

INVERTEBRATES OF
SOUTHERN CALIFORNIA
COASTAL WATERS

II. **Natantia**

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PREFACE

In July 1973, the Coastal Water Research Project initiated a program to standardize identification of southern California marine invertebrates obtained in trawls, benthic grabs, and intertidal collections. The goal of the program is to decrease the variability of identification of organisms and to obtain large blocks of uniform data, which then will be analyzed to determine the effects of pollution on these organisms and to identify "indicator invertebrates," those whose presence or absence in an area is an indication of pollution.

There are four main steps in the development of a key. First, a large-scale survey of the existing literature is conducted to obtain accurate lists of the species found in local waters and descriptions of these species. Second, the descriptions are compared with specimens in the collections of various organizations to determine the degree of variability in the characteristics that define the species. Third, an illustrated key to the species in the group is prepared using the least variable of the distinguishing characteristics. Finally, a meeting is held with the systematic biologists of various sanitation districts, private companies, and museums in southern California, where the key is reviewed and tested with specimens to identify and solve any problems with the key prior to publication.

This volume is the second in a series that will eventually cover the major groups of marine invertebrates. The volumes currently published or in preparation are:

- Volume I: Select Groups of Annelids, Arthropods, Echinoderms, and Molluscs, August 1975.*
- Volume II: Natantia, May 1976.*
- Volume III: Ophiurans (in preparation).
- Volume IV: Select Groups of Microcrustacea (in preparation).

The keys are not being produced in systematic order. Instead, the order is determined by the identification problems of local field workers and the commonness of the organisms in each group.

*Available from the Coastal Water Research Project; price for each volume is \$15.00 (California residents add sales tax).

This volume is a revision of a 1974 paper (Coastal Water Research Project TM 211) entitled "Key to Shrimp Common in Southern California Trawl Catches," which identified and illustrated 33 species of shrimp. The original key has been enlarged to include 74 species of shrimp occurring not only in trawl catches off the open coast but in bays and intertidal areas. As shrimp normally found to the north and south of southern California may occasionally be taken in local samples, we have included them here. In addition, we have incorporated the results of current systematic research--nomenclatural changes, distribution ranges, and reinterpretation of taxonomic groups.

Corrections to this volume will be issued periodically as new species are discovered. If you wish to receive these corrections, please keep the Project informed of your correct address.

ACKNOWLEDGMENT

We thank F.A. Chace, Jr., Smithsonian Institution, Washington, D.C., for his generous assistance with problems encountered during the preparation of this key and for reviewing the final manuscript.

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ORGANIZATION AND USE OF THE VOLUME

This volume contains a key to the families of southern California shrimp (Section 1) and keys to the genera and species within each family (Sections 2 through 9). Appendix A contains information on the characteristics and distribution of each species covered in the volume. Appendix B gives information on the specimens illustrated.

Sections 1 through 9 each contain one or more keys and, except for Section 1, a series of species pages. Use the family key in Section 1 to identify a specimen to family; then turn to the section on that family to complete the identification. The illustrations on Pages 2 and 3 show the characteristics referred to in the keys.

THE KEYS

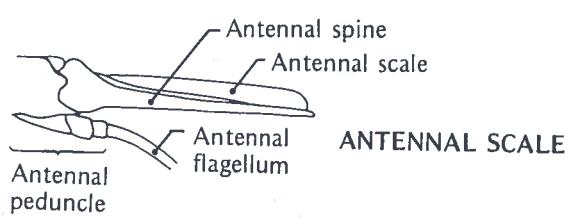
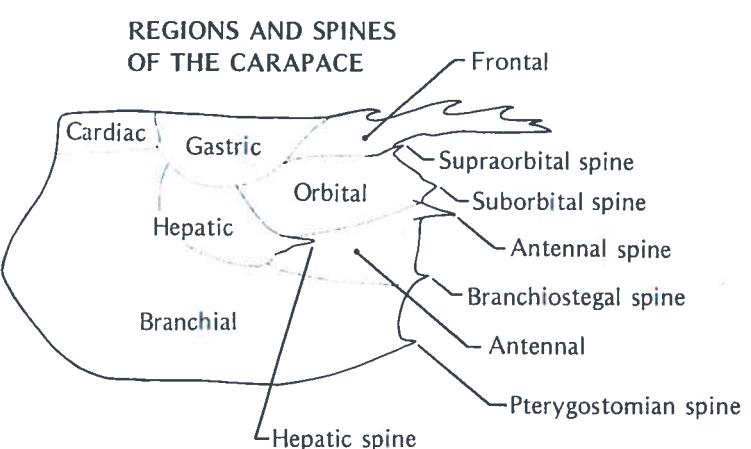
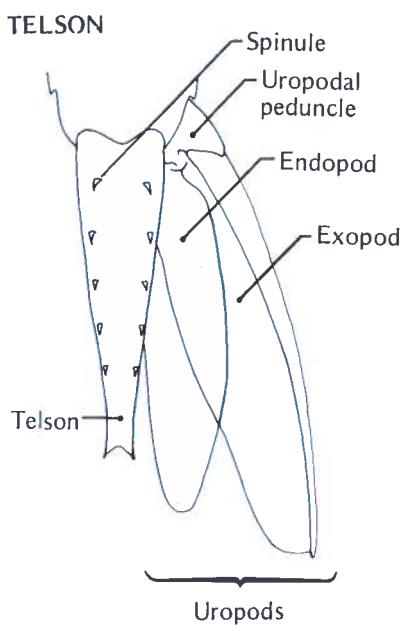
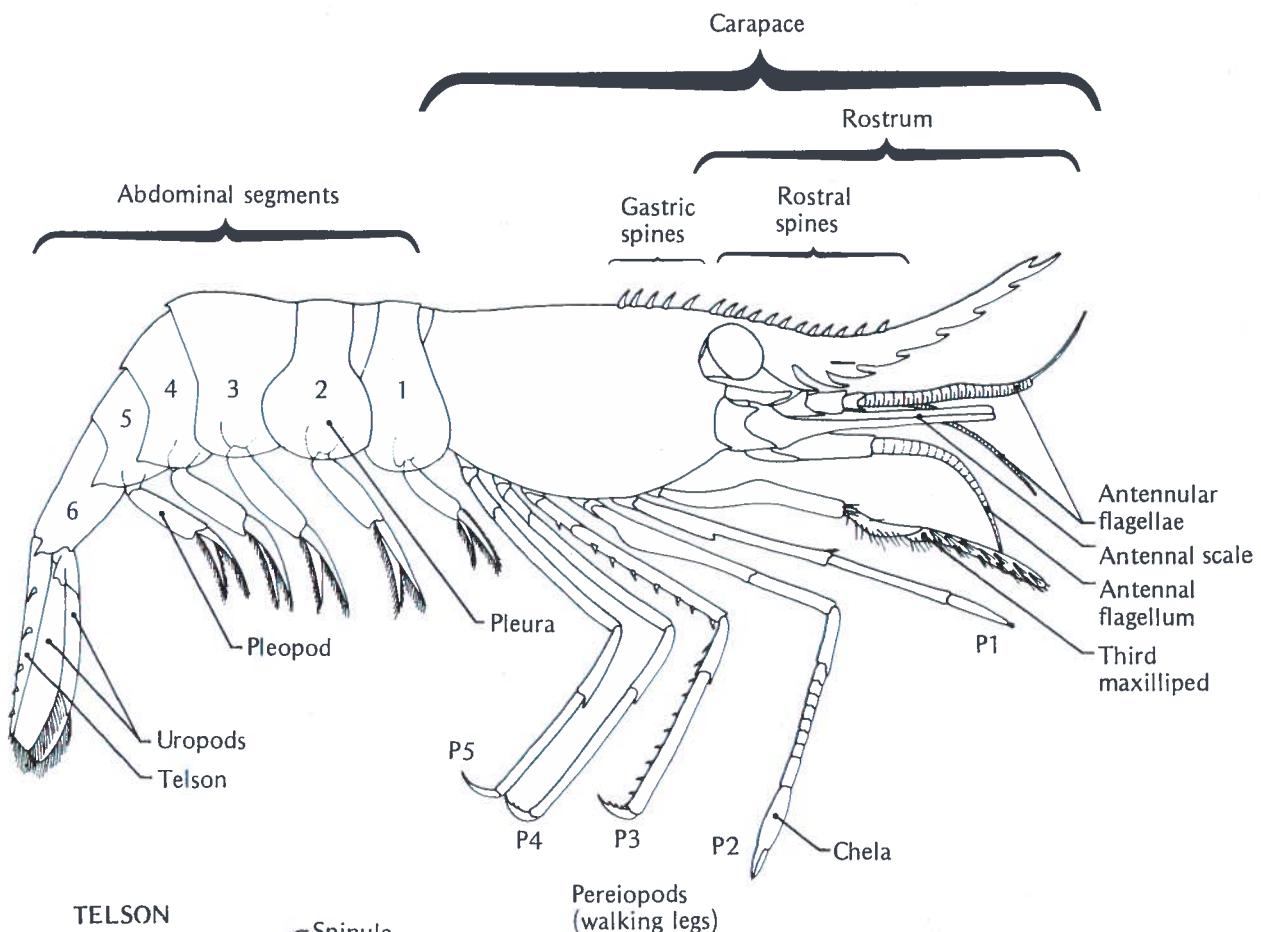
To use a key to identify a specimen, start with Statement Number 1. If the statement is true of your specimen, continue through the key until you come to a statement that is true and followed by an identifying name. If Statement Number 1 or any other statement is not true of your specimen, go to the statement number given in parentheses after the number of the untrue statement and proceed through the key from that point.

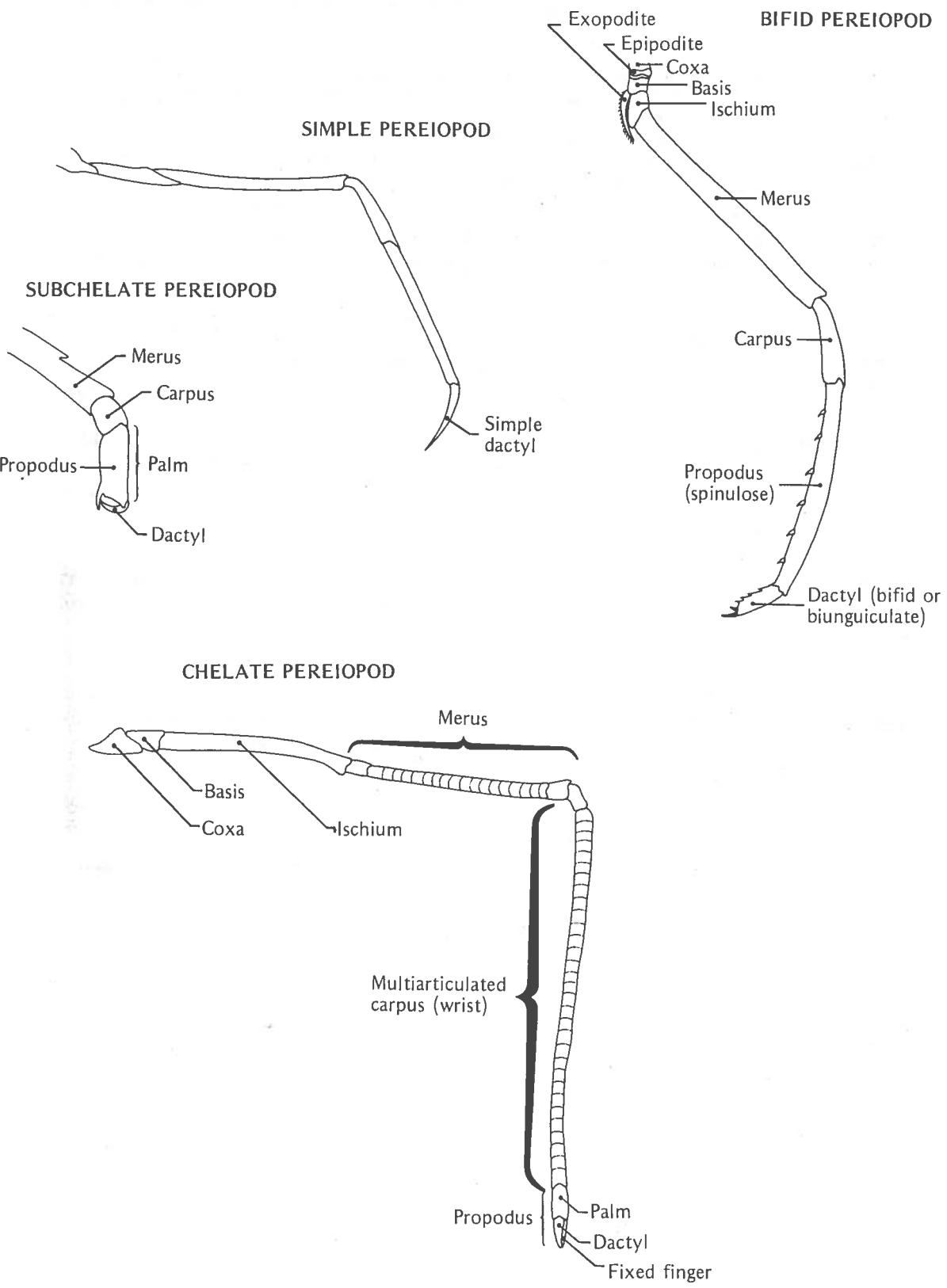
When you have reached an identifying name for your specimen in a key and it is a family or genus name, turn to the key for that family or genus and proceed as described above. If the identifying name is a species name, turn to the species pages following the key and find the page for that species. The species pages are in alphabetical order by genus: The index at the back of the volume may also be used to find a particular species page.

In certain cases, a statement in a key will be followed by a second, unnumbered statement in parentheses. This second statement refers to a secondary character that can be used in conjunction with the primary character to facilitate the identification (the secondary character should not be used alone).

THE SPECIES PAGES

The front side of each species page contains a drawing of the species or of its identifying character. The reverse side of





the page gives the known synonyms for the species and distribution information in two forms:

1. The distribution map shows the quadrants off California and Baja California where the species has been taken.
2. The distribution paragraphs give a general idea of where the species has been found in the world (and thus of its overall range) and lists specific places off California and Baja California where the species has been taken. These paragraphs are arranged by source. The complete citations are given in the reference list. The data attributed to the authors may refer to identifications made of specimens on file at other organizations (Marine Biological Consultants, Costa Mesa; Allan Hancock Foundation, University of Southern California, Los Angeles; Kerckhoff Marine Laboratory, California Institute of Technology, Corona del Mar). If not specified as such, the specimens identified in the key are located in the Coastal Water Research Project reference collection.

There is room on each species page to record your observations on the species. The authors are interested in having any additional or contradictory information that you may have on the species covered here. We would also like to learn of any species that you have taken off California that are not discussed in this volume.

Identifying characters are only given in the keys at the front of each section (they are not listed on the species pages). Therefore, we suggest that you go through the key to obtain the most valid identification of a particular specimen.

Section 1
KEY TO THE FAMILIES OF
CALIFORNIA SHRIMPS

Penaeidae
Sergestidae
Alpheidae
Crangonidae
Hippolytidae
Palaemonidae
Pandalidae
Pasiphaeidae

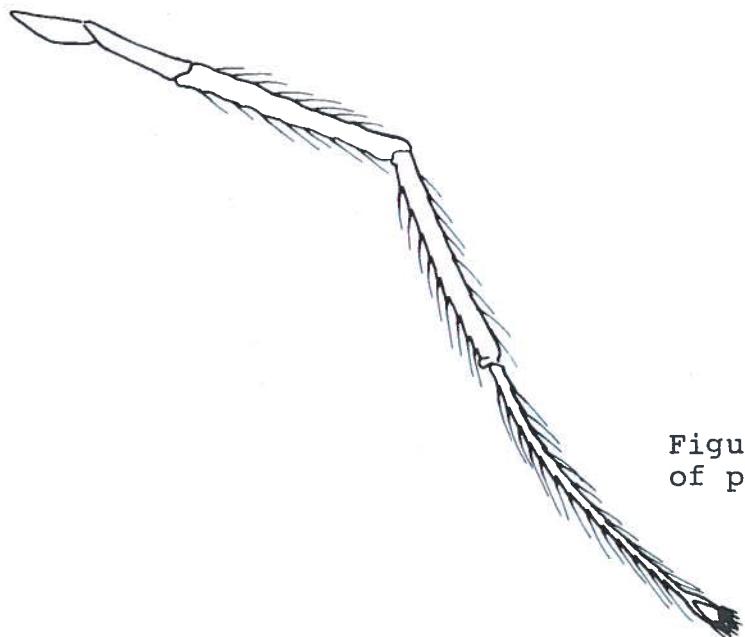


Figure 1-1. Chelate pereiopod
of penaeidean shrimp.

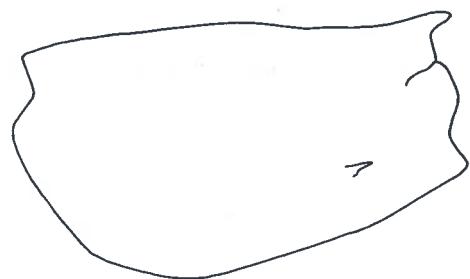


Figure 1-2. Rostrum of sergestid
shrimp.



Figure 1-3. Rostrum of penaeid
shrimp.

Section 1
KEYS TO THE FAMILIES OF
CALIFORNIA SHRIMPS*

- 1 . . . (4) Third pair of pereiopods are chelate, as shown in Figure 1-1. (First pair of pereiopods may not be chelate.) Pleura of second abdominal segment does not overlap pleura of first abdominal segment.

Section Penaeides

- 2 . . . (3) Rostrum is very short or absent (Figure 1-2).

Family Sergestidae

- 3 . . . (2) Rostrum is present and relatively prominent, with rostral teeth (Figure 1-3).

Family Penaeidae

- 4 . . . (1) Third pair of pereiopods are not chelate; pleura of second abdominal segment overlaps pleura of first abdominal segment (Figure 1-4).

Section Carides

- 5 . . . (10) Wrists (carpi) of second pair of pereiopods are subdivided (multiarticulated).

- 6 . . . (7) Both legs of first pair of pereiopods are simple.

Family Pandalidae

- 7 . . . (6) Both legs of first pair of pereiopods are not simple.

- 8 . . . (9) First pair of pereiopods has one or two strong or large chelae similar to those shown in Figure 1-5.

Family Alpheidae

- 9 . . . (8) First pair of pereiopods does not have strong chelae (Figure 1-6).

Family Hippolytidae

*The terms used in this key are illustrated in the diagram of shrimp features on Pages 2 and 3 of this volume.

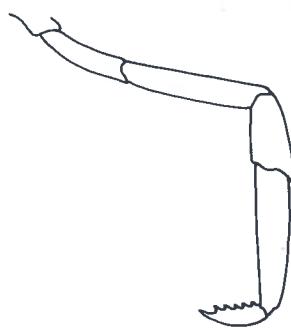


Figure 1-4. Nonchelate pereiopod of caridean shrimp.

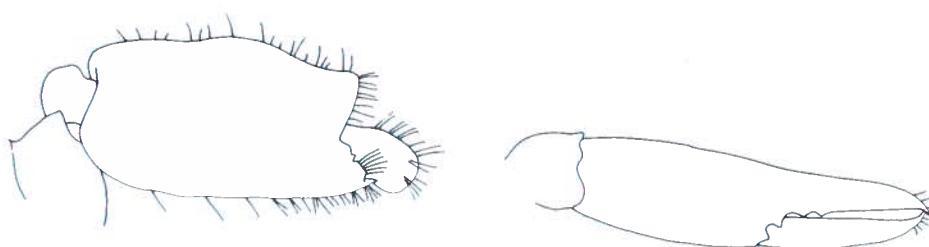


Figure 1-5. Typical variations in the chelae of alpheid shrimp.

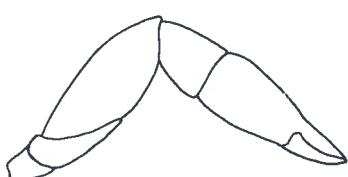


Figure 1-6. Pereiopod 1 of hippolytid shrimp.



Figure 1-7. Rostrum of pasiphaeid shrimp.

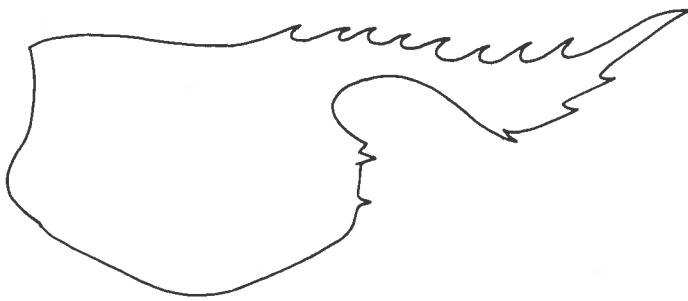


Figure 1-8. Rostrum of palaemonid shrimp.



Figure 1-9. Subchela of crangonid shrimp.

- 10 . . . (5) Wrists of second pair of pereiopods are not subdivided.
- 11 . . . (14) First pair of pereiopods are chelate.
- 12 . . . (13) Rostrum is short or lacking (Figure 1-7).
Family Pasiphaeidae
- 13 . . . (12) Rostrum is long (Figure 1-8).
Family Palaemonidae
- 14 . . . (11) First pair of pereiopods are subchelate
(Figure 1-9).
Family Crangonidae

Section 2
KEYS TO THE FAMILY
PENAEIDAE

Penaeus brevirostris Kingsley 1878
Penaeus californiensis Holmes 1900
Sicyonia ingentis (Burkenroad 1938)
Sicyonia penicillata Lockington 1879

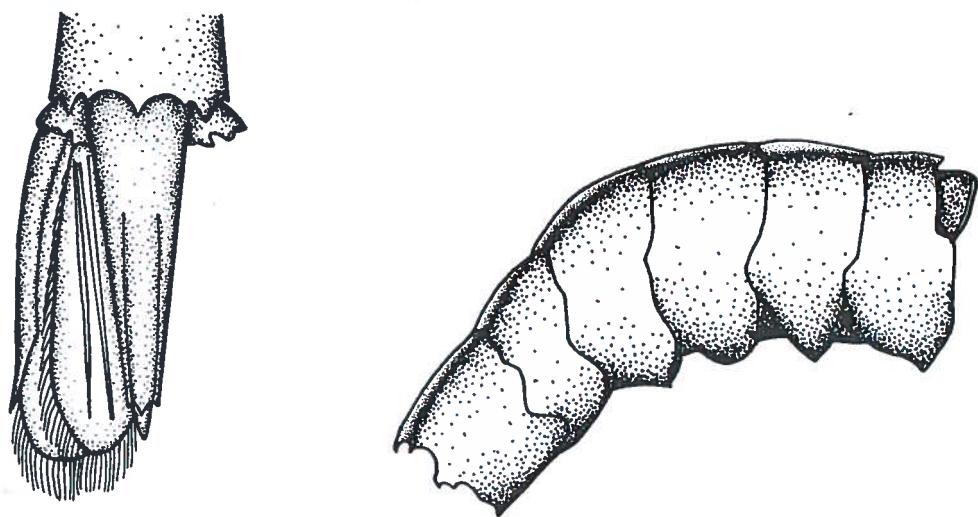


Figure 2-1. Telson and abdomen
of Sicyonia ingentis.

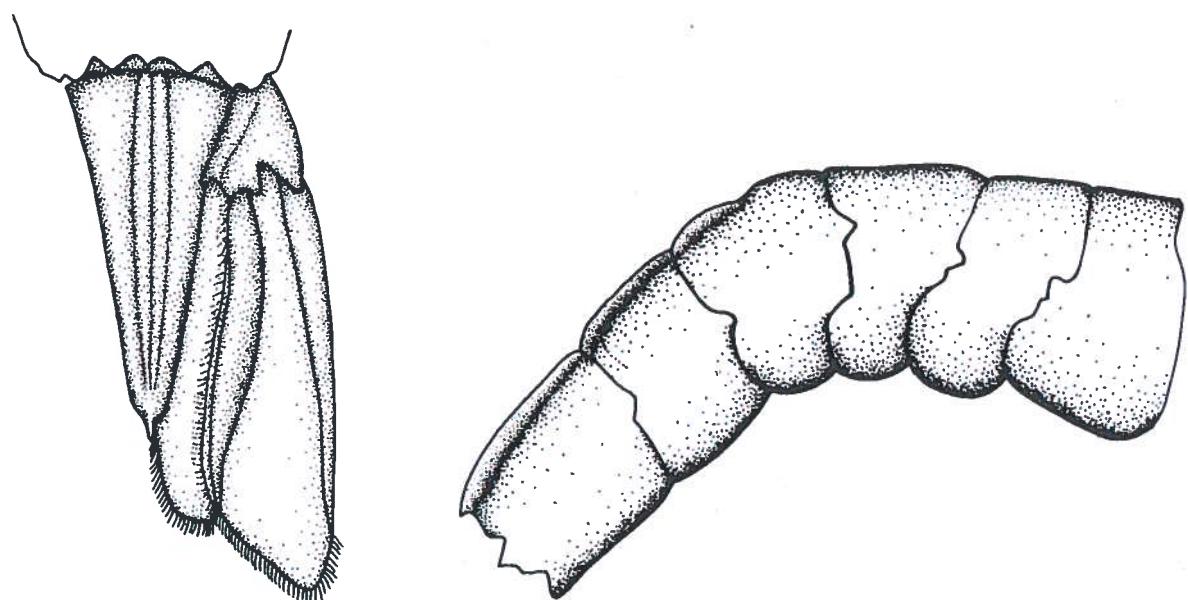


Figure 2-2. Telson and abdomen
of Penaeus californiensis.

Section 2
KEY TO THE GENERA
OF PENAEIDAE

- 1 . . . (2) The abdomen is entirely carinated. (The telson has lateral spines, which are very small and may not be present in juveniles.) See Figure 2-1.

Sicyonia

- 2 . . . (1) The abdomen is not entirely carinated: Only the fourth, fifth, and sixth abdominal segments have carinas; the telson does not have lateral spines (Figure 2-2).

Penaeus

KEY TO THE SPECIES
OF PENAEUS*

- 1 . . . (2) The antennal spine of the carapace extends posteriorly as a carina.

Penaeus californiensis

- 2 . . . (1) The antennal spine of the carapace extends posteriorly only slightly as a carina.

Penaeus brevirostris

KEY TO THE SPECIES
OF SICYONIA

- 1 . . . (2) One tooth is present on the dorsal carina of the carapace in a position posterior to the hepatic spine.

Sicyonia ingentis

- 2 . . . (1) Two teeth are present on the dorsal carina of the carapace in a position posterior to the hepatic spine.

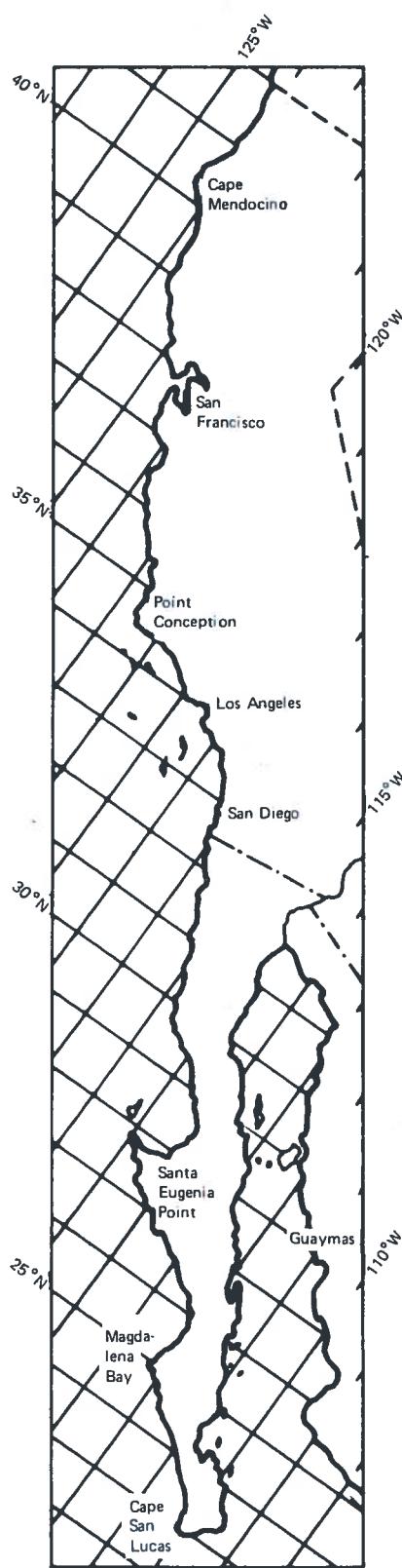
Sicyonia penicillata

*The only Penaeus species taken to date off California is P. californiensis. However, local specimens of this species are frequently misidentified as P. brevirostris. Thus, we have included information on both species in this key to emphasize their differences.

Penaeus brevirostris Kingsley 1878*

*The only Penaeus species taken to date off California is P. californiensis. However, local specimens of this species are frequently misidentified as P. brevirostris. Thus we have included information on both species in this key to emphasize their differences.

Penaeus brevirostris Kingsley 1878*



SYNONYM

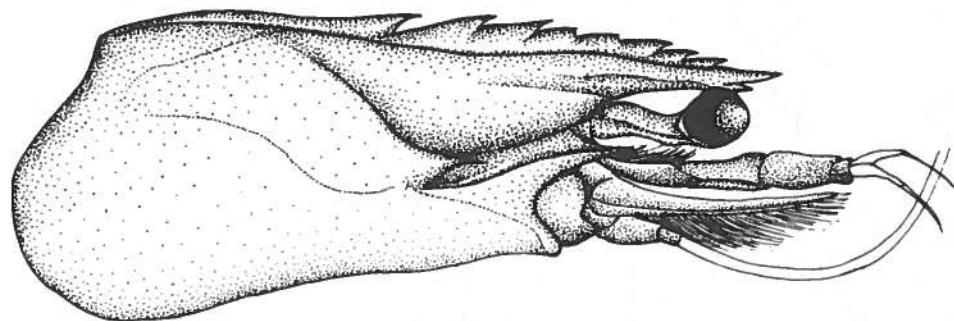
Penaeus brasiliensis Schmitt 1935, in part.

DISTRIBUTION

From Rathbun 1904: Galapagos Islands.

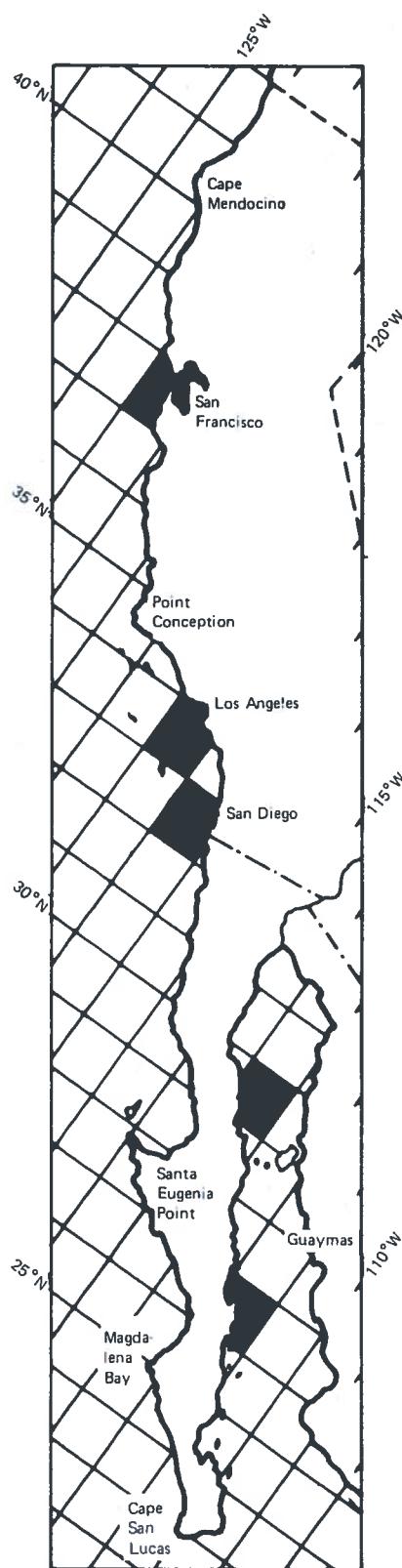
From Burkenroad 1938: Lagunaje de las Esquinapa and Pesqueria Caliquey, Esquinapa, Sinaloa, Mexico. Realejo, Nicaragua (Kingsley 1878). Panama City (tide pool), Chame River, Pearl Islands, and Bay of Panama, Panama.

Penaeus californiensis Holmes 1900



Carapace

Penaeus californiensis Holmes 1900



SYNONYMS

Penaeus californiensis Holmes 1900;
Pesta 1915. Penaeus canaliculatus
Holmes 1895. Penaeus brevirostris
Rathbun 1902, in part; Schmitt 1921;
Burkenroad 1934. Penaeus brasiliensis
Schmitt 1935, in part. Penaeus californicus Carlisle 1969.

DISTRIBUTION

From Holmes 1900: San Francisco and Anaheim, California.

From Rathbun 1902: San Francisco, Anaheim Bay, and San Diego, California.

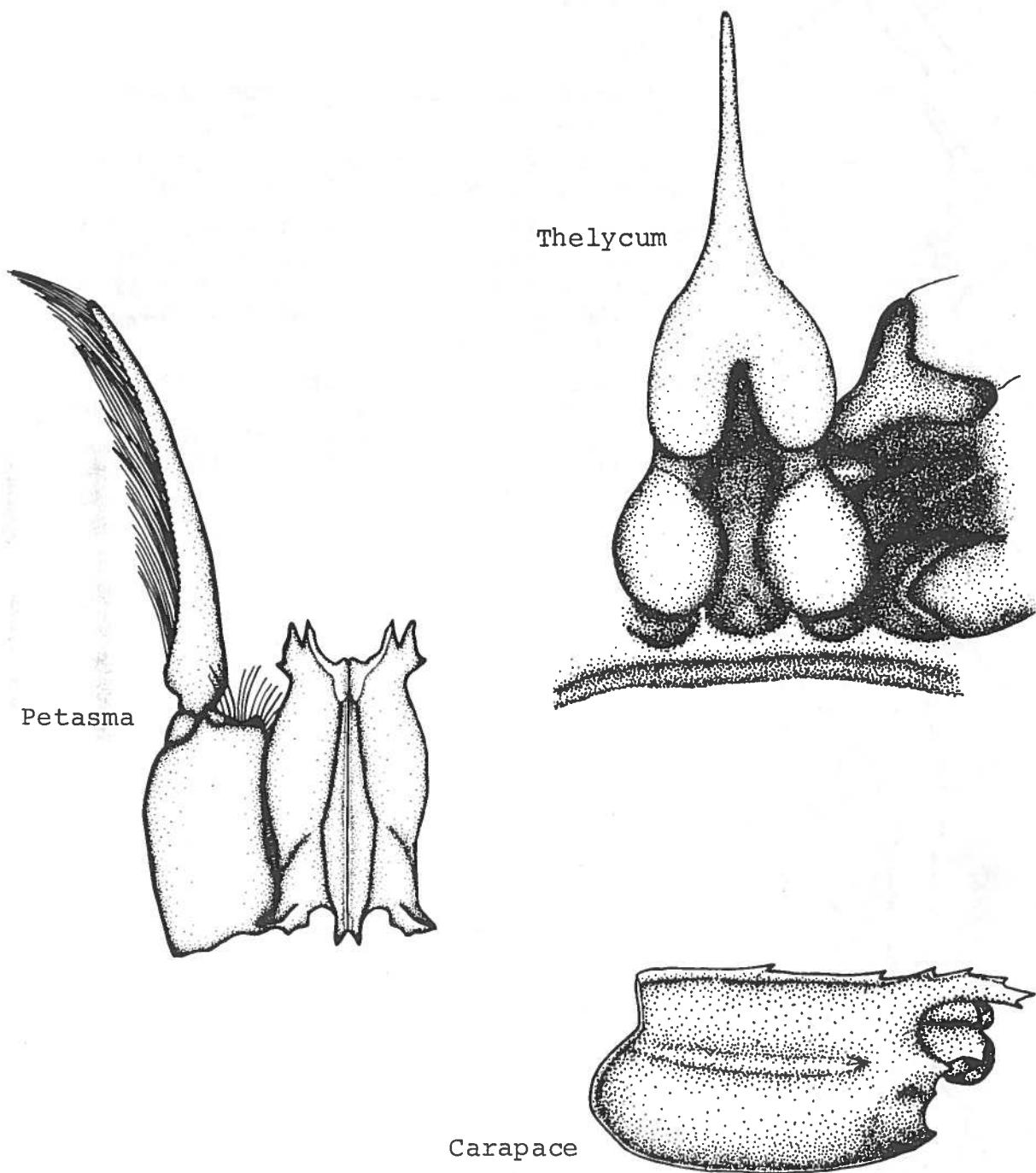
From Burkenroad 1938: San Francisco and Santa Monica, California. Gulf coast of Baja California, Arena Bank and Concepcion Bay, Baja California, Angeles Bay, Gulf of California (31 to 42 m), and Esquinapa, Sinaloa, Mexico (juveniles found in lagoons and estuaries).

From Carlisle 1969: Santa Monica Bay, California.

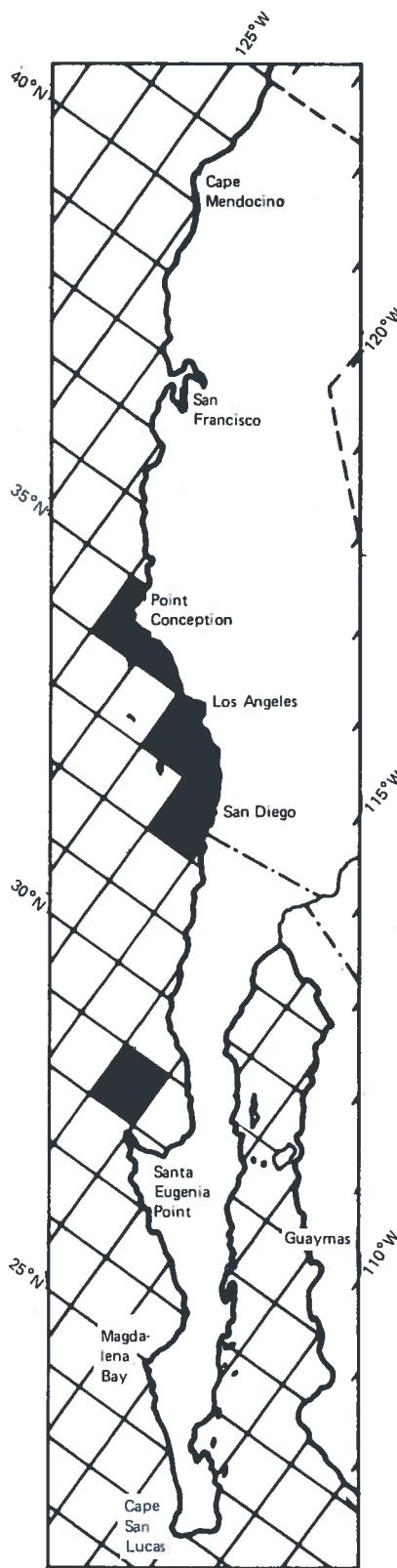
From Marine Biological Consultants, Inc.: Oxnard, California (21 m).

From authors' data: Palos Verdes, California (10 m).

Sicyonia ingentis (Burkenroad 1938)



Sicyonia ingentis (Burkenroad 1938)



SYNONYM

Eusicyonia ingentis Burkenroad 1938; of Frey 1971.

DISTRIBUTION

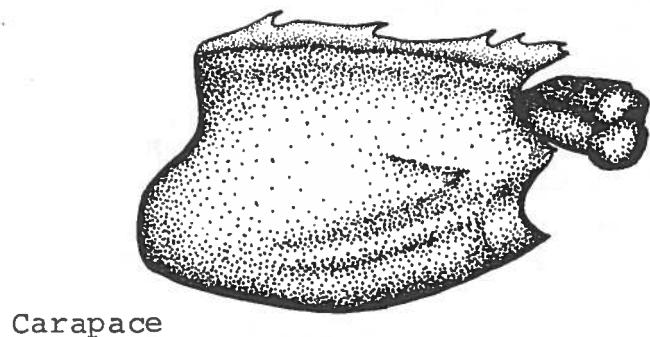
From Burkenroad 1938: Cedros Island, Baja California (70 to 111 m).

From Carlisle 1969: Santa Monica Bay, California (frequent, 97 to 183 m).

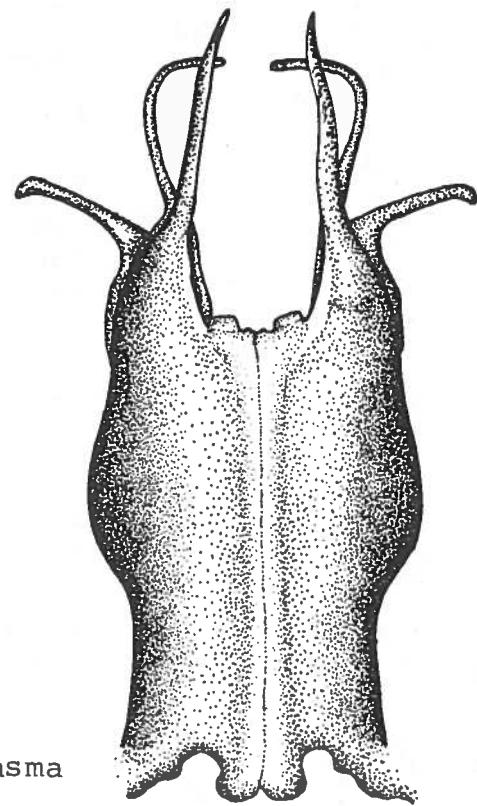
From Frey 1971: Ranges from Point Conception, California, to Cedros Island, Baja California. Taken commercially in the area between Santa Barbara and Ventura, California.

From authors' data: Port Hueneme, Santa Catalina Island, Santa Monica Bay (abundant), Palos Verdes (abundant), Dana Point, and San Diego, California (10 to 183 m).

Sicyonia penicillata Lockington 1879

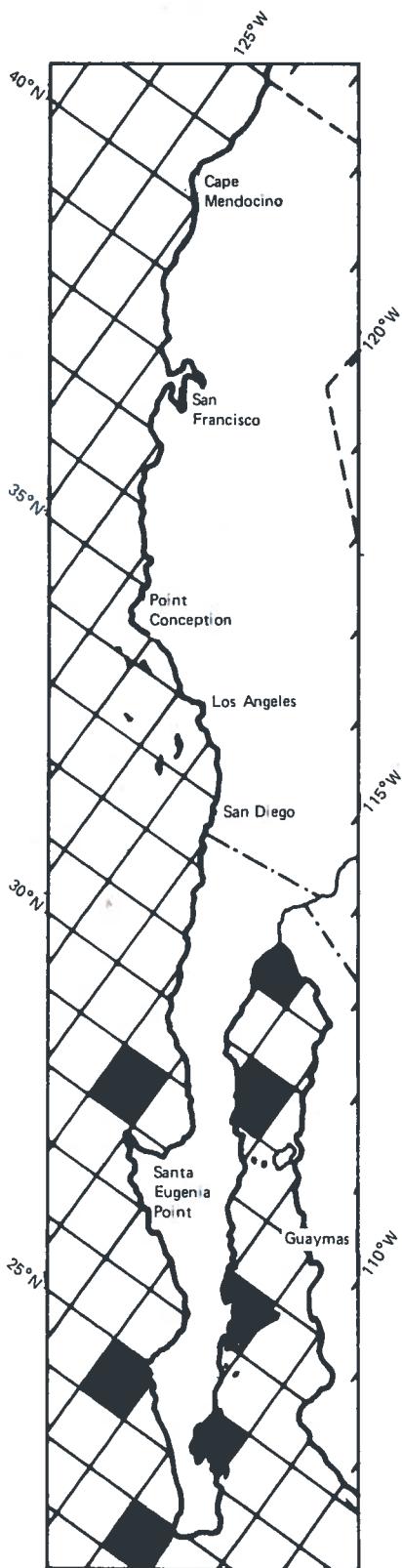


Carapace



Petasma

Sicyonia penicillata Lockington 1879



SYNONYM

Eusicyonia penicillata (Lockington) of Burkenroad 1934, 1938.

DISTRIBUTION

From Lockington 1879: Bolinas Bay, Baja California (26 m), and Angeles Bay, Gulf of California.

From Schmitt 1924: Ballandra Bay, Carmen Island, Gulf of California (31 to 42 m).

From Burkenroad 1938: Santa Inez Bay, San Lucas Bay, Cedros Island, and Magdalena Bay, Baja California, and San Felipe and Concepcion Bay, Gulf of California (4 to 74 m).

From authors' data: Isla Rocca Consag (off San Felipe), Gulf of California (30 m).

From Herkelraith: * San Ignacio, Baja California.

*J. Herkelraith, Whittier College, Whittier, California, personal communication.

Section 3
KEY TO THE FAMILY
SERGESTIDAE

Petalidium suspiriosum Burkenroad 1937
Sergestes similis Hansen 1903

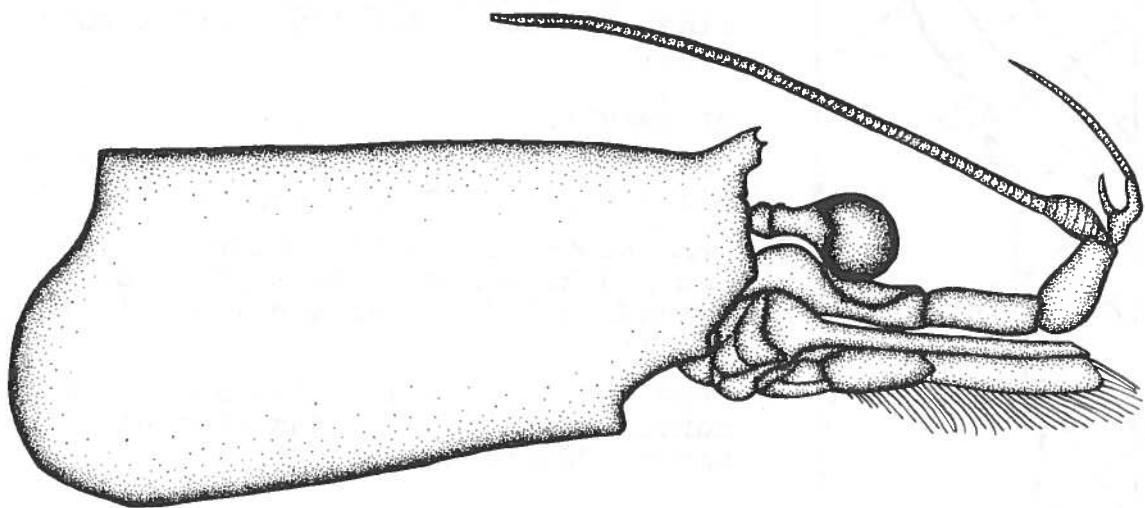
Section 3
KEY TO THE SPECIES OF THE
FAMILY SERGESTIDAE

1 . . . (2) The supraorbital spine is present; the telson tapers gradually to a point.

Sergestes similis

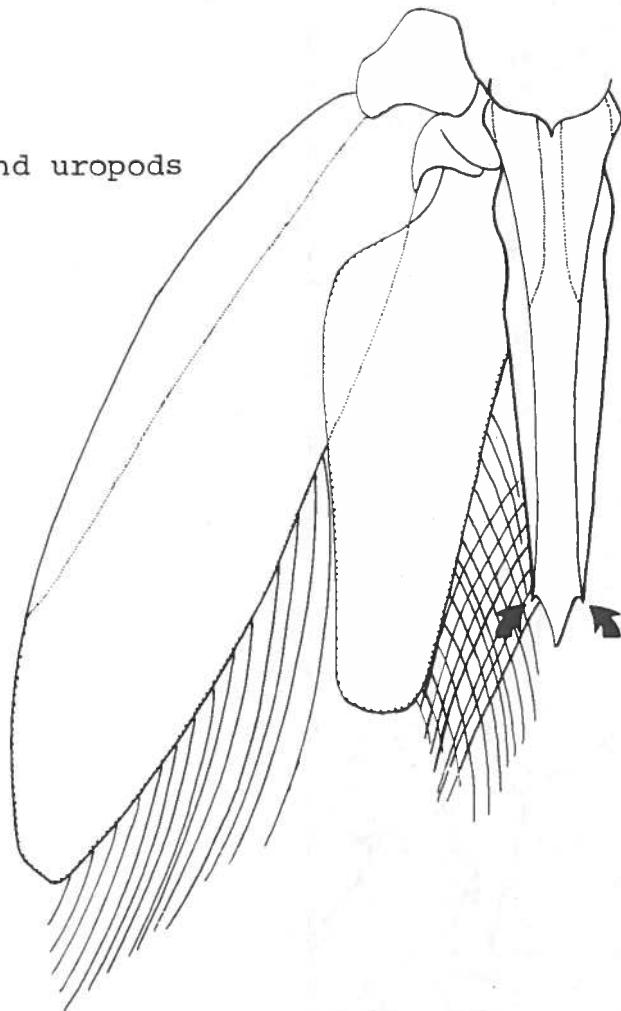
2 . . . (1) The supraorbital spine is absent; the terminal point of the telson is flanked by one pair of lateral spines.

Petalidium suspiriosum

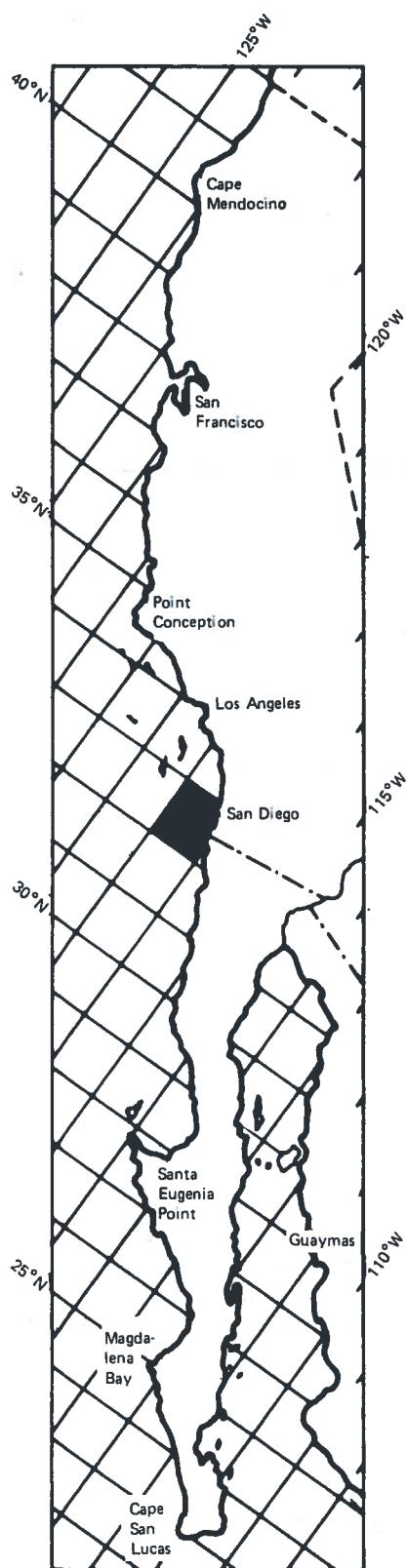


Carapace

Telson and uropods



Petalidium suspiriosum Burkenroad 1937



SYNONYM

Possible synonym Sergestes sp. indeterminate Rathbun 1904 (from Burkenroad 1937).

DISTRIBUTION

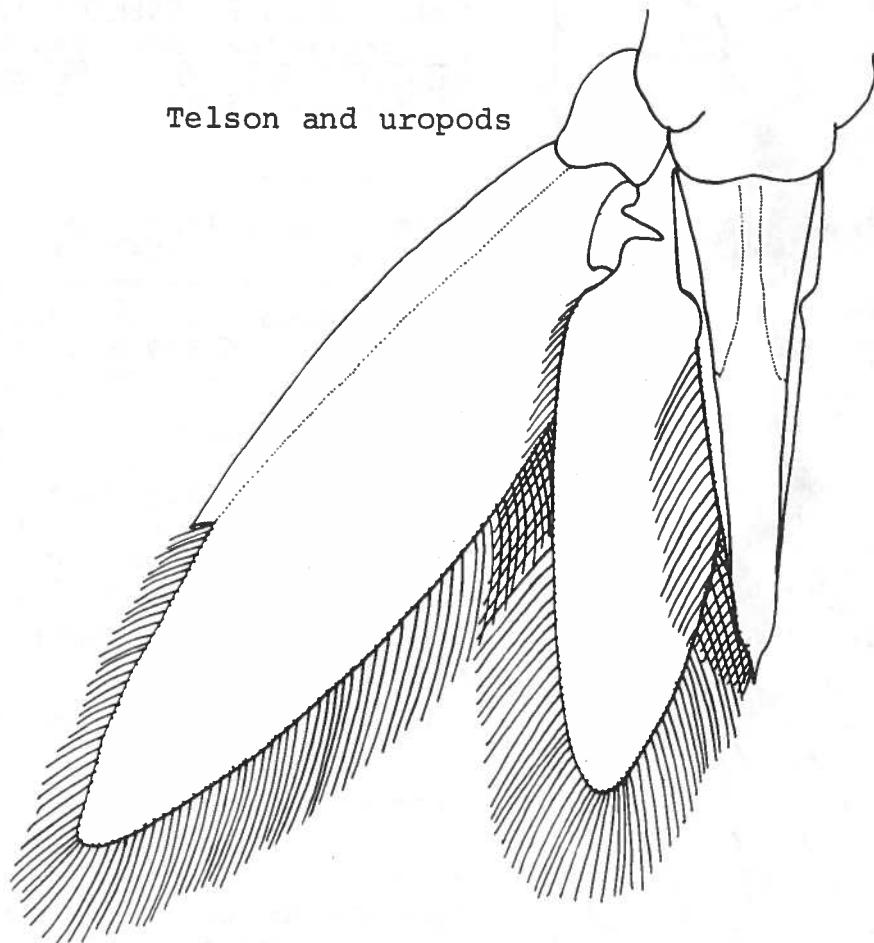
From Rathbun 1904: Possible location off San Diego, California (760 m).

From Burkenroad 1937: Clarion Island and 233 km north of Revillagigedo Islands (18°22'N lat and 114°45'W long, 911 m).

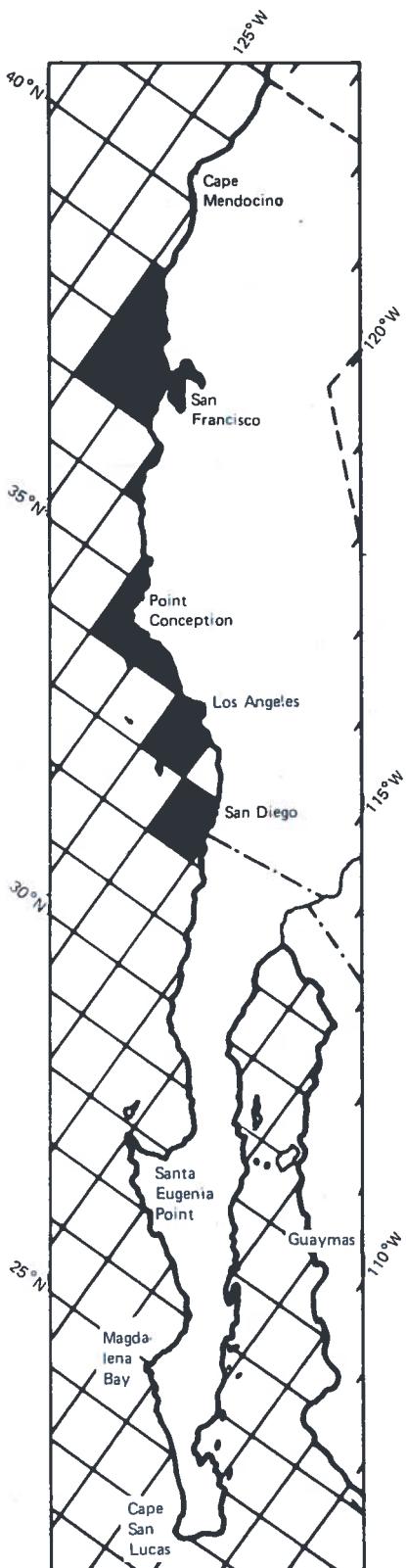
From authors' data (Allan Hancock Foundation collection): San Clemente Basin, California (1,000 m).

Sergestes similis Hansen 1903

Telson and uropods



Sergestes similis Hansen 1903



SYNONYMS

From Burkenroad 1937: Sergestes similis of Hansen 1903; Schmitt 1921; Illig 1927. Sergestes atlanticus of Bate 1888, in part; Rathbun 1904, in part. ?Sergestes nasidentatus of Bate 1888; Hansen 1896, 1903. ?Sergestes articus of Cecchini 1928.

DISTRIBUTION

From Rathbun 1904: Point Arena (438 m), Tiburon Island (267 m), Farallon Islands (1,009 m), Monterey Bay (762 m), San Luis Obispo Bay (462 m), Point Conception (426 and 519 m), and Santa Barbara Channel (574 to 589 m), California.

From Burkenroad 1937: Ranges along the Pacific coast of North America and in the Gulf of California. Tiburon Island, California (915 m). Southern Atlantic and southwest of Africa. Japan. Found midwater from 265 to 915 m.

From Barham 1957: Monterey Bay, California.

From Barham 1963: San Diego, California.

From Milne 1968: Gulf of Alaska. Washington. Oregon. 42° to 50° north latitude.

From Pearcy and Forss 1969: Common in southern California (Yaldwyn).

From authors' data: Santa Monica Bay (182 m), Palos Verdes (137 m), and Los Angeles County (600 m), California.

Section 4
KEYS TO THE FAMILY
ALPHEIDAE

- Alpheopsis equidactylus (Lockington 1877)
Alpheus barbara Lockington 1878
Alpheus bellimanus Lockington 1877
Alpheus californiensis Holmes 1900
Alpheus clamator Lockington 1877
Betaeus ensenadensis Glassell 1938
Betaeus gracilis Hart 1964
Betaeus harfordi (Kingsley 1878)
Betaeus harrimani Rathbun 1904
Betaeus longidactylus Lockington 1877
Betaeus macginitieae Hart 1964
Betaeus setosus Hart 1964
Pomagnathus corallinus Chace 1937
Synalpheus lockingtoni Coutière 1909

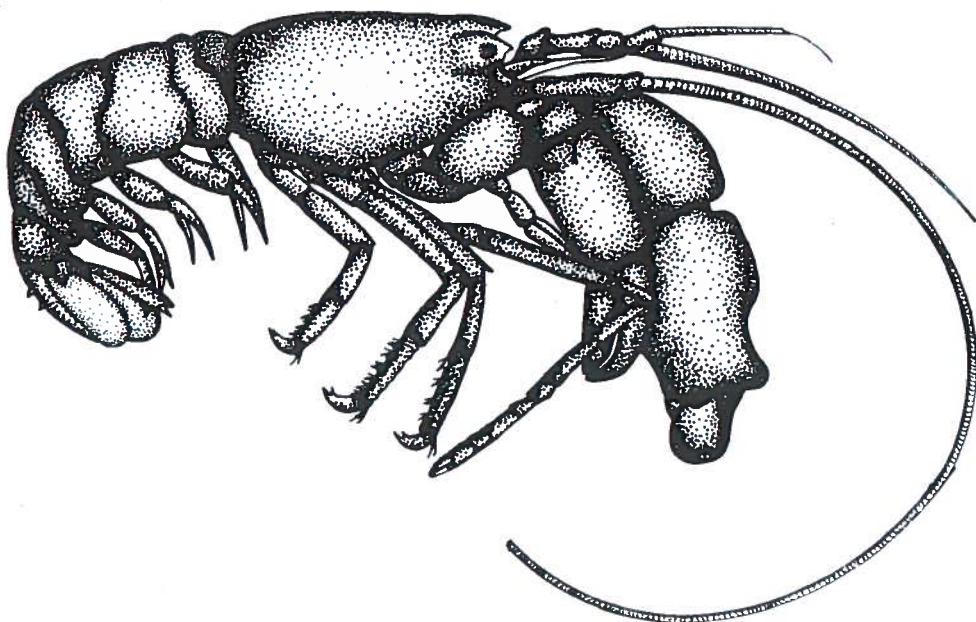


Figure 4-1. Body type of alpheid shrimp (Alpheus clamator).

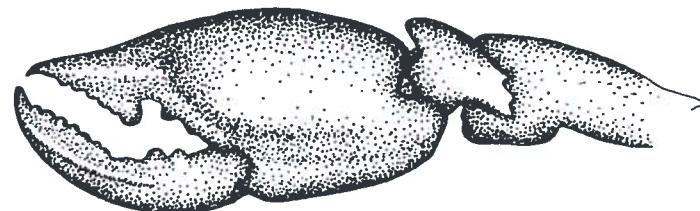


Figure 4-2. Chela of Betaeus harfordi.

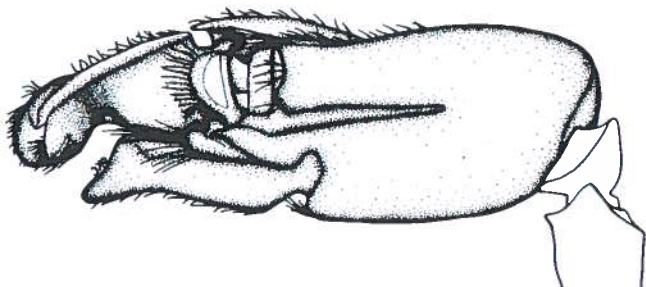


Figure 4-3. Chela of Alpheus bellimanus.

Section 4
KEY TO THE GENERA
OF ALPHEIDAE*

The general body type of the alpheid shrimps is shown in Figure 4-1.

- 1 . . . (2) The dactyl (movable finger) or the chela is in the ventral position (Figure 4-2).

Betaeus

- 2 . . . (1) The dactyl of the chela is dorsal or horizontal (Figure 4-3).

- 3 . . . (4) The ischiomeropodite of the third maxilliped is greatly expanded or operculiform (Figure 4-4).

Pomagnathus**

- 4 . . . (3) The ischiomeropodite of the third maxilliped is not operculiform.

- 5 . . . (8) The pereiopods have epipodites (Figure 4-5); the carapace does not have pterogostomian spines.

- 6 . . . (7) Pereiopods 3, 4, and 5 have spinulose propodi (Figure 4-5).

Alpheus

- 7 . . . (6) Pereiopods 3, 4, and 5 have at most slightly spinulose propodi; the first four carpal segments (counting from the most distal segment) of Pereiopod 2 are approximately equal to the length of the fifth segment.

Alpheopsis†

- 8 . . . (5) The pereiopods lack epipodites; pterogostomian spines are present on the carapace.

Synalpheus††

*The generic names Crago Lamarck 1801, Alpheus Weber 1795, and Crangon Weber 1795 were suppressed in 1955 by ruling of the International Commission on Zoological Nomenclature. This act restored the names Crangon Fabricius 1798 and Alpheus Fabricius 1798 as they are used in the keys in this section.

**One species, Pomagnathus corallinus.

† One species, Alpheopsis equidactylus.

††One species, Synalpheus lockingtoni.

Figure 4-4. Third maxilliped of *Pomagnathus corallinus*.

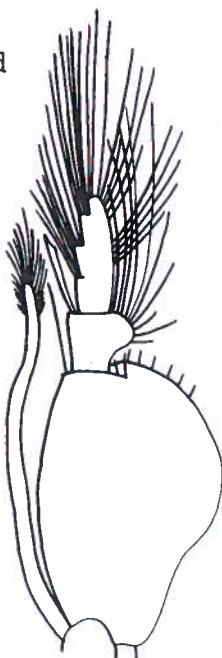
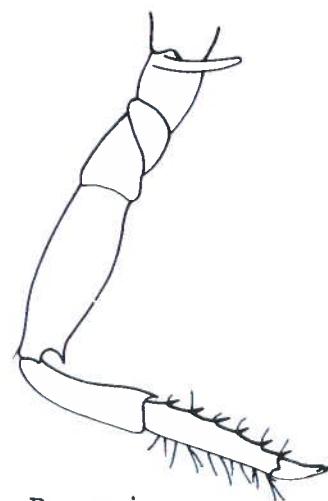


Figure 4-5. Pereiopod 4 of *Alpheus clamator*.



KEY TO THE SPECIES
OF ALPHEUS

- 1 . . . (6) Rostrum and spines on the orbital hood result in a trispinose front.
- 2 . . . (5) A spine is present at the basal joint of the antenna.
- 3 . . . (4) The dactyl of the smaller hand is laminate (flattened); the dactyls of Pereiopods 3, 4, and 5 are simple.
Alpheus bellimanus
- 4 . . . (3) The dactyl of the smaller hand is not laminate; the dactyls of Pereiopods 3, 4, and 5 are biunguiculate.
Alpheus clamator
- 5 . . . (2) No spine is present at the basal joint of the antenna.
Alpheus barbara*
- 6 . . . (1) Spines are not present on the orbital hood.
Alpheus californiensis

*Alpheus barbara has not been found since the original description by Lockington and Kingsley's record in 1878 of a specimen (noted as Alpheus clamator) from Santa Barbara, California.

KEY TO THE SPECIES
OF BETAEUS

- 1 . . . (6) The dactyls of the pereiopods are simple.
- 2 . . . (3) The dactyls of the chelipeds are longer than the palm, although this character is less marked in the female of the species, which can be confused with the male B. harrimani (Hart 1964).

Betaeus longidactylus

- 3 . . . (2) The dactyls of the chelipeds are shorter than the palm.
- 4 . . . (5) The posterior margin of the peduncle of the uropod fan is produced into two teeth. (The dactyls of the male chelipeds may be confused with the dactyls of the chelipeds of a female B. longidactylus (Hart 1964).)

Betaeus harrimani

- 5 . . . (4) The posterior margin of the peduncle of the uropod fan is not produced into two teeth.

Betaeus ensenadensis

- 6 . . . (1) The dactyls of the pereiopods are biunguiculate.
- 7 . . . (8) The frontal margin of the carapace is smoothly curved in dorsal view.

Betaeus macginitieae

- 8 . . . (7) The frontal margin of the carapace is indented in dorsal view.
- 9 . . . (10) The posterior margin of the peduncle of the uropod fan is produced into two teeth of subequal length. The dactyls of the pereiopods are moderately setose, partially concealing the bifid appearance.

Betaeus harfordi

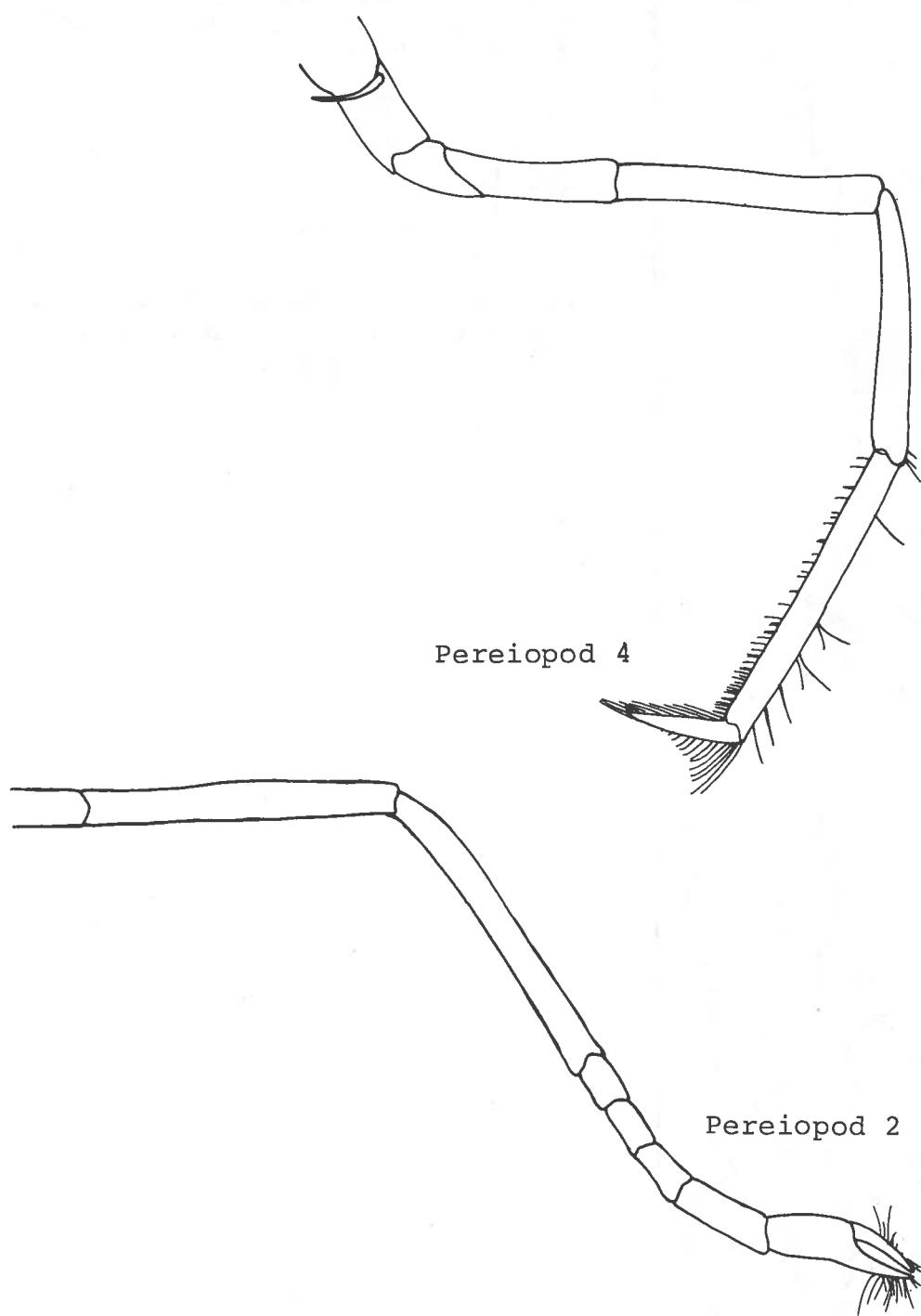
- 10 . . . (9) The posterior margin of the peduncle of the uropod fan is produced into two teeth, of which the outermost is the longest. The dactyls of the pereiopods are not setose enough to conceal the bifid appearance.
- 11 . . . (12) The dactyls of the chelipeds are longer than the palm; the entire animal is very hirsute.

Betaeus setosus

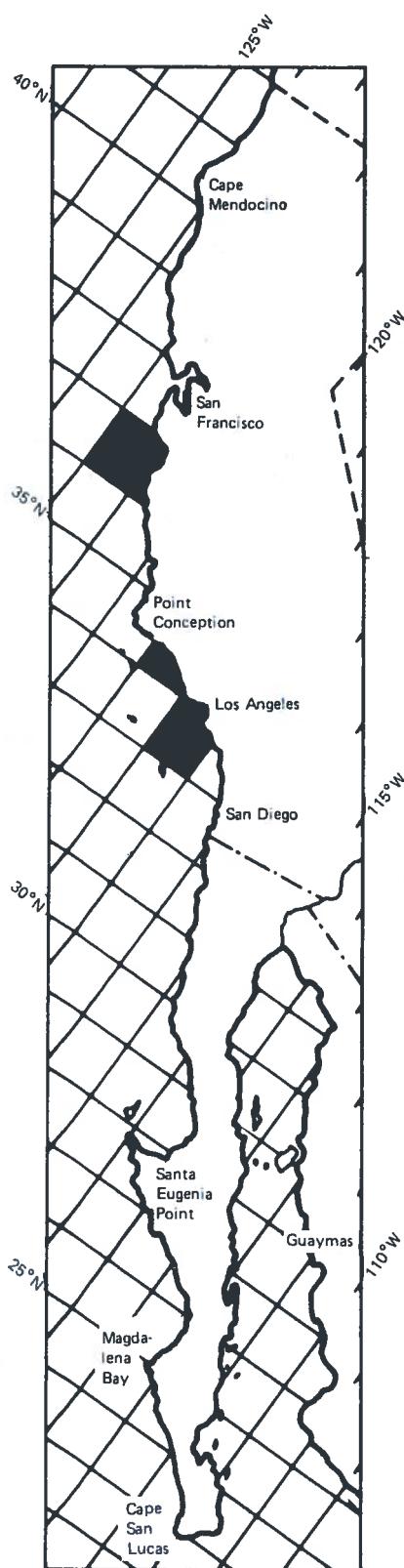
12 . . . (11) The dactyls of the chelipeds are shorter than
the palm; the animal is not especially hirsute.

Betaeus gracilis

Alpheopsis equidactylus (Lockington 1877)



Alpheopsis equidactylus (Lockington 1877)



SYNONYMS

Alpheus equidactylus of Holmes 1900; of Rathbun 1904. Crangon equidactylus of Schmitt 1921.

DISTRIBUTION

From Lockington 1877: Monterey, California.

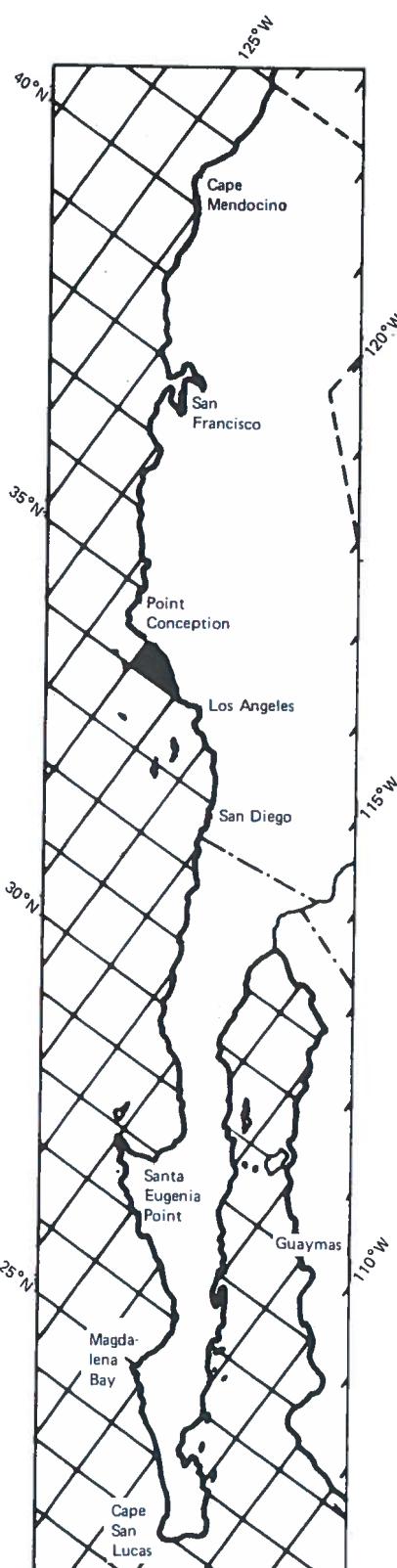
From Holmes 1900: Santa Barbara, California.

From authors' data (Allan Hancock Foundation collection): Palos Verdes, California (60 m).

Alpheus barbara Lockington 1878*

*A. barbara has not been found since the original description by Lockington and Kingsley's record in 1878 of a specimen (noted as A. clamator) from Santa Barbara, California.

Alpheus barbara Lockington 1878



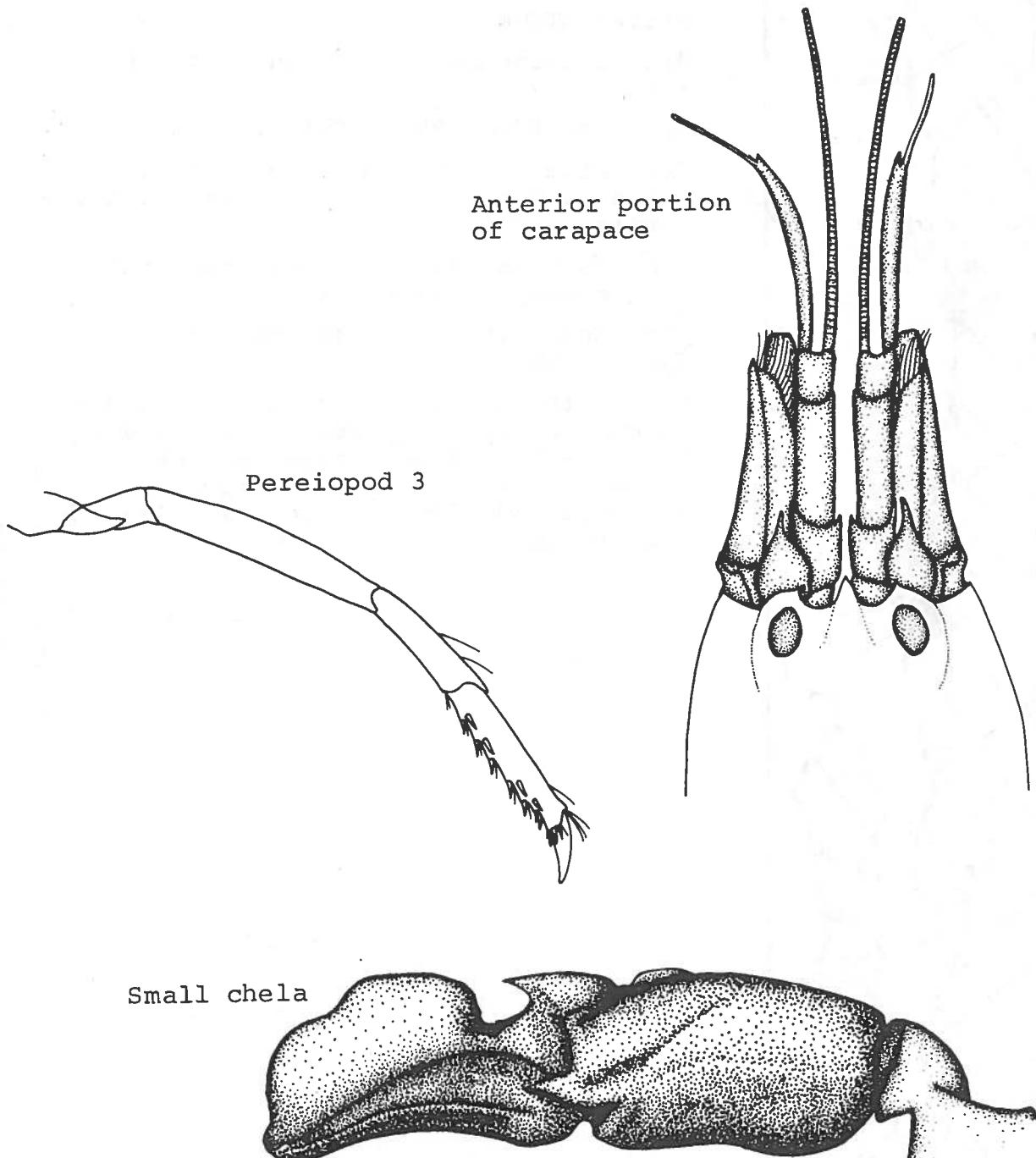
SYNONYMS

Alpheus clamator Kingsley 1878 (not Lockington). Crangon barbara of Schmitt 1921.

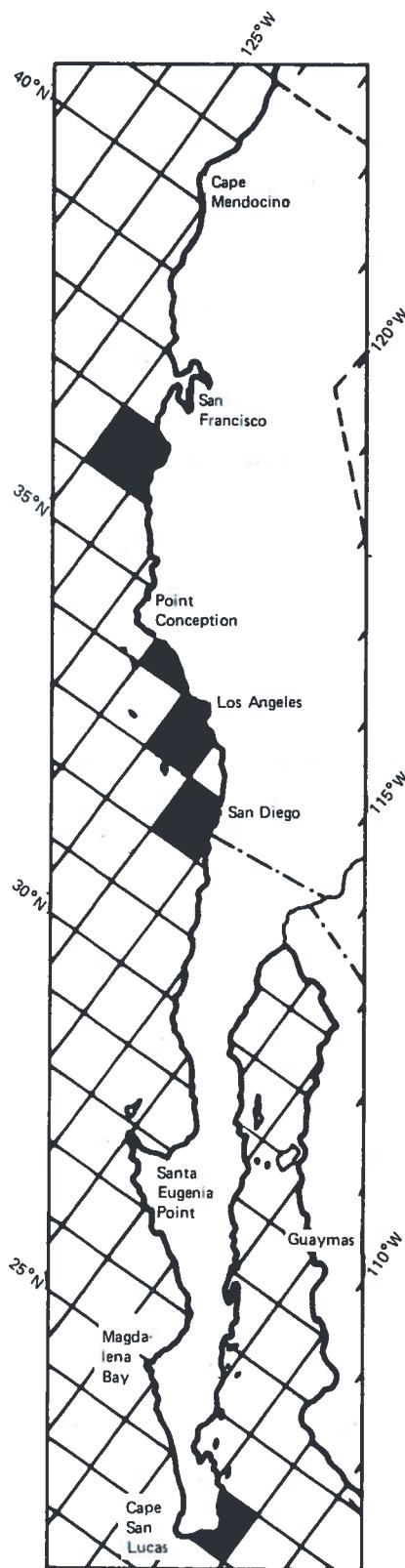
DISTRIBUTION

From Kingsley 1878: Santa Barbara, California.

Alpheus bellimanus Lockington 1877



Alpheus bellimanus Lockington 1877



SYNONYM

Crangon bellimanus of Schmitt 1921.

DISTRIBUTION

From Lockington 1877: San Diego, California.

From Coutière 1899: Chile.

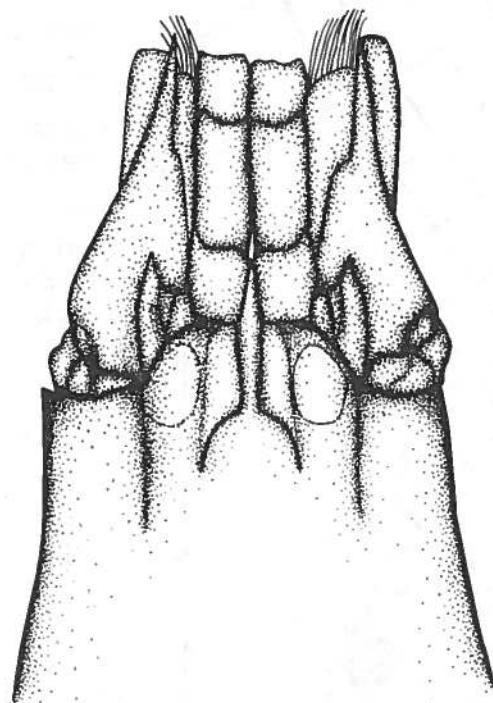
From Holmes 1900: Monterey, Santa Barbara, San Pedro, and San Diego, California.

From Rathbun 1904: Ranges from Monterey to San Diego, California.

From Chace 1937: Arena Bank, Baja California.

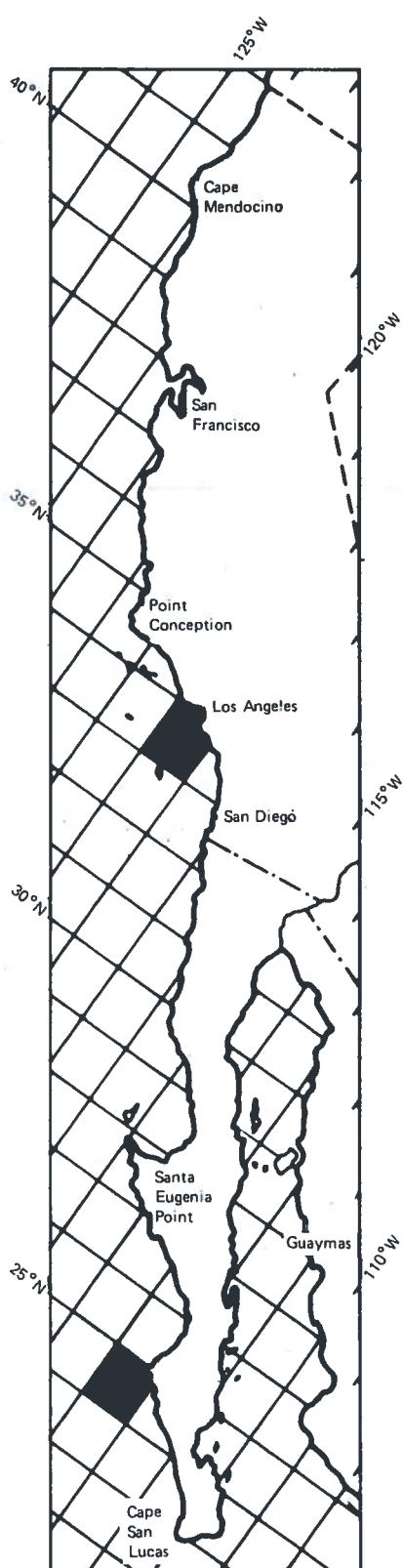
From authors' data: Santa Barbara (in stomach of Sebastes sp., 33 m), Palos Verdes (18 to 22 m), Engel's Bank (26-m biodredge), and off Imperial Beach (lat 32°34'7"N, long 117°9'W), California.

Alpheus californiensis Holmes 1900



Anterior portion
of carapace

Alpheus californiensis Holmes 1900



SYNONYM

Crangon californiensis of Schmitt 1921.

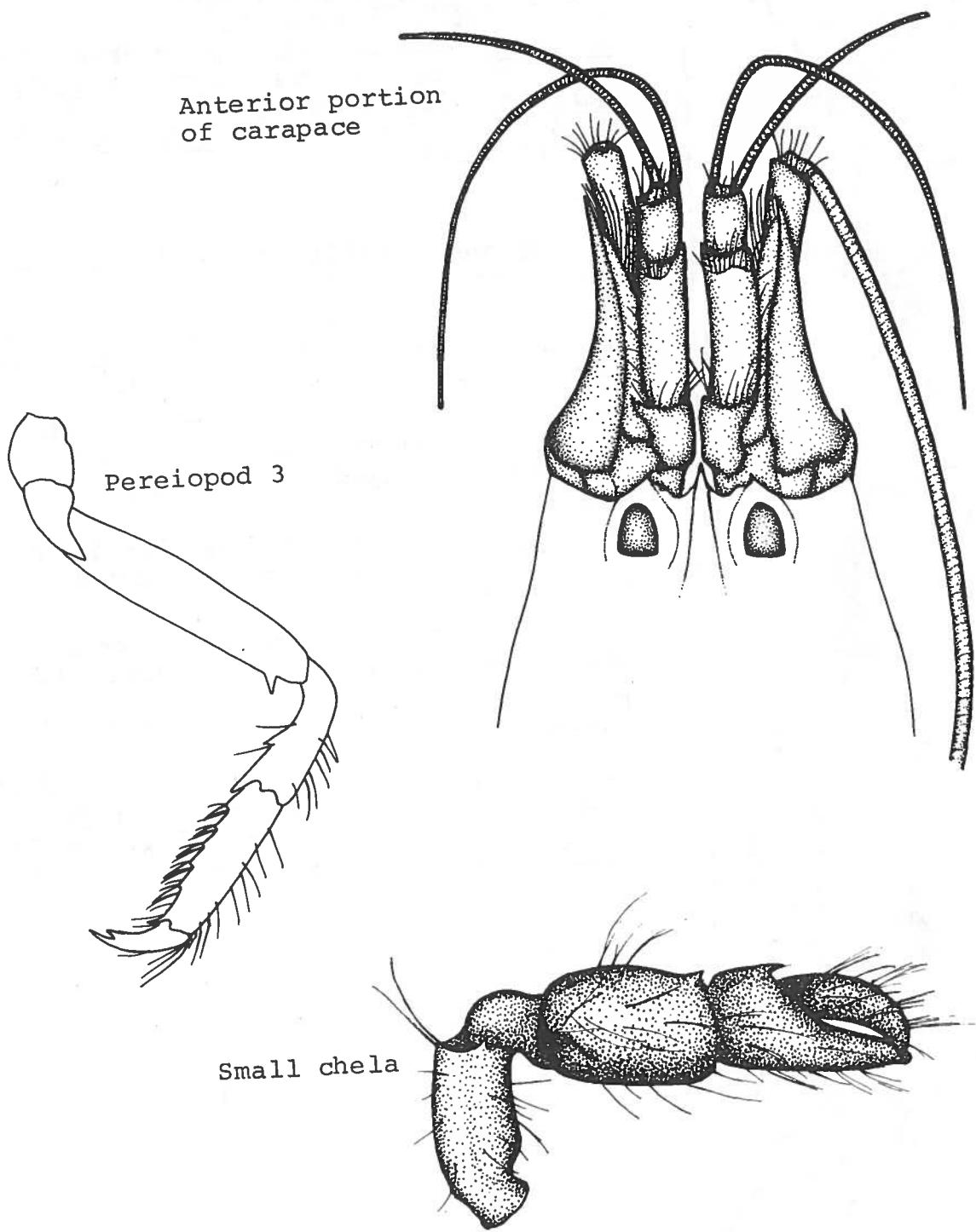
DISTRIBUTION

From Holmes 1900: San Pedro, California.

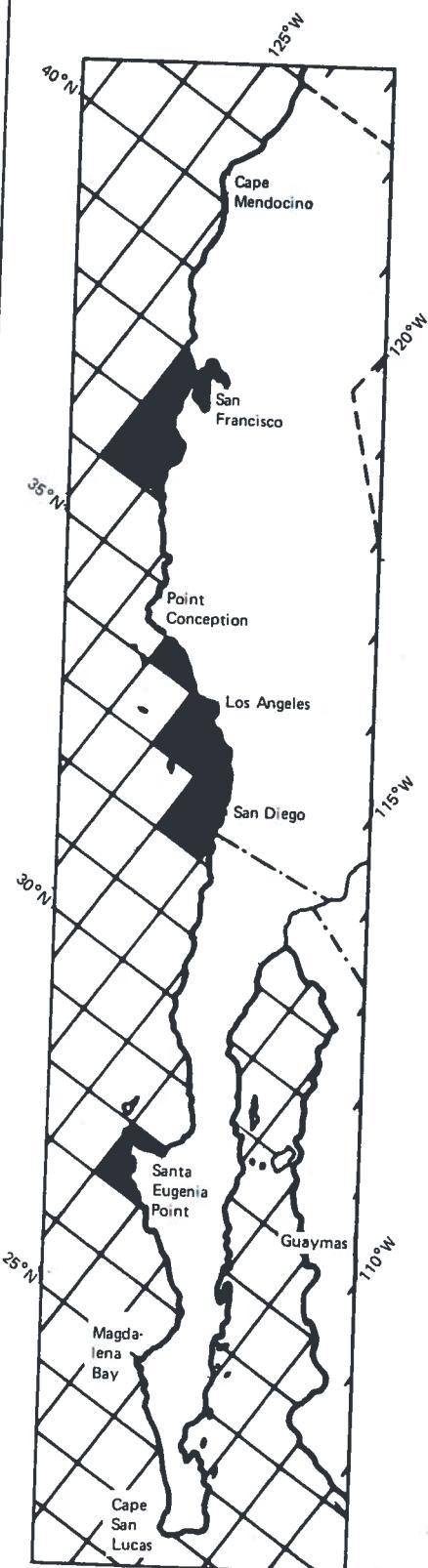
From Schmitt 1921: Magdalena Bay, Baja California.

From authors' data (Allan Hancock Foundation collection): Corona del Mar, California. Magdalena Bay, Baja California.

Alpheus clamator Lockington 1876



Alpheus clamator Lockington 1876



SYNONYMS

Alpheus clamator Lockington 1876; of Holmes 1900; of Baker 1912. Alpheus dentipes (Guerin 1832) of Rathbun 1904, 1916; of Schmitt 1921. Alpheus transversodactylus Kingsley 1878. Alpheus candei Kingsley 1883. Crangon clamator Schmitt 1946.

DISTRIBUTION

From Kingsley 1878: Santa Barbara and San Diego, California.

From Lockington 1876: Santa Barbara and Santa Barbara Island, California. San Bartolome Bay, Baja California.

From Holmes 1900: Farallon Islands, Monterey, Santa Barbara, San Pedro, and San Diego, California. San Bartolome Bay, Baja California.

From Rathbun 1904: Ranges from Farallon Islands, California, to San Bartolome Bay, Baja California.

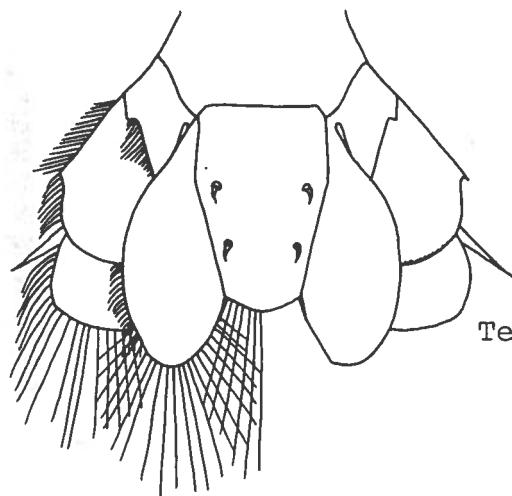
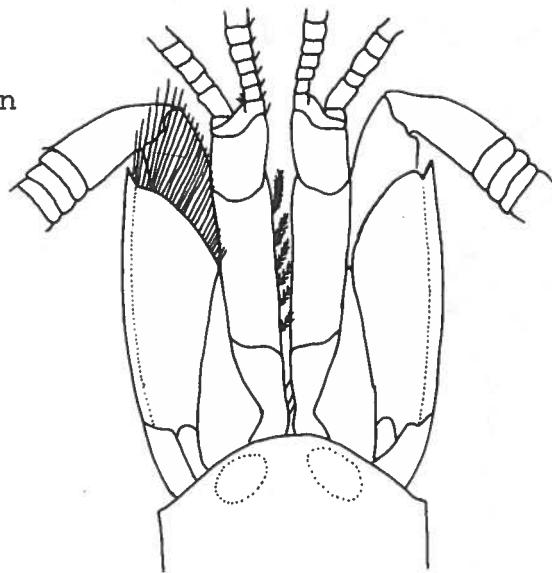
From Schmitt 1921: Found in common sponge masses and kelp holdfasts (Baker).

From Schmitt 1946: Santa Cruz Island, California.

From authors' data: Palos Verdes (Whites Point, Lunada Bay, and Indicator Point), Santa Catalina Island, and Dana Point, California (tides of -0.31 to 0.49 m).

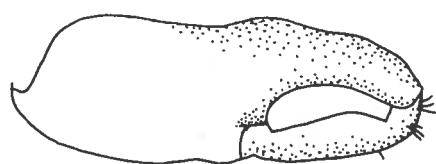
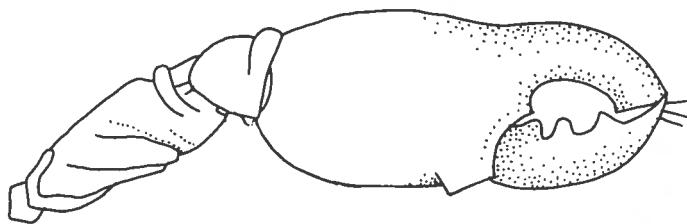
Betaeus ensenadensis Glassell 1938

Anterior portion
of carapace

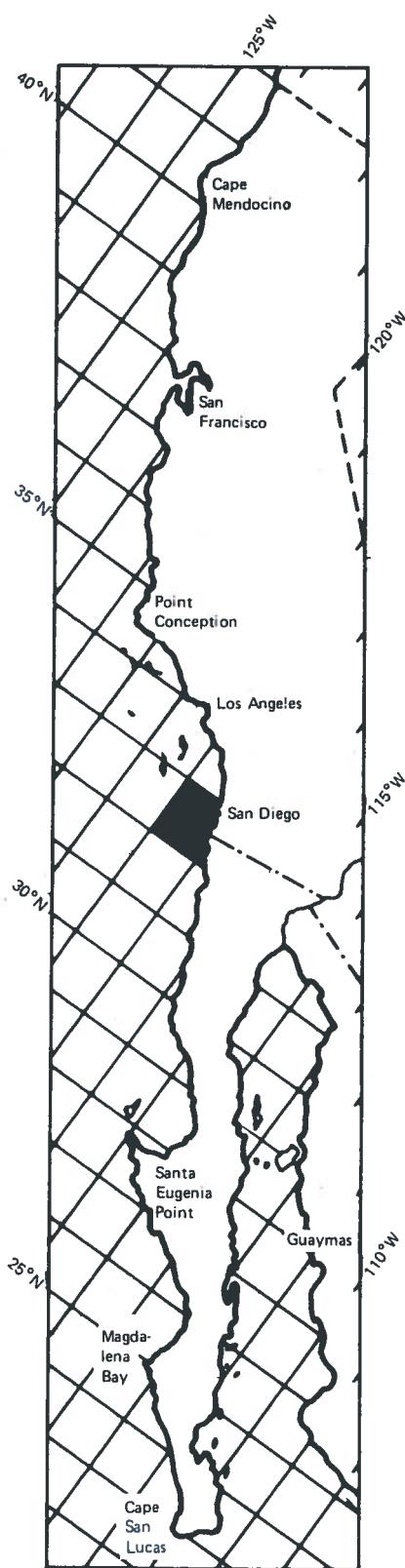


Telson and uropods

Typical chela (top);
median tooth on
dactyl may be missing
in male (bottom)



Betaeus ensenadensis Glassell 1938

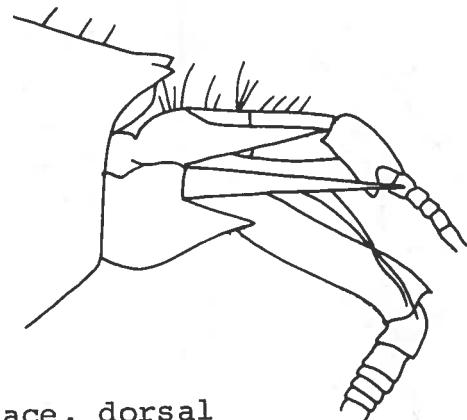
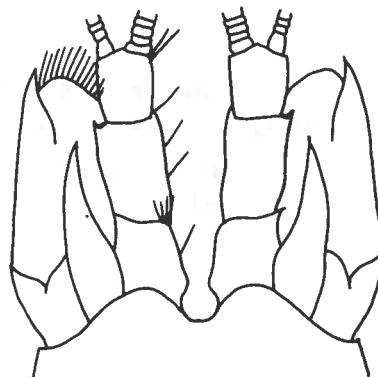


SYNONYM

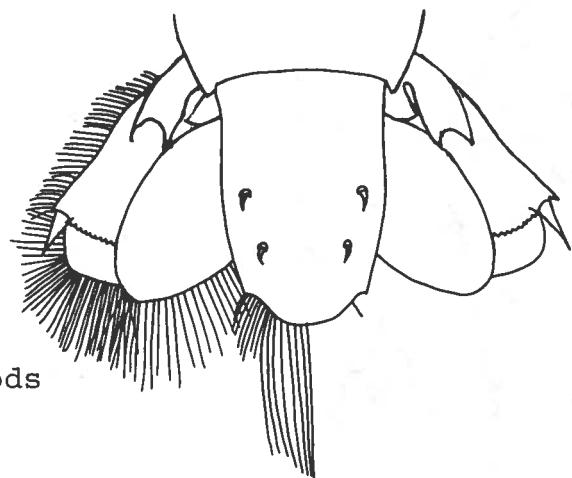
Betaeus (new species) MacGinitie 1934,
1937.

DISTRIBUTION

From Hart 1964: Ranges from Mission Bay, California, to Baja California. False Bay, San Diego, California (with Upogebia). El Estero de Punta Banda, Ensenada, Baja California.

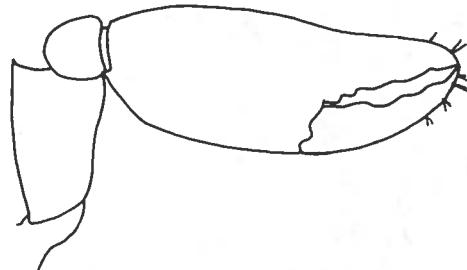


Anterior portion of carapace, dorsal
(left) and lateral (right) views

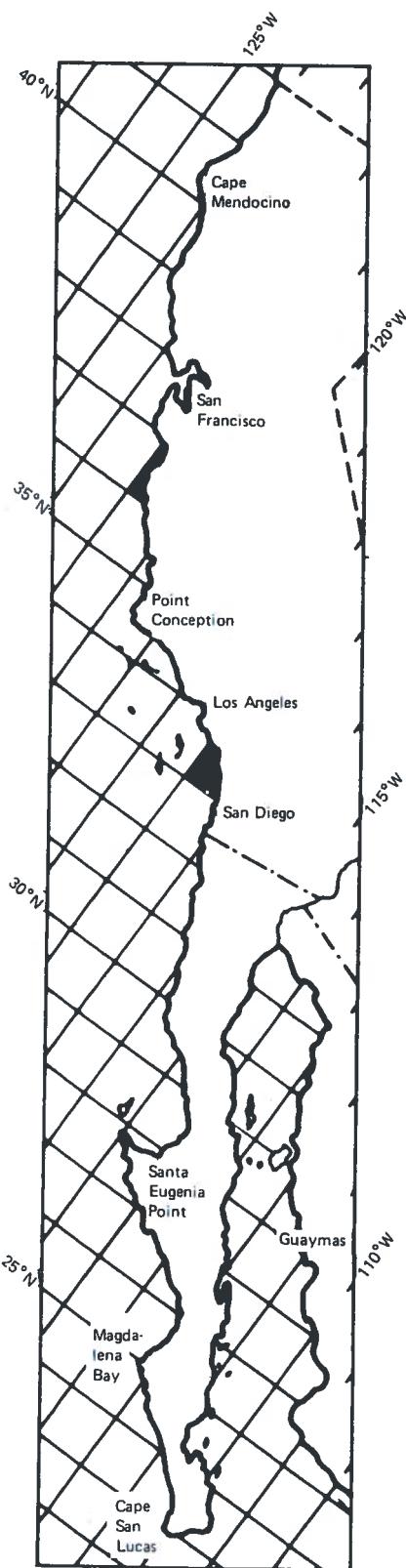


Telson and uropods

Chela of female



Betaeus gracilis Hart 1964



SYNONYM

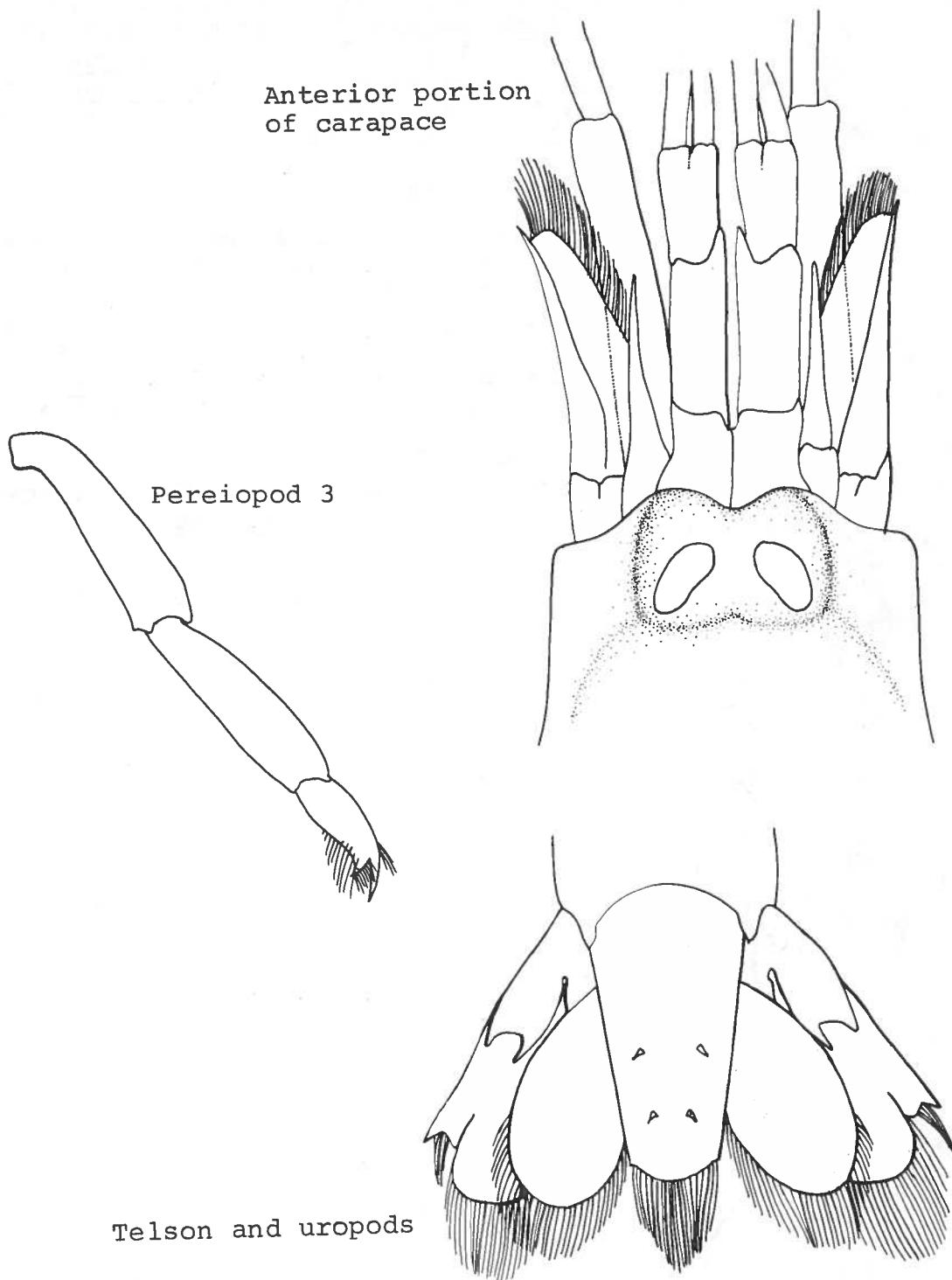
Betaeus harfordi of Hilton 1916.

DISTRIBUTION

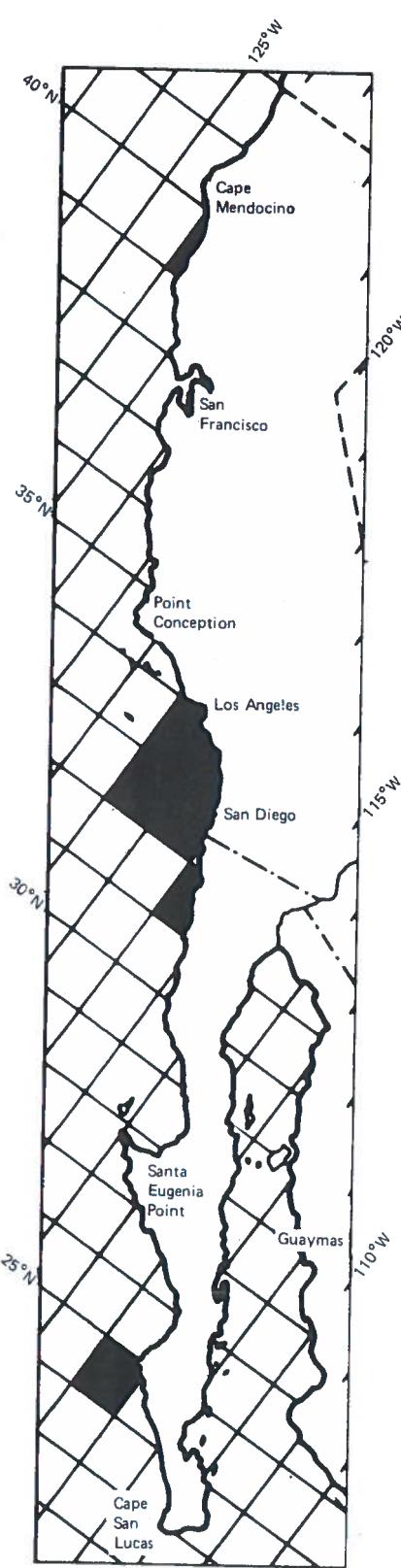
From Hilton 1916: Laguna Beach, California; found in kelp holdfasts.

From Hart 1964: Monterey Bay and Pacific Grove, California.

Betaeus harfordi (Kingsley 1878)



Betaeus harfordi (Kingsley 1878)



SYNONYMS

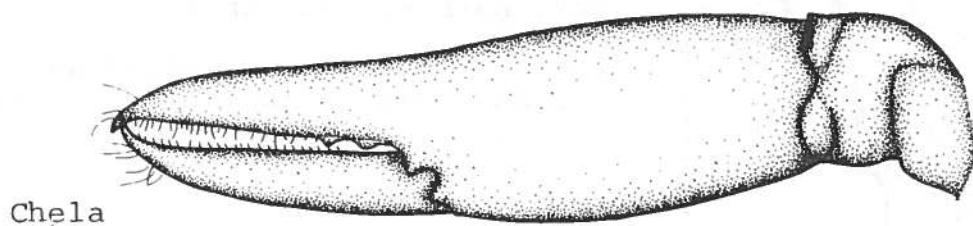
Betaeus equimanus of Lockington 1877.
Alpheus harfordi of Kingsley 1878; 1883.
Alpheus aequalis of Holmes 1900, in part;
of Kingsley 1878. Betaeus aequalis of
Lockington 1878. Betaeus harfordi of
Rathbun 1904; of Hilton 1916; of Schmitt
1921; of Hart 1964.

DISTRIBUTION

From Hart 1964: Fort Bragg, Santa Monica
Bay, San Pedro, Santa Catalina Island,
San Clemente Island, Santa Barbara Island,
Laguna Beach, Corona del Mar, and La Jolla
Cove, California. El Estero de Punta
Banda, Ensenada (with Haliotis fulgens)
and Magdalena Bay, Baja California.

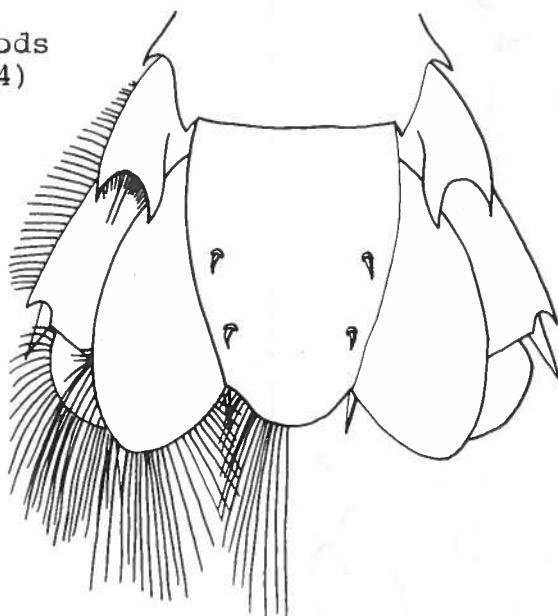
From authors' data: Santa Catalina
Island, California; at 3.5 m, in associa-
tion with Haliotis fulgens.

Betaeus harrimani Rathbun 1904

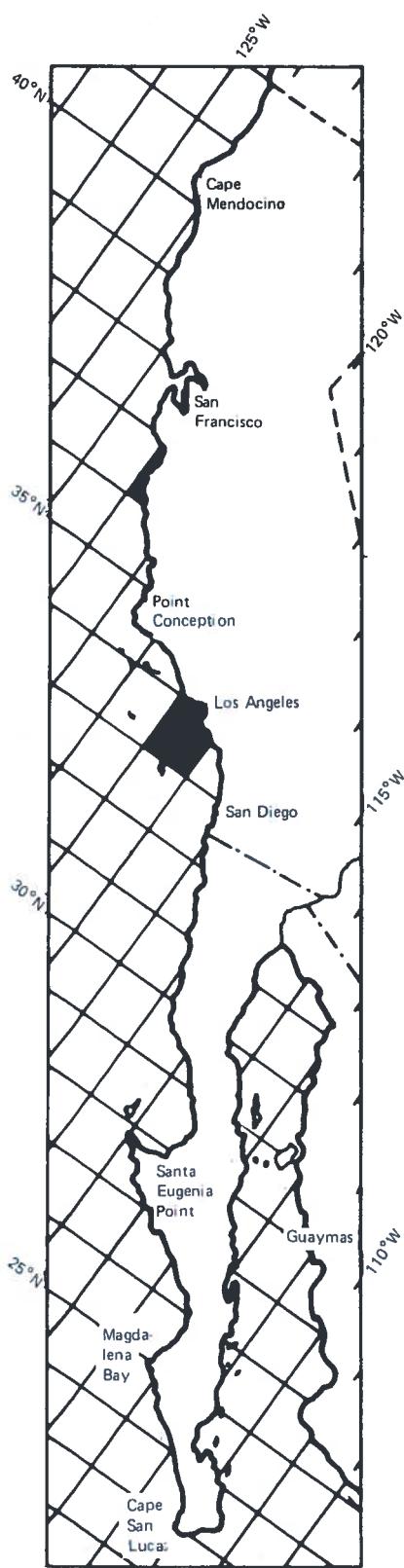


Chela

Telson and uropods
(after Hart 1964)



Betaeus harrimani Rathbun 1904

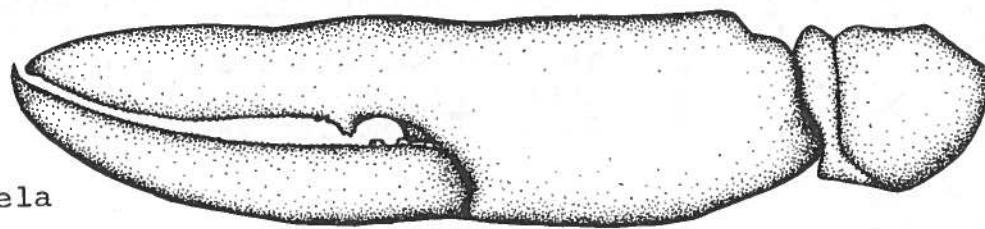


DISTRIBUTION

From Hart 1964: Monterey Bay and Newport Harbor, California.

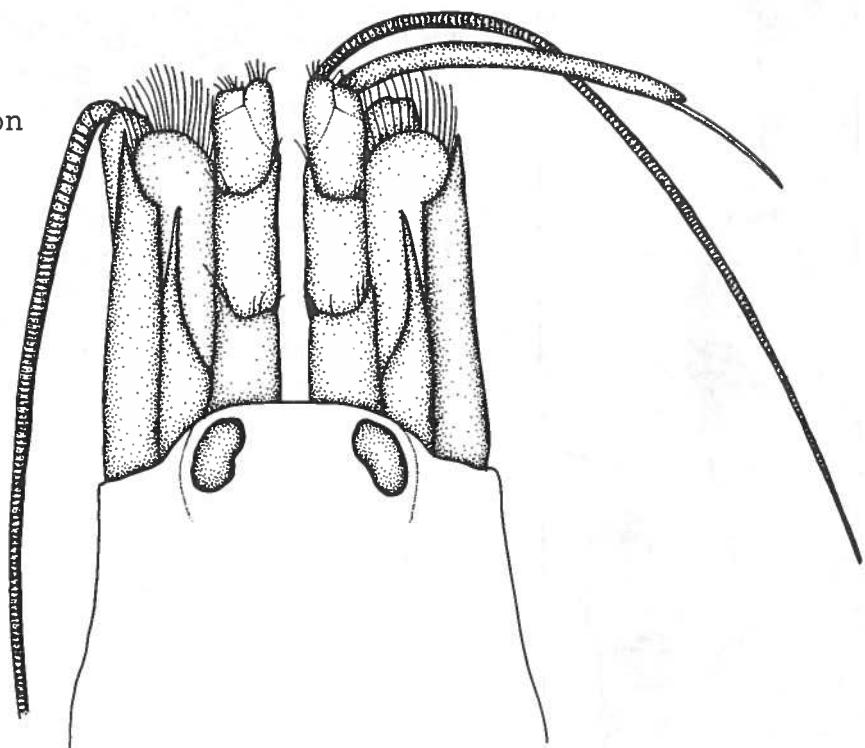
From authors' data: Paradise Cove, Malibu, California (rocky intertidal zone).

Betaeus longidactylus Lockington 1877

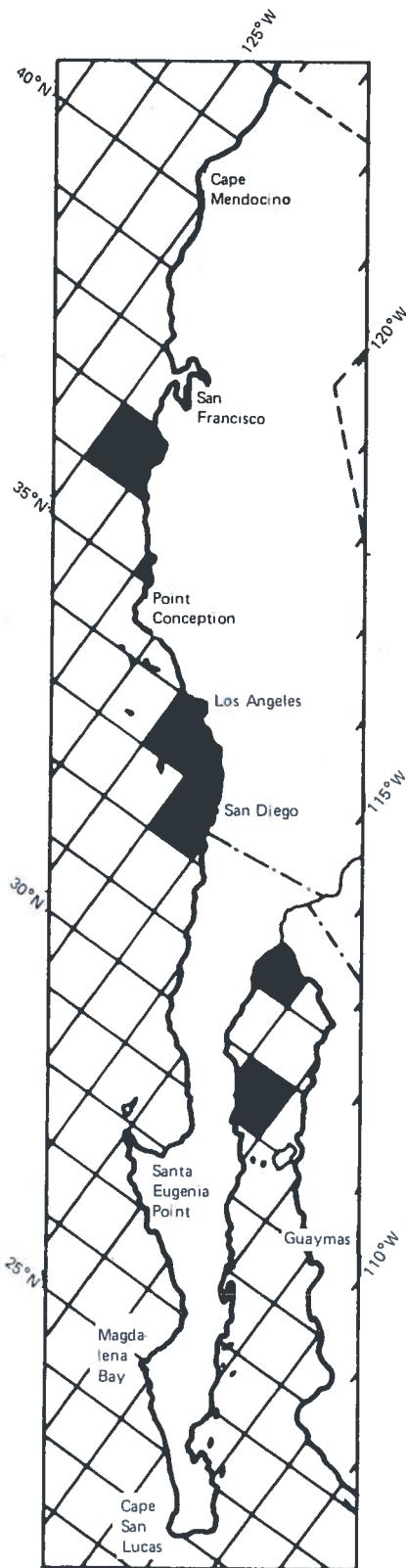


Chela

Anterior portion
of carapace



Betaeus longidactylus Lockington 1877



SYNONYMS

Betaeus longidactylus Lockington 1877; of Rathbun 1904; of Baker 1912; of Hilton 1916; of Schmitt 1921, 1924; of Hart 1964. *Alpheus longidactylus* (Lockington 1877) of Kingsley 1878; of Holmes 1900.

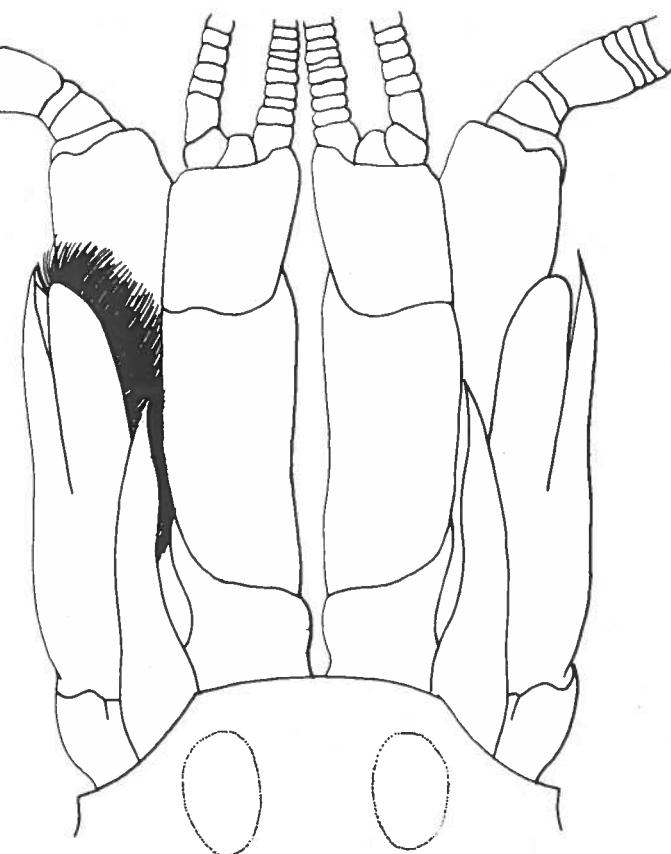
DISTRIBUTION

From Hart 1964: Ranges from Elkhorn Slough, Monterey, California, to Tepoca Bay, Gulf of California, Mexico; found in tide pools, under rocks, in eelgrass and crevices, and in burrows of *Urechis caupo* and *Upogebia pugettensis*. Monterey Bay, Morro Bay, Santa Monica Bay, San Pedro, Long Beach, Santa Catalina Island, Dana Point, Laguna Beach, La Jolla, and San Diego, California. San Felipe, Baja California.

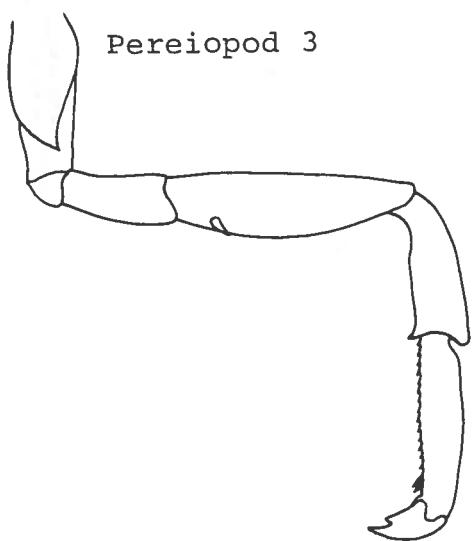
From authors' data: Flat Rock Cove, Palos Verdes Peninsula (rocky intertidal zone, 0.5 m), California. Bahia de los Angeles, Baja California (rocky intertidal zone).

Betaeus macginitiae Hart 1964

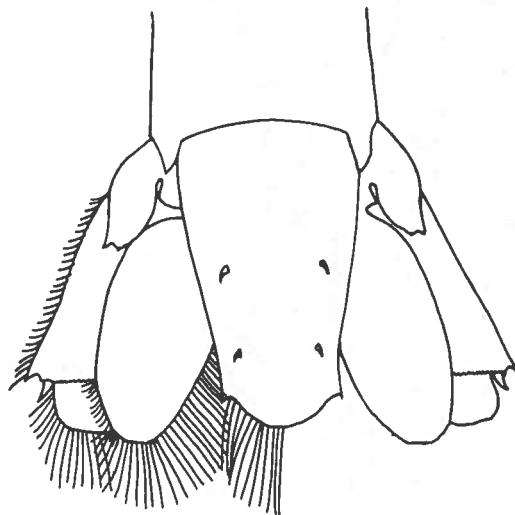
Anterior portion
of carapace (after
Hart 1964)



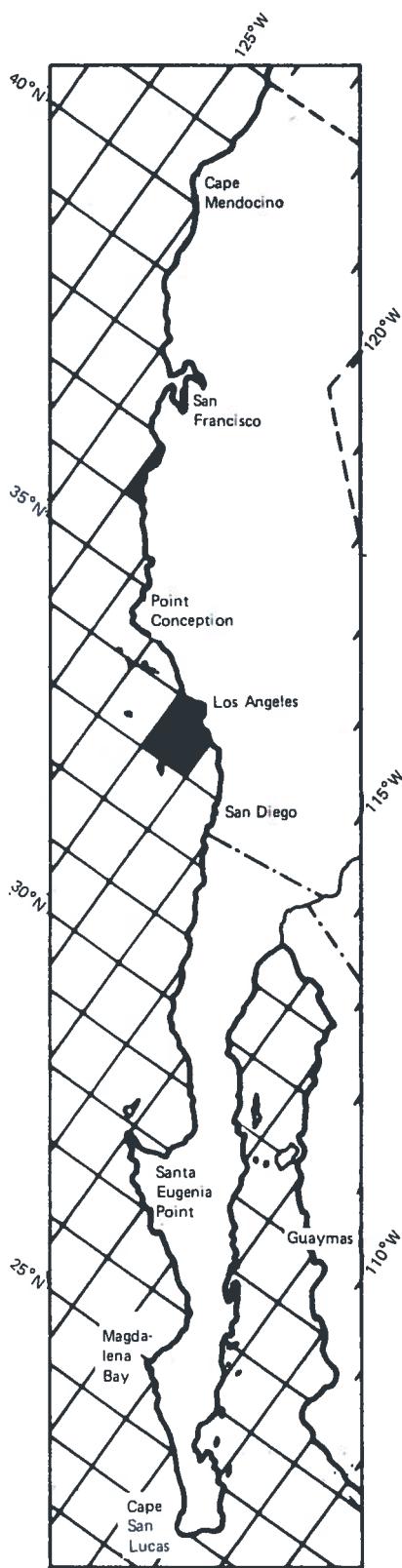
Pereiopod 3



Telson and uropods
(after Hart 1964)



Betaeus macginitiae Hart 1964



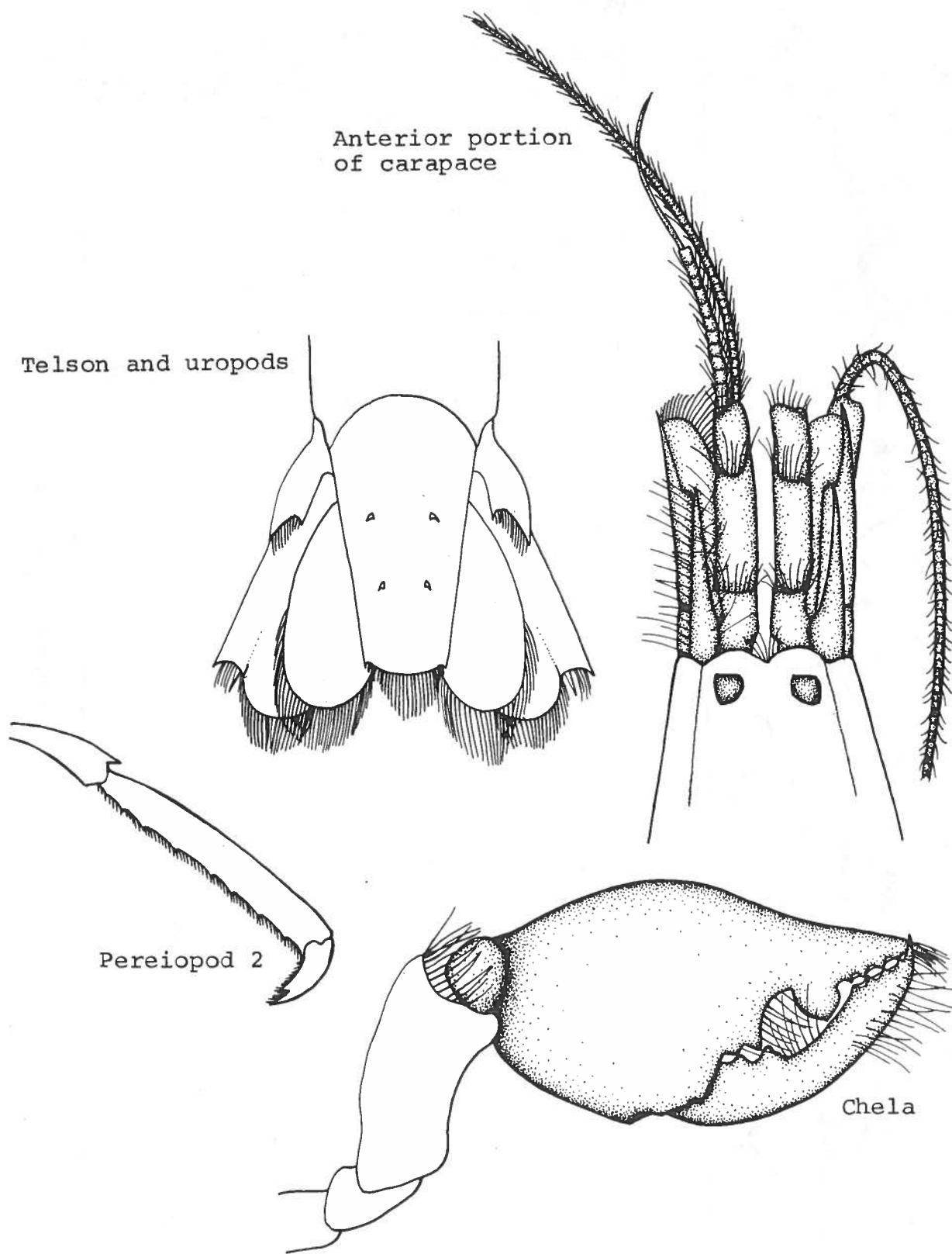
SYNONYMS

Alpheus aequalis of Holmes 1900, in part.
Betaeus harfordi of MacGinitie and
MacGinitie 1949, in part.

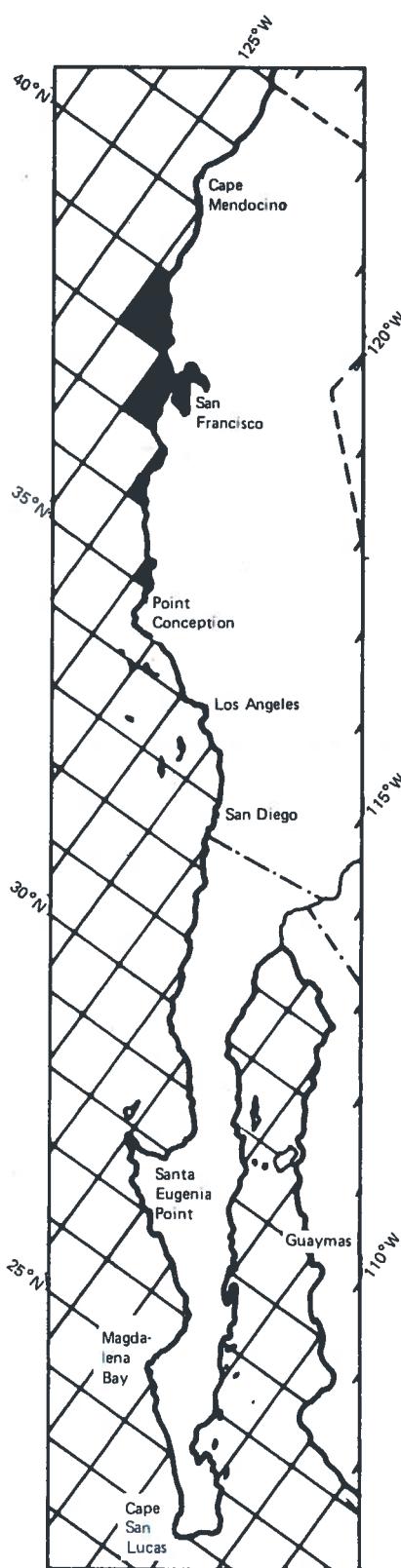
DISTRIBUTION

From Hart 1964: China Point, Monterey Bay, Santa Catalina Island, Laguna Beach, and Corona del Mar, California; occurs in association with the sea urchins Strongylocentrotus franciscana and S. purpuratus.

From authors' data: Palos Verdes Peninsula, California (Indicator Point, 0.5-m tide).



Betaeus setosus Hart 1964



SYNONYMS

Alpheus aequalis of Holmes 1900, in part (free living form). Betaeus harfordi of MacGinitie and MacGinitie 1949, in part; of Ricketts and Calvin 1952.

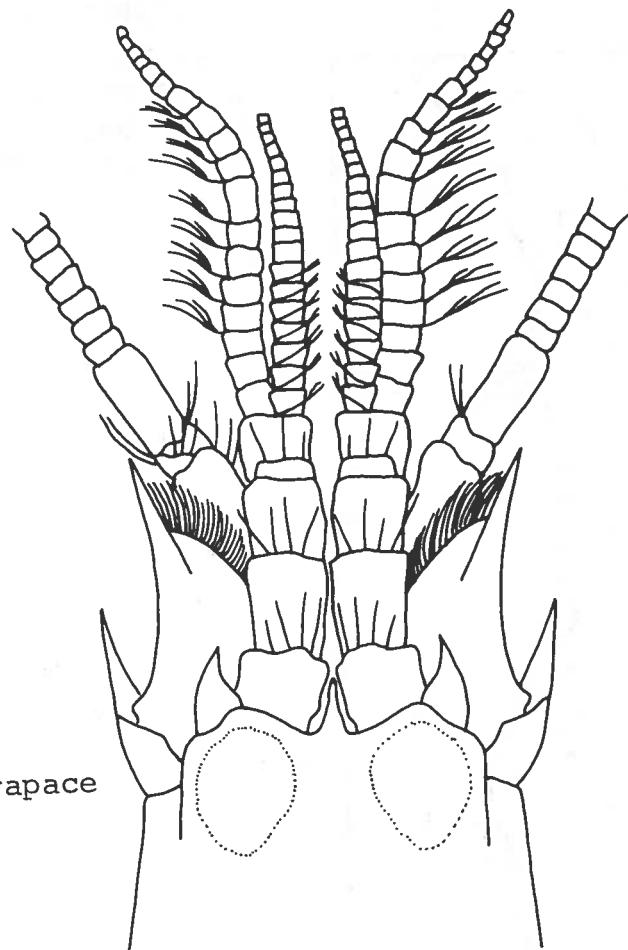
DISTRIBUTION

From Hart 1964: Ranges from Hecate Strait, Queen Charlotte Island, British Columbia, to Morro Bay, California. Dillon Beach, Bodega Lagoon, Tomales Point, Monterey Bay, and Morro Bay, California.

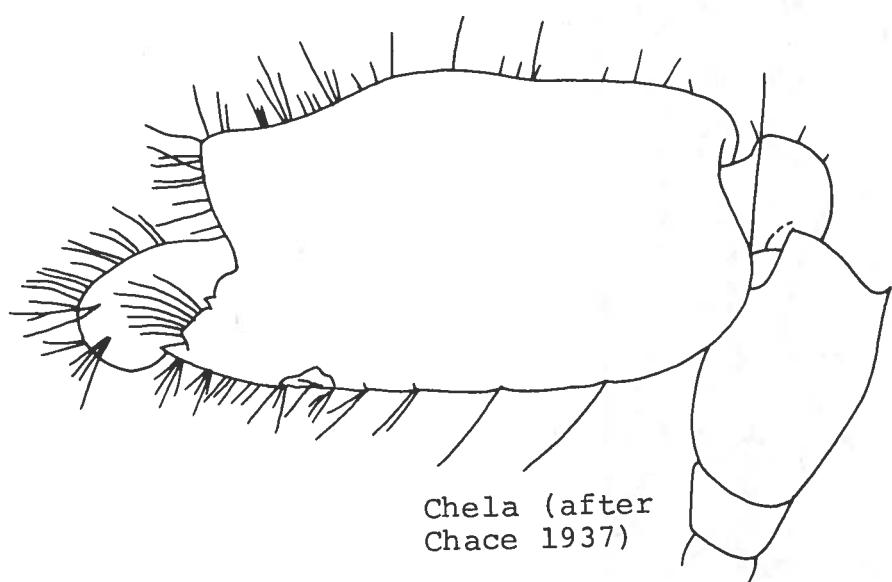
From authors' data (Allan Hancock Foundation collection): Hazard Reef, near Morro Bay, California.

Pomagnathus corallinus Chace 1937

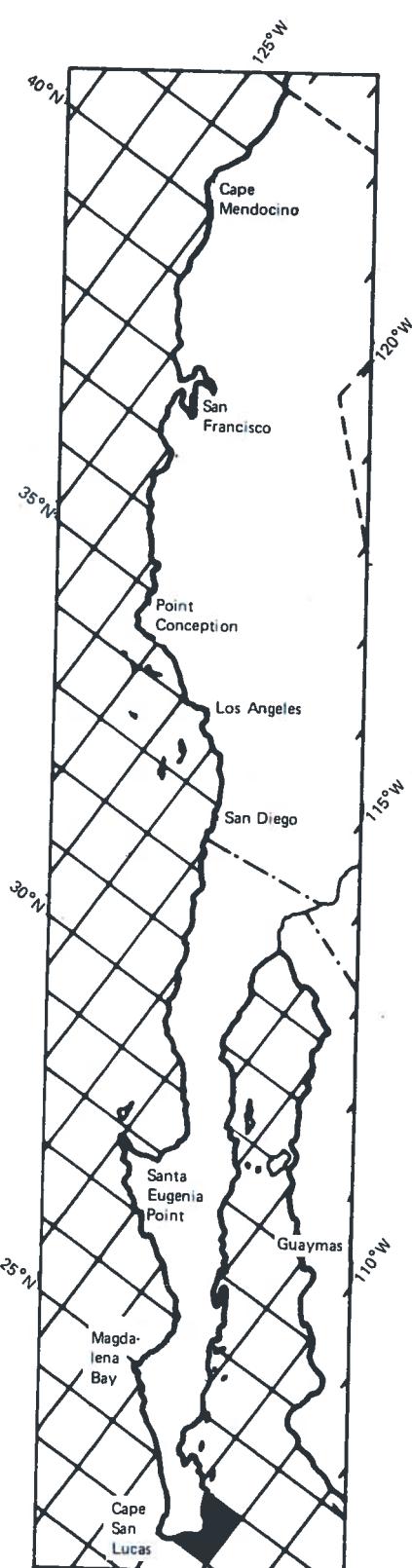
Anterior portion of carapace
(after Chace 1937)



Chela (after
Chace 1937)



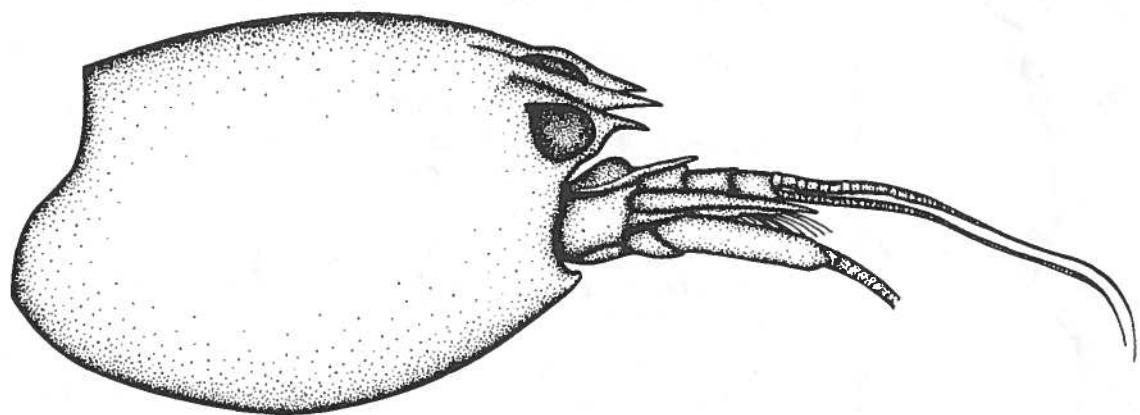
Pomagnathus corallinus Chace 1937



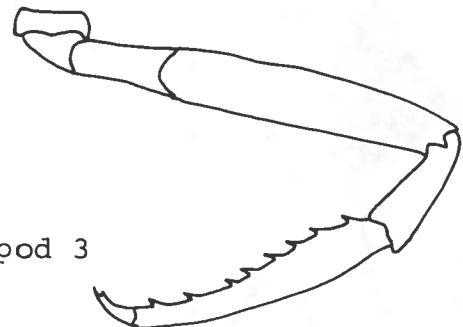
DISTRIBUTION

From Chace 1937: Clipperton Island, 1,078 km southwest of Mexico. Arena Bank, Baja California, at 4.5 m on the coral Pocillopora ligulator.

Synalpheus lockingtoni Coutiére 1909

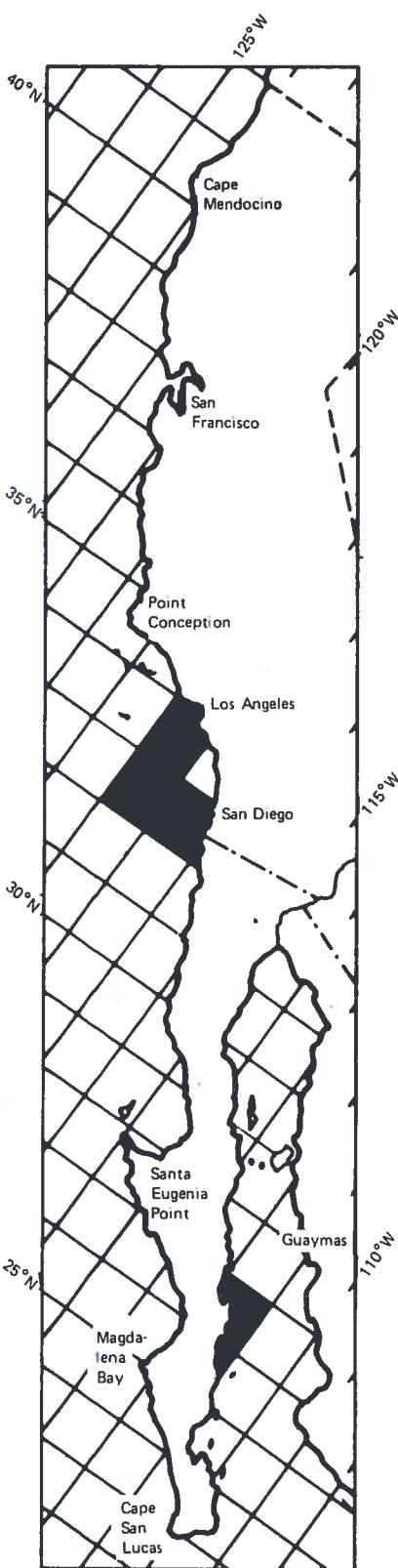


Carapace



Pereiopod 3

Synalpheus lockingtoni Coutière 1909



SYNONYMS

Alpheus levisculus Lockington 1878.
Synalpheus lockingtoni Coutière 1909
(new name); of Schmitt 1921.

DISTRIBUTION

From Lockington 1878: "Port Escondido, Mulege Bay, and other points on the California shore of the Gulf of California."

From Coutière 1909: San Nicolas Island, California, Albatross Station 4421 (419 to 545 m).

From Schmitt 1921: Santa Monica Bay and Venice Beach, California, in the roots of Nereocystis; west shore of Catalina Harbor, California (littoral).

From authors' data: Whites Point, Palos Verdes (tide of -0.31 m, rocky intertidal zone), and San Diego Bay (rocky intertidal zone), California.

Section 5
KEY TO THE FAMILY
CRANGONIDAE

- Argis californiensis (Rathbun 1902)
Crangon alaskensis elongata Rathbun 1902
 Crangon alba Holmes 1900
 Crangon communis Rathbun 1899
 Crangon holmesi Rathbun 1902
 Crangon munitella Walker 1898
 Crangon nigricauda Stimpson 1856
Crangon nigromaculata Lockington 1877
 Crangon resima Rathbun 1902
Crangon spinosissima Rathbun 1902
 Crangon stylirostris Holmes 1900
 Crangon zacae (Chace 1937)

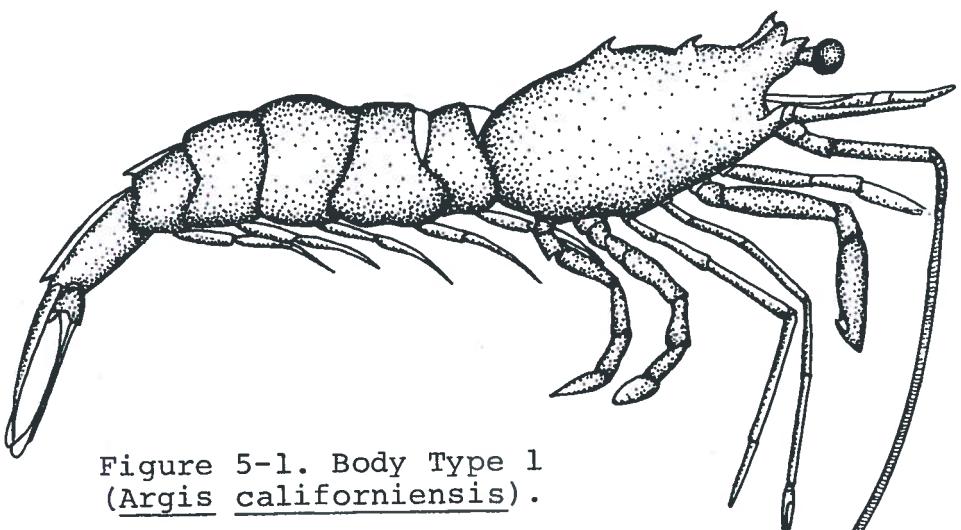


Figure 5-1. Body Type 1
(Argis californiensis).

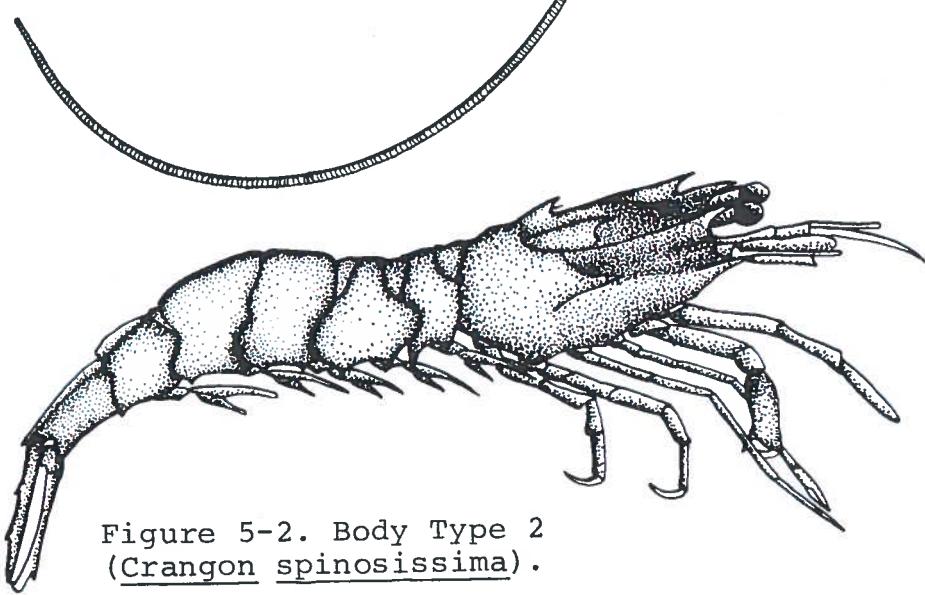


Figure 5-2. Body Type 2
(Crangon spinosissima).

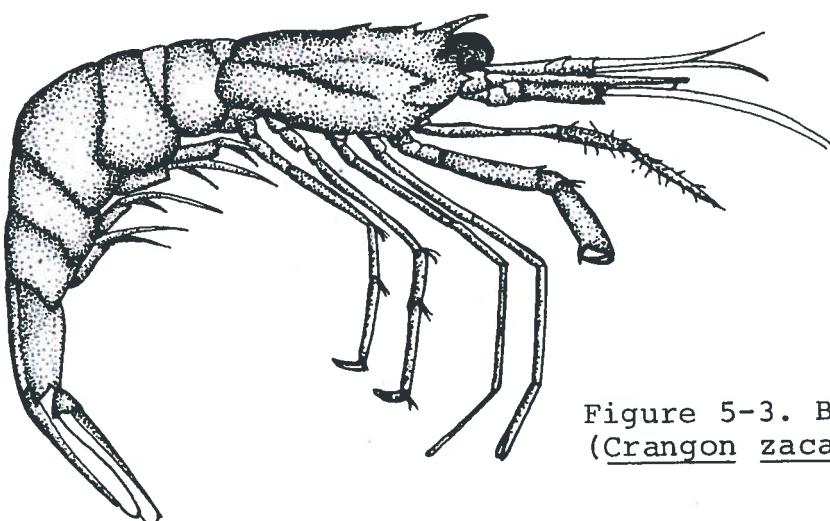


Figure 5-3. Body Type 3
(Crangon zacae).

Section 5
KEY TO THE SPECIES OF
CRANGONIDAE*

- 1 . . . (2) The dactyls of Pereiopods 4 and 5 are modified into a leaf-like shape (Body Type 1, Figure 5-1).

Argis californiensis

- 2 . . . (1) The dactyls of Pereiopods 4 and 5 are not leaf-shaped.

- 3 . . . (6) The gastric region of the carapace is depressed below the general level of the carapace (Body Type 2, Figure 5-2).

- 4 . . . (5) Carapace has three pairs of lateral spines--one pair in the gastric region, one pair in the hepatic region at the level of the suborbital spine, and one pair in the antennal region.

Crangon munitella

- 5 . . . (4) There are two pairs of lateral spines on the carapace--one pair in the gastric region and one pair in the hepatic region.

Crangon spinosissima

- 6 . . . (3) The gastric region of the carapace is not depressed below the general level of the carapace (Body Type 3, Figure 5-3).

- 7 . . . (8) The carapace has no median gastric spines.

Crangon stylirostris

*The generic names of Crago Lamarck 1801, Alpheus Weber 1795, and Crangon Weber 1795 were suppressed in 1955 by ruling of the International Commission on Zoological Nomenclature. This act restored the names Crangon Fabricius 1798 and Alpheus Fabricius 1798 as they are used in this volume.

The status of the various genera in the Crangonidae is incompletely understood and undergoing revision. The genera used in this key are those recognized by Holthuis (1955). The species included are those accepted by de Man (1920) and Dr. F.A. Chace, Jr. (Smithsonian Institution, Washington, D.C., unpublished compilation of California Caridea, 1973). One species, Crangon zacae, described in 1937, was added to this list.

- 8 . . . (7) The carapace has at least one median gastric spine.
- 9 . . . (18) The carapace has only one median gastric spine.
- 10 . . . (11) A live or freshly preserved specimen has one blue spot, and rarely two, on the lateral side of the sixth abdominal segment.

(Q)

Crangon nigromaculata

- 11 . . . (10) A live or freshly preserved specimen does not have blue spots on the sixth abdominal segment.
- 12 . . . (15) The ventral side of the sixth abdominal segment is grooved (Figure 5-4).
- 13 . . . (14) The internal angle of the blade of the antennal scale is produced beyond the tip of the antennal spine.

Crangon nigricauda

- 14 . . . (13) The internal angle of the blade of the antennal scale is not produced beyond the tip of the antennal spine.

Crangon alaskensis elongata

- 15 . . . (12) The ventral side of the sixth abdominal segment is not grooved (Figure 5-5).
- 16 . . . (17) The antipenultimate segment (third to last) of the third maxilliped is greatly dilated. This is primarily an island species.

Crangon alba

- 17 . . . (16) The antipenultimate segment of the third maxilliped is not dilated. This is an island species.

Crangon holmesi

- 18 . . . (9) The carapace has two median gastric spines.
- 19 . . . (20) The rostrum tilts up at an angle of 45 degrees. The tip of the rostrum has a small flag-like structure.

Crangon resima

- 20 . . . (19) The rostrum may be tilted upward, but not at a 45-degree angle. It also does not have the flag-like structure at the tip.

Figure 5-4. Grooved sixth abdominal segment (Crangon nigricauda).

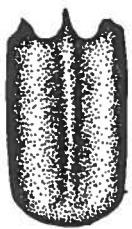
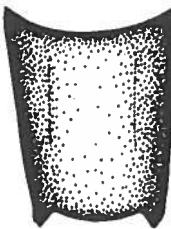


Figure 5-5. Sixth abdominal segment without groove (Crangon alba).



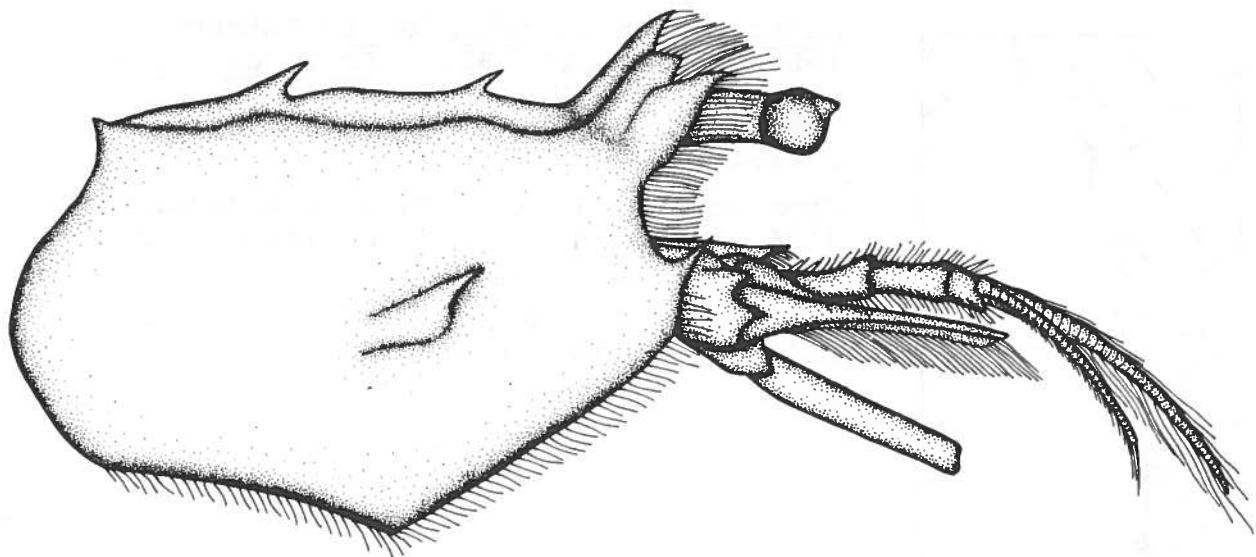
21 . . . (22) All abdominal segments except the first and second are carinated on the dorsal surface, with two carina separated by a median sulcus on the sixth abdominal segment.

Crangon communis

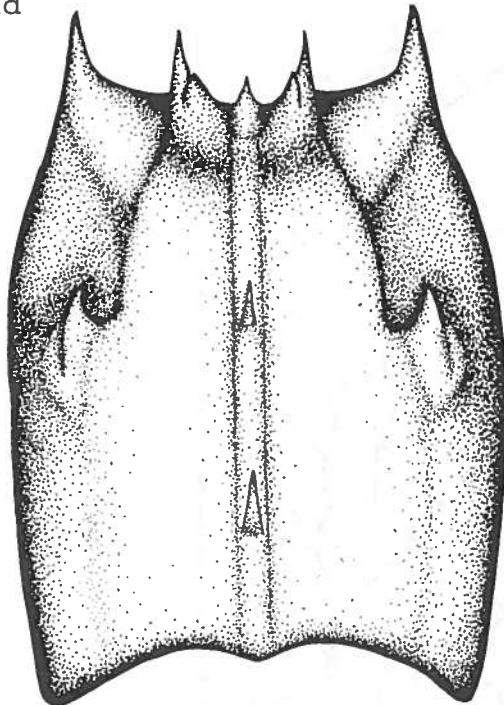
22 . . . (21) Only the sixth abdominal segment is carinated on the dorsal surface, with two carina separated by a median sulcus.

Crangon zacae

Argis californiensis (Rathbun 1902)

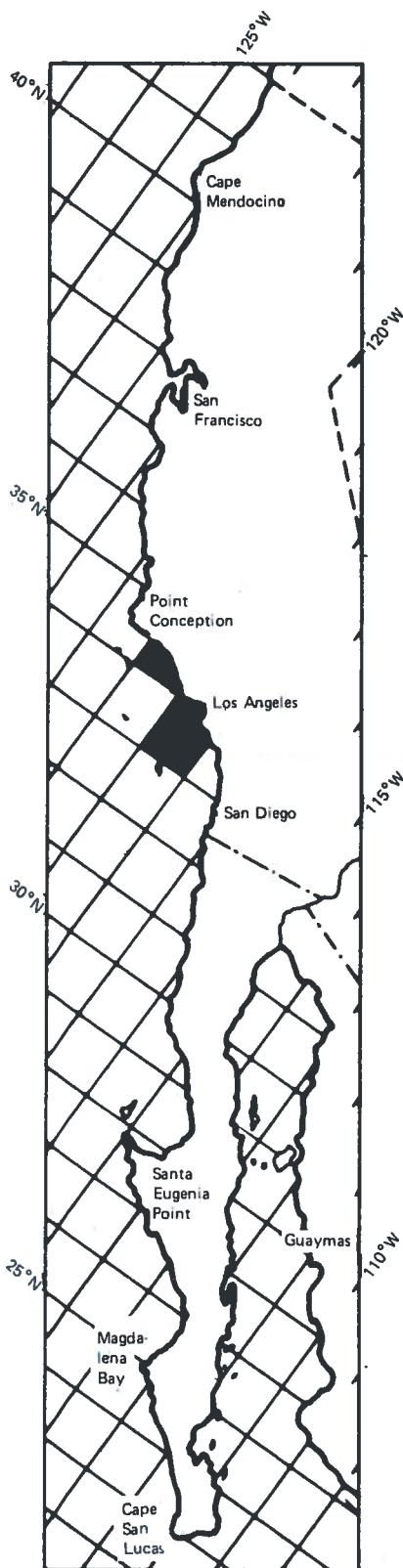


Carapace, dorsal (above) and
lateral (right) views



Pereiopod 4

Argis californiensis (Rathbun 1902)



SYNONYMS

Nectocrangon californiensis Rathbun 1902; of Schmitt 1921. Argis californiensis of de Man 1920.

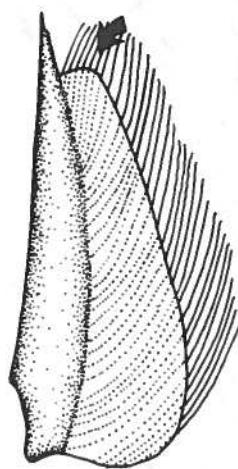
DISTRIBUTION

From Schmitt 1921: Santa Cruz Island (146 m) and Santa Catalina Island (108 to 284 m), California.

From authors' data: Santa Monica Bay, California (183 m).

Crangon alaskensis elongata Rathbun 1902

Antennal scale



Crangon alaskensis elongata Rathbun 1902

SYNONYMS

Crangon nigricauda of Lockington 1878, in part. *Crangon crangon affinis* of Ortmann 1895, in part. *Crangon vulgaris* of Kingsley 1899, in part. *Crangon alaskensis elongata* of de Man 1920. *Crago alaskensis elongata* of Schmitt 1921. *Crago alaskensis* of Carlisle 1969.

DISTRIBUTION

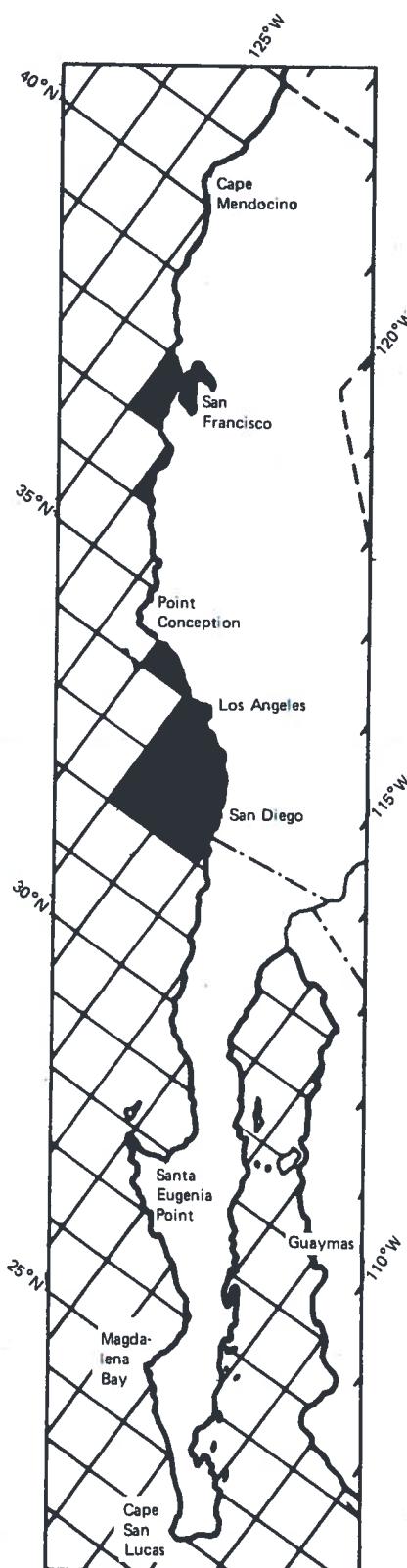
From Rathbun 1902: Found off Oregon and California at 16 to 97 m.

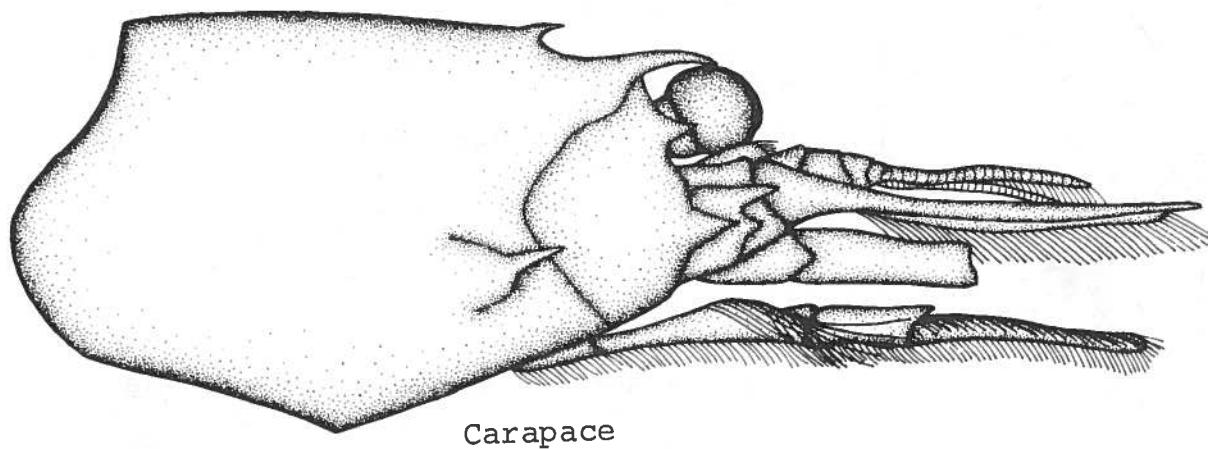
From Rathbun 1904: Monterey Harbor and Pacific Grove, California.

From de Man 1920: Ranges from British Columbia, Canada, to San Diego, California.

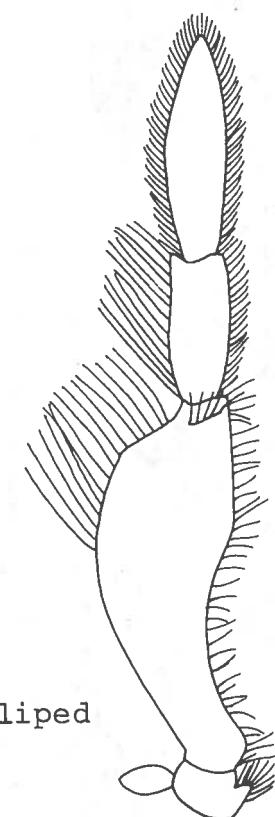
From Schmitt 1921: Ranges from British Columbia, Canada, to the U.S./Mexico border. San Francisco Bay (35 to 124 m) and Santa Barbara (53 m), California.

From authors' data: Oxnard, Santa Monica Bay, Palos Verdes, San Pedro Bay, Orange County, Santa Catalina Island, Dana Point, San Clemente Island, and San Diego, California (27 to 137 m, most common at 64 m).



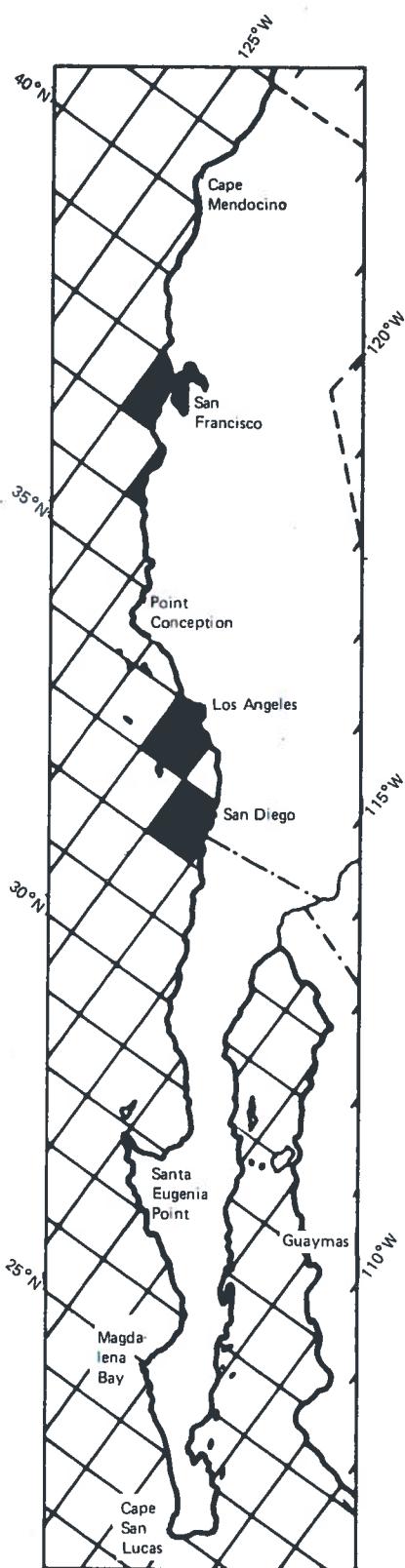


Carapace



Third maxilliped

Crangon alba Holmes 1900



SYNONYM

Crago alba of Schmitt 1921.

DISTRIBUTION

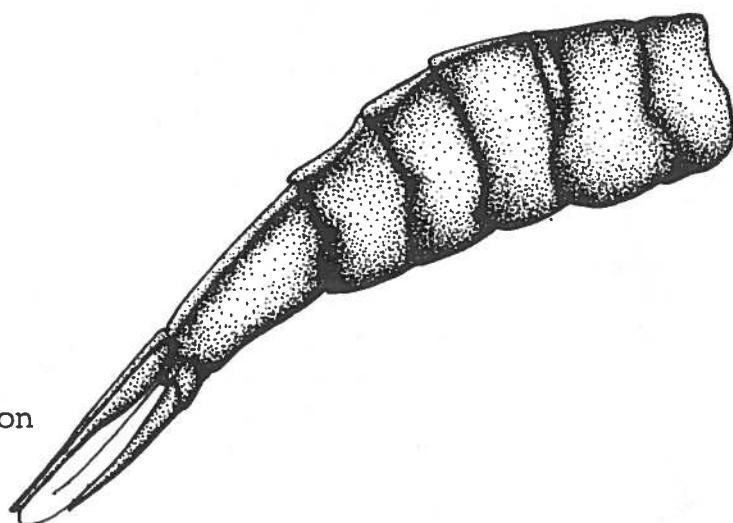
From Holmes 1900: Monterey Bay, California.

From Rathbun 1904: Ranges from Vancouver Island, British Columbia, to San Diego, California, up to 86 m. Farallon Islands (53 and 86 m), Pacific Grove, Lobos Rocks (75 m), Cortes Bank (86 m), and San Diego Bay (40 m), California.

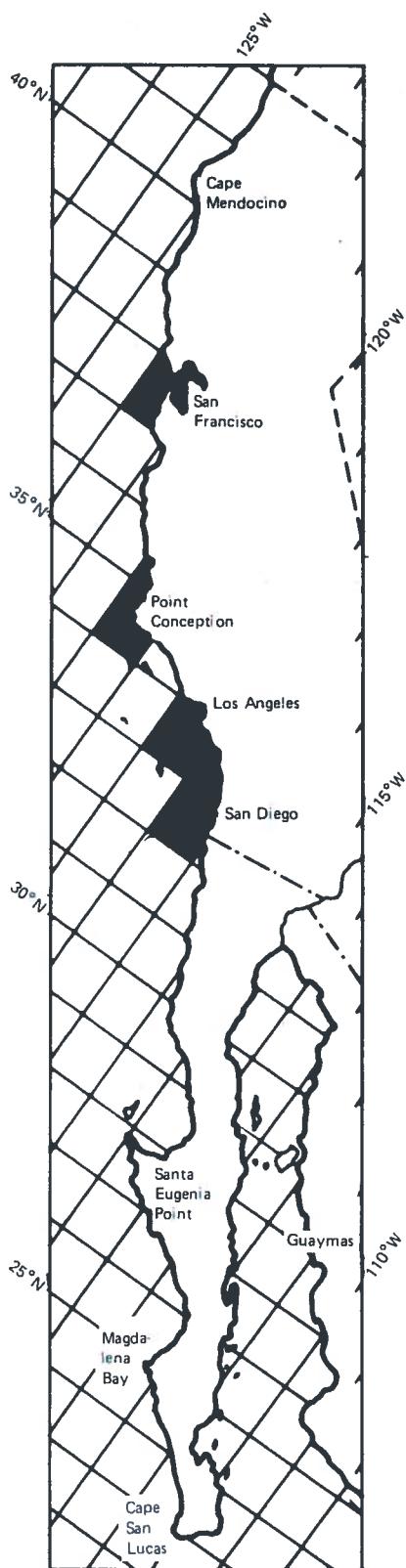
From authors' data: Santa Catalina Island (23 m) and Palos Verdes (23 m), California.

Crangon communis Rathbun 1899

Abdomen and telson



Crangon communis Rathbun 1899



SYNONYMS

Crangon communis Rathbun 1899; of Rathbun 1904. Crago communis of Schmitt 1921.

DISTRIBUTION

From Rathbun 1904: Ranges from the Bering Sea to San Diego, California (36 to 565 m, less abundant in southern localities).

From Schmitt 1921: San Francisco, California (110 to 124 m).

From Goodwin 1952: Point Sal (137 m), San Luis Obispo (146 m), and Pismo Beach (146 to 201 m), California.

From authors' data: Santa Monica Bay (137 m), Palos Verdes Peninsula (137 m), San Pedro Bay (137 m), and Dana Point (91 m), California.

COMMENTS

This species is occasionally found in shallow waters. It is less abundant than Crangon zacae and generally much larger.

Crangon holmesi Rathbun 1902

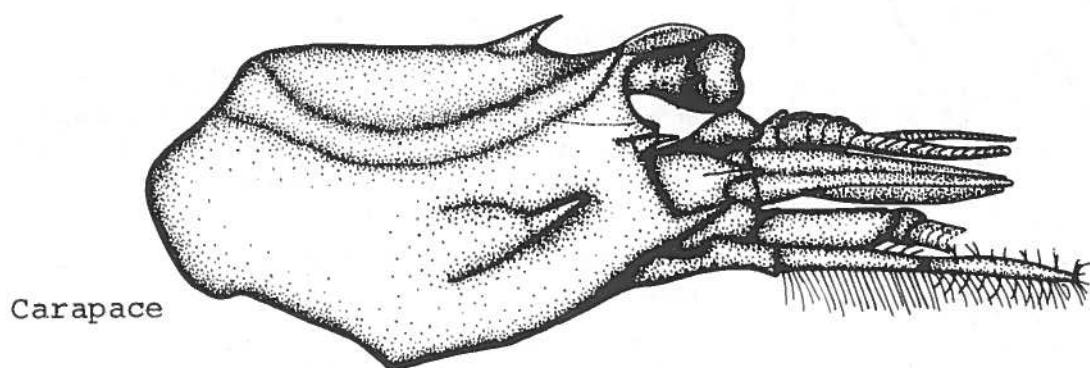
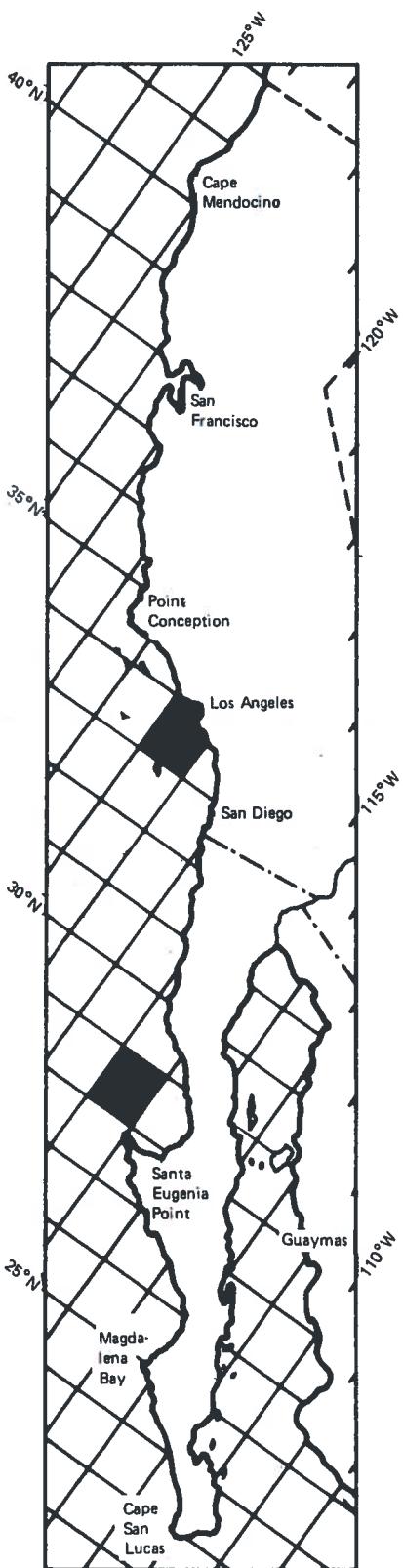


FIG. 2. CRANGON
holmesi Rathbun

Crangon holmesi Rathbun 1902



SYNONYM

Crago holmesi of Schmitt 1921.

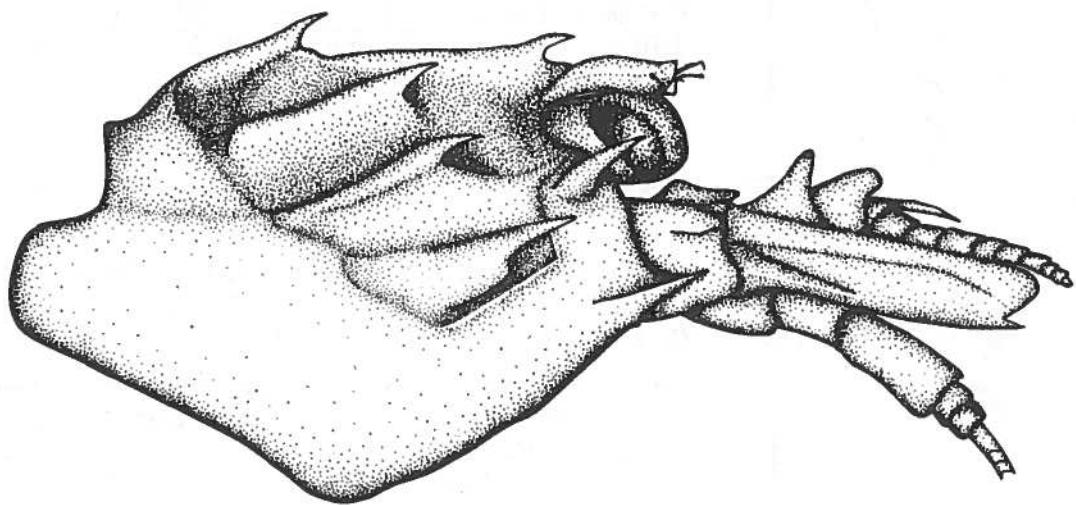
DISTRIBUTION

From Rathbun 1904: Off Wilmington (49 m) and in Catalina Harbor, Santa Catalina Island (55 to 73 m), California, and off Cedros Island, Baja California (106 m).

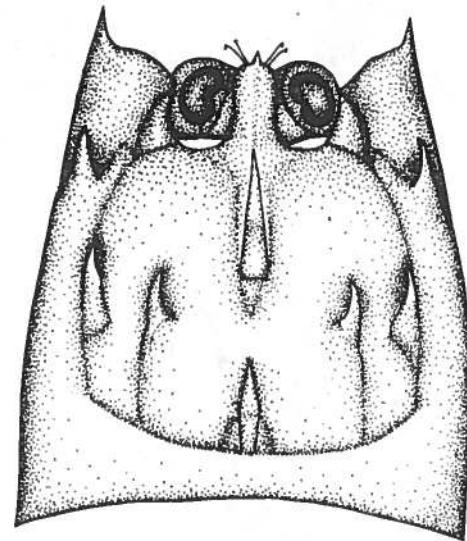
From Schmitt 1921: Found at 27 to 106 m.

From authors' data: Santa Catalina Island, California (60 m).

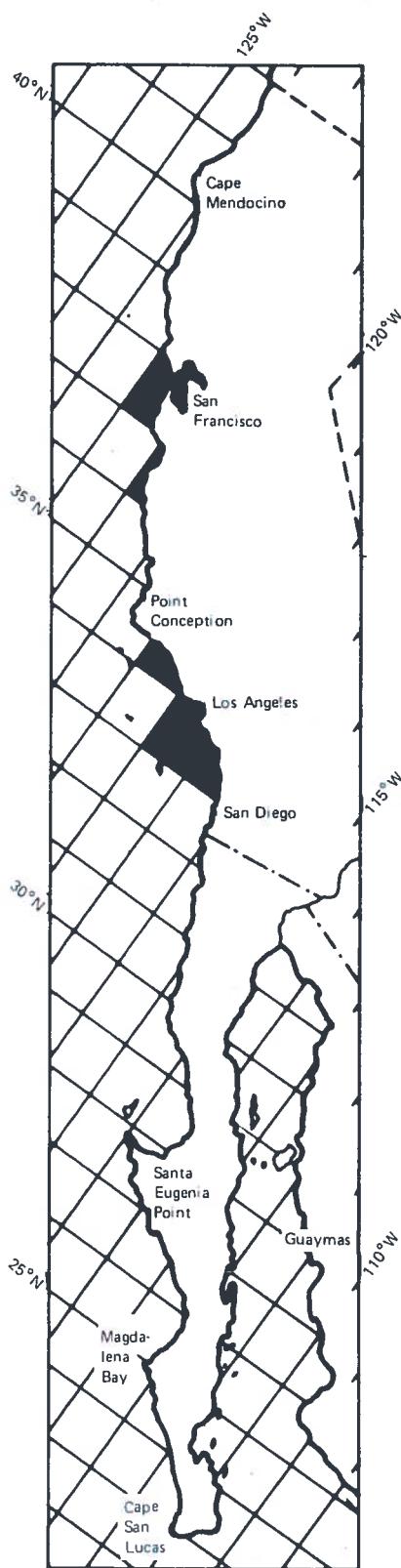
Crangon munitella Walker 1898



Carapace, lateral (above)
and dorsal (below) views



Crangon munitella Walker 1898



SYNONYMS

Crangon munitellus Walker 1898; of Holmes 1900. Crangon munitella Rathbun 1904. Crago munitella Hilton 1918; of Schmitt 1921.

DISTRIBUTION

From Walker 1898: Puget Sound, Washington.

From Rathbun 1904: Pacific Grove and Catalina Harbor, Santa Catalina Island, California (55 to 73 m, in sandy mud).

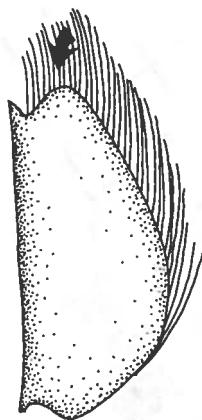
From Schmitt 1921: Ranges from Puget Sound to Laguna Beach and Santa Catalina Island, California (6 to 73 m). Sausalito, California (6- to 13-m dredge).

From authors' data: Port Hueneme, California (20 m).

COMMENT

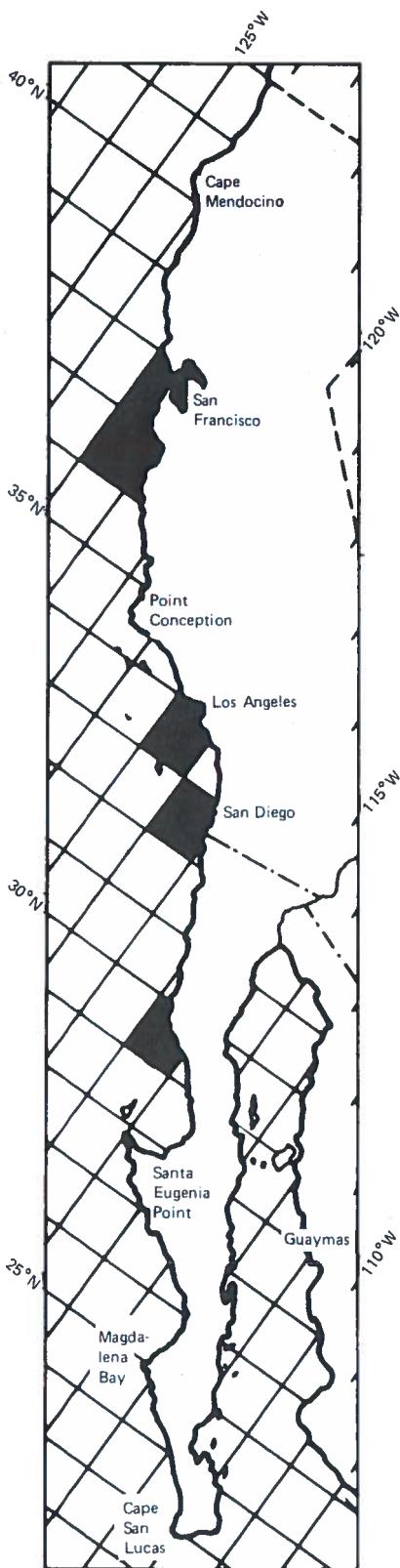
According to Carlton (Smith and Carlton 1975), Zarenkov has tentatively assigned this species to the genus Mesocrangon.

Crangon nigricauda Stimpson 1856



Antennal scale

Crangon nigricauda Stimpson 1856



SYNONYMS

Crangon nigricauda Stimpson 1856; of Stimpson 1857; of Lockington 1878; of Streets and Kingsley 1878, in part; of Kingsley 1878, in part; of Holmes 1900, in part; of Rathbun 1904. Crangon crangon affinis de Haan 1849; of Ortmann 1895, in part. Crangon vulgaris of Kingsley 1899, in part. Crangon vulgaris (Linn.) var. affinis de Haan 1849; of Walker 1898. Crago nigricauda of Schmitt 1921.

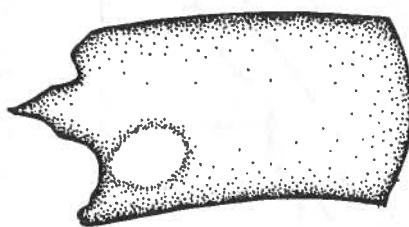
DISTRIBUTION

From Rathbun 1904: Bodega Bay, San Francisco Bay, Monterey, Santa Catalina Island, and San Diego Bay (11 to 22 m), California. San Geronimo Island, Baja California (12 m).

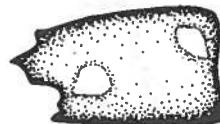
From Schmitt 1921: Found in littoral to 57 m.

From authors' data (Marine Biological Consultants collection): Pillar Point, California.

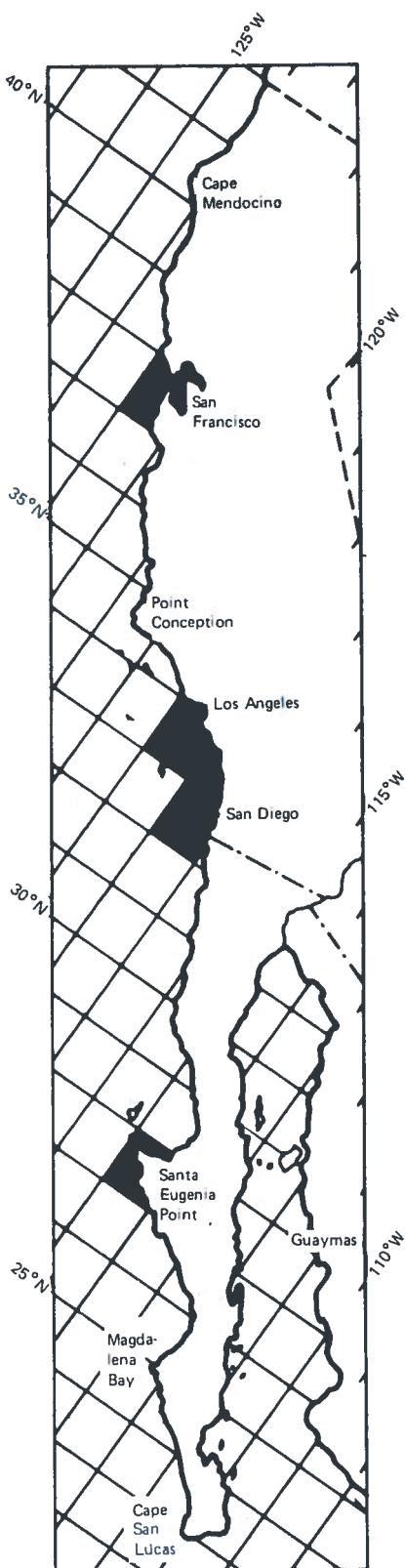
Crangon nigromaculata Lockington 1877



Sixth abdominal segment with
one spot (top) and rare
variation of two spots (bottom)



Crangon nigromaculata Lockington 1877



SYNONYMS

Crago nigromaculata of Schmitt 1921: of Goodwin 1952; of Carlisle 1969. Crangon nigromaculata Lockington 1877; of Holmes 1900; of Rathbun 1904. Crangon crangon affinis de Haan 1849; of Ortmann 1895, in part. Crangon vulgaris of Owen 1839, in part; of Dana 1852, in part.

DISTRIBUTION

From Rathbun 1904: Ranges from northern California to Baja California (5 to 60 m). Found between the Farallon Islands and San Diego, California, and in Turtle Bay, Baja California.

From Goodwin 1952: Drakes Bay, California (37 to 42 m).

From Carlisle 1969: Santa Monica Bay, California (18 to 174 m).

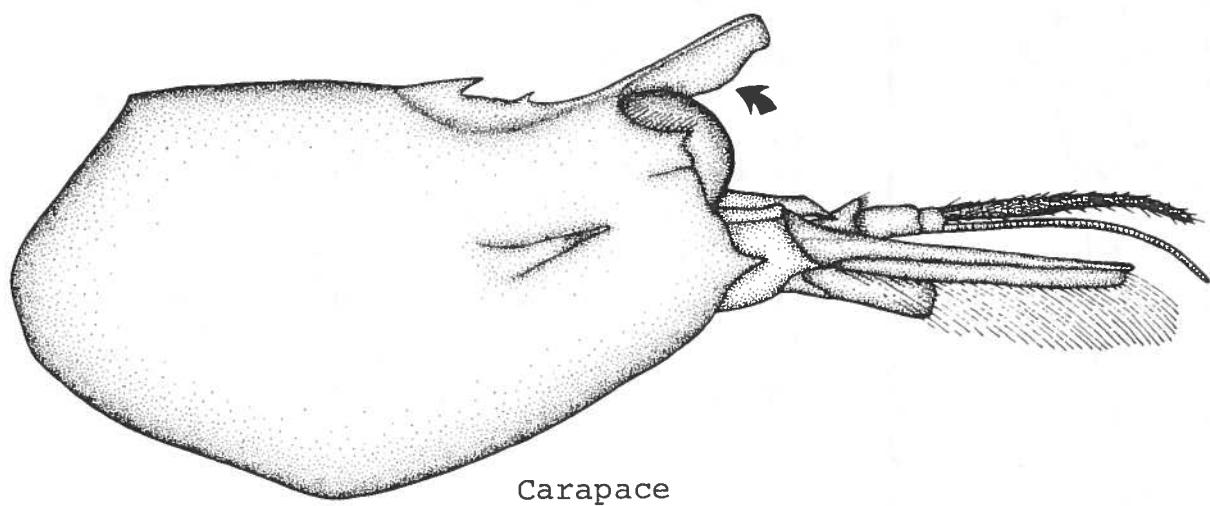
From authors' data: Oxnard, Palos Verdes, San Pedro Bay, Orange County, Santa Catalina Island, Dana Point, San Clemente Island, and Point Loma, California (18 to 44 m).

COMMENTS

Ortmann (1895) considers Crangon vulgaris, Crangon affinis, Crangon nigricauda, Crangon propinquus, Crangon nigromaculata and Crangon alaskensis to be synonyms of the subspecies Crangon crangon affinis de Haan 1849.

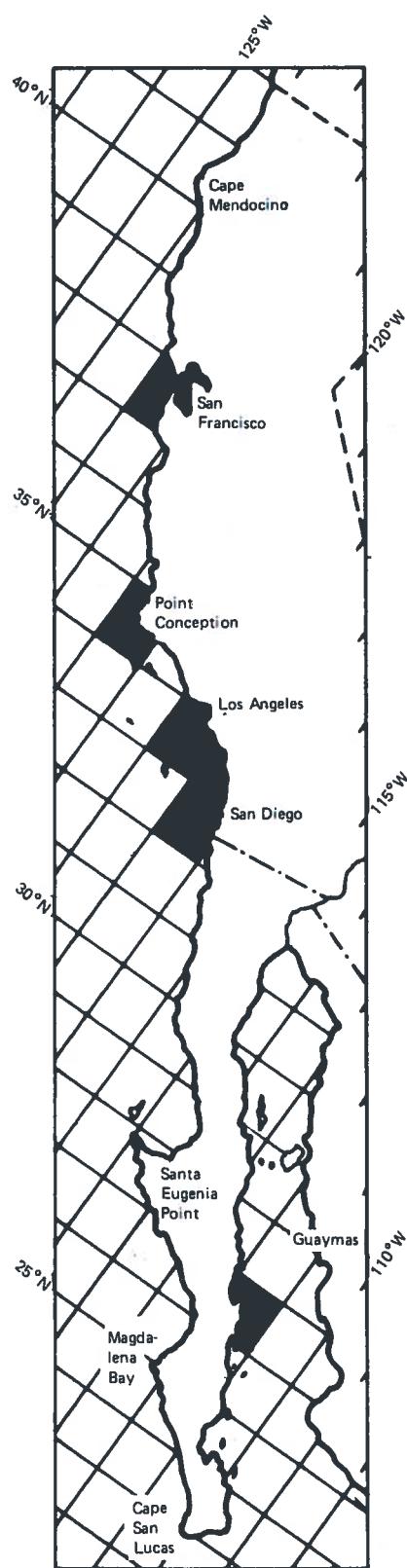
Lockington (1878) thought this species was a color variety of the group including Crangon vulgaris, Crangon nigricauda, and Crangon alaskensis.

Crangon resima Rathbun 1902



Carapace

Crangon resima Rathbun 1902



SYNONYM

Crago resima of Schmitt 1921; of Goodwin 1952.

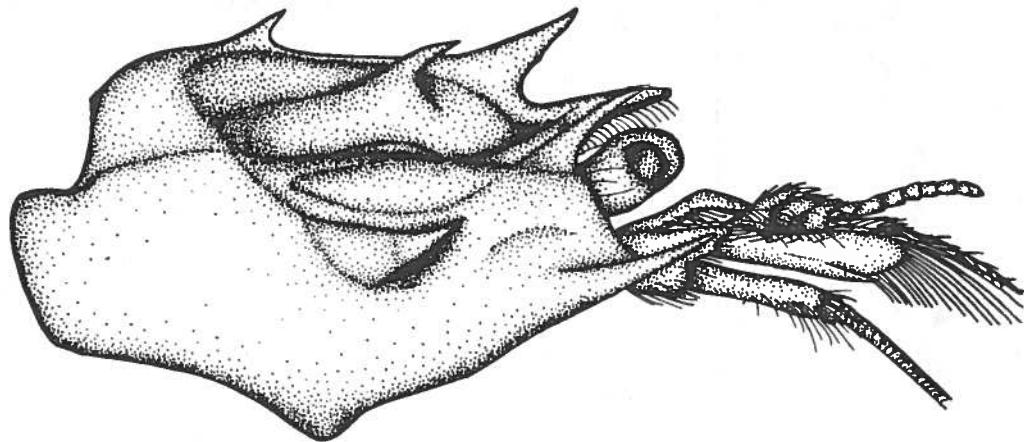
DISTRIBUTION

From Schmitt 1921: San Francisco and San Diego (227 m), California. San Domingo Point, Baja California.

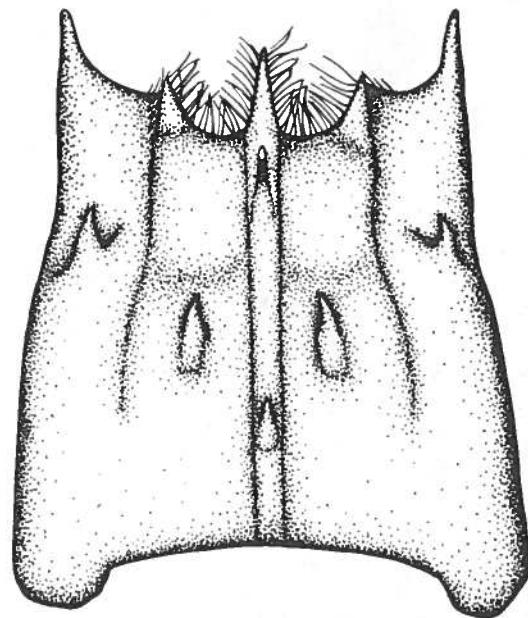
From Goodwin 1952: Santa Maria River and Point Sal, California.

From authors' data: Santa Monica Bay (137 and 183 m), Palos Verdes Peninsula (60 and 137 m), San Pedro Bay (137 and 183 m), and Dana Point (91 m), California.

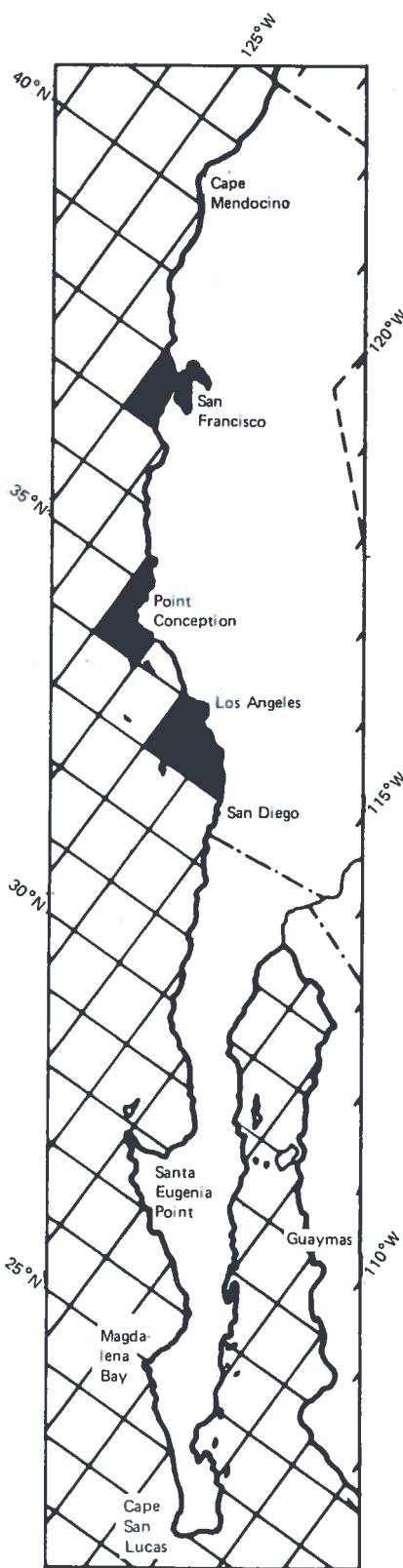
Crangon spinosissima Rathbun 1902



Carapace, lateral (above)
and dorsal (below) views



Crangon spinosissima Rathbun 1902



SYNONYMS

Crago spinosissima of Schmitt 1921; of Goodwin 1952. Crangon spinosissima of de Man 1920.

DISTRIBUTION

From Rathbun 1904: Found off Oregon and California (93 to 176 m). Point Arena (93 m) and Point Conception (176 m), California.

From Schmitt 1921: San Francisco Bay (84 to 124 m) and Point Fermin (27 m), California.

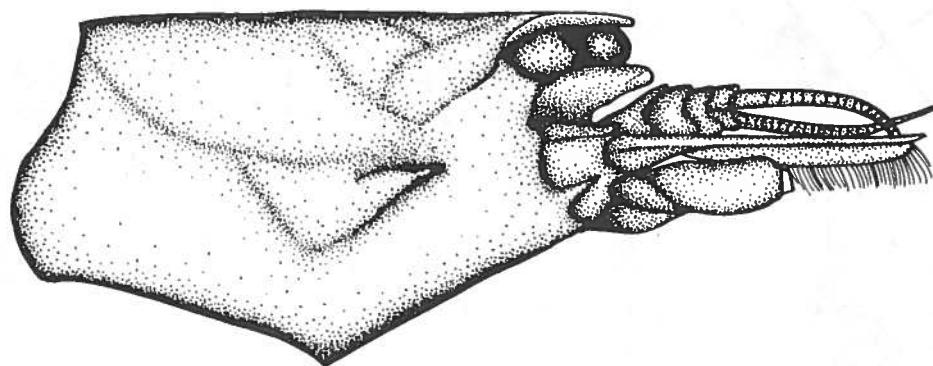
From Goodwin 1952: Pismo Beach, California (146 to 201 m).

From authors' data: Santa Monica Bay (137 to 183 m), San Pedro Bay (137 to 183 m), Orange County (137 m), and Dana Point (91 m), California.

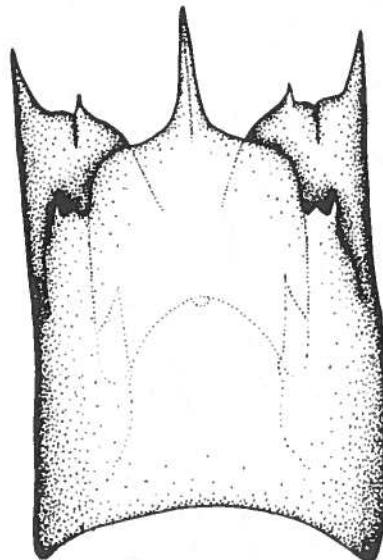
COMMENT

This species is a member of a subgroup of the genus Crangon whose members differ greatly in appearance (Body Type 2) from the rest of the genus. We would expect the members of this subgroup to undergo taxonomic changes in the future.

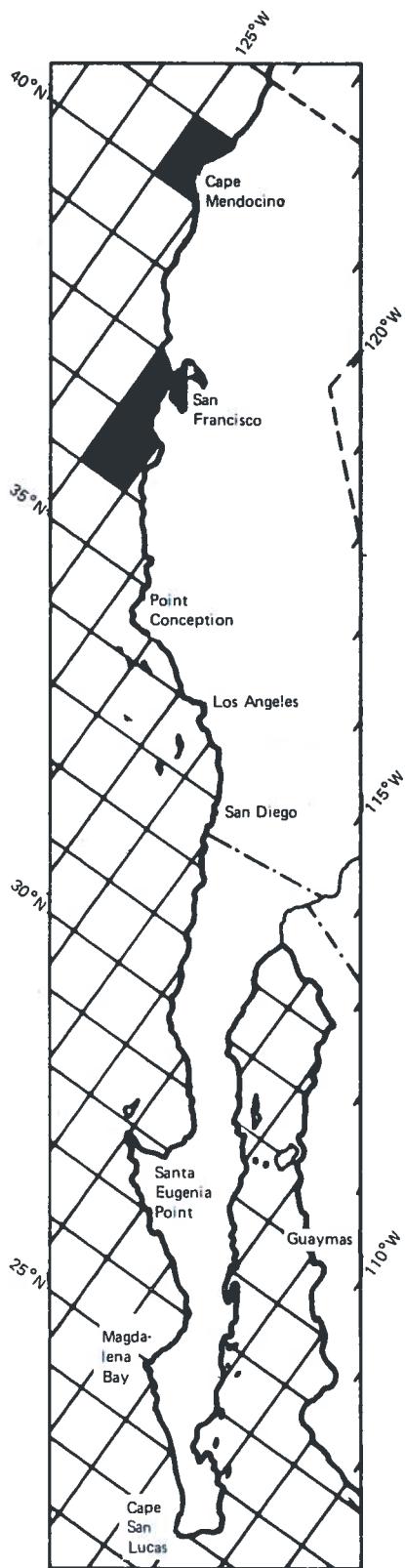
Crangon stylirostris Holmes 1900



Carapace, lateral (above)
and dorsal (below) views



Crangon stylirostris Holmes 1900



SYNONYM

Crango stylirostris of Schmitt 1921.

DISTRIBUTION

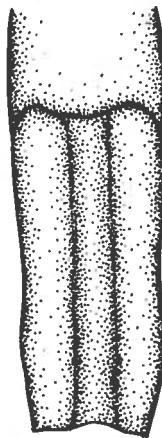
From Rathbun 1904: Trinidad, Humboldt County, and Santa Cruz, California.

From Schmitt 1921: San Francisco Bay, California.

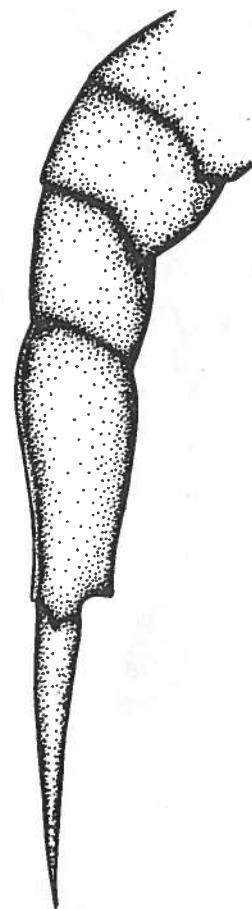
From authors' data (Marine Biological Consultants collection): Pillar Point, California.

Crangon zacae (Chace 1937)

Dorsal carina on sixth abdominal segment



Abdominal Segments 3, 4, 5,
and 6 and telson



Crangon zacae (Chace 1937)



SYNONYMS

Crago zacae Chace 1937. Crangon communis of Rathbun 1904, in part.

DISTRIBUTION

From Chace 1937: Monterey Bay, California (91 m). Cedros Island (81 m) and Gorda Banks (73 to 183 m), Baja California.

From authors' data: Santa Monica Bay (137 to 183 m), Palos Verdes (137 m), San Pedro Bay (137 to 183 m), Orange County (137 m), and Dana Point (91 m), California (found occasionally in shallower waters).

COMMENT

This species has not been cited as occurring in California waters since its original description.

Section 6
KEYS TO THE FAMILY
HIPPOLYTIDAE

- Eualus herdmani (Walker 1898)
Eualus macrophthalmus (Rathbun 1902)
Heptacarpus brachydactylus (Rathbun 1902)
Heptacarpus brevirostris (Dana 1852)
 Heptacarpus carinatus Holmes 1900
 Heptacarpus decorus (Rathbun 1902)
 Heptacarpus flexus (Rathbun 1902)
Heptacarpus franciscanus (Schmitt 1921)
Heptacarpus kincaidi (Rathbun 1902)
 Heptacarpus palpator (Owen 1839)
 Heptacarpus paludicola Holmes 1900
 Heptacarpus pictus (Stimpson 1871)
 Heptacarpus stimpsoni Holthuis 1947
 Heptacarpus taylori (Stimpson 1857)
 Heptacarpus tenuissimus Holmes 1900
Hippolyte affinis Owen 1839, incertae sedis
 Hippolyte californiensis Holmes 1895
 Hippolyte clarki Chace 1951
Hippolyte layi Owen 1839, incertae sedis
 Lebbeus lagunae (Schmitt 1921)
 Lebbeus washingtonianus (Rathbun 1902)
 Lysmata californica (Stimpson 1866)
 Spirontocaris dalli Rathbun 1902
 Spirontocaris holmesi Holthuis 1947
Spirontocaris lamellicornis (Dana 1852)
Spirontocaris prionota (Stimpson 1864)
 Spirontocaris sica Rathbun 1902
 Spirontocaris snyderi Rathbun 1902

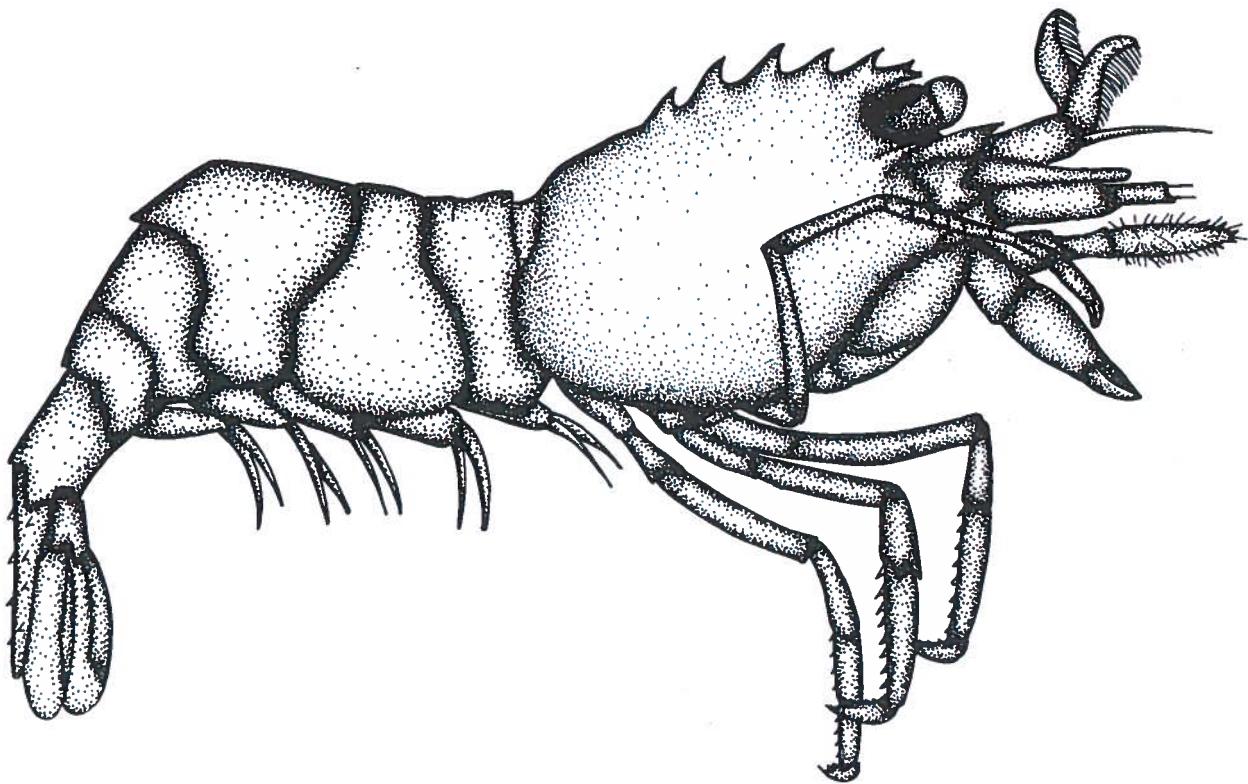


Figure 6-1. Hippolytid shrimp
(Heptacarpus taylori).

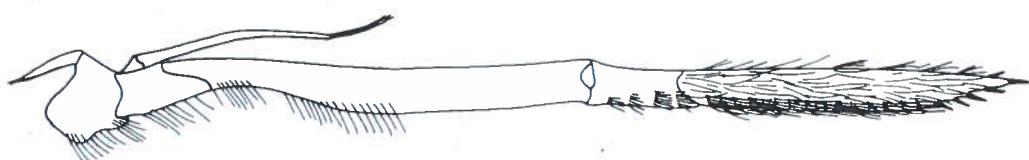


Figure 6-2. Third maxilliped of
Eualus macrophthalmus.

Section 6
KEY TO THE GENERA OF
HIPPOLYTIDAE

The body type of a hippolytid shrimp is shown in Figure 6-1.

- 1 . . . (2) The carpi of the second pair of pereiopods have more than seven segments (32).

Lysmata*

- 2 . . . (1) The carpi of the second pair of pereiopods have seven or less than seven segments.

- 3 . . . (4) The carpi of the second pair of pereiopods have three segments.

Hippolyte

- 4 . . . (3) The carpi of the second pair of pereiopods have seven segments.

- 5 . . . (6) The carapace has two or more supraorbital spines.

Spirontocaris

- 6 . . . (5) The carapace has less than two supraorbital spines.

- 7 . . . (8) The carapace has one supraorbital spine.

Lebbeus

- 8 . . . (7) The carapace lacks a supraorbital spine.

- 9 . . . (10) The third maxilliped has both an epipod and an exopod (Figure 6-2).

Eualus

- 10 . . . (9) The third maxilliped lacks an exopod but has an epipod.

Heptacarpus

*One species, Lysmata californica.

KEY TO THE SPECIES OF
EUALUS

KEY TO THE SPECIES OF
HEPTACARPUS

- 1 . . . (14) The rostrum is as long or longer than the posterior portion of the carapace (the distance between the posterior-most point of the cardiac region and the posterior-most point of the orbital socket).

2 . . . (7) The anterior half of the rostrum is devoid of dorsal spines.

3 . . . (6) The rostrum is acute and slender. (There is no epipod on Pereiopod 3; however, there may be epipods on the third maxilliped and on the other pereiopods.)

4 . . . (5) The pterogostomian spine is positioned at the level of the antennal scale. (Epipods are not present on the third maxilliped or the pereiopods.)

Heptacarpus tenuissimus

5 . . . (4) The pterogostomian spine is positioned below the level of the antennal scale. (Epipods are present on the third maxilliped and the first two pereiopods.)

Heptacarpus flexus

6 . . . (3) The rostrum is deep, not acute and slender. (Epipods are present on the third maxilliped and on the first three pereiopods.)

Heptacarpus carinatus

7 . . . (2) Dorsal spines are present on the anterior half of the rostrum.

8 . . . (9) The sixth abdominal segment is longer than the telson.

Heptacarpus decorus

- 9 . . . (8) The sixth abdominal segment is at least slightly shorter than the telson.
- 10 . . . (11) The rostrum has two to four ventral spines.
Heptacarpus paludicola
- 11 . . . (10) The rostrum has more than four (five to seven) ventral spines.
- 12 . . . (13) The pterogostomian spine is present.
Heptacarpus kincaidi
- 13 . . . (12) The pterogostomian spine is absent.
Heptacarpus franciscanus
- 14 . . . (1) The rostrum is shorter than the posterior portion of the carapace.
- 15 . . . (16) The dactyls of the pereiopods are extremely long (more than one-third and almost one-half the length of the propodi) and simple, not biunguiculate.
Heptacarpus stimpsoni
- 16 . . . (15) The dactyls of the pereiopods are short and stout and biunguiculate or armed with teeth.
- 17 . . . (18) The ventral portion of the rostrum is convex or expanded into a blade.
Heptacarpus brachydactylus
- 18 . . . (17) The ventral portion of the rostrum is not convex or expanded into a blade.
- 19 . . . (22) The rostrum extends to or beyond the middle of the antennal scale.
- 20 . . . (21) The rostrum extends to the middle of the antennular flagellum and nearly to the end of the antennal scale.
Heptacarpus paludicola
- 21 . . . (20) The rostrum extends at most only slightly beyond the antennular peduncle.
Heptacarpus pictus
- 22 . . . (19) The rostrum is short, not extending beyond the middle of the antennal scale.
- 23 . . . (26) The rostrum extends beyond the anterior-most edge of the cornea of the eye.

24 . . . (25) The antennal scale is longer than the telson
(measure carefully).

Heptacarpus palpator

25 . . . (24) The antennal scale is shorter than the telson.
(This species is not usually reported south of San Francisco, California, although we have a range extension to Tanner Bank, California.)

Heptacarpus brevirostris

26 . . . (23) The rostrum does not extend beyond the anterior-most edge of the cornea of the eye; it usually extends just beyond the margin of the carapace.
(The anterior-most teeth are often directed downward.)

Heptacarpus taylori

KEY TO THE SPECIES
OF HIPPOLYTE

1 . . . (2) The rostrum is bifid; the upper tooth extends beyond the lower tooth.

Hippolyte californiensis

2 . . . (1) The rostrum is trifid; the central tooth extends beyond the lower and upper teeth.

Hippolyte clarki

KEY TO THE SPECIES
OF LEBBEUS

1 . . . (2) The supraorbital spines are long, extending beyond the rostrum. (Three spines extend nearly to the middle of the carapace on the dorsal carina.)

Lebbeus lagunae

2 . . . (1) The supraorbital spines are short and do not extend to the rostrum. (Two dorsal spines are present on the anterior quarter of the carapace.)

Lebbeus washingtonianus

KEY TO THE SPECIES OF
SPIRONTOCARIS

1 . . . (2) Three, sometimes two, supraorbital spines are present; the spines on the dorsum of the

carapace are compound and have pointed lateral wings.

Spirontocaris prionota

- 2 . . . (1) Two supraorbital spines are present; the spines on the dorsum are not compound and the wings are lacking.
- 3 . . . (4) The rostrum has a bifid tip formed by the most forward tooth of the ventral wing of the rostrum, plus a tooth at the level of the midrib of the rostrum; the median spines of the carapace are positioned near the posterior margin.

Spirontocaris lamellicornis

- 4 . . . (3) The rostrum is formed by a blade and a slender process, which may be very short.
- 5 . . . (8) The carapace has three median spines, which are either at the midline or posterior to it.
- 6 . . . (7) The rostrum has a thin styliform process and a single ventral tooth; the rostral teeth and median spines on the carapace blend together.

Spirontocaris holmesi

- 7 . . . (6) The rostrum has a short tip and lacks a ventral tooth; there is a definite gap between the rostral teeth and the median spines on the carapace.

Spirontocaris snyderi

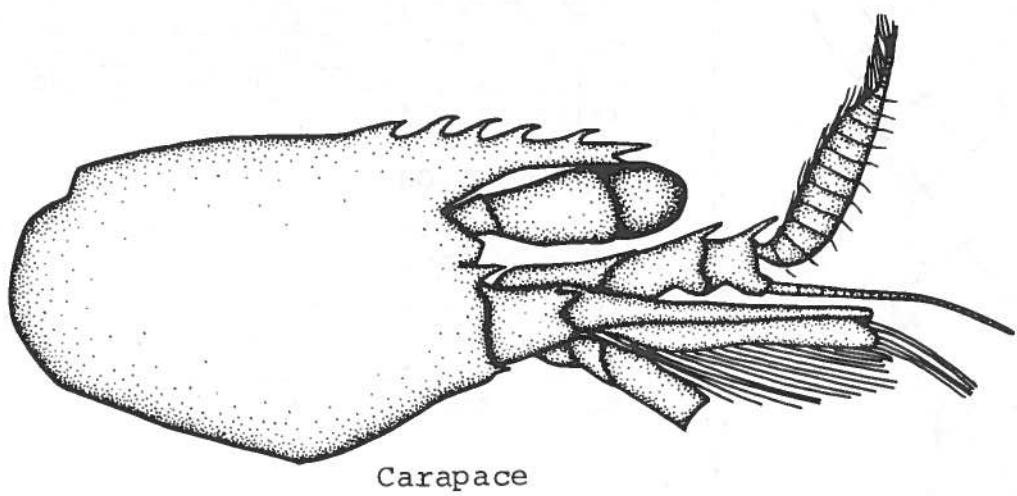
- 8 . . . (5) The carapace has two median spines, which are slightly anterior to the midline.
- 9 . . . (10) The rostrum has a thin styliform process, similar to that of S. holmesi; the antennular scale does not reach the second segment of the antennular peduncle.

Spirontocaris sica

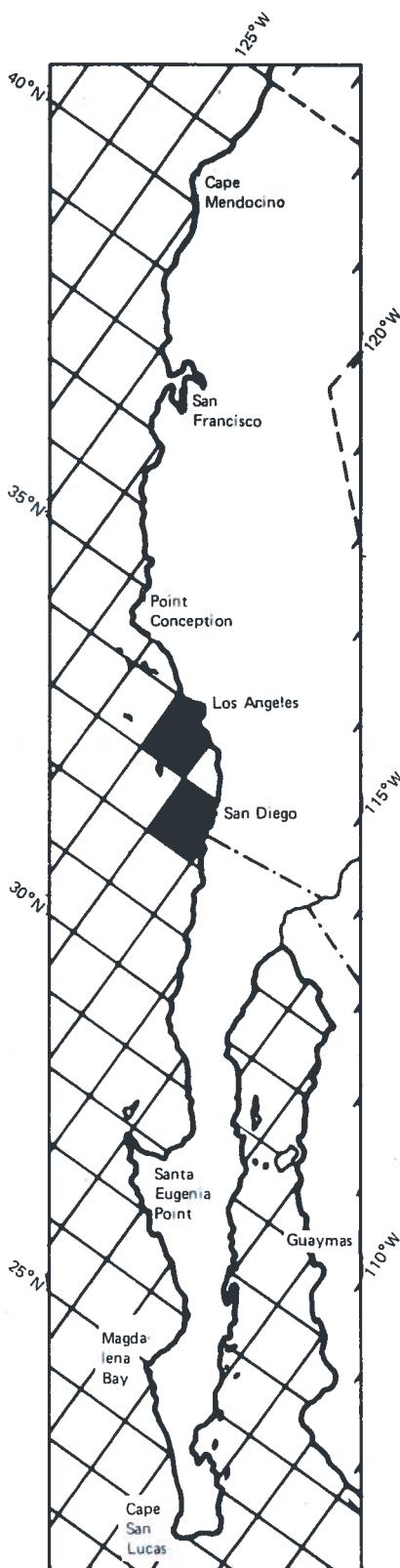
- 10 . . . (9) The rostrum has a short tip; the antennular scale reaches beyond the second segment of the antennular peduncle.

Spirontocaris dalli

Eualus herdmani (Walker 1898)



Eualus herdmani (Walker 1898)



SYNONYMS

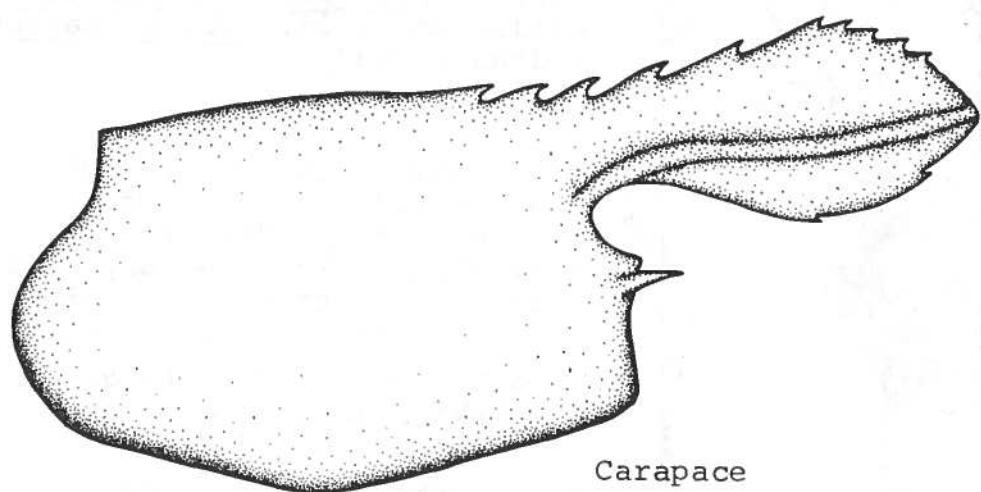
Spirontocaris herdmani Walker 1898; of Rathbun 1904. Heptacarpus herdmani of Holmes 1900. Hippolyte herdmani of Williamson 1915. Eualus herdmani of Holthuis 1947.

DISTRIBUTION

From Rathbun 1904: Sitka, Alaska (18 m). Puget Sound.

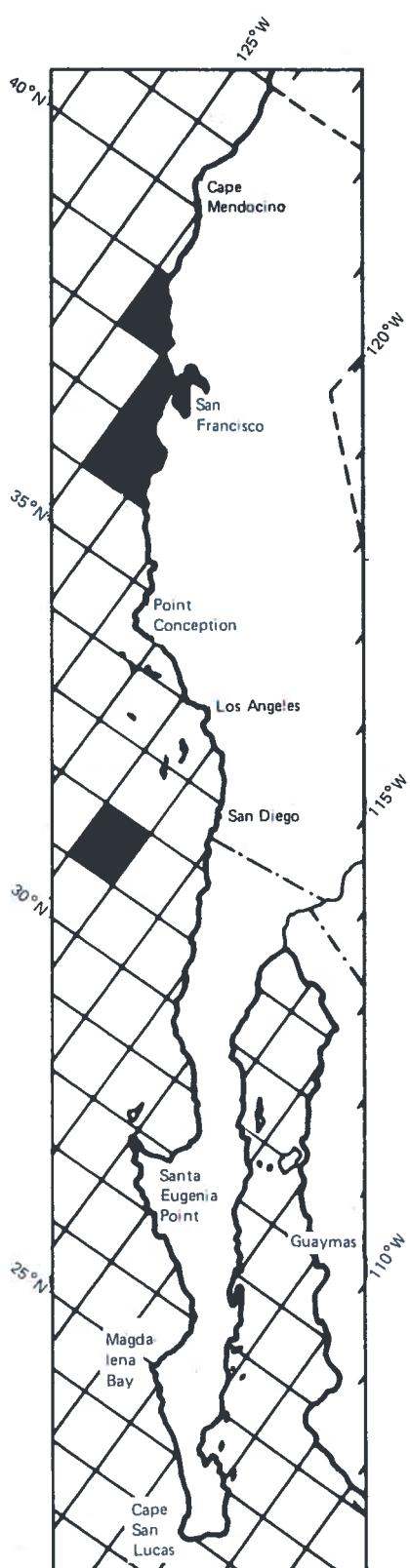
From authors' data: Santa Monica Bay (22 m), Palos Verdes Peninsula (22 m), Santa Catalina Island (36.5 m), and Point Loma (27.5 m), California.

Eualus macrophthalmus (Rathbun 1902)



Carapace

Eualus macrophthalmus (Rathbun 1902)



SYNONYMS

Spirontocaris macrophthalmus Rathbun
1902. Hippolyte macrophthalmus
Williamson 1915. Eualus macrophthalmus
Holthuis 1947.

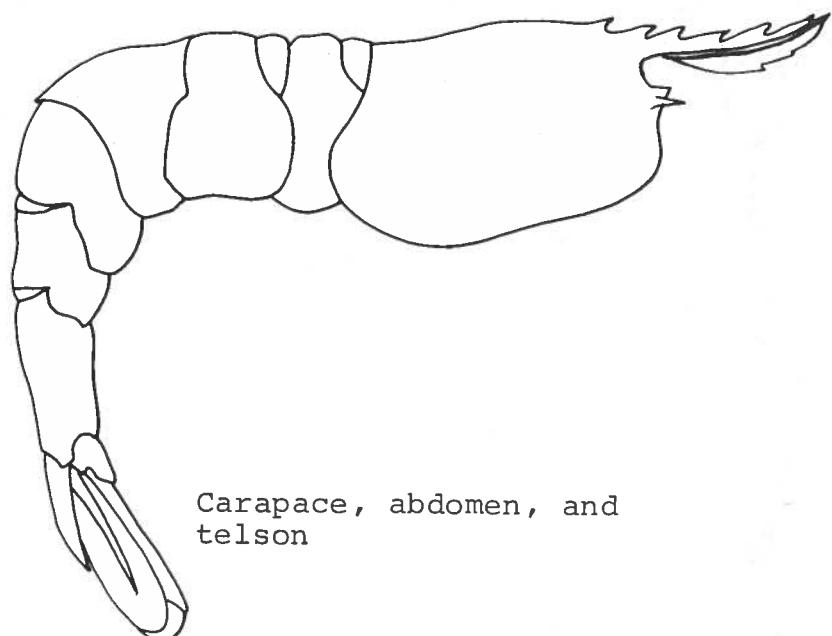
DISTRIBUTION

From Rathbun 1904: Off Point Arena (437 to 833 m), south of Farallon Islands (397 to 716 m), off Pigeon Point (542 m), off Monterey Bay (765 to 1,063 m), Monterey Bay (508 m), and off Point Sur (545 m), California.

From Holthuis 1947: Ranges from Unalaska, Alaska, to Point Sur, California (293 to 0,043 m).

From authors' data: Off Trinidad Head, Humboldt County (430 m; Allan Hancock Foundation collection) and Tanner Bank, California.

Heptacarpus brachydactylus (Rathbun 1902)



Carapace, abdomen, and
telson



Chela

a 1852)

(2)

MS
Lyte brevirostris Dana 1852.
Htocaris brevirostris of Walker
of Rathbun 1904; of Schmitt 1921.
carpus brevirostris of Holmes 1900;
Ithuis 1947.

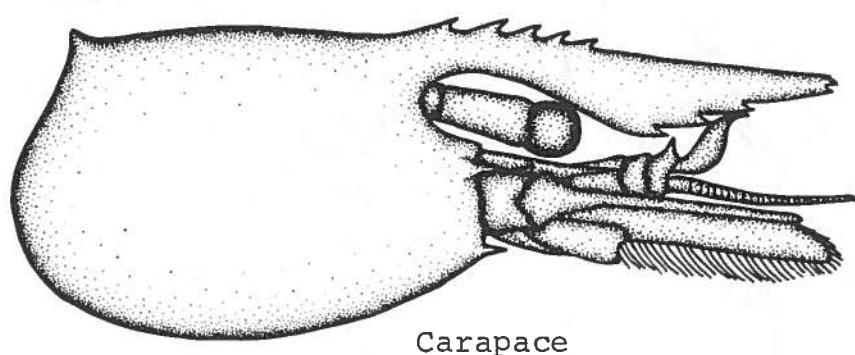
achydaactyla Rathbun
us brachydactylus

4: Santa Cruz Island
Diego (763 m), Califor-

47: Found in southern
9 to 686 m.

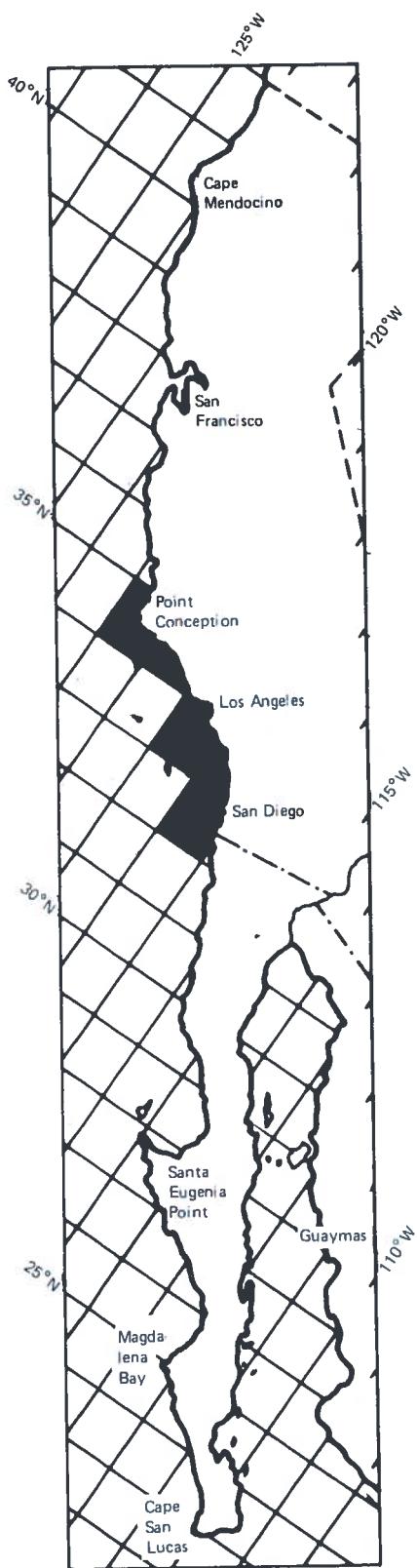
IBUTION
Rathbun 1904: Cape Mendocino and
Francisco Bay, California.
authors' data: Santa Catalina
d (5 to 18 m) and Tanner Bank (less
15 m; dive sample), California.

Heptacarpus carinatus Holmes 1900



Carapace

Heptacarpus decorus (Rathbun 1902)



SYNONYMS

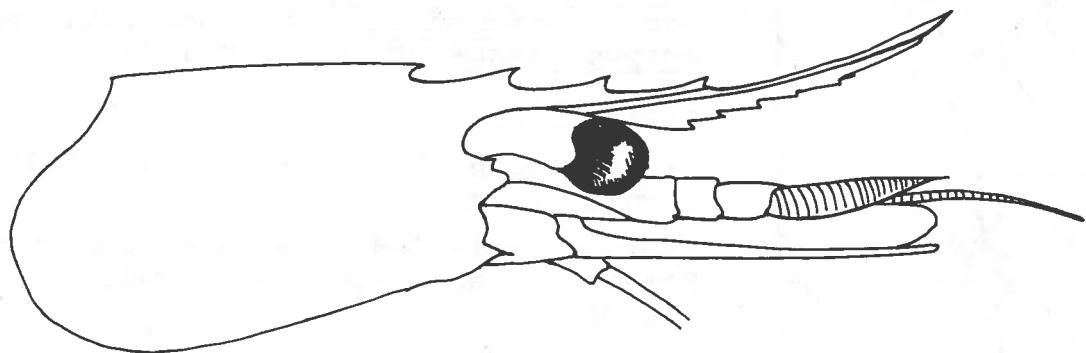
Spirontocaris decora Rathbun 1902; of Schmitt 1921. Hippolyte decora of Williamson 1915. Heptacarpus decorus of Holthuis 1947.

DISTRIBUTION

From Rathbun 1904: Point Conception (265 m), Santa Cruz Island (274 m), Santa Rosa Island (95 m), and San Diego (227 m), California.

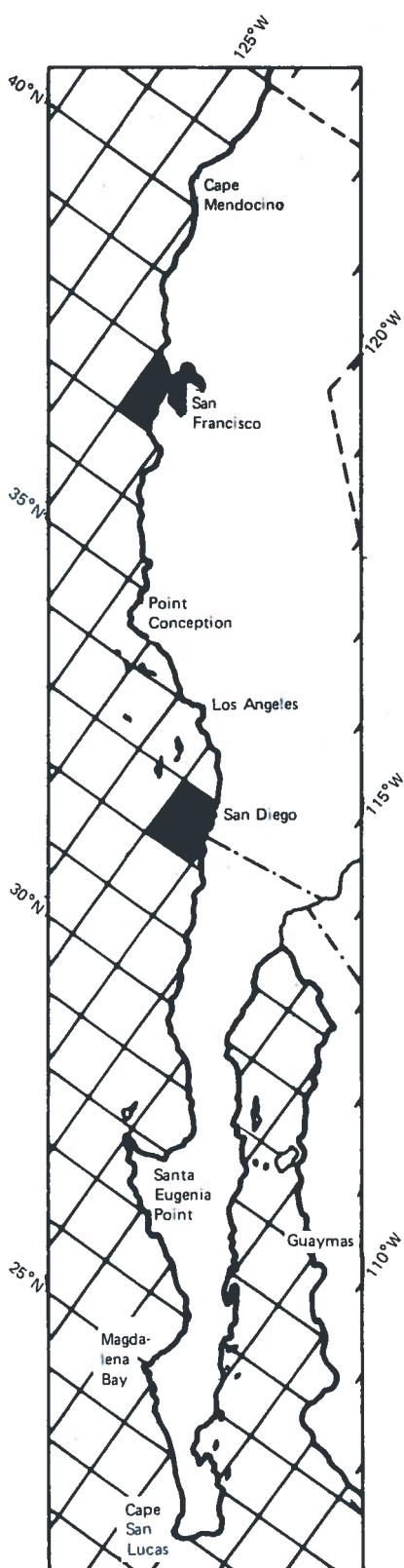
From authors' data: Palos Verdes Peninsula (22 m) and Dana Point (86.9 m), California.

Heptacarpus flexus (Rathbun 1902)



Carapace (after
Rathbun 1902)

Heptacarpus flexus (Rathbun 1902)



SYNONYMS

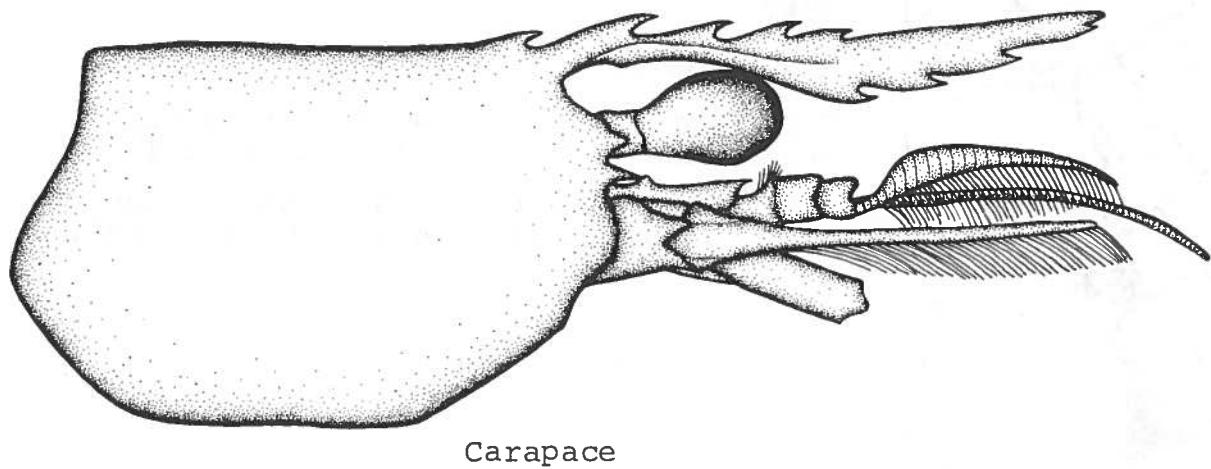
Spirontocaris flexa Rathbun 1902.
Hippolyte flexa Williamson 1915. Spiron-
tocaris camtschatica of Rathbun 1899;
non S. camtschatica Stimpson 1860. Hepta-
carpus flexus of Holthuis 1947.

DISTRIBUTION

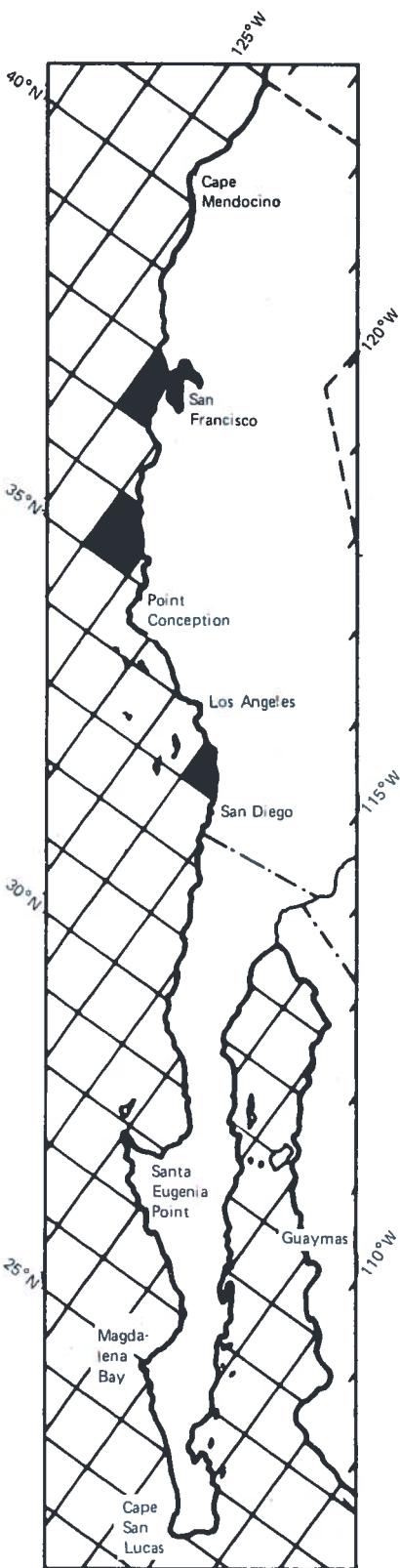
From Rathbun 1904: Drakes Bay, California (64 m).

From Holthuis 1947: Ranges from Fuca Strait to San Diego, California (82 to 274 m).

Heptacarpus franciscanus (Schmitt 1921)



Heptacarpus franciscanus (Schmitt 1921)



SYNONYMS

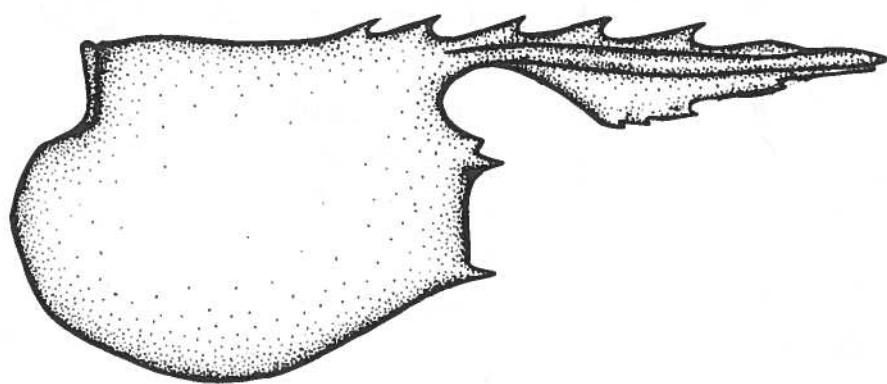
Spirontocaris franciscana Schmitt 1921.
Heptacarpus franciscana of Holthuis
1947.

DISTRIBUTION

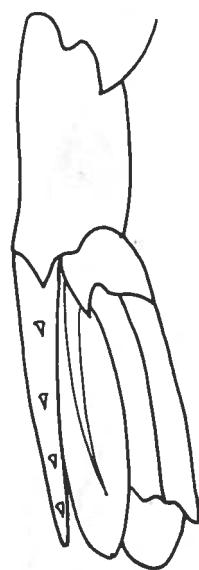
From Schmitt 1921: San Francisco Bay and Laguna Beach, California (4 to 13 m).

From authors' data (Allan Hancock Foundation collection): San Luis Obispo, California (8 m).

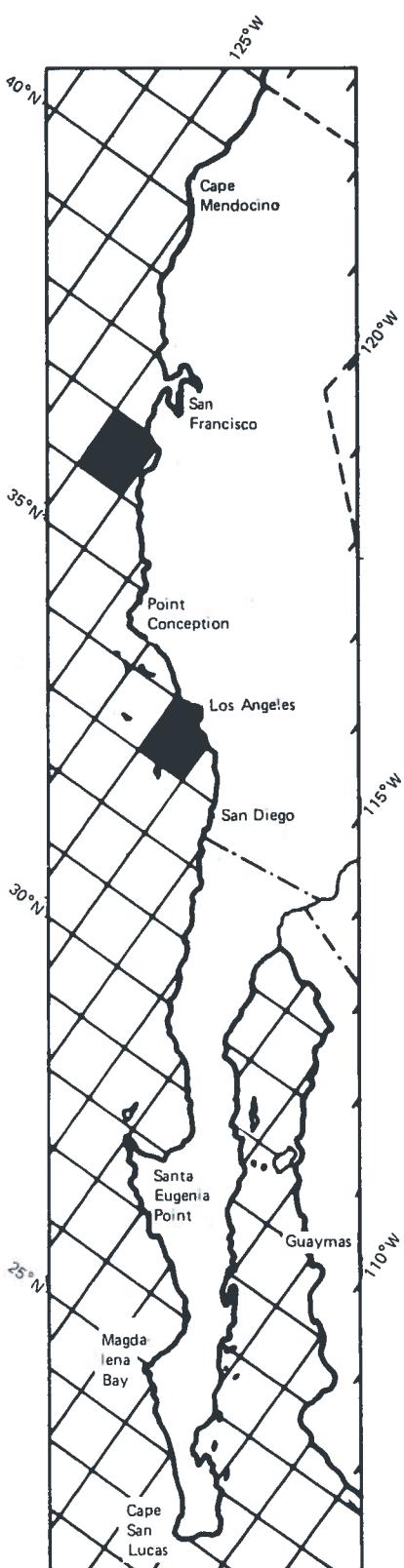
Heptacarpus kincaidi (Rathbun 1902)



Carapace and telson
(after Schmitt 1921)



Heptacarpus kincaidi (Rathbun 1902)



SYNONYMS

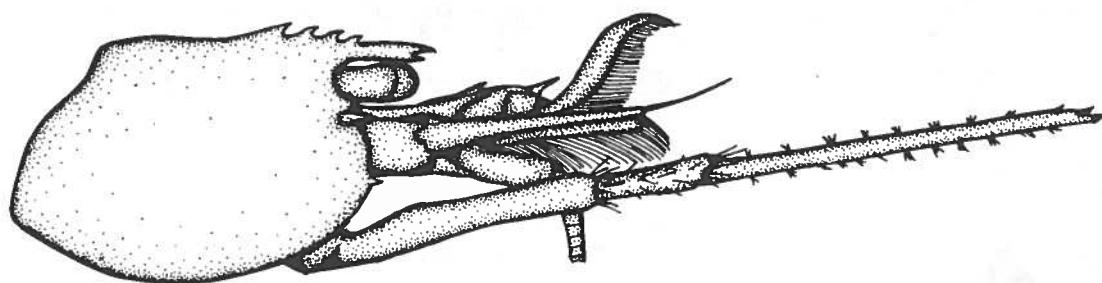
Spirontocaris kincaidi Rathbun 1902;
of Schmitt 1921. Hippolyte kincaidi of
Williamson 1915. Heptacarpus kincaidi
of Holthuis 1947.

DISTRIBUTION

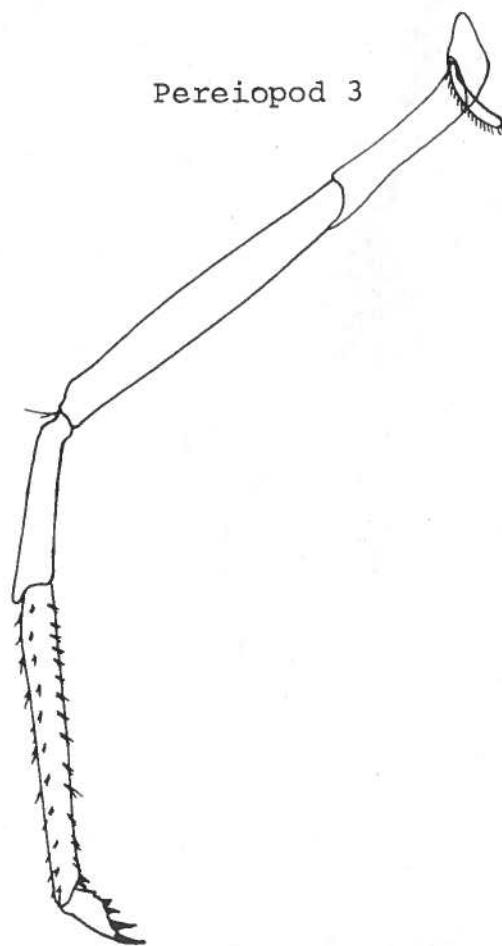
From Rathbun 1904: Ranges from Washington to Santa Cruz, California (38 to 73 m). Off Santa Cruz, California (38 m).

From Holthuis 1947: Ranges from Puget Sound to San Pedro, California (35 to 165 m).

Heptacarpus palpator (Owen 1839)



Carapace



Pereiopod 3

Heptacarpus palpator (Owen 1839)

SYNONYMS

Hippolyte palpator Owen 1839. Hippolyte hemphilli Lockington 1877. Spirontocaris palpator of Rathbun 1904; of Schmitt 1921, 1946. Heptacarpus palpator of Holmes 1900; of Holthuis 1947.

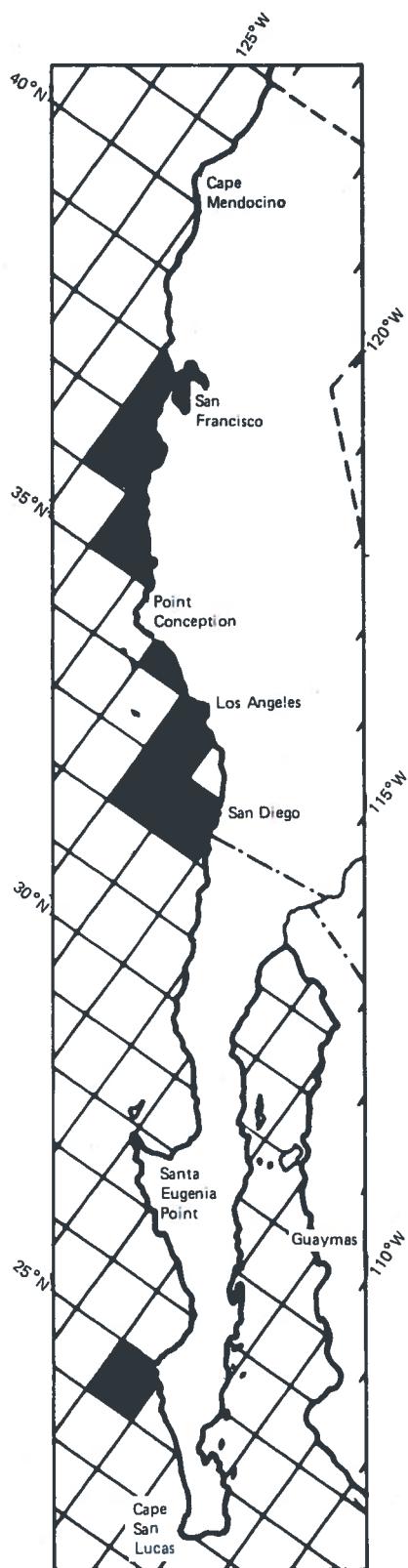
DISTRIBUTION

From Holmes 1900: San Pedro and Santa Catalina Island, California.

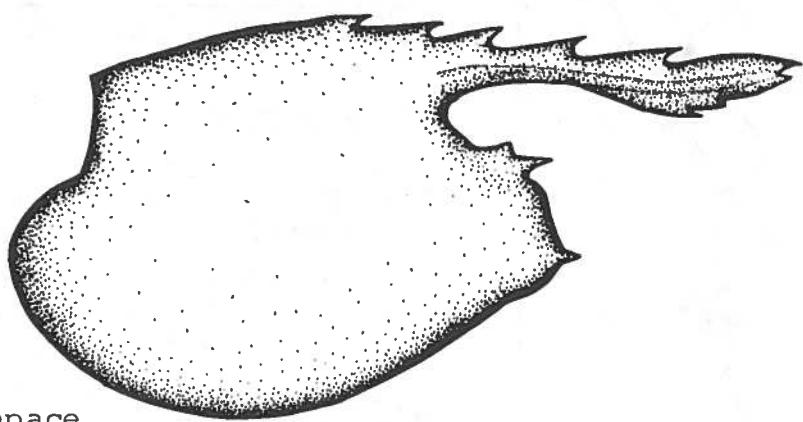
From Rathbun 1904: Ranges from San Francisco Bay, California, to Magdalena Bay, Baja California (Lockington); Monterey (Owen), Pacific Grove, and San Diego, California.

From Schmitt 1946: Santa Cruz Island, California (4 to 46 m).

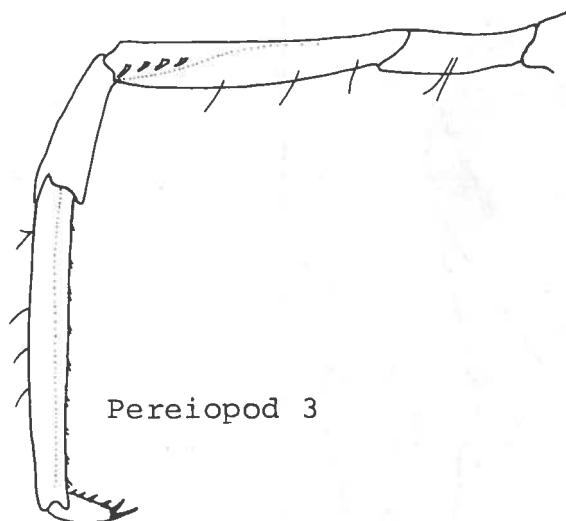
From authors' data: Alamitos Bay (on mussel colonies attached to boat floats), San Clemente Island (5 to 7 m), San Simeon (rocky intertidal zone), Los Angeles Harbor (on baited shrimp trap), and Whites Point, Palos Verdes Peninsula (on sand, tide of -0.03 m).



Heptacarpus paludicola Holmes 1900

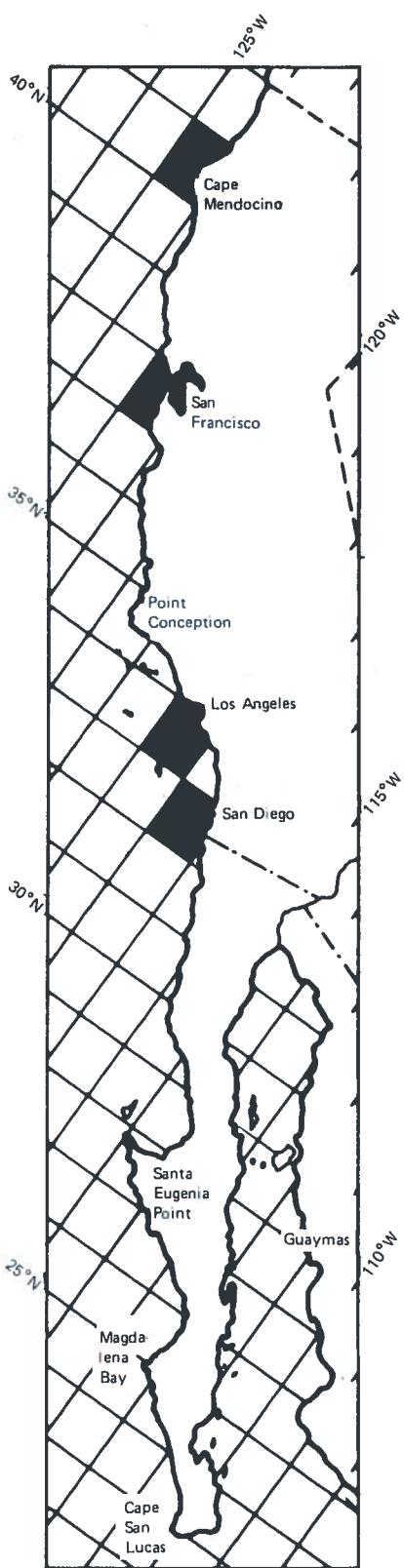


Carapace



Pereiopod 3

Heptacarpus paludicola Holmes 1900



SYNONYMS

Spirontocaris paludicola of Rathbun
1904. Heptacarpus paludicola of Holthuis
1947.

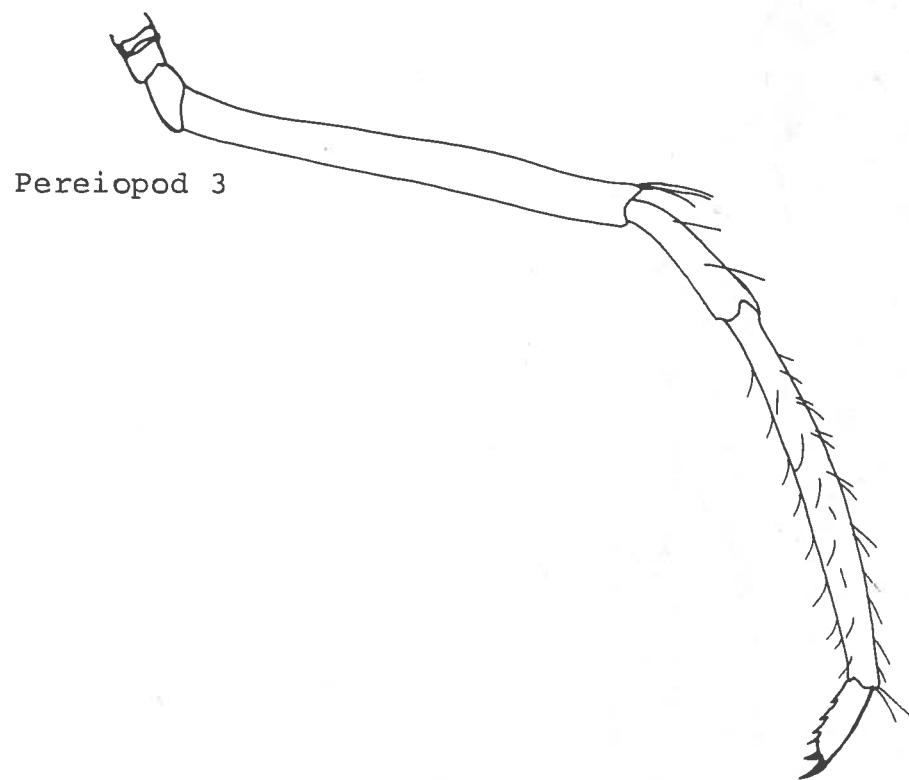
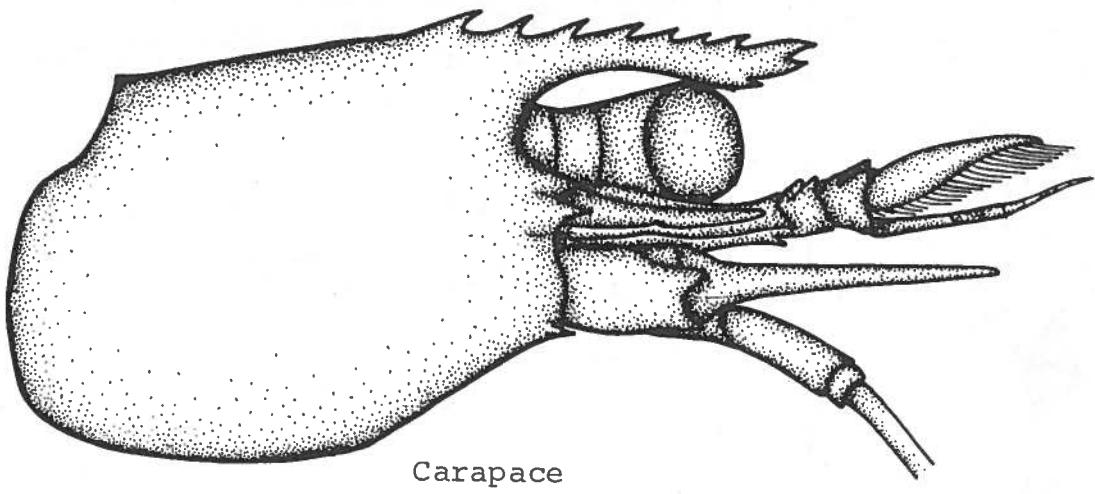
DISTRIBUTION

From Rathbun 1904: Ranges from Humboldt Bay (Holmes) to San Diego, California. San Francisco Bay, California 4 to 10 m).

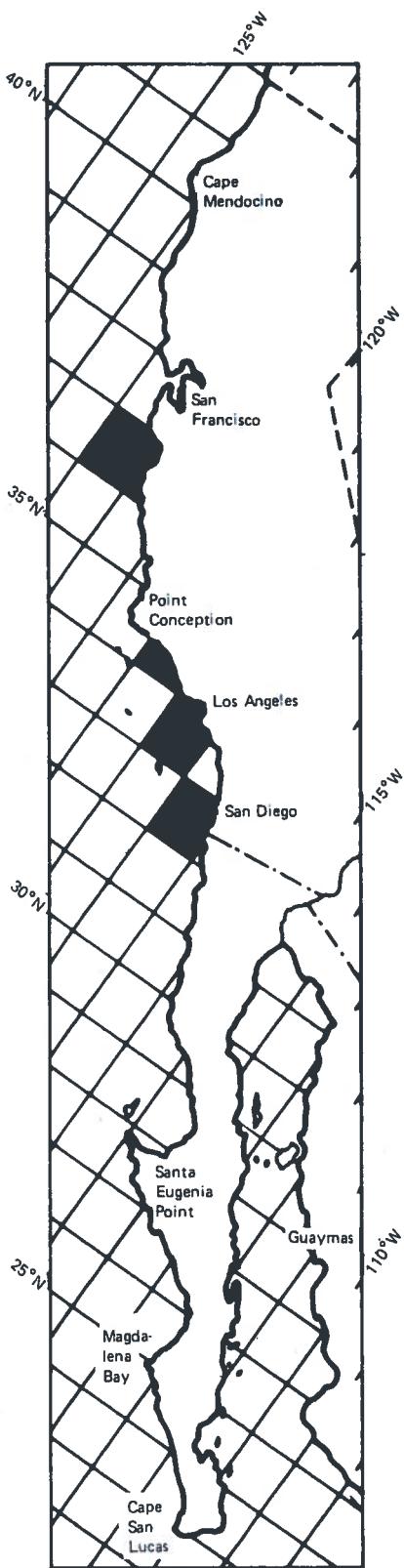
From Holthuis 1947: Ranges from British Columbia, Canada, to San Diego, California (4 to 9 m).

From authors' data: Whites Point, Palos Verdes Peninsula (on sand, tide of -0.3 m).

Heptacarpus pictus (Stimpson 1871)



Heptacarpus pictus (Stimpson 1871)



SYNONYMS

Hippolyte picta Stimpson 1871. Spiron-
tocaris picta of Rathbun 1904; of
Schmitt 1946. Heptacarpus pictus of
Holmes 1900; of Baker 1912; of Holthuis
1947.

DISTRIBUTION

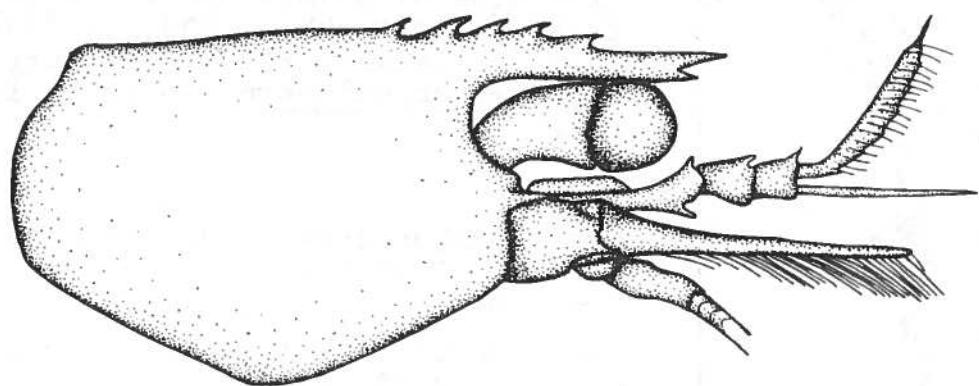
From Holmes 1900: San Pedro, California.

From Rathbun 1904: Ranges from Monterey
Bay to San Diego, California; Pacific
Grove, Santa Catalina Harbor, La Jolla,
and San Diego, California.

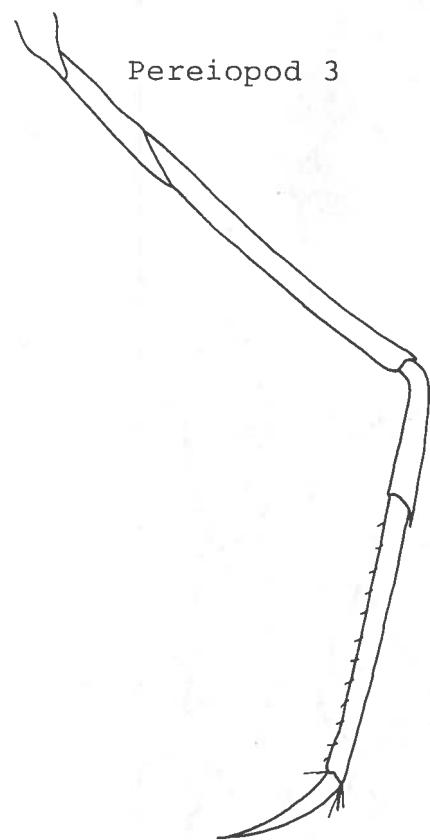
From Schmitt 1946: Santa Cruz Island,
California.

From authors' data: San Simeon (0.15 m)
and Santa Catalina Island (60 m), Cali-
fornia.

Heptacarpus stimpsoni Holthuis 1947

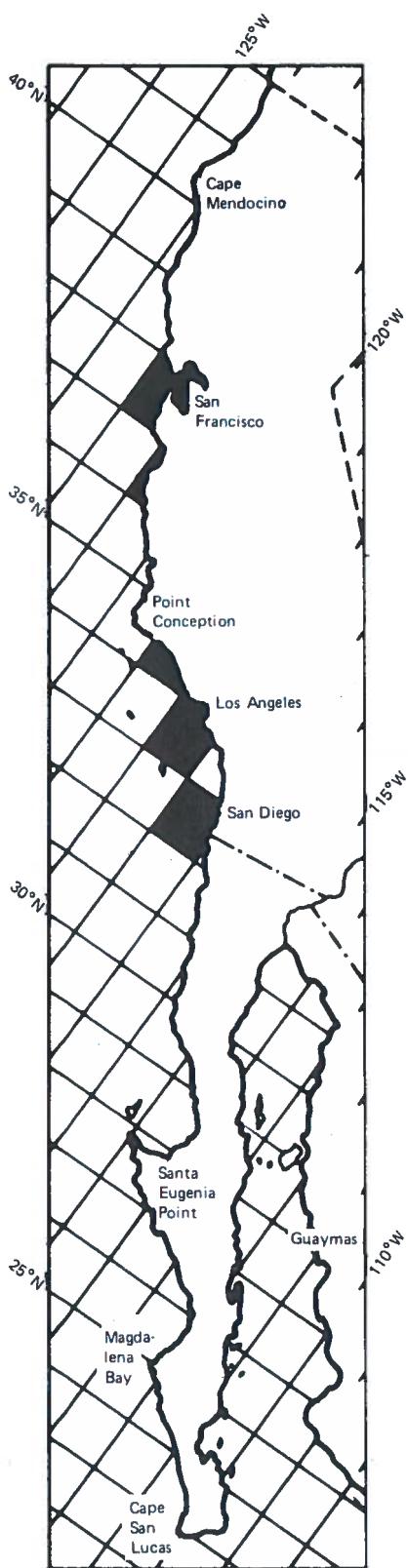


Carapace



Pereiopod 3

Heptacarpus stimpsoni Holthuis 1947



SYNONYMS

Hippolyte cristata Stimpson 1860; non H. cristata de Haan 1849. Heptacarpus cristatus of Holmes 1900. Spirontocaris cristata of Rathbun 1904; of Schmitt 1921; of Walker 1898; of Schmitt 1946. Heptacarpus stimpsoni Holthuis 1947 (new name).

DISTRIBUTION

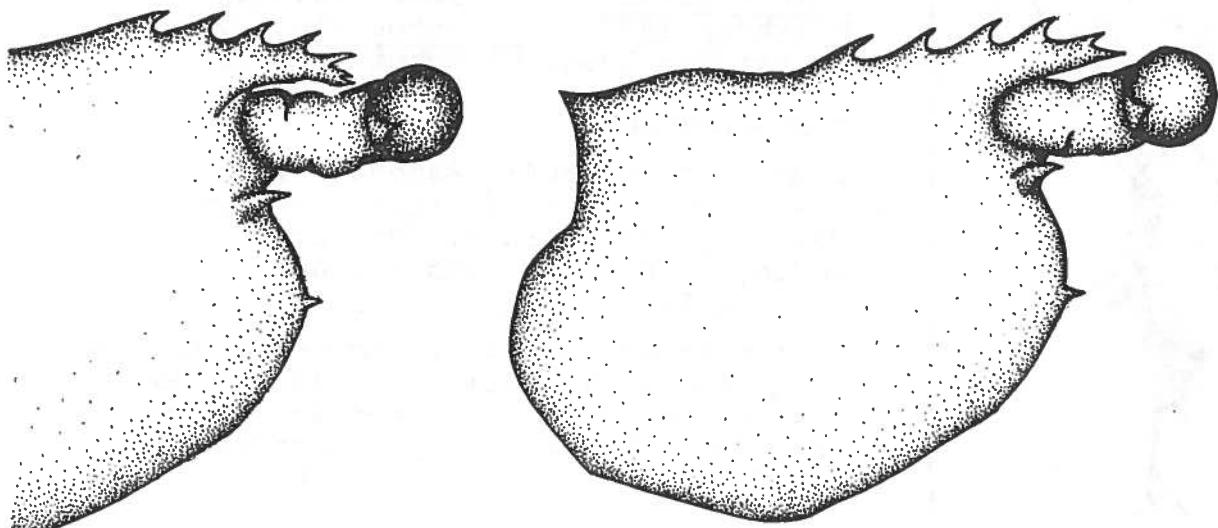
From Rathbun 1904: San Pablo Bay, Monterey Bay (60 m), and San Diego Bay (5 to 12 m, 18 m, and 40 m), California.

From Schmitt 1946: Santa Cruz Island, California (9 m).

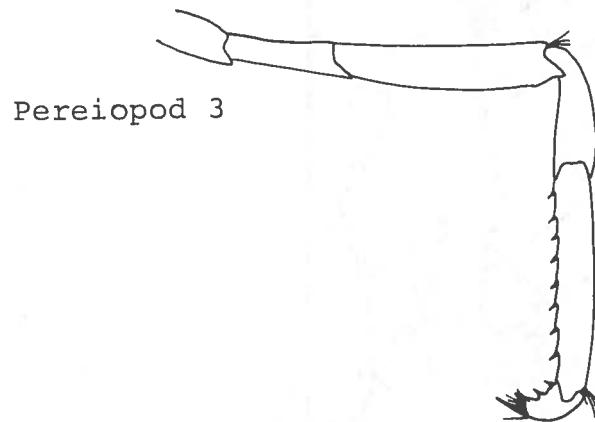
From Goodwin 1952: Drakes Bay, California.

From authors' data: Off Santa Barbara (Platform Hilda, on sediment collector at 30 m), Palos Verdes Peninsula (60 m), San Pedro Bay (55 m), and Santa Catalina Island (60 m), California.

Heptacarpus taylori (Stimpson 1857)

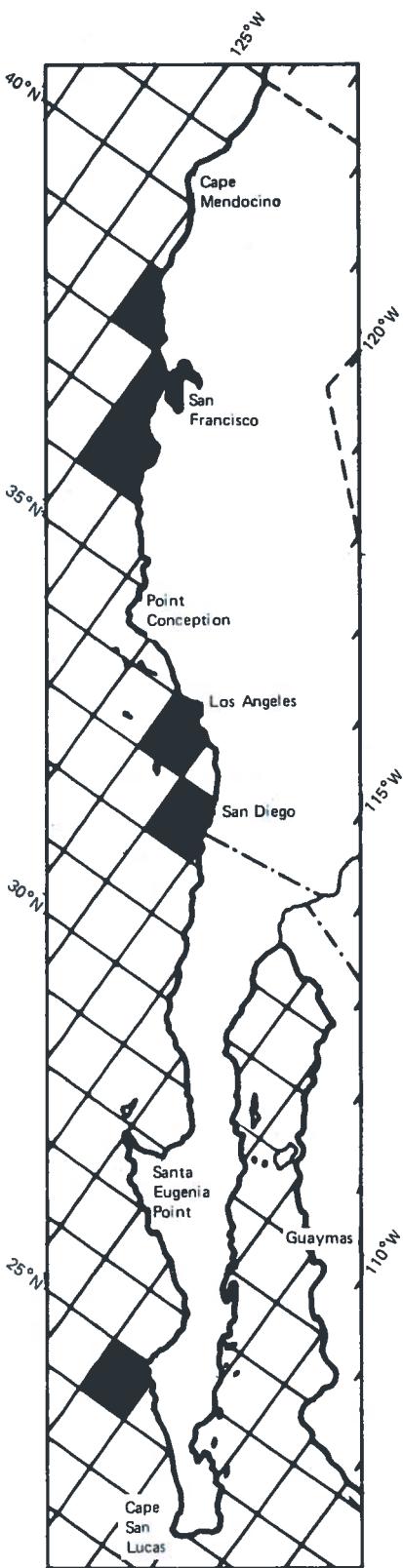


Typical variations
in rostrum



Pereiopod 3

Heptacarpus taylori (Stimpson 1857)



SYNONYMS

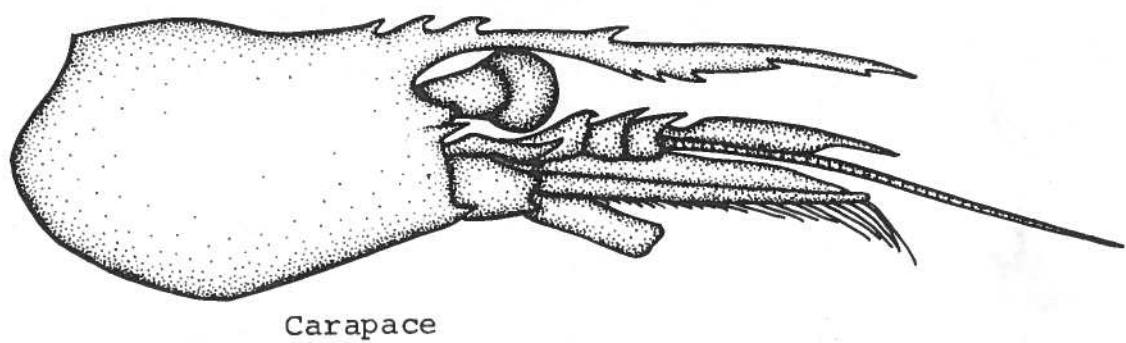
Hippolyte taylori Stimpson 1857. Heptacarpus taylori of Holmes 1900; of Holthuis 1947. Spirontocaris taylori of Rathbun 1904; of Schmitt 1921.

DISTRIBUTION

From Rathbun 1904: Ranges from San Francisco Bay, California, to Magdalena Bay, Baja California. Monterey, San Pedro, Point Loma, and San Diego, California.

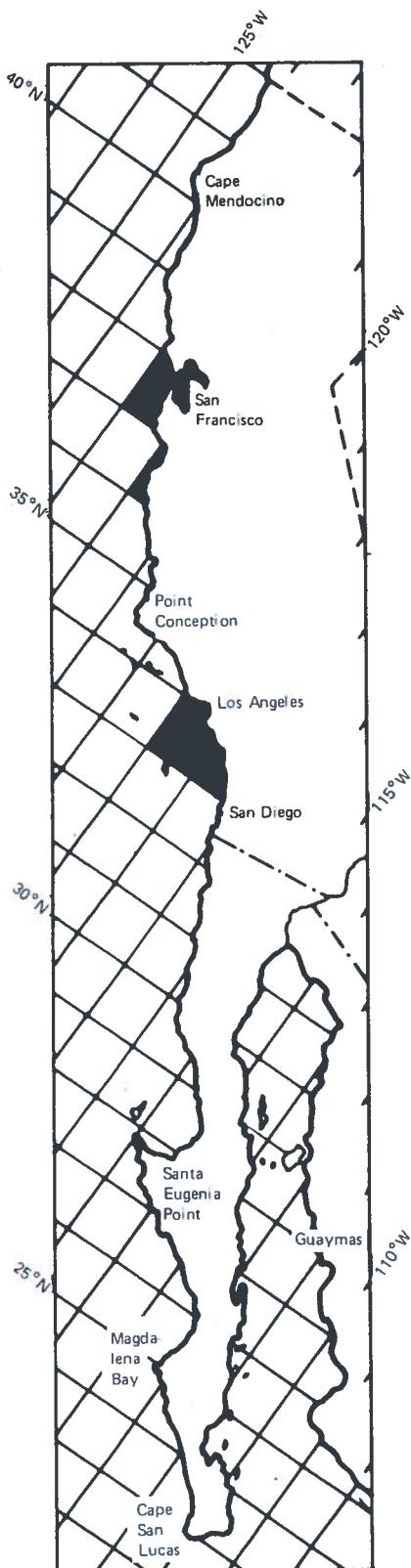
From authors' data: 27 km north of Fort Ross (13 m), San Simeon (0.15 m), Point Conception (0.15 m), and Palos Verdes Peninsula (0.5 m, rocky intertidal zone), California.

Heptacarpus tenuissimus Holmes 1900



Carapace

Heptacarpus tenuissimus Holmes 1900



SYNONYMS

Hippolyte gracilis Stimpson 1864. Heptacarpus tenuissimus Holmes 1900. Heptacarpus? gracilis of Holmes 1900. Spirontocaris gracilis of Rathbun 1904; of Schmitt 1921. Heptacarpus tenuissimus of Holthuis 1947.

DISTRIBUTION

From Rathbun 1904: Drakes Bay (64 m), Point Reyes (86 m), and Monterey Bay, California.

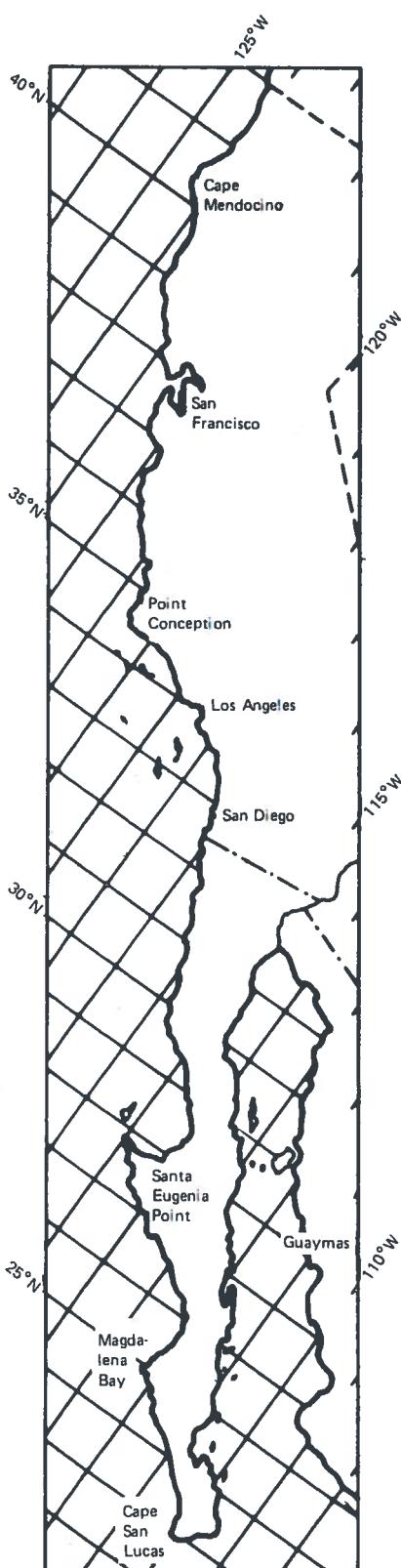
From Schmitt 1921: San Francisco Bay and Santa Catalina Island, California.

From authors' data: Santa Monica Bay (137 m), Palos Verdes Peninsula (137 m), and Dana Point (38 m), California.

Hippolyte affinis Owen 1839, incertae sedis

See Schmitt 1921 for illustration

Hippolyte affinis Owen 1839, incertae sedis



SYNONYMS

Spirontocaris affinis of Rathbun 1904; Schmitt 1921. Hippolyte affinis Owen 1839; Holmes 1900; Brandt 1851; Stimpson 1857; Kingsley 1878.

COMMENTS

This species appears to have been described from one specimen. Owen's short description follows in the original latin:

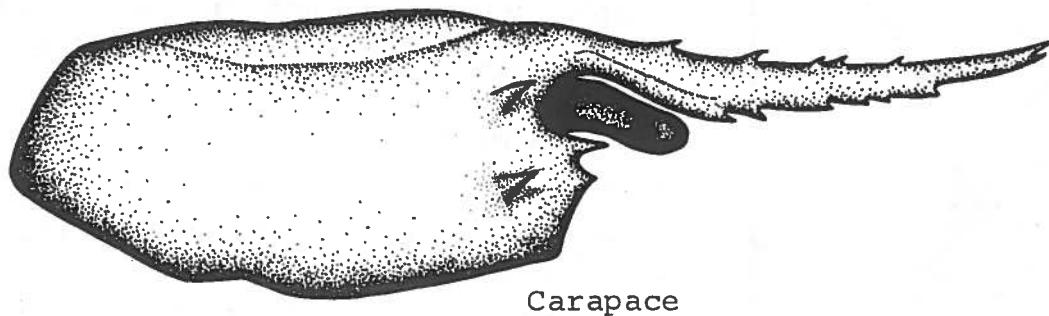
"Hip rostro antennis superioribus breviore, supra multi-serrato, ante medium subtus sex-serrato. Long. corp. 1 1/2. Color ruber."

The translation is:

Rostrum shorter than the first antennae, multiserrate above and armed below with six teeth before the middle. Body length 1 1/2 (inches). Color red.

Owen's description was accompanied by an illustration, which was subsequently redrawn and presented by Schmitt (1921). According to both Rathbun (1904) and Schmitt (1921), this species has one supraorbital spine, which would place it in the genus Lebbeus, following the separation of hippolytid genera defined by Holthuis (1955). Holthuis (1947) mentions that the figure by Owen shows one major supraorbital spine and two smaller spines, placing it in the genus Spirontocaris. As the description of this species is not complete enough to determine its genus, and as it has been collected only once, it has not been placed in the key to Hippolytidae in the front of this section.

Hippolyte californiensis Holmes 1895



Carapace

U.S. NATIONAL MUSEUM
BULLETIN NO. 109
PLATE VI

Hippolyte californiensis Holmes 1895

SYNONYMS

Hippolyte californiensis of Rathbun 1904, in part; of Schmitt 1921, in part (figs. 26a and b, not fig. 26c), 1924, in part; Chace 1937. Hippolyte mexicana Chace 1937.

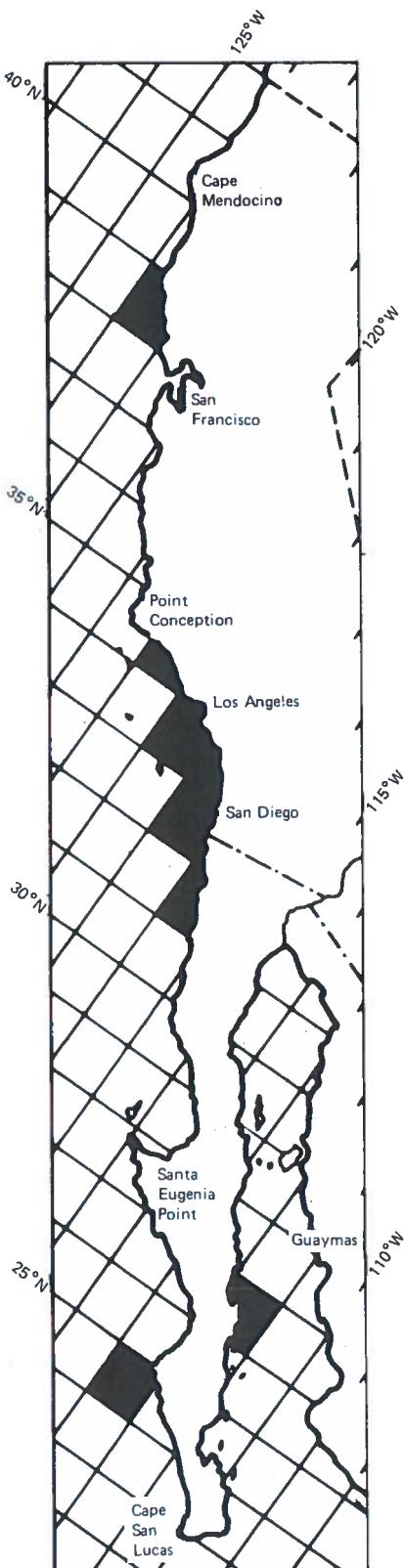
DISTRIBUTION

From Schmitt 1921: Venice, California.

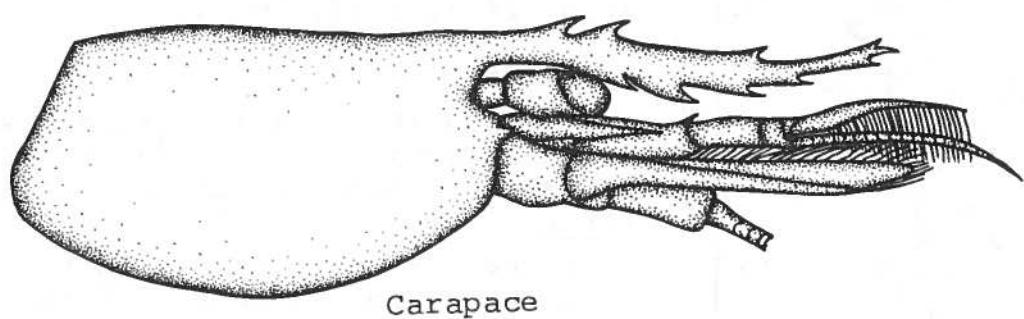
From Schmitt 1946: Santa Cruz Island, California (4 to 5 m).

From Chace 1951: Bodega Bay, Dillon Beach, Mugu Bay, Balboa, and San Diego, California. Ensenada, Cape San Lazaro, and Santa Inez Bay, Baja California.

From authors' data: Humboldt Bay, California (among Zostera).

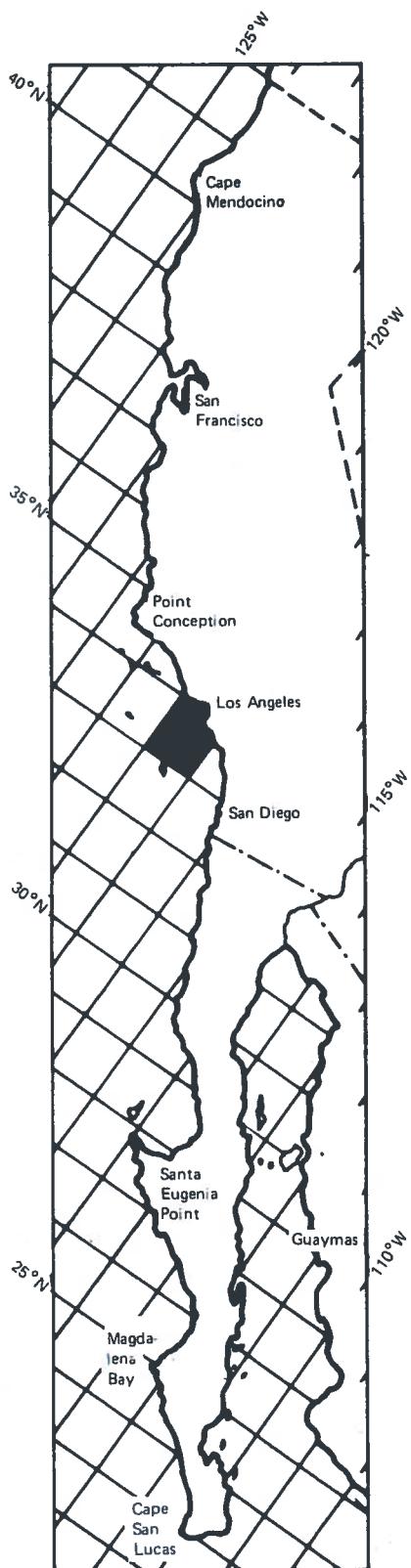


Hippolyte clarki Chace 1951



Carapace

Hippolyte clarki Chace 1951



SYNONYM

Hippolyte californiensis of Rathbun 1904, in part; of Schmitt 1921, in part (fig. 26c), 1924, in part.

DISTRIBUTION

From Chace 1951: This species is a northern form, but has been recorded as present in southern California (Anton Dohrn).

From Chess: * In Macrocystis holdfasts located off the isthmus of Santa Catalina Island, California (6 m).

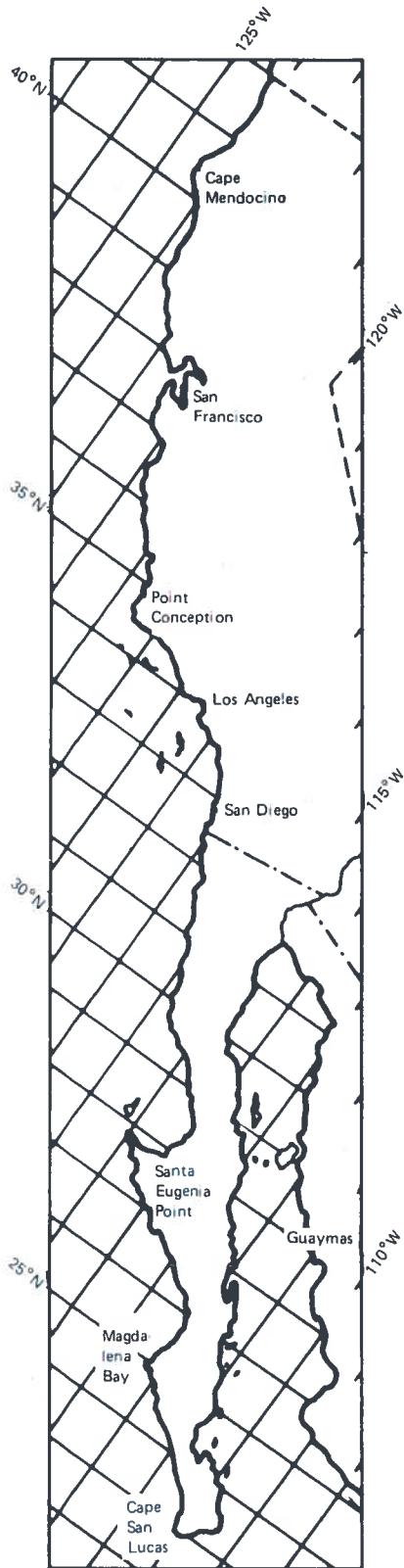
From authors' data: Palos Verdes Peninsula (30.5 m in drifting Macrocystis) and Fisherman's Cove, Santa Catalina Island (net tow through kelp wash), California.

*Anthony Chess, National Oceanic and Atmospheric Administration, Tiburon, California, personal communication.

Hippolyte layi Owen 1839, incertae sedis

See Schmitt 1921 for illustration

Hippolyte layi Owen 1839, incertae sedis



SYNONYMS

Spirontocaris layi of Holmes 1900; of Rathbun 1904; of Schmitt 1921. Hippolyte layi Owen 1839; of Brandt 1851; of Stimpson 1857; of Bate 1888; Lockington 1878; Kingsley 1878.

COMMENTS

This species appears to have been described from one specimen. Owen's description follows in the original latin:

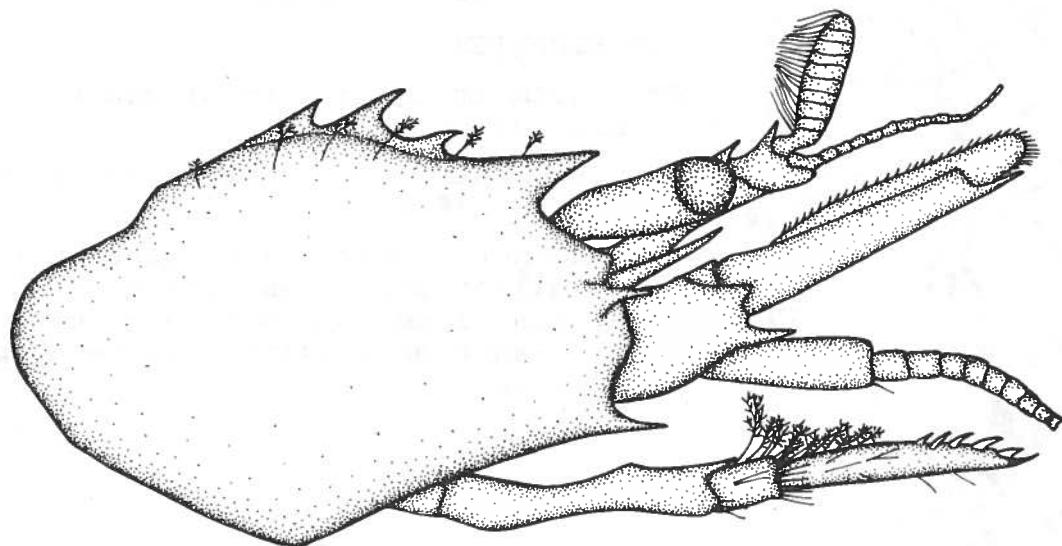
"Hip rostro acuminato, supra multiserrato, ante medium subtus quadriserrato. Long. corp. unc. 2 1/2. Color ruber."

The translation is:

Rostrum tapering to a point, upper margin many toothed, and below armed with four teeth before the middle. Body length 2-1/2 inches. Color red.

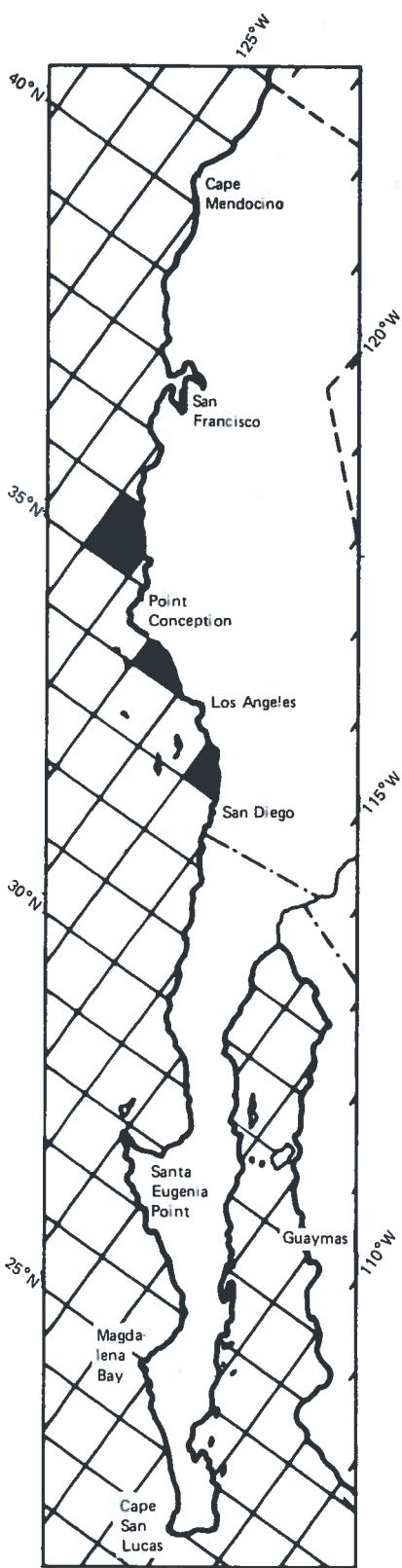
Holmes (1900) thought this species might have been a Heptacarpus, and Holthuis (1947) thought it might have been a Heptacarpus or a Eualus. As the description of this species is not complete enough to determine its genus, and as it has been collected only once, it has not been placed in the key to Hippolytidae in the front of this section.

Lebbeus lagunae (Schmitt 1921)



Carapace

Lebbeus lagunae (Schmitt 1921)



SYNONYMS

Spirontocaris lagunae Schmitt 1921,
1946. Lebbeus lagunae Holthuis 1947.

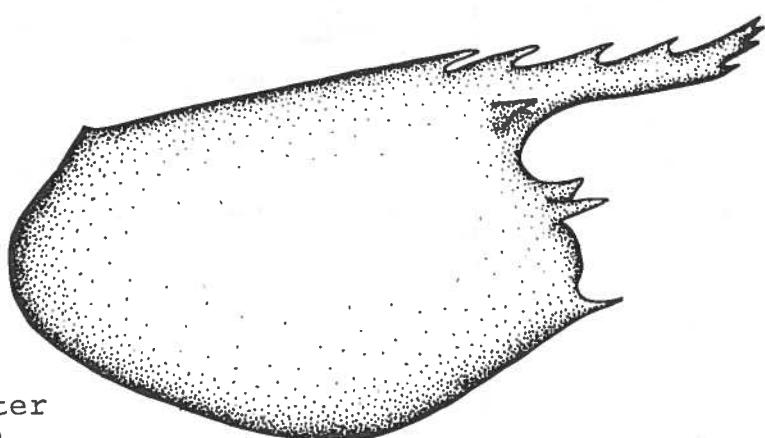
DISTRIBUTION

From Schmitt 1921: Laguna Beach, California (22 to 27 m).

From Schmitt 1946: Santa Cruz Island, California (9 m).

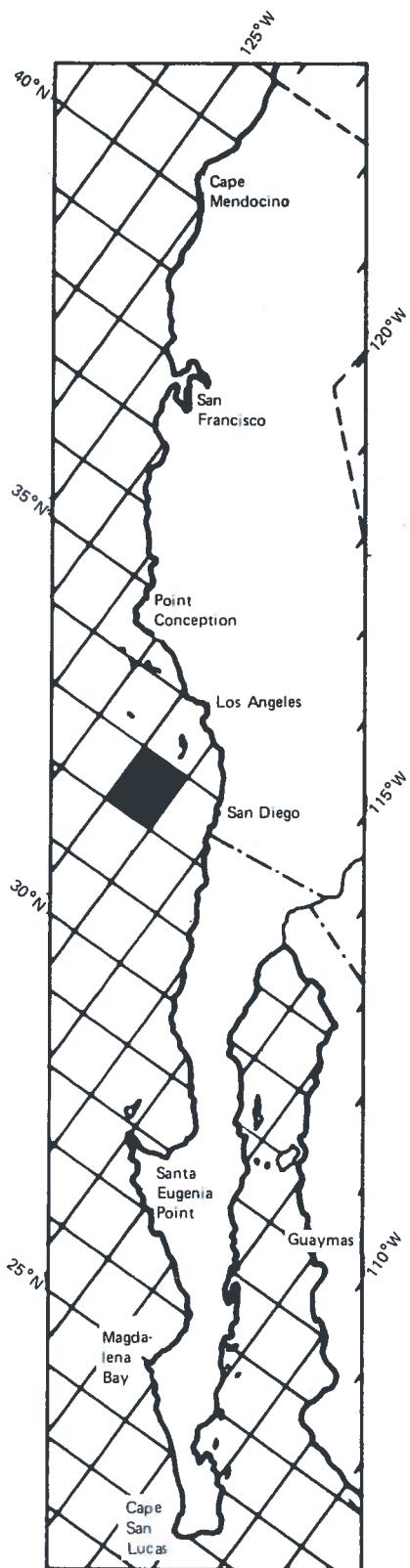
From authors' data (Allan Hancock Foundation collection): San Simeon (rocky intertidal zone) and 4 km east of S. Point, Santa Rosa Island (27 to 38 m), California.

Lebbeus washingtonianus (Rathbun 1902)



Carapace (after
Rathbun 1902)

Lebbeus washingtonianus (Rathbun 1902)



SYNONYMS

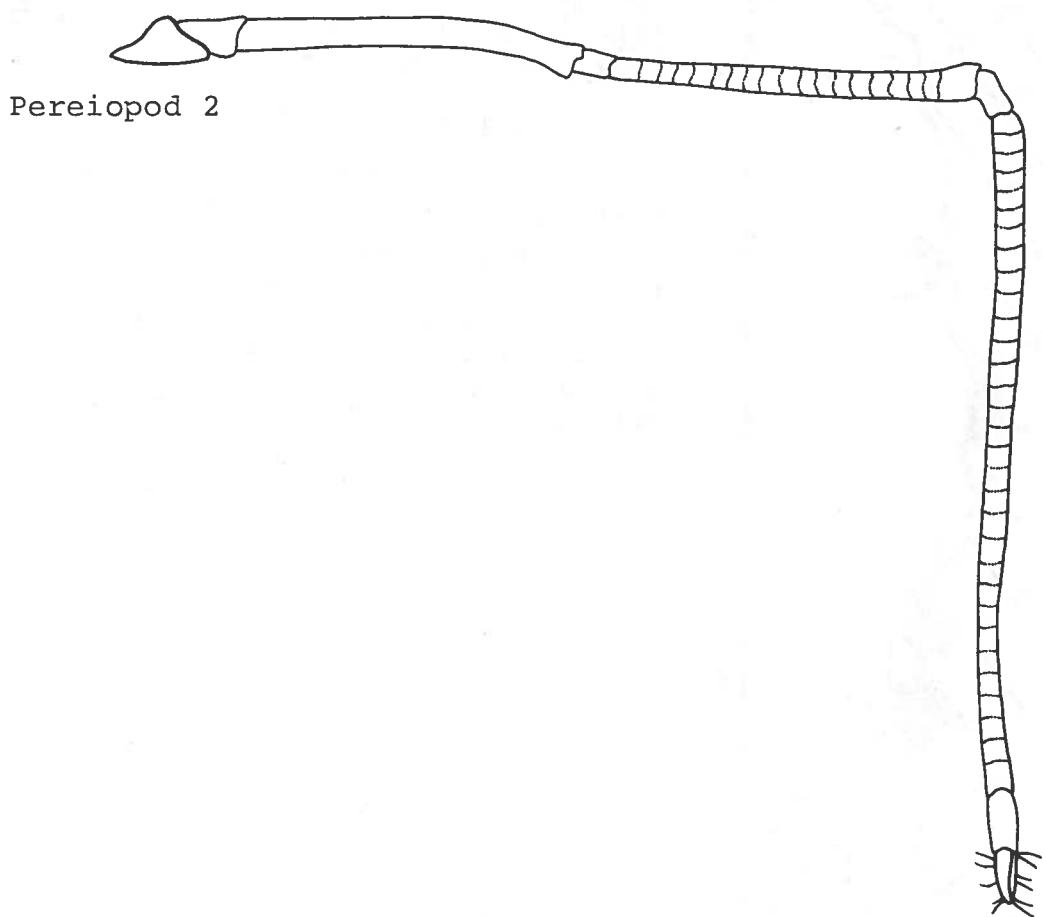
Spirontocaris washingtoniana Rathbun 1902, 1904; of Schmitt 1921. Lebbeus washingtonianus Holthuis 1947.

DISTRIBUTION

From Rathbun 1904: Sea Lion Rock, Washington (1,245 m).

From Schmitt 1921: San Clemente Island, California (271 to 856 m).

Lysmata californica (Stimpson 1866)



Lysmata californica (Stimpson 1866)

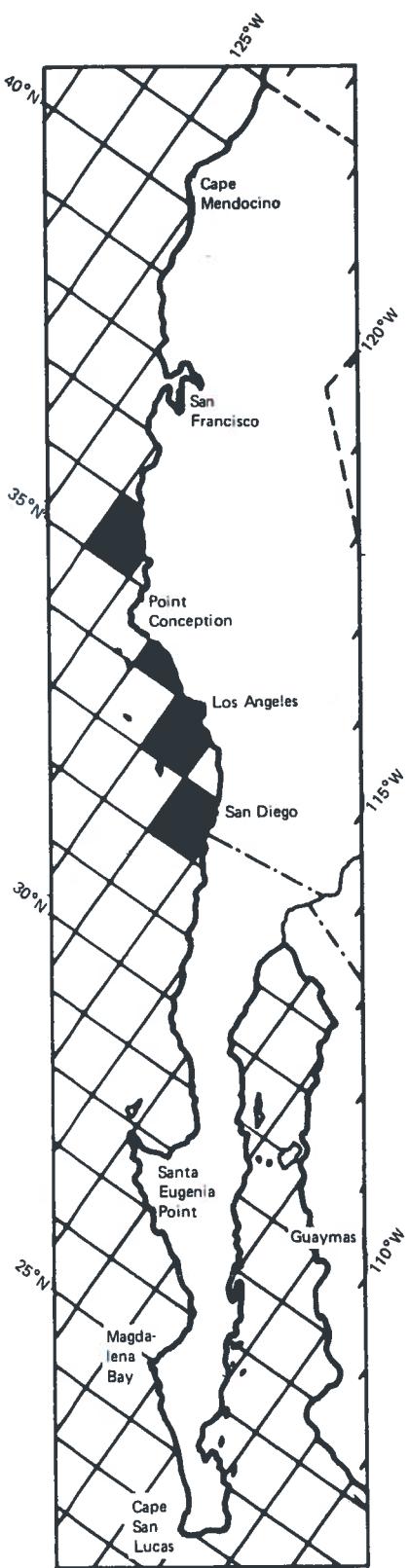
SYNONYMS

Hippolysmata californica Stimpson 1866;
of Holmes 1900; of Rathbun 1902; of
Schmitt 1921; of Holthuis 1947. Hippo-
lyte lineata Lockington 1877. Lysmata
californica Chace.*

DISTRIBUTION

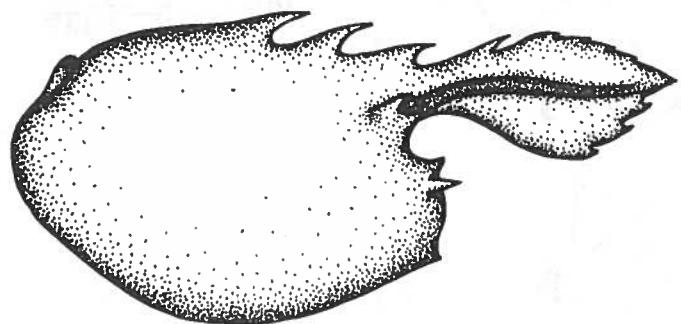
From Rathbun 1904: Ranges from Santa
Barbara to San Diego, California.

From authors' data: San Simeon (inter-
tidal zone), Los Angeles Harbor break-
water (on baited shrimp traps, 6 m),
Bunker Point, Palos Verdes (6 to 12 m),
and Lunada Bay, Palos Verdes (intertidal
zone), California.



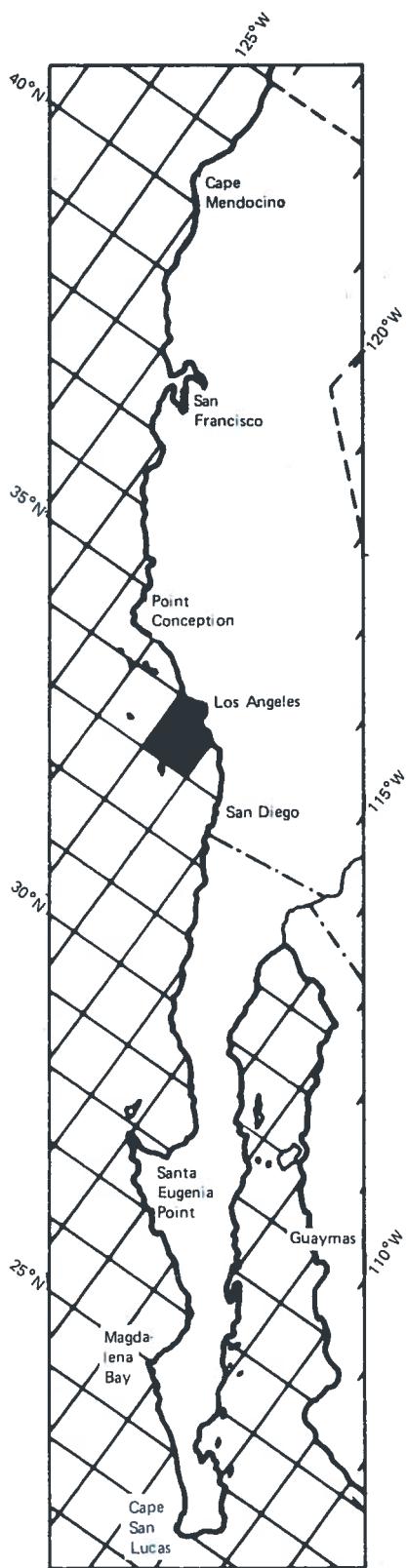
Dr. F.A. Chace, Jr., Smithsonian Insti-
tution, Washington, D.C., personal
communication.

Spirontocaris dalli Rathbun 1902



Carapace (after
Rathbun 1902)

Spirontocaris dalli Rathbun 1902



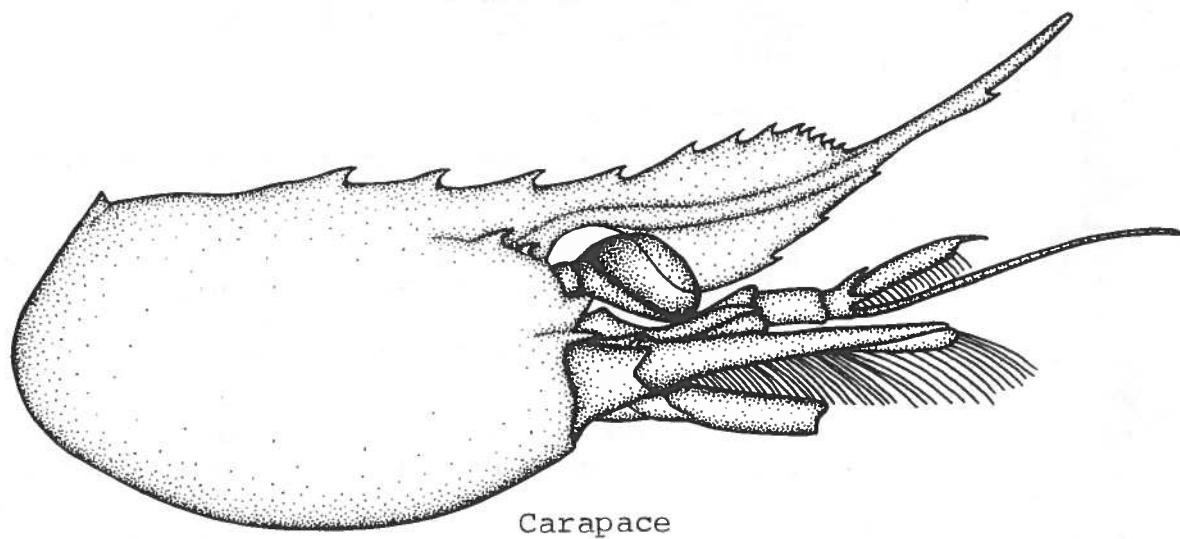
SYNONYMS

Hippolyte dalli of Williamson 1915.
Spirontocaris dalli of Rathbun 1904; of
Holthuis 1947.

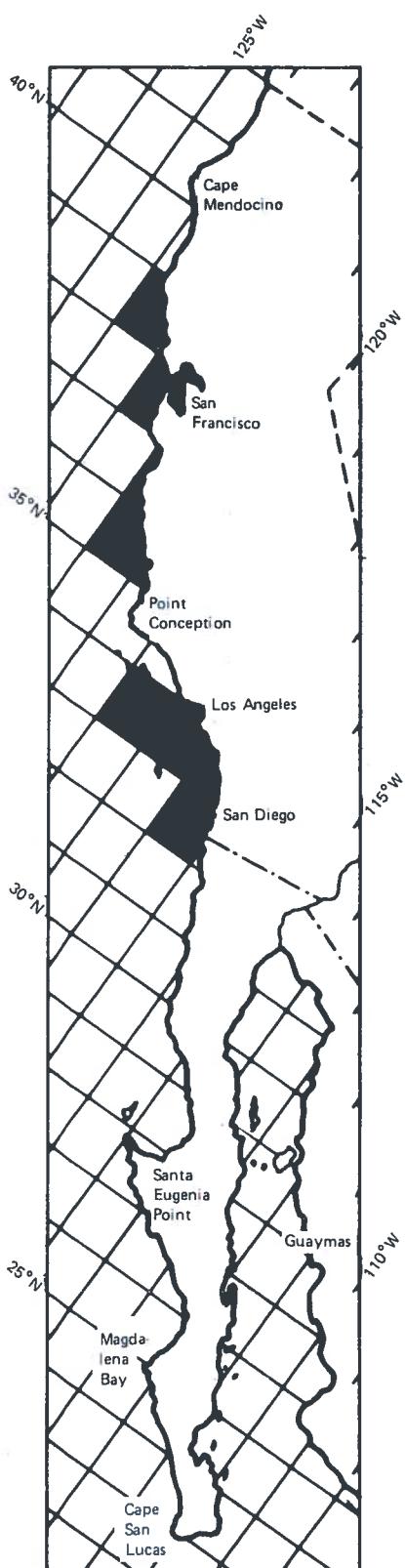
DISTRIBUTION

From Rathbun 1904: Ranges from the Arctic to Sitka, Alaska (9 to 33 m).

Spirontocaris holmesi Holthuis 1947



Spirontocaris holmesi Holthuis 1947



SYNONYMS

Spirontocaris bispinosa Holmes 1900;
of Rathbun 1904; of Schmitt 1921.
Hippolyte bispinosa of Williamson 1915.
Spirontocaris holmesi Holthuis 1947
(new name).

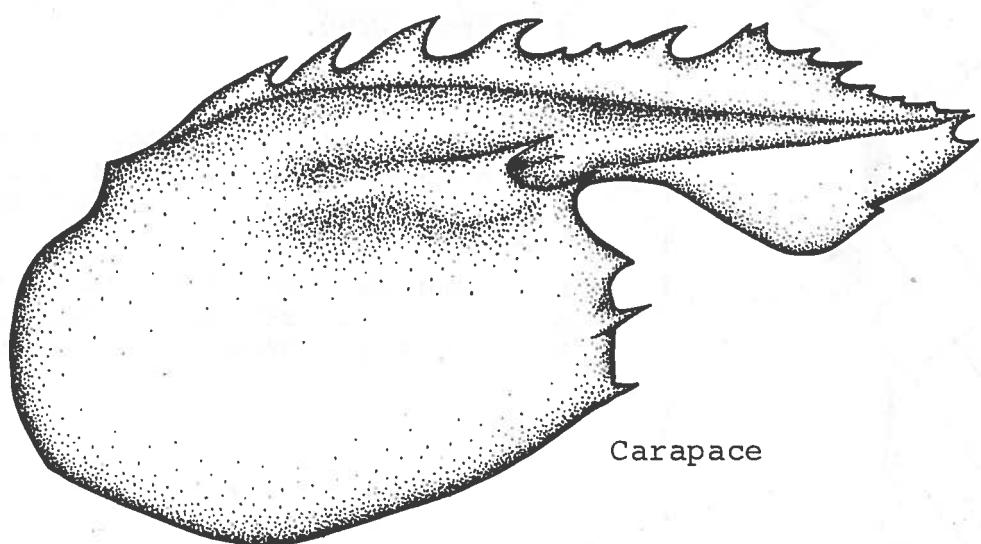
DISTRIBUTION

From Rathbun 1904: Ranges from Washington to San Diego, California. Bodega Head (306 m), Farallon Islands (350 m), Monterey Bay (24 to 124 m), Lobos Rocks (141 m), San Simeon Bay (293 and 386 m), Esteros Bay (168 m), San Nicolas Island (289 m), and San Diego (227 m), California.

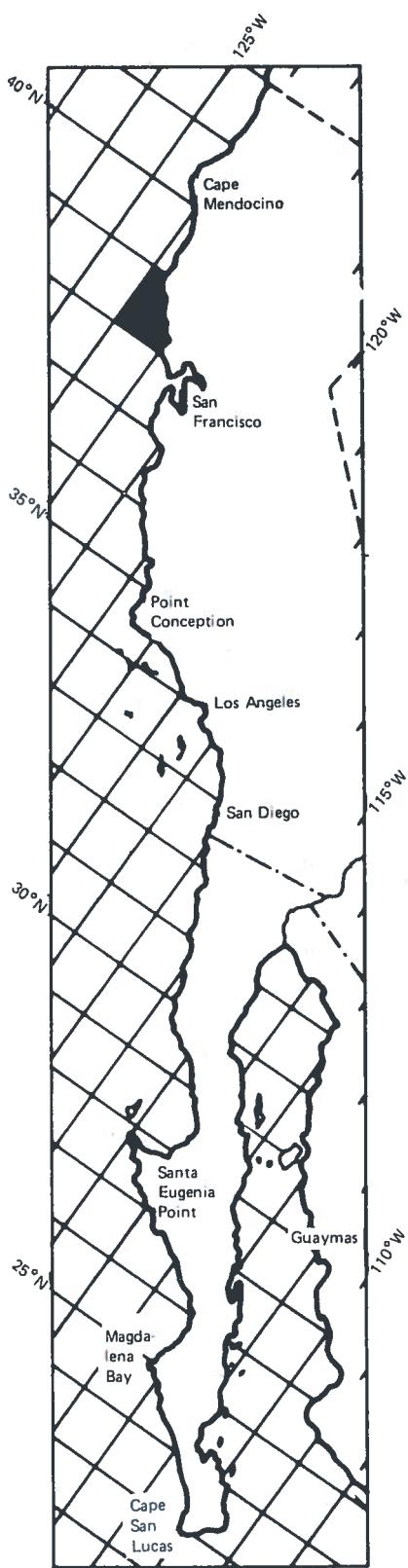
From Goodwin 1952: Ranges from Fort Bragg to San Luis Obispo Bay, California (137 to 229 m).

From authors' data: Santa Monica Bay (183 m), Palos Verdes Peninsula (137 and 183 m), San Pedro Bay (137 and 183 m), and Dana Point, California (91 m).

Spirontocaris lamellicornis (Dana 1852)



Spirontocaris lamellicornis (Dana 1852)



SYNONYMS

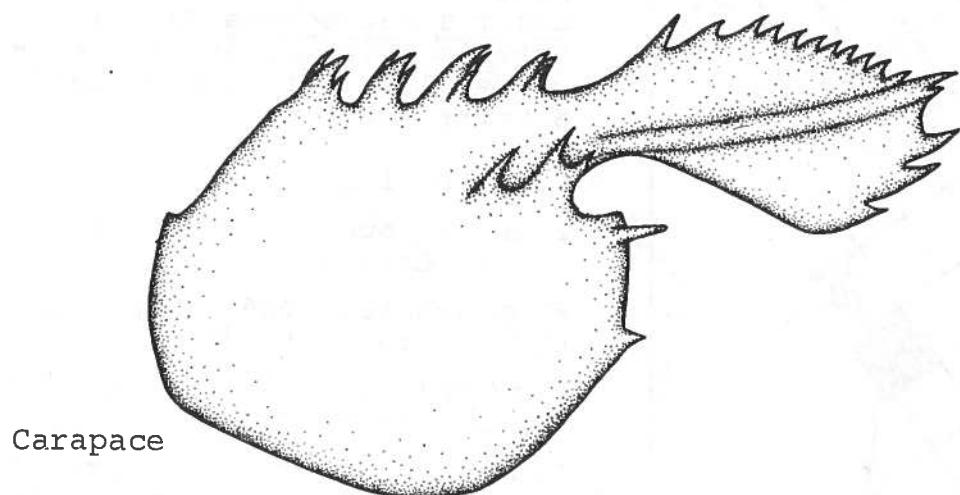
Hippolyte lamellicornis Dana 1852; of Stimpson 1857; of Kingsley 1878. Spirontocaris lamellicornis of Walker 1898; of Holmes 1900.

DISTRIBUTION

From Rathbun 1904: Ranges from Unalaska, Alaska, to Point Arena, California (16 to 141 m). Point Arena, California (93 m).

From authors' data (Kerckhoff Marine Laboratory collection): President's Channel, Puget Sound, Washington (192 m).

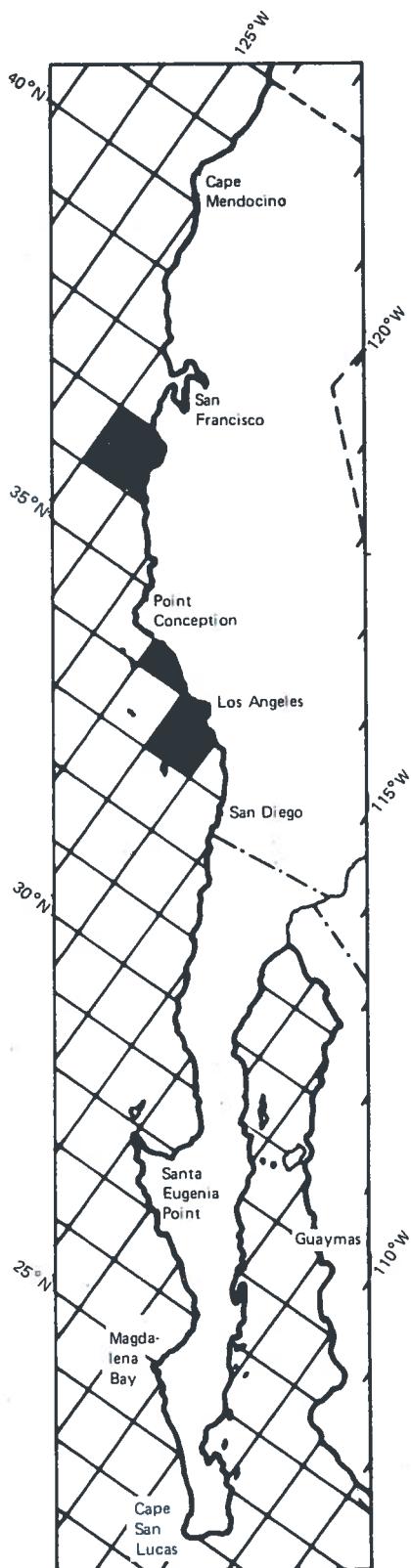
Spirontocaris prionota (Stimpson 1864)



Dorsal spines on
carapace, dorsal
view



Spirontocaris prionota (Stimpson 1864)



SYNONYMS

Hippolyte prionota Stimpson 1864; of Kingsley 1883; of Sharp 1893. Spirontocaris macrodonta Hart 1930. Spirontocaris prionota of Walker 1898; of Holmes 1900; of Rathbun 1900, 1904; of Schmitt 1921.

DISTRIBUTION

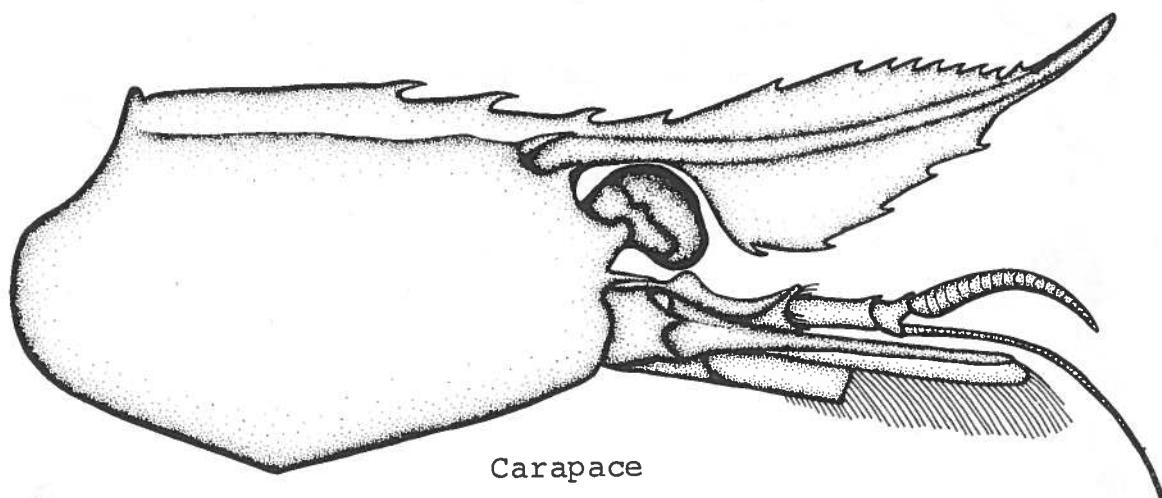
From Rathbun 1904: Monterey and Pacific Grove, California.

From Schmitt 1946: Santa Cruz Island, California (9 to 46 m).

From Holthuis 1947: Ranges from the Bering Sea to California (13 to 137 m).

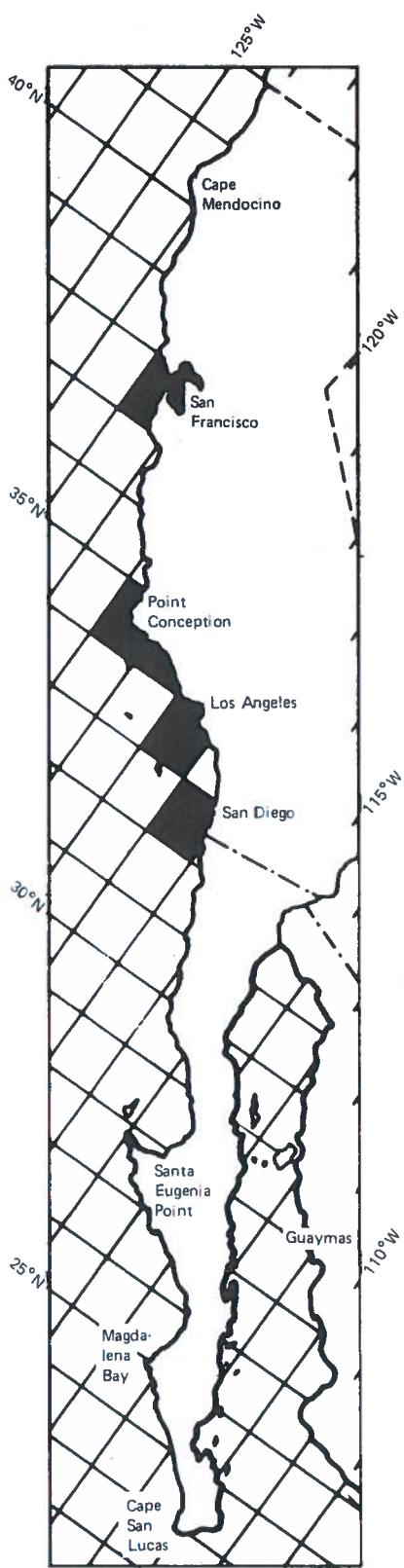
From authors' data: Bunker Point, Palos Verdes Peninsula (18 m; collected by D. Hotchkiss and J. Meistrell, County Sanitation Districts of Los Angeles County), Abalone Cove, Palos Verdes Peninsula (9-m dive), and Point Loma (kelp holdfast), California.

Spirontocaris sica Rathbun 1902



Carapace

Spirontocaris sica Rathbun 1902

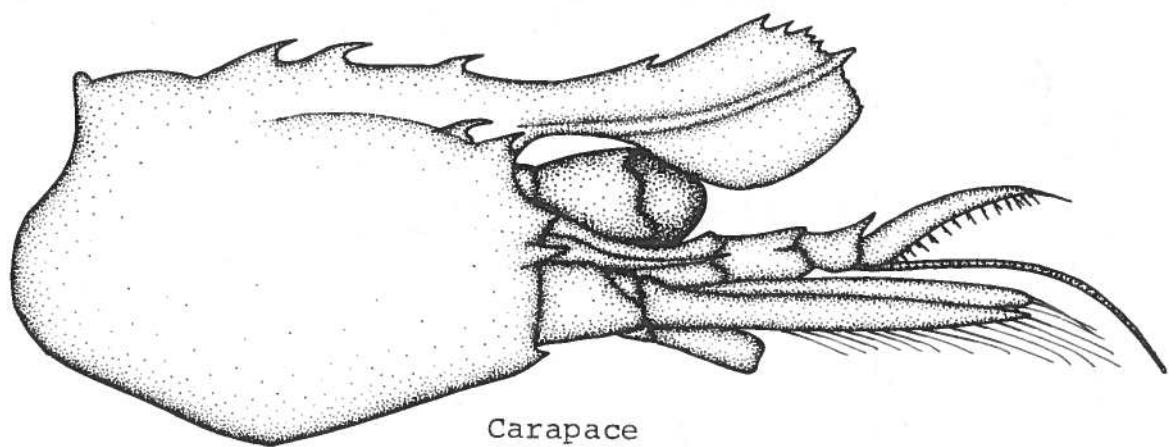


DISTRIBUTION

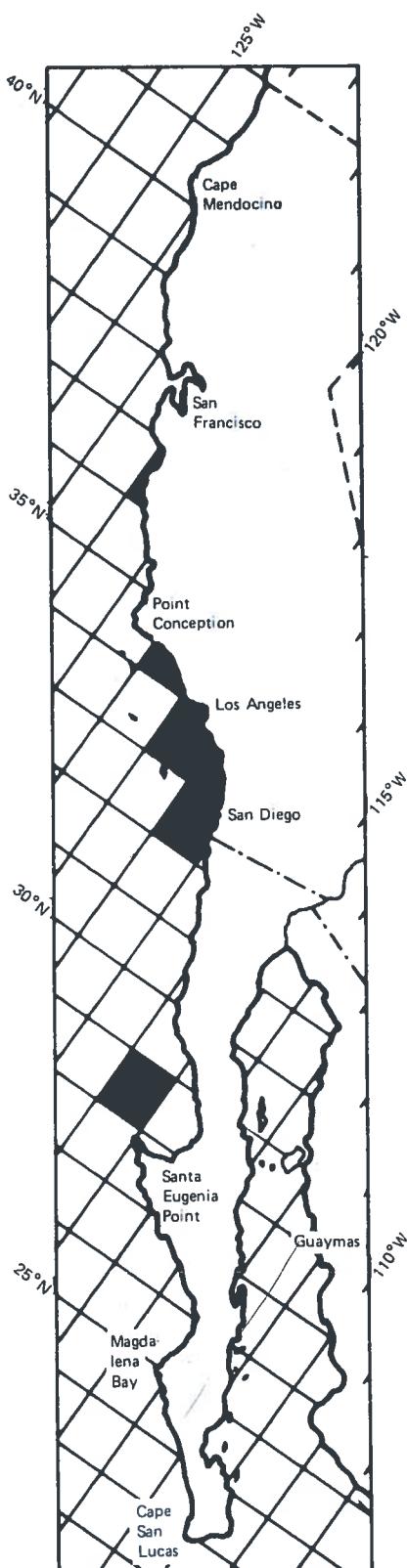
From Rathbun 1904: Ranges from Point Arena to San Diego, California (386 to 849 m). Santa Barbara Channel, California (485 m).

From authors' data: Santa Monica Bay (183 m), San Pedro Bay (137 and 183 m), and Palos Verdes Peninsula (137 and 183 m), California.

Spirontocaris snyderi Rathbun 1902



Spirontocaris snyderi Rathbun 1902



SYNONYMS

Hippolyte snyderi of Williamson 1915.
Spirontocaris snyderi of Schmitt 1921;
of Holthuis 1947; et al.

DISTRIBUTION

From Rathbun 1904: Monterey Bay, Lobos Rocks (141 m), and Santa Catalina Island (86 m), California. Cedros Island, Baja California (81 m).

From Schmitt 1946: Santa Cruz Island, California (37 m).

From authors' data: Palos Verdes Peninsula (64 and 137 m), Dana Point (91 m), and Point Loma (137 m), California.

Section 7
KEY TO THE FAMILY
PALAEMONIDAE

Subfamily Palaemoninae
Palaemon (Palaemon) ritteri Holmes 1895

Subfamily Pontoniinae
Palaemonella holmesi (Nobili 1907)
Periclimenes infraspinis (Rathbun 1902)
Pontonia californiensis Rathbun 1902
Pseudocoutierea elegans Holthuis 1951

Section 7
KEY TO THE SPECIES OF
PALAEMONIDAE

1 . . . (4) The third, fourth, and fifth pairs of pereiopods have biunguiculate dactyls.

2 . . . (3) The dorsal margin of the rostrum has one tooth.

Pontonia californiensis

3 . . . (2) The dorsal margin of the rostrum has five to eight teeth.

Periclimenes infraspinus

4 . . . (1) The third, fourth, and fifth pairs of pereiopods are simple.

5 . . . (6) The rostrum is not armed with teeth.

Pseudocoutierea elegans

6 . . . (5) The rostrum is armed with from six to ten dorsal teeth and from two to four ventral teeth.

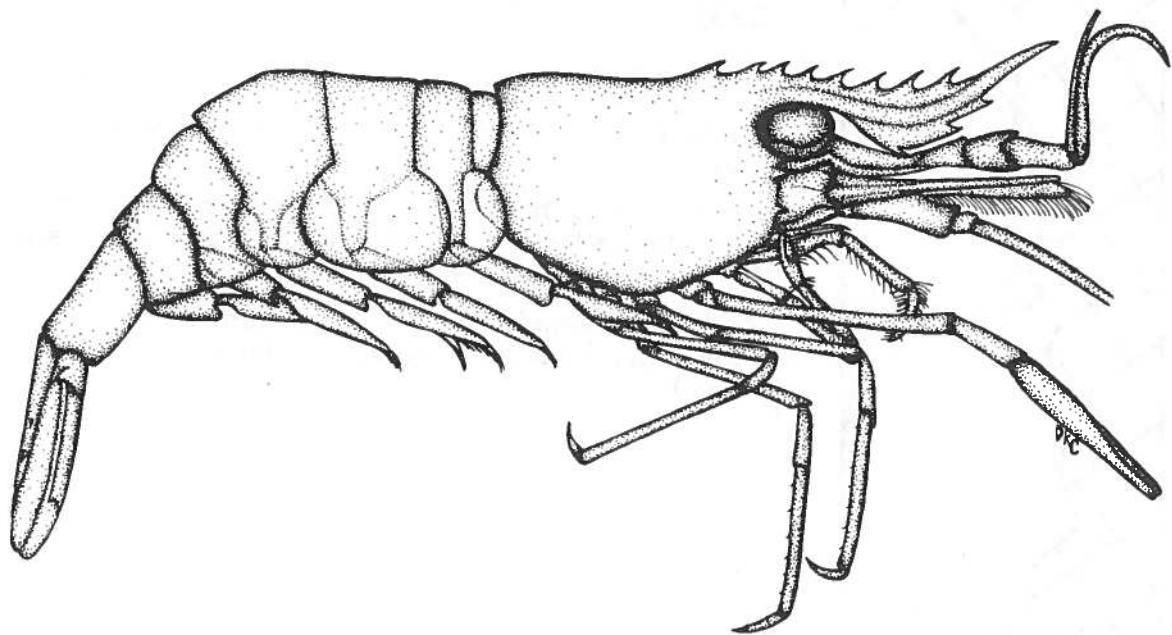
7 . . . (8) The anterointernal angle of the blade of the antennal scale (scaphocerite) is produced beyond the end of its spine.

Palaemon ritteri

8 . . . (7) The anterointernal angle of the blade of the antennal scale is not produced, the blade being shorter than the spine.

Palaemonella holmesi

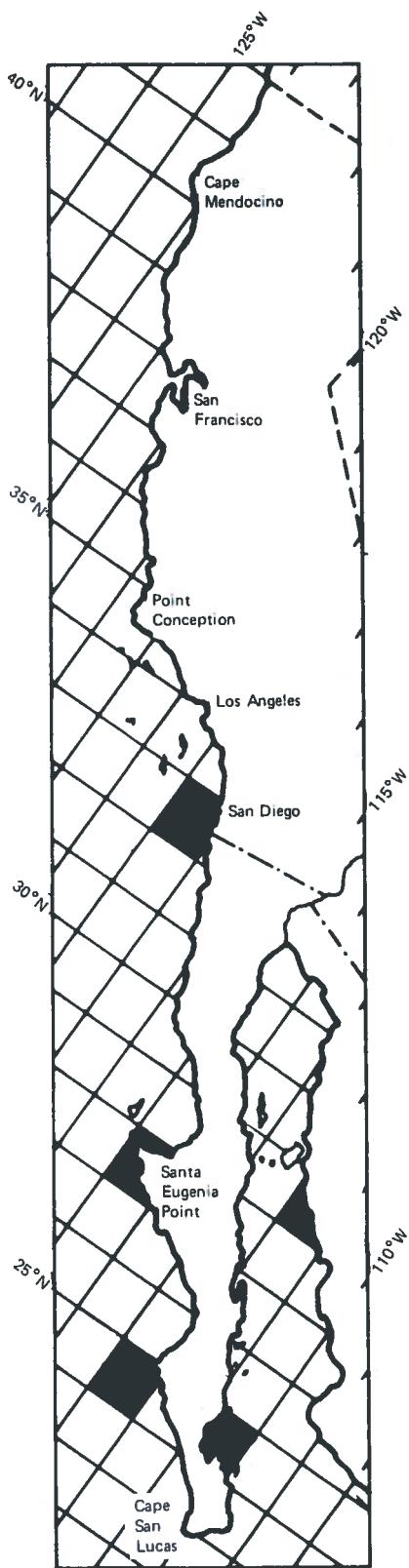
Palaemon ritteri Holmes 1895



Antennal scale



Palaemon ritteri Holmes 1895



SYNONYMS

Leander ritteri Nobili 1901. Non Palaemon ritteri? Rathbun 1910; of Schmitt 1939.

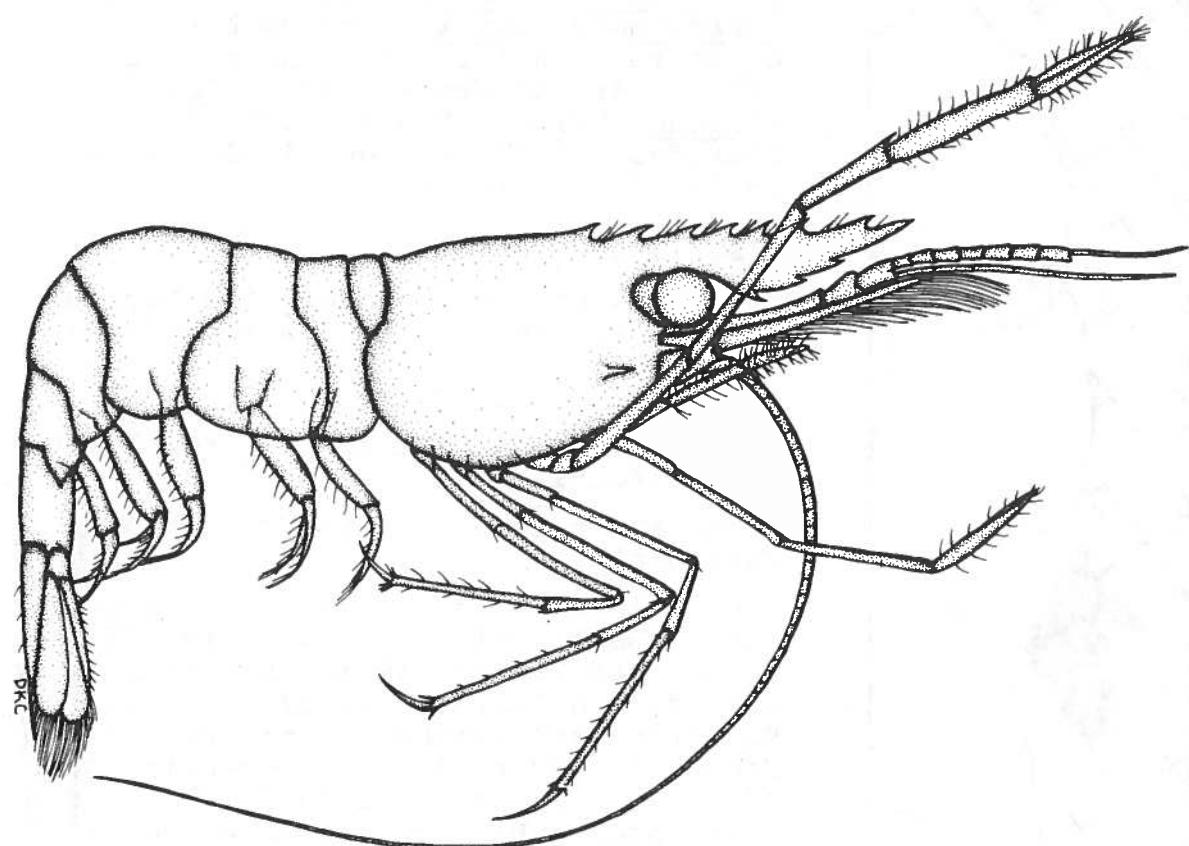
DISTRIBUTION

From Holmes 1895: San Diego, California.

From Rathbun 1904: San Bartolome Bay and Magdalena Bay, Baja California, and La Paz Harbor, Gulf of California.

From authors' data: Algodones Bay, Guaymus, Sonora, Mexico (intertidal zone).

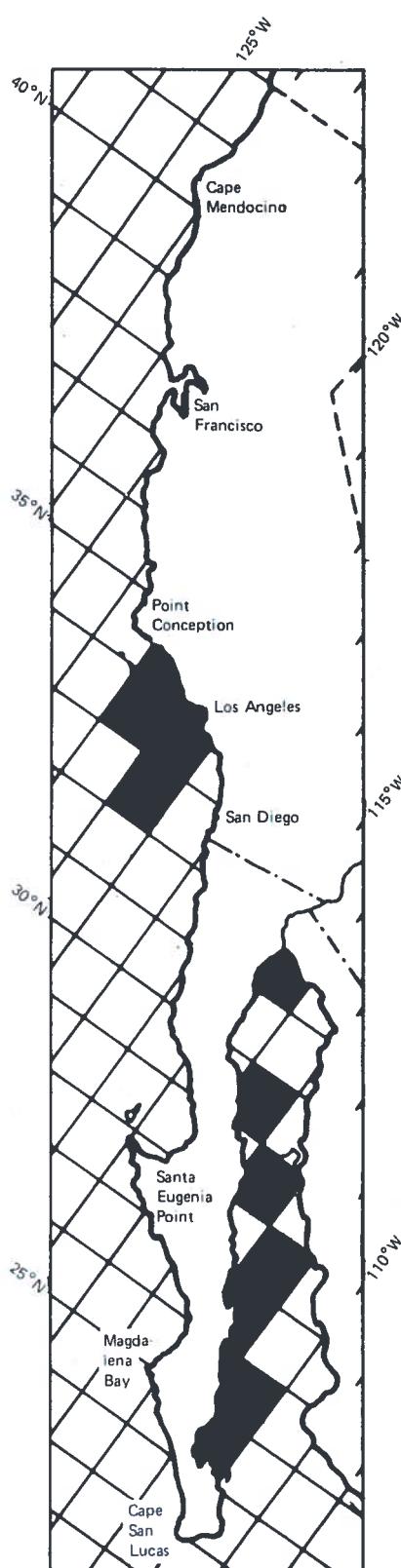
Palaemonella holmesi (Nobili 1907)



Antennal scale



Palaemonella holmesi (Nobili 1907)



SYNONYMS

Anchista tenuipes Holmes 1900; non Periclimenes tenuipes Borradaile 1898. Periclimenes tenuipes of Rathbun 1904; of Borradaile 1917; of Schmitt 1921, 1924, 1946; of Hewatt 1946. Periclimenes holmesi Nobili 1907; of Borradaile 1917; of Kemp 1922; of Chace 1937; of Schmitt 1939.

DISTRIBUTION

From Rathbun 1904: Concepcion Bay, Baja California, and Gulf of California (12 to 14 m).

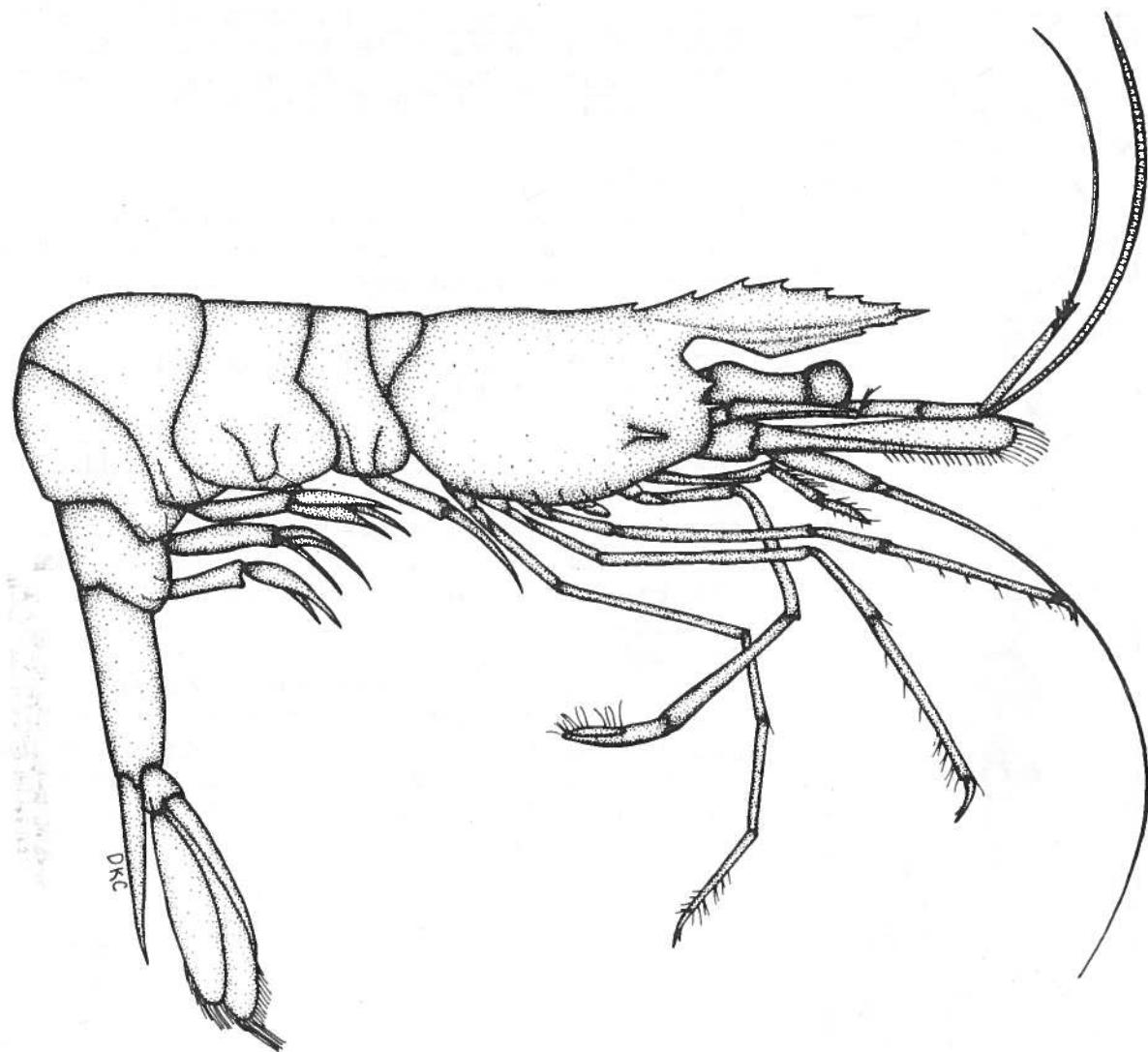
From Schmitt 1946: Ranges from Santa Catalina Island, California, to the Gulf of California.

From Hewatt 1946: Santa Cruz Island, California.

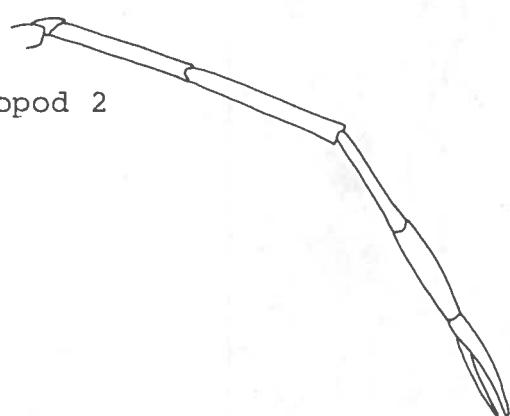
From Holthuis 1951: Off Wilson's Cove, San Clemente Island, California (25 to 29 m). La Paz Bay (9 m), Espiritu Santo Island, San Gabriel Bay (2 to 7 m), off San Francisco Island (27 m), Puerto Escondido (33 to 38 m), Concepcion Bay (3 to 22 m), Tortuga Island (33 m), San Francisquito Bay (18 m), Angel de la Guardia Island (18 m), Gonzaga Bay (18 to 45 m), Consag Rock (18 to 45 m), Tiburon Island (14 to 18 m), and Colima (Revillagigedo Islands), Baja California.

From authors' data: Isthmus Cove, Santa Catalina Island, California (15 to 18 m).

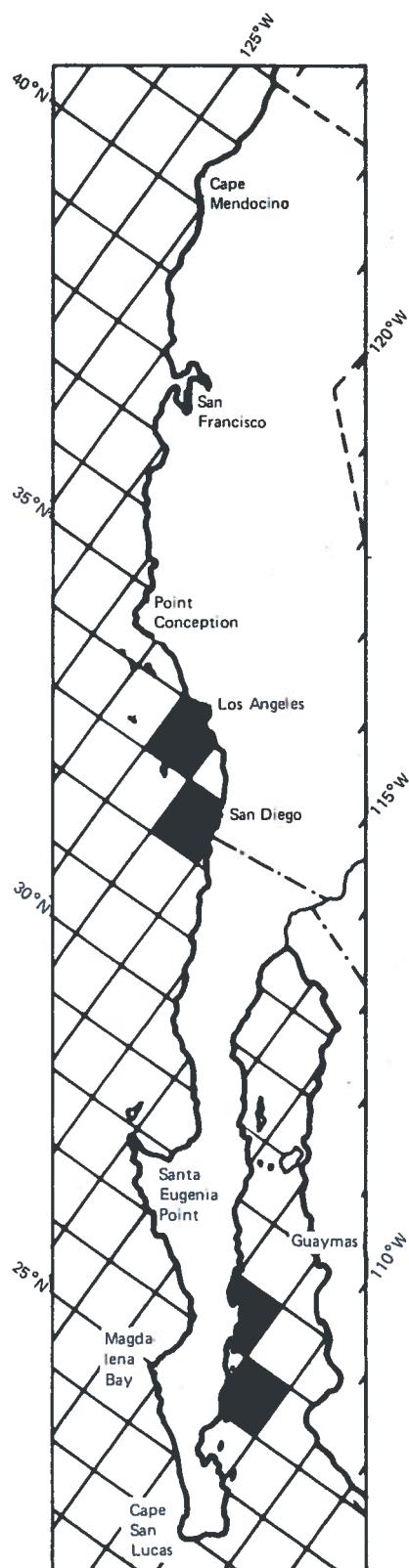
Periclimenes infraspinis (Rathbun 1902)



Pereiopod 2



Periclimenes infraspinis (Rathbun 1902)



SYNONYMS

Urocaris infraspinis Rathbun 1902, 1904; Kemp 1915; Barradaile 1917; Schmitt 1921. Periclimenes infraspinis of Kemp 1922; Chace 1937; Holthuis 1951.

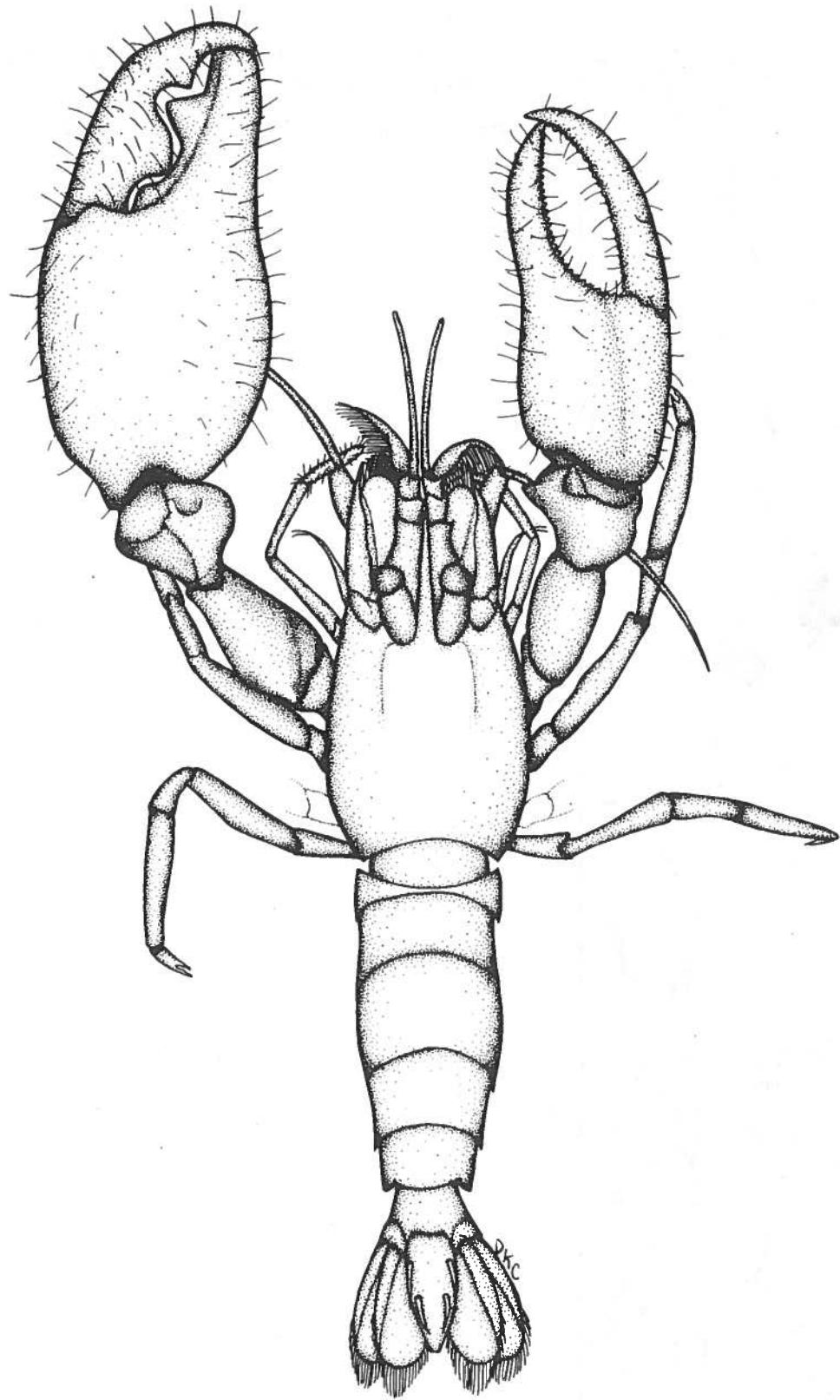
DISTRIBUTION

From Rathbun 1904: San Diego Bay, California (5 m). Off San Jose Island (14 m) and in Concepcion Bay, Baja California, and off Guaymas, Sonora, Mexico.

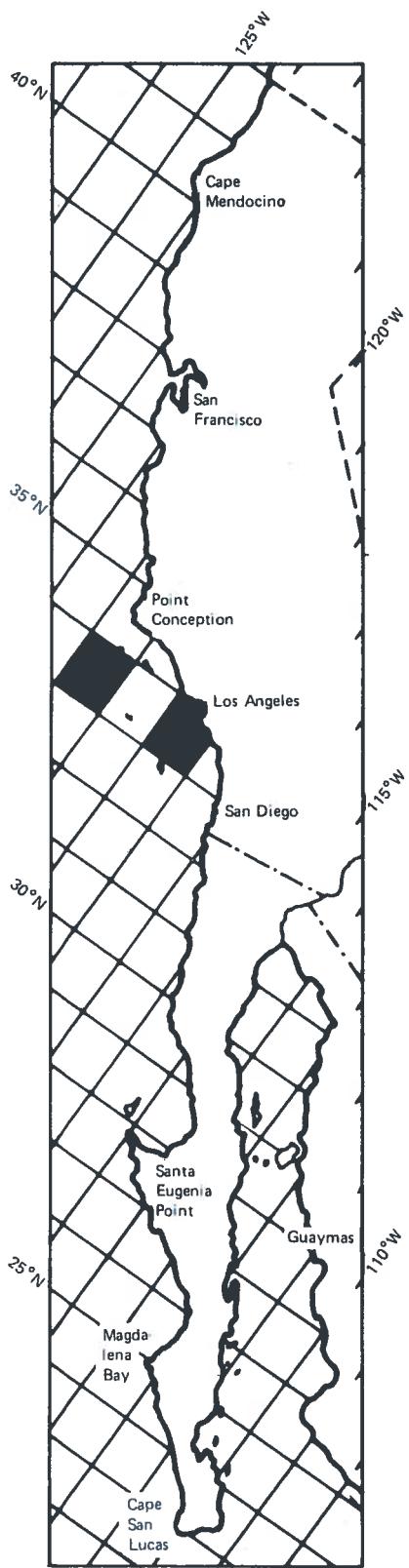
From Chace 1937: Santa Inez Bay, Baja California (5 m).

From authors' data: Engels Bank, California (26-m biosled sample). South of Tortuga Island, Gulf of California (38 m). Allan Hancock Foundation collection: Off Willard Island, Gonzaga Bay (18 to 37 m), east of San Francisco Island (27 and 86 m), San Lorenzo Channel (5 to 9 m), south of Tortuga Island (38 m), Salinas Bay, Carmen Island (38 m), Aqua Verde Bay, off San Marcial Reef (15 m), east of Angel de la Guardia Island (18 m), and San Francisco Bay (37 m), Baja California.

Pontonia californiensis Rathbun 1902



Pontonia californiensis Rathbun 1902

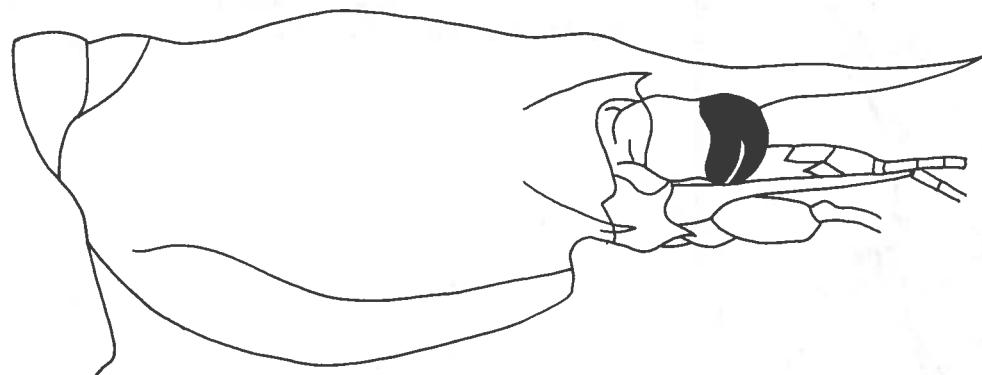


DISTRIBUTION

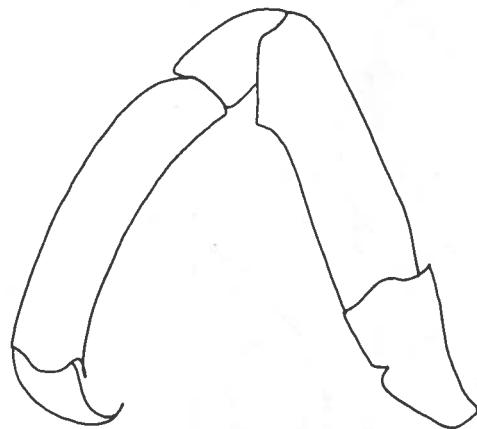
From Rathbun 1904: Santa Rosa Island, California (27 to 29 m).

From authors' data: Engels Bank, California (26 m).

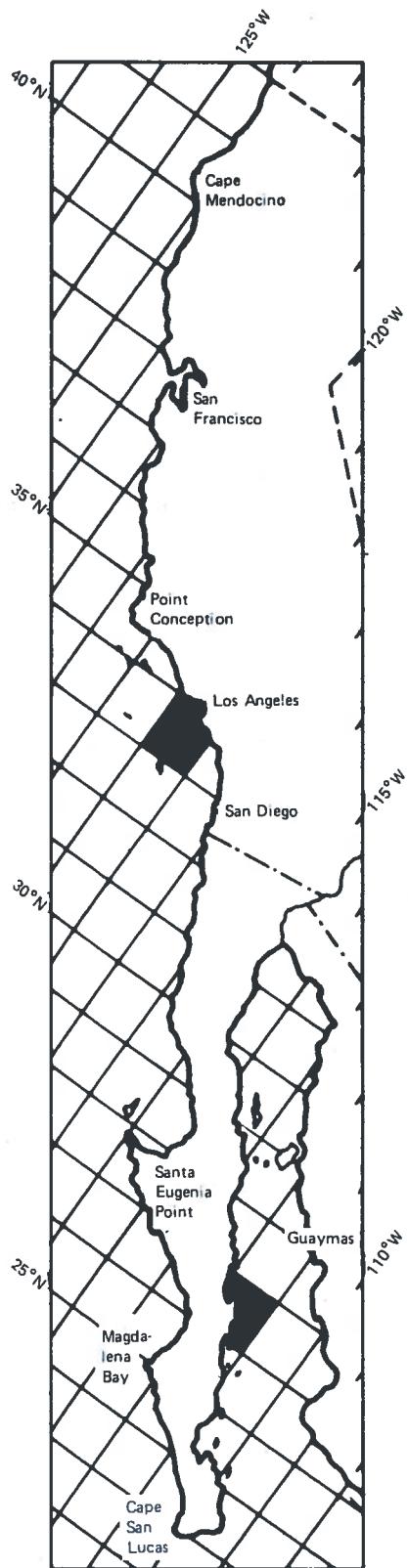
Pseudocoutierea elegans Holthuis 1951



Carapace and Pereiopod 3
(after Holthuis 1951)



Pseudocoutierea elegans Holthuis 1951



DISTRIBUTION

From Holthuis 1951: Long Point area, Santa Catalina Island, California (82 to 91 m). Off Ildefonso Island, Baja California (91 m).

Section 8
KEY TO THE FAMILY
PANDALIDAE

- Pandalopsis ampla Bate 1888
Pandalus danae Stimpson 1857
Pandalus gurneyi Stimpson 1871
Pandalus jordani Rathbun 1902
Pandalus montagui tridens Rathbun 1902
Pandalus platyceros Brandt 1851

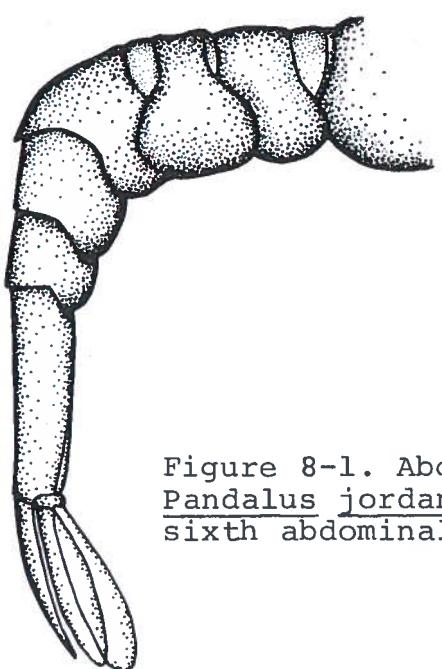


Figure 8-1. Abdomen and telson of *Pandalus jordani*, showing elongate sixth abdominal segment.

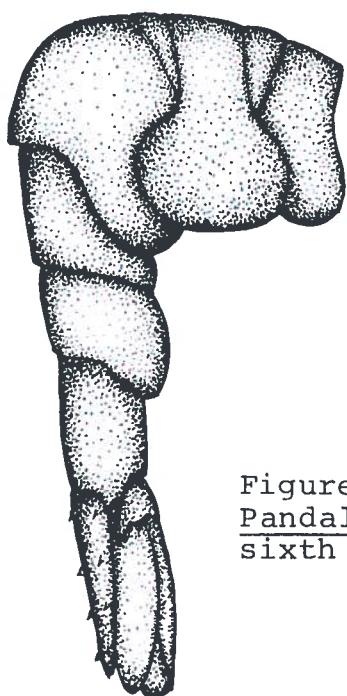


Figure 8-2. Abdomen and telson of *Pandalus danae*, showing short sixth abdominal segment.

Section 8
KEY TO THE SPECIES OF
PANDALIDAE

1 . . . (6) The sixth abdominal segment is slender and two-and-one-half to three times as long as wide (Figure 8-1).

2 . . . (3) Dorsal spines are present on the distal half of the rostrum.

Pandalus jordani

3 . . . (2) Dorsal spines are not present on the distal half of the rostrum.

4 . . . (5) The carpi of the second pair of pereiopods are approximately equally divided, with 20 to 24 segments. The pereiopods are of equal length.

Pandalopsis ampla

5 . . . (4). The carpi of the second pair of pereiopods are not equally divided: The right carpus has 20 to 28 segments and the left carpus has approximately 74 segments. The pereiopods are unequal in length.

Pandalus montagui tridens

6 . . . (1) The sixth abdominal segment is less than two times as long as it is wide (Figure 8-2).

7 . . . (10) The rostral spines are positioned slightly posterior to the midline of the carapace.

8 . . . (9) There are about 60 carpal segments on the left second pereiopod and about 20 carpal segments on the right second pereiopod.

Pandalus danae

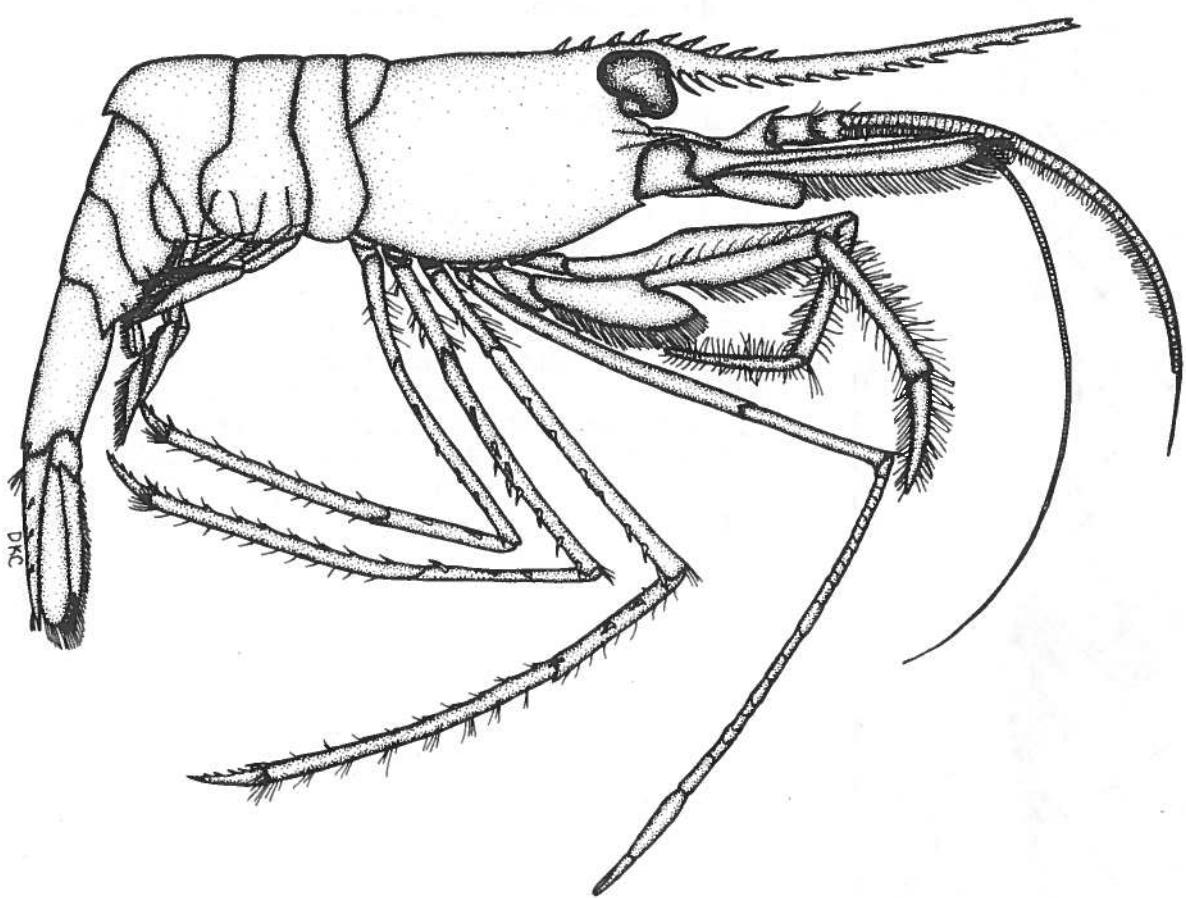
9 . . . (8) There are about 45 carpal segments on the left second pereiopod and about 17 carpal segments on the right second pereiopod.

Pandalus gurneyi

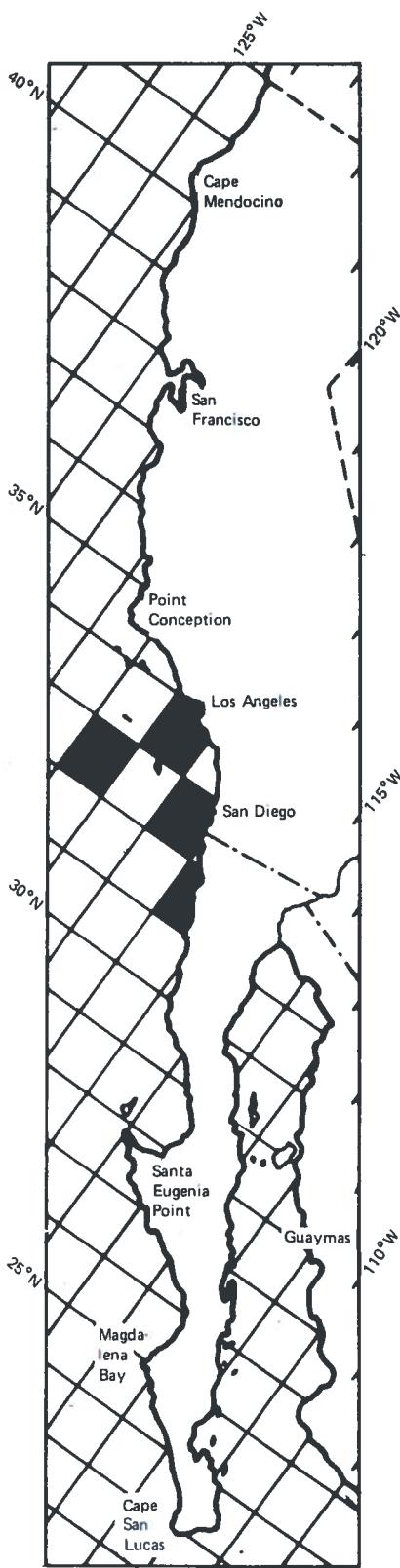
10 . . . (7) The rostral spines are limited to the anterior half of the carapace (in live or freshly preserved specimens, there are white spots on the first and fifth abdominal segments and horizontal white stripes on the carapace).

Pandalus platyceros

Pandalopsis ampla Bate 1888



Pandalopsis ampla Bate 1888



SYNONYMS

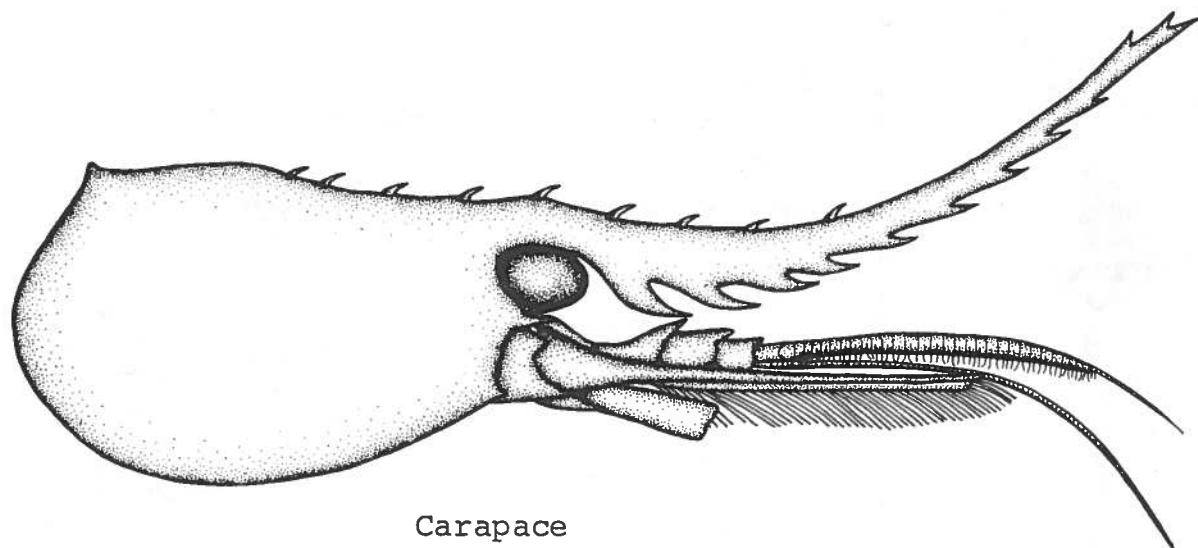
Pandalopsis amplus Bate 1888. Pandalopsis ampla of Faxon 1895; of Rathbun 1904; of Schmitt 1921.

DISTRIBUTION

From Rathbun 1904: Ranges from Washington to Mexico. San Diego (1,140 and 1,504 m), and off Cortes Bank (1,140 and 1,801 m), California. Montevideo, Uruguay (565 to 1,801 m).

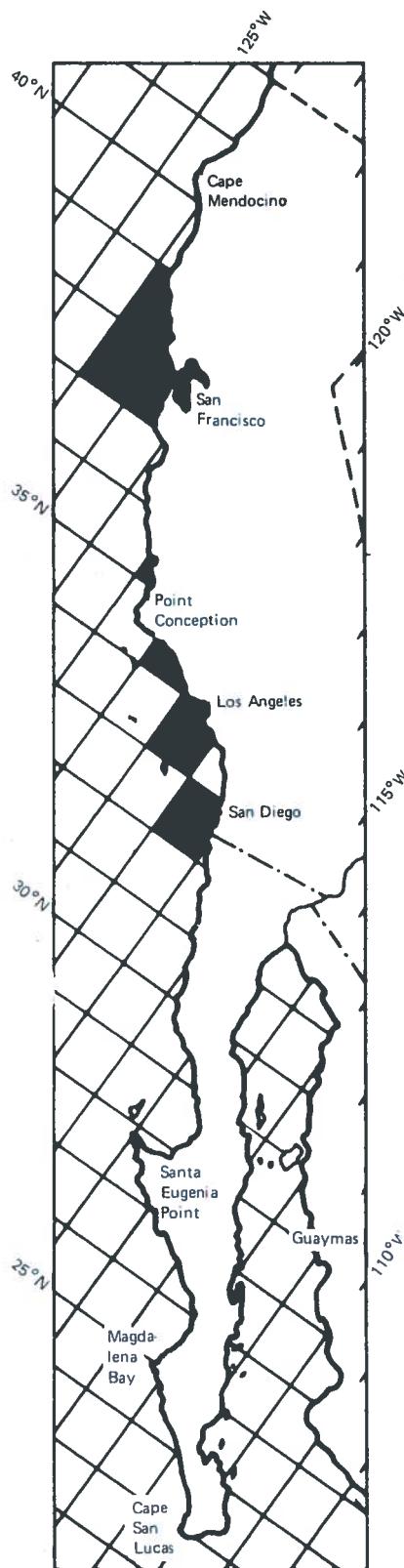
From authors' data: Santa Catalina Island, California (1,381 to 1,527 m). Allan Hancock Foundation: 17.5 km, 205°T from west-end light, Santa Catalina Island, California (1,161 to 1,308 m), and 64 km west of Punta Banda, Baja California (2,067 to 2,085 m).

Pandalus danae Stimpson 1857



Carapace

Pandalus danae Stimpson 1857



SYNONYMS

Pandalus franciscorum Kingsley 1878;
Holmes 1900. Pandalus danae of Rathbun
1904; Schmitt 1921; et al.

DISTRIBUTION

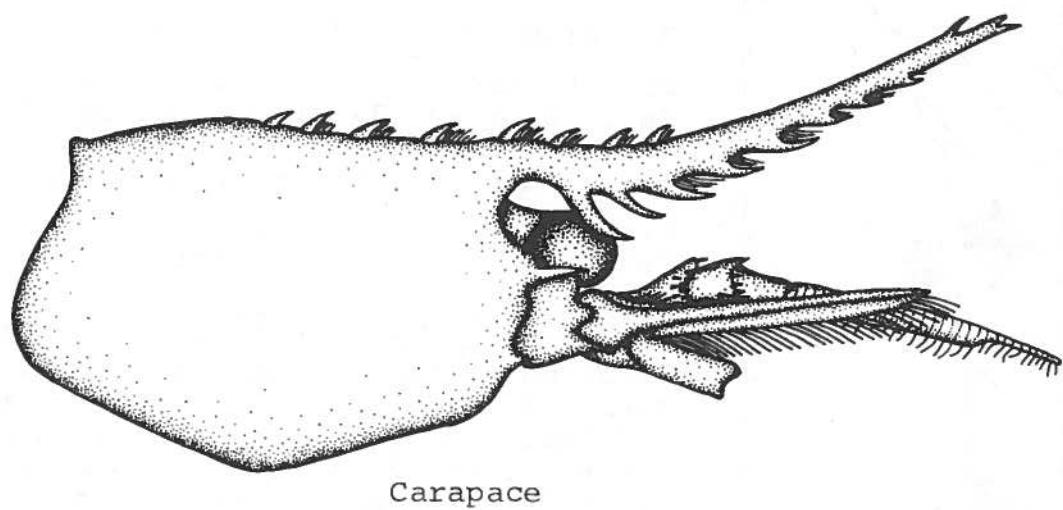
From Rathbun 1904: San Francisco, California.

From Schmitt 1921: Point Reyes, San Francisco, and Farallon Islands, California.

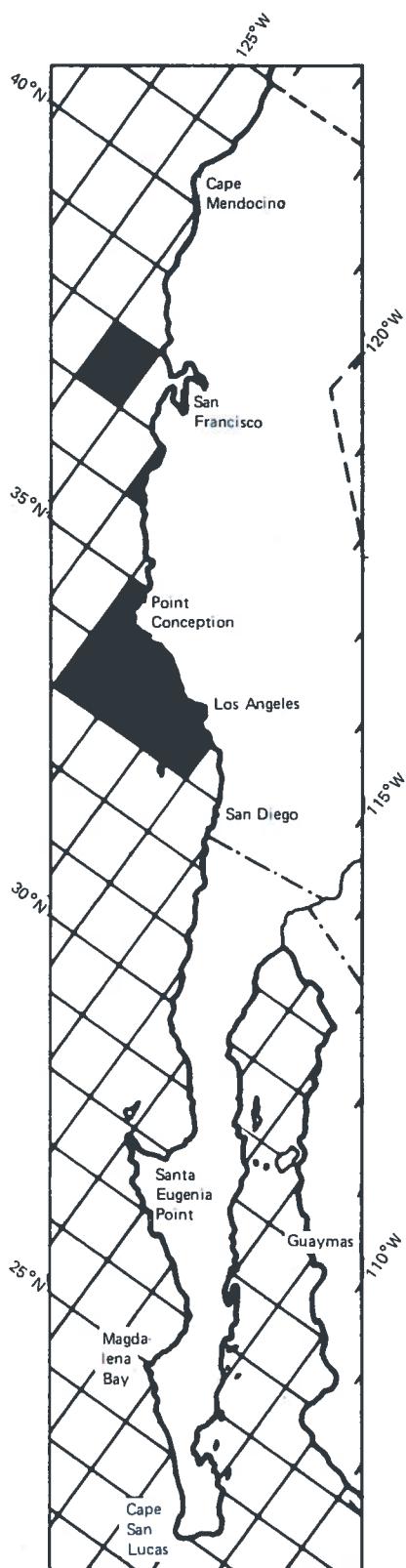
From Goodwin 1952: Ranges from Alaska to southern California. North of Drakes Bay (35 to 40 m), Drakes Bay (37 to 42 m), and Pismo Beach (150 m), California.

From authors' data: Palos Verdes (15 to 27 m), Point Loma (18 m), and Anacapa Island (15 m), California.

Pandalus gurneyi Stimpson 1871



Pandalus gurneyi Stimpson 1871



SYNONYM

Pandalus gurneyi of Rathbun 1904; Schmitt 1921; et al.

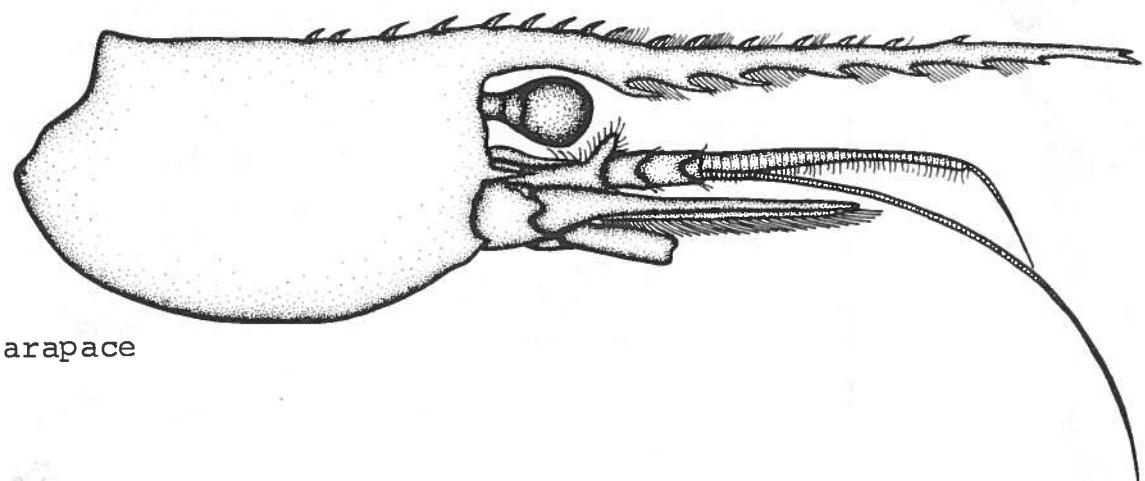
DISTRIBUTION

From Rathbun 1904: Monterey Bay (16 m), Santa Barbara (38 m), San Miguel Island (101 m), Santa Cruz Island (55 m), and Santa Rosa Island (95 m), California.

From Schmitt 1921: San Pedro and Santa Catalina Island, California.

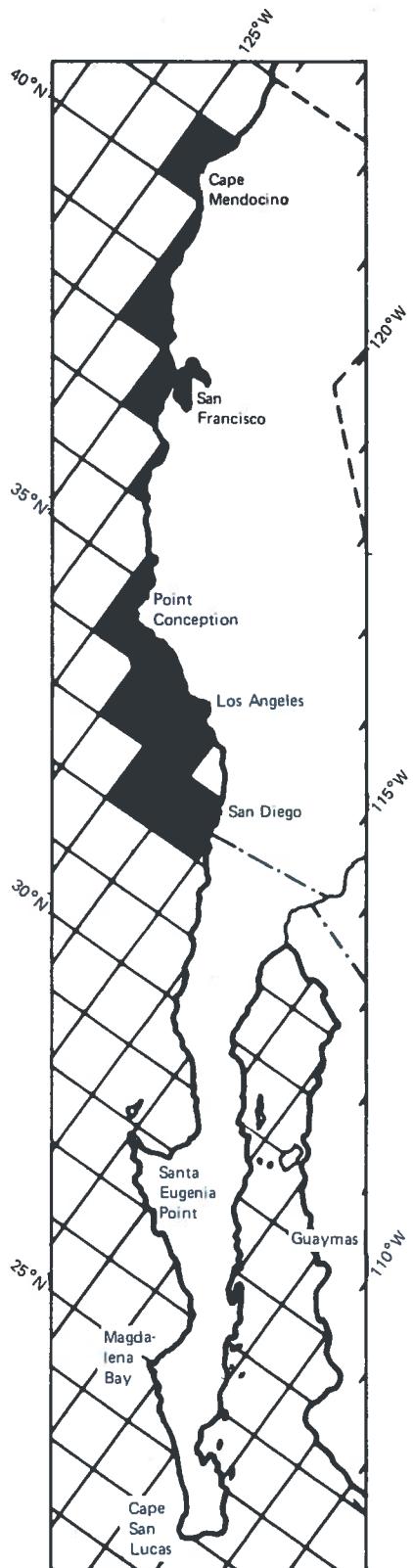
From authors' data (Allan Hancock Foundation collection): 5.2 km, 285°T, from Farallon Islands light (51 m), off Hopkins Marine Station, Pacific Grove (11 m), off Naples Reef, Santa Barbara County (14 to 18 m), 2 km from Prisoner's Harbor, Santa Cruz Island (66 m), and off San Nicolas Island (51 to 57 m), California.

Pandalus jordani Rathbun 1902



Carapace

Pandalus jordani Rathbun 1902



DISTRIBUTION

From Rathbun 1902: Bodega Head (306 m), Tomales Point (104 m), Drakes Bay (64 m), Monterey Bay (102 to 124 m), San Luis Obispo Bay (141 m), Santa Cruz Island (284 m), and San Nicolas Island (289 m), California.

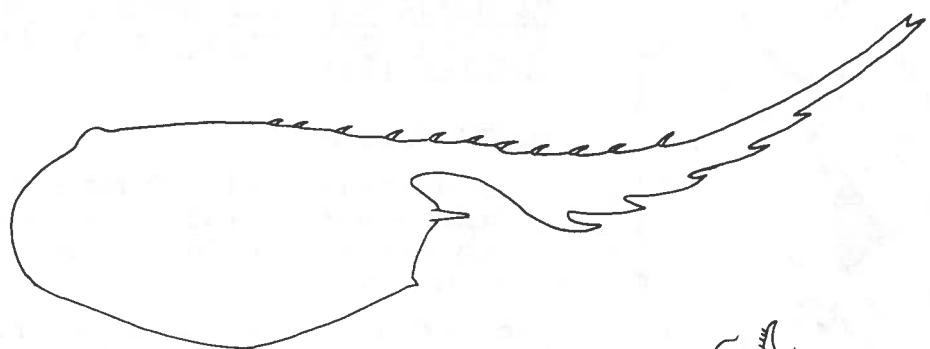
From Schmitt 1921: San Diego and Santa Cruz Island (283 m), California.

From Goodwin 1952: Humboldt County (110 to 117 m), Fort Bragg, Mendocino County (183 to 229 m), San Luis Obispo light (146 m), off Santa Maria River (137 m), and Pismo Beach (124 to 329 m), California.

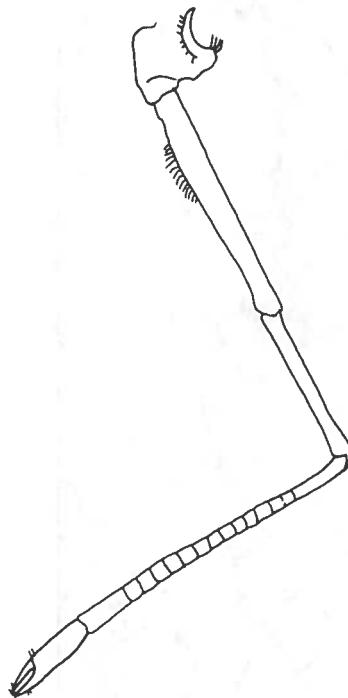
From Carlisle 1969: Santa Monica Bay, California (165 to 183 m).

From authors' data: Santa Monica Bay (137 and 183 m), Palos Verdes Peninsula (137 and 183 m), and San Pedro Bay (137 and 183 m), California.

Pandalus montagui tridens Rathbun 1902*

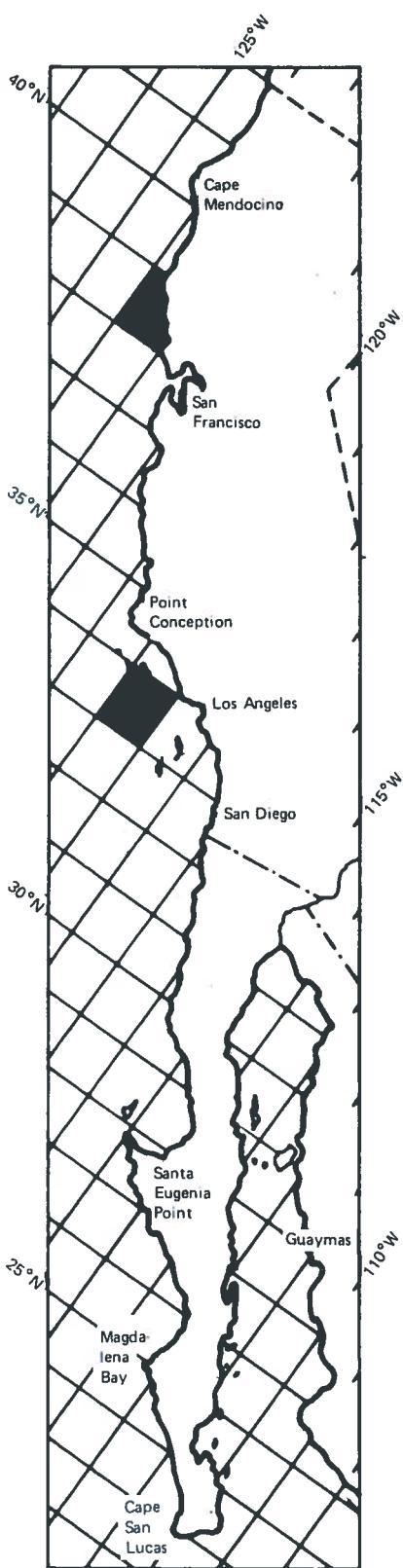


Carapace and pereiopod of Pandalus montagui Leach (after Calman 1899)



**P. montagui tridens* is a subspecies of *P. montagui* Leach and is distinguished from the latter by (1) its somewhat longer rostrum, which varies from 1-1/2 to 1-2/3 times the length of the posterior portion of the carapace, and (2) its (usually) trifid rostrum tip. In *P. montagui*, the rostrum is from 1-2/5 to 1-1/2 times the length of the posterior portion of the carapace and the rostrum tip is bifid. (From Rathbun 1902.)

Pandalus montagui tridens Rathbun 1902



SYNONYMS

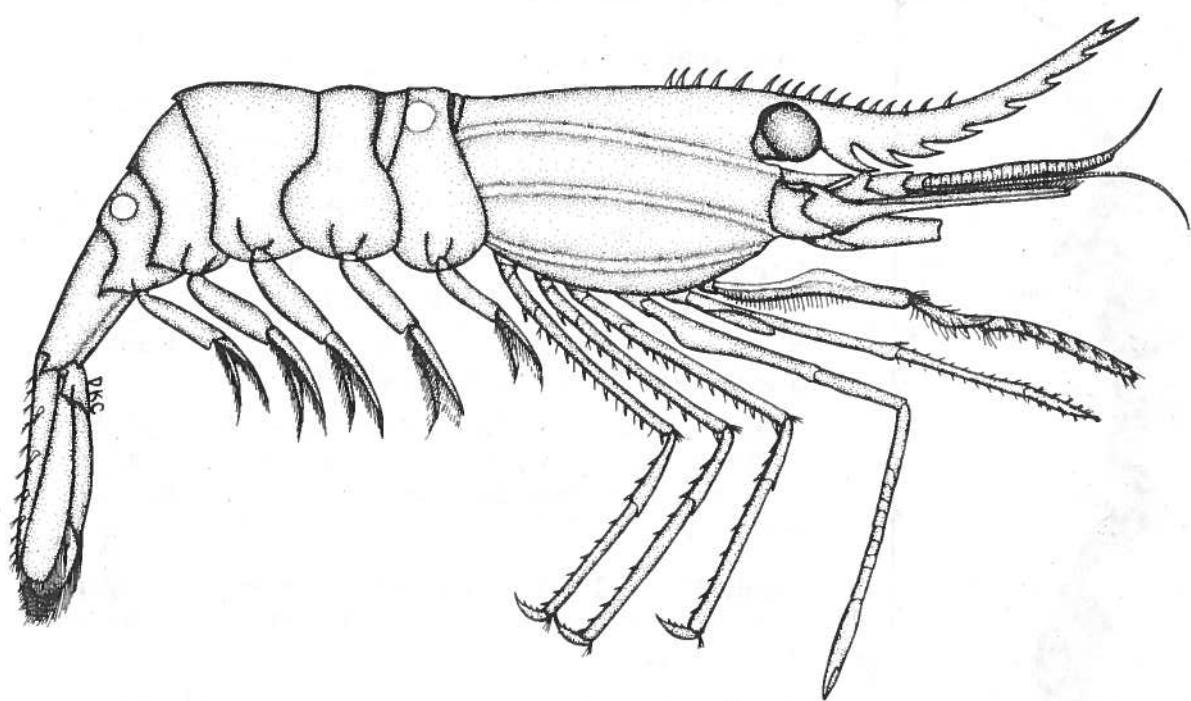
Pandalus annulicornis Richters 1884.
Pandalus montagui Rathbun 1899. Pandalus montagui tridens of Rathbun 1902; Schmitt 1921.

DISTRIBUTION

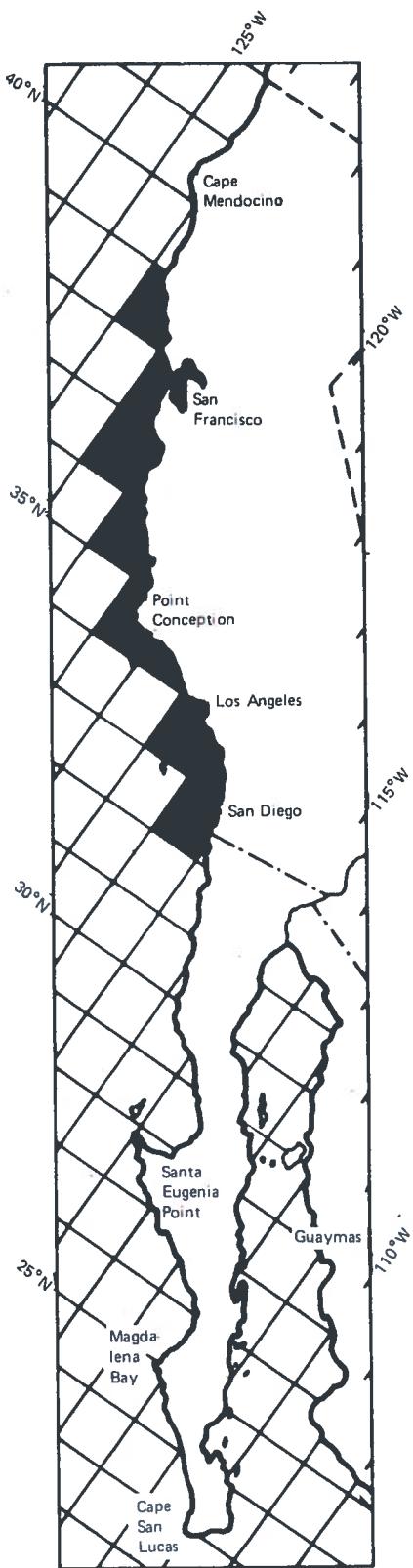
From Rathbun 1904: Ranges from the Bering Sea to Point Arena, California (5 to 642 m). Point Arena, California (437 m).

From Schmitt 1921: Ranges from the Bering Sea to San Nicolas Island, California (5 to 1,984 m).

Pandalus platyceros Brandt 1851



Pandalus platyceros Brandt 1851



SYNONYM

Pandalus pubescensulus Dana 1852;
Stimpson 1857; Kingsley 1878; Smith
1878-79; Holmes 1900.

DISTRIBUTION

From Rathbun 1904: Bodega Head (306 m), Farallon Islands (350 m), Point Año Nuevo (371 m), Monterey Bay (119 to 373 m), Point Carmel (296 m), Cape San Martin (299 m), Point Conception (265 m), Santa Cruz Island (274 to 487 m), and off San Diego (277 m), California.

From Schmitt 1921: San Diego and Portuguese Bend, California (46 m).

From Goodwin 1952: San Luis Obispo Bay (102 to 201 m), off Pismo Beach (183 to 366 m), off Santa Maria River, and off Point Sal, California.

From Frey 1971: Found in rocky canyon areas off Monterey, California (146 to 210 m).

From authors' data: Santa Catalina Island in trap with rockfish bait (183 m), Santa Monica Bay (183 m), Palos Verdes Peninsula (137 m), and Dana Point (91 m), California.

Section 9
KEYS TO THE FAMILY
PASIPHAEIDAE

- Parapasiphae cristata Smith 1884
Parapasiphae serrata Rathbun 1902
Parapasiphae sulcatifrons Smith 1884
Pasiphaea affinis Rathbun 1902
Pasiphaea chacei Yaldwyn 1962
Pasiphaea corteziana Rathbun 1902
Pasiphaea emarginata Rathbun 1902
Pasiphaea magna Faxon 1893
Pasiphaea pacifica Rathbun 1902

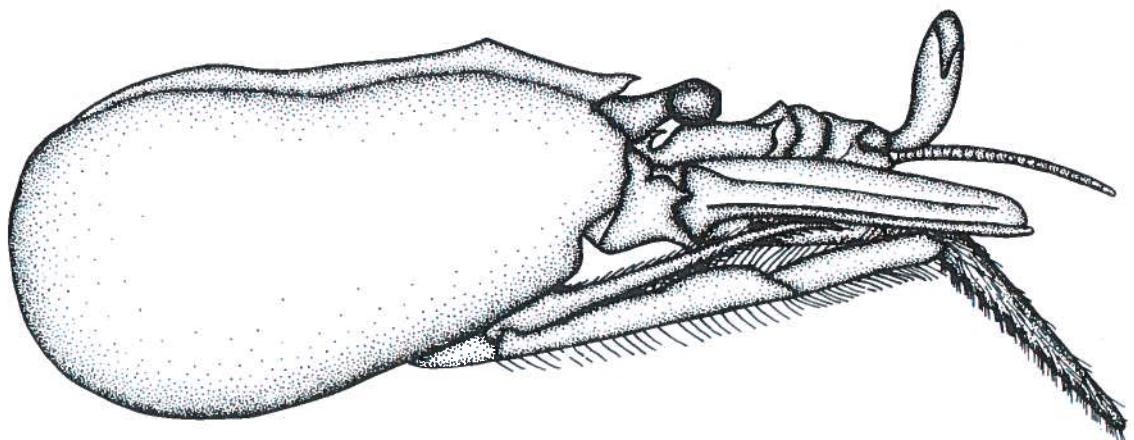


Figure 9-1. Carapace with normally developed rostrum (Parapasiphae sulcatifrons).

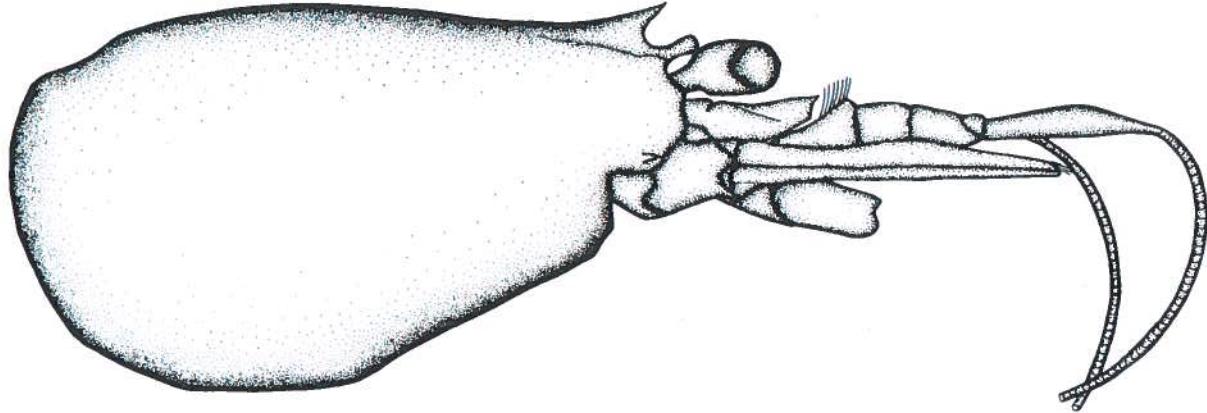


Figure 9-2. Carapace with post-frontal gastric spine (Pasiphaea emarginata).

Section 9
KEY TO THE GENERA OF
PASIPHAEIDAE*

- 1 . . . (2) The rostrum is normally developed (Figure 9-1).
Parapasiphae
- 2 . . . (1) The rostrum is actually a postfrontal gastric spine (Figure 9-2).
Pasiphaea

KEY TO THE SPECIES OF
PARAPASIPHAE

- 1 . . . (2) The dorsal median carina of the carapace has many teeth (16). (The telson is not distally forked.)
Parapasiphae serrata
- 2 . . . (1) The dorsal median carina of the carapace has less than three teeth.
- 3 . . . (4) The dorsal median carina of the carapace has two teeth. (The telson is not distally forked.)
Parapasiphae cristata
- 4 . . . (3) The dorsal median carina of the carapace has a single tooth. (The telson is distally forked.)
Parapasiphae sulcatifrons

KEY TO THE SPECIES OF
PASIPHAEA*

- 1 . . . (4) The telson is distally truncate or convex, not forked or notched.
- 2 . . . (3) The abdomen is carinated on five segments.
Pasiphaea magna

*This key is a modification of a provisional key to the species of Pasiphaea by J.C. Yaldwyn contained in an unpublished manuscript compiled by H.C. Genthe, Jr., and D. Ginn, University of Southern California, Los Angeles.

3 . . . (2) The abdomen is not carinated, although the sixth abdominal segment is greatly compressed.

Pasiphaea chacei

4 . . . (1) The telson is distally forked or notched.

5 . . . (8) The carapace is not carinate.

6 . . . (7) The abdomen is not carinate.

Pasiphaea corteziana

7 . . . (6) The abdomen is carinate on at least Segments 3 through 5.

Pasiphaea affinis

8 . . . (5) The carapace is carinate.

9 . . . (10) The sixth abdominal segment is not carinate.

Pasiphaea emarginata

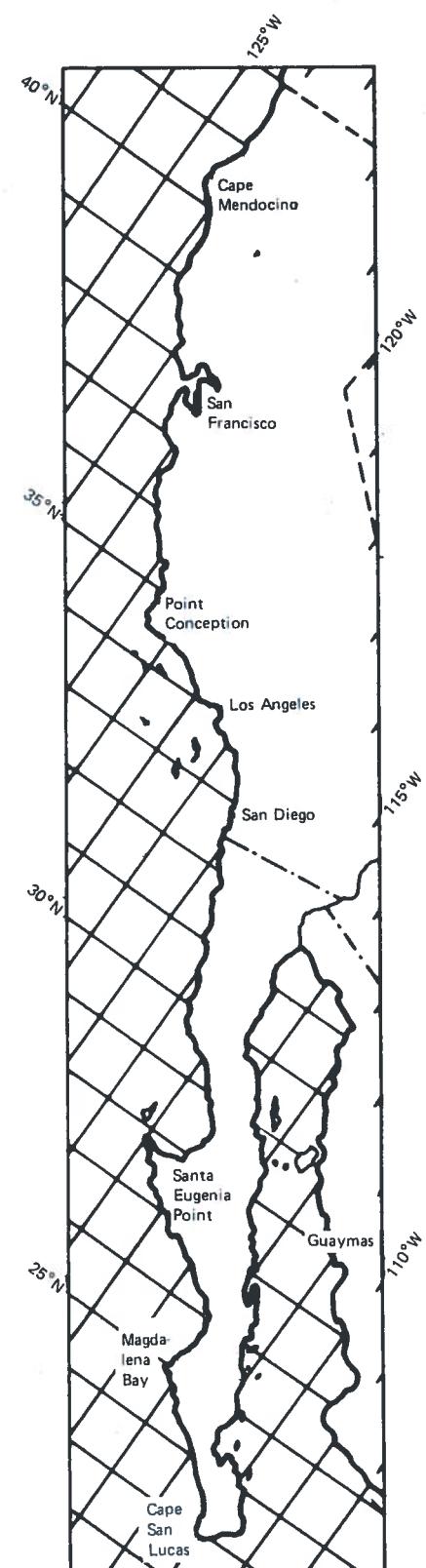
10 . . . (9) The sixth abdominal segment is carinate at least on the proximal portion.

Pasiphaea pacifica

Parapasiphae cristata Smith 1884

No illustration available

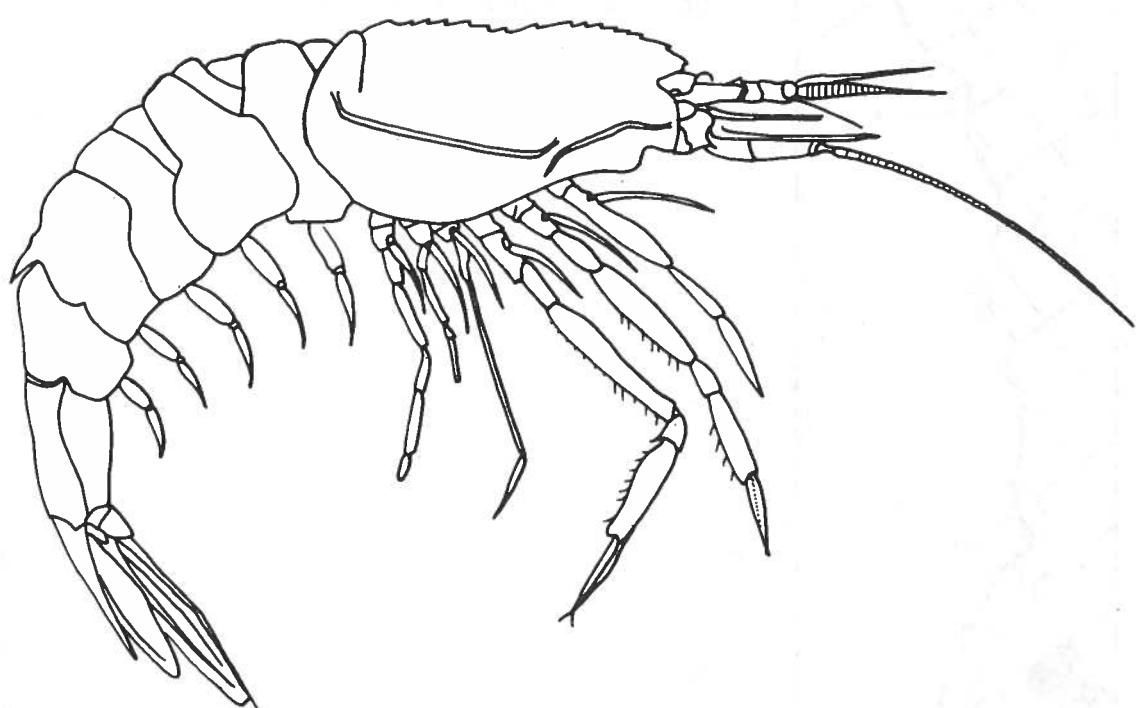
Parapasiphae cristata Smith 1884



DISTRIBUTION

From de Man 1920: Bermuda. Cuba (usually at 1,200 m). North Atlantic, off New Jersey (Smith 1884). Eastern Pacific, off Oregon (Forss 1965).

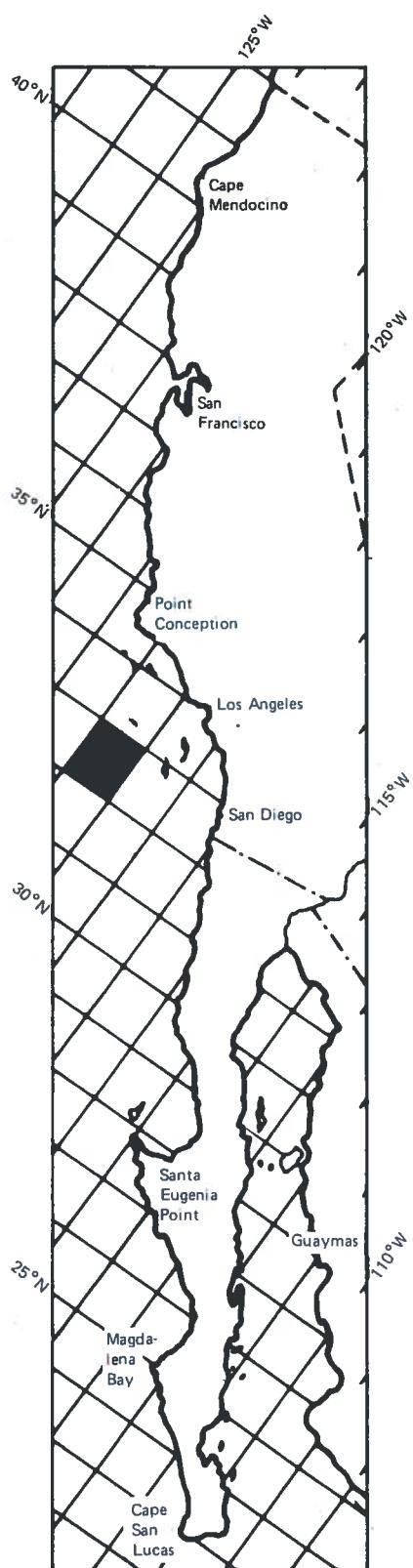
Parapasiphae serrata Rathbun 1902



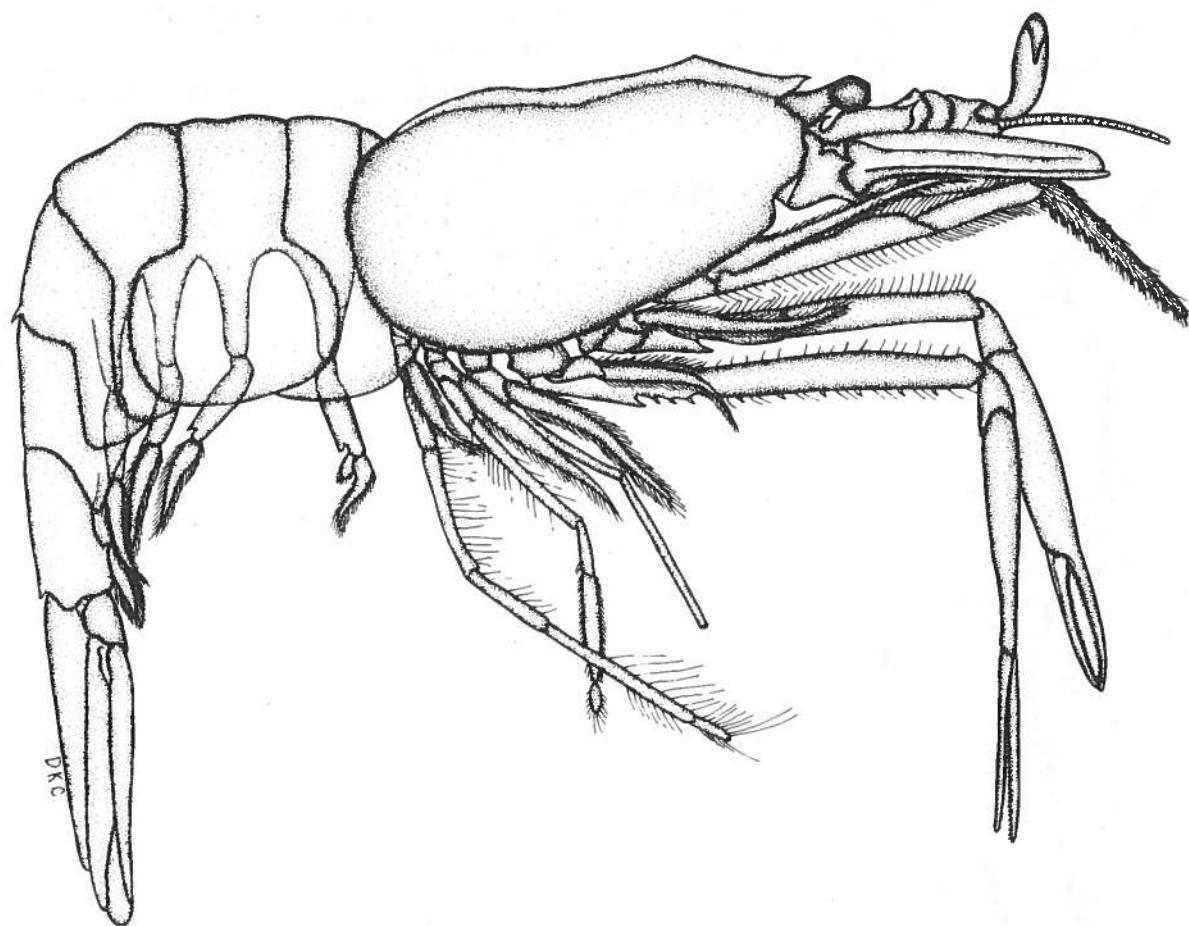
Parapaspheae serrata Rathbun 1902

DISTRIBUTION

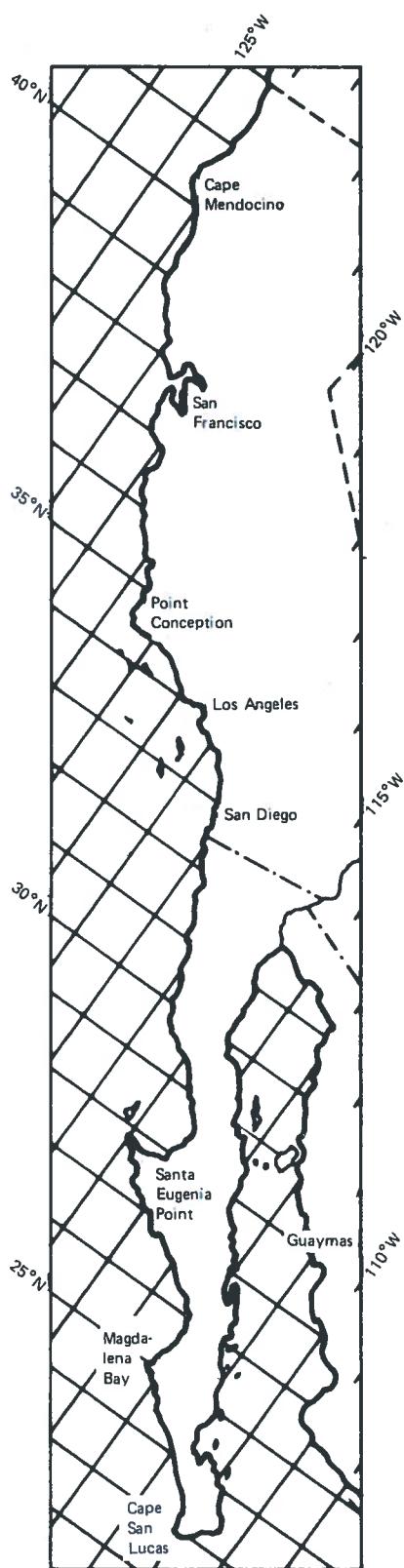
From Rathbun 1902: Cortes Bank, California (1,600 m.).



Parapasiphae sulcatifrons Smith 1884



Parapaspheae sulcatifrons Smith 1884



DISTRIBUTION

From de Man 1920 (Smith 1884): Iceland. Greenland. Ireland. North Atlantic. Off the east coast of North America between New York and Virginia.

From authors' data (Allan Hancock Foundation collection): 16 km, 215°T, from west end of Santa Catalina Island (1,242 to 1,251 m) and 27 km, 158°T, from the west end light, Santa Catalina Island (1,161 to 1,260 m).

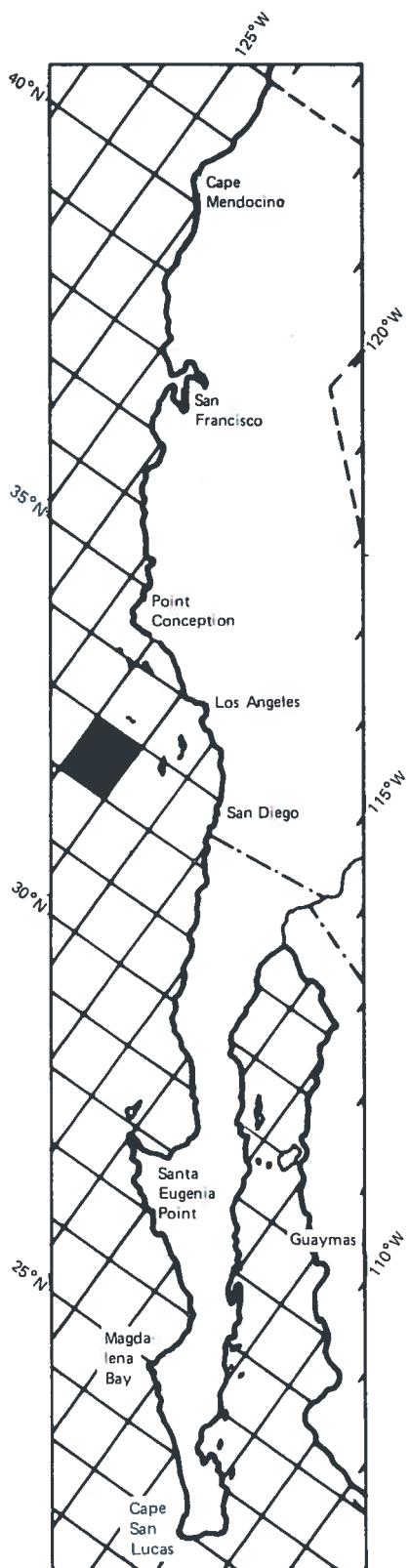
Pasiphaea affinis Rathbun 1902



Chela and telson (after
Rathbun 1902)



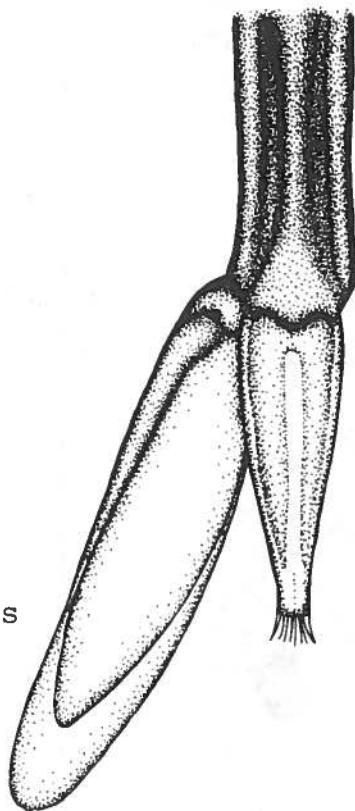
Pasiphaea affinis Rathbun 1902



DISTRIBUTION

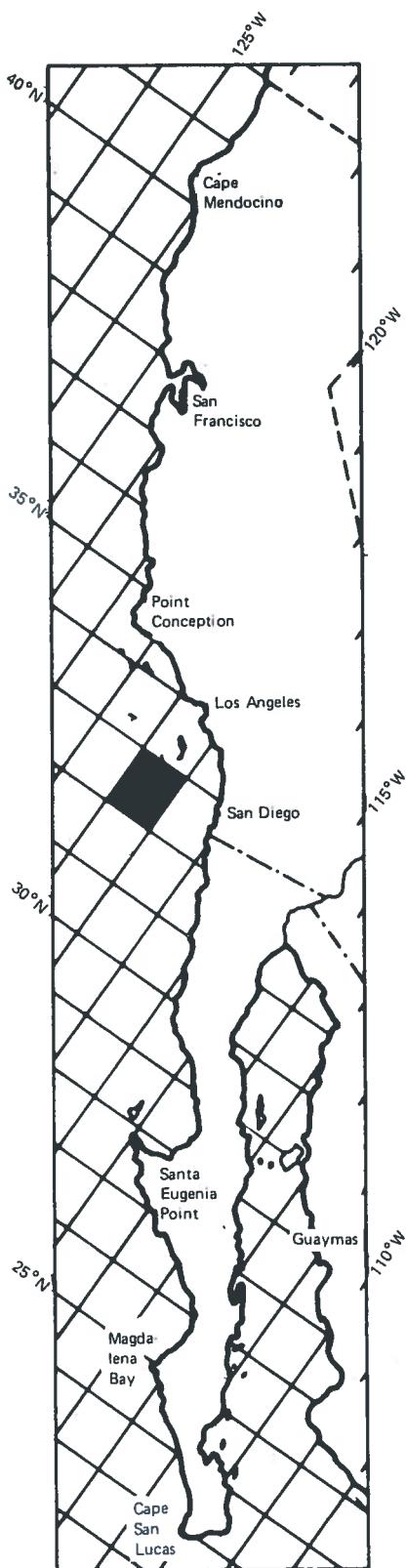
From Rathbun 1902: Cortes Bank, California (1,800 m).

Pasiphaea chacei Yaldwyn 1962



Telson and uropods

Pasiphaea chacei Yaldwyn 1962



DISTRIBUTION

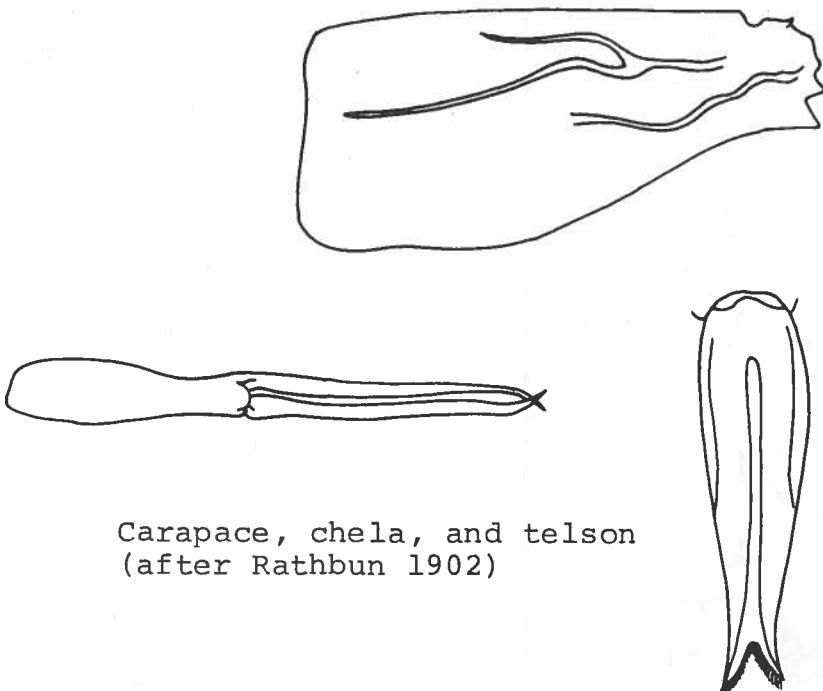
From Murillo: * Off southern California (Yaldwyn 1962). Oregon (Forss 1965; Pearcy and Forss 1966).

From Murillo 1973: Off Guadalupe Island, Mexico.

From authors' data: San Clemente Basin, California (1,000 m).

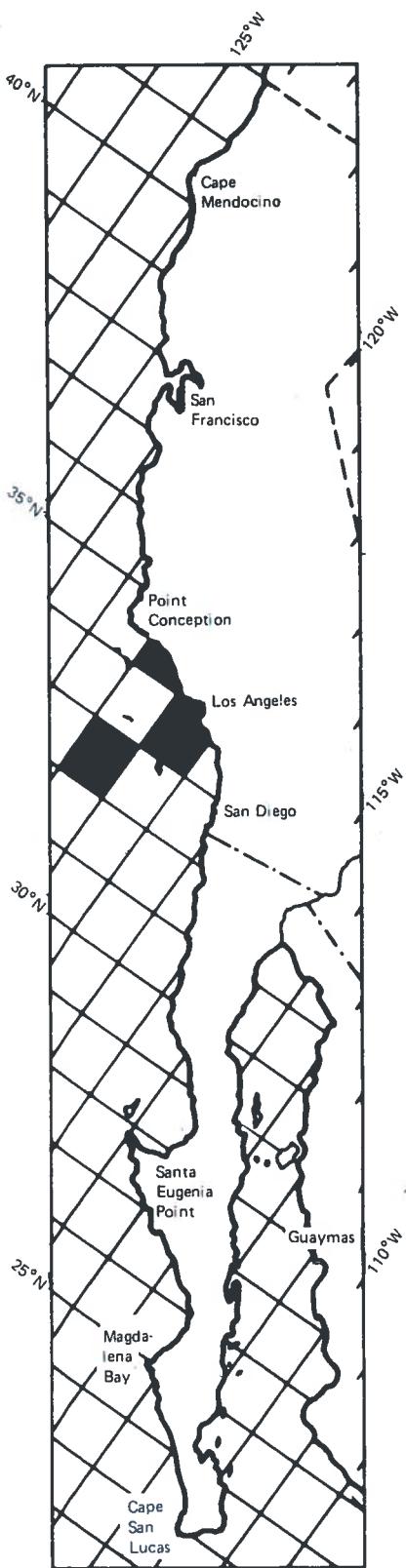
*Dr. M.M. Murillo, Department of Biology, University of Costa Rica, Ciudad Universitaria, Costa Rica, unpublished paper.

Pasiphaea corteziana Rathbun 1902



Carapace, chela, and telson
(after Rathbun 1902)

Pasiphaea corteziana Rathbun 1902

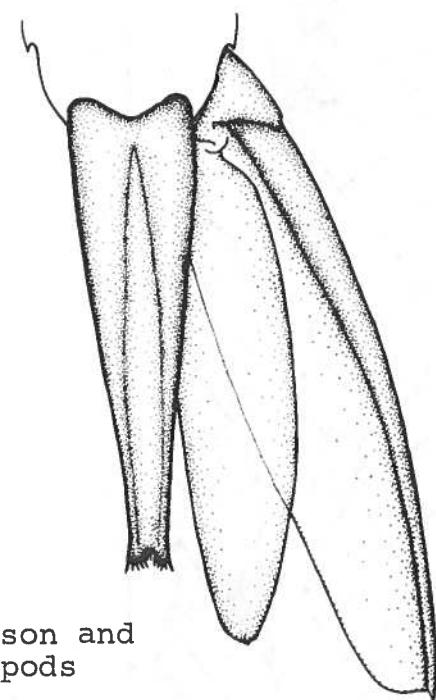
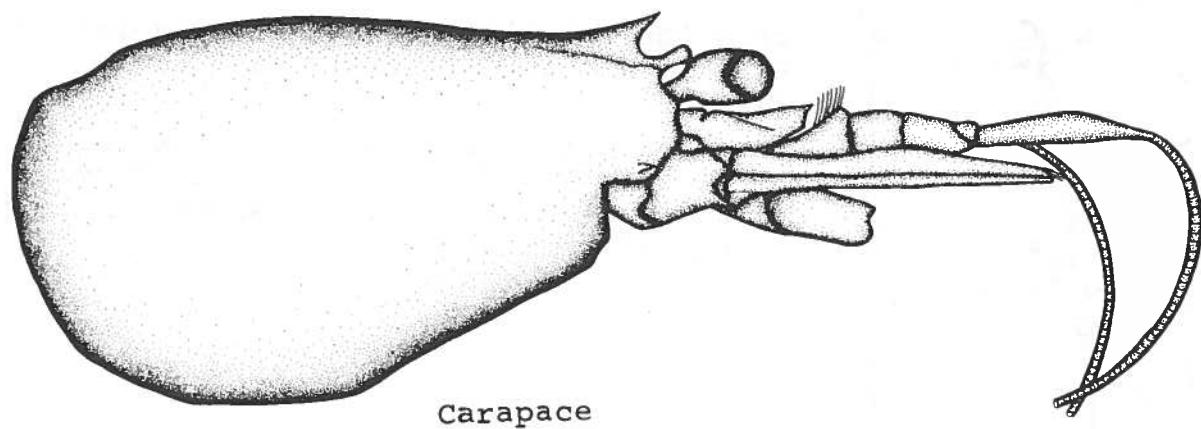


DISTRIBUTION

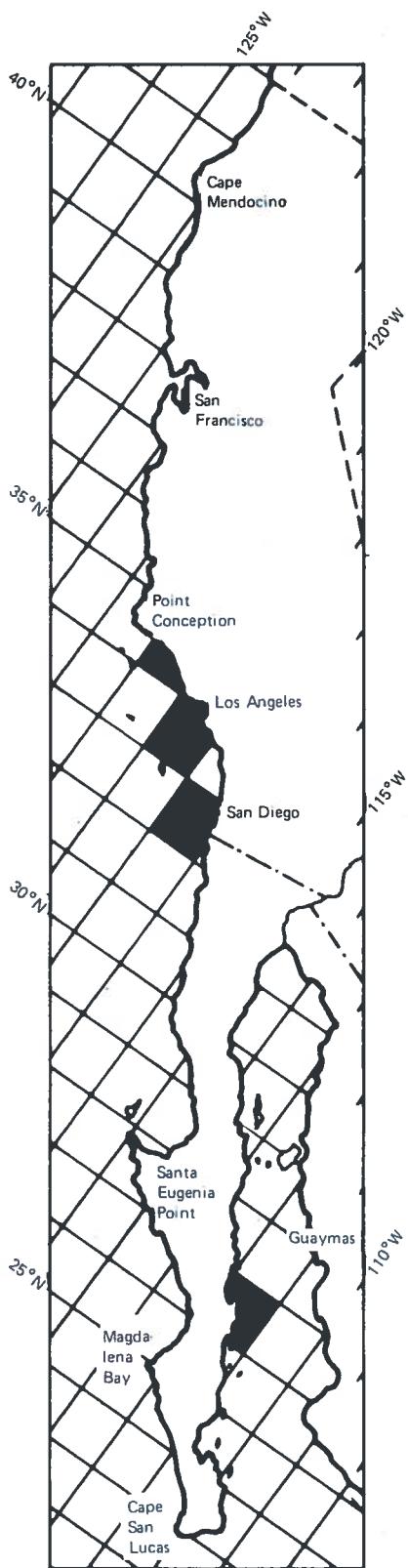
From Rathbun 1902: Cortes Bank, California (1,420 m).

From Schmitt 1921: Point San Pedro and Santa Cruz Island, California (1,398 to 1,630 m).

Pasiphaea emarginata Rathbun 1902



Pasiphaea emarginata Rathbun 1902



DISTRIBUTION

From Rathbun 1904: Santa Barbara Channel, California (484 to 589 m). Concepcion Bay, Baja California (1,568 m).

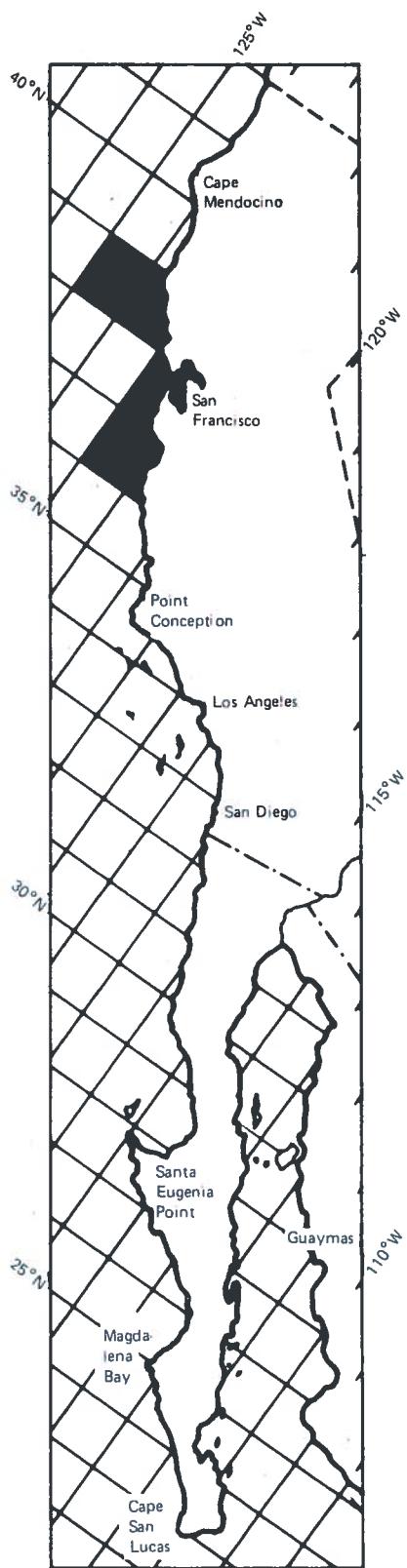
From Schmitt 1921: Santa Barbara Island and San Diego, California (395 to 1,244 m).

From authors' data (Allan Hancock Foundation collection): 10 km, 050°T, from Ship Rock, Santa Catalina Island, California (608 to 801 m).

Pasiphaea magna Faxon 1893

No illustration available

Pasiphaea magna Faxon 1893

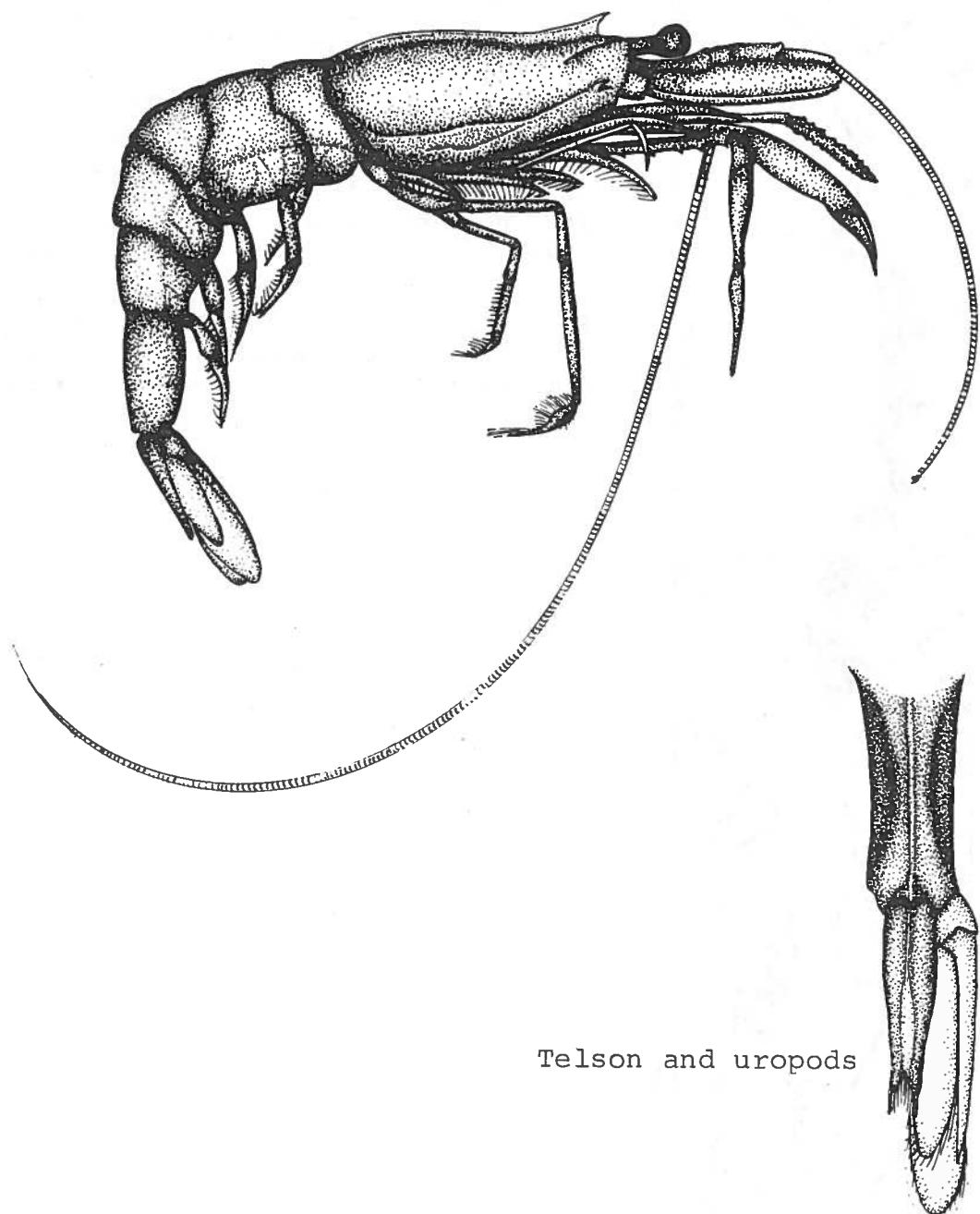


DISTRIBUTION

From Rathbun 1904: Point Arena (832 m), Farallon Islands (1,010 m), San Francisco (505 m), Pigeon Point (530 m), Monterey (765 to 834 m), and Point Sur (600 m), California. Gulf of Panama.

From Schmitt 1921: Point Loma, California.

Pasiphaea pacifica Rathbun 1902



Telson and uropods

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xico.

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Appendix A
SUPPLEMENTARY INFORMATION ON
CALIFORNIA SHRIMPS

This appendix contains additional information on the characteristics and distribution of California shrimp. Information on the presence or absence of exopods and epipods and the type of dactyls on the species of Hippolytidae is given in Table A-1.

Table A-2 contains this information for species in the other families covered in this volume.

Figures A-1 through A-3 show the distribution of species by habitat. These figures are primarily based on the authors' experience and should be used only for general information (a given species may occur outside the habitat designated on these figures).

Table A-1. Characters of California shrimp of the Family Hippolytidae.

Species	Maxilliped	Exopod/Epiped*					No. of Supra-Orbital Spines
		Third	Pereiopod	4	5	Type of Dactyls	
		1	2	3	4		
<i>Eualus herdmani</i>	p/p	a/p	a/p	a/a	a/a	a/a	0
<i>Eualus macrophthalmus</i>	p/p	a/a	a/a	a/a	a/a	a/a	0
<i>Heptacarpus brachy-dactylus</i>	a/p	a/a	a/a	a/a	a/a	a/a	0
<i>Heptacarpus brevirostris</i>	a/p	a/p	a/p	a/a	a/a	Biunguiculate	0
<i>Heptacarpus carinatus</i>	a/p	a/p	a/p	a/a	a/a	Biunguiculate	-
<i>Heptacarpus decorus</i>	a/p	a/a	a/a	a/a	a/a	Simple	0
<i>Heptacarpus flexus</i>	a/p	a/p	a/p	a/a	a/a	Multifid	0
<i>Heptacarpus franciscanus</i>	a/p	a/a	a/a	a/a	a/a	Multifid	0
<i>Heptacarpus kincaidi</i>	a/p	a/a	a/a	a/a	a/a	?	0
<i>Heptacarpus palpator</i>	a/p	a/p	a/p	a/a	a/a	Bifid	0
<i>Heptacarpus paludicola</i>	a/p	a/p	a/p	a/a	a/a	Bifid	0
<i>Heptacarpus pictus</i>	a/p	a/p	a/p	a/a	a/a	Multifid	0
<i>Heptacarpus stimpsoni</i>	a/p	a/p	a/p	a/a	a/a	Simple	0
<i>Heptacarpus taylori</i>	a/p	a/p	a/p	a/a	a/a	Multifid	0
<i>Heptacarpus tenuisimus</i>	a/a	a/a	a/a	a/a	a/a	Bifid	0
<i>Hippolyte affinis</i>	?	?	?	?	?	?	1
<i>Hippolyte californiensis</i>	p/a	a/a	a/a	a/a	a/a	Simple	1
<i>Hippolyte clarki</i>	p/a	a/a	a/a	a/a	a/a	Simple	1
<i>Hippolyte layi</i>	?	?	?	?	?	?	0
<i>Lebbeus lagunae</i>	a/p	a/p	a/p	a/a	a/a	Bifid	1
<i>Lebbeus washingtonianus</i>	p/p	a/p	a/p	a/a	a/a	?	1
<i>Lysmata californica</i>	p/p	a/p	a/p	a/p	a/a	Bifid	0

*p = present; a = absent; the character preceding the slash refers to the exopod; the character following the slash refers to the epiped.

Table A-1 continued

Species	Maxilliped	Exopod/Epipod*			Pereiopod 4	5	Type of Dactyls	No. of Supra- orbital Spines
		Third	Pereiopod 1	Pereiopod 2				
<i>Spirontocaris dalli</i>	p/p	a/p	a/p	a/a	a/a	a/a	?	2
<i>Spirontocaris holmesi</i>	p/p	a/p	a/p	a/a	a/a	a/a	Simple	2
<i>Spirontocaris lamel-</i>	p/p	a/p	a/p	a/p	a/a	a/a	Simple	2
<i>Spirontocaris licornis</i>								
<i>Spirontocaris prior-</i>	p/p	a/p	a/p	a/p	a/a	a/a	Bifid	3
<i>nota</i>								
<i>Spirontocaris sica</i>	p/p	a/p	a/a	a/a	a/a	a/a	Simple	2
<i>Spirontocaris synderi</i>	p/p	a/p	a/p	a/a	a/a	a/a	Simple	2

*p = present; a = absent; the character preceding the slash refers to the exopod; the character following the slash refers to the epipod.

Table A-2. Characters of California shrimp of the families Peneidae, Sergestidae, Alpheidae, Crangonidae, Palaemonidae, and Pasiphaeidae.

Species	Exopod/Epipod*						Type of Dactyls
	Third Maxilliped	1	2	3	4	5	
<i>PENEIDAE</i>							
<i>Peneus californiensis</i>	p/p	p/p	p/p	p/p	p/a	p/a	Simple
<i>Sicyonia ingentis</i>	a/a	a/p	a/p	a/p	a/a	a/a	Simple
<i>Sicyonia penicillata</i>	a/a	a/p	a/p	a/p	a/a	a/a	Simple
<i>SERGESTIDAE</i>							
<i>Petalidium suspiriosum</i>	a/a	a/a	a/a	a/a	a/a	a/a	Modified
<i>Sergestes similis</i>	a/a	a/a	a/a	a/a	a/a	a/a	Modified
<i>ALPHEIDAE</i>							
<i>Alpheopsis equidactylus</i>	p/p	p/p	p/p	p/p	p/p	p/p	Simple
<i>Alpheus bellimanus</i>	p/p	p/p	p/p	p/p	p/p	p/p	Simple
<i>Alpheus californiensis</i>	p/p	p/p	p/p	p/p	p/p	p/p	Simple
<i>Alpheus clamator</i>	p/p	p/p	p/p	p/p	p/p	p/p	Biunguiculate
<i>Betaeus ensenadensis</i>	p/p	p/p	p/p	p/p	p/p	p/p	Simple
<i>Betaeus gracilis</i>	p/p	p/p	p/p	p/p	p/p	p/p	Simple
<i>Betaeus harfordi</i>	p/p	p/p	p/p	p/p	p/p	p/p	Simple
<i>Betaeus harrimani</i>	p/p	p/p	p/p	p/p	p/p	p/p	Simple
<i>Betaeus longidactylus</i>	p/p	p/p	p/p	p/p	p/p	p/p	Simple
<i>Betaeus macginittiae</i>	p/p	p/p	p/p	p/p	p/p	p/p	Biunguiculate
<i>Betaeus setosus</i>	p/p	p/p	p/p	p/p	p/p	p/p	Biunguiculate
<i>Pomagnathus corallinus</i>	a/a?	a/a	a/a	a/a	a/a	a/a	Biunguiculate
<i>Synalpheus lockingtoni</i>	p/a	a/a	a/a	a/a	a/a	a/a	Biunguiculate
<i>CRANGONIDAE</i>							
<i>Argis californiensis</i>	p/p	a/a	a/p	a/a	a/a	a/a	Modified
<i>Crangon alaskensis elongata</i>	p/p	a/a	a/p	a/a	a/a	a/a	Simple
<i>Crangon alba</i>	p/p	a/a	a/p	a/a	a/a	a/a	Simple
<i>Crangon communis</i>	p/p	a/a	a/p	a/a	a/a	a/a	Simple
<i>Crangon holmesi</i>	p/p	a/a	a/p	a/a	a/a	a/a	Simple

*p = present; a = absent; the character preceding the slash refers to the exopod; the character following the slash refers to the epipod.

Table A-2 continued

Species	Third Maxilliped	Exopod/Epipod*					Type of Dactyls
		1	2	3	4	5	
CRANGONIDAE continued							
<i>Crangon munidella</i>	p/p	a/a	a/p	a/a	a/a	a/a	Simple
<i>Crangon nigricalva</i>	p/p	a/a	a/p	a/a	a/a	a/a	Simple
<i>Crangon nigromaculata</i>	p/p	a/a	a/p	a/a	a/a	a/a	Simple
<i>Crangon resima</i>	p/p	a/a	a/p	a/a	a/a	a/a	Simple
<i>Crangon spinosissima</i>	p/p	a/a	a/p	a/a	a/a	a/a	Simple
<i>Crangon stylirostris</i>	p/p	a/a	a/p	a/a	a/a	a/a	Simple
<i>Crangon zacae</i>	p/p	a/a	a/p	a/a	a/a	a/a	Simple
PALAEOMONIDAE							
<i>Palaemon ritteri</i>	p/p	a/a	a/a	a/a	a/a	a/a	Simple
<i>Palaemonella holmesi</i>	p/p	a/a	a/a	a/a	a/a	a/a	Simple
<i>Periclimenes infraspinosus</i>	p/p	a/a	a/a	a/a	a/a	a/a	Biunguiculate
<i>Pontonia californiensis</i>	p/a	a/a	a/a	a/a	a/a	a/a	Biunguiculate
<i>Pseudocoutierreæ elegans</i>	a/p	a/a	a/a	a/a	a/a	a/a	Simple
PANDALIDAE							
<i>Pandalopsis ampla</i>	a/p	a/p	a/a	a/a	a/a	a/a	Toothed
<i>Pandalus jordani</i>	a/p	a/p	a/p	a/a	a/a	a/a	Simple
<i>Pandalus platyceros</i>	a/p	a/p	a/p	a/a	a/a	a/a	Multifid
<i>Pandalus danae</i>	a/p	a/p	a/p	a/a	a/a	a/a	Multifid
<i>Pandalus montagui tridens</i>	a/p	a/p	a/p	a/a	a/a	a/a	Simple
<i>Pandalus gurneyi</i>	a/p	a/p	a/p	a/a	a/a	a/a	Multifid
PASIPHAEDAE							
<i>Parapasiphae sulcatifrons</i>	p/a	p/a	p/a	p/a	p/a	p/a	Modified
<i>Pasiphaea chacei</i>	p/a	p/a	p/a	p/a	p/a	p/a	Modified
<i>Pasiphaea emarginata</i>	p/a	p/a	p/a	p/a	p/a	p/a	Modified
<i>Pasiphaea pacifica</i>	p/a	p/a	p/a	p/a	p/a	p/a	Modified

*p = present; a = absent; the character preceding the slash refers to the exopod; the character following the slash refers to the epipod.

		Southern Form	State-Wide	Northern Form	Comments
ROCKY INTERTIDAL					
			HIPPOLYTIDAE		
		<u>Heptacarpus palpatore</u> • <u>Heptacarpus brevirostris</u>			Under rocks in tide pools
		<u>Heptacarpus taylori</u>			Under rocks in tide pools
		<u>Heptacarpus pictus</u>			Under rocks in tide pools
		• <u>Heptacarpus carinatus</u>			In dense Phyllospadix beds.
LOW ROCKY INTERTIDAL					
		Southern Form	State-Wide	Northern Form	Comments
			ALPHEIDAE		
		<u>Betaeus gracilis</u> • <u>Betaeus setosis</u>			In algae holdfasts
		<u>Betaeus ensenadensis</u> •			With <u>Callianassa</u> , <u>Upogebia</u>
		<u>Betaeus longidactylus</u> • <u>Betaeus harrimani</u>			Under <u>Strongylocentrotus</u> sp. 2
		<u>Alpheus clamator</u>			Under rocks in tide pools
		<u>Alpheus californiensis</u> •			Under rocks in tide pools
		<u>Synalpheus lockingtoni</u> •			Under rocks in tide pools ³
		• <u>Alpheopsis equidactylus</u>			
			HIPPOLYTIDAE		
		<u>Heptacarpus paludicola</u>			Under rocks in tide pools
		OTHER FAMILIES			
		<u>Palaemon ritteri</u> •			Under rocks in tide pools
		1. Possible commensals.	2. <u>S. franciscanus</u> and <u>S. purpuratus</u> .	3. With brown algae.	
ROCKY SUBTIDAL					
		Southern Form	State-Wide	Northern Form	Comments
			ALPHEIDAE		
		<u>Betaeus harfordi</u>			In mantle cavities of abalone ¹
		<u>Alpheus bellimanus</u>			In algae holdfasts
		<u>Pomognathus corallinus</u> •			South of Cabo Colnett
			HIPPOLYTIDAE		
		<u>Hippolyte clarkii</u> • <u>Hippolyte californiensis</u>			With <u>Macrocytis</u> , brown algae
		<u>Lysmata californica</u> •			In caves
		<u>Spirontocaris prionota</u> • <u>Spirontocaris lamellicornis</u>			In algae holdfasts
		<u>Lebbeus lagunae</u>			On sand rock bottoms ²
		OTHER FAMILIES			
		<u>Pandalus gurneyi</u> • <u>Pandalus danae</u>			In caves
		<u>Crangon alba</u> • <u>Crangon stylirostris</u>			On sand rock bottoms
		<u>Pontonia californiensis</u> •			On sand rock bottoms
		1. Especially <u>Haliotis fulgens</u> .	2. With large amounts of <u>Thalamnoporella</u> (a bryozoan).		

Figure A-1. California shrimp species found on rocky substrates.

Depth	Southern Form	State-Wide	Northern Form
0-18 meters		CRANGONIDAE <u>Crangon munitella</u> HIPPOLYTIDAE <u>Heptacarpus franciscanus</u> OTHER FAMILIES <u>Penaeus californiensis</u> <u>Palaemonella holmesi</u> •	
12-46 meters		CRANGONIDAE <u>Crangon nigromaculata</u> • <u>Crangon nigricauda</u> HIPPOLYTIDAE <u>Heptacarpus decorus</u> • <u>Spirontocaris dalli</u> OTHER FAMILIES <u>Periclimenes infraspinus</u> •	
46-92 meters		CRANGONIDAE <u>Crangon holmesi</u> ¹ • <u>Crangon alaskensis elongata</u> • HIPPOLYTIDAE <u>Heptacarpus tenuissimus</u> • <u>Heptacarpus flexus</u> <u>Heptacarpus kincaidi</u> OTHER FAMILIES <u>Sicyonia ingentis</u> ² • <u>Sicyonia penicillata</u> ³ •	
92 meters		CRANGONIDAE <u>Crangon spinosissima</u> • OTHER FAMILIES <u>Pseudocoutierea elegans</u> •	
92-184 meters		CRANGONIDAE <u>Crangon communis</u> <u>Crangon zacae</u> • HIPPOLYTIDAE <u>Heptacarpus stimpsoni</u> <u>Spirontocaris holmesi</u> ⁴ <u>Spirontocaris sica</u> ⁴ <u>Spirontocaris snyderi</u> ⁴ <u>Eualus herdmani</u> OTHER FAMILIES <u>Pandalus jordani</u> <u>Pandalus platyceros</u>	
>184 meters		CRANGONIDAE <u>Argis californiensis</u> • HIPPOLYTIDAE <u>Eualus macropthalmus</u> <u>Lebbeus washingtoniana</u> <u>Heptacarpus brachydactylus</u> • OTHER FAMILIES <u>Pandalus montaqui tridens</u>	

1. In our surveys, found only at S. Catalina I. 2. In high abundance near outfalls. 3. Has been found south of Cabo Colnett. 4. Found in trawl sample containing trash and Phylochaetopterus tubes.

Figure A-2. California shrimp found on soft bottoms.

Mesopelagic Bathypelagic
(200-1,000 m) (1,000-4,000 m)

- | | |
|--|---|
| <p><u>Parapasiphae sulcatifrons</u>
<u>Pasiphae pacifica</u>•
<u>Pasiphae chacei</u>•
<u>Pasiphae magna</u>
<u>Sergestes similis</u>•
<u>Petalidium suspiriosum</u>•</p> | <p><u>Parapasiphae cristata</u>
•<u>Parapasiphae serrata</u>
•<u>Pasiphae corteziana</u>
•<u>Pasiphae emarginata</u>
•<u>Pasiphae affinis</u>
•<u>Pandalopsis ampla</u></p> |
|--|---|

Figure A-3. Pelagic California shrimp.

Appendix B
INFORMATION ON SPECIMENS
ILLUSTRATED IN THIS VOLUME*

PENAEIDAE

Penaeus californiensis, Oxnard, Marine Biological Consultants;
48 mm.
Sicyonia ingentis, Palos Verdes (61 m), Coastal Water Research
Project; 17 mm.
Sicyonia penicillata, Isla Rocca Consag, San Felipe, Mexico
(27 m), Coastal Water Research Project; 14 mm.

SERGESTIDAE

Petalidium spiriosum, San Clemente Basin (1,000 m), Allan
Hancock Foundation Specimen 16673; 17 mm.
Sergestes similis, Los Angeles County (600 m), Coastal Water
Research Project; 21 mm.

ALPHEIDAE

Alpheopsis equidactylus, Allan Hancock Foundation Specimen 23077;
4 mm.
Alpheus bellimanus, Oil Platform Hilda off Santa Barbara (30 m),
Coastal Water Research Project; 15 mm.
Alpheus californiensis, Corona del Mar, Coastal Water Research
Project; 14 mm.
Alpheus clamator, Palos Verdes (rocky intertidal, 0.5 m), Coastal
Water Research Project; 9 mm.
Betaeus ensenadensis, after Hart 1964.
Betaeus gracilis, after Hart 1964.
Betaeus harfordi, Santa Catalina Island (12 m), Coastal Water
Research Project; 8 mm.
Betaeus harrimani, Malibu (rocky intertidal), Coastal Water
Research Project; 7 mm.
Betaeus longidactylus, Whites Point, Palos Verdes (rocky inter-
tidal, -0.2 m), Coastal Water Research Project; 13 mm.
Betaeus macginitiae, Indicator Point, Palos Verdes (rocky inter-
tidal, -0.5 m), Coastal Water Research Project; 9 mm.
Betaeus setosus, Morro Bay, Allan Hancock Foundation; 7 mm.
Pomagnathus corallinus, after Chace 1937.
Synalpheus lockingtoni, Whites Point, Palos Verdes (-0.3 m),
Coastal Water Research Project; 9 mm.

*Allan Hancock Foundation specimens were made available by
M. Wicksten. The size given for each specimen is the length
of the carapace in millimeters.

CRANGONIDAE

- Argis californiensis, Santa Monica Bay (183 m), Coastal Water Research Project; 12 mm.
- Crangon alaskensis elongata, Palos Verdes (137 m), Coastal Water Research Project; 11 mm.
- Crangon alba, Santa Catalina Island (22 m), Coastal Water Research Project; 10 mm.
- Crangon communis, southern California, Coastal Water Research Project; 17 mm.
- Crangon holmesi, Santa Catalina Island (15 to 18 m), Coastal Water Research Project; 4 mm.
- Crangon munitella, Port Hueneme (20 m), Coastal Water Research Project; 4 mm.
- Crangon nigricauda, Pillar Point, Marine Biological Consultants Collection AL-2; 3 mm.
- Crangon nigromaculata, Palos Verdes, Coastal Water Research Project; 9 mm.
- Crangon resima, Palos Verdes (137 m), Coastal Water Research Project; 7 mm.
- Crangon spinosissima, Santa Monica Bay (91 m), Coastal Water Research Project; 9 mm.
- Crangon stylirostris, Pillar Point, Marine Biological Consultants Collection AL-2; 4 mm.
- Crangon zacae, Santa Monica Bay (183 m), Coastal Water Research Project; 10 mm.

HIPPOLYTIDAE

- Eualus herdmani, Santa Catalina Island (Allan Hancock Foundation Station MS-2, 36.5 m).
- Eualus macrourus, Tanner Bank, Allan Hancock Foundation Specimen 7054; 13 mm.
- Heptacarpus brachydactylus, after Rathbun 1902.
- Heptacarpus brevirostris, San Simeon (rocky intertidal), Coastal Water Research Project; 7 mm.
- Heptacarpus carinatus, San Simeon (rocky intertidal), Coastal Water Research Project; 9 mm.
- Heptacarpus decorus, Palos Verdes (137 m), Coastal Water Research Project; 7 mm.
- Heptacarpus flexus, after Rathbun 1902.
- Heptacarpus franciscanus, Saint Georges Reef, Del Norte County (Searcher Station 164, 11 to 14 m), Allan Hancock Foundation; 4 mm.
- Heptacarpus kincaidi, after Schmitt 1921.
- Heptacarpus palpator, Los Angeles Harbor breakwater, Coastal Water Research Project; 8 mm.
- Heptacarpus paludicola, Santa Monica Bay (27 m), Coastal Water Research Project; 5 mm.
- Heptacarpus pictus, San Simeon (0.15 m), Coastal Water Research Project; 2 mm.
- Heptacarpus stimpsoni, Santa Catalina Island (66 m), Coastal Water Research Project; 4 mm.
- Heptacarpus taylori, Point Conception (-0.15 m), Coastal Water Research Project; 5 mm.

Heptacarpus tenuissimus, Palos Verdes (137 m), Coastal Water Research Project; 7 mm.
Hippolyte californiensis, Humboldt Bay (in intertidal Zostera beds), Coastal Water Research Project; 3 mm.
Hippolyte clarki, Palos Verdes (33 m), Coastal Water Research Project; 4 mm.
Lebbeus lagunae, Santa Rosa Island (27 to 38 m), Allan Hancock Foundation Specimen 1280-41; 6 mm.
Lebbeus washingtonianus, after Rathbun 1902.
Lysmata californica, Lunada Bay, Palos Verdes, Coastal Water Research Project; 12 mm.
Spirontocaris dalli, after Rathbun 1902.
Spirontocaris holmesi, Palos Verdes (137 m), Coastal Water Research Project; 9 mm.
Spirontocaris lamellicornis, Puget Sound, Washington (192 m), Coastal Water Research Project; 12 mm.
Spirontocaris prionota, Palos Verdes (18 m), Coastal Water Research Project; 4 mm.
Spirontocaris sica, Palos Verdes, Coastal Water Research Project; 10 mm.
Spirontocaris snyderi, Point Loma (137 m), Coastal Water Research Project; 3 mm.

PALAEOMONIDAE

Palaemon ritteri, Gulf of California, Coastal Water Research Project; 8 mm.
Palaemonella holmesi, Santa Catalina Island (15 to 18 m), Coastal Water Research Project; 4 mm.
Periclimenes infraspinis, south of Tortuga Island, Gulf of California (38 m), Allan Hancock Foundation Specimen 576-36; 3 mm.
Pontonia californiensis, Engels Bank (26 m), Coastal Water Research Project; 5 mm.
Pseudocoutierea elegans, after Holthuis 1951.

PANDALIDAE

Pandalopsis ampla, Santa Catalina Island (1,150 to 1,300 m), Allan Hancock Foundation Specimen 8714-63; 18 mm.
Pandalus danae, Palos Verdes (18 m), Coastal Water Research Project; 13 mm.
Pandalus gurneyi, Naples Reef off Santa Barbara (12 to 18 m), Allan Hancock Foundation Specimen 1970-16; 12 mm.
Pandalus jordani, Santa Monica Bay (183 m), Coastal Water Research Project; 24 mm.
Pandalus montagui, after Calman 1899.
Pandalus platyceros, Palos Verdes (137 m), Coastal Water Research Project; 20 mm.

PASIPHAEIDAE

Parapasphe sulcatifrons, Allan Hancock Foundation Specimen 8295-62; 28 mm.
Pasiphaea affinis, after Rathbun 1902.

Pasiphaea chacei, San Clemente Basin (1,000 m), Coastal Water Research Project; 20 mm.

Pasiphaea corteziana, after Rathbun 1902.

Pasiphaea emarginata, Allan Hancock Foundation Specimen 7569-62; 30 mm.

Pasiphaea pacifica, Los Angeles County (600 m), Coastal Water Research Project; 20 mm.

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