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KEY TO SHRIMP
COMMON IN SOUTHERN
CALIFORNIA TRAWL CATCHES

Jack Word
Danuta Charwat

SOUTHERN CALIFORNIA COASTAL WATER RESEARCH PROJECT
1500 East Imperial Highway, El Segundo, California 90245

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Illustrated by Danuta Charwat

Southern California Coastal Water Research Project
1500 East Imperial Highway
El Segundo, California 90245
(213) 322-3080

PREFACE

This key to the coastal shrimps of southern California is part of a series of papers and memoranda resulting from the Taxonomic Standardization Program of the Coastal Water Research Project. The program, initiated in 1973, brings together taxonomic experts, pertinent literature and keys, and practicing coastal marine biologists via monthly laboratory meetings and newsletters. The purpose of the program is to promote standardized terminology for benthic and epibenthic invertebrates and fishes encountered along the outer coasts, bays, and islands of southern California and to make materials for proper taxonomic identifications available to all practicing biologists.

We wish to thank participants of earlier meetings (notably the California Coastal Monitoring and Ecological Survey Standards Committees, CCMESS) for encouraging standardization among coastal workers as well as the many public and private agencies that are cooperating with us in this work.

ALAN J. MEARNS
Sr. Environmental Specialist
Biology Division

CONTENTS

INTRODUCTION	1
LIST OF SPECIES	3
BODY PARTS OF THE SHRIMP	5
KEY TO THE FAMILIES	6
KEY TO THE GENERA AND SPECIES	12
Penaeidae	12
Sergestidae	12
Lysmatidae	12
Pasiphaeidae	14
Pandalidae	14
Hippolytidae	18
Alpheidae	24
Crangonidae	26
DEPTH DISTRIBUTION OF SPECIES	33
BIBLIOGRAPHY	35
INDEX	41

INTRODUCTION

In 1973 and 1974, the Coastal Water Project made an intensive effort to preserve and properly identify specimens of the shrimp commonly caught in trawl surveys of southern California waters. This key, which is a guide to identification of 33 species, is one result of this effort. Our eventual goal is to publish a series of keys to invertebrates, which will aid field workers in properly identifying organisms caught and help standardize the nomenclature used in describing catches.

The key is based on our examination of more than 30,000 specimens taken in approximately 130 trawls between June 1973 and January 1974. The trawls covered stations off the stretch of coast between Malibu and Dana Point as well as sites off several of the offshore islands. The last section of this publication contains information on the distribution and depth ranges of the species described in the key: Except as indicated, we have found all species in each of the areas surveyed.

The key is divided into two parts--a section on families and a section on genera and species--and is pictorial: Every distinguishing feature is illustrated. (Color is used in the identification in only one case (Crangon nigromaculata).) The shrimp on Page 5, which is a composite of several species, has all of the body parts used in distinguishing species in the key. In almost all cases, a dissecting microscope must be used to examine the specimens; thus, the catch may have to be preserved. We recommend that individuals be separated as much as possible before the preservative is added (legs and other body parts, which may be the distinguishing feature of a species, frequently fall off preserved specimens).

We also suggest that diseased or abnormal specimens be preserved and the prevalence of the anomaly in the total catch be reported. The anomaly we find most often in our shrimp catches is the presence of parasitic isopods. The parasites, which lodge in the branchial chamber between the gills and the carapace and create a tumor-like lump on the body, are found in Crangonidae, Hippolytidae (*Spirontocaris* spp.), Alpheidae, and Pandalidae.

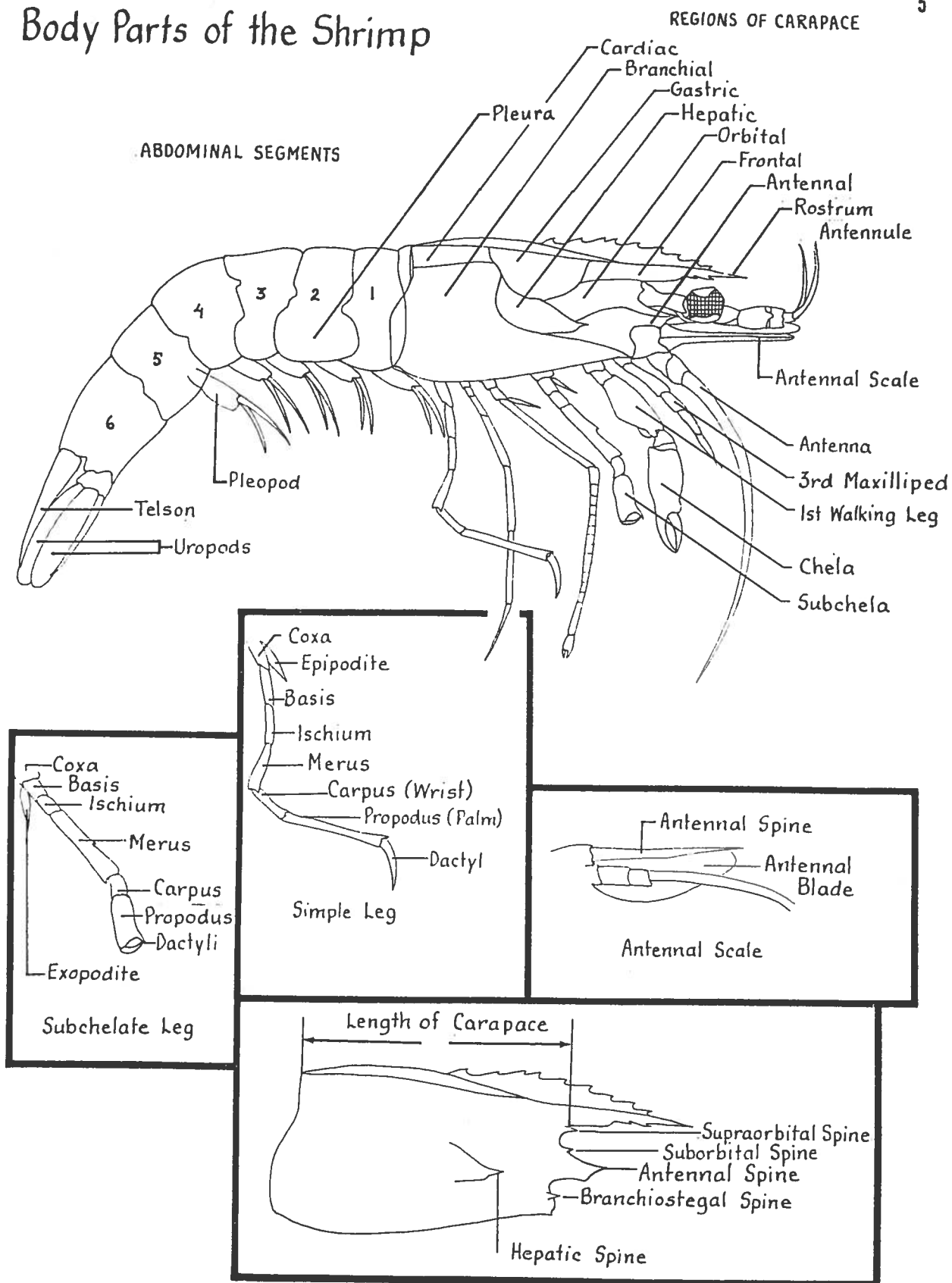
We plan to update this key as necessary and would appreciate your comments, suggestions, and additions.

SHRIMP SPECIES COMMON IN
SOUTHERN CALIFORNIA TRAWL CATCHES

TRIBE AND FAMILY	SPECIES
PENAEIDES	
Penaeidae	<u>Sicyonia ingentis</u> Burkenroad, 1938 <u>Penaeus californiensis</u> Holmes, 1900 <u>Penaeus brevirostris</u> Kingsley, 1878
Sergestidae	<u>Sergestes similis</u> Hansen, 1903
CARIDES	
Pasiphaeidae	<u>Pasiphaea pacifica</u> Rathbun, 1904
Lysmatidae	<u>Processa canaliculata</u> Leach, 1815
Pandalidae	<u>Pandalus jordani</u> Rathbun, 1902 <u>Pandalus platyceros</u> Brandt, 1851 <u>Pandalopsis</u> sp.
Alpheidae	<u>Alpheus dentipis</u> Guerin, 1832 <u>Alpheus equidactylus</u> Lockington, 1877 <u>Betaeus harfordi</u> (Kingsley, 1878) <u>Synalpheus lockingtoni</u> (Coutiere, 1909)
Crangonidae	<u>Crangon nigromaculata</u> Lockington, 1877 <u>Crangon nigrocauda</u> Stimpson, 1856 <u>Crangon alaskensis elongata</u> Rathbun, 1902 <u>Crangon alba</u> Holmes, 1900 <u>Crangon holmesi</u> Rathbun, 1902 <u>Crangon communis</u> Rathbun, 1899 <u>Crangon zaca</u> Chace, 1937 <u>Crangon resima</u> Rathbun, 1902 <u>Crangon spinosissima</u> Rathbun, 1902 <u>Argis californiensis</u> (Rathbun, 1902)
Hippolytidae	<u>Hippolysmata californica</u> Stimpson, 1896 <u>Spirontocaris bispinosa</u> Holmes, 1900 <u>Spirontocaris snyderi</u> Rathbun, 1902 <u>Spirontocaris sica</u> Rathbun, 1902 <u>Spirontocaris gracilis</u> (Stimpson, 1864) <u>Spirontocaris palpator</u> (Owen, 1839) <u>Spirontocaris brevirostris</u> (Dana, 1852) <u>Spirontocaris taylori</u> (Stimpson, 1857) <u>Spirontocaris pictus</u> (Stimpson, 1871) <u>Spirontocaris cristata</u> (Stimpson, 1860)

Body Parts of the Shrimp

5



KEY TO THE FAMILIES

- I. Third pair of walking legs are chelate, as shown in Figure 1 (first pair of walking legs may not be chelate). Pleura of second abdominal segment does not overlap pleura of first abdominal segment (Figures 1 and 2).

Tribe Penaeides

- A. Rostrum is very short or not present (Figure 3).

Family Sergestidae

- B. Rostrum is present and relatively prominent, with rostral teeth (Figure 1a).

Family Penaeidae

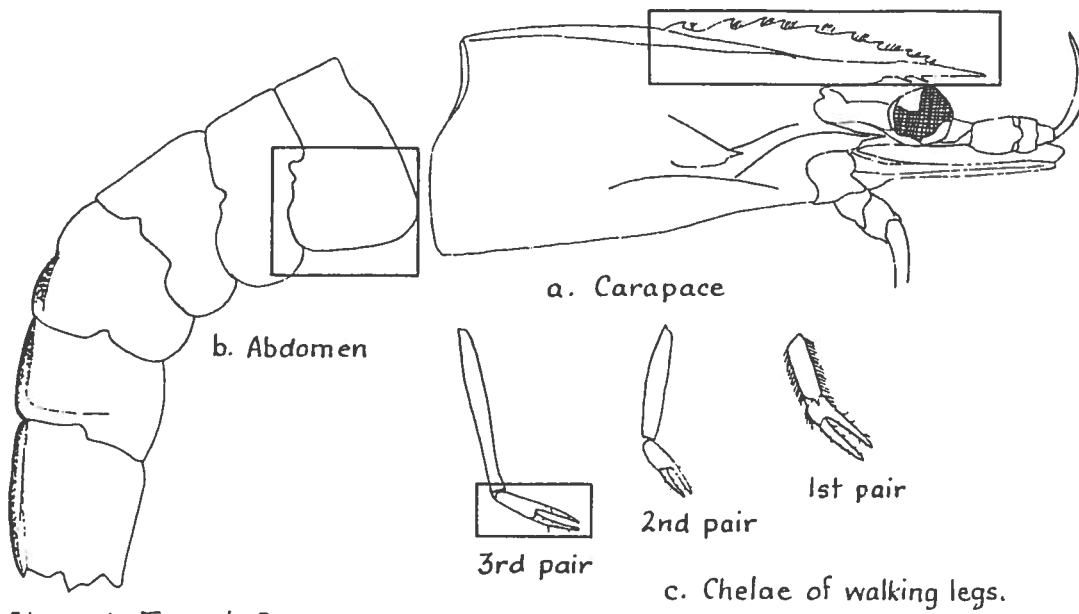


Figure 1. Typical *Penaeus* sp.

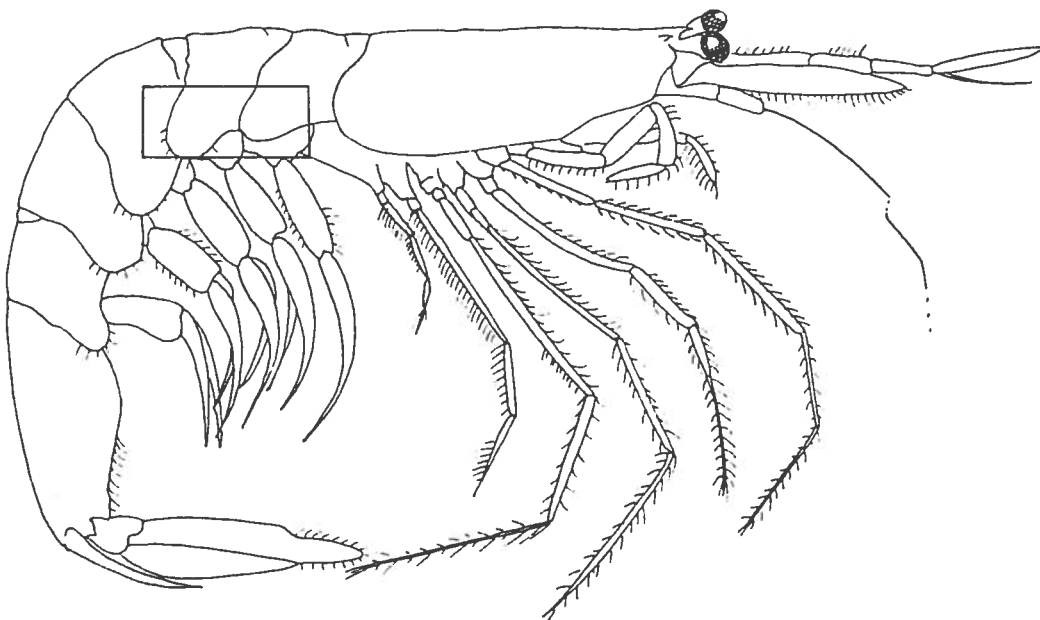


Figure 2. Typical *Sergestid* shrimp. After Illig 1927.

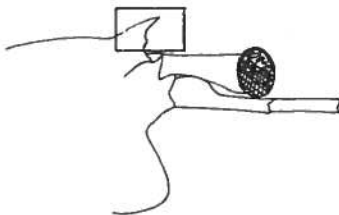


Figure 3. Rostrum of *Sergestes similis*.

- II. Third pair of walking legs are not chelate; pleura of second abdominal segment overlaps pleura of first abdominal segment (Figure 4).

Tribe Carides

- A. Wrists (carpi) of second pair of walking legs are subdivided (multiarticulated), as shown in Figure 5.
1. One leg of first pair of walking legs is chelate (Figure 6a); the other is simple (not chelate, Figure 6b).

Family Lysmatidae

2. Both legs of first pair of walking legs are simple.

Family Pandalidae

3. Both legs of first pair of walking legs are chelate.
 - a. First pair of walking legs has one or two strong or large chelae similar to those shown in Figure 7 (Snapping Shrimp).

Family Alpheidae

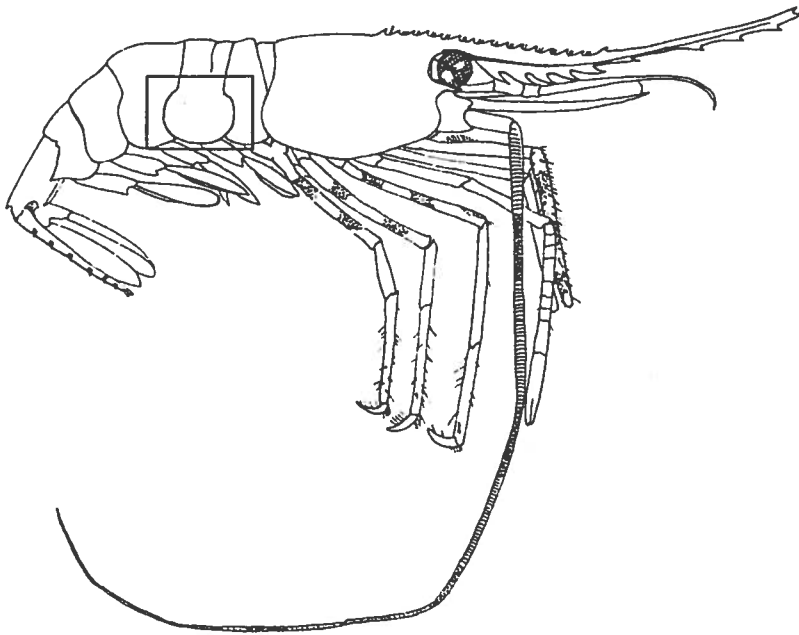


Figure 4. Typical body shape of the tribe Carides.

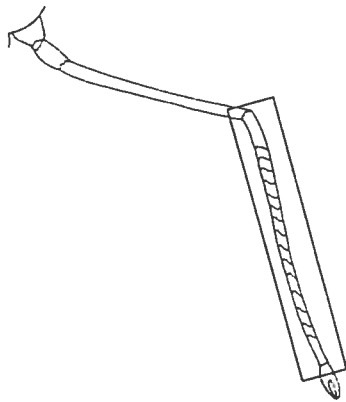
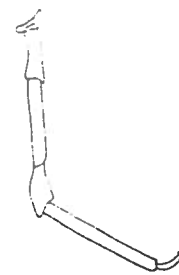


Figure 5. Second walking leg with multiarticulated carpus.



a. Chelate



b. Simple (no chela)

Figure 6. Chelate and simple walking legs.



Left

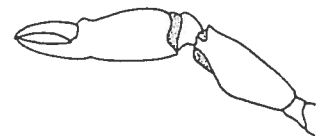


Right

a. *Synalpheus lockingtoni*



Left



Right

b. *Alpheus dentipes*

Figure 7. Typical variations in the chelae on the first pair of walking legs in the family Alpheidae.

b. First pair of walking legs does not have the strong chelae shown in Figure 7.

- (1) Rostrum has teeth and is relatively prominent (Figure 8).

Family Hippolytidae

- (2) Rostrum has no teeth or very inconspicuous teeth at apex that give it a bifid appearance.

Family Lysmatidae

B. Wrists of second pair of walking legs are not subdivided (Figure 9).

1. Chelae are elongate, similar to that shown in Figure 10.

Family Pasiphaeidae

2. Chelae are of the type shown in Figure 11 (subchelate).

Family Crangonidae

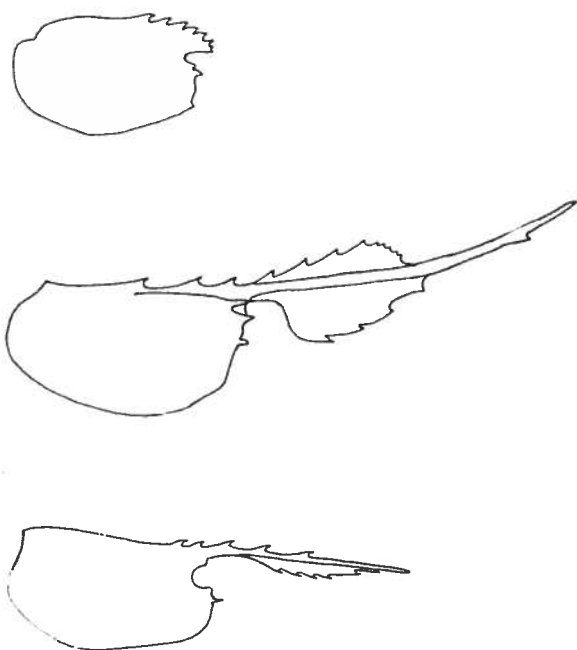


Figure 8. Typical variations in the rostrum in the family Hippolytidae.

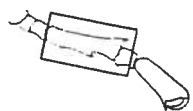


Figure 9. Second walking leg without multiarticulated carpus.



Figure 10. Typical chela of a Pasiphaeidae.



Figure 11. Typical chela of a Crangonidae.

KEY TO THE GENERA AND SPECIES

PENAEIDAE

- I. Abdomen is entirely carinated; telson has lateral spines (Figure 12).

Sicyonia ingentis

- II. Only fourth, fifth, and sixth abdominal segments are carinated; telson does not have lateral spines (Figure 13).

Genus Penaeus*

SERGESTIDAE

Sergestes similis is the only species in this family that we have found in southern California otter trawl catches.

LYSMATIDAE

Processa canaliculata (Figure 14) is the only species in this family that we have found in southern California otter trawl catches.

* For key to species in this genus, see Burkenroad 1938.

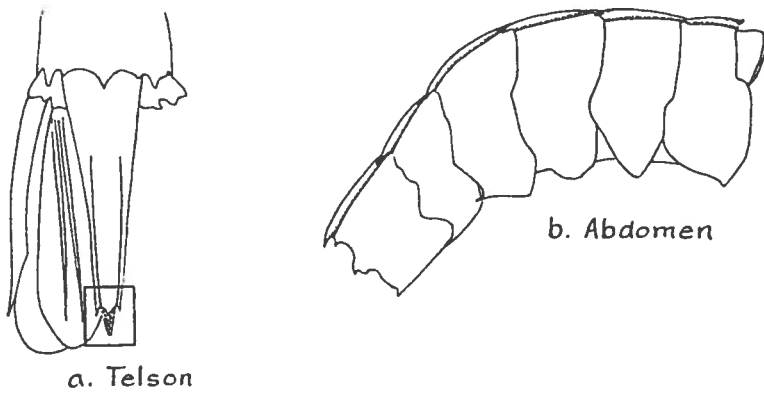


Figure 12. *Sicyonia ingentis*

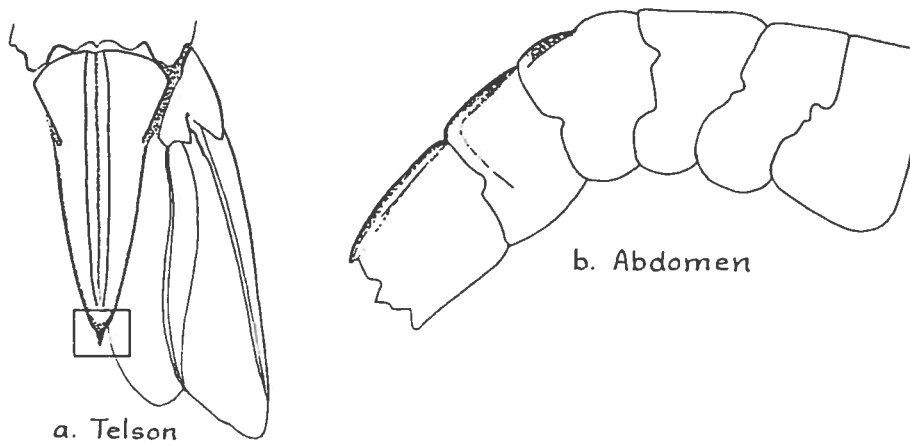


Figure 13. *Penaeus* sp.

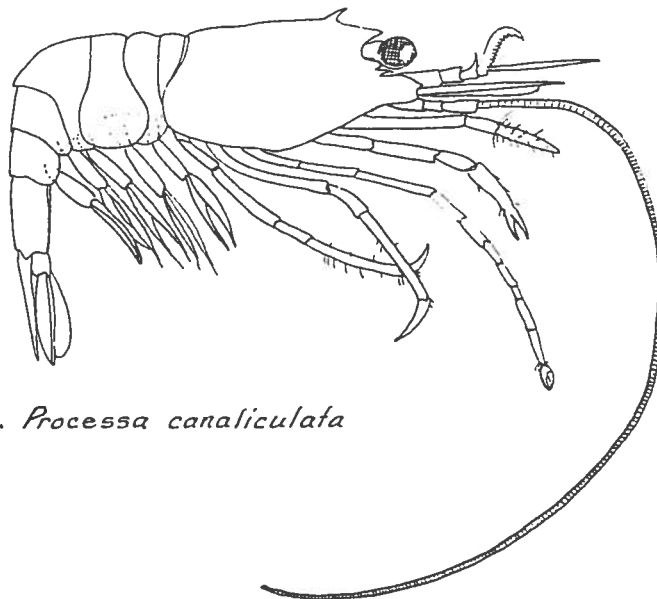


Figure 14. *Processa canaliculata*

PASIPHAEIDAE

Pasiphaea pacifica (Figure 15) is the only species in this family that we have found in southern California otter trawl catches.

PANDALIDAE

- I. Sixth abdominal segment is slender and about three times as long as wide (Figure 16).

Pandalus jordani

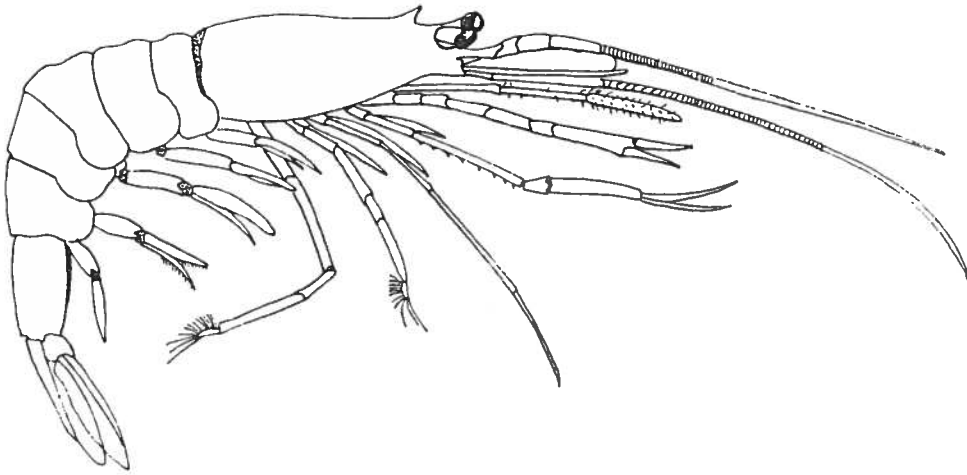


Figure 15. *Pasiphaea pacifica*

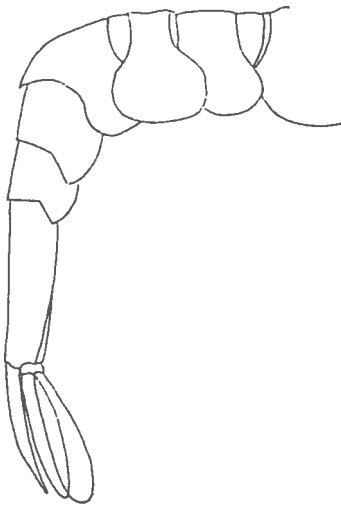


Figure 16. Abdomen and telson
of *Pandalus jordani*.

II. Sixth abdominal segment is short and stout--about 1-1/2 times as long as wide (Figure 17).

A. Merus of third pair of maxillipeds and ischium of first pair of walking legs have laminate expansions (Figure 17).

Pandalopsis sp. (n.sp.)

B. Merus of third pair of maxillipeds and ischium of first pair of walking legs do not have laminate expansions (Figure 18).

Pandalus platyceros

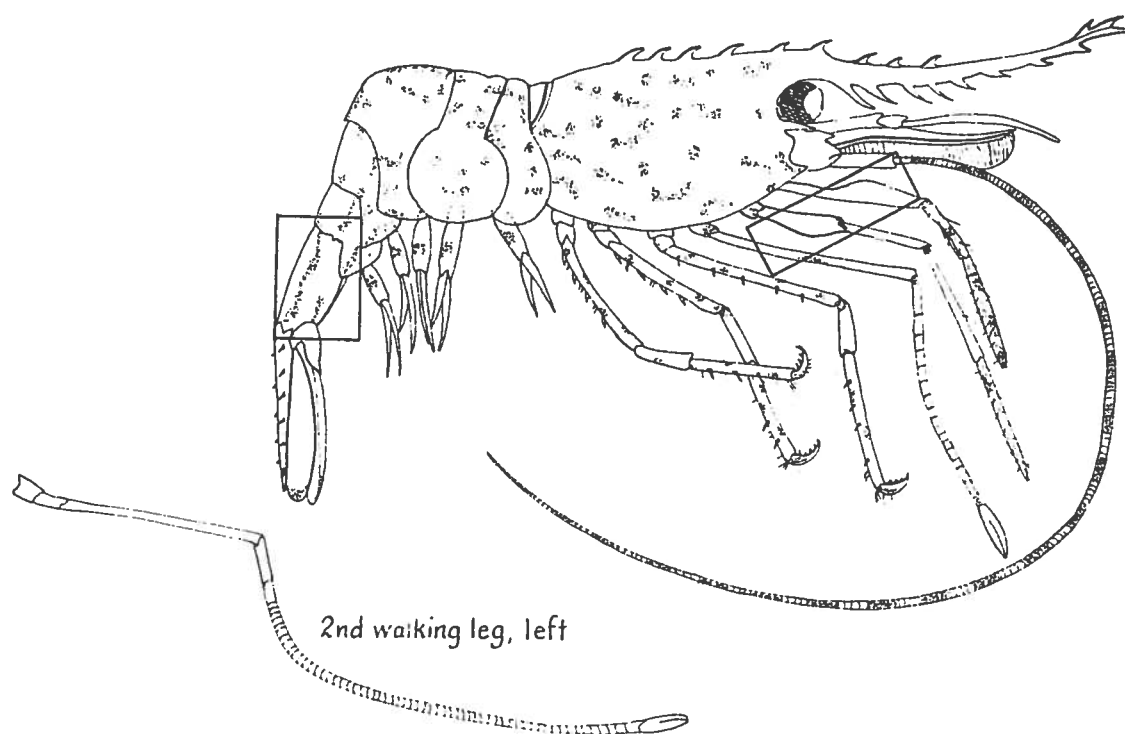


Figure 17. *Pandalopsis* sp. (n.sp.)

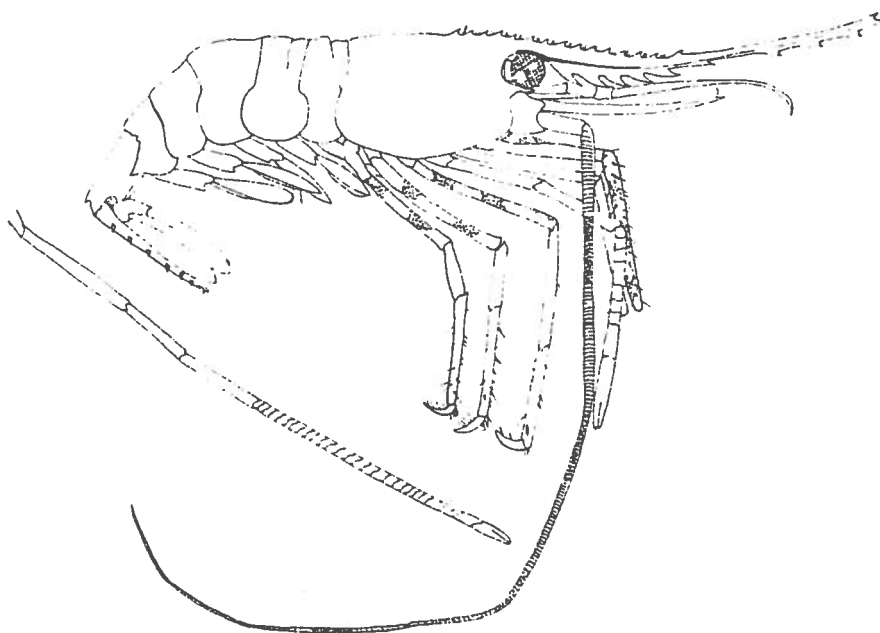


Figure 18. *Pandalus platyceros*

HIPPOLYTIDAE

- I. Carpi of second pair of walking legs have more than seven segments (21 segments in all, Figure 19).

Hippolyasmata californica

- II. Carpi of second pair of walking legs have seven segments (Figure 20).

- A. Carapace has two supraorbital spines (Figure 21).

1. Tip of rostrum is elongate.

- a. Ventral portion of elongated tip has a spine (Figure 21a).

Spirontocaris bispinosa

- b. Ventral portion of elongated tip does not have a spine (Figure 21b).

Spirontocaris sica

2. Tip of rostrum is short (Figure 21c).

Spirontocaris snyderi

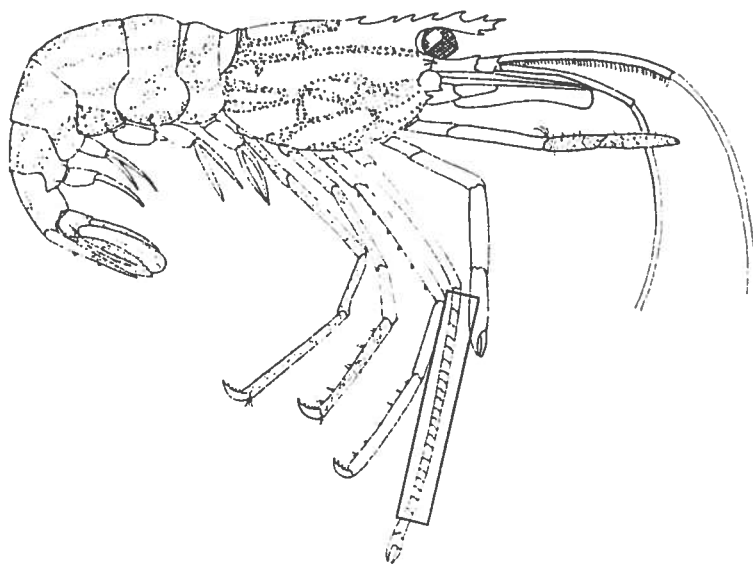


Figure 19. *Hippolysmata californica*

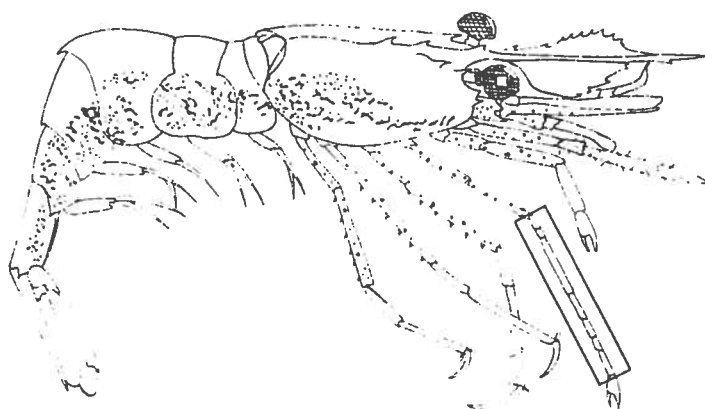
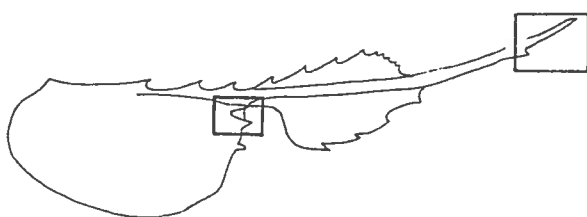


Figure 20. Typical *Spirontocaris* sp.



a. *Spirontocaris bispinosa*



c. *Spirontocaris snyderi*



b. *Spirontocaris sica*

Figure 21. Carapace with two supraorbital spines.

B. Carapace does not have supraorbital spines (Figure 22).

1. Rostrum is long--as long as carapace--and slender (Figure 22).

Spirontocaris gracilis

2. Rostrum is not as long as carapace (Figure 23).

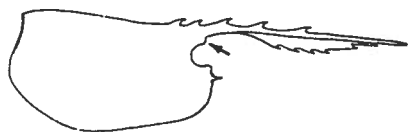
- a. Dactyls of walking legs are long and slender--about one-third to one-half the length of propodi (Figure 24).

Spirontocaris cristata

- b. Dactyls of walking legs are short--less than one-third the length of propodi.

- (1) Tip of rostrum is behind cornea of eye (Figure 25).

Spirontocaris taylori



(*Spirontocaris gracilis*)

Figure 22. Carapace with no supraorbital spines.

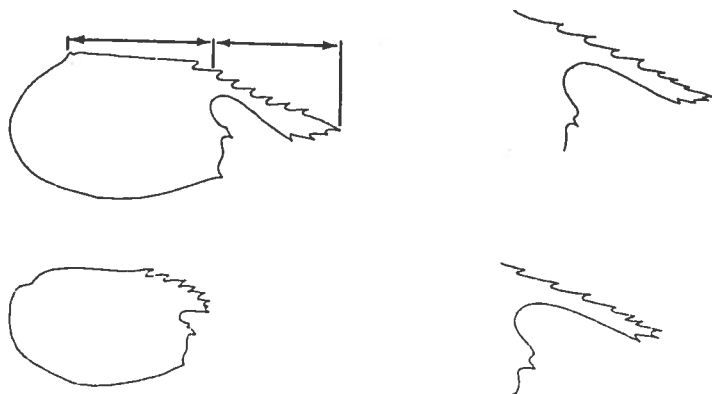


Figure 23. Rostrum not as long as carapace (typical variations).

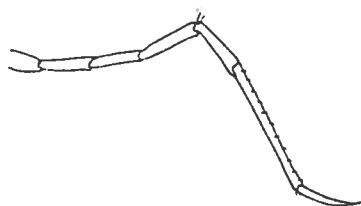


Figure 24. Elongated dactyl segment of *Spirontocaris cristata*.



Figure 25. Rostrum of .
Spirontocaris tayleri

(2) Tip of rostrum is in front of cornea of eye (Figure 26).

(a) Rostrum has two to four teeth on ventral side (Figure 27).

Spirontocaris pictus

(b) Rostrum has one tooth--or none--on ventral side (Figure 26).

-1- Antennal scale is longer than telson (Figure 28 and Table 1).

Spirontocaris palpator

-2- Antennal scale is shorter than telson (Figure 29 and Table 1).

Spirontocaris brevirostris

Table 1
Variability of ratio of
length of antennal scale to length of telson
in Spirontocaris palpator and S. brevirostris.
From Schmitt 1921.

Species	Length of Carapace (mm)	Length of Antennal Scale (mm)	Length of Telson (mm)
<u>S. palpator</u> *	8	4	3.5
	9	5	4.0
	9	5	4.5
	10	6	5.0
<u>S. brevirostris</u> **	14	7	7.0
	14	7	8.0
	15	7	8.0
	17	8	8.0

*Four specimens from southern California waters.

**Two specimens from San Francisco Bay, two from Alaskan waters.



Figure 26. Rostrum of
Spirontocaris brevirostris.

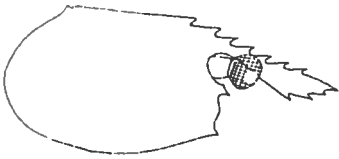


Figure 27. Rostrum of
Spirontocaris pictus.



Figure 28. Antennal scale that is
longer than telson.



Figure 29. Antennal scale that is
shorter than telson.

ALPHEIDAE

I. Rostrum is present (Figure 30).

- A. Dactyli are bifid, although this is apparent only upon inspection under a dissecting microscope at 20-25 power (Figure 31).

Synalpheus lockingtoni

B. Dactyli are not bifid.

1. Merus joints of third and fourth pairs of walking legs have a spine (Figure 32).

Alpheus dentipes

2. Merus joints of third and fourth pairs of legs do not have a spine (Figure 33).

Alpheus equidactylus

II. Rostrum is absent (Figure 34).

Betaeus harfordi

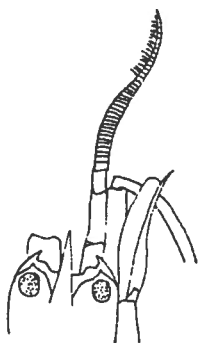


Figure 30. Carapace (top view)
of Alpheid shrimp.



Figure 31. Bifid dactyl of
Synalpheus lockingtoni.

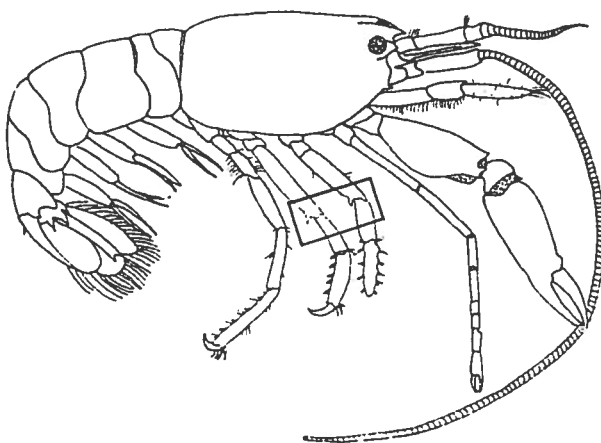


Figure 32. *Alpheus dentipes*.

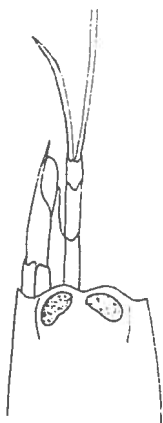


Figure 34. Carapace (top view)
of *Betaeus harfordi*.



Figure 33. Walking leg of
Alpheus equidactylus.

CRANGONIDAE

- I. Dactyli of fourth and fifth pair of walking legs are modified into a leaf-like shape; body type similar to that shown in Figure 35.

Argis californiensis

- II. Dactyli of fourth and fifth pair of walking legs are not leaf shaped.

- A. Gastric region of carapace is depressed below the general level of the carapace; body type similar to that shown in Figure 36.

Crangon spinosissima

- B. Gastric region of carapace is not depressed below general level of carapace.

1. Carapace has one median spine (Figure 37).

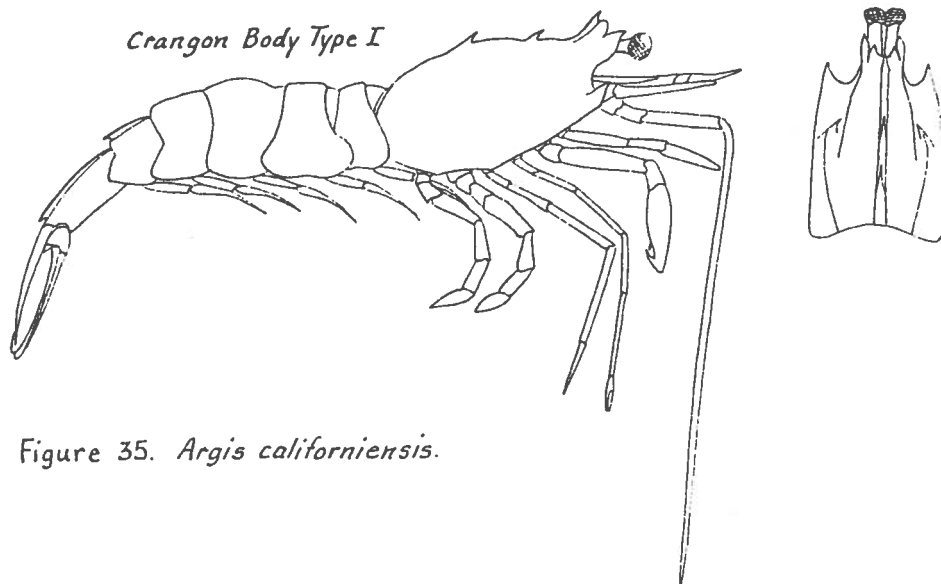


Figure 35. *Argis californiensis*.

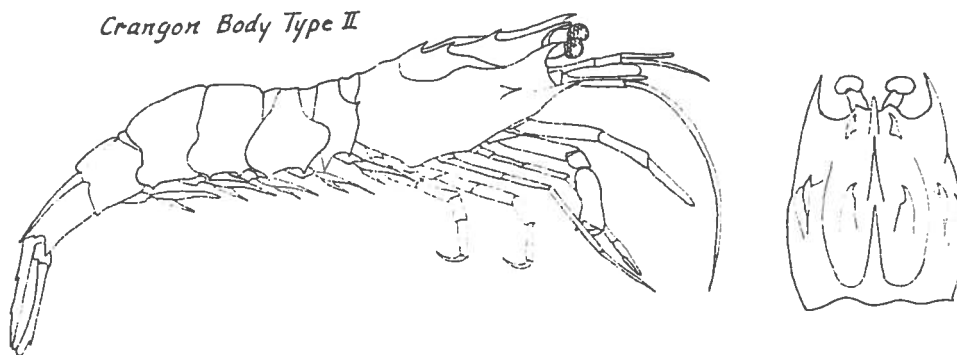


Figure 36. *Crangon spinosissima*.

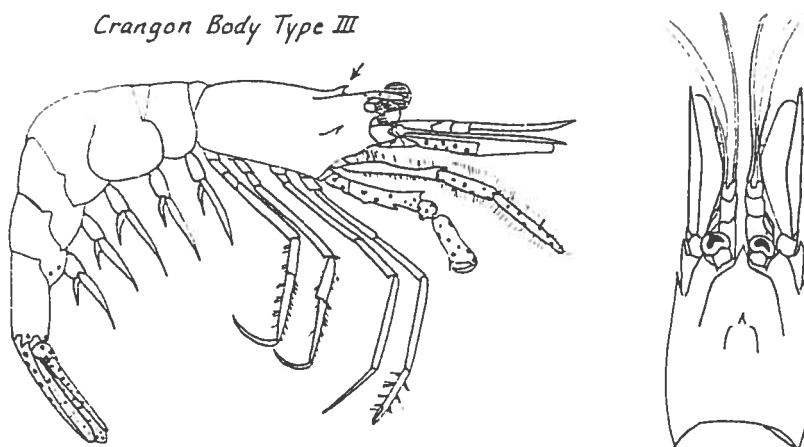


Figure 37. *Crangon alaskensis elongata*
(carapace has one median spine).

- a. A live or freshly preserved animal has one* blue spot on the lateral sides of the sixth abdominal segment (Figure 38).

Crangon nigromaculata

- b. A live or freshly preserved specimen does not have blue spots on sixth abdominal segment.

- (1) Ventral side of sixth abdominal segment is concave (Figure 39).

- (a) Internal angle of the blade of the antennal scale is produced (Figure 40).

Crangon nigrocauda

- (b) Internal angle of the blade of the antennal scale is not produced (Figure 41).

Crangon alaskensis elongata

- (2) Ventral side of sixth abdominal segment is convex (Figure 42).

- (a) Antennal scale is nearly as long or as long as the main part of the carapace--the portion between the base of the rostrum and the first abdominal segment.

Crangon holmesi

- (b) Antennal scale is approximately three-fourths the main part of the carapace.

Crangon alba

2. Carapace has two median spines (Figure 43).

* Or, occasionally, two.



Figure 38. Sixth abdominal segment of *Crangon nigromaculata*.



Figure 39. Cross-section of concave 6th abdominal segment.



Figure 40. Antennal scale of *Crangon nigromaculata*.



Figure 41. Antennal scale of *Crangon alaskensis elongata*.



Figure 42. Cross-section of convex 6th abdominal segment.

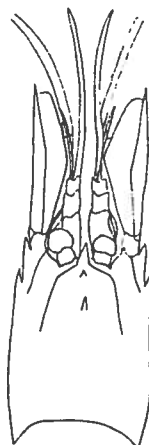


Figure 43. Carapace with two median spines.

- a. Rostrum tilts up at a 45° angle and has a flag-like structure at the tip (Figure 44).

Crangon resima

- b. Rostrum does not tilt up at a 45° angle and does not have a flag-like tip (Figure 45).

- (1) Only sixth abdominal segment is carinated, with one pair of carinae on dorsal surface separated by a median sulcus (Figure 46).

Crangon zaca

- (2) All but first and second abdominal segments are carinated (Figure 47).

Crangon communis



Figure 44. Carapace and rostrum
of *Crangon resima*.

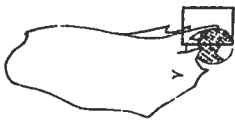


Figure 45. Carapace and rostrum
of *Crangon zaccae*.

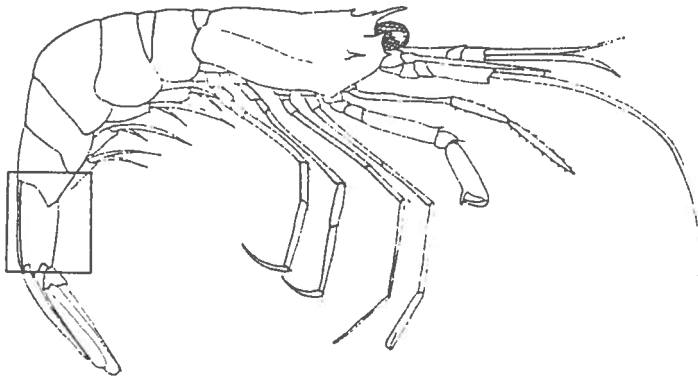


Figure 46. *Crangon zaccae*.

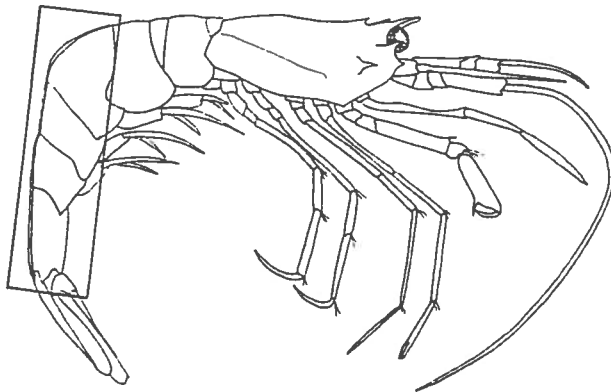


Figure 47. *Crangon communis*.

DEPTH DISTRIBUTION OF SHRIMP SPECIES COMMON IN
SOUTHERN CALIFORNIA TRAWL CATCHES

Depth (m)	Species
0-30 m	<p> <i>Penaeus californiensis</i> <i>Processa canaliculata</i> <i>Pandalopsis</i> sp.¹ <i>Alpheus dentipes</i>¹ <i>Crangon nigromaculata</i> <i>Hippolytasmata californica</i>¹ </p> <p> <i>Spirontocaris palpator</i>¹ <i>Spirontocaris brevistrostris</i>¹ <i>Spirontocaris taylori</i>¹ <i>Spirontocaris picta</i>¹ <i>Betaeus harfordi</i>^{2,3} </p>
30-90 m	<p> <i>Sicyonia ingentis</i>⁴ <i>Alpheus equidactylus</i>¹ <i>Crangon nigrocauda</i> <i>Crangon alaskensis elongata</i> </p> <p> <i>Crangon alba</i>³ <i>Crangon holmesi</i>³ <i>Spirontocaris cristata</i>¹ </p>
90-180 m	<p> <i>Sicyonia ingentis</i>⁴ <i>Sergestes similis</i>⁵ <i>Pasiphaea pacifica</i>⁵ <i>Pandalus jordani</i> <i>Pandalus platyceros</i> <i>Synalpheus lockingtoni</i>^{1,3} <i>Crangon communis</i> </p> <p> <i>Crangon zaca</i> <i>Crangon resima</i> <i>Crangon spinosissima</i>⁶ <i>Spirontocaris bispinosa</i> <i>Spirontocaris snyderi</i> <i>Spirontocaris sica</i> <i>Spirontocaris gracilis</i> </p>
180 m	<p> <i>Pasiphaea pacifica</i>⁵ <i>Sergestes similis</i>⁵ </p> <p> <i>Argis californiensis</i>⁷ </p>
<ol style="list-style-type: none"> 1. Often found near rocks or kelp holdfasts. 2. Often commensal to subtidal abalones. 3. Found to date only off Santa Catalina Island. 4. Much more abundant at 61 m than at 139 m; however, individuals from shallower stations are smaller than those from deep stations. 5. Found in only one 139-m trawl (probably normally reside in deeper waters). 6. Found to date only in Santa Monica and San Pedro Bays. 7. Found only in one 180-m trawl in Santa Monica Bay. 	

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INDEX

- Alpheidae 8, 24
Alpheus dentipes 9, 24, 25, 33
Alpheus equidactylus 24, 25, 33
Argis californiensis 26, 27, 33

Betaeus harfordi 24, 25, 33

Carides 8-11
Crangon alaskensis elongata 27, 28, 29, 33
Crangon alba 28, 33
Crangon communis 30, 31, 33
Crangon holmesi 28, 33
Crangon nigrocauda 28, 29, 33
Crangon nigromaculata 1, 28, 29, 33
Crangon resima 30, 31, 33
Crangon spinosissima 26, 27, 33
Crangon zaca 30, 31, 33
Crangonidae 10, 11, 26-31

Hippolytina californica 18, 19, 33
Hippolytidae 10, 11, 18-23

Lysmatidae 8, 10, 12

Pandalidae 8, 14-16
Pandalopsis n.sp. 16, 17, 33
Pandalus jordani 14, 15, 33
Pandalus platyceros 16, 17, 33
Pasiphaea pacifica 14, 15, 33

Pasiphaeidae 10, 11, 14
Penaeidae 6, 7, 12
Penaeides 6-7
Penaeus sp. 7, 12, 13
Penaeus brevirostris 3, 12, 33
Penaeus californiensis 3, 12, 33
Processa canaliculata 12, 13, 33

Sergestes similis 7, 12, 33
Sergestidae 6, 7, 12
Sicyonia ingentis 12, 13, 33
Snapping shrimp 8
Spirontocaris bispinosa 18, 19, 33
Spirontocaris brevirostris 22, 23, 33
Spirontocaris cristata 20, 21, 33
Spirontocaris gracilis 20, 21, 33
Spirontocaris palpator 22, 23, 33
Spirontocaris pictus 22, 23, 33
Spirontocaris sica 18, 19, 33
Spirontocaris synderi 18, 19, 33
Spirontocaris taylori 20, 21, 33
Synalpheus lockingtoni 9, 24, 25, 33