

PHYLUM ARTHROPODA

Class Crustacea

The Higher Malacostraca (Decapoda and Stomatopoda)

The great majority of the well known crustaceans collected and studied at Woods Hole are in the order Decapoda, although the group also includes some little known forms and presents problems of identification in certain families, such as in the Xanthidae and Pinnotheridae. The "mantis shrimps" of the order Hoplocarida or Stomatopoda (see page 127) are represented only by two species, not commonly collected.

Figure references in this chapter are to Plates 16 and 17.

KEY TO THE MORE COMMON DECAPOD CRUSTACEANS

- I. Small animals of shrimp-like form; abdomen well developed, with tail fan; pleopods used for swimming; pleura (side plates) of 2nd abdominal segment overlapping those of first segment; the typical shrimps and prawns (fig. 41) Section CARIDEA 1
- II. Animals of heavier form, with well developed abdomen; pleopods not used for swimming; thoracic legs adapted for walking; chelipeds large and strong.
- A. Abdomen not much (if at all) wider or longer than cephalothorax; body firm, well armored and well pigmented; the familiar fresh water crayfishes and, as the only local marine representative, the lobster Homarus americanus Subsection ASTACURA or NEPHROPSIDA
- B. Abdomen markedly wider and/or longer than cephalothorax; bodies soft, seemingly weak; burrowing forms with tendency to reduced eyes and pigmentation; sometimes placed with Anomura Subsection THALASSINIDEA 4
- III. Animals of typically crablike form, with 5th (last) pair of thoracic legs not markedly reduced; abdomen reduced, lacking uropods, and folded under body; antennae short and set medial to eyes; the "true crabs" Section BRACHYURA 5
- IV. Fifth pair of thoracic legs very reduced and folded up above bases of 4th pair; form varies from quite crablike to not very crablike; abdomen in some is asymmetrical or twisted, or reduced, but with uropods Section ANOMURA 27

I. Caridea

1. Carpus (the segment next to the claw or hand) of 2nd pair of legs not annulated (fig. 40) 2
1. Carpus of 2nd pair of legs annulated into 3 parts (fig. 39); with humped abdomen (Family HIPPOLYTIDAE) Hippolyte zostericola
2. Rostrum short, not compressed; first pair of legs subchelate (fig. 31); 2nd pair of legs chelate (as in fig. 41); eyes set close together (Family CRANGONIDAE) Crangon septemspinosus
2. Rostrum long and laterally compressed; first and 2nd pair of legs chelate; eyes set widely apart (Family PALAEMONIDAE) Palaemonetes

There are three local species, of which P. vulgaris is much the most common; the tabulation below should separate the three:

	<u>P. vulgaris</u> (figs. 33, 34)	<u>P. intermedius</u> (figs. 35, 36)	<u>P. pugio</u> (figs. 37, 38)
Dorsal rostral teeth	to tip	to tip	tip naked
Ventral rostral teeth	4-5	4-5	2-3
Dorsal rostral teeth lying posterior to orbits	2	1	1
Teeth of chelae of second legs:			
<u>movable finger</u>	$\frac{2}{1}$	$\frac{1}{0}$	$\frac{0}{0}$
fixed finger			

II. Thalassinidea

- 3. Chelipeds unequal in size; body very pale Callinassa atlantica
- 3. Chelipeds of equal size 4
- 4. Chelipeds with fingers not deflexed (fig. 30); fairly common and of good size (ca. 100 mm long) Upogebia affinis
- 4. Chelipeds with fingers deflexed (subchelate, fig. 29); a rare animal of small size (to ca. 35 mm) Naushonia crangonoides

Note: The Hoplocarida (Stomatopoda) or "mantis shrimps" have somewhat the same habitat and body build as the above 3 species, but are at once distinguished by their formidable mantis-like claws, large eyes, and by the short carapace which does not cover the last 4 thoracic segments (see page 127 and fig. 32).

III. Brachyura

- 5. Carapace triangular or globose, with apex projecting forward to form a rostrum; "spider crabs" 6
- 5. Carapace usually broader than long; rostrum small or wanting 9
- 6. Carapace triangular, resembling small chip of stone (fig. 3); walking legs very small but chelipeds relatively huge (Family PARTHENOPIDAE) Heterocrypta granulata
- 6. Walking legs long and conspicuous (Family MAIIDAE or INACHIDAE) 7
- 7. Carapace with medial dorsal spines 8
- 7. Carapace surface smooth, without median dorsal spines; splotched with red Pelvia mutica
- 8. With 6 spines in the median dorsal row; few dorsal tubercles (fig. 1) Libinia dubia
- 8. With 9 spines in median dorsal row; many dorsal tubercles (fig. 2) Libinia emarginata

9. Free living crabs, well pigmented, with eyes not reduced 10
9. Small crabs with reduced eyes; commonly but not always with reduced body pigmentation; usually commensal in worm tubes or bivalves, but some may wander free; carapaces either subcircular or markedly widened from side to side; small, rarely reaching 2.5 cm across carapace 19
10. Carapace outline varies, but characteristically front margin is curved, and bears a series of teeth between the eye and the (antero) lateral corner on each side; size varies, but several over 5 cm across carapace belong here; "canceroid" crabs 11
10. Carapace outline squarish, with a more or less straight front margin; most are active, semi-terrestrial crabs, rarely over 4 cm across carapace; free living "grapsoid" crabs 23
11. First antennae (antennules) folded longitudinally or nearly so (fig. 4) Family CANCRIDAE 12
11. First antennae folded transversely or obliquely (fig. 5) 13
12. Edges of antero-lateral teeth entire; chelipeds granulate, not denticulate (fig. 6) Cancer irroratus
12. Edges of antero-lateral teeth denticulate; upper margin of palm denticulate (fig. 7) Cancer borealis
13. Last pair of walking legs not markedly adapted for swimming; tips sharp, for walking (fig. 10) 14
13. Last pair of legs flattened and paddle-like; tips rounded, for swimming (figs. 8, 9) 18
14. Front (region between eyes) produced into 3 low teeth; 5 very prominent sharp anterolateral teeth (fig. 10); hind pair of legs slightly flattened; an active long legged crab commonly 5-7.5 cm across carapace; the common "green crab" but color varies from greenish-black to orange Carcinus maenas
14. Front not produced into teeth; generally small crabs, but more heavily built and less active than Carcinus, with shorter legs and heavier chelae; tips of chelae dark in some species; a group in which specific identification requires care Family XANTHIDAE 15
15. Frontal margin (between eyes) with a single edge, not seeming double; fingers of chelae dark 16
15. Frontal margin transversely grooved so as to appear double; fingers of chelae whitish; carapace with 4 and 3 distinct transverse lines of granules on anterior half Rhithropanopeus harrisi
16. Movable finger of major cheliped with a heavy blunt tooth near base (fig. 26); carapace width often exceeds 2.5 cm (fig. 25) Panopeus herbsti
16. Movable finger of major cheliped without such a tooth 17
17. With an elongated dark red spot on the inner (concealed) surface of each maxilliped (note: Panopeus herbsti sometimes but not always has a comparable spot, but it is small, circular, and located near base of maxilliped); fingers of minor chela "spooned" (fig. 28); carapace rather flattened and oval in outline (fig. 27); uncommon Eurypanopeus depressus
17. Without such red spot on maxillipeds; fingers of minor chela not "spooned" (Fig. 24); carapace outline more angular (fig. 23) not oval; very common Neopanope texana

- 18. Antero-lateral teeth on carapace 3 to 5 in number (fig. 9); carapace not usually broad; color cream to tan with red markings ("lady crab") Ovalipes ocellatus
- 18. Antero-lateral teeth 9 in number (fig. 8); carapace extremely broad; outermost lateral tooth especially long and sharp; with some blue coloration, particularly on chelipeds ("blue crab") Callinectes sapidus
- 19. Fifth (last) pair of thoracic legs very small and tucked up under carapace; you are in the wrong part of key; animal is a brachyurous anomuran; go on to no. 30.
- 19. Fifth (last) pair of thoracic legs is not especially reduced, useful in locomotion. This is a difficult family with marked sexual dimorphism Family PINNOTHERIDAE 20
- 20. Carapace thin and shiny; body almost circular (fig. 12); commensal in mantle cavity of bivalves or in Chaetopterus tubes Pinnotheres maculatus
- 20. Carapace much wider than long, generally commensal Pinnixa 21
- 21. Propodus (2nd segment from tip) of 3rd walking leg slender, twice as long as wide (figs. 13, 14) Pinnixa sayana
- 21. Propodus of 3rd walking leg not slender; less than twice as long as wide 22
- 22. Body and legs smooth, not especially hairy; propodus of 3rd leg only slightly if at all longer than wide (figs. 15, 16) Pinnixa cylindrica
- 22. Body and legs distinctly hairy; propodus of 3rd leg clearly longer than wide, and with edge granular or serrated (figs. 17, 18) Pinnixa chaetoptera
- 23. A gap is left between the 3rd maxillipeds when they are held at rest; front very or moderately broad; eyestalks short Family GRAPSIDAE 24
- 23. The 3rd maxillipeds almost or quite close over the mouth region when held at rest; front moderately or very narrow; eyestalks long; one cheliped of male very large; local representatives are the typical "fiddler crabs" Family OCYPODIDAE 25
- 24. Carapace very square (fig. 19); dark plum colored to bluish black (the "square backed fiddler"); found burrowing in salt marshes Sesarma reticulatum
- 24. Carapace with corners rounded off (fig. 20); color variably blotched olive-green; drifts in on Sargassum ("Columbus crab", "Gulf-weed crab") Planes minutus
- 25. Inner surface of large claw of male with an oblique ridge (fig. 22) 26
- 25. Inner surface of large claw of male without such oblique ridge (fig. 21); carapace mottled in grays and purple ("calico back") Uca pugilator

26. Carapace uniformly dark, almost black; not exceeding as a rule 22 mm in width; very numerous (the "black fiddler crab") Uca pugnax
26. Carapace grayish, lighter at front, with central brown mark; size very much larger than in the common fiddler crabs; carapace commonly over 23 mm, even 36 mm wide; reddish spots at joints of chelipeds, especially in males ("big fiddler crab"; red-jointed fiddler crab") Uca minax

IV. Anomura

27. Animals inhabit gastropod shells; abdomen soft and twisted ("hermit crabs") 28
27. Abdomen symmetrical and tucked under thorax 30
28. Chelipeds slender; hands subcylindrical 29
28. Hands broad, flat, tuberculate Pagurus pollicaris
29. Chelae with 4 or 5 distinct purplish bands on whitish background Pagurus annulipes
29. Chelae without such distinct banding Pagurus longicarpus
30. Form essentially crablike, except for having 5th (last) thoracic legs reduced and hidden under carapace (fig. 11); small, rounded; chelipeds directed forward in resting position (not transversely as in Brachyura); antennae long and set lateral to eyes (Family PORCELLANIDAE) Polyonyx macrocheles
30. Body egg shaped; carapace gray and shining; telson forms a long triangular white ventral shield; burrows in wave-swept sandy beaches (Family HIPPIDAE; "mole crabs", "sand bugs") Emerita talpoida

ANNOTATED LIST OF DECAPOD CRUSTACEANS

I. Caridea (shrimps)

Crago, see Crangon. The re-establishment of the old (1798) generic name Crangon for the common shrimps is the result of the suppression in 1955 of the name Crago by the International Commission on Zoological Nomenclature (Opinions and Declarations, 10(1): 1-44). This action terminated a most confusing situation, briefly: In 1904 Rathbun (Proc. Biol. Soc. Wash. 17: 170) reported that the name Crangon had first been used in an obscure work by Weber (1795) for the "snapping shrimps" known since 1798 as Alpheus, and in consequence she redesignated Alpheus as Crangon. This left the common shrimps without a name, so she adopted for them the "next available" name, Crago. The remarkable 3-way confusion included the use of the family name Crangonidae for the snapping shrimps and Crangonidae for the common shrimps. Under the 1955 ruling our common shrimp is secure under the generic name Crangon (Family Crangonidae), and the snapping shrimps (which do not occur at Woods Hole) are Alpheus, and restored to the arms of their family Alpheidae.

Crangon septemspinosus Say, 1818. Found in sand, in which it buries itself, below tide marks. Common, the name Crangon vulgaris Fabricius, 1798 has been used by those who believe the local form to be conspecific with the common European shrimp.

Hippolyte zostericola (Smith, 1874). Particularly common among eel grass (Zostera), its green body color rendering the shrimp inconspicuous.

Palaemonetes intermedius Holthius, 1949. Prior to 1949 this species and the next were confused with and included in P. vulgaris. Found in brackish water, and mainly southern.

Plate 16

DECAPOD CRUSTACEA

Sources: Redrawn from Rathbun (R), from Ryan (Ry), from specimens (S), all but nos. 13-14 by Bruce Shearer.

- Fig. 1. Libinia dubia, young male, carapace (R).
2. Libinia emarginata, young male, carapace (R).
3. Heterocrypta granulata (R).
4. Lower side of front of Cancer irroratus to show first antennae folded longitudinally or obliquely (S).
5. Same region of Carcinus maenas to show first antennae folded transversely (S).
6. Carapace of Cancer irroratus, to show smooth edged anterolateral teeth (S).
7. Anterolateral margin only of Cancer borealis, showing denticulate anterolateral teeth (S).
8. Callinectes sapidus, carapace and fifth leg (S).
9. Ovalipes ocellatus, carapace and fifth leg (S).
10. Carcinus maenas, carapace and fifth leg (S).
11. Polyonyx macrocheles (S).
12. Pinnotheres maculatus, male (S).
13. Pinnixa sayana, male, ventral (S).
14. Same, female (S).
15. Pinnixa cylindrica, male (S).
16. Same, female (S).
17. Pinnixa chaetopterana, male (S).
18. Same, female (S).
19. Sesarma reticulatum (S).
20. Planes minutus (S).
21. Inside of large claw of male Uca pugilator, lacking oblique ridge (S).
22. Same, but of Uca pugnax, with oblique ridge (S).
23. Carapace of Neopanope texana (S).
24. Major chela of same, with area of black outlined extending onto palm (S).
25. Carapace of Panopeus herbsti (points exaggerated) (S).
26. Major chela of same, to show blunt tooth on movable finger (S).
27. Carapace of Eurypanopeus depressus, to show oval outline (Ry).
28. Minor chela of same, to illustrate "spooned" condition (Ry).

Plate 16

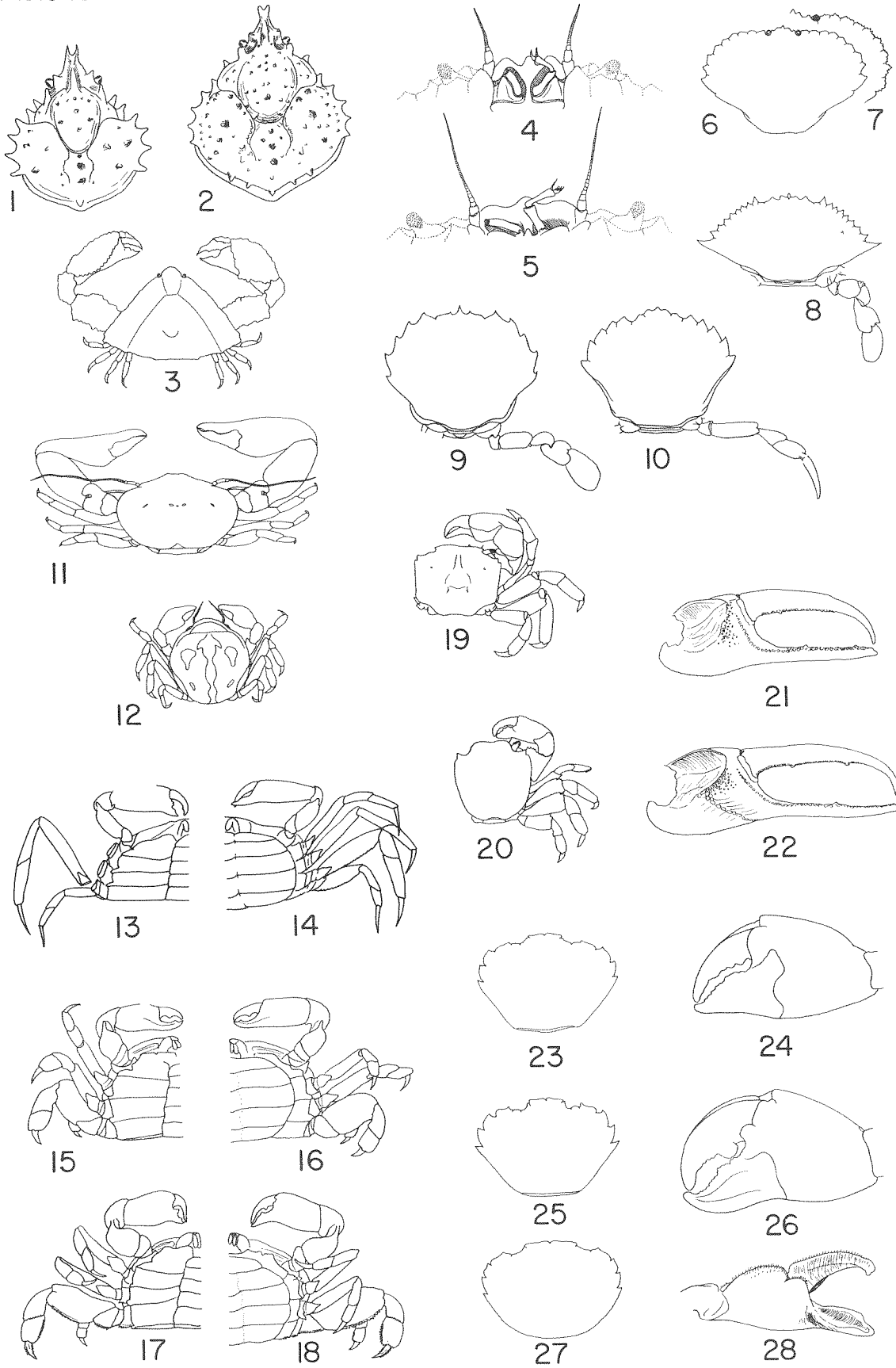


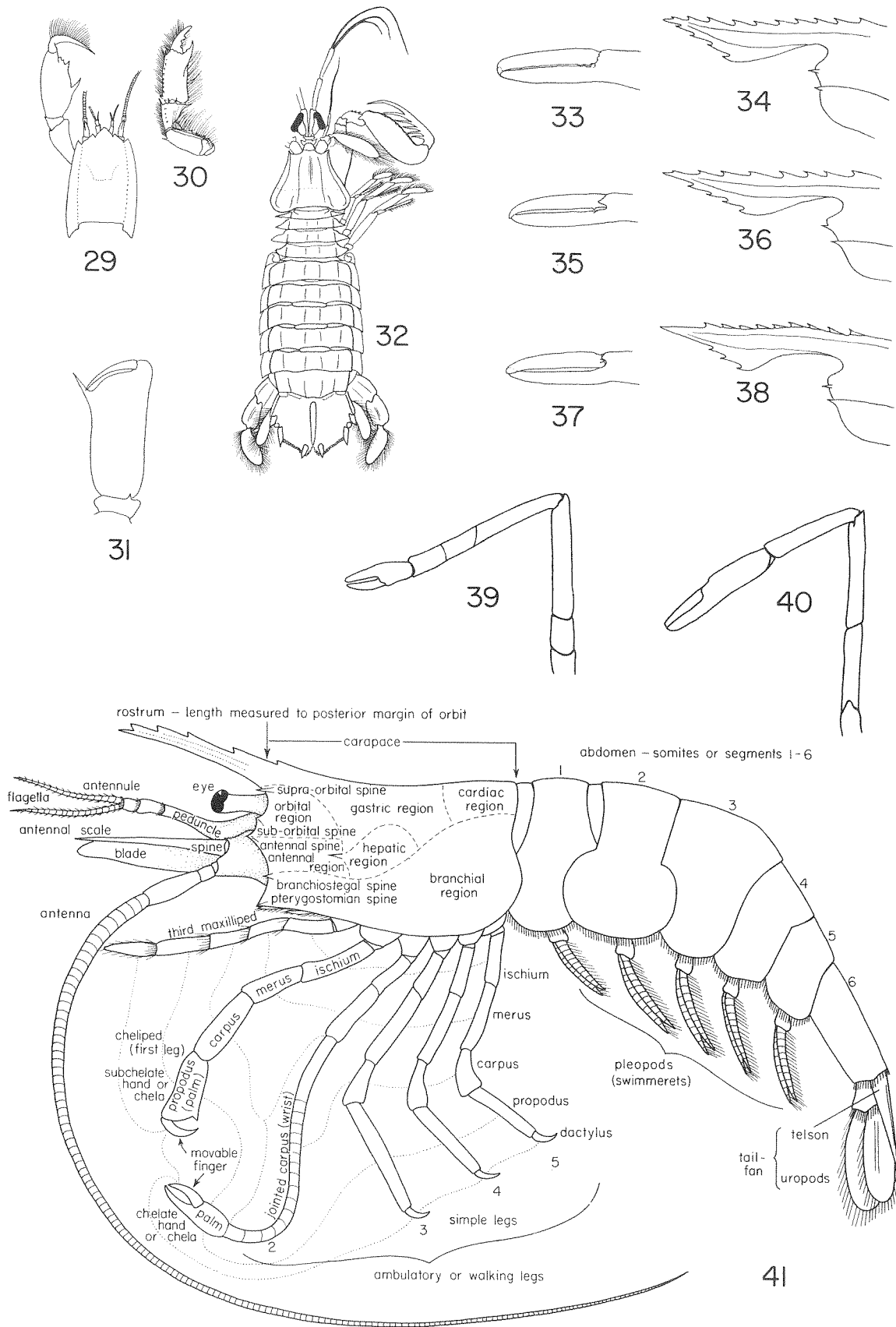
Plate 17

DECAPOD CRUSTACEA (cont.); STOMATOPODA

Figs. 29-40: Redrawn from Kingsley (K), Holthius (H), specimens (S), by Bruce Shearer.

- Fig. 29. Naushonia cranqonoides, carapace and left chela (K).
30. Upogebia affinis (S), left cheliped only.
31. Cranqon septemspinosus, "subchelate" first chela (S).
32. Squilla empusa (order Stomatopoda, not Decapoda) (S).
33. Second chela of Palaemonetes vulgaris (H).
34. Rostrum of same (S).
35. Second chela of Palaemonetes intermedius (H).
36. Rostrum of same (H).
37. Second chela of Palaemonetes pugio (H).
38. Rostrum of same (S).
39. Second leg of Hippolyte to show annulated carpus (S).
40. Second leg of Palaemonetes; carpus not annulated (S).
41. Lateral view of a generalized decapod, redrawn after Schmitt, showing the typical shrimp-like ("caridoid") form and appendages.

Plate 17



Palaemonetes pugio Holthius, 1949. In brackish to almost fresh water.

Palaemonetes vulgaris (Say, 1818). This is the species usually collected and used at Woods Hole. Tends to occur in more saline water than the two less common species above.

II A. Astacura or Nephropsidea

(Crayfish and lobsters)

Homarus americanus Milne-Edwards, 1837. The familiar lobster, generally taken commercially in subtidal water; uncommon locally because of fishing. A point for comparative physiologists to bear in mind is that the lobster is more closely related to the fresh water crayfishes than to any other of the local marine crustaceans.

II B. Thalassinidea

(Mud shrimps)

Callinassa atlantica (Smith, 1874). A burrower in muddy sand, intertidal and in shallow water. The name C. atlantica replaces the name C. stimpsoni, which has prior application to a Pacific coast fossil species (see Schmitt, 1935).

Naushonia crangonoides Kingsley, 1895. Rare; has been found in intertidal or shallow subtidal, in muddy sand.

Upogebia affinis (Say, 1817). Habitat similar to that of Callinassa, but muddier.

III. Brachyura

(True crabs)

Callinectes sapidus Rathbun, 1895. The blue crab. Common in grassy bays and salt water ponds. An important commercial and experimental animal, whose wide range on our east coast has been extended by accidental introduction into France, Holland, Denmark, and Israel. Penetrates into waters of very low salinity, especially in the warmer parts of its range.

Cancer borealis Stimpson, 1859. Northern rock crab, Jonah crab. Despite name, is not confined to rocky areas but is often found in sand.

Cancer irroratus Say, 1817. Rock crab. Similar to the above, but perhaps more characteristic of rocky areas.

Carcinides, see Carcinus. "Carcinides" is now a rejected synonym of Carcinus. The facts are briefly: in 1897 Rathbun (Proc. Biol. Soc. Wash., 11: 164) substituted Carcinides for the well known name, Carcinus, of the common green crab on the grounds that the name Carcinus had been given prior use by Latreille in 1796 for an essentially unrecognizable genus of amphipods. However, Latreille described no species under Carcinus, and the term in his sense was never subsequently used. In Opinion 330 (Opinions and Declarations, ... 9(24): 321-338, 1955) the International Commission on Zoological Nomenclature suppressed Carcinus of Latreille 1796 and validated the Carcinus of Leach 1814 as applied to the green crab.

Carcinus maenas (Linnaeus). The green crab. The commonest crab of this area, in marine and brackish water.

Eurypanopeus depressus (Smith, 1869). Apparently uncommon or of doubtful occurrence in Woods Hole region; reported by Verrill and Smith but not taken by Sumner survey (1913) nor in the summer of 1963. It is extremely common further south (e.g. Delaware Bay), and is often associated with oysters or oyster shells in muddy areas where salinity may be lowered.

Heterocrypta granulata (Gibbes, 1849). Dredged on bottoms of shingles or pebbles, which the animal much resembles.

Libinia dubia Milne Edwards, 1834. On muddy shores and flats. Stenohaline.

Libinia emarginata Leach, 1815. Common on muddy shores and flats. This is the species more commonly used at Woods Hole. Stenohaline.

- Neopanope texana sayi (Smith, 1869). Extremely common. This subspecies ranges from Canada to Florida, where it merges and is confused with N. texana texana.
- Ovalipes ocellatus (Herbst, 1799). Found in sand at low water mark and subtidally. Buries itself with only the eyes showing. Ranges from Cape Cod to South Carolina.
- Panopeus herbsti Milne-Edwards, 1834. The species (as several "forms") ranges from Boston to Brazil.
- Pelia mutica (Gibbes, 1850). Dredged, on gravelly and shelly bottom.
- Pinnixa chaetoptera Stimpson, 1859. Commensal in tubes of Chaetopterus, Amphitrite, and probably other worms.
- Pinnixa cylindrica (Say, 1818). Said to occur in burrows of Arenicola cristata. Young found free on low intertidal muddy shores.
- Pinnixa sayana Stimpson, 1860. Reported to be dug out of mud, but probably actually in worm or other burrows.
- Pinnotheres maculatus Say, 1818. Commensal in Mytilus, Modiolus, and several other bivalves, as well as in Chaetopterus tubes.
- Planes minutus (Linnaeus). A visitor that drifts into Woods Hole on Sargassum; may be found on shore occasionally.
- Rhithropanopeus harrissi (Gould, 1841). This has never been reported from Woods Hole, but has probably been overlooked since its range is from Mexico to Maine and New Brunswick. It is found in waters of very low salinity, even fresh water, and has been introduced and become common in other regions, where it has been used in physiological research (e.g. San Francisco Bay, Holland, Germany).
- Sesarma reticulatum (Say, 1817). A southern form, of spotty occurrence in certain fiddler crab marshes, rather to landward. May be looked for in or near Uca minax habitats.
- Uca minax (LeConte 1855). A southern species, in this area near the extreme of its range and found only in a few localities. May occur in very low salinities.
- Uca pugilator (Bosc, 1801-02). In salt marshes; tends to make burrows in sand and in Salicornia areas. Less gregarious than U. pugnax.
- Uca pugnax (Smith, 1870). In salt marshes. Tends to make burrows in muddy areas.

IV. Anomura

- Emerita talpoida (Say, 1817). Very common on exposed sandy beaches; intertidal.
- Pagurus annulipes Say, 1817. Dredged.
- Pagurus longicarpus Say, 1817. The commonest shallow water hermit crab; found everywhere.
- Pagurus pollicaris Say, 1817. The large hermit crab; common.
- Polyonyx macrocheles (Gibbes, 1850). Lives in Chaetopterus tubes.

Order Hoplocarida (Stomatopoda)

(Mantis-shrimps)

Members of this order differ greatly from decapods in structure, having only a short carapace that does not cover the last 3 or 4 segments of the thorax, and having the second maxillipeds modified to remarkable mantis-like, raptorial claws. They burrow in subtidal or low intertidal mud, and are not commonly taken. There are two local species, distinguished as follows:

1. Carapace and abdomen with several longitudinal carinae or keels; size large, up to 25 cm; 6 teeth on finger of raptorial claw; fairly common subtidally, but rare intertidally (fig. 32)
 Squilla empusa Say, 1818
2. Carapace and abdomen smooth, without carinae; small, up to 4 cm long; raptorial claw with 11-15 teeth; rare
 Nannosquilla grayi (Chace, 1958)
 (Described as Lysiosquilla grayi; see Manning, 1963)

REFERENCES ON DECAPODS AND STOMATOPODS

- Chace, F. A., Jr., 1958. A new stomatopod crustacean of the genus Lysiosquilla from Cape Cod, Massachusetts. Biol. Bull., 114: 141-145.
- Hay, W. P. and C. A. Shore, 1918. The decapod crustaceans of Beaufort, N. C., and the surrounding region. Bull. U. S. Bur. Fish. 35(1915-1916): 371-475.
- Holthius, L. B., 1952. A general revision of the Palaemonidae (Crustacea, Decapoda, Natantia) of the Americas. II. The subfamily Palaemoninae. Allan Hancock Foundation Occ. Papers no. 12: 1-396.
- Kingsley, J. S., 1899. Synopsis of North American Invertebrates. III. The Caridea of North America. Amer. Nat. 33: 709-720.
- Manning, R. B., 1963. Preliminary revision of the genera Pseudosquilla and Lysiosquilla . . . Bull. Mar. Sci. Gulf and Caribbean, 13: 308-328.
- Rathbun, M. J., 1917. The grapsoid crabs of America. Bull. U. S. Nat. Mus., 97: i-xxii, 1-461.
- _____, 1925. The spider crabs of America. Ibid, 129: i-xx, 1-613.
- _____, 1930. The cancrivora crabs of America of the families Euryalidae, Portunidae, Atelecyclidae, Cancridae, and Xanthidae. Ibid, 152: i-xvi, 1-609.
- Schmitt, W. L., 1935. Mud shrimps of the Atlantic coast of North America. Smithson. Misc. Coll., 93: 1-21, 4 pl.