Synopses of North-American Invertebrates. III. The Caridea of North America

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SYNOPSES OF NORTH-AMERICAN INVERTEBRATES.

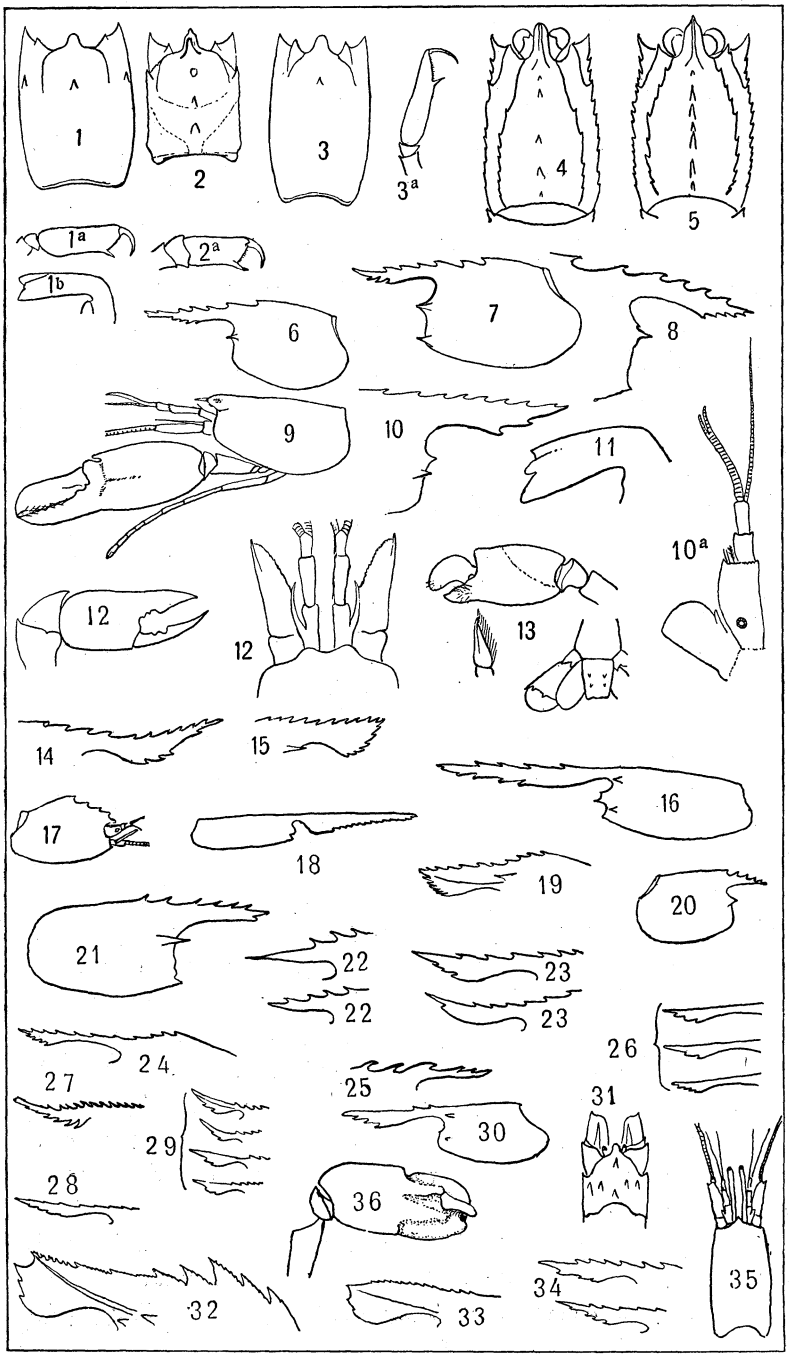
III. The Caridea of North America.

J. S. KINGSLEY.

In the preparation of this number of the "keys" now being published in the *American Naturalist*, it has been the endeavor to include all the shrimps and prawns reported from the waters of North America north of the southern boundary of the United States and within the 100-fathom line. It is believed that this key will serve for the identification of any species (except in the genera Hippolyte and Pandalus) now known to inhabit our waters; but the student may reasonably expect that several tropical species may later be found within these limits. The genera most likely to furnish additions of this character are Alpheus, Palæmon, Peneus, Atya, and Caridina.

In using the synopsis which follows, the student must remember that the characters of the key are not repeated. It will be seen that the mandibles furnish important characters. With a little practice these structures may be readily removed with the dissecting needle without injuring the specimen for exhibition purposes. Caridea should only be preserved as alcoholic material; any attempt to dry them proves disastrous. The terminology of parts employed below, with few exceptions, will be understood by any one who has dissected a cray fish or lobster. Branchiostegal spines are small spines just below the antennæ, near the anterior margin of the carapax. The carpal joint is the antepenult segment of the legs and is spoken of as annulate, where it is broken up into a number of smaller joints (see Fig. 39).

The geographical distribution of the species is roughly indicated by full-face letters following the specific name. These letters are: **A**, Alaska south; **D**, Monterey to San Diego; **M**,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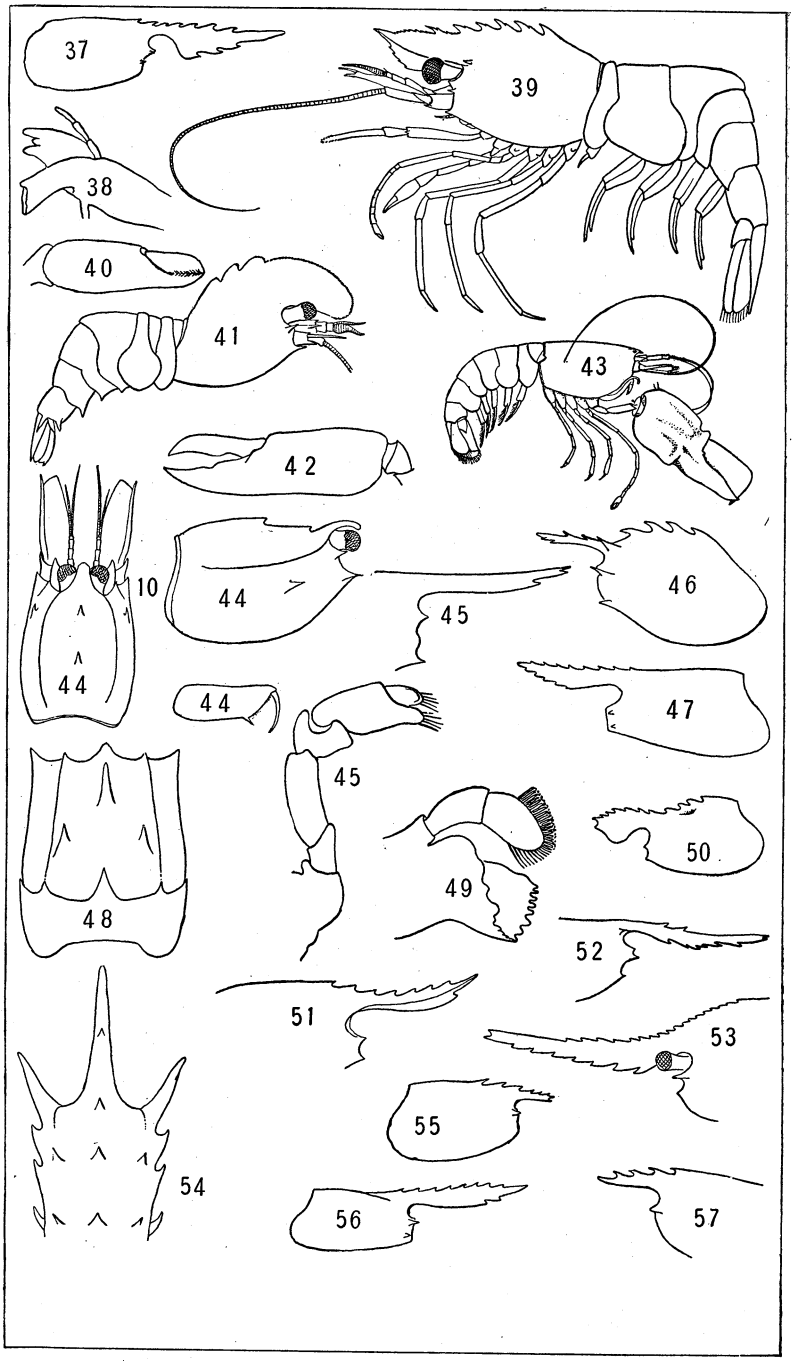
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Cape Cod to North Carolina; **N**, Atlantic coast south to Cape Cod; **P**, Puget Sound to San Francisco; **S**, South Carolina to Florida.

The Caridea are aquatic decapod crustacea, commonly known as shrimps and prawns. Most of them are marine, but a few occur in the warmer fresh waters of the globe. The most important literature for the student of American forms follows:

SAY. Crustacea of the United States. *Journ. Acad. Nat. Sci.* Vol. i. Philadelphia, 1818.

H. MILNE-EDWARDS. Histoire Naturelle des Crustaces. Tome 2. 1837.

STIMPSON. Crustacea and Echinoderms of Pacific Coast. *Journ. Boston Soc. Nat. Hist.* Vol. vi. 1857.

STIMPSON. Prodromus descr. animal. evert. [etc.]. *Proc. Acad. Nat. Sci.* Philadelphia, 1860.

STIMPSON. Notes on North American Crustacea. *Annals N. Y. Lyc. Nat. Hist.* Vol. x. 1871.

DANA. Crustacea United States Exploring Expedition. 1852.

OWEN. Crustacea in Beechey's Voyage to the Pacific. 1839.

KRÖYER. Monograf. Slægten Hippolyte's nord. Arter. *Vid. Selsk. Afhandl. Kjöbenhavn.* Bd. ix. 1842.

SMITH. Crustacea Atlantic Coast North of Cape Cod. *Trans. Connecticut Acad. Sci.* Vol. v. 1879.

SMITH. Crustacea in Invertebrate Animals of Vineyard Sound. *Rep. U. S. Fish Commission for 1871–72.* 1873.

KINGSLEY. On a Collection of Crustacea [etc.]. *Proc. Acad. Nat. Sci.* Philadelphia, 1879.

KINGSLEY. Carcinological Notes, No. v. *Bulletin Essex Inst.* Vol. xiv.

ORTMANN. Crangonidæ. *Proc. Acad. Nat. Sci.* Philadelphia, 1895.

Less important are: STIMPSON: *Am. Journ. Sci.*, II, vol. xxix (Ft. Macon, N. C.). — STIMPSON: Invertebrata of Grand Menan, *Smithsonian Contributions*, 1853. — GIBBES: *Proc. Am. Assoc. Adv. Sci.*, vol. iii, 1851. — BATE: (Puget Sound), *Proc. Zool. Soc. London*, 1864. — LOCKINGTON: *Proc. Cal. Acad. Nat. Sci.*, 1876. — LOCKINGTON: (Alpheus), *Ann. and Mag. Nat. Hist.*, vol. i, 1878. — KINGSLEY: (Alpheus), *Bull. U. S. Geol. Survey*, 1878. — KINGSLEY: *Proc. Acad. Nat. Sci.*, Philadelphia, 1878. — KINGSLEY: *Bull. Essex Inst.*, vol. x. — ORTMANN: Atyidæ, *Proc. Acad. Nat. Sci.*, Philadelphia, 1894. — HOLMES (California): *Proc. California Acad. Sci.*, II, vol. iv, 1894. — WALKER (Puget Sound): *Trans. Liverpool Biol Soc.*, vol. xii, 1898. — BENEDICT: *Proc. U. S. Nat. Mus.*, vol. xviii, 1895. — SMITH: *Rep. U. S. Fish Commission for 1872–73.* 1874.

Key to the Genera of Caridea.[1]

1. Body usually cylindrical, elongate; antennæ long; abdomen large, usually extended, and bearing, as a rule, six pairs of feet (pleopoda), the sixth pair, together with the telson, forming a caudal fin . . . . . MACRURA 2
1. Body depressed; antennæ small; abdomen small, and folded under the cephalothorax; no caudal fin formed . . BRACHYURA
2. Last pair of thoracic feet normal 3
2. Last pair of thoracic feet reduced and dorsal in position ANOMURA (pars)
3. Carapax with two longitudinal dorsal sutures; antennal scale small or lacking; cervical suture frequently present THALASSINIDEA.
3. Longitudinal sutures lacking; cervical frequently present; carapax united in front to epistome . . . . ASTACIDEA
3. Carapax not united to epistome, sutures lacking; antennal scale large CARIDEA 4
4. Not more than two pairs of feet chelate 5
4. Three anterior pairs of feet chelate . . . PENEIDÆ 28
5. Mandibles slender, incurved, not expanded or bifid at the tip; no mandibular palpus (Fig. 11) . . . . CRANGONIDÆ 6
5. Mandibles stout, crown broad, dilated (Fig. 49) . . ATYIDÆ 14
5. Mandibles with the crown deeply bifid (Fig. 38) PALÆMONIDÆ 17
6. First pair of feet the stouter, subchelate (Fig. 1 *a*); *i.e.*, the movable finger closing on the palm . . . . CRANGONINÆ 7
6. First pair of feet the stouter; chelate . . . LYSMATINÆ 10
6. Second pair the larger . . . GNATHOPHYLLINÆ (extralimital)
7. Second pair of feet chelate 8
7. Second pair of feet not chelate . . . . . *Sabinea* 36
7. Second pair of feet obsolete, rostrum long . . *Paracrangon* 39
8. Branchiæ five on either side 9
8. Branchiæ seven on either side . . . . *Pontophilus* 37
9. Rostrum short, eyes free . . . . . *Crangon* 29
9. Rostrum obsolete, eyes nearly concealed . . *Nectocrangon* 38
10. Rostrum long 11
10. Rostrum short, antennulæ biflagellate . . . *Concordia* 45
11. External maxillipeds with exopodite 12
11. External maxillepeds without exopodite . . . *Tozeuma* 42
12. Carpus of second pair triannulate 13
12. Carpus of second pair multiarticulate . . . *Hippolysmata* 40
13. Carapax with a median dorsal spine . . . . *Latreutes* 43

[1] The *American Naturalist* will undertake to determine and return any specimens that cannot be placed in the keys, and solicits correction and criticism for future revision.

13. Carapax without median spine . . . . *Rhynchocyclus* 44
14. Feet without exopodites; fresh water . . . . ATYINÆ 15
14. Feet with exopodites; marine . . . . EPHYRINÆ 16
15. Third pair of feet scarcely larger than the anterior pairs *Caridina* 46
16. Rostrum toothed, three anterior pairs of feet slender *Acanthephyra* 47
17. First pair of feet the larger, chelate . . . ALPHEINÆ 18
17. First and second pair of feet slender, the first not chelate (PANDALINÆ) *Pandalus* 65
17. Second pair of feet the larger, both pairs chelate . PALÆMONINÆ 24
18. Mandible with palpus 19
18. Mandible without palpus 23
19. Carpus of second pair annulate 20
19. Carpus of second pair not annulate 22
20. Rostrum very short or absent 21
20. Rostrum moderate or long 22
21. Eyestalks short, eyes hidden under carapax . . . *Alpheus* 48
21. Eyestalks long, eyes free . . . . . *Ogyris* 61
22. First pair of feet short, second slender . . . . *Hippolyte* 59
22. First and second pairs of feet subequal . . . *Caridion* 60
23. Carpus of second pair triarticulate . . . . *Virbius* 62
23. Carpus of second pair five-articulate . . . . . *Thor* 64
24. Mandibles without palpus 25
24. Mandibles with palpus; antennula triflagellate . . *Palæmon* 72
25. Antennula biflagellate, one branch divided at the tip . . . 26
25. Antennula triflagellate 27
26. Rostrum short; external maxillipeds broad . . . *Pontonia* 66
26. Rostrum long, slender; external maxillipeds slender . *Anchistia* 67
27. Rostrum toothed above only . . . . . *Urocaris* 71
27. Rostrum toothed above and below . . . *Palæmonetes* 68
28. Posterior pair of feet not annulate . . . . . *Peneus* 74
28. Posterior pair of feet annulate . . . . . *Sicyonia* 76

SYNOPSIS OF NORTH-AMERICAN CARIDEA.

Family CRANGONIDÆ. First and second pairs of feet unequal.

Sub-family CRANGONINÆ. External maxillipeds pediform.

G. *Crangon* Fabr. Eyes free; antennulæ biflagellate; posterior feet acuminate.

29. Carapax strongly sculptured; at least two spines in the median line; abdomen usually sculptured 30
29. Carapax not strongly sculptured; one median and one lateral spine on either side 34
30. Median carina of carapax with three or four spines; abdomen longitudinally keeled 31
30. Median carina two-spined 32

31. Epimera of abdomen spined; carapax with more than three keels; rostrum simple . . . . . *C. salebrosus* Owen **A**
31. Abdominal epimera without spines; carapax with three carinæ, the middle one four-spined . . . . *C. sharpei* Ortmann **A**
21. Middle keel three-spined . *C. boreas* (Phipps) Fabr. **A, N**, Fig. 2
32. Epimera without spinules; a median carina on abdomen, the sixth segment with two carinæ . . *C. intermedius* Stm. **A**, Fig. 44
32. Epimera without spinules; abdomen not sculptured . . . 33
33. Second lateral carina complete . . *C. munitus* Dana, Fig. 48
33. Second lateral carina extending half the length of the carapax *C. munitellus* Walker **P**, Fig. 31
34. A spine on each side of the posterior margin of fifth abdominal segment; palm very oblique . *C. franciscorum* Stm. **P, D**, Fig. 3
35. Fifth abdominal segment without spines *C. vulgaris* Fabr. **A, D, P, N, M**, Fig. 1

G. *Sabinea* Owen. Rostrum very short; eyes free, stout; second pair of feet short; branchiæ seven.

36. Rostrum obtusely rounded; telson subtruncate *S. septemcarinata* Ross **N**, Fig. 4
36. Rostrum and telson acute . . . *S. sarsii* Smith **N**, Fig. 5

G. *Pontophilus* Leach, Sars. Rostrum short, eyes free, second pair of feet very short.

37. Rostrum very short, tridentate . . . *P. brevirostris* Smith **M**
37. Rostrum longer . . . . . *P. norvegicus* Sars **N, M**

G. *Nectocrangon* Brandt. Dactyli of fourth and fifth pairs of feet dilated.

38. Two spines in the middle line of the carapax behind the rostrum *N. lar* (Owen) Brandt **N, A**
38. Three spines behind rostrum . . *N. alaskensis* Kingsley **A**

G. *Paracrangon* Dana. Rostrum elongate, fourth and fifth pairs of feet acuminate.

39. . . . . *P. echinatus* Dana **P**, Fig. 54

Sub-family LYSMATINÆ. Carpus of second pair annulate; external maxillipeds pediform.

G. *Hippolysmata* Stimpson. Four anterior pairs of feet with exopodites; first pair stout, second slender.

40. Branchiostegal spine present 41
40. No branchiostegal spine *H. wurdemanni* (Gibbes) Stm. **M, S**, Fig. 6
41. Flagella of antennula nearly as long as body; antennal scale tapering *H. intermedia* Kingsley **S**, Fig. 7
41. Flagella of antennula 1½ times length of body; antennal scale broad *H. californica* Stm. **D** Fig. 8

G. *Tozeuma* Stimpson. Body elongate, rostrum very long; external maxillipeds very short; carpus of third pair triarticulate.

42. . . . . *T. carolinensis* Kingsley **M, S**, Fig. 18

G. *Latreutes* Stimpson. First pair of feet with exopodites, carapax with a median spine.

43. . . . . *L. ensiferus* (M.-Edw.) Stm. Gulf weed

G. *Rhynchocyclus* Stimpson. Four anterior pairs of feet with exopodites, carpus of second triarticulate.

44. . . . . *R. parvulus* Stm. Texas

G. *Concordia* Kingsley. Rostrum very short; carpus of second pair biarticulate.

45. . . . . *C. gibberosa* Kingsley **M**, Fig. 17

Family ÁTYIDÆ. First two pairs of feet nearly equal, carpus of second pair not annulate.

Sub-family ATYINÆ.

G. *Caridina* Milne-Edwards. Rostrum prominent; carpus of first pair very short.

46. . . . . *C. pasadenæ* Kingsley, southern California Fig. 45

Sub-family EPHYRINÆ.

G. *Acanthephyra.* Rostrum toothed; antennulæ biflagellate.

47. . . . . *A. pacifica* (Holmes) Fig. 52

Family PALÆMONIDÆ.

Sub-family ALPHEINÆ. Second pair of feet usually chelate; carpus frequently annulate.

G. *Alpheus* Fabricius. First pair of feet usually very unequal; carpus of second annulate.

48. Rostrum present; orbital hoods prolonged into spines . . . 49
48. Rostrum spiniform; orbital hoods not spined 55
48. Rostrum absent; orbital hoods not spined 57
49. Dactylus of larger pincer normal 50
49. Dactylus of larger pincer horizontal or inverted 54
50. Larger hand with both margins entire 51
50. Larger hand with margins constricted above and below . . 52
51. Feet of posterior pairs not spined beneath . *A. biunguiculatus* Stm. (*læviusculus* Lockington. Originally descended from Hawaiian Islands; may occur on west coast of United States).
51. Posterior feet spined below . . . . *A. minus* Say **M, S, D**
52. A spine on basal joint of antenna 53
52. No spine on basal joint of antenna *A. websteri* Kingsley **S**, Fig. 13
53. Dactylus of smaller hand with straight lower margin *A. bellimanus* Lockington **D**
53. Dactylus of smaller hand with tooth near base *A. equidactylus*[1] Lockington **D**
54. No spine on basal joint of antenna . *A. barbara* Lockington **D**
54. Basal joint of antenna spined . . *A. clamator* Lockington **D**
55. Basal joint of antenna spined, larger hand constricted above and below *A. packardii* Kingsley **S**, Fig. 9

[1] Imperfectly known; larger hand lost.

55. Basal joint without external spine; dactylus normal . . . 56
56. Upper margin of large hand notched, lower entire
A. floridanus Kingsley **S**, Fig. 42
56. Larger hand constricted above and below
A. heterochelis Say **M**, **S**, west coast Fig. 43
57. Dactylus working horizontally . *A. candei* Guerin **S**, **D**, Fig. 36
57. Dactylus completely inverted 58
58. Hands of first pair equal . . *A. longidactylus* Kingsley **D**
58. First pair of hands unequal . . *A. harfordi* Kingsley **D**, Fig. 12

G. *Hippolyte* Leach. Rostrum not joined to carapax; external maxillipeds slender; first pair of feet short, equal. *Hippolyte* contains a large number of species, mostly from the colder seas. It is impossible to frame a key to the North American species at the present time. The following list includes the species found in our limits.

59. *H. affinis* Owen **D**, Fig. 15.
H. brevirostris Dana **P**, Fig. 57.
H. californiensis Holmes, Fig. 16.
H. cristata Stm. **P**.
H. esquimaltiana Bate **P**.
H. fabricii Kröyer **N**, Fig. 29.
H. gaimardii M.-Edw. **N**, **P**, Fig. 28.
H. gracilis Stm. **P**.
H. grœnlandica (Fabr.) Miers. **N**, **A**, **P**.
H. hemphilli Lockington, California.
H. herdmanni (Walker) **P**, Fig. 21.
H. incerta Buchholz **N**.
H. lamellicornis Dana **P**, Fig. 50.
H. layi Owen **D**, Fig. 14.
H. macilenta Kröyer **N**, Fig. 33.
H. microceros Kr. **N**, Fig. 25.
H. palpator Owen **D**, Fig. 55.
H. panschii Buchholz **N**.
H. phippsii Kröyer **N**, **A**, **P**, Figs. 19, 24.
H. picta Stm. **D**.
H. polaris (Sabine) Owen **N**, Figs. 23, 26.
H. prionota Stm. **P**, Fig. 41.
H. pusiola Kr. **N**, **M**, Fig. 22.
H. securifrons Norman **N**, Fig. 39.
H. sitchensis Brandt **A**.
H. spinus (Sowerby) White **N**, **A**, **P**, Figs. 32, 46.
H. stylus Stm. **P**.
H. suckleyi Stm. **P**.
H. taylori Stm. **D**.

G. *Caridion* Goës. Rostrum elongate, three-jointed mandibular palpus, carpus of second pair obsoletely biarticulate.

60. . . . . *C. gordoni* (Bate) Goës **N**, Fig. 51

G. *Ogyris* Stm. Rostrum very short, mandibular palpus two-jointed; carpus of second pair triarticulate.

61. . . . . *O. alphœrostris* Kingsley **M**, Fig. 35

G. *Virbius* Stm. Antennulæ biflagellate; carpus of second pair triarticulate.

62. No hepatic spine; antennal scale moderate.
V. acuminatus (Dana) Stm. Gulf weed
62. Hepatic spine present 63

63. Antennal scale moderate, rostrum elongate
V. zostericola Smith **M**, Fig. 30
63. Antennal scale as long as carapax; rostrum half as long as carapax
V. pleuracanthus Stm. **M, S**

G. *Thor* Kingsley. Carpus of second pair five-articulate.

64. . . . . *T. floridanus* Kingsley **S**, Fig. 20

Sub-family PANDALINÆ. Carpus of second pair multiarticulate.

G. *Pandalus* Leach. It is at present impossible to frame a key for the species.

65. *P. borealis* Kr. **A, N.**
P. danæ Stm. **P**, Fig. 27.
P. dapifer Murdoch **A.**
P. franciscorum Kingsley **P.**
P. gurneyi Stm. **D.**
P. hypsinotus Brandt **A.**
P. leptoceros Smith **N, M.**
P. montagui Leach **N, M.**
P. platyceros Brandt **A.**
P. pubescentulus Dana **P**, Fig. 53.

Sub-family PALÆMONINÆ. Carpus of second pair never annulate, feet without exopodites.

G. *Pontonia* Latreille. Rostrum short, external maxillipeds expanded, with exopodites.

66. Carapax smooth; dactylus of larger hand of second pair with two teeth
P. domestica Gibbes **S**
66. Carapax pubescent; dactylus of larger hand with one tooth
P. unidens Kingsley **S**, Fig. 40

G. *Anchistia* Dana. Rostrum long, slender; second pair of feet slender, equal.

67. . . . . *A. americana* Kingsley **S**, Fig. 10

G. *Palæmonetes* Heller. Rostrum long lamellate; antennal and branchiostegal spines present; fresh or brackish water.

68. Fresh-water species 69
68. Salt or brackish water species 70
69. Rostrum without teeth below *P. antrorum* Benedict. Well in Texas
69. Rostrum toothed below. *P. paludosa* (Gibbes) Kingsley, South Carolina, Great Lakes, Fig. 56.
70. Rostrum straight . . *P. vulgaris* (Say) Stm. **N, M, S**, Fig. 47
70. Rostrum recurved . . . . . *P. carolinus* Stm. **M, S**

G. *Urocaris* Stimpson. Rostrum toothed above, toothless below; eyes elongate; sixth segment of abdomen very long.

71. . . . . *U. longicaudatus* Stm. **M, S**

G. *Palæmon* Fabricius. Rostrum lamellate; eyes free; mandibular palpus three-jointed.

72. Hepatic spine lacking, marine . . . . (S. G. *Leander*) 73
72. Hepatic spine present, fresh-water
P. ohionis Smith, Ohio and Mississippi rivers
73. Rostrum with 10 to 12 teeth above, 6 or 7 below
P. tenuicomis Say. Gulf weed, Atlantic

73. Rostrum with 7 to 8 teeth above, 3 below *P. ritteri* Holmes **D**, Fig. 37

Family PENEIDÆ. Third pair of feet the largest.

G. *Peneus* Labreille. Rostrum elongate, external maxillipeds with exopodites.

74. Both flagella of antennulæ very short; carapax sulcate near middle line . . . . . *P. braziliensis* Latr. **M, S, D**[1]

74. Antennular flagella longer, no sulci near middle line . . . 75

75. Carapax without median carina, rostrum entire below *P. constrictus* Stm. **M, S**

75. Carapax carinate to nearly posterior margin; rostrum dentate below *P. setiferus* (L.) M.-Edw. **M, S**

G. *Sicyonia* Milne-Edwards. Rostrum short; carapax carinate; external maxillipeds without exopodite.

76. Two teeth on median carina and two minute teeth on the rostrum *S. carinata* (Olir.) M.-Edw. **S**

76. Three teeth on median carina and four on the rostrum *S. brevirostris* Stm. **S**

76. Three teeth on median carina, two on rostrum, the tip spined *S. lævigata*

76. Two teeth on median carina, three on rostrum *S. dorsalis* Kingsley **S**

[1] Possibly the specimens of *P. canaliculatus* of Holmes belong here.

LIST OF FIGURES.

1. *Crangon vulgaris.*
2. *Crangon boreas.*
3. *Crangon franciscorum.*
4. *Sabinea septemcarinata.*
5. *Sabinea sarsii.*
6. *Hippolysmata wurdemanni.*
7. *Hippolysmata intermedia.*
8. *Hippolysmata californica.*
9. *Alpheus packardii.*
10. *Anchistia americana.*
11. *Hippolysmata californica*, mandible.
12. *Alpheus harfordi.*
13. *Alpheus websteri.*
14. *Hippolyte layi.*
15. *Hippolyte affinis.*
16. *Hippolyte californiensis.*
17. *Concordia gibberosa.*
18. *Tozeuma carolinensis.*
19. *Hippolyte phippsii* (*turgida*).
20. *Thor floridanus.*
21. *Hippolyte herdmanni.*
22. *Hippolyte pusiola.*
23. *Hippolyte polaris.*
24. *Hippolyte phippsii.*
25. *Hippolyte microceros.*
26. *Hippolyte polaris* (*borealis*).
27. *Pandalus danæ.*
28. *Hippolyte gaimardii* (*gibba*).
29. *Hippolyte fabricii.*
30. *Virbius zostericola.*
31. *Crangon munitellus.*
32. *Hippolyte spinus.*
33. *Hippolyte macilenta.*
34. *Hippolyte gaimardii.*
35. *Ogyris alphærostris.*
36. *Alpheus candei.*
37. *Palæmon ritteri.*
38. *Palæmon ritteri*, mandible.
39. *Hippolyte securifrons.*
40. *Pontonia unidens.*
41. *Hippolyte prionota.*
42. *Alpheus floridanus.*
43. *Alpheus heterochelis.*
44. *Crangon intermedius.*
45. *Caridina pasadenæ.*
46. *Hippolyte spinus.*
47. *Palæmonetes vulgaris.*
48. *Crangon munitus.*
49. *Caridina pasadenæ*, mandible.
50. *Hippolyte lamellicornis.*
51. *Caridion gordoni.*
52. *Acanthephyra pacifica.*
53. *Pandalus pubescentulus.*
54. *Paracrangon echinatus.*
55. *Hippolyte palpator.*
56. *Palæmonetes paludosa.*
57. *Hippolyte brevirostris.*