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A MONOGRAPH ON THE SHALLOW WATER CARIDEAN  
SHRIMPS OF THE GULF OF CALIFORNIA, MEXICO

by *Mary K. Wicksten*

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For Dr. Chace, with thanks for  
your help -

*Mary K. Wicksten*

SHALLOW WATER CARIDEAN SHRIMPS OF THE  
GULF OF CALIFORNIA, MÉXICO

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## ABSTRACT

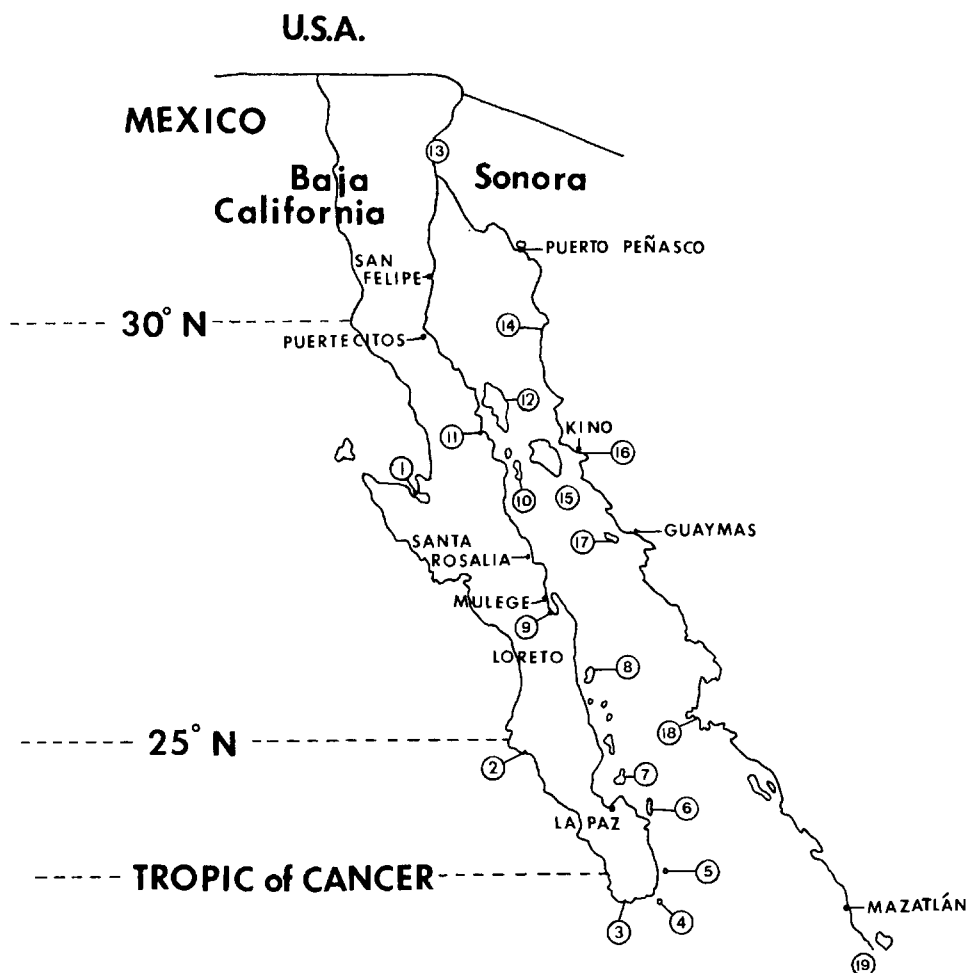
Seventy-seven species of carideans are reported from the Gulf of California, México. *Dasycaris kerstitchi* n. sp., *Processa peruviana* n. sp., and *Alpheus mazatlanicus* n. sp. are described. *Hippolyte mexicana* Chace is found to be the male of *Hippolyte williamsi* Schmitt, not *H. californiensis* Holmes. *Alpheus fagei* Crosnier and Forest, *A. arenensis* (Chace), and *A. ridleyi* Pocock are synonymized with *A. websteri* Kingsley. *Alpheus cristulifrons* Rathbun, *Neopalpheopsis euryone* (De Man), and *Thor spinosus* Boone are recorded for the first time from the eastern Pacific Ocean.

The majority of carideans in the Gulf are of tropical origin. The fauna has strong affinities with the tropical Atlantic and Indo-West Pacific.



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**Figure 1**

**THE GULF OF CALIFORNIA AND VICINITY**

- |                        |                              |                            |
|------------------------|------------------------------|----------------------------|
| 1. Scammon's Lagoon    | 8. Isla Carmen               | 14. Cabo Tepoca            |
| 2. Bahía Magdalena     | 9. Bahía Concepcion          | 15. Isla Tiburón           |
| 3. Cabo San Lucas      | 10. Isla San Lorenzo         | 16. Bahía Kino             |
| 4. Gorda Banks         | 11. Bahía de los Angeles     | 17. Isla San Pedro Nolasco |
| 5. Cabo Pulmo          | 12. Isla Ángel de la Guardia | 18. Punta San Ignacio      |
| 6. Isla Cerralvo       | 13. Río Colorado             | 19. Laguna Caimanero       |
| 7. Isla Espíritu Santo |                              |                            |

## INTRODUCTION

Caridean shrimp compose one of the most common macroinvertebrate groups of shallow subtidal and intertidal habitats in the Gulf of California, México. Some are cleaners (Limbaugh 1961; Reynolds 1977; Corredor 1978), others are symbiotic with mollusks, sponges, ascidians, or antipatharians (Holthuis 1951b), and others are prey for fishes and birds (Chace 1937; Hobson and Chess 1976). Despite their abundance and probable ecological importance, there has been no comprehensive treatment of carideans of this area.

Literature on the carideans of the Gulf of California is scattered in many works. Faxon's reports (1893, 1895) on material taken by the R.V. *Albatross* remain useful for many species, particularly offshore animals. Chace (1937) reported on shrimp taken by the *Zaca* expedition off southern Baja California. Species ranging from California into western México have been described by Holmes (1900), Rathbun (1904), and Schmitt (1921). Word and Charwat (1976) provided keys to common carideans of southern California, including a few Mexican species. A short treatment of intertidal carideans of the Gulf was included in the guidebook by Brusca (1980).

Short accounts of carideans have been given for other parts of the Panamic Province. Many include species ranging into the Gulf of California. Abele (1975, 1976) provided lists of species from Panama and discussed interspecies relationships. Chace (1962) reported on the fauna of Clipperton Island. Schmitt (1924), Siversten (1933), and Hult (1939) wrote on the shrimp of the Galápagos Islands. The work by Chace (1972) on carideans of the Caribbean Sea provides useful references on amphi-American species. Méndez (1981) and Wicksten and Méndez (1983) have described and reported on carideans off northern Perú.

To identify most Mexican carideans, systematic treatments of the higher taxa are useful, if not essential. The alpheids have been discussed in works by De Man (1911), Coutière (1909), Banner (1953, 1956, and 1959), and Hart (1964). Hippolytids have been treated world-wide by Holthuis (1947). Hayashi (1975) wrote on Indo-West Pacific processids. The American palaemonids were treated in two volumes by Holthuis (1951b, 1952b). Chace (1954) discussed the species of *Hippolyte* on the west coast of North America. Abele (1972) described two species of *Ambidexter* from the Panamic Province. Wicksten (1978, 1981) has worked on the species of *Plesionika* and *Automate* in the area.

## METHODS

In this work, the Gulf of California is defined as that body of water and its coasts extending from Cabo San Lucas (at the tip of the peninsula of Baja California) to the estuary of the Colorado River on the north and along the mainland coast of México south to the vicinity of Mazatlán, Sinaloa. The northernmost limit of the Gulf lies at approximately 31°50'N, the southernmost at about 22°50'N. Shallow water is defined as extending from the high tide mark to 100 fathoms (183 m), approximately the limit of the continental shelf. The majority of the species treated here, however, were collected at depths of 25 fathoms (50 m) or less.

Except as noted, the specimens examined for this study are in the collections of the Allan Hancock Foundation (AHF), University of Southern California. Other material is housed at Scripps Institution of Oceanography (SIO), the Instituto del Mar del Perú (IMARPE), and the Estación Mazatlán of the Universidad Nacional Autónoma de México (EMU). Specimens collected by the R.V. *Velero III* in the Galápagos Islands and other specimens as noted were observed at the U.S. National Museum of Natural History (USNM), Smithsonian Institution. Additional specimens were obtained on loan from the Muséum National d'Histoire Naturelle, Paris; the American Museum of Natural History, and the California Academy of Sciences. Almost all the specimens were taken intertidally by hand or subtidally by trawling or dredging. Other methods of collection included beach seining, poisoning while collecting fishes, picking from sponges and corals, use of a Van Veen grab, and hand netting by SCUBA divers. Very few of the specimens were taken during quantitative sampling programs. Most of the collecting was carried out by the staff of the R.V. *Velero III* in 1936, 1937, and 1940 (station numbers ending in -36 to -40); the *Velero IV* in 1949, 1950, and 1955 (station numbers ending in -49, -50, and -55); Tom and Beatrice Burch in 1967-68, the R.V. *Searcher* in 1971, personnel of the University of Arizona in the 1970's, R. C. Brusca in 1970-80, Alex Kerstitch in 1978-81, and the staff of the R.V. *El Puma* in 1981. A key to abbreviations of the stations and collectors is given in Appendix 1.

I have presented all records with the account of each species if I examined 12 or less lots of

**Table A**  
**Ranges of Species.**

<b>Tropical Eastern Pacific:</b>	
<i>Alpheus grahami</i>	<i>Pontonia chimaera</i>
<i>Alpheus mazatlanicus</i>	<i>Pontonia longispina</i>
<i>Ambidexter panamensis*</i>	<i>Pontonia simplex</i>
<i>Ambidexter swifti</i>	<i>Processa peruviana</i>
<i>Automate rugosa</i>	<i>Pseudocourtierea elegans*</i>
<i>Dasycares kerstitchi</i>	<i>Salmones serratidigitus</i>
<i>Gnathophyllum panamense</i>	<i>Synalpheus apioceros sanjosei (TA)</i>
<i>Lysmata galapagensis</i>	<i>Synalpheus digueti</i>
<i>Neopontonides dentiger</i>	<i>Synalpheus goodei occidentalis (TA)</i>
<i>Ogyrides sp.</i>	<i>Synalpheus nobilii</i>
<i>Palaemon gracilis</i>	<i>Synalpheus paulsonoides</i>
<i>Palaemon ritteri*</i>	<i>Synalpheus sanlucasi</i>
<i>Palaemonetes hiltoni*</i>	<i>Synalpheus townsendi mexicanus</i>
<i>Pantomus affinis</i>	<i>Typton hephaestus</i>
<i>Periclimenes lucasi</i>	<i>Typton serratus</i>
<i>Plesionika mexicana*</i>	
<i>Pomagnathus corallinus</i>	
<b>Mexico-California:</b>	<b>Tropical Western America-</b>
<i>Alpheus bellimanus</i>	<b>Tropical Atlantic:</b>
<i>Betaeus longidactylus</i>	<i>Alpheus armillatus</i>
<i>Crangon munitellus</i>	<i>Alpheus cristulifrons</i>
<i>Eualus lineatus**</i>	<i>Alpheus cylindricus</i>
<i>Heptacarpus palpator**</i>	<i>Alpheus floridanus</i>
<i>Hippolyte californiensis**</i>	<i>Alpheus malleator</i>
<i>Lysmata californica</i>	<i>Alpheus normanni</i>
<i>Palaemonella holmesi</i>	<i>Alpheus schmitti</i>
<i>Periclimenes infraspinis</i>	<i>Alpheus websteri</i>
<i>Synalpheus lockingtoni</i>	<i>Leptochela serratorbita</i>
<b>Tropical Western America-</b>	<i>Lysmata intermedia</i>
<b>Indo-West Pacific:</b>	<i>Pontonia margarita</i>
<i>Alpheus leviusculus</i>	<i>Synalpheus fritzmuelleri**</i>
<i>Alpheus lottini</i>	<i>Synalpheus herricki**</i>
<i>Harpiliopsis depressus</i>	<i>Trachycaris restrictus</i>
<i>Lysmata trisetacea</i>	<i>Typton tortugae</i>
<i>Nealpheopsis euryone</i>	
<i>Processa aequimana</i>	
<i>Synalpheus biunguiculatus</i>	
<i>Synalpheus charon</i>	
<i>Thor paschalis</i>	
<i>Thor spinosus</i>	

Key to symbols: \* One or two records from California. TA: subspecies of species occurring in tropical western Atlantic. \*\* Only one or two records from the Gulf of California.

Note: The species of *Ogyrides* has not been identified.

specimens. The numbers of specimens and stations as well as the overall range is given for each of the more common species. For the more common palaemonids, I present records not provided by Holthuis (1951b, 1952b). Additional information on the stations of the *Velero III* can be found in the station list (Fraser 1943). Records of the *Velero IV* are available at the Allan Hancock Foundation. Data on the specimens from Scripps Institution of Oceanography can be found in the catalog of decapod crustaceans (Luke 1977).

**Table B**  
**Species Usually found in the Southern Gulf of California.**

<i>Alpheus cylindricus</i>	<i>Harpiliopsis depressus</i>
<i>Alpheus leviusculus</i>	<i>Lysmata galapagensis</i>
<i>Alpheus lottini</i>	<i>Lysmata trisetacea</i>
<i>Alpheus malleator</i>	<i>Synalpheus biunguiculatus</i>
<i>Alpheus websteri</i>	<i>Synalpheus charon</i>
<i>Brachycarpus biunguiculatus</i>	<i>Synalpheus nobili</i>

### FAUNAL RELATIONSHIPS

The majority of caridean species in the Gulf of California belong to widespread tropical groups (Table A). Of the 77 species recorded herein, 32 species and subspecies are known primarily from tropical eastern Pacific waters. Ten species normally range from México north to the coast of California. Two species (*Latreutes antiborealis* and *Hippolyte williamsi*) reach their northern limits in the Gulf of California, ranging south to Chile. Ten species also occur in the Indo-West Pacific region. Fifteen species are amphi-American in distribution, found in tropical regions of both the western Atlantic and the eastern Pacific. Three species (*Alpheus paracrinitus*, *Automate dolichognatha*, and *Brachycarpus biunguiculatus*) are pantropical in warm waters. One palaemonid (*Palaemonetes paludosus*) has been introduced from the eastern United States by human activity. Four species of *Macrobrachium* may be found in estuaries or lagoons along the tropical Pacific coast. *Alpheus sulcatus* has a very peculiar distribution; it is found in the Pacific from México to northern Perú, off western Africa, and in the Indo-West Pacific region.

Only one genus, *Pomagnathus* Chace, is endemic to the tropical eastern Pacific Ocean. However, Banner (1964) pointed to similarities between the structure of the mouth-parts and branchial formula of *Pomagnathus corallinus* and two other species, *Alpheus clippertoni* and *A. paragracilis*. Possibly, *Pomagnathus* in the future may be relegated to subgeneric status in the widespread genus *Alpheus*.

There are marked differences in the patterns of distribution of the two most common caridean families in the Gulf of California. Of the 24 species in the family Palaemonidae, 19 occur only in the eastern Pacific. Two are amphi-American, one has been introduced into fresh water, one is pantropical, and one extends into the Indo-West Pacific region. Of the 33 species of alpheids, however, only 12 are confined to the eastern Pacific. Ten species are amphi-American, three subspecies of *Synalpheus* belong to amphi-American species, two species are pantropical, and five species extend into the Indo-West Pacific. *Alpheus sulcatus* occurs in the eastern Pacific, off western Africa, and in the Indo-West Pacific.

Why are alpheids so widespread in comparison with the palaemonids, particularly in regard to amphi-American species? The last free connection between the tropical Atlantic and the eastern Pacific was in the Miocene, over 12 million years ago. Species with amphi-American distributions have not diverged morphologically since then. Perhaps palaemonids, particularly obligate commensals, have a faster rate of allopatric speciation than alpheids. The scarcity of coral reefs, large sponges, or other suitable habitats may have affected species in the eastern Pacific. Interspecific competition or predation may also be important. Further information on the microhabitats, behavior, interspecific interactions, and genetics of these shrimp will help to explain these curious differences.

Within the Gulf of California, 12 species usually occur from Guaymas southward (Table B). Only *Betaeus longidactylus* is more common in the northern Gulf than to the south. Other common species tend to range throughout the Gulf.

*Alpheus mazatlanicus*, *Dasycaris kerstitchi*, *Pontonia longispina*, *Synalpheus goodei occidentalis*, *S. paulsonoides*, and *S. townsendi mexicanus* are known only from the Gulf of California. Lack of collecting in proper habitats may have prevented their discovery in other areas.

### HABITAT GROUPS

The collector of shrimps often finds caridean species in specific habitats. In rocky intertidal areas, *Alpheus armillatus*, *A. sulcatus*, *Lysmata californica*, *Palaemon ritleri*, and *Synalpheus lockingtoni* are



common. *Betaeus longidactylus* may occur in tidepools in the northern Gulf. *Palaemon ritteri*, *Thor paschalis*, and *Hippolyte williamsi* may be found in clumps of the brown alga *Sargassum muticum*. On sandy bottoms, the processids (*Ambidexter* spp. and *Processa* spp.), *Leptochela serratorbita*, and the commensal shrimp *Pontonia pinnae* (in the pen shell *Pinna rugosa*) can be found. *Automate rugosa* recently has been found as part of the infauna of soft bottoms in the southern Gulf. Inhabiting rocky or mixed subtidal bottoms are *Alpheus normanni*, *Gnathophyllum panamense*, *Palaemonella holmesi*, *Periclimenes infraspinis*, and *Synalpheus nobilii*. Among branched corals (*Pocillopora* spp.) live *Alpheus lottini*, *Harpiliopsis depressus*, and *Synalpheus charon*.

### ADDITIONAL SPECIES THAT MAY OCCUR IN THE GULF

Five species of carideans that occur off the west coast of México have not been reported from the Gulf of California. These are the palaemonids *Periclimenaeus hancocki* Holthuis, *Fennera chacei* Holthuis, and *Waldola schmitti* Holthuis (southwestern Mexican coast); and the crangonid *Neocrangon zacaе* (Chace) (Clarion Island, outer coast of Baja California) (Holthuis 1951b; Wicksten 1980).

### KEY TO THE FAMILIES OF SHALLOW WATER CARIDEANS OF THE GULF OF CALIFORNIA

1. First pair of pereopods chelate or simple ..... 2
  - First pair of pereopods subchelate ..... family Crangonidae
2. Exopods on pereopods. Fingers of chelae with comb-like cutting edges ... family Pasiphaeidae
  - No exopods on pereopods. Fingers of chelae without comb-like cutting edges ..... 3
3. Carpus of second pair of pereopods entire. (First pair of pereopods with well-developed chelae) ..... 4
  - Carpus of second pair of pereopods subdivided into two or more segments. (First pair of pereopods chelate or not) ..... 5
4. Third maxilliped expanded, operculiform. (Compact, brightly-colored body) ..... family Gnathophyllidae
  - Third maxilliped not expanded or operculiform. (Body form various) ... family Palaemonidae
5. Chelae of first pair of pereopods very small or absent. (Rostrum upcurved, toothed, longer than carapace) ..... family Pandalidae
  - Chelae of first pair of pereopods distinct, at least on one side. (Rostrum various) ..... 6
6. Second pereopods unequal or equal. Rostrum short, entire or with bifid tip ..... family Processidae
  - Second pereopods always equal in length. Rostrum toothed or reduced to short spine ..... 7
7. Eyestalks elongate, reaching almost to end of antennular peduncle. First pair of pereopods shorter than and about as robust as second ..... family Ogyrididae
  - Eyestalks never elongate, often hidden by carapace. First pair of pereopods often longer than or more robust than second ..... 8
8. Chelipeds of first pereopods with dark tips, equal in size and shape. Rostrum with dorsal teeth ..... family Hippolytidae
  - Chelipeds of first pereopods without dark tips, one often larger and heavier than other. Rostrum without teeth ..... family Alpheidae

### FAMILY PASIPHAEIDAE

*Leptochela* Stimpson, 1860

*Leptochela serratorbita* Bate

*Leptochela serratorbita* Bate, 1888: 859, pl. 134, fig. 1.—Chace 1937: 111.—Williams 1965: 41, fig. 33.—Chace 1972: 16.—Hendrickx, Wicksten, and van der Heiden 1983: 67.

MATERIAL. MÉXICO: Off Puerto Refugio, Isla Ángel de la Guardia (29 January 1940, 94–100 m, rock and gravel, sta. 1057-40, 1 specimen).—Bahía de los Angeles (2 March 1937, 46–74 m,

sand; sta. 535-36, 1 specimen).—Bahía de Mazatlán (11 April 1980, 8 m, fine sand, sta. C10, VV8; 1 specimen; 29 April 1980, 27 m, muddy sand, sta. C11, VV1; 1 specimen; 20 April 1980, 10 m, fine sand, sta. C19, VV8, 1 specimen; all collected by ship *FC-1*, EMU).—Bahía Tenacatita, Colima (8 May 1939, 4–15 m, mud, sta. 964-49, 2 specimens).—COSTA RICA: Port Parker (24 March 1939, surface, sta. 934-39, 1 specimen).

HABITAT. Sandy or muddy bottoms, surface to 110 m. May be attracted to night lights.

TYPE LOCALITY. Saint Thomas, Virgin Islands.

DISTRIBUTION. North Carolina to Bay of Campeche and Antigua Island; southern Gulf of California to Costa Rica.

## FAMILY PALAEMONIDAE

### Key to the Species

1. Posterior margin of telson with 2 pairs spines. Pleurobranch on third maxilliped . . . . . 2
  - Posterior margin of telson with 3 pairs spines. No pleurobranch on third maxilliped . . . . . 10
2. Hepatic spine present, branchiostegal spine absent . . . . . 3
  - Hepatic spine absent, branchiostegal spine present . . . . . 7
3. Dactyls of last 3 pereopods biunguiculate. Strictly marine, rocky bottoms or among coral . . . . . *Brachycarpus biunguiculatus* (Lucas)
  - Dactyls of last 3 pereopods simple. Fresh and estuarine waters on sand, mud, gravel, and rocky rubble . . . . . 4
4. Carpus of second pereopod distinctly shorter than merus. Second pereopods of male stout, with numerous small spines and stiff setae . . . . . *Macrobrachium americanum* Bate
  - Carpus of second pereopods as long as or longer than merus. Second pereopods of male stout or slender . . . . . 5
5. Second chelae of adult male equal or subequal in shape, second pereopods long and slender, chelae with velvet-like pubescence . . . . . *Macrobrachium tenellum* (Smith)
  - Second chelae of adult male very unequal in size and shape, second pereopods stout, chelae with setae, but no velvet-like pubescence . . . . . 6
6. Second chelae of adult male with large spines on dorsomesial borders, movable finger of larger chelae with 13 teeth on cutting edge. Third pereopod relatively smooth, with few setae . . . . . *Macrobrachium digueti* (Bouvier)
  - Second chelae of adult male with small spines on dorsomesial borders, movable finger of larger chela with 6 teeth on cutting edge. Third pereopod with relatively stiff, spinose setae . . . . . *Macrobrachium occidentale* Holthuis
7. Mandible with palp . . . . . 8
  - Mandible without palp . . . . . 9
8. Carpus of second pereopod shorter than propodus. Rostrum equal to or slightly greater than length of scaphocerite. Widespread marine species, on sand or rock . . . . . *Palaemon ritleri* Holmes
  - Carpus of second pereopod longer than propodus. Rostrum greatly exceeding length of scaphocerite. In lagoons . . . . . *Palaemon gracilis* (Smith)
9. Fused part of 2 rami of dorsal antennular flagellum distinctly longer than free part. (Rostrum with 6–8 dorsal teeth and 3–4 ventral teeth). Estuarine parts of Colorado River drainage only . . . . . *Palaemonetes paludosus* (Gibbes)
  - Fused part of 2 rami of dorsal antennular flagellum shorter than free part. (Rostrum with 8–11 dorsal teeth and 2–3 ventral teeth). In bays, lagoons, or estuaries . . . . . *Palaemonetes hiltoni* Schmitt
10. Third maxillipeds without exopods. (Inhabiting only subtidal zones) . . . . . 11
  - Third maxilliped with exopods. (Inhabiting intertidal to subtidal zones) . . . . . 12
11. Pleura of third-fifth abdominal segments ending in pointed, toothlike tips. Rostrum without dorsal teeth . . . . . *Pseudocoutierea elegans* Holthuis
  - Pleura of third-fifth abdominal segments rounded. Rostrum with 11 dorsal teeth . . . . . *Neopontonides dentiger* Holthuis

12. Hepatic spine present ..... 13  
 – Hepatic spine absent ..... 16
13. Rostrum broad, deep. Body strongly depressed. Third pereopod with dactyl twisted distally ..... *Harpiliopsis depressa* (Stimpson)  
 – Rostrum narrow, slender. Body not depressed. Third pereopods with dactyl not twisted .. 14
14. Dorsal surface of rostrum straight, with 3 ventral teeth anterior to eye. Spine of scaphocerite exceeding blade ..... *Palaemonella holmesi* Nobili  
 – Rostrum arched over eye on dorsal surface, with 2–3 ventral teeth, all near apex. Spine of scaphocerite falling short of distal end of blade ..... 15
15. Dactyls of last 3 pereopods biunguiculate. Third abdominal segment without pronounced hump ..... *Periclimenes infraspinis* (Rathbun)  
 – Dactyls of last 3 pereopods simple. Third abdominal segment with pronounced hump ..... *Periclimenes lucasi* Chace
16. Blade of scaphocerite rudimentary. (Rostrum spiniform, without teeth) ..... 17  
 – Blade of scaphocerite well developed. (Rostrum various) ..... 19
17. Outer margin of uropodal exopod entire ..... 18  
 – Outer margin of uropodal exopod serrate ..... *Typton serratus* Holthuis
18. Dactyls of both second legs semicircular, upper margin strongly convex. Carpus of large second leg with spinules on lower border ..... *Typton tortugae* McClendon  
 – Dactyls of both second legs not semicircular, generally elongated. Carpus of second leg without lower spinules ..... *Typton hephaestus* Holthuis
19. Carapace with prominent dorsal teeth. (Commensal with antipatharians) ..... *Dasycaris kerstitchi* n. sp.  
 – Carapace without dorsal teeth. (Commensal with mollusks or ascidians) ..... 20
20. Dorsal spines of telson small, inconspicuous ..... 21  
 – Dorsal spines of telson large, well developed ..... 22
21. Eyes, when extended laterally, reaching beyond antennal spines. Scaphocerite without final tooth. Dactyls of fifth pereopod much stouter than those of third pereopod. In gastropods ..... *Pontonia chimaera* Holthuis  
 – Eyes, when extended laterally, not reaching antennal spines of carapace. Scaphocerite with small final tooth.  
 – Dactyls of third and fifth pereopods similar. In pelecypods ..... *Pontonia pinnae* Lockington
22. Dactyls of last 3 pereopods broad, posterior margins distinctly convex. Usually commensal in pearl oyster (*Pinctada mazatlanica*) ..... *Pontonia margarita* Smith  
 – Dactyls of last 3 pereopods slender, posterior margins straight. Commensal in *Pinna* sp. or found among rocks ..... 23
23. Dorsal spines of telson very long and slender, anterior pair reaching beyond base of posterior part. Among rocks ..... *Pontonia longispina* Holthuis  
 – Dorsal spines of telson short, anterior pair reaching at most to middle of distance between both pairs. Commensal in *Pinna* sp. ..... *Pontonia simplex* Holthuis

#### Subfamily Palaemoninae

*Palaemon* Weber, 1795

*Palaemon ritteri* Holmes

*Palaemon ritteri* Holmes, 1895: 21, figs. 29–35.—Holmes 1900: 216.—Rathbun 1904: 29.—Schmitt 1921: 34, fig. 1.—Hult 1939: 6.—Holthuis 1950a: 8.—Holthuis 1952b: 163, pl. 44, figs. a–g.—Word and Charwat 1976: 163.—van der Heiden and Hendrickx 1979: 38.—Brusca 1980: 250, fig. 14.2.—Chace and Abbott 1980: 569.

**MATERIAL.** Approximately 195 specimens from 38 stations, outer coast of Baja California from Estero de Punta Banda to Bahía Magdalena; Gulf of California from La Paz to San Felipe, Puerto Peñasco to Guaymas.

**HABITAT.** Shore to 40 m, among rocks and algae. Most specimens have been collected in the intertidal zone.

TYPE LOCALITY. San Diego, California.

DISTRIBUTION. San Diego, California; outer coast of Baja California from Estero de Punta Banda south, Gulf of California, west coast of tropical México, Panamá, Colombia, Isla Cocos, Ecuador, Galápagos Islands.

COLOR IN LIFE. Translucent with oblique dark brown bars (Holthuis 1952b).

REMARKS. *Palaemon ritteri* is one of the most common shrimps of the Gulf of California. It occurs regularly from the southern coast of Baja California, throughout the Gulf of California, and further south along the western American coastline. There have been no reports of it from California, U.S.A. since the collection of the type specimen.

A specimen taken at Coloraditos (11–14 April 1979) was parasitized by an epicarid isopod.

*Palaemon gracilis* (Smith)

*Leander gracilis* Smith, 1871: 97.

*Palaemon gracilis* Holthuis 1950a: 7.—1952b: 183, pl. 45, figs. f-1.—van der Heiden and Hendrickx 1979: 48.—Hendrickx, Wicksten, and van der Heiden 1983: 68.

MATERIAL. Laguna Caimanero, Sinaloa (1978, M. E. Hendrickx, 4 specimens, AHF and EMU).

HABITAT. Fresh to estuarine waters.

TYPE LOCALITY. Estero at Realejo, western Nicaragua.

DISTRIBUTION. Laguna Caimanero; "fresh waters of western America from Nicaragua to south Panama" (Holthuis 1952b).

REMARKS. The specimens from Laguna Caimanero are the only ones known from México. The animal may occur in other coastal lagoons of the southern Gulf of California.

*Palaemonetes* Heller, 1869

*Palaemonetes hiltoni* Schmitt

*Palaemonetes hiltoni* Schmitt, 1921: 36, pl. 12, fig. 5.—Holthuis 1950a: 10.—1952b: 227, pl. 53, figs. n-s.—Hendrickx, Wicksten, and van der Heiden 1983: 69.

MATERIAL. Laguna Caimanero, Sinaloa (1978, A. Menz, many specimens, AHF, EMU, USNM).

HABITAT. Coastal lagoons or estuaries.

TYPE LOCALITY. San Pedro, California.

DISTRIBUTION. Southern California and western México. The species has not been found in southern California in recent years.

*Palaemonetes paludosus* (Gibbes)

*Hippolyte paludosa* Gibbes, 1850b: 197.

*Palaemonetes paludosus*.—Holthuis 1950a: 10.—1952b: 207, pl. 51, figs. e-j.—St. Amant and Hulquist 1969: 252.

MATERIAL. Río Hardy, Río Colorado, Baja California (26 March 1972, D.A. Thomson and party, 11 specimens).

HABITAT. Shallow fresh water.

TYPE LOCALITY. St. Andrews, Charleston County, South Carolina.

DISTRIBUTION. Fresh waters east of Alleghenies, New Jersey to Florida, U.S.A. Introduced into other areas.

REMARKS. The specimens from Río Hardy undoubtedly were introduced.

*Macrobrachium* Bate, 1868

*Macrobrachium americanum* Bate

*Macrobrachium americanum* Bate, 1868: 363, pl. 30.—Holthuis 1950a: 12.—1952b: 128, pl. 31, figs. d–e.—van der Heiden and Hendrickx 1979: 48.—Holthuis 1980a: 87.—Méndez 1981: 73, fig. 245.—Hendrickx, Wicksten, and van der Heiden 1983: 68.

*Palaemon jamaicensis* Semper, 1868: 585.—Faxon 1895: 148.

*Macrobrachium jamaicensis*.—Rathbun 1910: pl. 51, fig. 1.—Schmitt 1924: 386.—Boone 1931: 146, pl. 51.—Sivertsen 1933: 5.—Hult 1939: 5. (See Holthuis, 1952b for a more extensive synonymy).

MATERIAL. Laguna Caimanero, Sinaloa (1979, A. Menz, 1 specimen, EMU).

HABITAT. Fresh water, occasionally upper reaches of estuaries.

TYPE LOCALITY. Lake Amatitlán, Guatemala.

DISTRIBUTION. In fresh water from La Paz and Cabo San Lucas, Baja California Sur; Guaymas, Sonora; Laguna Caimanero, south to northern Perú, Isla Cocos, Galápagos Islands.

*Macrobrachium tenellum* (Smith)

*Palaemon tenellum* Smith, 1871: 98.

*Macrobrachium tenellum*.—Holthuis 1950a: 19.—1952b: 54, pl. 10–11, figs. a, b.—van der Heiden and Hendrickx 1979: 48.—Holthuis 1980a: 105.—Méndez 1981: 73, fig. 233. (See Holthuis, 1952b for a more complete synonymy).

MATERIAL. MÉXICO: Laguna Caimanero, Sinaloa (1979, A. Menz, 1 specimen, EMU).—Tapo Botadero, Sinaloa (September 1978, A. Menz, 2 specimens, EMU).—Bahía Tangola Tangola, Oaxaca (16 March 1933, in fresh water, sta. 119-33, 1 specimen).—Laguna Coyuca, near Acapulco, Guerrero (9 September 1946, sta. 1556-46, 1 specimen; 16 September 1946, sta. 1567-46, 1 specimen).—COSTA RICA: Puerto Culebra (12 March 1933, shore, along slough, sta. 115-33, 1 specimen; 13 March 1933, sta. 117-33, 1 specimen).—Estero Camaronero, Quepos (15 January 1982, 1 m, R. Du Bois, P. Phillips, and D. Lynch, 3 specimens).—EL SALVADOR: Estero La Barra de Santiago (7 September 1980, Mirta Aida Aquino Torres, 3 specimens).

HABITAT. Fresh water streams and pools, occasionally in upper reaches of estuaries.

TYPE LOCALITY. Polvon, western Nicaragua.

DISTRIBUTION. Mulege and La Paz, Baja California Sur; vicinity of Mazatlán south to northwestern Perú.

COLOR IN LIFE. Gray, with red spots on both sides of the abdominal segments (M. A. Aquino Torres, pers. comm.).

*Macrobrachium digueti* (Bouvier)

*Palaemon Digueti* Bouvier, 1895: 159, fig. 2.

*Macrobrachium digueti*.—Holthuis 1950a: 13.—1952b: 103, pl. 26, figs. a–e.—van der Heiden and Hendrickx 1979: 48.—Méndez 1981: 73, fig. 225.—Hendrickx, Wicksten and van der Heiden 1983: 68. (See Holthuis 1952b for a more complete synonymy.)

MATERIAL. Laguna Caimanero, Sinaloa (1979, A. Menz, 1 specimen, EMU).



HABITAT. Fresh water, occasionally into upper reaches of estuaries.

TYPE LOCALITY. Río Mulege, Baja California Sur.

DISTRIBUTION. Mulege, California Sur; Laguna Caimanero, Sinaloa south to Perú.

*Macrobrachium occidentale* Holthuis

*Macrobrachium occidentale* Holthuis, 1950b: 95.—1952b: 74, pl. 17, figs. a–e.—Hendrickx, Wicksten, and van der Heiden 1983: 68.

MATERIAL. Río Baluarte, Sinaloa (November 1978, 2 specimens, collection of Estación Mazatlán).

HABITAT. Fresh water.

TYPE LOCALITY. Río de los Esclavos, Guatemala.

DISTRIBUTION. Río Baluarte, Guatemala, El Salvador, Panamá.

*Brachycarpus* Bate, 1888

*Brachycarpus biunguiculatus* (Lucas)

*Palaemon biunguiculatus* Lucas, 1849: 45, pl. 4, fig. 4.

*Brachycarpus savignyi* Bate, 1888: 795, pl. 129, fig. 4.

*Palaemonella orientalis* Rathbun, 1906: 925.

*Brachycarpus biunguiculatus*.—Holthuis 1950a: 12.—1952b 3, pl. 1, figs. a–q.—Abele 1975: 70.—Corredor 1978: 35.

MATERIAL. MÉXICO: S of Punta Arena, Gulf of California (2 February 1971, 3–5 m, rocks; *Searcher* sta. 44, 1 specimen).—S end Isla Cerralvo (7 February 1971, 10–12 m, *Searcher* sta. 46, 1 specimen).—Punta Chileno, Cabo San Lucas (22–25 July 1981, 5–10 m, rocks and coral; A. Kerstitch, 9 specimens).—Shepard's Rock, Cabo San Lucas (20 July 1981, 15 m, cliff; A. Kerstitch, 4 specimens).—Isla Clarion (27 March 1954, L. Pinkas and D. Joseph, 1 specimen).

HABITAT. Shore to 10 m, rocks and coral bottoms.

TYPE LOCALITY. Oran and Bone in Algeria.

DISTRIBUTION. Bermuda, Florida, Caribbean Sea; Mediterranean, Red Sea, Liberia, Ceylon, Tahiti, Oahu, Molokai, Wake Island; southern Gulf of California, Costa Rica, Panamá, Isla Gorgona, Isla Cocos, Galápagos Islands.

COLOR IN LIFE. Dark blue green, mottled with whitish (Holthuis 1952b). Translucent, red striped (A. Kerstitch color slide).

Subfamily Pontoniinae

*Palaemonella* Dana, 1852

*Palaemonella holmesi* (Nobili)

*Periclimenes holmesi* Nobili, 1907: 5.—Chace 1937: 132.

*Anchista tenuipes* Holmes, 1900: 216.

*Periclimenes tenuipes*.—Rathbun 1904: 34, fig. 12.—Schmitt 1921: 39, fig. 24.

*Palaemonella holmesi*.—Holthuis 1951b: 13, pl. 3, figs. a–h; pl. 4, figs. a–i.—1952a: 7.—Word and Charwat 1976: 165.—Abele 1976: 270.—Brusca 1980: 252, fig. 14.8.—Chace and Abbott 1980: 569.

**MATERIAL.** CALIFORNIA, U.S.A.: Inner San Pedro Harbor (14 September 1977, Los Angeles Harbor Project, 1 specimen).—MÉXICO: Bahía San Gabriel, Isla Espíritu Santo (15 March 1949, 2 m, coral; sta. 1737-49, many specimens).—Bahía Salinas, Isla Carmen (20 March 1949, 13 m, algae; sta. 1755-49, 1 specimen).—1 mi. WSW Punta Perico, Isla Carmen (21 March 1949, 13–20 m, sand; sta. 1759-49, 2 specimens).—Off Cabo Tortola, Bahía Tortuga, Baja California (6 March 1949, 2–7 m, mud; sta. 1707-49, 1 specimen).—20 mi. SE of El Desemboque, Sonora (4 February 1968, L. T. Findley, many specimens).—Isla Las Animas, Sonora (9 September 1978, 6 m, A. Kerstitch, 1 specimen).—Isla Blanca, Guaymas (16 June 1978, A. Kerstitch, 1 specimen).—W shore Isla Socorro (26 August 1946, sta. H46-226, 1 specimen).

**HABITAT.** Subtidal sandy or rocky bottoms, 2-90 m.

**TYPE LOCALITY.** Santa Catalina Island, California.

**DISTRIBUTION.** Shallow coastal waters of western American coast from southern California to Ecuador. Rare north of western México.

**COLOR IN LIFE.** Semi-translucent, pale brown (Holthuis 1951b).

*Periclimentes* Costa, 1844

*Periclimentes infraspinis* (Rathbun)

*Urocaris infraspinis* Rathbun, 1902: 31, fig. 10.—Schmitt 1921: 37, fig. 22.

*Periclimentes infraspinis*.—Chace 1937: 132.—Holthuis 1951b: 46, pl. 13, figs. a-l.—1952a: 9.—Word and Charwat 1976: 167.—Brusca 1980: 250, fig. 14.3.—Chace and Abbott 1980: 569.—Hendrickx, Wicksten, and van der Heiden 1983: 70.

**MATERIAL.** MÉXICO: Scammon's Lagoon, Baja California (14 September 1953, sta. KG5, 1 specimen).—W side Roca Marcial, Gulf of California (17 March 1949, 5–17 m, sta. 1742-49, 2 specimens).—Estero Soldado, Sonora (10 January 1973, 1 m, L. T. Findley, 1 specimen; 21 April 1973, 1 m, W. W. Reynolds and party, 2 specimens).—Window Rock, Guaymas (24 June 1978, 31 m, among antipatharians, A. Kerstitch, 1 specimen).—Bay of Mazatlán (August 1979, 9 m, sand, 3 specimens, EMU).

**HABITAT.** Shallow water to 150 m, among rock, sand or algae. Occasionally associated with black coral (*Antipatharia*).

**TYPE LOCALITY.** Bahía Concepción, Baja California.

**DISTRIBUTION.** San Diego, California to Costa Rica and Galápagos Islands.

**COLOR IN LIFE.** Semitranslucent, pale brown (Holthuis, 1951b).

*Periclimentes lucasi* Chace

*Periclimentes lucasi* Chace, 1937: 133, fig. 8.—Holthuis 1951b: 54, pl. 16, figs. a-k; pl. 19, figs. f-h.—1952a: 12.—Brusca 1980: 250, fig. 14.4, pl. 5.

**MATERIAL.** MÉXICO: Bahía San Juanico, Baja California (2 March 1937, 29 m, sand and kelp; sta. 616-37, 1 specimen).—S of Isla Tortuga, Gulf of California (13 March 1936, 39 m, volcanic sand; sta. 576-36, 1 specimen).—Bahía Empalme, Sonora (19 November 1946, shore, mud, sand and rocks; 1 specimen).—Isla Catalina, San Carlos, Sonora (17 June 1978, 18 m, with cerianthids; A. Kerstitch, 8 specimens).—Bahía Santa Lucia, Acapulco, Guerrero (1–2 February 1954, 2–7 m, rock, sand and mud; sta. 2596-54, 1 specimen).

**HABITAT.** Sandy and muddy bottoms, subtidally to 90 m, occasionally associated with cerianthids.

**TYPE LOCALITY.** Bahía San Lucas, Gulf of California.

DISTRIBUTION. Baja California, Gulf of California to southern Panamá, in shallow littoral waters.

COLOR IN LIFE. Translucent, with fine lemon yellow and purple lines on frontal appendages (Holthuis 1951b).

*Harpiliopsis* Borradaile, 1917

*Harpiliopsis depressa* (Stimpson)

*Harpilius depressus* Stimpson, 1860: 38.—Chace, 1937: 135.

*Harpiliopsis depressus*.—Holthuis 1951b: 70, pl. 21, figs. a–i, pl. 22, figs. a–f.—1952a: 16.—Chace 1962: 608.—Abele and Patton 1976: 37.—Abele 1976: 270.

MATERIAL. MÉXICO: Isla Espíritu Santo (15 March 1949, among coral; sta. 1737-49, many specimens).—Punta Chileno, Cabo San Lucas (22–25 July 1981, 5–10 m, rock and coral; A. Kerstitch, 6 specimens).—Shepard's Rock, Cabo San Lucas (20 July 1981, 15 m, rock; A. Kerstitch, 7 specimens).—Isla María Cleofa (18 March 1956, shore, sta. KW17, 8 specimens).—Isla Isabel (22 March 1956, shore, sta. KW28, 9 specimens).—ISLA COCOS: Wafer Bay (3 June 1973, shore, among *Porites* sp., University of Southern California field party, 1 specimen).

HABITAT. Shallow water, among corals.

TYPE LOCALITY. Hawaii.

DISTRIBUTION. Red Sea, Seychelles, Malay Archipelago, Polynesia, Gulf of California to Colombia, Galápagos Islands.

COLOR IN LIFE. Translucent to pale green, dark blue-black, sometimes striped with deep blue on pale gray background (Holthuis 1952a, Abele 1976, color photograph by A. Kerstitch).

REMARKS. I have treated all these specimens of *Harpiliopsis* as belonging to *H. depressus*. However, A. J. Bruce and L. Abele (pers. comm.) have suggested that a second species, *H. spinigera* Ortman, also may be present in the area. The two species seem to differ in color patterns. Unfortunately, I have notes on living colors only for one lot of specimens. The animals seem to vary considerably in their abdominal spination, armature of the chelipeds, and placement of rostral teeth. Examination of a large series of specimens from throughout the eastern Pacific and Indo-West Pacific may be necessary to determine the correct designation of the species of *Harpiliopsis*.

*Typton* Costa, 1844

*Typton hephaestus* Holthuis

*Typton hephaestus* Holthuis, 1951b: 159, pl. 49, figs. 0–p.—1952a: 19.

MATERIAL. MÉXICO: Scammon's Lagoon, Baja California (13 September 1953, 6–8 m, rocks; sta. KG-3, 1 specimen).

HABITAT. Subtidal, among rocks.

TYPE LOCALITY. Southern Gulf of California (24°12'N, 109°55'W).

DISTRIBUTION. The species is known only from these two records.

*Typton serratus* Holthuis

*Typton serratus* Holthuis 1951b: 167, pl. 53, figs. a–l.—1952a: 19.

MATERIAL. MÉXICO: Puerto Refugio, Isla Ángel de la Guardia (26 January 1940, 15–38 m, sand and sponge; 1 specimen).—Acapulco, Guerrero (September 1946, sta. H46-252, 1 specimen).

HABITAT. Among sponges, subtidal.

TYPE LOCALITY. Tagus Cove, Isla Isabela (Albemarle Island), Galápagos Islands.

DISTRIBUTION. Gulf of California, Acapulco, and Galápagos.

COLOR IN LIFE. Light Chinese orange, articulations of fingers darker (Holthuis 1951b).

*Typton tortugae* McClendon

*Typton tortugae* McClendon, 1911: 19.—Holthuis 1951b: 153, pl. 48, figs. a–c.—1952a: 19.

RECORD IN LITERATURE. Southern Gulf of California (24°12'N, 109°55'W, *Albatross* sta. 2826, 1 specimen, Holthuis 1951b).

HABITAT. In sponges, shallow water to 20 m.

TYPE LOCALITY. Tortugas, Florida.

DISTRIBUTION. Bermuda, Florida, and Gulf of California.

*Dasycaris* Kemp, 1922

*Dasycaris kerstitchi* new species

Fig. 2

DESCRIPTION. Carapace smooth. Dorsal surface with 2 prominent teeth, the anterior one the larger. Small knob posterior to orbit. Antennal spine present. Antero-lateral margin rounded. Rostrum missing from this specimen.

Abdominal segments smooth. Pleura of first 2 segments rounded. Third segment not produced in dorsal midline, with pleura bluntly pointed. Pleura of fourth and fifth segments produced ventrally. Sixth segment shorter than telson, with sharp posterolateral point. Telson 3× as long as broad, with 2 pair marginal spines and 3 pair spines on posterior margin.

Eye large. Cornea oblique, hemispherical and not conoidally produced. Eyestalk rounded, with very large median knob.

Antennular peduncle slightly shorter than scaphocerite. Basal segment about 2× as long as wide, sides subparallel. Stylocerite sharp, less than 0.5× length of basal segment. Distolateral border with broad, triangular tooth. Statocyst well developed. Second segment about 0.3× length of basal segment. Distal segment about equal to second segment. Lower flagellum biramous, with rami fused proximally. Aesthetascs present on this flagellum. Upper flagellum broken.

Antenna with basicerite unarmed. Carpocerite subcylindrical, short and stout, reaching about 0.5× length of scaphocerite. Antennal flagellum broken, but exceeding at least length of carapace. Scaphocerite without lateral spine, 2.5× as long as wide.

Mandible without palp. Molar process with stout, blunt teeth, incisor process laminar, with small teeth. First maxilla with long setae along edges of endites. Second maxilla with nonsetose palp and well-developed scaphognathite. First maxilliped with small palp. Basal and coxal endites forming lamina. Large caridean lobe, large epipod, and exopod present. Second maxilliped with terminal segment having rows of long and short setae. Coxa with elongated epipod. Exopod present. Third maxilliped slender. Antepenultimate segment fused with basis, about 4× as long as wide, with curved margins. Penultimate segment less than 0.5× length of antepenultimate, 2× as long as wide. Ultimate segment shorter than penultimate, 2× as long as wide, setose. Epipod, exopod, and arthrobranch present.

First pereopod slender, exceeding end of scaphocerite by about 0.5× length of carpus and length of chela. Palm of chela subcylindrical, 2× as long as wide. Fingers simple, slightly gaping. Carpus about 6× as long as wide. Merus about equal to carpus, ischium about 0.5× length of merus, basis about equal to ischium. Coxa short and stout.

Second pereopods missing.

Third pereopod with strongly curved dactyl, about 3× as long as basal width. Dactyl simple, without basal process, with slight swelling in middle of flexor margin. Propodus about 5× as long as

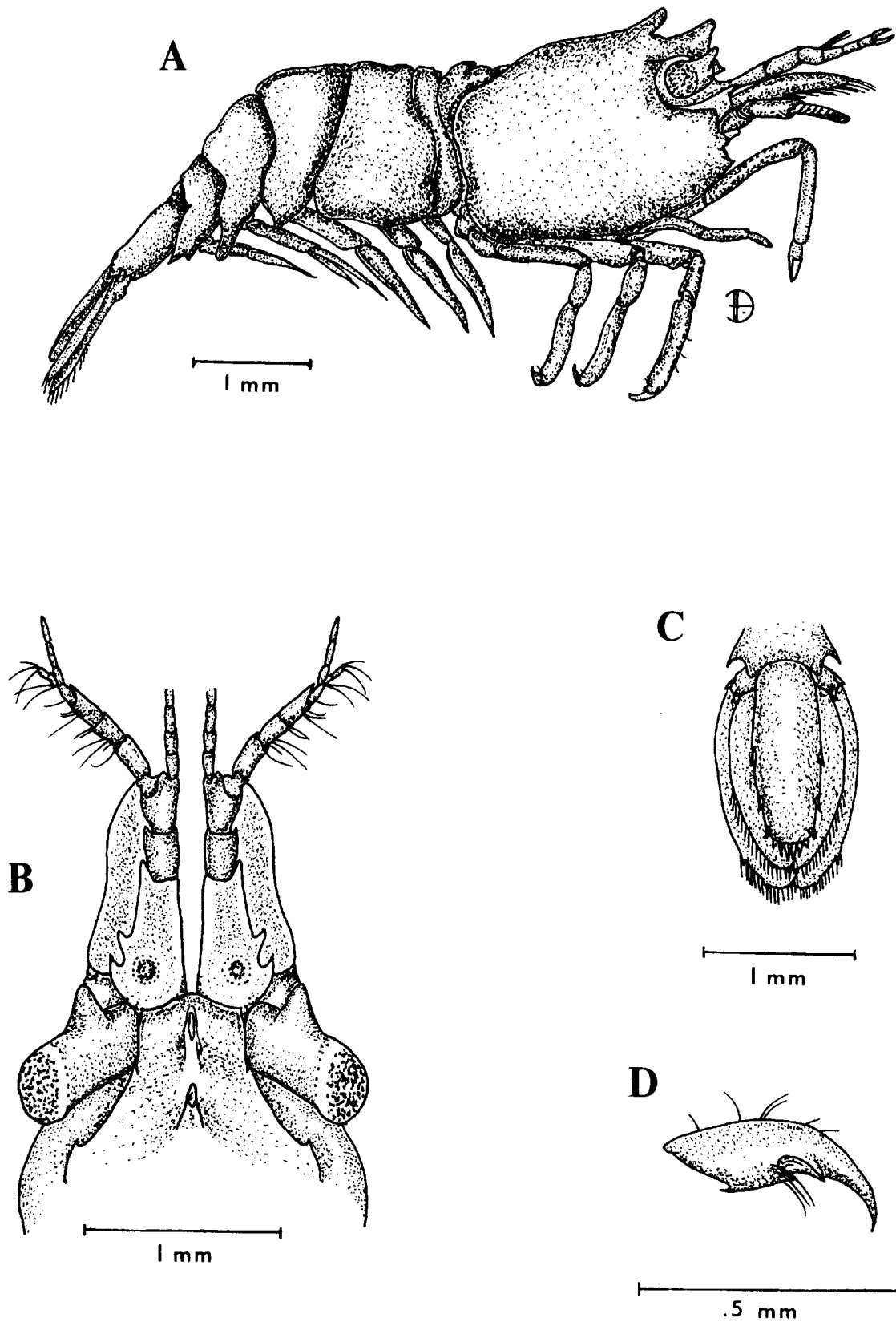


Figure 2. *Dasycares kerstitchi* n. sp. Holotype, female. A, whole animal in lateral view; B, dorsal view of frontal region (rostrum broken); C, tail fan; D, dactyl of third pereopod.



wide, slightly curved. Carpus about  $0.3\times$  length of propodus. Merus about  $0.9\times$  carpus,  $3.5\times$  as long as broad. Ischium about  $0.5\times$  length of merus. Fourth and fifth pereopods similar to third.

Second pleopod with appendix interna.

Uropods exceeding telson. Basipodite without spines. Outer branch of uropod with small lateral tooth.

HOLOTYPE. Female, total length 8.2 mm. Punta Doble, San Carlos, Sonora ( $27^{\circ}56'N$ ,  $111^{\circ}02'W$ ), 30 m, on cliff among *Antipathis grandis*; 29 December 1981, Alex Kerstitch. AHF type number 813.

COLOR IN LIFE. Pinkish purple (color slide by A. Kerstitch).

REMARKS. *Dasycaris kerstitchi* is most closely related to *D. zanzibarica* Bruce. The dorsal teeth of the carapace are very similar in the two species. In both, the third maxilliped has an arthrobranch, and there are no spines on the propodi of the third to fifth pereopods. However, in *D. kerstitchi*, the pleura of the fourth and fifth abdominal segments are much more elongated, there is no lateral tooth on the scaphocerite, and the telson is broader. *Dasycaris zanzibarica* usually has a hepatic tooth rather than a knob near the orbit. The color patterns also are different—*D. zanzibarica* is transparent with yellow-white bands. Both species are associated with antipatharians.

Other species of *Dasycaris* occur in the Indo-West Pacific region, being found associated with pennatulaceans or other hosts (Bruce 1973). *Dasycaris kerstitchi* is the first member of the genus to be recorded from the eastern Pacific.

The species is named in honor of its collector, Alex Kerstitch.

*Pontonia* Latreille, 1829

*Pontonia chimaera* Holthuis

*Pontonia chimaera* Holthuis, 1951b: 125, pl. 39, figs. a–p.—1952a: 15.

MATERIAL. Bahía Venetia, Sonora (30 June 1975, E. Stull, 1 specimen, in shell of gastropod).

HABITAT. Commensal in mantle cavities of gastropods.

TYPE LOCALITY. West of Cocal, north side of Isla Pedro Gonzales, Archipiélago de las Perlas, Panamá.

DISTRIBUTION. The species is known only from these two records.

*Pontonia pinnae* Lockington

*Pontonia pinnae* Lockington, 1878: 163.—Holthuis 1951b: 118, pl. 36, figs. a–l.—1952a: 15.—Brusca 1980: 250, fig. 14.5.

MATERIAL. MÉXICO: Bahía Cholla, Sonora (6 September 1967, sand and rock, Tom and Beatrice Burch, 2 specimens).—Punta Lobos, Sonora (10 January 1967, rocks, Burch 67006, 1 specimen).—Hidden Beach, Sonora (20 August 1967, in *Pinna* sp., Burch 67120, 1 specimen).—Estero de los Seris, Sonora (no date, E. Stull, 3 specimens).—Window Rock, Guaymas (27 June 1978, 18 m, A. Kerstitch, 3 specimens).—Guaymas (17 February 1948, J. Burch, many specimens).—Puerto Escondido, Gulf of California (22 January 1955, sta. K121, 6 specimens).

HABITAT. Shallow water, commensal in pen shell (hacha), *Pinna rugosa*.

TYPE LOCALITY. Bahía de los Angeles, Bahía de Mulege, and Isla San Jose, Gulf of California.

DISTRIBUTION. Gulf of California to Panamá.

COLOR IN LIFE. Milky white.

*Pontonia margarita* Smith

*Pontonia margarita* Smith, 1869: 245.—Chace 1937: 136.—Holthuis 1951b: 137, pl. 43, figs. a-i.—1952a: 15.—Brusca 1980: 250, fig. 14.7.—Hendrickx, Wicksten, and van der Heiden 1983: 70.

**MATERIAL.** MÉXICO: Cove S of Bahía Ballenas (22 February 1936, shore, sand, and rock; sta. 510-36, 3 specimens; 21 March 1936, shore, sand, rock, *Pinna* sp.; sta. 608-36, 1 specimen).—Bahía San Gabriel, Isla Espíritu Santo (20 March 1936, shallow water, coral; sta. 604-36, 1 specimen).—North Bay, Isla San Francisco (25 February 1936, shore, rock and sand; sta. 518-36, 16 specimens).—Isla San Francisco (9 March 1937, shore, sta. 652-37, 1 specimen).—Bahía Agua Verde, Gulf of California (18 March 1936, sta. 602-36, shore, 1 specimen).—Puerto Escondido, Gulf of California (16 March 1936, shore, shingle; sta. 591-36, 1 specimen).—COSTA RICA: Isla Olacinta, Puntarenas (21 January 1982, 7 m, reef; R. DuBois, 2 specimens).

**HABITAT.** Shore to shallow subtidal zone, commensal in pearl oyster, *Pinctada mazatlanica*; and related species.

**TYPE LOCALITY.** Bay of Panamá.

**DISTRIBUTION.** Eastern and western coasts of Florida; Gulf of California, Panamá, Colombia, and Galápagos Islands.

*Pontonia longispina* Holthuis

*Pontonia longispina* Holthuis, 1951b: 128, pl. 40, figs. a-j.—1952a: 15.—Brusca 1980: 250, fig. 14.6.

**MATERIAL.** MÉXICO: Puerto Refugio, Isla Ángel de la Guardia (27 January 1940, shore, rocks; sta. 1049-40, 1 specimen).—Bahía Catalina, off Guaymas (9 February 1940, shore, shingle; sta. 1092-40, 1 specimen).

**HABITAT.** Intertidal zone.

**TYPE LOCALITY.** Puerto Refugio, Isla Ángel de la Guardia.

**DISTRIBUTION.** The species is known only from these two records.

*Pontonia simplex* Holthuis

*Pontonia simplex* Holthuis, 1951b: 135, pl. 42, figs. a-m.—1952a: 16.

**MATERIAL.** MÉXICO: Puerto Escondido, Gulf of California (20 March 1949, rocky beach, 2 specimens).—Bahía Tenacatita, Colima (15 February 1935, lagoon with *Pinna* sp., sta. 487-35, 1 specimen).

**HABITAT.** Shore, among *Pinna* sp.

**TYPE LOCALITY.** Bahía Tenacatita, Colima.

**DISTRIBUTION.** The species is known only from these two records.

*Pseudocoutierea* Holthuis, 1951b*Pseudocoutierea elegans* Holthuis

*Pseudocoutierea elegans* Holthuis, 1951b: 182, pl. 57, figs. a-r.—1952b: 19.—Word and Charwat 1976: 171.—Abele 1976: 71.

**MATERIAL.** MÉXICO: Off Isla Ildefonso, Gulf of California (15 March 1937, 92 m, sand and shell, sta. 677-37, 1 specimen).—S of White Friars, Guerrero (2 March 1934, 46 m, rock; sta. 264-34, 1 specimen).

**HABITAT.** Subtidal sand and rock bottoms.

**TYPE LOCALITY.** 0.5 miles east of Long Pt., Santa Catalina Island, California (sta. 1405-41).

**DISTRIBUTION.** Southern California, western México, Isla Malpelo, Galápagos Islands.

*Neopontonides* Holthuis, 1951b

*Neopontonides dentiger* Holthuis

*Neopontonides dentiger* Holthuis, 1951b: 193, pl. 61. figs. a-l.—1952b: 8.

**MATERIAL.** MÉXICO: Bahía de Mazatlán, Sinaloa (27 September 1979, 8 m, sand and rock; sta. CH-9, R.V. *El Puma*, 1 specimen, EMU).—Off Punta Piaxtla, Sinaloa (24 April 1981, mud, stones, and gorgonians, no depth; R.V. *El Puma*, SIPCO I cruise, 1 specimen, EMU).

**HABITAT.** Subtidal bottoms.

**TYPE LOCALITY.** Ecuador, off Cabo San Francisco.

**DISTRIBUTION.** Only these three locations are known.

## FAMILY GNATHOPHYLLIDAE

*Gnathophyllum* Latreille, 1819

*Gnathophyllum panamense* Faxon

*Gnathophyllum panamense* Faxon, 1893: 198.—1895: 146, pl. E.—Sivertsen 1933: 6.—Hult 1939: 6.—Abele 1976: 273, 270.—Abele and Patton 1976: 37.—Brusca 1980: 252, pl. 5.—Hendrickx, Wicksten, and van der Heiden 1983: 70.

**MATERIAL.** MÉXICO: Cabeza Ballena, Baja California (4 March 1937, shore, rocks; sta. 623-37, 3 specimens). Bahía San Gabriel, Isla Espíritu Santo (14 February 1940, shoal, coral; sta. 1110-40, 1 specimen).—Isla San Esteban, Gulf of California (5 February 1940, shore, rock; sta. 1083-40, 1 specimen).—Islas San Jorge (11 October 1974, 6-7 m, M. R. Gilligan, 1 specimen).—Isla San Nicolas, Sonora (2 July 1978, 18 m, A. Kerstitch, 2 specimens).—Bahía Venetia, Sonora (30 June 1975, 3-10 m, R. C. Brusca, 1 specimen).—Guaymas, Sonora (13 August 1973, 0-3 m, M. Molles, 1 specimen).—Punta Los Cerritos, Mazatlán (8 May 1981, shore, rocks, 1 specimen, EMU).—GALÁPAGOS: Black Beach, Isla Santa María (Charles Island) (27 January 1933, shore, rock; sta. 33-33, 1 specimen; 18 January 1934, shore, rock; sta. 163-34, 1 specimen; 6 December 1935, shore, rock; sta. 313-35, 1 specimen).—Darwin Bay, Tower Island (16 January 1938, shore, rock; sta. 782-38, 1 specimen).

**HABITAT.** Among rocks, shore to 20 m.

**TYPE LOCALITY.** Panamá, on reef.

**DISTRIBUTION.** Gulf of California, Panamá, Galápagos Islands.

**COLOR IN LIFE.** Dark brown with red and white spots. Rostrum, eyes and antennae pale ochre. Fifth and sixth abdominal segments also ochre. Basal joints of second pair of chelipeds and third to fifth legs violet. Merus, carpus, and fingers of second pair of chelipeds ochre (Faxon 1895).

## FAMILY PANDALIDAE

## Key to Species

1. Rostrum movable, with 4–5 dorsal spines and 27–36 ventral spines. Second legs unequal, left with 18 carpal segments and right with 8 carpal segments . . . . . *Pantomus affinis* Chace  
 – Rostrum immovable, with 4–5 dorsal spines and 10–14 ventral spines. Second leg unequal, left with about 100 carpal segments and right with 20 carpal segments . . . . .  
 . . . . . *Plesionika mexicana* Chace

*Pantomus* A. Milne-Edwards, 1883

*Pantomus affinis* Chace

*Pantomus affinis* Chace, 1937: 116.

*Pantomus* sp.—Mendez 1981: 98, fig. 308.

**MATERIAL.** COSTA RICA: Gulf of Dulce (26 March 1939, 35–92 m, mud and fine sand; sta. 941-39, 2 specimens).—PERÚ: SW of Lobos de Tierra (17 May 1971, 712–744 m, E. del Solar, M. Viacava, and J. Velez, 4 specimens, IMARPE).

**HABITAT.** Mud and sand, 40–744 m.

**TYPE LOCALITY.** Bahía Santa Inez, Baja California.

**DISTRIBUTION.** Only these three localities are known.

**COLOR IN LIFE.** Body transparent and colorless except for variable number of red and yellow chromatophores on carapace and abdomen. Mouthparts yellowish (Chace 1937).

*Plesionika* Bate, 1888

*Plesionika mexicana* Chace

*Plesionika mexicana* Chace, 1937: 112, fig. 1.—Wicksten 1978: 85.—Méndez 1981: 103.

**MATERIAL.** MÉXICO: 1.25 mi. SW of Cabeza Ballena, Baja California (11 March 1949, sta. 1726-49, 13 specimens).—Off Isla San Pedro Nolasco, Sonora (29 March 1937, 138 m, sand; sta. 734-37, 1 specimen).—S of White Friars, Guerrero (2 March 1934, 46 m, rock; sta. 264-34, 1 specimen).—PANAMÁ: Off Isla Pacora, off Bahía Honda (21 February 1934, 28–46 m, rock, shell and nullipores; sta. 245-34, 1 specimen).—COLOMBIA: Bahía Octavia (27 January 1935, 55–65 m, sand and gravel; sta. 429-35, 11 specimens).—N of Isla Gorgona (24 February 1938, 74–111 m, sta. 854-38, 6 specimens).—GALÁPAGOS: Tagus Cove, Isla Isabela (Albemarle Island) (13 January 1934, 55 m, rock, coral and nullipores; sta. 147-34, 3 specimens).—PERÚ: Banco de Mancora (9 January 1971, 230 m, SNP-1 sta. 7101, M. Viacava, V. Alamo, 1 specimen, IMARPE).

**HABITAT.** Sand, mud, or shell bottoms, 28-258 m.

**TYPE LOCALITY.** Arena Bank, México.

**DISTRIBUTION.** Redondo Beach, California; Gulf of California, southern México, Panamá, Colombia, Ecuador, Galápagos Islands, Perú.

**COLOR IN LIFE.** Translucent white with short, longitudinal scarlet stripes, alternating with areas speckled with opaque white dots (Chace 1937).

## FAMILY HIPPOLYTIDAE

## Key to the Species

1. Lateral surface of carapace with many scattered spines. Carpus of second pereopods with 2 segments . . . . . *Trachycaris restrictus* (A. Milne-Edwards)

- Lateral surface of carapace with at most 2 spines. Carpus of second pereopods with 3 or more segments . . . . . 2
- 2. Carpus of second pereopods with 3 segments. (Small species, often associated with sea grasses or algae) . . . . . 3
- Carpus of second pereopods with 6 or more segments. (Size and associations various) . . . . . 5
- 3. Rostrum deep, lamellate. Anterior margin on carapace with 10 spines. No hepatic spine . . . . . *Latreutes antiborealis* Holthuis
- Rostrum elongate. Anterior margin of carapace with 2 spines. One hepatic spine . . . . . 4
- 4. First antennular segment with prominent outer distal spine, occasionally with smaller spine. Rostrum of female almost as long as scaphocerite . . . . . *Hippolyte californiensis* Holmes
- First antennular segment with 3 spines. Rostrum of female about 0.6× length of scaphocerite . . . . . *Hippolyte williamsi* Schmitt
- 5. Carpus of second pereopod with 6 segments. Rostrum reaching at most to limit of anteriorly directed eye . . . . . 6
- Carpus of second pereopod with more than 6 segments. Rostrum reaching to or beyond limit of anteriorly directed eye . . . . . 7
- 6. Supraorbital spine present. Subtidal only . . . . . *Thor spinosus* Boone
- Supraorbital spine absent. Intertidal-subtidal, often among *Sargassum* sp. . . . . *Thor paschalis* (Heller)
- 7. Carpus of second pereopods with 7 segments. Flagellum of antenna not as long as body . . . . . 8
- Carpus of second pereopod with more than 7 segments. Flagella of antenna often as long as body . . . . . 9
- 8. Exopod on third maxilliped. Eyestalks often reaching second segment of antennular peduncle. Third maxillipeds slender . . . . . *Eualus lineatus* Wicksten and Butler
- No exopod on third maxilliped. Eyestalks not reaching end of first segment of antennular peduncle. Third maxillipeds often long and stout . . . . . *Heptacarpus palpator* (Owen)
- 9. Rostrum with 4 dorsal teeth, 12 ventral teeth. (23 segments in carpus of second pereopod. Usually in southern Gulf of California) . . . . . *Lysmata trisetacea* (Heller)
- Rostrum with 5–8 dorsal teeth, 1–5 ventral teeth. (17–32 segments in carpus of second pereopod. Upper to middle Gulf ranging southward) . . . . . 10
- 10. 17 segments in carpus of second pereopods. (Rostrum with 5–6 (rarely 7) dorsal teeth, 1 ventral tooth) . . . . . *Lysmata galapagensis* Schmitt
- 23 or more segments in carpus of second pereopods. (Rostrum with 6 or more dorsal teeth, 3 or more ventral teeth) . . . . . 11
- 11. Rostrum with 3 ventral teeth, narrow, with 6–7 dorsal teeth. (26–32 segments in carpus of second pereopods) . . . . . *Lysmata californica* (Stimpson)
- Rostrum with 4–5 ventral teeth, deep, with 7–8 dorsal teeth. (23–30 segments in carpus of second pereopods) . . . . . *Lysmata intermedia* (Kinglsey)

*Trachycaris* Calman, 1906

*Trachycaris restrictus* (A. Milne-Edwards)

*Hippolyte restrictus* A. Milne-Edwards, 1878: 231.

*Platybema rugosum* Bate, 1888: 579, pl. 104, fig. 2.

*Trachycaris rugosus*.—Holthuis 1947: 16.

*Trachycaris restrictus*.—Holthuis 1949: 233, figs. 2, 3.—Chace 1972: 142.—Hendrickx, Wicksten, and van der Heiden 1983: 71.

*Trachycaris restricta*.—Holthuis 1951a: 130, fig. 27.

MATERIAL. MÉXICO: S of Isla Tortuga, Gulf of California (13 March 1936, 42 m, volcanic sand, sta. 576-36, 2 specimens).—PANAMÁ: Off Isla Medidor, Bahía Honda (28 March 1939, 56–65 m, rock, mud, coralline algae; sta. 948-39, 1 specimen).

HABITAT. Sand, rock, mud, and coralline bottoms, 0–100 m.

TYPE LOCALITY. Cape Verde Islands.



DISTRIBUTION. Eastern Atlantic from the Canary Islands to St. Helena Island; Bermudas to Estado do Para, Brazil; Gulf of California, Panamá.

COLOR IN LIFE. Bright red (Holthuis 1949).

*Latreutes* Stimpson, 1860

*Latreutes antiborealis* Holthuis

*Latreutes* sp.—Chace 1937: 129, fig. 7.

*Latreutes antiborealis* Holthuis, 1952c: 62, fig. 14.—Hendrickx, Wicksten, and van der Heiden 1983: 71.

MATERIAL. MÉXICO: Off Bahía Santa Maria, Baja California (19 January 1940, 33–46 m, sand; sta. 1031-40, 2 specimens).—Off Rocky Point, Sonora (2 February 1940, 18–20 m, mud, sand and shell; sta. 1072-40, 1 specimen).—Ensenada de San Francisco, Sonora (7 February 1940, sand, trawled, sta. 1088-40, 1 specimen).—Bahía de Mazatlán, Sinaloa (22 February 1980, 6 m, sand; sta. C9 VV7, boat *FC-1*, 1 specimen, EMU).—GALÁPAGOS: Isla Santa Fe (Barrington Island) (2 February 1933, 7–18 m, rock; sta. 46-33, 1 specimen).—Off S Seymour Island (19 February 1933, 28 m, sand and shell; sta. 87-33, 2 specimens).—Academy Bay, Isla Santa Cruz (Indefatigable Island) (20 January 1934, 28–46 m, sand, rock, and algae; sta. 169-34, many specimens).—Post Office Bay, Isla Santa María (Charles Island) (27 January 1934, 15–18 m, sand, rock, and algae; sta. 193-34, 4 specimens).—Gardner Bay, Isla Española (Hood Island) (19 December 1934, 36 m, rock, kelp, and algae; sta. 362-35, 1 specimen).—PERÚ: Paita (6 October 1926, 39 specimens, USNM).—Off Islas Viejas, Bahía Independencia (12 January 1935, 22 m, sand; sta. 373-35, 1 specimen, USNM).—Bahía Independencia (14 January 1935, 9 m, rock and sand; sta. 382-35, 9 specimens, USNM).

HABITAT. Sandy bottoms, 4–46 m.

TYPE LOCALITY. Golfo de Ancud, Canal San Antonio, Chile.

DISTRIBUTION. I have borrowed the specimen from Santa Inez Bay, Baja California, which was examined by Chace (1937), from the American Museum of Natural History. I compared it with specimens of *L. antiborealis* from Chile. The material from the Gulf of California and Chace's specimen match exactly the description given by Holthuis (1952c).

*Hippolyte* Leach, 1814

*Hippolyte californiensis* Holmes

Fig. 3

*Hippolyte californiensis* Holmes, 1895: 576, figs. 21–26.—Holmes 1900: 193.—Rathbun 1904: 56.—Schmitt 1921: 48, fig. 26.—Holthuis 1947: 14.—Chace 1951: 35, fig. 1 (in part).—MacGinitie and MacGinitie 1968: 273.—Ricketts, Calvin, and Hedgpeth 1968: 266.—Word and Charwat 1976: 135.—Brusca 1980: 254, fig. 14.12.—Chace and Abbott 1980: 569, 573, fig. 23.9.

MATERIAL. MÉXICO: Bahía San Carlos, Sonora (2 February 1958, E. S. Reese, 1 specimen). Also 70 specimens from 11 other stations, Friday Harbor, Washington (1 September 1949, J. L. Mohr, 1 specimen) to Bahía de los Angeles, Baja California (3 March 1936, 2 m, sand, sta. 539-36, 1 specimen).

HABITAT. Shore to 10 m, among sand, algae, *Zostera* sp. or rocks.

TYPE LOCALITY. Bodega Bay, California.

DISTRIBUTION. Sitka, Alaska; Puget Sound; Humboldt Bay, Bodega Bay, and Mission Bay, California; west coast of Baja California, occasional in Gulf of California.

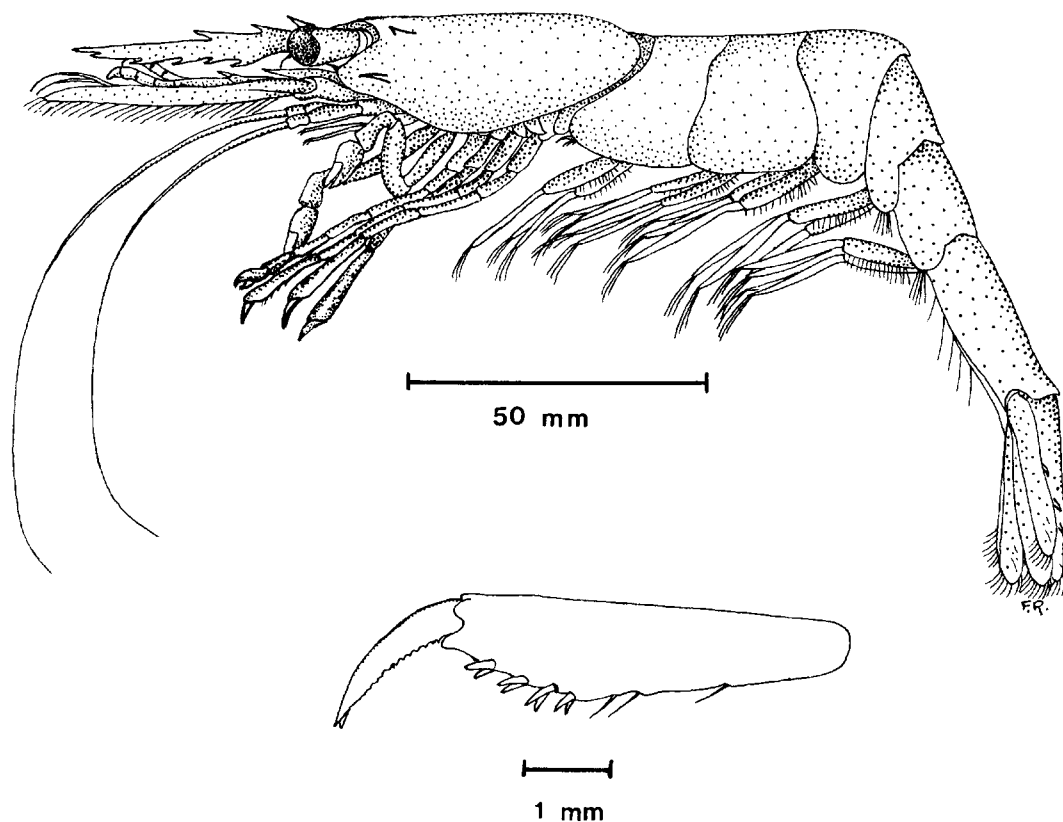


Figure 3. *Hippolyte californiensis* Holmes. Male in lateral view, detail of propodus and dactyl of third pereopod.

**COLOR IN LIFE.** Bright green to brown, matching algae or eelgrass. (Color notes from live specimens from Humboldt Bay, California).

*Hippolyte williamsi* Schmitt

*Hippolyte williamsi* Schmitt, 1924: 163, fig. 40.—Wicksten 1979: 627.

*Hippolyte mexicana* Chace, 1937: 127, fig. 6.

*Hippolyte californiensis*.—Chace 1951: 35, fig. 1 (in part).

**MATERIAL.** About 75 specimens from 22 stations; throughout Gulf of California, Zihuantanejo, Guerrero; Ecuador, Galápagos Islands, Perú, Chile.

**COLOR IN LIFE.** Brown or green (color note by W. L. Schmitt for sta. 14-33).

**REMARKS.** This common shrimp long has been confused with *H. californiensis* in the Gulf of California, probably due to lack of study of a series of specimens. Comparison of males and females from the outer western Mexican coast, the Gulf of California, and more southern regions reveals that the male described as *H. mexicana* is not the male of *H. californiensis*, but rather that of *H. williamsi*. The two can be told apart quickly by counting the spines on the distal end of the first antennular segment: *H. californiensis* has one (rarely two), *H. williamsi* has three. A comparison of the three western American species of *Hippolyte* is given in Table C. The male of *H. californiensis*, not illustrated previously, is shown in Fig. 2.

*Thor* Kingsley, 1878a

*Thor paschalis* (Heller)

*Hippolyte paschalis* Heller, 1862: 276, pl. 3, fig. 24.

**Table C**  
**Comparison of the Three Western American Species of *Hippolyte*.**

	<i>Hippolyte clarki</i> Chace	<i>Hippolyte californiensis</i> Holmes	<i>Hippolyte williamsi</i> Schmitt
Rostrum length	Female: exceeds antennal scale. Male: reaches end of antennal scale.	Female: about equal to antennal scale. Male: equals first segment of antennal peduncle.	Female: reaches 4/7 of antennal scale. Male: reaches middle of second segment of antennular peduncle.
Rostral spines, tip	(1-3)/(1-5) trifid	(3-4)/(3-5) bifid	(2-4)/(2-5) bifid
Spines of first segment of antennular peduncle	No spines	Usually 1, rarely 2	3 spines
Spines of merus of pereopod #3	2-5	3-5	3
Spines of dactyl of pereopod #3	Female: 8 long upper, 6-8 lower spines. Male: 5-6 upper, 1 strong spine, 14 lower spines.	Female: 3 long and stout, 10-13 long spines on lower margin. Male: numerous lower spines, difficult to count.	Female: 3 short upper, 3 long, 5 short stout spines on lower margin. Male: 5 upper, 2 apical, 16 lower spines.
Spines of merus of pereopod #4	To 5	3 spines	2 spines
Spines of merus of pereopod #5	To 4	1 spine	No spines
Range, habitat	Sheep Bay, Alaska (Butler, 1980) to Cedros Island, Baja California. Among giant kelps and eelgrass.	Sitka, Alaska to Baja California, rare in Gulf of California. Usually among <i>Zostera marina</i> .	Gulf of California to Chile. Among rocks and <i>Sargassum</i> spp.

*Thor paschalis*.—Holthuis 1947: 14, 49-50.—Bruce 1976: 50, 57.—Hendrickx, Wicksten, and van der Heiden 1983: 71.

**MATERIAL.** About 130 specimens from 15 stations, Gulf of California, Acapulco and Zihuatanejo, Guerrero; Panamá.

**HABITAT.** Intertidal to 20 m, among rocks or algae; particularly common among *Sargassum* sp.

**TYPE LOCALITY.** Red Sea.

**DISTRIBUTION.** Red Sea, Madagascar, Indian Ocean, Indonesia, Singapore, Mariana Islands, Zanzibar, Kenya, Gulf of California, western México, Panamá.

**COLOR IN LIFE.** Translucent with thin transverse dark lines of chromatophores (color slide by A. Kerstitch).

*Thor spinosus* Boone

*Thor spinosus* Boone, 1935: 192, pl. 52.—Bruce 1976: 51.

**MATERIAL.** Canal de San Lorenzo, Gulf of California (7 March 1937, 6-9 m, sand, corallines, and other algae; sta. 639-37, 1 specimen).

**HABITAT.** Subtidal bottoms with sand and algae.

**TYPE LOCALITY.** Temukus Roads, Bali.

**DISTRIBUTION.** Kenya, Seychelles, Bali, Celebes, Japan, Hawaii, Gulf of California.

**COLOR IN LIFE.** Ground dark olive brown with pattern of fine striae, with lateral margins of minute red chromatophores and row of larger bluish-white chromatophores down center. Pair of small dorso-lateral, dark bluish-red eyespots present on third abdominal tergite and pair of similar but larger spots on endopods of uropods. Single large median ventral spot present on sixth abdominal segment. Pereopods olive brown with fine white longitudinal striae (Bruce 1976).

*Eualus* Thallwitz, 1892

*Eualus lineatus* Wicksten and Butler

*Eualus lineatus* Wicksten and Butler, 1983: 3, figs. 1–2.

*Spirontocaris herdmani*.—Rathbun 1904: 100 (in part).

*Eualus herdmani*.—Holthuis 1947: 11 (in part).—Word and Charwat 1976: 103.—Hobson and Chess 1976: 567.—Butler 1980: 197.

Not *Spirontocaris herdmani* Walker, 1898: 277, fig. 2. (= *Heptacarpus herdmani* of Wicksten and Butler, 1983: 1).

**MATERIAL.** MÉXICO: Bahía San Gabriel, Isla Espiritu Santo (30 March 1949, 39 m, sta. 1780-49, many specimens). Also 43 specimens from 25 stations, Naha Bay, Alaska to Santa Catalina Island, California.

**HABITAT.** Shallow subtidal zone, hard to sandy bottoms.

**DISTRIBUTION.** Alaska, British Columbia, Puget Sound, Oregon, southern California, Bahía San Gabriel, México.

**COLOR IN LIFE.** Red diagonal lines on carapace and first and second abdominal segments, red spots and blotches on third to sixth abdominal segments, telson, uropods, and protopodites of pleopods, smaller red spots on all anterior appendages, including eyestalk and pereopods (Butler 1980, color plate 1C).

**REMARKS.** *Eualus lineatus* long has been confused with *Heptacarpus herdmani*, known only from the holotype collected in Puget Sound. The latter species can be distinguished from the former easily by the lack of exopods on the third maxillipeds and the long, slender dactyls of the third to fifth pereopods.

*Heptacarpus* Holmes, 1900

*Heptacarpus palpator* (Owen)

*Hippolyte palpator* Owen, 1839: 89, pl. 28.

*Spirontocaris palpator*.—Rathbun 1904: 98.—Schmitt 1921: 65, fig. 43.—Ricketts, Calvin, and Hedgpeth 1968: 163, fig. 137.

*Heptacarpus palpator*.—Holthuis 1947: 12.—Word and Charwat 1976: 121.—Chace and Abbott 1980: 569.

**MATERIAL.** Bahía San Gabriel, Isla Espiritu Santo (30 March 1949, 39 m, sta. 1780-49, many specimens).

**HABITAT.** Tidepools, docks, and shallow subtidal algae.

**DISTRIBUTION.** San Francisco Bay, California to Bahía Magdalena, Baja California; Isla Espiritu Santo.

**COLOR IN LIFE.** Translucent with transverse lines of brown chromatophores to dark brown (color notes from live specimen from San Pedro, California).

**REMARKS.** The record from station 1780-49 is the only one from the Gulf of California. The species is common in low tide pools and in shallow subtidal zones in southern California.

*Lysmata* Risso, 1816*Lysmata trisetacea* (Heller)

*Hippolyte trisetacea* Heller, 1861: 29.

*Hippolysmata paucidens* Rathbun, 1906: 913, pl. 24, fig. 4.

*Lysmata paucidens*.—Schmitt 1939: pl. 12.

*Lysmata trisetacea*.—Holthuis 1948: 19, 65.—Chace 1962: 614.—Abele 1975: 81.

MATERIAL. MÉXICO: S of Punta Arena, Gulf of California (2 February 1971, 3–5 m, rocks; *Searcher* sta. 44, 6 specimens).—Bahía San Gabriel, Isla Espíritu Santo (14 February 1940, shoal, coral; sta. 1110-40, 3 specimens).—Braithwaite Bay, Isla Socorro (3 January 1934, shallow, *Pocillopora* sp., sta. 131-34, 1 specimen; 18 March 1939, 129–138 m, rock and shell; sta. 925-39, 1 specimen).

HABITAT. Among rock, shell, or coral, intertidal to 150 m.

TYPE LOCALITY. Red Sea.

DISTRIBUTION. Red Sea to Hawaiian Islands, southern Gulf of California, Clipperton, Clarion, Socorro, and Malpelo Islands.

*Lysmata galapagensis* Schmitt

*Lysmata galapagensis* Schmitt, 1924: 165, fig. 41.—Hult 1939: 6.—Holthuis 1947: 19.—Abele 1975: 81.—Wicksten 1979: 629.

MATERIAL. MÉXICO: N of Punta Entrada, Bahía Magdalena (2 November 1971, *Searcher* sta. 288, 2 specimens).—Bahía Venetia, Sonora (30 June 1975, 3–10 m, R. C. Brusca, 2 specimens).—Window Rock, Guaymas (24 June 1978, 10 m, A. Kerstitch, 5 specimens).—Isla María Cleofa (18 March 1956, sta. KW-17, 1 specimen).—San Lorenzo Reef, Acapulco (4 September 1946, sta. H46-234, 1 specimen).

HABITAT. Rocky bottoms, intertidal to 10 m.

TYPE LOCALITY. Northeast of Eden, Galápagos Islands.

DISTRIBUTION. Bahía Magdalena, Baja California; Gulf of California, southwestern México, Panamá, Galápagos Islands.

COLOR IN LIFE. Red, with transverse stripes of brown and white on abdomen and posterior part of carapace (color slide by A. Kerstitch).

*Lysmata californica* (Stimpson)

*Hippolysmata californica* Stimpson, 1866: 48.—Holmes 1900: 180, pl. 2, fig. 38.—Rathbun 1904: 56.—Schmitt 1921: 49, fig. 27.—Holthuis 1947: 19.—MacGinitie and MacGinitie 1968: 274.—Ricketts, Calvin, and Hedgpeth 1968: 144, fig. 117.

*Lysmata californica*.—Abele and Patton 1976: 37.—Word and Charwat 1976: 135.—Brusca 1980: 253, fig. 14.11.—Holthuis 1980b: 129.—Chace and Abbott 1980: 569, 573, fig. 23.8.—Standing 1981: 780.—Hendrickx, Wicksten, and van der Heiden, 1983: 70.

MATERIAL. About 75 specimens from 14 stations, outer coast of Baja California and Gulf of California.

HABITAT. Intertidal zone to 10 m, rocky bottoms and tide pools.

DISTRIBUTION. Usually south of Point Conception, California; rarely as far north as Tomales Bay; along outer coast of Baja California, throughout Gulf of California to Panamá.

**COLOR IN LIFE.** Translucent with transverse bands of red chromatophores, giving overall bright red color as seen at a short distance. Specimens from tidepools may have a greenish tint (color notes from live specimens from San Pedro, California).

**REMARKS.** *Lysmata californica* is abundant from southern California throughout the Gulf of California. It is primarily nocturnal, remaining in cracks or under rocks during daylight hours.

*Lysmata intermedia* (Kingsley)

*Hippolysmata intermedia* Kingsley, 1878a: 90.

*Lysmata intermedia*.—Sivertsen 1933: 5, pl. 2, figs. 9–15.—Holthuis 1947: 19.—Chace 1972: 128.

**MATERIAL.** MÉXICO: Off Punta Entrada, Bahía Magdalena (2 November 1971, subtidal, *Searcher* sta. 288, 1 specimen).—Guaymas (25 March 1978, 10 m, A. Kerstitch, 1 specimen; 28–29 March 1978, 3–6 m, A. Kerstitch, 1 specimen).—Bahía Bacoichibampo, Sonora (3 July 1978, 6 m, A. Kerstitch, 3 specimens).—Bahía de Mazatlán, Sinaloa (27 November 1980, 8 m, sand, sta. C16 Chango IV, boat *FC-1*, 1 specimen, EMU).—1–2 mi. NW of Matanchen Beach, Nayarit (21 December 1961, J. R. Paxton, 2 specimens).

**HABITAT.** Intertidal zone to 10 m, among rocks.

**TYPE LOCALITY.** Dry Tortugas, Florida.

**DISTRIBUTION.** Florida Keys to Tobago and Curacao, Azores, Gulf of California and west coast of México, Galápagos Islands, Perú.

**COLOR IN LIFE.** Translucent red with horizontal lines of broken silver dots (color slide by A. Kerstitch).

## FAMILY PROCESSIDAE

### Key to the Species

1. Only one of the first pair of pereopods chelate, other simple. First pereopods extending beyond scaphocerite ..... 2
  - Both of first pair of pereopods chelate. First pereopods extending to distal half of scaphocerite ..... 3
2. Second pereopods equal in length, carpus with 9–11 segments . . . *Processa aequimana* (Paulson)
  - Second pereopods not equal in length, the right longer than the left. Right carpus with about 55 segments ..... *Processa peruviana* n. sp.
3. Rostrum with apex bifid, extending beyond midpoint of eyestalk ..... *Ambidexter swifti* Abele
  - Rostrum with apex simple, not extending to midpoint of eyestalk ..... *Ambidexter panamensis* Abele

*Processa Leach*, 1815

*Processa aequimana* (Paulson)

*Nika aequimana* Paulson, 1875: 97, pl. 14.

*Processa aequimana*.—Manning and Chace 1971: 13.—Hayashi 1975: 80, fig. 10.

**MATERIAL.** MÉXICO: Bahía Salinas, Isla Carmen (13 July 1965, 0–2 m, B. Walker, SIO RR65-46, 1 specimen).—Punta Lobos, Isla Carmen (17 July 1965, 0–6 m, B. Walker, SIO RR65-69, 2 specimens).—Off Punta Chivato, Baja California (5 April 1980, 28 m, sand; A. Kerstitch, 5 specimens).—Inside George's Island, Gulf of California (3 February 1940, 21–24 m, sand and shell, sta. 1075-40, 1 specimen).—Reef on Punta San Felipe (8 April 1947, sta. H47-55, 1 specimen).—Bahía Tepoca, Sonora (4 February 1940, 22 m, sand and shell; sta. 1078-40, 1 specimen).

**HABITAT.** Sand bottoms, 2–28 m.

TYPE LOCALITY. Red Sea.

DISTRIBUTION. Red Sea, Israel, Mozambique, Java, South Vietnam, Japan, Gulf of California.

REMARKS. These small shrimp closely resemble the species described by Hayashi (1975). Two other species found in the Atlantic, *P. parva* Holthuis and *P. vicina* Manning and Chace, also are similar to the shrimp from the Gulf of California. Further study of a series of all of these specimens might resolve questions on whether the specimens from the Gulf of California should be designated as a separate species or subspecies.

*Processa peruviana* new species

Figs. 4–6

*Processa* sp.—Méndez 1981: 98, fig. 294.

DESCRIPTION. Rostrum simple, slightly shorter than cornea. Eyes large. Carapace with antennal spine.

Abdominal pleura rounded. Sixth segment  $1.25\times$  length of fifth. Telson  $2.25\times$  length of sixth segment, with 2 pair dorsal spines; first at  $0.33$  its length and second at  $0.66$  its length. Apex of telson with 2 long and 2 short spines.

First segment of antennular peduncle exceeding cornea, setose. Second segment about  $0.66\times$  first. Third segment about  $0.5\times$  second. Flagellum with 2 rami, one  $0.25\times$  length of other.

Sharp spine at inferodistal end of basal segment of second antenna. Spine of scaphocerite reaching level of distal margin of blade. Scaphocerite  $11\times$  as long as wide. Carpocerite about  $0.5\times$  length of blade. Flagellum long and slender.

Mandible without incisor process, molar process having 5 small spines on posterior margin. First maxilla with upper endite hooked, lower broad, without palp. Second maxilla with well-developed scaphognathite. First and second maxillipeds with exopods and epipods. Third maxilliped stout, longer than scaphocerite. Ultimate segment slender, setose. Penultimate segment  $1.5\times$  length of ultimate. Antepenultimate segment  $2.6\times$  length of penultimate. Exopod present.

Right first pereopod chelate. Dactyl about  $0.33\times$  length of propodus. Carpus  $0.66\times$  length of propodus. Merus  $2.66\times$  length of carpus. Ischium equal to carpus. No exopod, epipod, or arthrobranch present. Left first pereopod with simple, hooked dactyl. Propodus  $3\times$  length of dactyl. Carpus equal to propodus. Merus  $3.5\times$  length of carpus. Ischium  $0.66\times$  length of merus.

Right second pereopod longest appendage, about equal to entire body length. Dactyl of chela about  $0.5\times$  length of propodus. Carpus with 49–55 segments, the most distal the longest. Merus  $0.25\times$  length of carpus, with 20–21 segments. Ischium about  $0.38\times$  length of merus.

Left second pereopod considerably shorter than right, chelate. Dactyl of chela about  $0.5\times$  length of propodus. Carpus with 21–22 segments,  $10\times$  length of propodus. Merus about  $0.5\times$  carpus, with 7 segments. Ischium about equal in length to carpus.

Third pereopod long and slender. Dactyl simple. Propodus about  $2.5\times$  length of dactyl. Carpus  $2\times$  length of propodus. Merus about same length as carpus, with sharp proximal spine and smaller distal spine. Fourth pereopod with simple dactyl. Propodus  $3\times$  length of dactyl. Carpus  $2.5\times$  length of propodus. Merus about equal in length to carpus, with 4 lateral spines. Ischium  $1.75\times$  length of carpus, with sharp proximal spine and very small distal spine. Fifth pereopod very slender. Dactyl simple. Propodus  $4.25\times$  length of dactyl. Carpus about equal to propodus in length. Merus about equal to carpus, without spines. Ischium about  $0.5\times$  length of carpus, without spines.

First pleopods long and slender, exopods more than  $2\times$  length of endopods. Second pleopods with exopods and endopods equal in length, with appendix interna.

Uropods equal in length to telson,  $11\times$  as long as wide. Outer margin of exopods straight, with spine exceeding blade.

MATERIAL. About 145 specimens from 20 stations: outer coast of Baja California from Islas San Benito to Bahía Magdalena; Gulf of California, Off Isla Manuelita, Costa Rica; Gulf of Panamá, and north of Mancora, Perú.

HABITAT. Sandy bottoms, 31–107 m.

HOLOTYPE AND TYPE LOCALITY. Female, ovigerous, total length 31.5 mm. 2.75 mi. from

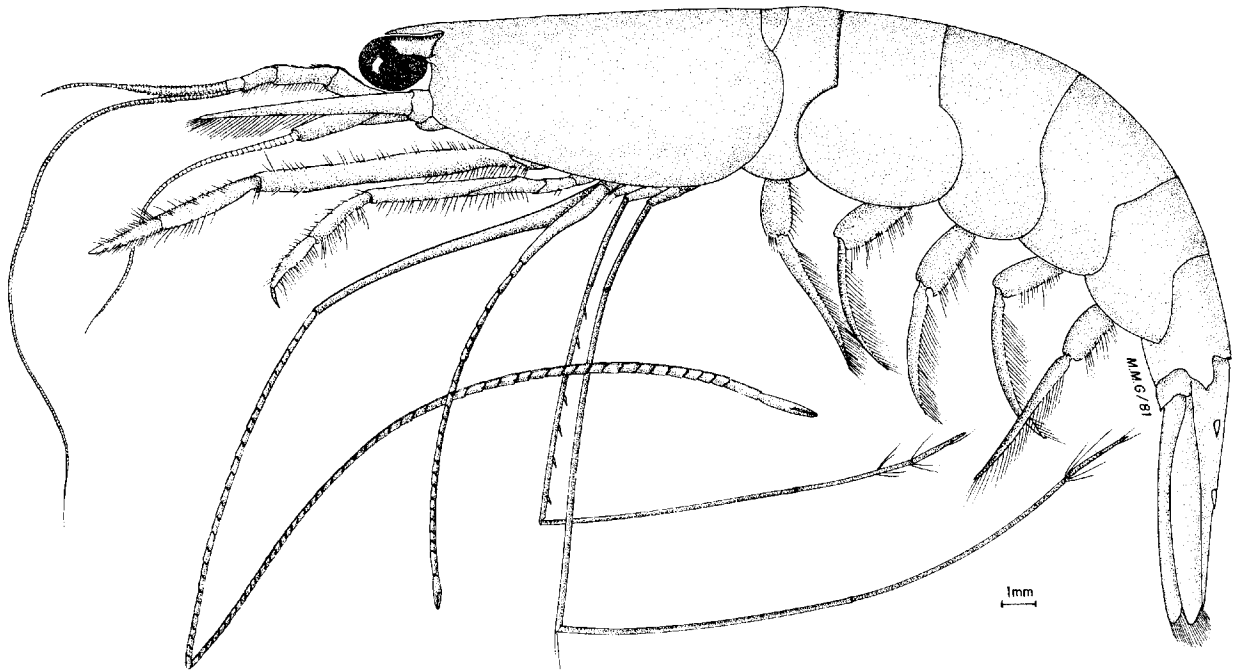


Figure 4. *Processa peruviana* n. sp. Male, lateral view.

Isla Manuelita, Costa Rica (5°36'09"N, 87°01'14"W), 146 m, beam trawl, 3 June 1973, *Velero IV* sta. 19044. AHF type number 735.

PARATYPES. 3 females, total lengths 41.7, 38.5, and 32.0 mm; N of Mancora, Perú (3°55'S, 81°01'W), 105 m, *SNP-1* sta. 27, cruise 7709, 3 September 1970, E. del Solar and V. Alamo, collectors; IMARPE.—Female, ovigerous, total length 34.6 mm; W side Isla Monserrate (25°39'N, 111°07.7'W), Gulf of California; 40 foot otter trawl, 11 July 1961, R. Rosenblatt, SIO 65-292.—Female, ovigerous, total length 40.2 mm, female, 37.0 mm, 3 males, 23.0, 23.3, and 20.3 mm; Bay of Panamá (7°56'0"N, 79°41'03"W), 95 m, mud; 30 March 1888, R.V. *Albatross* sta. 2805, USNM.—Female, ovigerous, total length 34.1 mm; off Mazatlán, Sinaloa (22°24'N, 105°55'W), Van Veen grab, 37 m, sand, 22 August 1981, SIPCO II sta. A1-VV0, Estación Mazatlán number EMU-1069.

DISTRIBUTION. Outer coast of Baja California, Gulf of California, Costa Rica, Panamá, and Perú.

REMARKS. *Processa peruviana* resembles *P. profunda* Manning and Chace and *P. canaliculata* Leach in having an exopod on the third maxilliped and an antennal spine. *Processa profunda*, from the Gulf of México, has a scaphocerite scarcely exceeding the antennular peduncle; *P. peruviana* has 69–76. In *Processa profunda*, the mandible has 18 small spines; in *P. peruviana* there are only five.

Like the European *P. canaliculata*, *P. peruviana* is a large and obvious species. In *P. canaliculata*, there are 44–53 mero-carpal articles in the right second pereopod, not 69–76. The lobe of the sixth abdominal segment in *P. canaliculata* usually is unarmed, while in *P. peruviana* it is armed. Neither *P. canaliculata* nor *P. profunda* is known to occur in the eastern Pacific. *Processa aequimana*, a much smaller species, lives in shallow water close to shore.

Although the species is widespread in the tropical eastern Pacific, I have chosen the specific epithet to commemorate its recognition as a new species in Perú.

*Ambidexter* Manning and Chace, 1971

*Ambidexter swifti* Abele

*Ambidexter swifti* Abele 1972: 366, figs. 1–3.—Abele 1976: 273.



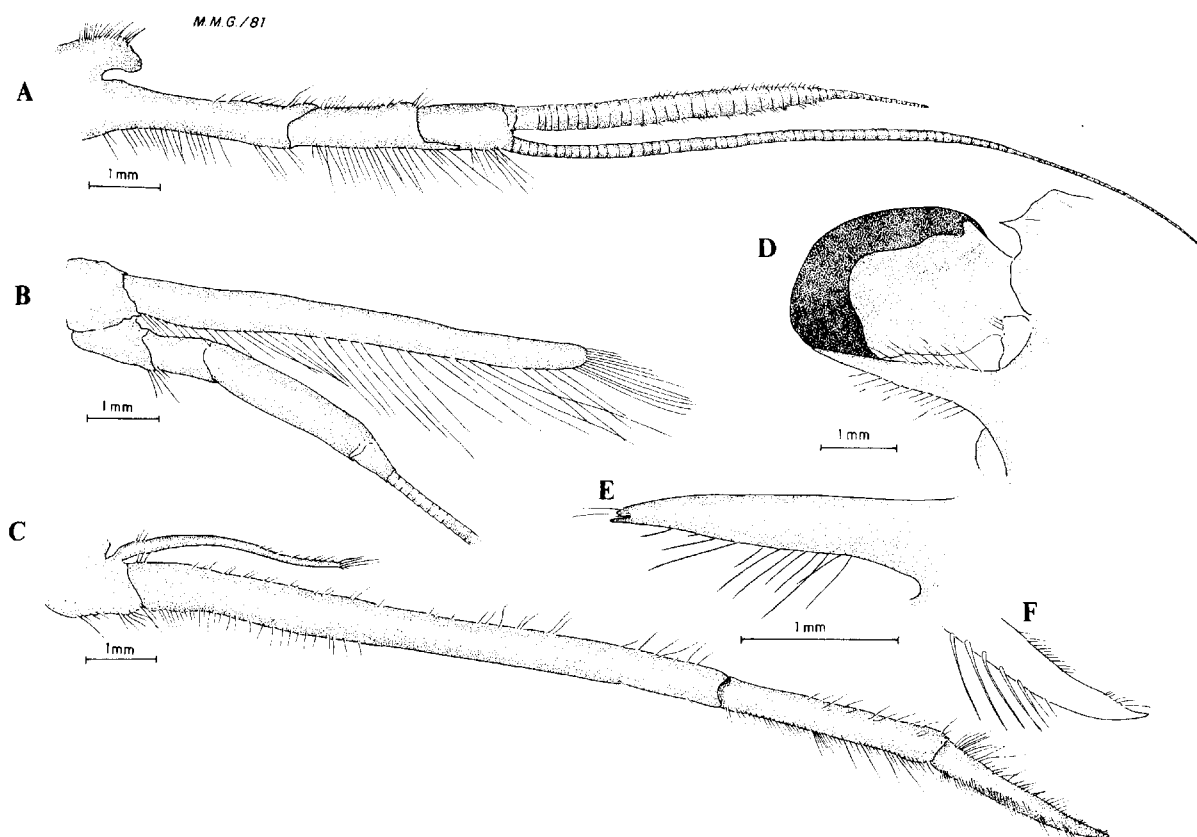


Figure 5. *Processa peruviana* n. sp. Male. A, right first antenna; B, right second antenna; C, right third maxilliped; D, rostrum and eye in dorsal view; E, rostrum; F, detail of end of third maxilliped.

**MATERIAL.** MÉXICO: Between S end of E and W Islas San Benito, outer coast of Baja California (19 September 1939, 65 m, sand and kelp, sta. 1099-39, 1 specimen).—40 mi. S of San Felipe (14 June 1980, R. C. Brusca, 1 specimen).—Norse Beach, Puerto Peñasco (2 December 1967, shore, rock; A. Havens, 5 specimens).

**HABITAT.** Rocks, tidepools, sand and shell bottoms; intertidal to 70 m.

**TYPE LOCALITY.** Punta Paitilla, Panamá.

**DISTRIBUTION.** Islas San Benito, Gulf of California, Panamá.

**COLOR IN LIFE.** Transparent, with scattered red-brown chromatophores.

*Ambidexter panamensis* Abele

*Processa canaliculata*: Rathbun 1904 (in part).

*Ambidexter panamensis* Abele, 1972: 373, figs. 4-5.—Abele 1976: 266.

**MATERIAL.** MÉXICO: 15 mi. S of San Felipe (25 November 1955, 1 mi S of San Felipe (24-25 February 1955, R. H. Linsley, 1 specimen).—GALÁPAGOS: Off Gardner Bay, Isla Española (Hood Island) 31 January 1934, 46-65 m, rock; sta. 201-34, 1 specimen).

**HABITAT.** Sand mud or rock, shallow water.

**TYPE LOCALITY.** Naos Island, Fort Amador, Canal Zone, Panamá.

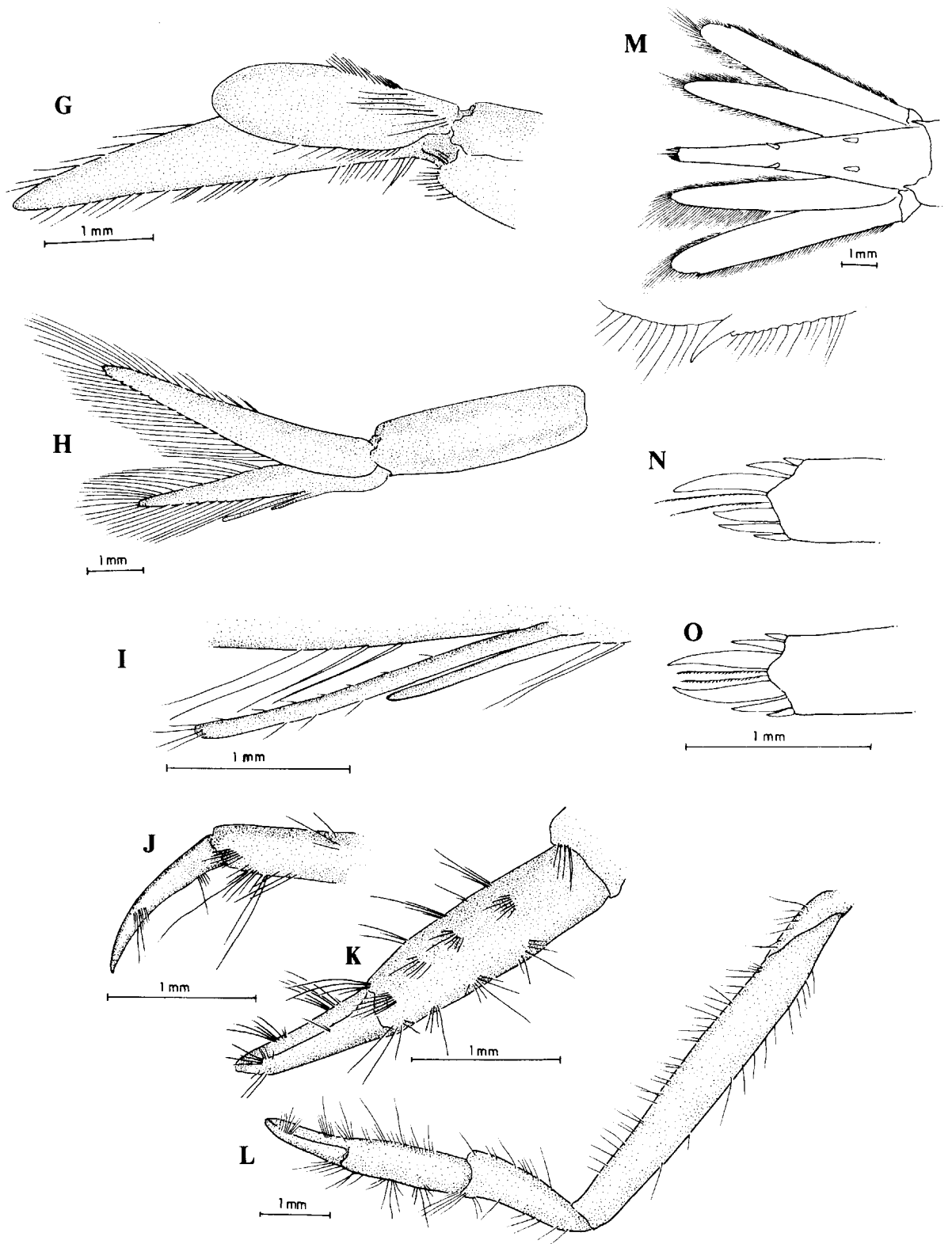


Figure 6. *Processa peruviana* n. sp. Male. G, first pleopod; H, second pleopod; I, second pleopod, appendices masculina and interna; J, dactyl of left first pereopod; K, chela of right first pereopod; L, right first pereopod; M, telson and uropods, with detail of lateral tooth of uropod; N, end of telson; O, end of telson of female.

DISTRIBUTION. San Diego, California; Gulf of California; Panamá; Galápagos Islands.

COLOR IN LIFE. Transparent (Abele 1972).

REMARKS. This species and probably also *Processa peruviana* have been confused in the past with *P. canaliculata*, found off the coast of Europe.

## FAMILY ALPHEIDAE

### Key to the Species

1. No epipods on pereopods. (Third-fifth legs with biunguiculate dactyls) ..... 2
  - Epipods on pereopods 1-2 at least. (Third-fifth legs usually with simple dactyls) ..... 14
2. Third maxillipeds expanded, forming operculum over mouthparts. Major chela strongly compressed laterally ..... *Pomagnathus corallinus* Chace
  - Third maxillipeds not expanded, not forming operculum over mouthparts. Major chela rounded ..... 3
3. Dactyl of third pereopod with 2 unequal hooks, the flexor hook the stronger. A prominence often present on dactyl of third pereopod ..... 4
  - Dactyl of third pereopod with hooks approximately equal in width, the extensor hook the stronger. No prominence present on dactyl ..... 7
4. Inferior hook of dactyl of third pereopod 3-5× diameter of distal hook, broad and blunt at tip. (Associated only with corals) ..... *Synalpheus charon* (Heller)
  - Inferior hook of dactyl of third pereopod no more than 3× diameter of distal hook, triangular and acute at tip. (Found among corals or other hard substrates) ..... 5
5. Appendages markedly slender. Merus of third pereopod 4× as long as wide ..... *Synalpheus fritzmuelleri* Coutière
  - Appendages stout. Merus of third pereopod no more than 3× as long as wide ..... 6
6. Superior spine of basicerite reaching end of first segment of antennular peduncle. Merus of third pereopod 2.5× as long as wide ..... *Synalpheus sanlucasi* Coutière
  - Superior spine of basicerite not reaching end of first segment of antennular peduncle. Merus of third pereopod 3× as long as wide ..... *Synalpheus nobilii* Coutière
7. Small cheliped with brush of setae on dactyl. Telson with strong dorsal spines. Dactyls of pereopods very short ..... 8
  - Small cheliped without brush of setae on dactyl. Telson without strong dorsal spines. Dactyls of pereopods about 0.33× as long as propodus ..... 9
8. Tooth of scaphocerite reaching to or beyond distal end of antennular peduncle. Margin of outer uropod with 8-17 spines ..... *Synalpheus goodei occidentalis* Coutière
  - Tooth of scaphocerite falling short of level of distal end of antennular peduncle. Margin of outer uropod with 4 spines ..... *Synalpheus herricki* Coutière
9. Scaphocerite broad, about 2× as long as wide. (Dorsal tooth of basicerite absent) ..... *Synalpheus biunguiculatus* (Stimpson)
  - Scaphocerite narrow or reduced, much more than 2× as long as wide. (Dorsal tooth of basicerite present or absent) ..... 10
10. Frontal teeth bluntly triangular. Rostrum equal in length to ocular teeth ..... *Synalpheus digueti* Coutière
  - Frontal teeth long and sharp. Rostrum usually longer than ocular teeth ..... 11
11. Basicerite without dorsal tooth. Merus of third pereopod 5× as long as wide. (Tooth of scaphocerite exceeding thickened base of antennal flagellum) ..... *Synalpheus townsendi mexicanus* Coutière
  - Basicerite with dorsal tooth. Merus of third pereopod 3.5-5.3× as long as wide. (Tooth of scaphocerite falling short of or exceeding thickened base of antennular flagellum) ..... 12
12. Merus of third pereopod 5.3× as long as wide. Spine of antennal scale exceeding thickened base of antennal flagellum. (Strictly subtidal) ..... *Synalpheus paulsonoides* Coutière
  - Merus of third pereopod 3.6-3.8× as long as wide. Spine of antennal scale not exceeding thickened base of antennal flagellum. (Intertidal-shallow subtidal) ..... 13
13. Spine of stylocerite exceeding first segment of antennular peduncle. Rostrum reaching distal margin of first segment of antennular peduncle ..... *Synalpheus lockingtoni* Coutière

- Spine of stylocerite reaching or barely exceeding first segment of antennular peduncle. Rostrum not reaching distal margin of first segment of antennular peduncle . . . . . *Synalpheus apioceros sanjosei* Coutière
- 14. Sixth abdominal segment with movable plate articulated at posterolateral angle . . . . . 15
  - Sixth abdominal segment without movable plate articulated at posterolateral angle . . . . . 16
- 15. Rostrum present, pointed in lateral view. Posterior margin of telson ending in acute triangular median tooth . . . . . *Neopalpheopsis euryone* (De Man)
  - Rostrum absent, front rounded. Posterior margin of telson rounded . . . . . *Betaeus longidactylus* Lockington
- 16. Large chela without large, molar-shaped tooth. Eyes visible in anterior view . . . . . 17
  - Large chela with large, molar-shaped tooth. Eyes not visible in anterior view . . . . . 19
- 17. Eyes completely or almost completely covered by carapace. Rostrum reaching beyond end of eyestalks . . . . . *Salmoneus serratidigitus* (Coutière)
  - Eyes dorsally fully exposed. Rostrum not reaching end of eyestalks . . . . . 18
- 18. No spines on flexor margin of propodus of third or fourth pereopod. Large chela with tubercles at distal margin of propodus, with 5 slight ridges on palm . . . . . *Automate rugosa* Coutière
  - Spines on flexor margin of propodus of third and fourth pereopod. Large chela without tubercles or ridges . . . . . *Automate dolichognatha* De Man
- 19. Anterior margins of orbital hoods with acute teeth . . . . . 20
  - Anterior margins of orbital hoods without acute teeth . . . . . 23
- 20. Chelae with laminate dactyls. Sharp tooth dorsal to articulation of dactyl and propodus of minor chela . . . . . *Alpheus bellimanus* Lockington
  - Chelae with rounded dactyls. No tooth dorsal to articulation of dactyl and propodus of minor chela . . . . . 21
- 21. Dactyls of pereopods blunt and stubby, with tips shaped like horses' hooves. Chelae spotted . . . . . *Alpheus lottini* (Guérin)
  - Dactyls of pereopods slender, tips pointed. Chelae not spotted . . . . . 22
- 22. Outer face of large chela flat and smooth. No dorsal tubercles on either large or small chelae . . . . . *Alpheus websteri* Kingsley
  - Outer face of large chela setose and tuberculate. Dorsal tubercles on both large and small chela . . . . . *Alpheus malleator* Dana
- 23. Front without adrostral depressions. Rostrum short, barely longer than ocular hoods . . . . . *Alpheus cylindricus* Kingsley
  - Front with adrostral depressions. Rostrum usually exceeding ocular hoods . . . . . 24
- 24. Ocular hoods with bluntly triangular tips. Strong tooth on dorsal margin of large chela at base of its dactyl . . . . . 25
  - Ocular hoods rounded. No tooth on dorsal margin of large chela or teeth at base of its dactyl . . . . . 26
- 25. Large chela with tooth on dorsal margin behind base of dactyl. Merus of large cheliped with 12 inferior spines . . . . . *Alpheus normanni* Kingsley
  - Large chela without tooth on dorsal margin behind base of dactyl, but with many sharp teeth on either side of dactyl. Merus of large cheliped with 10 inferior spines . . . . . *Alpheus grahami* Abele
- 26. Dactyl of large chela closing horizontally. Merus of third pereopod with sharp inferior distal tooth . . . . . *Alpheus cristulifrons* Rathbun
  - Dactyl of large chela closing vertically. Merus of third pereopod without sharp inferior distal tooth . . . . . 27
- 27. Large chela without grooves or tubercles, cylindrical or compressed. (Rostrum without deep adrostral grooves) . . . . . 28
  - Large chela with grooves or tubercles. (Rostrum with or without deep adrostral grooves) . . 29
- 28. Large chela cylindrical. Rostrum without dorsal ridge. Occurring on hard substrates . . . . . *Alpheus paracrinitus* Miers
  - Large chela compressed. Rostrum without dorsal ridge. Occurring on soft substrates . . . . . *Alpheus floridanus* Kingsley
- 29. Large chela without pronounced dorsal notch behind base of dactyl. Rostrum flanked by deep adrostral grooves, without dorsal ridge . . . . . *Alpheus sulcatus* Kingsley
  - Large chela with pronounced notch behind base of dactyl. Rostrum not flanked by deep adrostral depressions, with dorsal ridge . . . . . 30

30. Dactyl of third pereopod subspatulate. Fingers of small chela long, forceps-like. Occurring on soft substrates . . . . . *Alpheus mazatlanicus* n. sp.  
 – Dactyl of third pereopod simple, conical. Fingers of small chela not long, forceps-like. Occurring on hard substrates . . . . . 31
31. Merus of third pereopod with blunt tooth at distal end of flexor margin. Fingers of small chela about 0.5× length of palm . . . . . *Alpheus schmitti* Chace  
 – Merus of third pereopod without blunt tooth at distal end of flexor margin. Fingers of small chela about equal in length to palm . . . . . 32
32. Merus of large chela with inferior distal tooth. Palm of large chela posterior to notches 1.25× as long as wide. (Common throughout Gulf) . . . . . *Alpheus armillatus* H. Milne-Edwards  
 – Merus of large chela without inferior distal tooth. Palm of large chela posterior to notches 1.6× as long as wide. (Mostly in southern Gulf) . . . . . *Alpheus leviusculus* Dana

*Pomagnathus* Chace, 1937*Pomagnathus corallinus* Chace

*Pomagnathus corallinus* Chace, 1937: 124, fig. 5.—Chace 1962: 612.—Abele 1975: 81.—Abele 1976: 270.—Word and Charwat 1976: 270.

MATERIAL. MÉXICO: Isla Cerralvo (8 August 1974, M. R. Gilligan and party, 1 specimen).—Bahía San Gabriel, Isla Espíritu Santo (7 March 1937, shallow, coral; sta. 638-37, 1 specimen, USNM).—Isla Isabel (19 March 1933, shallow, *Porites* sp.; sta. 125-33, 3 specimens, USNM).—Sulphur Bay, Isla Clarion (5 January 1934, shallow, coral; sta. 140-34, 1 specimen, USNM).—COSTA RICA: Playa Blanca (8 February 1935, shore, coral; sta. 464-35, 3 specimens, USNM).—Port Parker (9 February 1935, shallow, coral; sta. 473-35, 1 specimen, USNM).—PANAMÁ: Islas Secas (4 February 1935, shallow, coral; sta. 447-35, 1 specimen, USNM).—GALÁPAGOS: Gardner Bay, Isla Española (Hood Island) (17 December 1934, shallow, coral; sta. 357-35, 1 specimen).—Cartago Bay, Isla Isabela (Albemarle Island) (14 February 1933, shore, sand; sta. 76-33, 1 specimen).

HABITAT. Intertidal zone to very shallow subtidal zone, among coral.

TYPE LOCALITY. Off Arena Bank, Baja California.

DISTRIBUTION. Gulf of California, southwestern México, Islas Clarion and Clipperton, Costa Rica, Panamá, Galápagos Islands.

COLOR IN LIFE. Yellow, ochre tubercles on chelae, most of chelae dirty china white with black border behind fingers. Fingers translucent white to dirty cream buff. Eggs grass green (color note by W. L. Schmitt).

*Synalpheus* Bate, 1888*Synalpheus charon* (Heller)

*Alpheus charon* Heller, 1861: 27.

*Synalpheus charon*.—De Man 1911: 245, pl. 8, fig. 37a-c.—Chace 1937: 122.—Banner 1953: 37, fig. 11.—Chace 1962: 613.—Abele 1975: 78.—Abele and Patton 1976: 37.—Abele 1976: 270.

MATERIAL. MÉXICO. Shepard's Rock, Cabo San Lucas (20 July 1981, 15 m, rocky cliff; A. Kerstitch, 1 specimen).—E of Cape Rule, Isla Socorro (9 June 1934, sta. 297-34, 1 specimen).—Sulphur Bay, Isla Clarion (10 June 1934, shore, rock; sta. 298-34, 18 specimens).—Isla María Cleofa (18 March 1956, sta. KW-17, 6 specimens).—Isla Isabel (22 March 1956, shore sta. KW-28, 2 specimens).

HABITAT. Intertidal, among *Pocillopora* spp.

TYPE LOCALITY. Red Sea.

**DISTRIBUTION.** Red Sea, Indian Ocean, south China, southern Japan, Australia, Hawaii, Gulf of California, southwestern México, Islas Clipperton and Clarion; Panamá.

**COLOR OF LIFE.** Brilliant orange red (Banner 1953).

*Synalpheus fritzmulleri* Coutière

*Synalpheus fritzmulleri* Coutière, 1909: 35, figs. 18, 19.—Williams 1965: 69, fig. 56.—Chace 1972: 92.—Holthuis 1980b: 30.

**RECORD IN LITERATURE.** "Lower California" (Coutière 1909).

**HABITAT.** Sponges, coral, weed-covered rocks, ships, and timbers (Chace 1972).

**TYPE LOCALITY.** Marco, Florida.

**DISTRIBUTION.** North Carolina and the Bermudas to Estado de Santa Catarina, Brazil; St. Paul's Rocks and St. Helena Island, South Atlantic; Baja California, to a depth of 50 m.

**COLOR IN LIFE.** Chelae varying shades of green, darker toward extremities of fingers, body more or less colorless, speckled with quite numerous tiny red chromatophores (Williams 1965).

*Synalpheus sanlucasi* Coutière

*Synalpheus sanlucasi* Coutière, 1909: 41, fig. 23.—Chace 1937: 123.—Abele and Patton 1976: 37.—Brusca 1980: 253.

**MATERIAL.** West of Squall Point, Bahía Tenacatita, México (5 February 1954, 0–7 m, rocks; sta. 2600-54, 1 specimen).

**HABITAT.** Among coral or rocks, to 7 m.

**TYPE LOCALITY.** Cabo San Lucas, Baja California.

**DISTRIBUTION.** Arena Bank, Cabo San Lucas, and Bahía Tenacatita, México; Islas Perlas, Panamá.

**REMARKS.** Although closely related to *S. nobilii*, *S. sanlucasi* can be distinguished from it by its very compact appendages.

*Synalpheus nobilii* Coutière

*Synalpheus nobilii* Coutière, 1909: 40, fig. 22.—Schmitt 1939: 12, 24.—Chace 1962: 613.—Abele 1975: 75, fig. 30.—Abele 1976: 273.—Hendrickx, Wicksten, and van der Heiden 1983: 72.

**MATERIAL.** MÉXICO: Bahía San Gabriel, Isla Espíritu Santo (14 February 1940, shoal, coral; sta. 1110-40, 2 specimens).—Bahía Catalina, off Guaymas (9 February 1940, shore, shingle; sta. 1092-40, 1 specimen).—Rocas #3, 5 km N of Mazatlán, Sinaloa (3 December 1979, rocks and corallines, shore; 2 specimens, EMU).—Punta Chile, Mazatlán (23 October 1980, rocks, shore; 1 specimen, EMU).—Cerro de Vigía, Mazatlán (24 October 1980, rocks and corallines, shore; 2 specimens; 22 November 1980, rocks and corallines, shore; 5 specimens, EMU).—Bahía Tangola Tangola (1 March 1934, shore, rocks; sta. 260-34, 1 specimen).—San Lorenzo Rocks, Acapulco (30 January 1954, 0–4 m, rocks; sta. 2591-54, 3 specimens).—Bahía Santa Lucia, Acapulco (13 September 1946, to 4 m, sta. 1561-46, 3 specimens; 1–2 Feb. 1954, 2–7 m, mud, rock and sand; sta. 2596-54, 1 specimen).—Braithwaite Bay, Isla Socorro (3 January 1934, shallow, *Pocillopora* sp.; sta. 131-34, 1 specimen).—Sulphur Bay, Isla Clarion (10 June 1934, shore, rock; sta. 298-34, many specimens).—GALÁPAGOS: Albemarle Point, Isla Isabela (Albemarle Island) (11 February 1933, shore, rock; sta. 69-33, 5 specimens).

HABITAT. Intertidal to 8 m, among rocks or coral.

TYPE LOCALITY. Santa Elena, Ecuador.

DISTRIBUTION. Gulf of California, western México, Islas Clarion and Clipperton; Ecuador, Galápagos Islands.

*Synalpheus goodei occidentalis* Coutière

*Synalpheus goodei occidentalis* Coutière, 1909: 59, fig. 34.

MATERIAL. MÉXICO: Off Bahía Concepción (15 March 1937, 22 m, corallines; sta. 683-37, 1 specimen). Puerto Refugio, Isla Ángel de la Guardia (26 January 1940, 20–41 m, shell and sand; sta. 1048-40, 2 specimens).—Bahía Agua Verde (12 February 1940, 18 m, mud and coral; sta. 1101-40, 2 specimens).

HABITAT. Subtidal, 20–40 m, on sand, shell, mud, coral or coralline bottoms.

TYPE LOCALITY. Golfo de San José, Baja California.

DISTRIBUTION. Southern Gulf of California.

*Synalpheus herricki* Coutière

*Synalpheus herricki* Coutière, 1909: 74, fig. 44.—Chace 1937: 123.—Chace 1972: 93.

RECORD IN LITERATURE. Arena Bank, Baja California (Chace 1937).

TYPE LOCALITY. Off Anclote, Florida.

HABITAT. Muddy Subtidal bottoms to 38 m.

DISTRIBUTION. Eastern Gulf of México, Arena Bank.

*Synalpheus biunguiculatus* (Stimpson)

*Alpheus biunguiculatus* Stimpson, 1860: 31.

*Synalpheus biunguiculatus*.—Banner 1953: 32, fig. 10.—Chace 1962: 612.—Abele 1975: 75.—Abele and Patton 1976: 37.—Hendrickx, Wicksten, and van der Heiden 1973: 72.

MATERIAL. MÉXICO: Bahía San Gabriel, Isla Espíritu Santo (7 March 1937, shallow, coral; sta. 638-37, 1 specimen; 14 February 1940, shore, shingle; sta. 1112-40, 1 specimen).—Isla San Pedro Nolasco, Sonora (23 December 1978, 10 m, under rock; A. Kerstitch, 1 specimen).—Bahía Catalina, off Guaymas (9 February 1940, shore, shingle; sta. 1092-40, 2 specimens).—Punta Chile, Mazatlán (8 January 1982, shore, cobble; M. K. Wicksten, 2 specimens, EMU).—Mazatlán (24 October 1980, M. E. Hendrickx and party, 5 specimens, EMU).—Isla María Cleofa (8 March 1956, J. Knudsen, 1 specimen).—COLOMBIA: Port Utria (15 February 1934, shore, reef; sta. 239-34, 1 specimen).—GALÁPAGOS: Osborn Is., Gardner Bay, Isla Española (Hood Island) (19 December 1934, shore, rock; sta. 359-34, 1 specimen).—Isla Santa Fé (Barrington Island) (26 January 1938, shore, coral; sta. 811-38, 2 specimens).

HABITAT. Intertidal to 10 m, among rocks, shingle, or coral.

TYPE LOCALITY. Hawaiian Islands.

DISTRIBUTION. Hawaiian Islands, Gulf of California, western México, Isla Clipperton, Islas Perlas, Panamá; Colombia, Galápagos Islands.

COLOR IN LIFE. Translucent sky blue with dark red chromatophores spaced over body. Corneas reddish-brown. Antennal flagellum golden. Major chela with orange spot at propodal-

dactylar junction. Viscera olive green. Walking legs mostly translucent blue, with few chromatophores. Red spot on outer edge of tail fan. Female with brown eggs (color note from live animals from Mazatlán, Sinaloa).

REMARKS. The two shrimp from Punta Chile were found under the same rock at low tide. They can snap loudly.

*Synalpheus digueti* Coutière

*Synalpheus digueti* Coutière, 1909: 48, fig. 28.—Chace 1937: 123.—Abele 1976: 270.—Abele and Patton 1976: 37.—Brusca 1980: 253.—Hendrickx, Wicksten, and van der Heiden 1983: 72.

MATERIAL. About 100 specimens from 22 stations, Gulf of California from Guaymas south; southwestern México, Acajutla, El Salvador; Port Parker, Costa Rica; Port Utria, Colombia; Isla Santa Cruz, Galápagos Islands; AHF, USNM, EMU, and California Academy of Sciences.

HABITAT. Intertidal to 10 m, among rocks or coral.

TYPE LOCALITY. "Lower California."

DISTRIBUTION. Gulf of California, southwestern México, Costa Rica, Panamá, Colombia, Galápagos Islands.

COLOR IN LIFE. Male translucent green. Corneas black. Brown marks flanking rostral ridge on carapace. Antennal flagellum golden. Red chromatophores in peduncle of first antenna. Stomach blue. Large chela with dark green around margin of palm and on dactyl, tips of fingers orange. Small chela translucent green. Ovigerous female apricot pink, with tiny red chromatophores, or golden brown. Eggs olive color (color notes from live shrimp at Punta Chile, Mazatlán).

REMARKS. At Punta Chile, these shrimp lived in pairs under rocks. They inhabited small chambers formed from parts of the sandy tubes of polychaetes. They can snap loudly.

*Synalpheus townsendi mexicanus* Coutière

*Synalpheus townsendi mexicanus* Coutière, 1909: 34, fig. 17.—Chace 1937: 123.—Brusca 1980: 253.

MATERIAL. MÉXICO: Shepard's Rock, Cabo San Lucas (15 August 1974, D. G. Lindquist, 1 specimen).—Chileno Point, Cabo San Lucas (22–25 July 1981, 5–10 m, rock and coral; A. Kerstitch, 2 specimens).—Canal de San Lorenzo (15 March 1949, 24 m, coral; sta. 1738-49, 1 specimen).—Puerto Escondido, Gulf of California (11 February 1940, 26–33 m, sand and coral; sta. 1097-40, 1 specimen).

HABITAT. Intertidal to 35 m, sand or coral bottoms.

TYPE LOCALITY. Isla Cerralvo, Baja California.

DISTRIBUTION. Southern Gulf of California.

*Synalpheus paulsonoides* Coutière

*Synalpheus paulsonoides* Coutière, 1909: 24, fig. 5.

MATERIAL. MÉXICO: Off Isla San Francisco (24 February 1936, 55 m, corallines; sta. 513-36, 1 specimen).—Bahía San Ignacio (31 March 1937, 55–92 m, shell; sta. 742-37, 1 specimen).—Puerto Escondido (10 February 1940, 15–28 m, sand, sponge, and coral; sta. 1093-40, many specimens).

HABITAT. Subtidal, to 92 m, on coralline rubble, shell, sand, coral, or sponge bottoms.

TYPE LOCALITY. Isla San José, Baja California.



DISTRIBUTION. Gulf of California.

*Synalpheus lockingtoni* Coutière

*Synalpheus lockingtoni* Coutière, 1909: 21, fig. 1.—Schmitt 1921: 77, fig. 54.—Carlton and Kuris 1975: 304.—Brusca 1980: 253.

MATERIAL. MÉXICO: Scammon's Lagoon, Baja California (13 September 1953, 5.5–8.3 m, rocks; sta. KG-3, 1 specimen; 14 September 1953, 6.5–14.8 m, rocks; sta. KG-4, 1 specimen).—Bahía Magdalena, Baja California (3 November 1971, shore, muddy sand; *Searcher* sta. 291, 5 specimens).—S of San Felipe, Baja California (1 January 1976, in sponge, R. C. Brusca and B. Wallerstein, 1 specimen).—Off Bahía Cholla, Sonora (3 September 1966, 15 m, rocks and shells; Burch sta. 66041, 2 specimens; 18 March 1967, 6 m, among gorgonians; Burch 67041, 3 specimens; 28 May 1970, 5 m, among bryozoans; Burch sta. 67070, 1 specimen).—Bahía Cholla, Sonora (18 March 1967, 6 m, among gorgonians; Burch sta. 67040, 2 specimens; 7 November, 1967, rocks, collector not recorded, 1 specimen).—Guaymas Bay (23 January 1940, shore, sta. 1040-40, many specimens).—Zihuatanejo, Guerrero (11 June 1979, shore, rocks; R. C. Brusca, 1 specimen).

HABITAT. Intertidal to shallow subtidal zones, among rocks, worm tubes, sponges, or other sessile invertebrates.

TYPE LOCALITY. Gulf of California (exact location not specified).

DISTRIBUTION. Elkhorn Slough, California (Carlton and Kuris 1975) to Zihuatanejo, Guerrero.

REMARKS. This species also is common on reefs and in harbors along the coast of southern California, U.S.A.

*Synalpheus apioceros sanjosei* Coutière

*Synalpheus apioceros sanjosei* Coutière, 1909: 29, fig. 10.—Hendrickx, Wicksten, and van der Heiden 1983: 72.

MATERIAL. MÉXICO: Isla Blanca, off Guaymas (21 November 1979, 6–10 m, rocks; A. Kerstitch, 1 specimen).—Isla San Nicolas, Sonora (2 July 1978, 20 m, rocks; A. Kerstitch, 2 specimens).—Bahía Santa Lucia, Guerrero (13 September 1946, to 4 m, sta. 1561-46, 2 specimens; 1–2 February 1954, 1.8–7.3 m, mud, sand, and rock; sta. 2596-54, many specimens).—San Lorenzo Rocks, Acapulco, Guerrero (30 January 1954, to 4 m, rocks; sta. 2591-54, many specimens).—COSTA RICA: N shore Punta Morales, Golfo de Nicoya (21 February 1980, shore, R. C. Brusca, 5 specimens).

HABITAT. Intertidal to shallow subtidal hard bottoms.

TYPE LOCALITY. Isla San José, Baja California.

DISTRIBUTION. Gulf of California to Costa Rica.

REMARKS. *Synalpheus apioceros sanjosei* can be confused easily with *S. lockingtoni*. There have been no studies of intraspecific variation in any species of *Synalpheus* from the eastern Pacific. Careful examination of a large series of specimens and more detailed records of the habitat might aid in distinguishing these two species.

*Betaeus* Dana, 1852

*Betaeus longidactylus* Lockington

*Betaeus longidactylus* Lockington, 1877: 35.—Rathbun 1904: 108.—Schmitt 1921: 80, pl. 12.—Hart 1964: 441, figs. 20–22, 27, 32–34, 40–42.—MacGinitie and MacGinitie 1968: 279.—Word and

Charwat 1976: 279.—Ricketts, Calvin and Hedgpeth 1968: 64, fig. 44.—Chace and Abbott 1980: 569, 572, fig. 23.5.—Brusca 1980: 253, fig. 14.10.

**MATERIAL.** MÉXICO: Off Puerto Refugio, Isla Ángel de la Guardia (29 January 1940, 100–126 m, sand and rocks, sta. 1058-40, 1 specimen).—Willard Bay, Isla Gonzaga (30 January 1940, shore, shingle; sta. 1063-40, 6 specimens).—40 mi. S of San Felipe (1 January 1976, B. Wallerstein and R. C. Brusca, 1 specimen).—Coloraditos, Baja California (11–13 April 1979, shore, B. Wallerstein and R. C. Brusca, 1 specimen).—Tucson Beach, Sonora (12 April 1968, shore, rock and sand; Burch sta. 68041, 1 specimen).—Bahía Cholla, Sonora (12 April 1968, Burch sta. 68046, 1 specimen).

**HABITAT.** Intertidal, under rocks, among algae, and in sponges.

**TYPE LOCALITY.** San Diego, California.

**DISTRIBUTION.** Elkhorn Slough, California to Bahía Tepoca, México (Hart 1964). Usually found in the northern part of the Gulf of California (Brusca 1980).

**COLOR IN LIFE.** Olive, dark green, sometimes with light tan mid-dorsal stripe (notes on living specimens from San Pedro, California).

*Neoalpheopsis* Banner, 1953

*Neoalpheopsis euryone* (De Man)

*Alpheopsis? euryone* De Man, 1910: 308.—De Man 1911: 184, pl. 5, fig. 19.

*Neoalpheopsis euryone*.—Banner 1953: 25, fig. 7.

**MATERIAL.** MÉXICO: Bahía Concepción (30 June 1980, 20 m, rocks with algae; A. Kerstitch, 1 specimen).—GALÁPAGOS: Cartagó Bay, Isla Isabela (Albemarle Island) (13 February 1933, shore, rocks and sand; sta. 73-33, 2 specimens).—Darwin Bay, Isla Tower (24–25 February 1933, shore to shallow water, rocks and coral; sta. 96-33 and 98-33, 2 specimens).—Blacks Beach, Isla Santa María (Charles Island) (19 January 1934, shore, rock; sta. 166-34, 1 specimen).—Osborn Island, Gardner Bay, Isla Española (Hood Island) (31 January 1934, shore, rock; sta. 202-34, 1 specimen).—S. Seymour Island (19 January 1938, shore, rocks and sand; sta. 789-38, 1 specimen).

**HABITAT.** Shore to 20 m, among rocks, sand, or coral.

**TYPE LOCALITY.** Anchorage off Hawio- and Kamboling-islands, Karkaralong Group (about 5°N, 125°30'E).

**DISTRIBUTION.** Indonesia, Hawaii, Gulf of California, Galápagos Islands.

*Salmoneus* Holthuis, 1955

*Salmoneus serratidigitus* (Coutière)

*Jousseamea latirostris* Coutière, 1896: 382.

*Jousseamea serratidigitus* Coutière, 1896: 382.

*Salmoneus serratidigitus*.—Banner and Banner 1981: 63.

**MATERIAL.** Off Shepard's Rock, Cabo San Lucas (2 July 1981, 10 m, rocks and coral; A. Kerstitch, 1 specimen).

**HABITAT.** Rocky subtidal bottoms.

**TYPE LOCALITY.** "Gulf of California."

**DISTRIBUTION.** Only these two records are known.

**COLOR IN LIFE.** Pale yellow (color slide by A. Kerstitch).

*Automate De Man*, 1888*Automate rugosa* Coutière

*Automate rugosa* Coutière, 1900: 357.—De Man 1911: 140.—Wicksten 1981: 1105, figs. 1–2.—Hendrickx, Wicksten, and van der Heiden, 1983: 72.

MATERIAL, MÉXICO: Off Turtle Bay, Baja California (18 January 1940, 33–57 m, sand and mud; 1 specimen).—South Bay, Isla Cedros, west coast of Baja California (5 March 1949, 30 m, sand and mud; sta. 1703-49, 2 specimens).—Off Mazatlán (23°10'N, 106°28'W, 25 April 1981, 27 m, muddy sand; sta. SIPCO I, B11P, R.V. *El Puma*, 1 specimen, EMU).—Off Mazatlán (23°06'N, 106°30'W, 25 April 1981, 65 m, muddy sand; SIPCO I, B22P, R.V. *El Puma*, 2 specimens, EMU).—Off Punta Piaxtla, Sinaloa (23°31'N, 107°00'W, 24 April 1981, 70 m, muddy sand; sta. SIPCO I C21P, R.V. *El Puma*, 1 specimen, EMU).

HABITAT. Subtidal muddy sand.

TYPE LOCALITY. Bay of Panamá.

DISTRIBUTION. Southern outer coast of Baja California, Mazatlán, and Panamá.

*Automate dolichognatha* De Man

*Automate dolichognatha* De Man, 1888: 529, pl. 22, fig. 5.—De Man 1911: 139.—Banner and Banner 1973: 299, fig. 1.—Wicksten 1981: 1104.—Hendrickx, Wicksten, and van der Heiden 1983: 73. (See Wicksten, 1981 for a more complete synonymy).

*Automate haightae* Boone, 1931: 184, fig. 22.

MATERIAL. 12 specimens from 12 stations, off Mazatlán (23°10'N, 106°28'W); Isla Clarion, Panamá, Isla Cocos, Colombia, Ecuador, to Islas Galápagos; AHF, USNM and EMU.

HABITAT. Intertidal to 18 m, among sand, rocks, or coralline algae.

TYPE LOCALITY. Pulau Tuguan, Indonesia.

DISTRIBUTION. Djibouti, Eylath, Israel; Maldive and Laccadive Archipelagos; Malaysia, Japan, Marianas Islands; as far east as Samoa in the central Pacific (Banner and Banner 1973); North Carolina, Virgin Islands, Antigua Island, Barbados, and the Yucatán Peninsula (Chace 1972); southern Gulf of California to Galápagos Islands; northern Perú (M. Mendez pers. comm.).

COLOR IN LIFE. Semi-translucent, creamy yellow (Boone 1931); pale translucent gallstone yellow to nearly clear, fingers of chelae dull white, eggs cadmium orange (W. L. Schmitt unpubl. field notes).

*Alpheus* Fabricius, 1798*Alpheus bellimanus* Lockington

*Alpheus bellimanus* Lockington, 1877: 34.—Rathbun 1904: 108.—Word and Charwat 1976: 41.—Brusca 1980: 252.

*Crangon bellimanus*.—Schmitt 1921: 75, fig. 51.—Chace 1937: 118.

MATERIAL. MÉXICO: Shepard's Rock, Cabo San Lucas (2 July 1981, 10 m, rocks and coral; A. Kerstitch, 2 specimens).—Los Frailes, Baja California (13 March 1949, shore, rocks; sta. 1734-49, 1 specimen).—S of Punta Arena, Baja California (2 February 1971, 3–5 m, rocks; *Searcher* sta. 44, 7 specimens).—Bahía Tangola Tangola (1 March 1934, shore, rocks; sta. 260-34, 1 specimen).—Isla Socorro (4 January 1934, 1 specimen).—Off Braithwaite Bay, Isla Socorro (18 March 1939, 31–85 m, sand and corallines; sta. 924-39, 8 specimens).—Off Sulphur Bay, Isla Clarion (11 June 1935, 55 m, nullipores and corallines; sta. 303-34, 1 specimen; 11 June 1934, 36 m, nullipores and corallines; sta. 304-34, 6 specimens).—Sulphur Bay, Isla Clarion (16 March 1939, 53–83 m, sand and corallines;

sta. 917-39, 8 specimens).—PANAMA: Islas Secas (27 March 1939, 46–48 m, sandy mud; sta. 945-49, 1 specimen).

HABITAT. Lowest intertidal zone to 80 m, usually dredged on sand, rocks, or among corallines.

TYPE LOCALITY. San Diego, California.

DISTRIBUTION. Monterey, California south along outer coast of Baja California, southern Gulf of California, Islas Socorro and Clarion; western México, Islas Secas, Panamá. Seldom reported north of Santa Barbara, California.

COLOR IN LIFE. Mostly olive green, orange at tip of tail fan. Tips of chelae and branchial regions orange. White mark on palm of large chela (color slide by A. Kerstitch).

*Alpheus lottini* Guérin

*Alpheus lottini* Guérin, 1830–31: pl. 3.—Holthuis 1958: 22.—Chace 1962: 608.—Bruce 1976: 44.—Brusca 1980: 252.

*Alpheus ventrosus* H. Milne-Edwards, 1837: 352.—De Man 1911: 207.—Banner 1958: 164, fig. 5.  
*Crangon ventrosus*.—Hult 1939: 4.

*Crangon ventrosa*.—Banner 1953: 84, fig. 28.

*Alpheus sublucanus*.—Holthuis 1979: 9.—1980a: 122. (See Holthuis 1979 for a more complete synonymy).

MATERIAL. About 110 specimens from 16 stations, southern Gulf of California, southwestern México, Isla Socorro, Panamá, Colombia, and Galápagos Islands.

HABITAT. Shallow water, among corals (*Pocillopora* spp.).

TYPE LOCALITY. Red Sea.

DISTRIBUTION. Red Sea, South Africa, Indian Ocean, tropical western Pacific to Hawaii; southern Gulf of California south to Colombia; Islas Socorro, Clarion, and Clipperton; Galápagos Islands.

COLOR IN LIFE. Bright orange-red, often with deep red middorsal stripe and deep red spots on chelae (Banner 1953).

REMARKS. Banner and Banner (1982) have petitioned the International Commission on Zoological Nomenclature to have the name *A. lottini* conserved for this species. Holthuis (1981) prefers to hold to strict priority, using *Alpheus sublucanus* (Forskål 1775). As of this writing, a decision on the name is pending.

*Alpheus websteri* Kingsley

*Alpheus websteri* Kingsley, 1880: 416.

*Alpheus Ridleyi* Pocock, 1890: 518.—Chace 1972: 69.

*Alpheus nigro-spinatus* Rankin, 1898: 249, pl. 30, fig. 6.

*Crangon arenensis* Chace, 1937: 119, fig. 4.

*Alpheus fagei* Crosnier and Forest, 1965: 603, fig. 1.—1966: 233, fig. 8.

MATERIAL. 27 specimens from 16 stations: São Tomé (eastern Atlantic), St. Lucia Island, Caribbean; Key West, Florida; southern Gulf of California, southwestern México, Isla Socorro, Costa Rica, Panamá, Colombia, and Galápagos Islands.

HABITAT. Intertidal zone to 6 m, among rocks or coral.

TYPE LOCALITY. Key West, Florida.

DISTRIBUTION. Eastern Atlantic, Caribbean region, southern Gulf of California south to Colombia, Isla Socorro, Galápagos Islands.

REMARKS. I have compared the type specimen of *A. websteri* from the U.S. National Museum with paratypes of *A. fagei*, from the Muséum National d' Histoire Naturelle in Paris, and specimens identified as *A. ridleyi* from the Caribbean and *A. arenensis* from the eastern Pacific, at the U.S. National Museum. I can find no significant differences between any of these specimens. The proportions of the appendages and parts of the antennae, the spination of the antennae, carapace, and telson; and the spination of the uropods and frontal margin of the carapace show individual differences only, not major differences from population to population.

Crosnier and Forest (1966) compared *A. rugimanus* A. Milne-Edwards, *A. fagei*, *A. ridleyi*, and *A. arenensis* in a chart. The only difference indicated between the last three species was the number of spines at the distal end of the propodus of the third pereopod: no spines in *A. fagei*, one in *A. ridleyi* and *A. arenensis*. In the two specimens of *A. fagei* I examined, there were indeed no such spines. However, I do not consider this difference sufficient to warrant designation as a separate species for *A. fagei*.

Kingsley (1880) did not illustrate *A. websteri*. His type specimen, however, is in good condition. It agrees well with the description except that its orbital hoods are spinose, not "acute, but not spinose." Evidently, this senior synonym has been overlooked.

The populations of *A. websteri* are widely separated. Perhaps genetic or behavioral studies will discover that the populations deserve subspecific rank. However, such a widespread distribution in the tropical Atlantic and eastern Pacific is by no means rare, being known also in *Trachycaris restrictus*, *Alpheus malleator*, *A. cristulifrons*, and other species.

#### *Alpheus malleator* Dana

*Alpheus malleator* Dana, 1852: 557, pl. 31, figs. a-h.—Crosnier and Forest 1966: 240, fig. 10.—Chace 1972: 68.—Brusca 1980: 252.

MATERIAL. MÉXICO: W of Squall Pt., Bahía Tenacatita (5 February 1954, sta. 2600-54, 1 specimen).—Islas Tres Marietas (21 March 1956, shore, sand; sta. KW25, 2 specimens).—Bahía Santa Lucia, Acapulco (13 September 1946, to 4 m, sta. 1561-46, 1 specimen; 1-2 February 1954, 2-7 m, mud, rock, and sand; sta. 2596-54, 1 specimen).—GALÁPAGOS: Gardner Bay, Isla Española (Hood Island) (25 January 1933, sta. 29-33, 5 specimens).—Albemarle Point, Isla Isabela (Albemarle Island) (11 February 1933, shore, rock; sta. 69-33, 1 specimen).

HABITAT. Sandy and rocky shores.

TYPE LOCALITY. Rio de Janeiro, Brazil?

DISTRIBUTION. Eastern Atlantic from Senegal to Congo; Puerto Rico to Estado de Sao Paulo, Brazil; Gulf of California, southwestern México, Ecuador, Galápagos Islands.

COLOR IN LIFE. Palm and movable finger of cheliped marbled, tip of fixed finger satan red. Legs almost solid purple and poppy red. Chela on top burnt umber, on sides a greenish sepia. Body and carapace clove to real brown. White-greyish transverse bands across hind third of carapace and across anterior end of each somite except first, hazel spot on anterior center of each somite. Epimeres white on side of carapace. Eggs hazel. Abdomen of large animals with white splotchy bars, smaller shrimp with irregular splotchy transverse bars of white across anterior edge of each somite. Tail fan reddish, terminal fringe golden tawny (color note by W. L. Schmitt unpublished).

#### *Alpheus cylindricus* Kingsley

*Alpheus cylindricus* Kingsley, 1878b: 197.—Crosnier and Forest 1966: 257, fig. 16.—Chace 1972: 65.—Pequegnat and Ray 1974: 246, fig. 49d.

MATERIAL. MÉXICO: Bahía San Gabriel, Isla Espíritu Santo (6 March 1937, shallow, coral; sta. 634-37, 2 specimens; 7 March 1937, shallow, coral; sta. 634-37, 2 specimens; 7 March 1937, shallow, coral; sta. 638-37, 5 specimens).—Isla Isabel (19 March 1933, shore, rock; sta. 124-33, 2 specimens).—COLOMBIA: Port Utria (23 January 1935, shore, rock; sta. 413-35, 1 specimen).

HABITAT. Shore to shallow subtidal zone, among rocks or coral.

TYPE LOCALITY. Archipelago de las Perlas, Gulf of Panamá.

**DISTRIBUTION.** Eastern Atlantic from islands of Principe, São Tomé, and Annobon; Bermudas and Florida to Barbados; Flower Gardens Reefs off Texas, Gulf of California, Colombia, and Galápagos Islands.

**COLOR IN LIFE.** Carapace spotted on sides, whitish. Whole animal pale white on mud-dorsum, sides and head to hind end vermilion, pale; chelae suffused ochraceous-rufous (color note by W. L. Schmitt unpublished).

*Alpheus normanni* Kingsley

*Alpheus normanni* Kingsley, 1878a: 93.—Williams 1965: 65, fig. 53.—Chace 1972: 68.—Brusca 1980: 252.

*Crangon normanni*.—Chace 1937: 122.

**MATERIAL.** About 140 specimens from 20 stations: Gulf of California, Isla Clarion, and Galápagos Islands.

**HABITAT.** Usually subtidal, to 73 m, on rocks, sand, or shell.

**TYPE LOCALITY.** Pacific coast of Panamá.

**DISTRIBUTION.** Virginia to Bermudas, to Tobago and westward to the Yucatán peninsula; eastern Pacific from the Gulf of California, Isla Clarion, Panamá, and Galápagos Islands.

**COLOR IN LIFE.** Gray or dull green, sometimes with a median and lateral stripe of whitish often clouded or mottled with dark green or brown, a paler spot behind each eye; large chela dark green usually banded with yellowish brown or yellow on inner surface; smaller chela and other legs paler, often banded with dull gray or reddish; occasionally body banded with red and pale yellow, large chela with two pale bands, immovable finger blackish, dactyl reddish (Williams 1965).

*Alpheus grahami* Abele

*Alpheus grahami* Abele, 1975: 72, fig. 29.

**MATERIAL.** MÉXICO. Bahía San Gabriel, Isla Espíritu Santo (15 March 1949, 2 m, coral; sta. 1737-49, 1 specimen).—Puerto Escondido (16 March 1936, shore, shingle; sta. 591-36, 1 specimen).—Isla San Nicolas, San Carlos, Sonora (2 July 1978, 18 m, A. Kerstitch, 2 specimens).—Bahía Catalina, off Guaymas (9 February 1940, shore, shingle; sta. 1092-40, 2 specimens).

**HABITAT.** Rocks, coral, and shingle, shore to 40 m.

**TYPE LOCALITY.** Southeastern side of Isla Malpelo, Colombia.

**DISTRIBUTION.** Gulf of California, Isla Malpelo.

**COLOR IN LIFE.** Carapace and abdomen translucent brown with oblique translucent white lines edged with blue. Tail fan edged with blue and red. Chelae reddish with violet tips (color slide by A. Kerstitch).

*Alpheus cristulifrons* Rathbun

*Alpheus cristulifrons* Rathbun, 1900: 152.—Crosnier and Forest 1966: 260, figs. 17, 18.—Chace 1972: 64.—Pequegnat and Ray 1974: 246, figs. 49c, 50.

**MATERIAL, MÉXICO:** Puerto Escondido, Baja California (10 February 1940, 15–28 m, sand, sponge, and coral; sta. 1093-40, 1 specimen).—Bahía Santa Lucia, Acapulco (13 September 1946, to 4 m, sta. 1561-46, 8 specimens).

**TYPE LOCALITY.** Fernando de Noronha (off Brazil).

**HABITAT.** Reef edges near tide level and associated with rocks and coral, including *Pocillopora* and *Porites* (Chace 1972).

**DISTRIBUTION.** Eastern tropical Atlantic from São Tomé and Príncipe; western Atlantic from Dry Tortugas to Fernando de Noronha and westward to the Yucatán peninsula; Flower Gardens Reefs off Texas, Gulf of California, western México.

**COLOR IN LIFE.** Brownish orange with scattered white dots over carapace, abdomen and large chela. Chela with lighter background color than carapace and abdomen. Black areas on head, thorax, and near tip of large chela (Pequegnat and Ray 1974).

*Alpheus paracrinitus* Miers

*Alpheus paracrinitus* Miers, 1881: 365, pl. 16, fig. 6.—Chace 1962: 609.—Crosnier and Forest 1966: 253, fig. 15.—Chace 1972: 69.—Pequegnat and Ray 1974: 246, fig. 49e, 51.—Brusca 1980: 252.

*Crangon paracrinita*.—Banner 1953: 110, fig. 40.

**MATERIAL. MÉXICO:** Bahía Agua Verde (12 February 1940, 18 m, mud and coral; sta. 1101-40, 10 specimens).—Isla San Pedro Nolasco, Sonora (30 June 1978, 6 m, A. Kerstitch, 3 specimens).—Bahía Santa Lucia, Acapulco (13 September 1946, to 4 m, sta. 1561-46, 3 specimens; 1-2 February 1954, 2-7 m, mud, rock and sand; sta. 2596-54, 3 specimens).—Sulphur Bay, Isla Clarion (10 June 1934, shore, rock; sta. 298-34, 2 specimens).—**GALÁPAGOS:** Isla Santa Fé (Barrington Island) (26 January 1938, shore, coral; sta. 811-38, 1 specimen).

**TYPE LOCALITY.** Goree, Senegal.

**HABITAT.** Among rocks, coral, or mud; shore to 18 m.

**DISTRIBUTION.** Eastern Atlantic, Bermuda to Tobago, Flower Garden Reefs off Texas, Indian Ocean, tropical Indo-West Pacific to Hawaii, Gulf of California, western México, Islas Clarion and Clipperton, Galápagos Islands.

**COLOR IN LIFE.** Translucent white with bands of red on thorax and abdomen, chelae with red mottling, eggs yellow to greenish (Banner 1953).

*Alpheus floridanus* Kingsley

*Alpheus floridanus* Kingsley, 1878b: 193.—Chace 1972: 65, figs. 17-20.—Hendrickx, Wicksten, and van der Heiden 1983: 74.

*Alpheus floridanus floridanus*.—Holthuis 1951a: 81.—Crosnier and Forest 1966: 267, figs. 20a, 21f-i.

*Alpheus floridanus africana* Balss, 1916: 21, fig. 5.

*Alpheus floridanus africanus*.—Holthuis 1951a: 79, fig. 15.—Crosnier and Forest 1966: 269, figs. 20b, 21a-e.

**MATERIAL. MÉXICO:** Off Willard Point, Bahía Gonzaga (30 January 1940, 55-74 m, mud; sta. 1061-40, many specimens).—Off Mazatlán (13 March 1981, fine sand and mud; R.V. *El Puma*, 1 specimen, EMU).—Bahía de Mazatlán, Sinaloa (7 March 1979, fine sand; 1 specimen; 25 January 1980, 25 m, muddy sand; 1 specimen; 27 November 1980, 25 m, mud; 1 specimen, EMU).—**PANAMÁ:** Isla Taboga (2 May 1939, 4-9 m, mud and sand; sta. 959-39, 1 specimen).

**HABITAT.** Subtidal mud or sandy mud, to 37 m.

**TYPE LOCALITY.** Fort Jefferson, Dry Tortugas, Florida.

**DISTRIBUTION.** Eastern Atlantic from Guinea to Congo, Gulf of México to Estado da Bahía, Brazil; Gulf of California, Panamá.

Table D

Comparison between *Alpheus sulcatus* and *Alpheus californiensis*.

	<i>Alpheus sulcatus</i>	<i>Alpheus californiensis</i>
Rostrum	Not carinate	Carinate
Orbital sulci	Deep	Shallow
Major chela	Deep groove running horizontally along upper half of palm, no notch behind base of dactyl.	No deep groove running horizontally along upper half of palm, pronounced notch behind base of dactyl.
Body	Usually laterally compressed.	Rounded
Dactyls of third pereopods	Stout	Markedly slender
Habitat	Rocky bottoms	Quiet muddy or silty bottoms, rocks in harbors.
Range in eastern Pacific	Bahía Magdalena to Perú	Marina del Rey, California to Bahía Magdalena.

*Alpheus sulcatus* Kingsley

*Alpheus sulcatus* Kingsley, 1878b: 193.—Sivertsen 1933: 3, pl. 1.—Crosnier and Forest 1966: 237, fig. 9.—Méndez 1981: 97.—Banner and Banner 1982: 79, fig. 20.

*Crangon sulcatus*.—Hult 1939: 4.

*Alpheus macrochirus* Richters, 1880: 164, pl. 17, figs. 31–33. (See Banner and Banner 1982 for a more complete synonymy.)

**MATERIAL.** About 85 specimens from 14 stations: Gulf of California, Isla Lobos de Tierra, Perú.

**HABITAT.** Shore to shallow subtidal rocky bottoms.

**TYPE LOCALITY.** Not specified by Kingsley. His material came from the Bay of Panamá and Zorritas, Perú.

**DISTRIBUTION.** Eastern Atlantic (São Tomé and Congo); east and South Africa, Red Sea, Australia, to Society Islands; Gulf of California, Bay of Panamá, Galápagos Islands, Perú.

**COLOR IN LIFE.** Body and chelae orange-red, translucent; dots of white on dorsal midline and along sides of carapace and abdomen (color slide by A. Kerstitch).

**REMARKS.** Crosnier and Forest (1966) suggested that *A. sulcatus* and *A. californiensis* Holmes might be the same species. I have examined the type specimen of the latter species as well as other specimens of it from southern California and Baja California. The two can be distinguished easily, as shown in Table D. The ranges of the two species overlap only at Bahía Magdalena, Baja California.

*Alpheus mazatlanicus* new species

Figs. 7–8

*Alpheus* cf. *A. malabaricus* (Fabricius): Hendrickx, Wicksten, and van der Heiden 1983: 74.

**DESCRIPTION.** Rostrum short, sharp, barely exceeding eyescales in small specimens, reaching middle of first segment of antennular peduncle in large males. Rostral carina indistinct to sharp.



**Table E**

	<i>Alpheus malabaricus malabaricus</i> (Fabricius)	<i>Alpheus malabaricus dolichodactylus</i> Ortmann	<i>Alpheus malabaricus leptopus</i> De Man	<i>Alpheus malabaricus songkla</i> Banner and Banner	<i>Alpheus malabaricus trefzae</i> Banner and Banner	<i>Alpheus mackayi</i> Banner	<i>Alpheus mazatlanicus</i> new species
<b>SMALL CHELA:</b>							
Fingers	Straight, meet entire length. 3× palm.	Gape, 3× palm.	Gape, 3× palm.	Gape, 1.5× palm.	Entire small chela missing.	Straight, 1.4–1.7× palm.	Gape in male, Straight in female. 1–2× palm.
Tooth above dactylar articulation	Present	Absent	Absent	Slight notch.		Present	Absent
Finger tips	Do not cross.	Cross	Do not cross.	Cross		Cross	Usually cross.
<b>LARGE CHELA:</b>							
Inferior depressed area	Slight	Notched	Slight	Slight	Slight	With strong shoulder, no notch.	Deeply notched.
Inferior margin of merus of cheliped	With long, narrow, acute tooth.	With sharp tooth.	With sharp tooth.	Without tooth.	With small tooth.	With sharp tooth.	Without tooth.
<b>ROSTRUM LENGTH</b>	Middle of first antenular segment.	Middle of first antenular segment.	Middle of first antenular segment.	Middle of first antenular segment.	Barely reaching beyond orbital hoods.	Not reaching beyond orbital hoods.	End of orbital hoods to middle of first antenular segment.
<b>RANGE</b>	Indian Ocean, Japan (Banner and Banner, 1966).	Japan (De Man, 1911).	Indonesia (De Man, 1911).	Thailand (Banner and Banner, 1966).	Australia (Banner and Banner, 1982).	Hawaii (Banner, 1959; Banner and Banner, 1974).	Mexico.

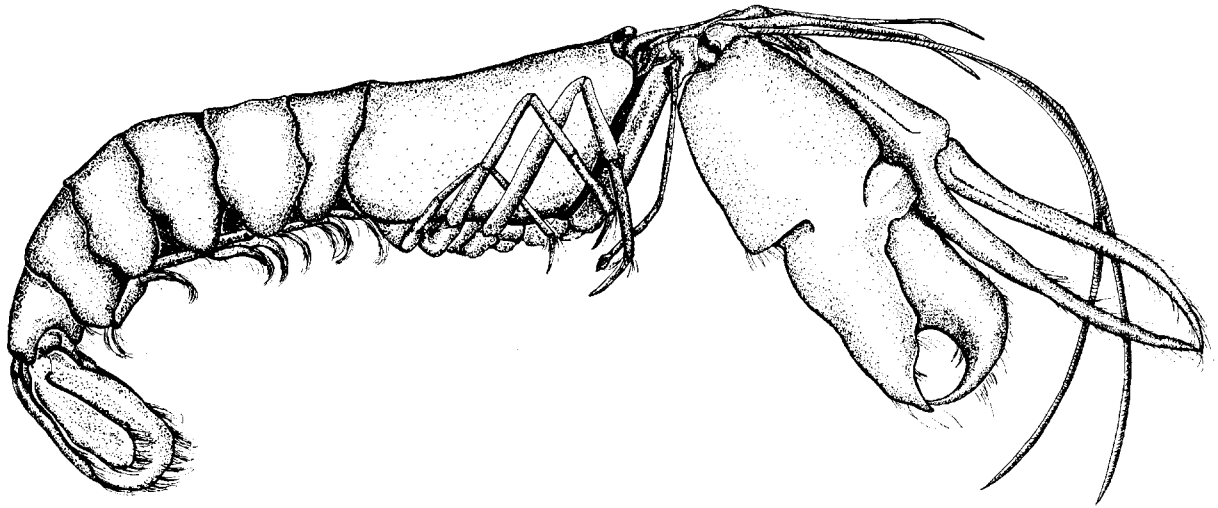


Figure 7. *Alpheus mazatlanicus* n. sp. Holotype, male.

Orbital hoods prominently inflated. No orbitorostral grooves. Margin of carapace between orbital hoods and rostrum concave.

Visible portion of first antennular segment about 0.5× length of second, third about 0.6× length of second. Second segment about 3× as long as broad. Stylocerite blunt, not reaching end of first antennal article. Scaphocerite with outer margin slightly concave, lateral spine barely exceeding blade, reaching to end of antennular peduncle. Basicerite without spines. Carpocerite longer than antennular peduncle or scaphocerite.

Large chela 3× as long as broad, fingers about 0.4× entire length. Movable finger angled, with sharp tip. Transverse groove of superior margin of palm with proximal shoulder very abrupt, groove continuing on both faces as ill-defined triangular depression. Inferior shoulder abrupt, bordering prominent notch. Distal depressed area well-defined. Merus of large chela 4× as long as wide, with superior margin projecting distally as tooth, inferior margins without teeth.

Small chela sexually dimorphic. Fingers of male long and slender, 1–2× as long as palm. Upper finger overlapping lower at distal end. In one male, upper finger with balaeniceps ridge (ridge of stiff, curved setae). Fingers gaping. Palm 2× as long as wide, superior distal margin without tooth. Merus 5× as long as broad, unarmed. In female, fingers 1.5× as long as palm, overlapping or not, not gaping.

Carpal articles of second leg with ratio 9:10:2:2:2.

Third pereopod with tiny spine on ischium. Merus about 5× as long as wide, unarmed. Carpus about 0.5× length of merus, with superior margin projecting distally, but rounded. Propodus 0.8× as long as merus, without spinules or long setae. Dactyl simple, subspatulate, 0.4× as long as merus.

Telson 3× as long as posterior margin is broad. Posterior margin slightly arcuate.

**HOLOTYPE AND TYPE LOCALITY.** Male, 32.6 mm total length. Laguna Caimanero, Sinaloa, México. 15 May 1978, A. Menz; AHF type number 784.

**PARATYPES.** Two males, total lengths 33.5 and 51.3 mm, two females, 29.9 and 27.9 mm each. Laguna Caimanero (15 May 1978, A. Menz). Male and one female to USNM; other male and female to AHF.—2 females, total lengths 48.3 and 51.5 mm each. Head of main channel, Estero de Urias, Sinaloa; sand, 24 November 1981, Walter Hubbard, Estación Mazatlán #EMU-1068.

**COLOR IN LIFE.** Olive green.

**REMARKS.** *Alpheus mazatlanicus* closely resembles the five subspecies of *A. malabaricus*, from the Indo-West Pacific region; and *A. machayi* from Hawaii. Of these, *A. malabaricus mazatlanicus* most closely resembles *A. malabaricus songkla*. The species are compared to Table E.

The paratypes from Estero de Urias were found near mangroves (*Rhizophora mangle*) in sand inhabited also by ghost shrimp (*Upogebia* sp.). The temperature was 31°C in the water, with a salinity of 36‰.

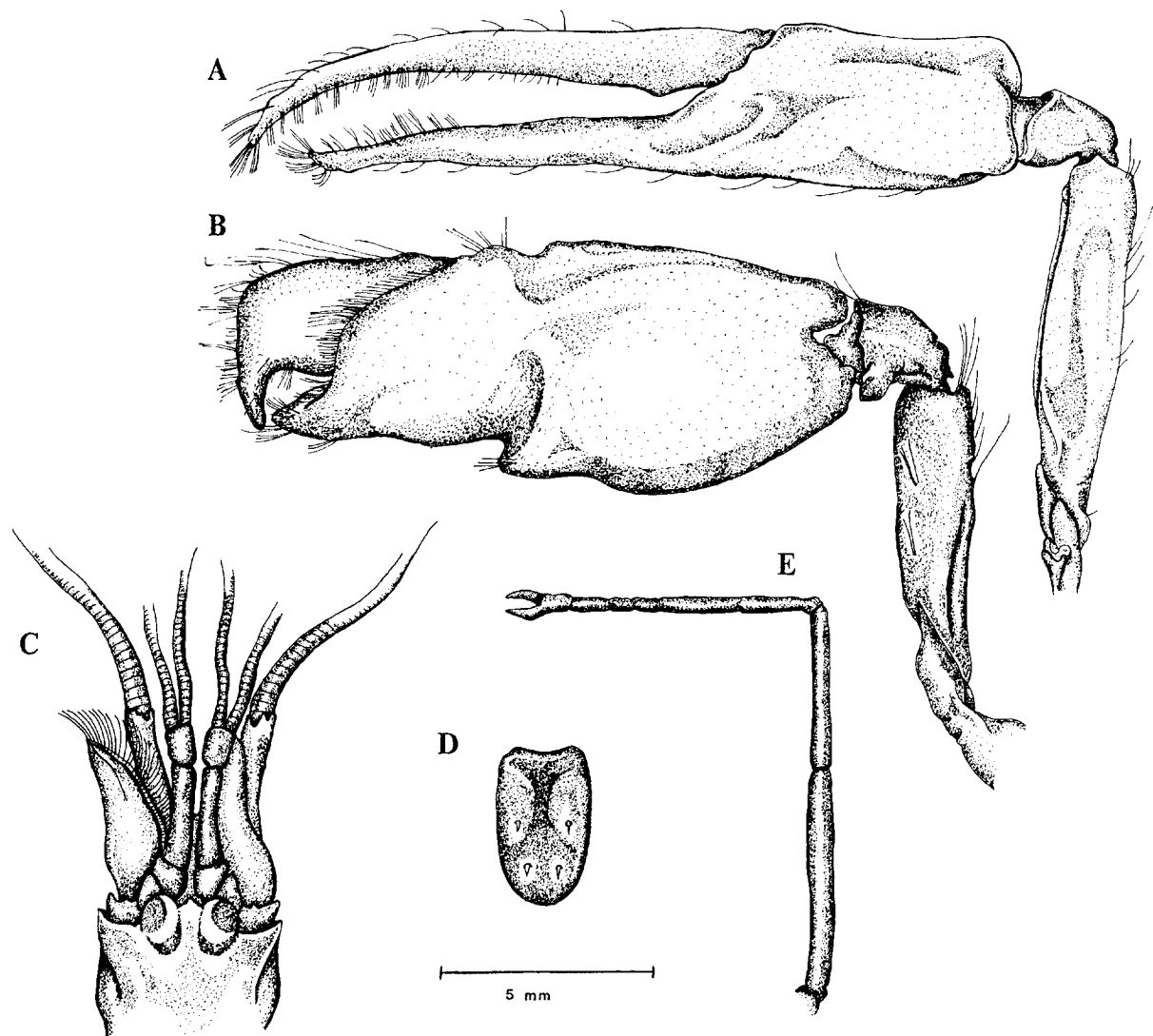


Figure 8. *Alpheus mazatlanicus* n. sp. Holotype. A, minor chela; B, major chela; C, frontal region in dorsal view; D, telson; E, second pereopod.

*Alpheus schmitti* Chace

*Alpheus schmitti* Chace, 1972: 70, figs. 21, 22.—Hendrickx, Wicksten, and van der Heiden 1983: 75.

**MATERIAL.** Punta Chile to Punta Tiburon, Bahía de Mazatlán, Sinaloa (15 February 1980, shore, rocks; M. E. Hendrickx, 2 specimens, AHF and EMU).

**HABITAT.** Intertidal, among rocks or coral.

**TYPE LOCALITY.** Grand Anse Bay outside Saint Georges Harbour, Grenada.

**DISTRIBUTION.** Florida Keys, Antigua Island, Grenada, Tobago; southern Gulf of California.

**COLOR IN LIFE.**—Carapace and abdomen mostly translucent and colorless, with some bluish chromatophores. Major chela marked by broad, brownish to chocolate brown band, white elsewhere; carpus and merus of cheliped with brown spots on white background. Minor chela mostly brown except for white proximal half of movable finger; carpus and merus as in major cheliped. Second

pereopods bright blue. Posterior pereopods translucent, colorless. Lateral branch of uropod with grayish-green band; mesial branch with similar oblique or nearly longitudinal band (Chace 1972).

*Alpheus armillatus* H. Milne-Edwards

*Alpheus armillatus*. H. Milne-Edwards, 1837: 354.—Williams 1965: 67, fig. 35.—Chace 1972: 62.—Hendrickx, Wicksten, and van der Heiden 1983: 75.

**MATERIAL.** About 250 specimens from 43 stations: Bahía Magdalena, throughout Gulf of California, Mazatlán, and Isla María Cleofa, México, AHF and EMU, Acajutla, El Salvador, collection of California Academy of Sciences.

**HABITAT.** Rocky bottoms, shore to 20 m.

**TYPE LOCALITY.** "West Indies."

**DISTRIBUTION.** North Carolina; West Indies to Cananea, Sao Paulo, Brazil; Bermuda; outer coast of Baja California southward through Gulf of California, southwestern México.

**COLOR IN LIFE.** Body with dark gray or brown ground color, crossed by nine conspicuous lunate elliptical spots or bands of translucent white equal in width to intervening dark bands; carapace with three white bands, third one at posterior margin of carapace; abdominal bands usually whiter and more clearly defined than bands on carapace; abdomen often dark green with spots bordered by line of orange; uropods and telson usually with broad crossband and sometimes tipped orange; chelae thickly speckled with dark gray; whitish bands above, tipped with pale pink or white; antennal peduncles grayish, flagella and walking legs orange yellow banded with white (Verrill 1922, in Williams 1965). Specimens from the Gulf of California may have an olive-green ground color, with yellowish, more faint bands (color slide by A. Kerstitch, color notes from live shrimp at Punta Chile, Mazatlán).

*Alpheus leviusculus* Dana

*Alpheus edwardsi leviusculus* Dana, 1852: 543, pl. 34, figs. 3a-f.

*Alpheus leviusculus*.—De Man 1911: 411, pl. 23, figs. 982-b.—Banner and Banner 1964: 92, fig. 4.—Hendrickx, Wicksten, and van der Heiden 1983: 74.

*Crangon leviusculus*.—Hult 1939: 3.

**MATERIAL.** About 85 specimens from 12 stations: southern Gulf of California, southwestern México, Isla Clarion, Costa Rica, Panamá, Colombia, and Galápagos Islands, AHF, EMU and USNM.

**HABITAT.** Shore to 68 m, rocks and coral.

**TYPE LOCALITY.** Wake Island.

**DISTRIBUTION.** Wake Island, Canton Island, Gulf of California south to Colombia, Isla Clarion, Galápagos Islands.

**REMARKS.** Banner and Banner (1982) erected a new subspecies, *A. leviusculus leviusculus*, from the Indo-West Pacific region. The specimens from the eastern Pacific may belong to a distinct subspecies. Comparisons of a series of specimens from many areas will be necessary to determine the subspecific status of these shrimps.

## FAMILY OGYRIDIDAE

*Ogyrides* Stebbing, 1914

*Ogyrides* sp.—Schmitt 1939: 9.—Hendrickx, Wicksten, and van der Heiden 1983: 75.

**MATERIAL.** MÉXICO. Bahía de Mazatlán, Sinaloa (25 June 1979, 9.5 m, sand; M.E. Hendrickx, 1 specimen; 22 February 1980, 6 m, sand; M.E. Hendrickx, 2 specimens, EMU).—N of White Friars,

Guerrero (7 May 1939, 37–46 m, sand; sta. 963-39, 1 specimen).—Bahía Chacahua, Oaxaca (20 March 1939, 18–28 m, mud; sta. 927-39, many specimens).

HABITAT. Mud or sand, 6–50 m.

REMARKS. This unidentified species is being studied by Jack Word, University of Washington.

## FAMILY CRANGONIDAE

*Crangon* Fabricius, 1798

*Crangon munitellus* Walker

*Crangon munitellus* Walker, 1898: 275, pl. 16, fig. 1.—Holmes 1900: 176.—Wicksten 1980: 39.

*Crangon munitella*.—Rathbun 1904: 10.—Carlton and Kuris 1975: 404.

*Crango munitella*.—Schmitt 1921: 101, fig. 70.

*Mesocrangon munitella*.—Butler 1980: 121.

MATERIAL. MÉXICO: Bahía San Francisquito, Baja California (1 March 1936, 18 m, sand and algae; sta. 531-36, 1 specimen; 2 March 1936, 36 m, sand and kelp; sta. 532-36, 1 specimen).—Off S end Isla Tiburon (10 March 1936, 15–18 m, kelp and corallines; sta. 564-56, 1 specimen).—S of Isla Tiburon (28 March 1937, 13 m, sand; sta. 731–37, 1 specimen). All at USNM.

HABITAT. Sandy or mixed sand and rock bottoms, often under kelp, subtidal.

TYPE LOCALITY. Puget Sound, Washington.

DISTRIBUTION. Goose Island, Queen Charlotte Sound (Butler 1980) to northern Baja California, Gulf of California.

REMARKS. Zarenkov (1965) split the genus *Crangon*, erecting the new genus *Mesocrangon* to include *C. munitella* and two other species. I find Zarenkov's generic characters to be inconsistent and difficult to understand. I prefer to retain the older generic designation until other investigators can provide better justification for splitting the genus.

## RESUMEN EN ESPAÑOL

Setenta y siete especies de carideos son reportadas del Golfo de California. *Dasycaris kerstitchi* n. sp. y *Alpheus mazatlanicus* n. sp. son descritas. Se descubre que *Hippolyte mexicana* Chace es el macho de *H. williamsi* Schmitt, no *H. californiensis* Holmes. *Alpheus fagei* Crosnier y Forest, *A. arenensis* (Chace), *A. ridleyi* Pocock, y *A. websteri* Kingsley son sinonimas. *A. cristulifrons* Rathbun, *Neopalpheopsis euryone* (De Man), y *Thor spinosus* Boone son reportadas por la primera vez del Pacífico este.

La mayoría de los carideos del Golfo son de origen tropical. La fauna tiene notables afinidades con el Atlántico tropical y el Pacífico oeste tropical.

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## APPENDIX 1: GUIDE TO STATIONS AND ABBREVIATIONS

### COLLECTORS FOR STATIONS:

1-33 to 1502-42: R.V. *Velero III*, University of Southern California.  
 1503-46 to 19044-73: R.V. *Velero IV*, University of Southern California.  
 Burch: Tom and Beatrice Burch, northern Gulf of California collection.  
 C: boat *FC-1*, Estación Mazatlán, Universidad Nacional Autónoma de México.  
 H: Carl L. Hubbs, collector.  
 KG: Knudsen-Gorsline Baja California collection.  
 KW: Knudsen-Winter western México collection.  
 PH: Peruvian Coastal Islands Investigations, boat *SNP-1*.  
*Searcher*: R.V. *Searcher* collections, sponsored by Los Angeles County Museum of Natural History.  
 SIPCO: R.V. *El Puma*, Estación Mazatlán.

### INSTITUTIONS:

AHF: Allan Hancock Foundation, University of Southern California.  
 EMU: Estación Mazatlán, Universidad Nacional Autónoma de México.  
 IMARPE: Instituto del Mar del Perú.  
 SIO: Scripps Institution of Oceanography.  
 USNM: U.S. National Museum of Natural History (Smithsonian Institution).

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The ALLAN HANCOCK FOUNDATION was established at the University of Southern California in 1939 by Captain G. Allan Hancock, business and educational leader, master mariner and organizer of scientific expeditions. The building housing the Foundation, which was especially designed for marine science programs and collections obtained on the Captain's expeditions, together with his ship the VELERO III, were presented to the University in 1939. The Hancock Library, built around the holdings of the Boston Society of Natural History, which were acquired by the Captain in 1944, now contains more than 90,000 volumes and 100,000 reprints and separates. The building also contains one of the most extensive collections of marine algae and invertebrates from the Eastern Pacific region.

The Foundation's principal research activities are oriented toward ecological and systematic marine biology, biological oceanography, marine geology, and paleoecology.

Dr. Richard C. Dugdale is Director of the Foundation.