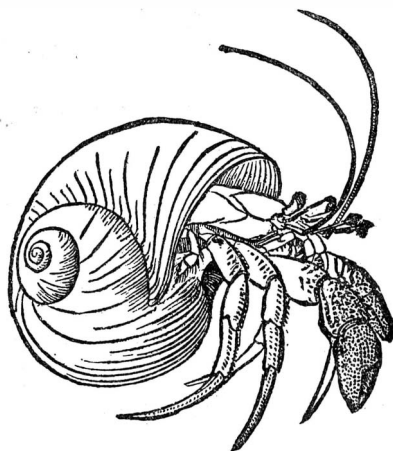


Fig. 34. *Pagurus acadianus* Benedict, in shell, from the side. (after R. Rathbun).

**P. kröyeri** Stimpson. 1, 5, 12. (Fig. 36).

Carapace and pereopods naked or only slightly pubescent. Chelipeds inconspicuously spinulose, spinules numerous but very small and short. Left manus with its carina single, very sharply prominent, denticulate and running to right of median line; surface beneath the carina to the right smooth; extero-inferiore edge of hand sharp and slightly dilated. "V" of spines at middle of right hand has a little row of spines between sides. Posterior margin of last caudal segment deeply emarginate and spinulose. Colour according to Kröyer's figure of "*pubescens*", chelipeds cinnamon tinged with



Fig. 36. *Pagurus kröyeri* Stimpson, left cheliped, from above. (after Benedict).

**P. pubescens** Kröyer. 1, 12, 15. (Fig. 37).

Carapace and pereopods thickly pilose. Right cheliped coarsely spinous. Left manus armed only with a low, obtuse and often double carina. "V" of spines at middle of right hand has no row of spines between sides. Colour, clothed with yellow hair. Entire length 50 to 130 mm.



Fig. 37.

*Pagurus pubescens* Kröyer, left cheliped from above. (after Benedict).

Just below low-water mark to 150 fathoms. Greenland to New Jersey; northern Europe.

Genus **PARAPAGURUS** Smith.

Abdomen with paired appendages other than uropods on first and second segments in male only. Outer maxillipeds widely separated at base; exopodite of first pair non-flagellate. Chelipeds dissimilar and unequal, the right vastly the larger. Fourth pair of legs subchelate. In female only one oviduct which opens on coxa of third left thoracic leg.

**P. pilosimanus** Smith. 12, 13, 15. (Fig. 38).

Cervical suture deep, arcuate; anterior part of carapace a little broader than long, anterior margin more nearly straight than in *Pagurus*. Eyestalks slender, tapering, cornea small. Antennal peduncle reaches end of second article of antennular peduncle; flagellum very long, reaching far beyond ambulatory legs. Chelipeds covered with fascicles of short setae arising from small pits. Ambulatory legs greatly exceed major cheliped; dactyls very long and slender. Colour pale, dull orange, darker at tips of legs. Length of body 38 to 65 mm.

Inhabits compound actinoid polyps, usually *Epizoanthus paguriphilus*; 250 to 2221 fathoms. Grand Bank of Newfoundland to Gulf of Mexico; West Africa.

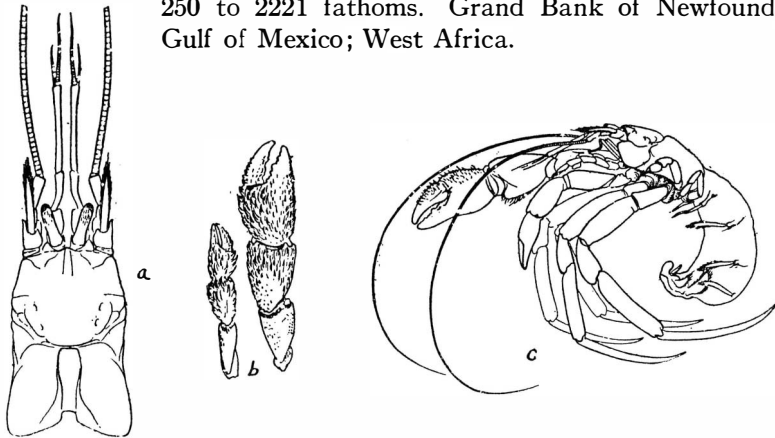


Fig. 38. *Parapagurus pilosimanus* Smith, ♂. (after Smith). (a) Carapace and anterior appendages of (c). (b) Chelipeds, from above. (c) Entire animal, from the side.

## LITHODIDAE

Body crab-like. Abdomen more or less firm, often segmented, bent under thorax; no tail-fan developed, uropods absent. First pair of legs chelate; fourth pair like third; fifth pair very small, folded under carapace, making it appear superficially that the crab has only four pairs of legs.

Genus **LITHODES** Latreille.

Carapace armed with a number of strong, long spines. Third to fifth abdominal segments with median plates replaced by a membranous area covered by calcified, often spinous, nodules; lateral plates of these segments in female very much larger on left side than on right; plates of basal (second) segment more or less fused, either completely or with median and lateral, or lateral and marginal fused.

**L. maia** (Linnaeus). 3, 12, 14. (Fig. 39).

Carapace dorsally spinous with longer spines on margin. Dorsal prominence of rostrum horizontal or a little deflexed, elongate and bifid. Eight rostral

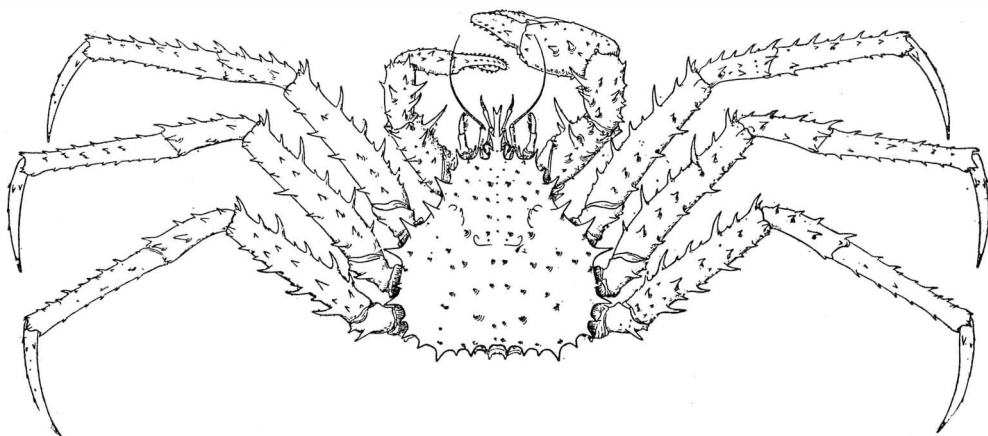


Fig. 39. *Lithodes maia* (Linnaeus), from above. (after unpublished drawing in U.S. National Museum).

spines: a distal pair, a median pair, a basal pair with an odd one between, and the ventral spine. Second segment of abdomen spinous, all pieces fused in one. Colour, madder brown, tubercles and spines tipped with vinaceous cinnamon; legs obscurely banded with two shades of the brown. Length of carapace from 80 to 175 mm.

Depth, 35 to 291 fathoms. Newfoundland to Sandy Hook, New Jersey; northwestern Europe.



## PORTUNIDAE

Carapace transverse, usually widest at last antero-lateral tooth. Antennules folded transversely or obliquely. Third maxillipeds not overlapping epistome. Legs flattened and more or less adapted for swimming. Swimming crabs.

Genus **PORTUNUS** J. C. Fabricius. (*Neptunus* of authors).

Carapace depressed or a little convex, often with surface areolated. Front proper (between antennae) well delimited from inner supraorbital angles and cut into three to six teeth. Antero-lateral borders oblique, arched, longer than postero-lateral, cut into nine teeth (including orbital angle) of which the ninth may be enlarged. Merus of outer maxillipeds not markedly produced at antero-external angle. Abdomen of male triangular.

**P. sayi** (Gibbes). 17. (Fig. 40).

Carapace convex, not very uneven. Front with four small acute teeth. A long acuminate lateral spine; between it and the blunt orbital tooth seven

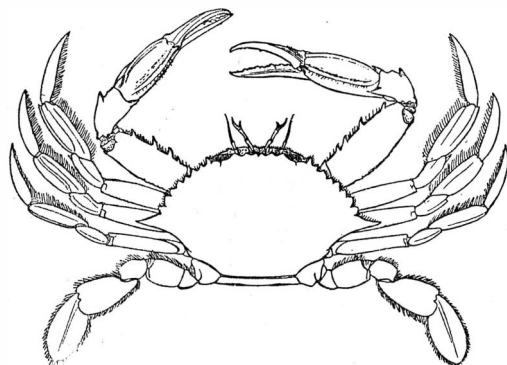


Fig. 40. *Portunus sayi* (Gibbes), from above. (after Verrill).

small acute teeth. Cheliped with three or four spines on merus, two on carpus, two on manus. First, second and third legs flat; fourth leg a swimming paddle, the last two articles much enlarged. Colour, variegated yellow-brown, tan and purplish. Width 30 to 50 mm.

Pelagic, common on gulf weed. South of Halifax (40° N.); Vineyard Sound to Trinidad; occasionally elsewhere.

Genus **CALLINECTES** Stimpson.

Abdomen of male very narrow,  $\perp$ -shaped. Merus of outer maxillipeds strongly produced outward at antero-external angle. Otherwise much as in *Portunus*.

**C. sapidus** Rathbun. 10, 17. (Fig. 41). (*C. hastatus* of authors).

Frontal or inter-antennal teeth two. Length of intramedial region (that part of gastric region posterior to second granulate ridge) about half its anterior

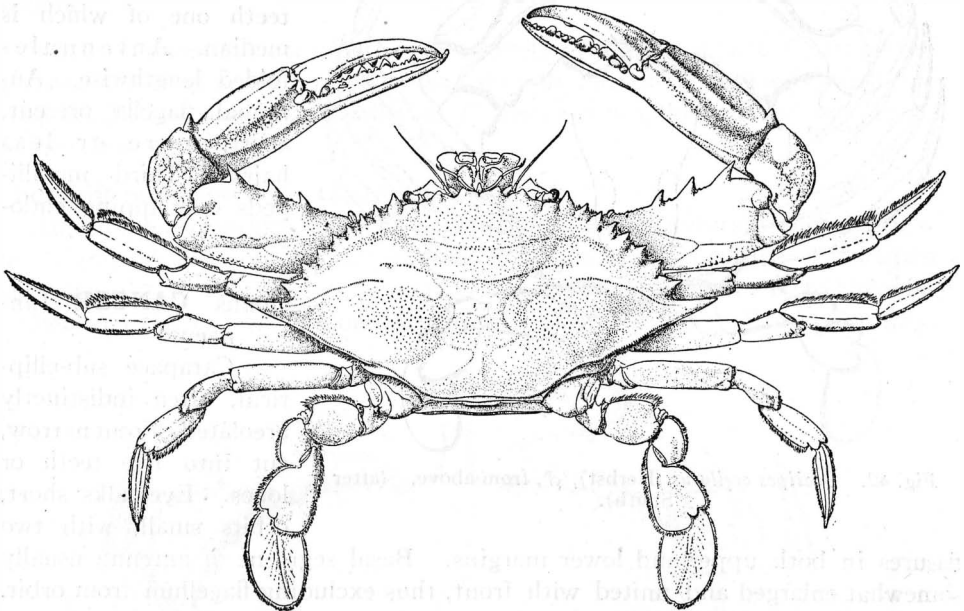


Fig. 41. *Callinectes sapidus* Rathbun, ♂, from above. (after R. Rathbun).

width. Penult segment of male abdomen much constricted in proximal half, widening at both extremities. Colour grayish or bluish green, spines of carapace and fingers bright red; adult males bright blue on chelipeds, legs and margins of carapace. Width 8 to 18 cm.

Cow Bay near Halifax, Nova Scotia. Rare north of Cape Cod. From Cape Cod to Texas; West Indies; Brazil; Bermudas.

Genus **OVALIPES** Rathbun. (*Platyonichus* of authors).

Carapace with five subequal teeth on antero-lateral margin. Interocular teeth three. Last leg forming a broad swimming paddle.

**O. ocellatus** (Herbst). 3, 10, 15. (Fig. 42).

Carapace one-fourth wider than long, convex, granulate, a stridulating ridge on under side. Chelipeds stout, palm triangular in section, costate. Colour yellowish gray with small annular spots of reddish purple; carapace and chelipeds iridescent. Width 30 to 50 mm.

In sand from low-water mark to 10 fathoms. Minas Basin at Bass River, Nova Scotia (Leim). From Cape Cod to North Carolina.

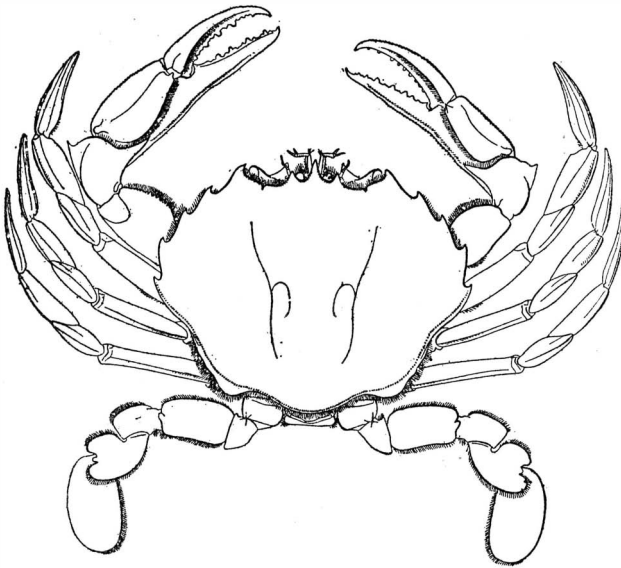


Fig. 42. *Ovalipes ocellatus* (Herbst), ♂, from above. (after Smith).

## CANCRIDAE

Carapace broadly oval, front with several teeth one of which is median. Antennules folded lengthwise. Antennal flagella present, short, more or less hairy. Third maxillipeds overlapping endostome.

Genus **CANCER** Linnaeus.

Carapace sub-elliptical, often indistinctly areolated. Front narrow, cut into five teeth or lobes. Eyestalks short, orbits small, with two

fissures in both upper and lower margins. Basal segment of antenna usually somewhat enlarged and united with front, thus excluding flagellum from orbit.

### Synopsis of species:

1. (2) Margin of lateral teeth of carapace entire. (Fig. 43). **C. irroratus.**
2. (1) Margin of lateral teeth of carapace denticulate. (Fig. 44). **C. borealis.**

**C. irroratus**  
Say. 10, 12, 13,  
15. (Fig. 43).

Nine anterolateral teeth, two posterolateral teeth, the last one obscure. Teeth with entire edges. Carapace finely granulate. Chelipeds granulate not denticulate; six longitudinal costae on manus.

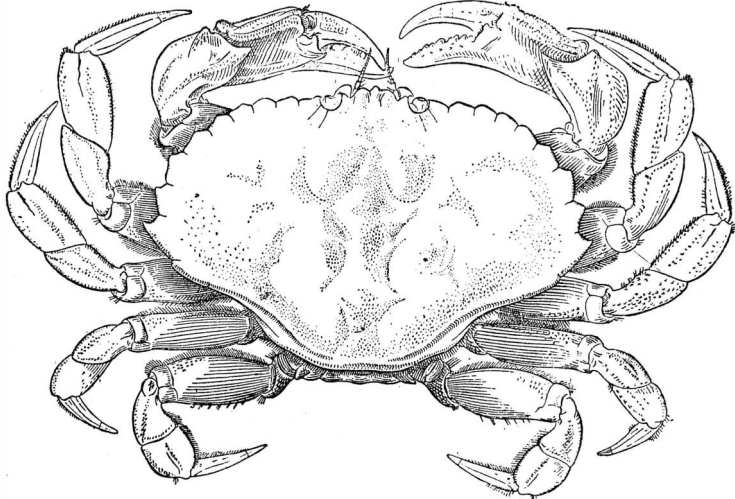


Fig. 43. *Cancer irroratus* Say, ♂, from above. (after R. Rathbun).

Colour, darkest on nodules; small purplish or crimson spots formed by minute rings, on white or yellow ground. Width 60 to 150 mm.

Under stones, low water to 300 fathoms (occasional). Labrador to South Carolina.

NOTE.—*Cancer amoenus* Herbst is scarcely synonymous with *C. irroratus*; the shape of the carapace and of its lateral teeth allies it more closely with one of the Pacific species. The locality of *C. amoenus* is unknown and the type-specimen not extant.

**C. borealis** Stimpson. 10, 12, 13, 15. (Fig. 44).

Antero-lateral margins more strongly arched than in *irroratus*; teeth denticulate. Carapace uneven, coarsely granulate. Manus and dactylus of cheliped denticulate above. Colour, buff ground, crimson granules. Width 60 to 150 mm.

Between tides to 400 fathoms southward. Nova Scotia to South Carolina.

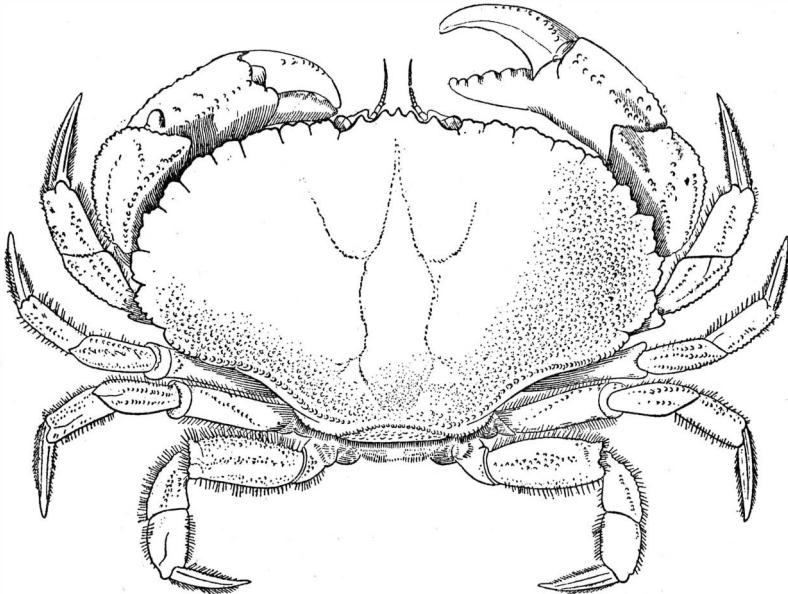


Fig. 44. *Cancer borealis* Stimpson, ♂, from above. (after Smith).

## XANTHIDAE

Carapace usually transverse. Antennules folded slanting or transversely. Male openings nearly always on coxae of feet of last pair.

Genus **NEOPANOPE** A. Milne Edwards.

Carapace sub-hexagonal. First two antero-lateral teeth closely fused, second tooth lobiform. Front advanced, arcuate. Terminal segment of male abdomen broader than long, sub-triangular.

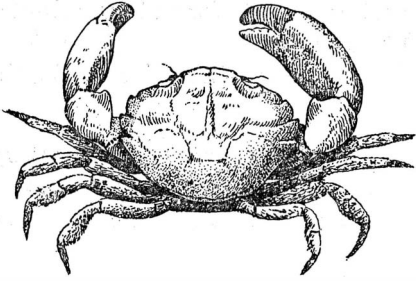


Fig. 45. *Neopanope texana sayi* (Smith), ♂, from above. (after Benedict and Rathbun).

**N. texana sayi** (Smith). 10. (Fig. 45).

Dactyl of major chela without a large basal tooth. Fingers black or dark-coloured in males. Colour of immovable finger continued extensively on palm. Colour of carapace, dark blue or brown speckles on a ground of light bluish to yellowish. Width 15 to 27 mm.

Malpeque, Prince Edward Island. From Cape Cod to Florida.

### Genus **RHITHROpanopeus** Rathbun.

Carapace squarish, broad behind. Abdomen narrow, not reaching coxa of fifth foot; last segment broadly rounded at extremity.

**R. harrisii** (Gould). 10. (Fig. 46).

Front truncate; dorsal ridges prominent. First two antero-lateral teeth fused, last three dentiform. Legs slender. Colour brownish, paler below; [fingers not contrasted with palm. Width 10 to 20 mm.

Brackish water. From Miramichi estuary, New Brunswick, to Gulf of Mexico.

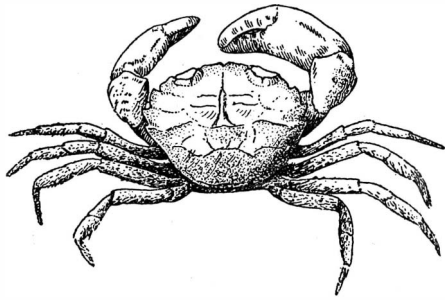


Fig. 46. *Rhithropanopeus harrisii* (Gould), ♂, from above. (after Benedict and Rathbun).

## GONEPLACIDAE

Body usually squarish. Palp of outer maxillipeds articulates at or near antero-lateral angle of merus. Interantennular septum a thin plate. Genital ducts of male usually perforate base of last pair of legs, often passing forward through groove in sternum.

### Genus **GERYON** Kröyer.

Carapace hexagonal, antero-lateral margins arcuate, dentate. Front slightly prominent. Eyes and orbits large; antennal flagella standing in orbital hiatus. Antennules fold obliquely. Buccal cavity anteriorly widening, not entirely closed by outer maxillipeds. Chelipeds massive. Legs long, compressed. Segments of abdomen separate in both sexes.

**G. quinquedens** Smith. 12, 13, 15. (Fig. 47).

Carapace convex especially antero-posteriorly; a blunt transverse ridge at widest part; cardiac and posterior gastric regions bounded laterally by deep grooves. Antero-lateral teeth normally five, frontal teeth four. A subdistal spine on merus, a large inner spine on carpus; fingers elongate. Colour, dark red. Width 30 to 180 mm.

Off shore, 100 to 1000 fathoms. South of Halifax (42° 37' N.) to South Carolina.

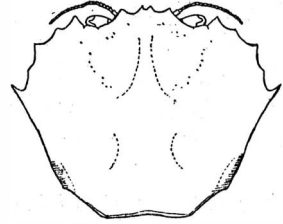


Fig. 47. *Geryon quinquedens* Smith, outline of carapace of ♂, from above. (after Smith).

## GRAPSIDAE

Palp of outer maxillipeds articulates at antero-external angle or at middle of anterior border of merus. A gap usually between maxillipeds of outer pair. Sides of body either straight or very slightly arched. Front broad. Male openings sternal.

Genus **PLANES** Leach. (*Nautilograpsus* Milne Edwards).

Carapace convex, almost smooth. Antennae entering orbit. A small antero-lateral tooth behind orbit. Palp articulating at middle of anterior margin of merus of outer maxilliped. Legs flattened, somewhat natatory.

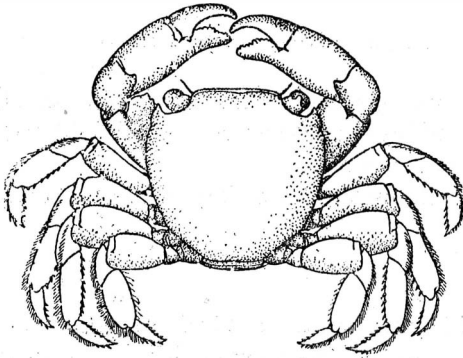


Fig. 48. *Planes minutus* (Linnaeus), from above. (after Verrill).

**P. minutus** (Linnaeus). 3, 17. (Fig. 48).

Carapace uniformly convex, postero-lateral margins arcuate. Merus of outer maxilliped much broader than long. Chelipeds equal. Legs fringed with hair. Colour variable, mottled yellowish and olive green. Width 10 to 20 mm.

Pelagic, common on gulf weed in all temperate and tropical seas. Off Nova Scotia; North Atlantic from Massachusetts southward.

## MAJIDAE

Fore part of body narrow, forming a distinct rostrum. Second article of antenna well developed, fused with epistome. Chelipeds very mobile. Ambulatory legs long. Hooked hairs present, which entangle foreign substances and tend to concealment and protection. Spider crabs.

Genus **CHIONOECETES** Kröyer.

Carapace about as broad as long, rough with tubercles or spines. Rostrum divided into two short flat triangular horns. No preocular tooth; postocular tooth large. Orbits and eyes large. Chelipeds much shorter than next legs; fingers long and narrow. Ambulatory legs compressed.

**C. opilio** (O. Fabricius). 5, 9, 12. (Fig. 49).

Carapace chiefly tuberculate. Rostrum horizontal. Branchial regions far apart. Lateral margin of carapace exposed in dorsal view as far forward as

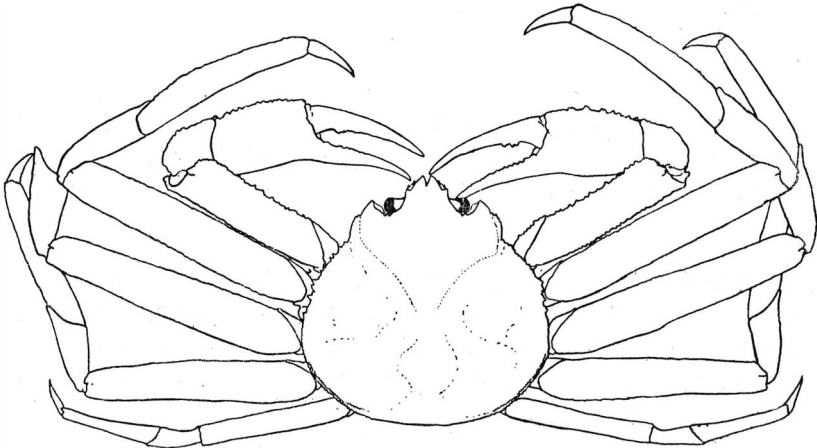


Fig. 49. *Chionoectes opilio* (O. Fabricius), ♂, from above. (after Kröyer).

first pair of ambulatory legs. Spines of pterygostomian-branchial row small, numerous and of nearly equal size. Meropodites of ambulatories broadly dilated. Colour, light brick-red. Length from 50 to 125 mm.

Littoral to 350 fathoms. West Greenland to Casco Bay, Maine; Arctic Alaska to Siberia and Bering Sea.

Genus **HYAS** Leach.

Carapace narrower than post-frontal length, lyrate or shield-shaped, tuberculate. Rostrum triangular, flat, horns separated by narrow slit. Chelipeds stout, about as long as legs. Legs cylindrical.

Synopsis of species:

1. (2) Carapace subtriangular. (Fig. 50). **H. araneus**.
2. (1) Carapace lyrate, hepatic region expanded.
3. (4) Rostrum elongate, its length contained from 4.5 to 6.4 times in total carapace length. (Fig. 51). **H. coarctatus**, typical.
4. (3) Rostrum short, its length contained from 7.1 to 9.3 times in total carapace length. (Fig. 52). **H. coarctatus alutaceus**.

**H. araneus** (Linnaeus). 3, 9, 12. (Fig. 50).

Carapace subtriangular. Hepatic region not dilated laterally. Basal article of antenna subtriangular, narrowing anteriorly. Colour purplish red. Length 30 to 110 mm.

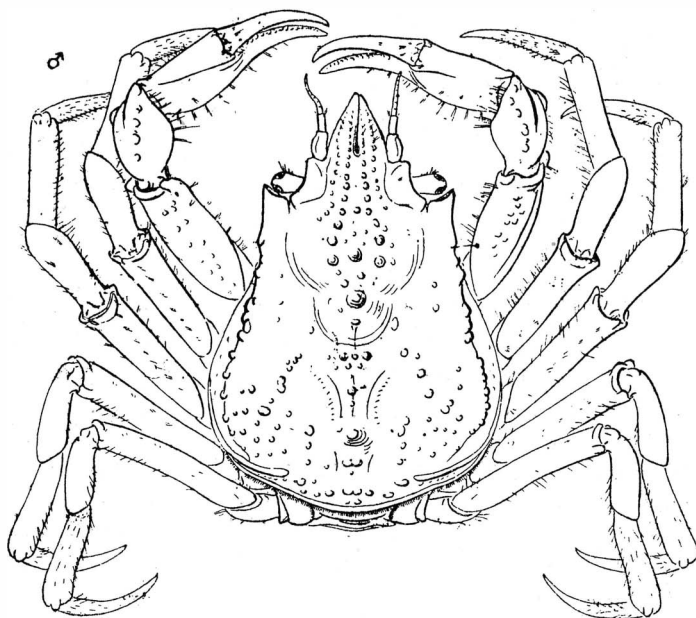


Fig. 50. *Hyas araneus* (Linnaeus), ♂, from above. (after M. J. Rathbun).

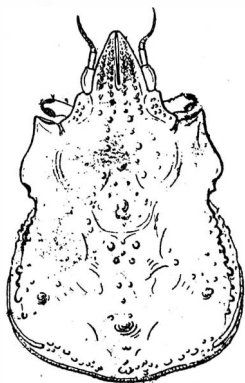


Fig. 51. *Hyas coarctatus* Leach, carapace of ♂, from above. (after M. J. Rathbun).

Shallow water to 273 fathoms. Hebron, Labrador to Rhode Island. West and east coasts of Greenland; celand; northern Europe; Spitzbergen to Kara Sea.

**H. coarctatus** Leach. 9, 12. (Fig. 51).

Carapace lyrate. Hepatic region dilated laterally, forming with post-orbital region an alate expansion, its posterior angle broadly rounded. Basal antennal article with moderately converging sides. Rostrum long. Colour similar to that of *araneus*. Total carapace length is to rostrum length as 4.5 : 1 in medium specimens up to 6.4 : 1 in large specimens. Length 30 to 51.5 mm.



Depth, 3.5 to 906 fathoms. Newfoundland to North Carolina; northwestern Europe to Murman Sea.

**H. coarctatus alutaceus** Brandt. 8, 9, 12.  
(Fig. 52).

Differs from typical *coarctatus* in wider carapace; shorter and broader rostrum; total carapace length is to rostrum length as 7.1 : 1 in medium specimens up to 9.3 : 1 in large specimens; tubercles of carapace less strong. Colour dusky brick-red. Length 40 to 99 mm.

Depth 9 to 121 fathoms. West Greenland to Cape Breton; Arctic America; Arctic Siberia to Sakhalin Island.

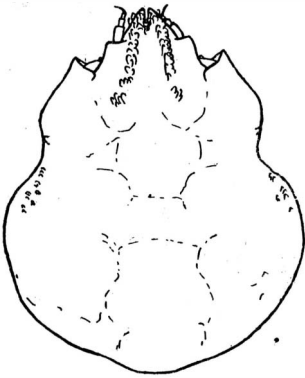


Fig. 52. *Hyas coarctatus alutaceus* Brandt, carapace of ♂, from above. (after M. J. Rathbun).

Genus **LIBINIA** Leach.

Carapace behind rostrum nearly hemispherical, tuberculate or spinous. Rostrum small, apex bifid. Orbits small, subcircular, chelipeds stout, palm much longer than fingers. Legs cylindrical.

**L. emarginata** Leach. 3, 9, 10, 12. (Fig. 53). (*L. canaliculata* Say).

Densely pubescent. Dorsal tubercles many, non-granulate, more or less unevenly placed. Nine median spines or tubercles, five behind cervical groove. No spine at angle of buccal cavity. Colour brownish or dirty yellow. Length from 50 to 107 mm.

Shore to 27 fathoms. Windsor, Nova Scotia; Casco Bay, Maine, to west Florida.

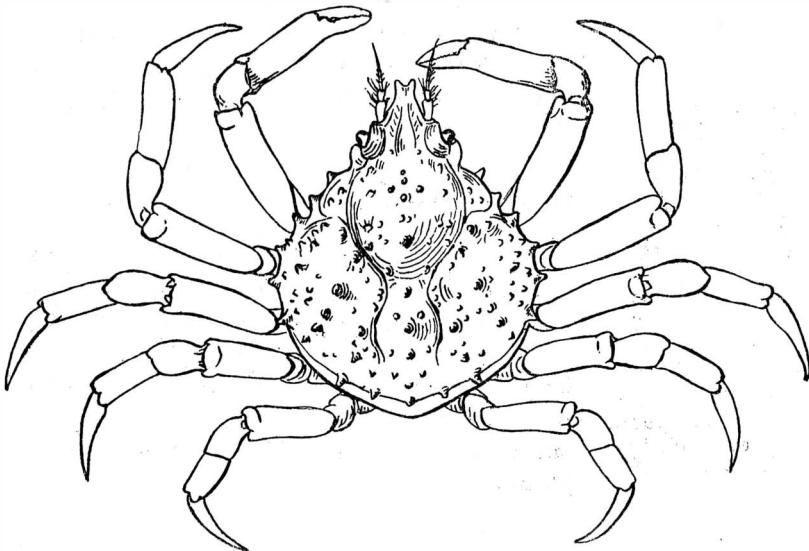


Fig. 53. *Libinia emarginata* Leach, young ♂, from above. (after R. Rathbun).