

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× length of propodus. Merus about 0.9× carpus, 3.5× as long as broad. Ischium about 0.5× 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°56'N, 111°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.

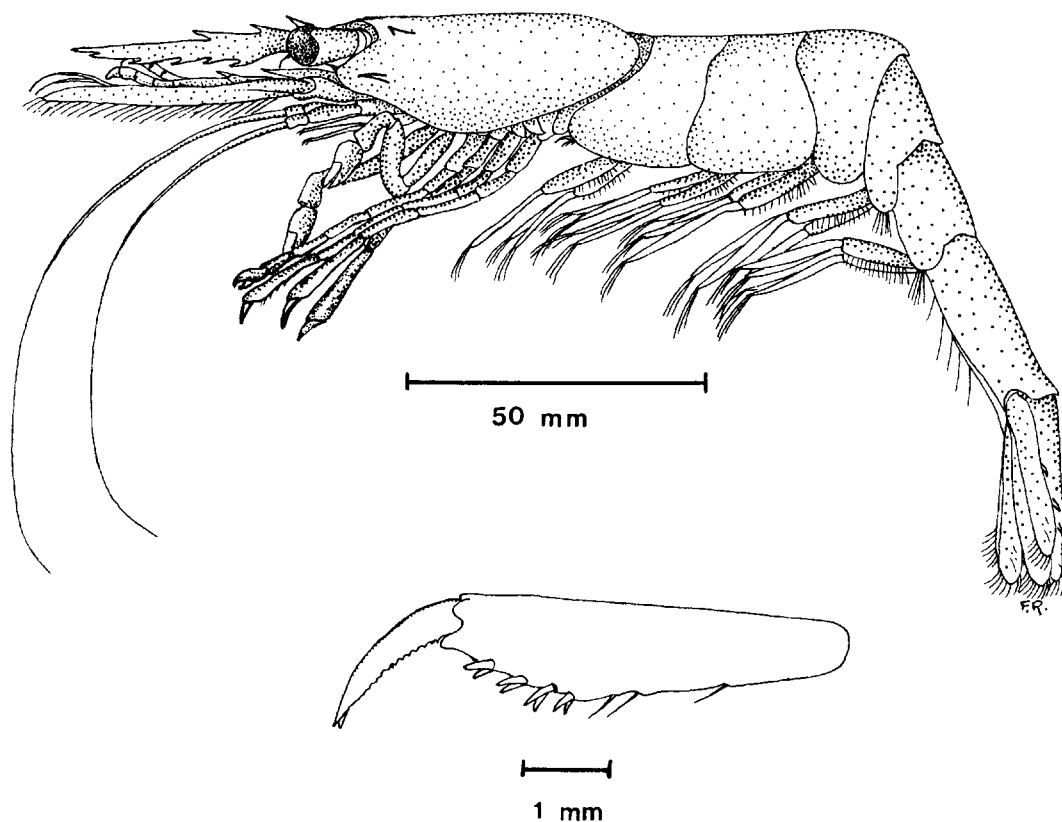


Figure 3. *Hippolyte californiensis* Holmes. Male in lateral view, detail of propodus and dactyl of third pereopod.

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

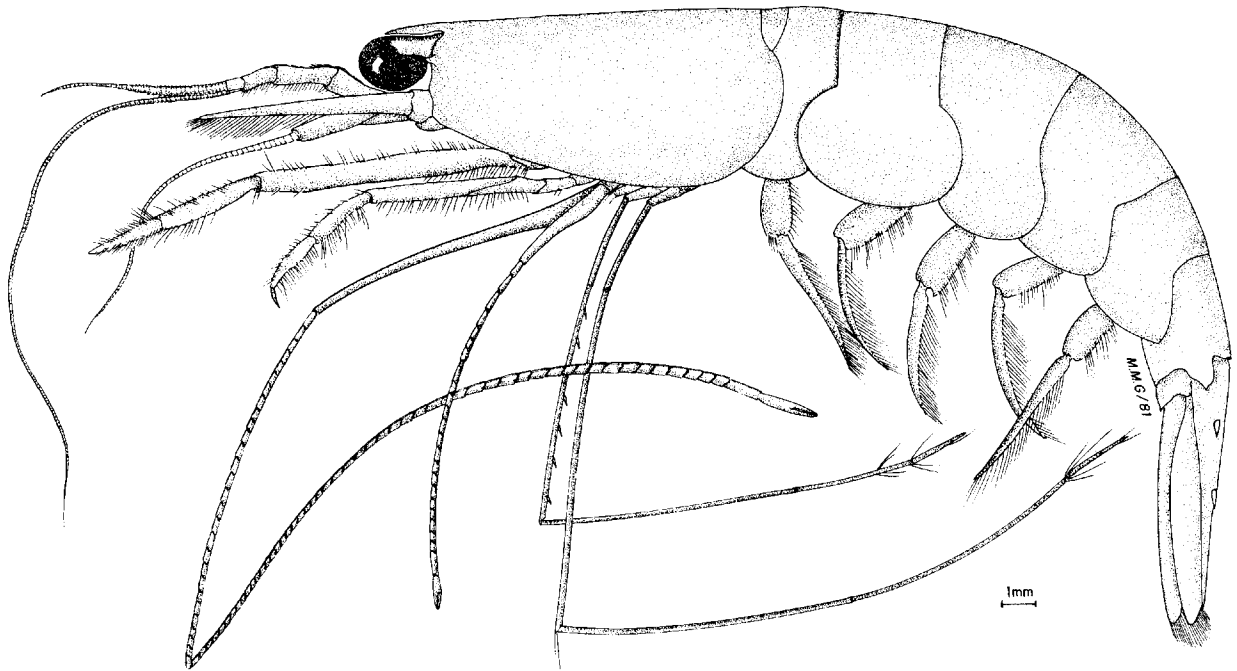


Figure 4. *Processa peruviana* n. sp. Male, lateral view.

Isla Manuelita, Costa Rica ($5^{\circ}36'09''\text{N}$, $87^{\circ}01'14''\text{W}$), 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 ($3^{\circ}55'\text{S}$, $81^{\circ}01'\text{W}$), 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 ($25^{\circ}39'\text{N}$, $111^{\circ}07.7'\text{W}$), 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 ($7^{\circ}56'0''\text{N}$, $79^{\circ}41'03''\text{W}$), 95 m, mud; 30 March 1888, R.V. *Albatross* sta. 2805, USNM.—Female, ovigerous, total length 34.1 mm; off Mazatlán, Sinaloa ($22^{\circ}24'\text{N}$, $105^{\circ}55'\text{W}$), 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.

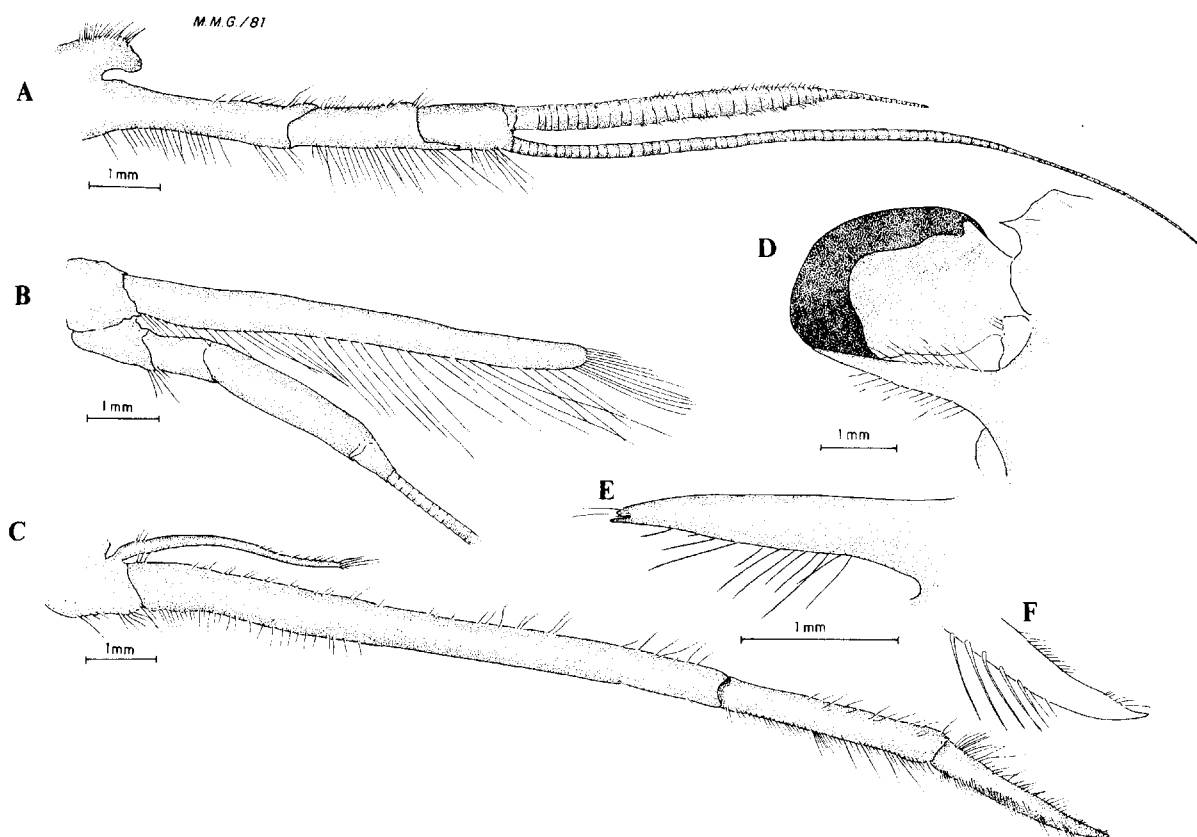


Figure 5. *Processa peruviana* n. sp. Male. A, right first antenna; B, right second antenna; C, right third maxilliped; D, rostrum and eye in dorsal view; E, rostrum; F, detail of end of third maxilliped.

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.

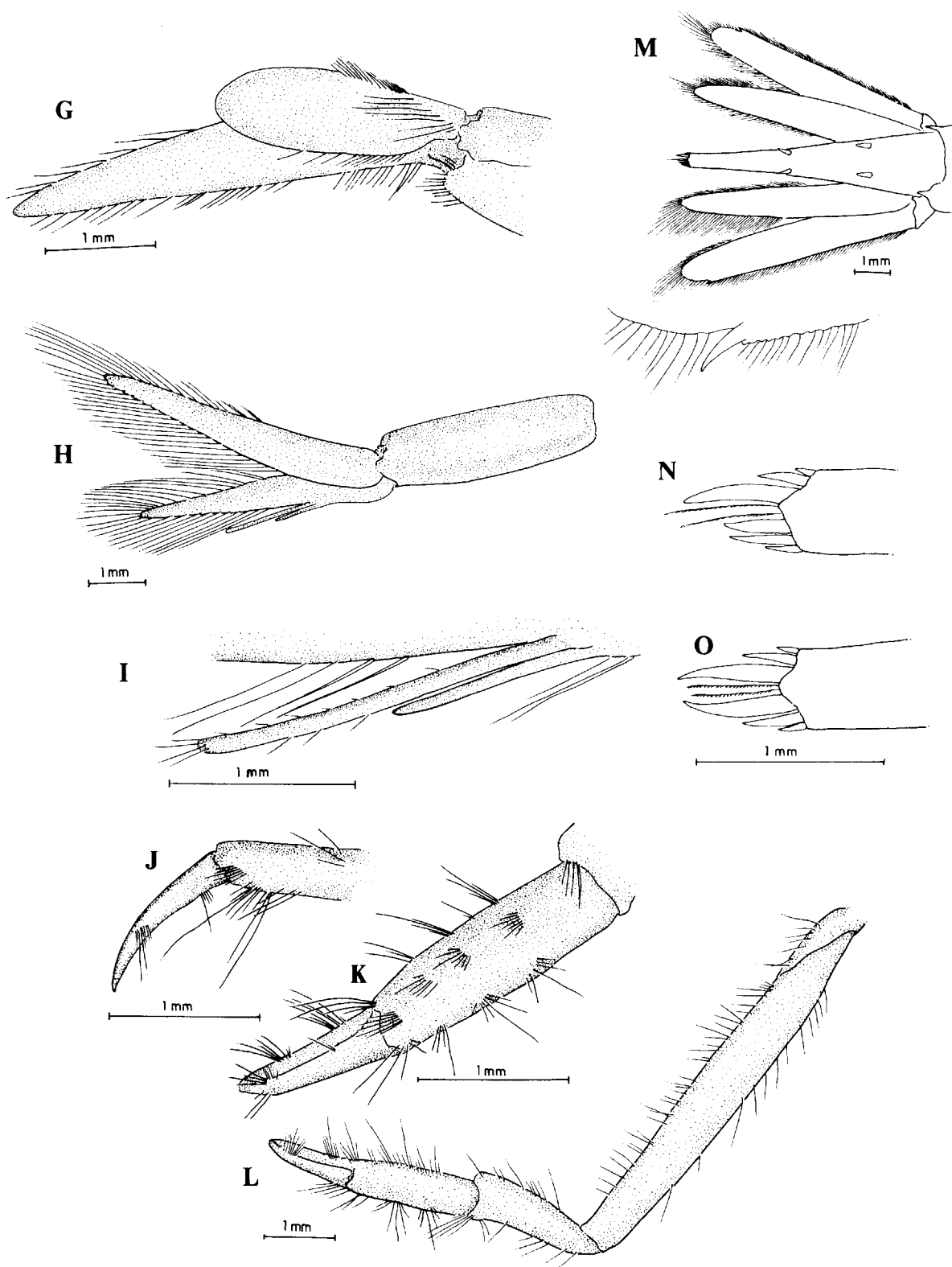


Figure 6. *Processa peruviana* n. sp. Male. G, first pleopod; H, second pleopod; I, second pleopod, appendices masculina and interna; J, dactyl of left first pereopod; K, chela of right first pereopod; L, right first pereopod; M, telson and uropods, with detail of lateral tooth of uropod; N, end of telson;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

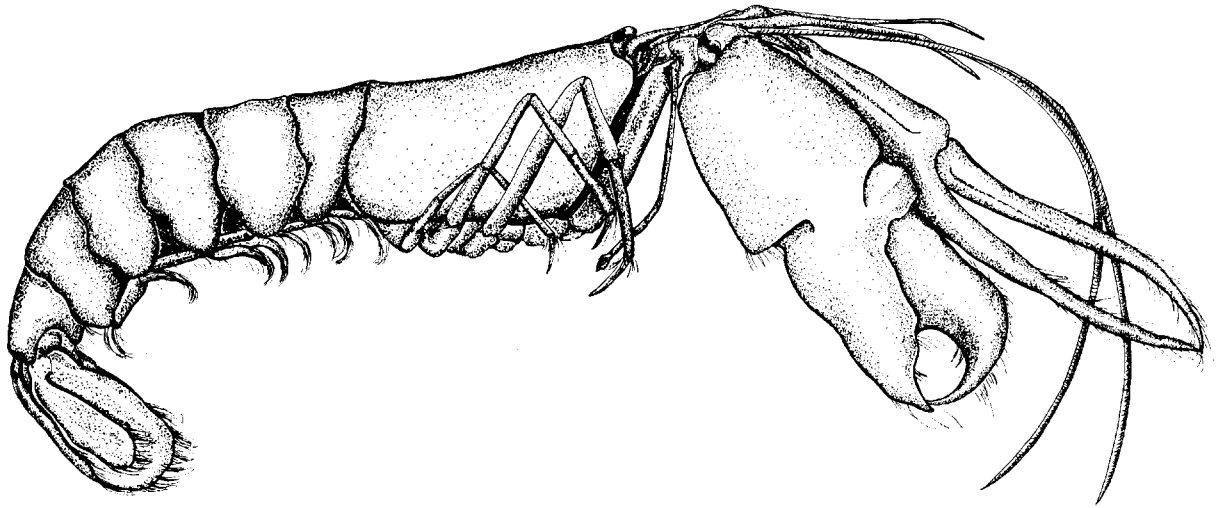


Figure 7. *Alpheus mazatlanicus* n. sp. Holotype, male.

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‰.

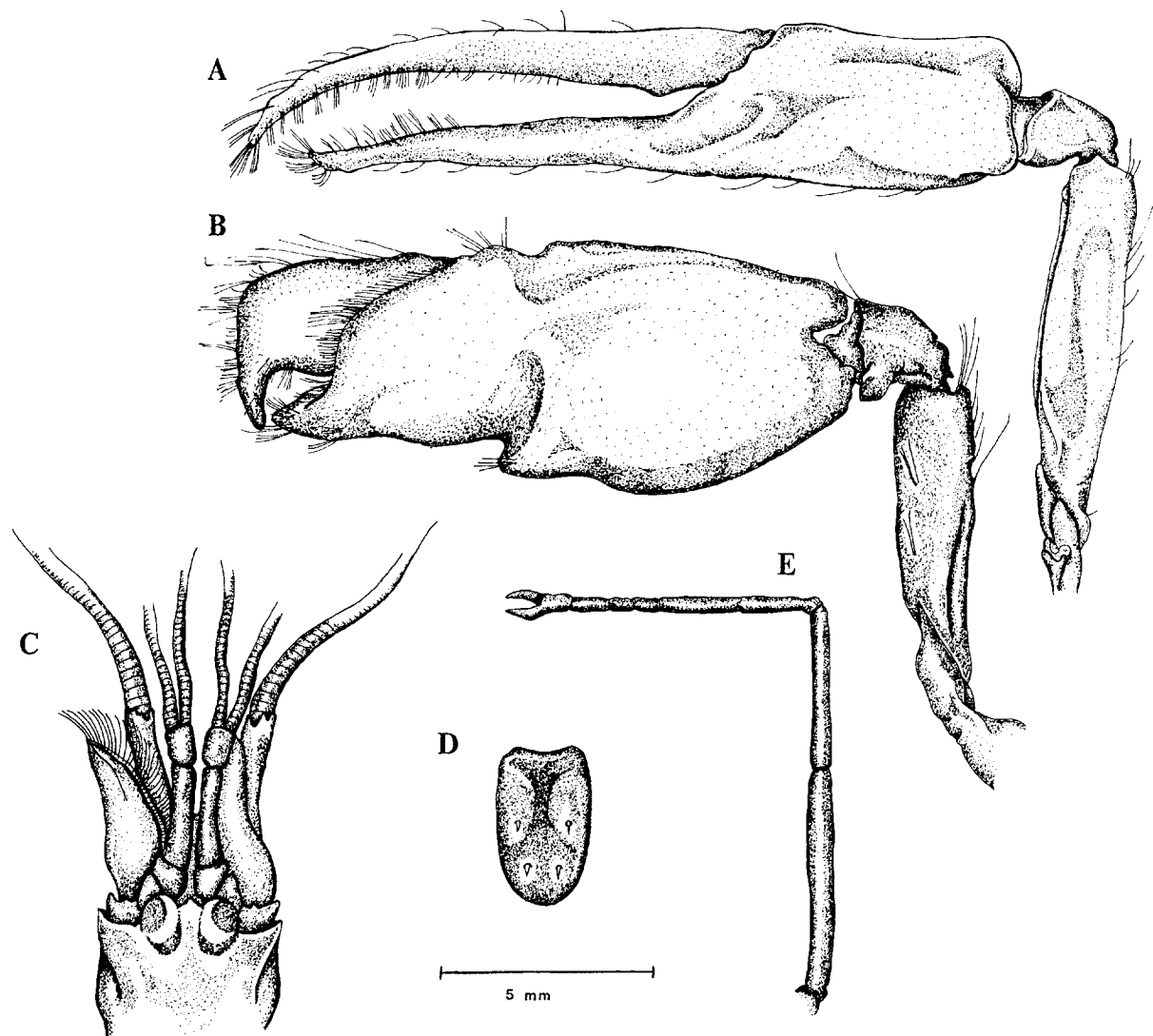


Figure 8. *Alpheus mazatlanicus* n. sp. Holotype. A, minor chela; B, major chela; C, frontal region in dorsal view; D, telson; E, second pereopod.

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, *Neolpheopsis 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.

ACKNOWLEDGMENTS

I am grateful to Fenner A. Chace, Jr. of the U.S. National Museum of Natural History for criticism and a great deal of helpful advice. Albert and Dora Banner of the University of Hawaii helped with some of the alpheids. John Garth, Janet Haig, and Richard Brusca of the Allan Hancock Foundation provided suggestions and enthusiastic support for the project. Matilde Méndez of the Instituto del Mar del Perú collaborated on work on carideans of the Peruvian coast. Alex Kerstitch, Donald Thomson, and Matthew Gilligan of the University of Arizona collected and donated many interesting specimens. Michel Hendrickx and his colleagues of the Estación Mazatlán collected many shrimp, and provided space, help, and hospitality during my visit to Mazatlán. Figures 1, 2, and 4–5 are by Paula Walker and Helen Finney. Figure 3 is by Frances Runyan.

This study was aided by a fellowship of the Allan Hancock Foundation, a visiting fellowship from the Smithsonian Institution, and a minigrant from Texas A&M University.

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).

LITERATURE CITED

- Abele, L.G. 1972. A review of the genus *Ambidexter* (Crustacea: Decapoda: Processidae) in Panama. *Bull. Mar. Sci.* 22(2): 365-380.
- . 1975. The macruran decapod Crustacea of Malpelo Island. *Smithson. Contr. Zool.* 176: 69-85.
- . 1976. Comparative species composition and relative abundance of decapod crustaceans in marine habitats of Panama. *Mar. Biol.* 38: 263-278.
- and W.K. Patton. 1976. The size of coral heads and the community biology of associated decapod crustaceans. *J. Biogeogr.* 3: 35-47.
- Balss, H. 1916. Crustacea, II: Decapoda Macrura und Anomura (ausser Fam. Paguridae). In Michaelson, W. *Beiträge zur Kenntniss der Meeresfauna Westafrikas*. Hamburg: L. Friederichsen and Co. pp. 13-46.
- Banner, A.H. 1953. The Crangonidae, or snapping shrimp, of Hawaii. *Pac. Sci.* 12(1): 3-144.
- . 1956. Contributions to the knowledge of the alpheid shrimp of the Pacific Ocean. Part I. Collections from the Mariana Archipelago. *Pac. Sci.* 10(3): 318-373.
- . 1959. Contributions to the knowledge of the alpheid shrimp of the Pacific Ocean. Part IV. Various small collections from the central Pacific area, including supplementary notes on alpheids from Hawaii. *Pac. Sci.* 13: 130-155.
- and D.M. Banner. 1964. Contributions to the knowledge of the alpheid shrimp of the Pacific Ocean, IX. Collections from the Phoenix and Line islands. *Pac. Sci.* 18(1): 83-100.
- and ———. 1966. The alpheid shrimp of Thailand. *Siam Soc. Monogr. Ser.*, No. 3. 168 pp.
- and ———. 1981. *Alpheus lottini* Guerin, 1829 (Crustacea, Decapoda): proposed conservation. *Z.N. (S.)* 2370. *Bull. Zool. Nom.* 38(4): 297-303.

- Banner, D.M. and A.H. Banner. 1973. The alpheid shrimp of Australia. Part 1: the lower genera. *Rec. Austr. Mus.* 28(15): 291-382.
- and ———. 1981. Annotated checklist of the alpheid shrimp of the Red Sea and Gulf of Aden. *Zool. Meded. Leiden* no. 190, 99 pp.
- and ———. 1982. The alpheid shrimp of Australia. Part III. The remaining alpheids, principally the genus *Alpheus*, and the family Ogyrididae. *Rec. Austr. Mus.* 34(1): 1-357.
- Bate, C.S. 1868. On a new genus, with four new species of freshwater prawns. *Proc. Zool. Soc. London*, 1868: 363-368.
- . 1888. Report on the Crustacea Macrura collected by the H.M.S. *Challenger* during the years 1873-76. *Rep. Voy. Challenger, Zool.* Vol. 24, i-xc, 1-942 pp.
- Boone, L. 1931. A collection of anomuran and macruran Crustacea from the Bay of Panama and the fresh waters of the Canal Zone. *Bull. Amer. Mus. Nat. Hist.* 63: 137-189.
- . 1935. Crustacea and Echinodermata. Scientific results of the world cruise of the yacht "Alva," 1931, William K. Vanderbilt commanding. *Bull. Vanderbilt Mar. Mus.* 6: 1-263.
- Borradaile, L.A. 1917. Notes on Carides. *Ann. Mag. Nat. Hist. ser. 8, Vol. 15*: 205-213.
- . 1917. On Carides from the western Indian Ocean. The Percy Sladen Trust Expedition to the Indian Ocean in 1905, under the leadership of Mr. J. Stanley Gardiner. *Trans. Linn. Soc. London Zool.*, ser. 2, Vol. 17: 397-412.
- Bouvier, E.L. 1895. Sur les Palémons recueillis dans les eaux douces de la Basse-Californie par M. Diguët. *Bull. Mus. Hist. Nat. Paris*, Vol. 1: 159-162.
- Bruce, A.J. 1973. Notes on some Indo-Pacific Pontoniinae, XXIV. *Dasycaris zanzibarica* sp. nov. from the western Indian Ocean, with remarks on other species of *Dasycaris* Kemp, 1922 (Decapoda Natantia). *Crustaceana* 23(3): 247-260.
- . 1976. *Shrimps from Kenya*. *Zool. Verhand. Leiden* No. 145. 72 pp.
- Brusca, R.C. 1980. *Common Intertidal Invertebrates of the Gulf of California*. Tucson: Univ. Arizona Press. 513 pp.
- Butler, T.H. 1980. Shrimps of the Pacific coast of Canada. *Canad. Bull. Fish. Aquatic Sci.* 202. 280 pp.
- Carlton, J.T. and A.M. Kuris. 1975. Keys to decapod Crustacea. In Smith, R.I. and J.T. Carlton, eds. *Light's manual: Intertidal invertebrates of the central California coast*. Berkeley: Univ. Calif. Press. pp. 385-412.
- Chace, F.A. Jr. 1937. The Templeton Crocker Expedition. VII. Caridean decapod Crustacea from the Gulf of California and the west coast of Lower California. *Zoologica* 22(2): 109-138.
- . 1951. The grass shrimps of the genus *Hippolyte* from the west coast of North America. *J. Wash. Acad. Sci.* 41(1): 35-39.
- . 1962. The non-brachyuran decapod crustaceans of Clipperton Island. *Proc. U.S. Nat. Mus.* 113 (34660): 605-635.
- . 1972. The shrimps of the Smithsonian-Bredin Caribbean Expeditions with a summary of the West Indian shallow-water species (Crustacea: Decapoda: Natantia). *Smiths. Contr. Zool.* 98. 179 pp.
- and D.P. Abbott. 1980. Caridea: the shrimps. In Morris, R.H., D.P. Abbott and E.C. Hadlerlie, eds. *Intertidal invertebrates of California*. Stanford: Stanford Univ. Press. pp. 567-576.

- Corredor, D. 1978. Notes on the behavior and ecology of the new fish cleaner shrimp *Brachycarpus biunguiculatus* (Lucas) (Decapoda Natantia, Palaemonidae). *Crustaceana* 35(1): 35-40.
- Costa, O.G. 1844. Su due nuovi Generi di Crostacei Decapodi Macrouri Nota. *Ann. delle Acad. degli Aspiranti Naturalisti, Napoli*, 2, 285 pp.
- Coutière, H. 1900. Sur quelques Alpheidae des Côtes américaines (Collection de l'U.S. National Museum, Washington). *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences* 131: 356-358.
- . 1905. Les Alpheidae. In Gardiner, J. Stanley. *The Fauna and Geography of the Maldive and Laccadive Archipelagos, Being an Account of the Work Carried on and of the Collections Made by an Expedition During the Years 1899 and 1900*, Vol. 2, pt. 4, pp. 852-918.
- . 1909. The American species of snapping shrimps of the genus *Synalpheus*. *Proc. U.S. Nat. Mus.* 36(1659): 1-93.
- Crosnier, A. and J. Forest. 1966. Note préliminaire sur les Alpheidae recueillis par la "Calypso" dans l'Atlantique orientale tropicale (Crustacea, Decapoda, Natantia). *Bull. Mus. Hist. Nat. Paris*. 2nd series, 36(5): 602-610.
- and ———. 1966. Campagne de la *Calypso* dans le Golfe de Guinée et des Iles Principe, São Tomé et Annobon (1956), et campagne aux Iles du Cap Vert (1959). 19. Crustacés Décapodes: Alpheidae. *Annales de l'Institut Océanogr. Monaco. Series 2, No. 44*: 13-314.
- Dana, J.D. 1852. Crustacea. In *U.S. Exploring Expedition, During the Years 1838, 1840, 1841, 1842, Under the Command of Charles Wilkes, U.S.N.* Vol. 1. viii + 685 pp. (Atlas, 96 plates, publ. in 1855). Philadelphia.
- Fabricius, J.C. 1798. *Supplementum Entomologiae Systematicae. Hafniae*, 572 pp.
- Faxon, W. 1893. Reports on the dredging operations off the west coast of central America to the Galápagos, to the west coast of México, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U.S. Fish Commission steamer "Albatross" during 1891, Lieut. Commander Z.L. Tanner, U.S.N., commanding. VI. Preliminary descriptions of new species of Crustacea. *Bull. Mus. Comp. Zool. Harvard Univ.* 24(7): 149-220.
- . 1895. Reports on an exploration off the west coasts of México, central and South America, and off the Galapagos Islands, in charge of Alexander Agassiz, by the U.S. Fish Commission steamer "Albatross" during 1891, Lieut. Commander Z.L. Tanner, U.S.N., commanding. 15. The stalk-eyed Crustacea. *Mus. Comp. Zool. Harvard Univ. Mem.* 18 292 pp.
- Forskål, P. 1775. *Descriptiones animalium, avium, amphibium, piscium, insectorum, vernium, quae in itinere orientali observavit. Haunia: Heineck et Faber*, 1-19, I-XXXII, 1-164 pp.
- Fraser, C.M. 1943. General account of the scientific work of the *Velero III* in the eastern Pacific, 1931-41. Part III. A ten-year list of the *Velero III* collecting stations. *Allan Hancock Pac. Exped.* 1(3): 431 pp.
- Gibbes, L.R. 1850a. Catalogue of the Crustacea in the cabinet of the Academy of Natural Sciences of Philadelphia, August 20th, 1847 with notes on the most remarkable. *Proc. Acad. Nat. Sci. Phila.* 1850, pp. 22-30.
- . 1850b. On the carcinological collections of the cabinets of natural history in the United States, with an enumeration of the species contained therein and descriptions of new species. *Proc. Third Meeting Amer. Assoc. Adv. Sci.*: 165-201.
- Guérin-Meneville, F.E. 1830-1831. Crustacés, Arachnides et Insectes. In Duperrey, M.L.I. *Voyage autour du monde, exécuté par Ordre du Roi, sur la Corvette de Sa Majesté, La Coquille, pendant les années 1822, 1823, 1824, et 1825, Zoologie*, Vol. 2, pt. 2, ser. 1, 319 pp.

- Hart, J.F.L. 1964. Shrimps of the genus *Betaeus* on the Pacific coast of North America with descriptions of three new species. Proc. U.S. Nat. Mus. 115 (3490): 431-466.
- Hayashi, K. 1975. The Indo-West Pacific Processidae (Crustacea, Decapoda, Caridea). J. Shimonoseki Univ. Fish. 23(1): 47-145.
- Van der Heiden, A.M. and M.E. Hendrickx. 1979. *Inventario de la Fauna Marina y Costera del sur de Sinaloa, México*. Mazatlán: Centro de Ciencias del Mar y Limnología. 71 pp.
- Heller, C. 1861. Synopsis der im rothen Meere vorkommenden Crustaceen. Verh. zool.-bot. Ges. Wien 11: 3-32.
- . 1862. Beitrage zur Crustaceen-Fauna des rothen Meeres. Zweiter Theil. S.B. Akad. Wiss. Wien, 44, pt. 1, pp. 241-295.
- . 1869. Zur näheren Kenntniss der in den sussen Gewässern des sudlichen Europa vorkommenden Meeres-crustaceen. Zeitschr. wiss. Zool. 19: 156-162.
- Hendrickx, M., M.K. Wicksten, and A. van der Heiden. 1983. Studies of the coastal marine fauna of southern Sinaloa, México. IV. Preliminary report on Caridea. Proc. Biol. Soc. Wash. 96(1): 67-78.
- Hobson, E.S. and U.R. Chess. 1976. Trophic interactions among fishes and zooplankters near shore at Santa Catalina Island, California. U.S. Nat. Mar. Fish. Serv. Bull. 74(3): 567-598.
- Holmes, S.J. 1895. Notes on west American Crustacea. Proc. Calif. Acad. Sci. ser. 2, vol. 4: 563-588.
- . 1900. Synopsis of California stalk-eyed Crustacea. Occ. Papers Calif. Acad. Sci. 7. 260 pp.
- Holthuis, L.B. 1947. The Decapoda of the Siboga Expedition. Part 10. The Hippolytidae and Rhynchocinetidae. Siboga Expeditie 39 a⁸. 100 pp.
- . 1949. The caridean Crustacea of the Canary Islands. Zool. Meded. Leiden. 30(15): 227-255.
- . 1950a. The Palaemonidae collected by the *Siboga* and *Snellius* expeditions, with remarks on other species. I. Subfamily Palaemoninae. Siboga Expeditie 39a⁹. 268 pp.
- . 1950b. Preliminary descriptions of twelve new species of palaemonid prawns from American waters (Crustacea Decapoda). Proc. Kon. Nederl. Akad. Wetensch. 53: 93-99.
- . 1951a. The caridean Crustacea of tropical west Africa. Atlantide Report No. 2. Copenhagen: Danish Sci. Press, Ltd. 187 pp.
- . 1951b. A general revision of the Palaemonidae (Crustacea Decapoda Natantia) of the Americas. I. The subfamilies Euryrhynchinae and Pontiinae. Occ. Papers Allan Hancock Found. 11. 332 pp.
- . 1952a. The Palaemonidae collected by the *Siboga* and *Snellius* expeditions with remarks on other species. II. Subfamily Pontiinae. Siboga Expeditie 39a¹⁰. 249 pp.
- . 1952b. A general revision of the Palaemonidae. II. The subfamily Palaemoninae. Occ. Papers Allan Hancock Found. 12. 396 pp.
- . 1952c. Reports of the Lund University Chile Expedition 1948-49. The Crustacea Decapoda Macrura of Chile. Lunds Universitets Årsskrift N.F. Avd. 2, Bd. 7, No. 10. 109 pp.
- . 1958. Crustacea Decapoda from the northern Red Sea (Gulf of Aqaba and Sinai Peninsula).

- I. Macrura. Contributions to the knowledge of the Red Sea No. 8. State of Israel Sea Fisheries Res. Sta. Bull. 17: 1-40.
- . 1979. A small collection of decapod Crustacea from Galápagos Islands. Galápagos, Studi e Ricerche—Spedizione "L. Mares—Gruppo Ricerche Scientifiche e Tecniche Subacquee," Florence. 11 pp.
- . 1980a. FAO species catalogue. Vol. 1—Shrimps and prawns of the world. FAO Fish. Syn. No. 125, Vol. 1. 271 pp.
- . 1980b. The decapod and stomatopod Crustacea of St. Paul's Rocks. Zool. Meded. Leiden 56(3): 27-51.
- . 1981. Comment on the above application. Z.N. (S.) 2370. Bull. Zool. Nom. 38(4): 303-304.
- Hult, J. 1939. Crustacea Decapoda from the Galápagos Islands collected by Mr. Rolf Blomberg. Arkiv for Zoologi 30A(5): 1-18.
- Kemp, S. 1922. Notes on Crustacea Decapoda in the Indian Museum. XV. Pontoniinae. Rec. Ind. Mus. 24: 113-288.
- Kingsley, J.S. 1878a. Notes on the North American Caridea in the Museum of the Peabody Academy of Science at Salem, Massachusetts. Proc. Acad. Nat. Sci. Phila., 1878: 89-98.
- . 1878b. A synopsis of the North American species of the genus *Alpheus*. Bull. U.S. Geol. and Geogr. Survey of the Territories, U.S. Dept. Int. Vol. 4: 189-199.
- . 1880. On a collection of Crustacea from Virginia, North Carolina and Florida with a revision of the genera of Crangonidae and Palaemonidae. Proc. Acad. Nat. Sci. Phila. 31(3): 383-427.
- Latreille, P. A. 1819. Salicoques, Carides, Latr. Nouveau Dictionnaire d'Histoire naturelle, 30: 68-73.
- . 1829. Crustacés, Arachnides et Partie des Insectes (Des Animaux articulés et Pourvus de Pieds articulés ou Des Crustacés, des Arachnides et des Insectes). Vol. 4 In Cuvier, *Le Regne Animal Distribué d'après son Organisation, pour Servir de Base à l'Histoire naturelle des Animaux et d'Introduction à l'Anatomie comparée*. Ed. 2. xxvii + 584 p. Paris: Deterville and Crochard.
- Leach, W.E. 1814. *Zoological Miscellany: Being Descriptions of New or Interesting Animals by William Elford Leach*. London. Vol. 1: 144 pp.
- . 1815. A tabular view of the external characters of four classes of animals, which Linne arranged under Insecta; with the distribution of the genera composing three of these classes into orders, etc. and descriptions of several new genera and species. Trans. Linn. Soc. London 11: 306-400.
- Limbaugh, C. 1961. Cleaning symbiosis. Sci. Amer. 205(2): 42-49.
- Lockington, W.N. 1877. Remarks on the Crustacea of the Pacific coast, with descriptions of some new species. Proc. Calif. Acad. Sci. 7: 28-36.
- Lucas, H. 1849. Crustacés, Arachnides, Myriopodes et Hexapodes. Exploration scientifique de l'Algérie pendant années 1840, 1842. Sciences physiques. Zoologie I. Histoire naturelle des Animaux articulés, pt. I, pp. 1-403.
- Luke, S.R. 1977. Catalog of the benthic invertebrate collections. I. Decapod Crustacea and Stomatopoda. Scripps Inst. Oceanogr. Ref. No. 77-9. 72 pp.
- McClendon, J.F. 1911. On adaptations in structure and habits of some marine animals of Tortugas, Florida. Pap. Tortugas Lab. Carnegie Inst. 3: 55-62.

- MacGinitie, G.E. and N. MacGinitie. 1968. *Natural History of marine animals*. New York: McGraw-Hill. 2nd ed., 523 pp.
- De Man, J.G. 1888. Bericht über die von Herrn Dr. J. Brock im indischen Archipel gesammelten Decapoden und Stomatopoden. *Archiv für Natur*. 53(1): 215–600.
- . 1911. The Decapoda of the Siboga Expedition. Part II. The Alpheidae. *Siboga Expeditie 39a¹*. 1–465.
- Manning, R.B. and F.A. Chace, Jr. 1971. Shrimps of the family Processidae from the northwestern Atlantic Ocean (Crustacea: Decapoda: Caridea). *Smiths. Contr. Zool.* 89. 41 pp.
- Méndez, M. 1981. Claves de identificación y distribución de los langostinos y camarones (Crustacea: Decapoda) del mar y ríos de la costa del Perú. *Bol. Inst. Mar Perú-Callao*. Vol. 5. 170 p.
- Miers, E.J. 1881. On a collection of Crustacea made by Baron Hermann Maltzan at Goree Island, Senegambia. *Ann. and Mag. Nat. Hist.* 5(8): 204–377.
- Milne-Edwards, A. 1862. Faune carcinologique de l'île de la Réunion. Annexe F de l'ouvrage intitulé: Notes sur l'île de la Réunion par L. Maillard, pp. 1–16.
- . 1878. Description de quelques espèces nouvelles de Crustacés provenant du voyage aux îles du Cap-Vert de MM. Bouvier et de Cessac. *Bull. Soc. philom. Paris*, ser. 7, vol. 2: 225–232.
- . 1883. *Recueil de Figures de Crustacés nouveaux ou peu connus*. Paris. 3 pp.
- Milne-Edwards, H. 1837. Histoire naturelle des crustacés, comprenant l'anatomie, la physiologie et la classification de ces animaux. Tome II. Paris: Roret. 532 pp.
- Nobili, G. 1907. Nuove osservazioni sulla identità di *Brachycarpus neapolitanus* Cano e *Palaemon biunguiculatus* Lucas. *Annu. Mus. Zool. Univ. Napoli*, n. ser. vol. 2(21): 1–6.
- Owen, R. 1839. Crustacea. The Zoology of Captain Beechey's Voyage; compiled from the collections and notes made by Captain Beechey, the officers and naturalist of the expedition, during a voyage to the Pacific and Behring Straits performed in his Majesty's ship *Blossom*, under the command of Captain F.W. Beechey, R.N., F.R.S., etc., in the years 1825–28. pp. 72–92.
- Paulson, O. 1875. Podophthalmata and Edriophthalmata (Cumacea), part 1. Investigations on the Crustacea of the Red Sea with notes on Crustacea of the adjacent seas. i–xiv, 1–144. (In Russian).
- Pequegnat, L.H. and J.P. Ray. 1974. Crustacea and other arthropods. In Bright, T.J. and L.H. Pequegnat, eds. *Biota of the West Flower Garden Bank*. Houston: Gulf Publ. Co. pp. 231–288.
- Pocock, R.I. 1890. Crustacea. In Ridley, H.N. *Notes on the Zoology of Fernando Noronha*. J. Linn. Soc. London 20: 506–526.
- Rankin, W.M. 1898. The Northrop collection of Crustacea from the Bahamas. *Annals N.Y. Acad. Sci.* 11(12): 225–258.
- Rathbun, M.J. 1900. The decapod and stomatopod Crustacea. Part I. In Results of the Branner-Agassiz Expedition to Brazil. *Proc. Wash. Acad. Sci.* 2: 133–156.
- . 1902. Descriptions of new decapod crustaceans from the west coast of North America. *Proc. U.S. Nat. Mus.* 24(1272): 885–905.
- . 1904. Decapod crustaceans of the northwest coast of North America. *Smiths. Inst.: Harriman Alaska Exped.* 10: 3–210.
- . 1906. The Brachyura and Macrura of the Hawaiian Islands. *Bull. U.S. Fish Comm.* Vol. 23, pt. 3, pp. 827–930.

- . 1910. The stalk-eyed Crustacea of Peru and the adjacent coast. *Proc. U.S. Nat. Mus.* 38: 531–620.
- Reynolds, W.W. 1977. Substrate feeders and facultative cleaners: cleaning behavior in some Gulf of California marine animals. *Animal Behavior* 25(4): 1063.
- Richters, F. 1880. Decapoda. In Möbius, K. ed. *Beiträge zur Meeresfauna der Insel Mauritius und der Seychellen bearbeitet von K. Möbius, F. Richters, und E. von Martens nach Sammlungen, angelegt auf einer Reise nach Mauritius*. Berlin: Gutmann. 352 pp.
- Ricketts, E.F., J. Calvin, and J.W. Hedgpeth. 1968. *Between Pacific Tides*. Stanford: Stanford Univ. Press. 4th ed., 614 pp.
- Risso, A. 1816. *Histoire Naturelle des Crustacés des Environs de Nice*. Paris: Librairie Greque-Latine-Allemande. 175 pp.
- St. Amant, J.A. and R.G. Hulquist. 1969. *Palaemonetes paludosus* collected in the Rio Hardy and Colorado River, Baja California. *Calif. Fish and Game* 55(3): 252.
- Schmitt, W.L. 1921. The marine decapod Crustacea of California. *Univ. Calif. Publ. Zool.* 23: 1–470.
- . 1924. The Macrura and Anomura collected by the Williams Galápagos Expedition, 1923. *Zoologica* 5(15): 161–171.
- . 1939. Decapod and other Crustacea collected on the presidential cruise of 1938. *Smiths. Misc. Coll.* 98(6): 1–29.
- Semper, C.L. 1868. Some remarks on the new genus *Macrobrachium* of Mr. Spence Bate. *Proc. Zool. Soc. London*, 1868: 585–587.
- Siversten, E. 1933. The Norwegian Zoological Expedition to the Galápagos Islands 1925, conducted by Alf Woolebaek. VII. Littoral Crustacea Decapods from the Galápagos Islands. *Meddelelser fra det Zoologiske Museum, Oslo*. 23 pp.
- Smith, S.I. 1869. *Pontonia margarita* new species. In Verrill, A.E. On the parasitic habits of Crustacea. *Amer. Nat.* 3: 239–250.
- . 1871. List of Crustacea collected by J.A. McNiel in central America. *Rep. Peabody Acad. Sci.*, 1869, 87–98.
- Standing, J.D. 1981. Occurrences of shrimps (Natantia: Penaeidea and Caridea) in central California and Oregon. *Proc. Biol. Soc. Wash.* 94(3): 774–786.
- Stebbing, T.R.R. 1914. South African Crustacea. Part VII. In South African Crustacea, for the Marine Investigations in South Africa. *Annals S. Afr. Mus.* 15(2): 57–104.
- Stimpson, W. 1860. Prodröm descriptionis animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, C. Ringgold et J. Rodgers, Ducibus, observavit et descripsit. *Proc. Acad. Nat. Sci. Philadelphia* 1860, pp. 22–48.
- . 1866. Descriptions of new genera and species of macrurous Crustacea from the coasts of North America. *Proc. Chicago Acad. Sci.* 1: 46–48.
- . 1871. Notes on North American Crustacea, in the museum of the Smithsonian Institution. No. III. *Lyc. Nat. Hist., N.Y.* 10: 921–936.
- Thallwitz, J. 1892. Decapoden-Studien, insbesondere basirt auf A.B. Meyer's Sammlungen im Ostindischen Archipel, nebst einer Aufzählung der Decapoden und Stomatopoden des Dresdener Museums. *Abh. Ber. zool.-anthrop. Mus. Dresden*, 1890–91, pt. 3, pp. 1–55.

- Walker, A.O. 1898. Crustacea collected by W.A. Herdman in Puget Sound, Pacific coast of North America, September, 1897. Proc. and Trans. Liverpool Biol. Soc. 12: 268–287.
- Weber, F. 1795. *Nomenclator entomologicus secundum Entomologiam systematicam ill. Fabricii adjectis speciebus recens detectis et varietatibus*. vii + 171. Chilonii et Hamburg.
- Wicksten, M.K. 1978. The species of *Plesionika* from California and western Mexico (Natantia: Pandalidae). Bull. So. Calif. Acad. Sci. 77(2): 84–87.
- . 1979. Zoogeographical affinities of the broken back shrimp (Caridea: Hippolytidae) of western South America. In Proc. Internat. Symp. on Mar. Biogeogr. and Evol. in So. Hemisphere. N.Z. DSIR Info. ser. 137, vol. 2: 627–634.
- . 1980. Range extensions of four species of crangonid shrimps in the eastern Pacific Ocean (Decapoda: Crangonidae). Bull. So. Calif. Acad. Sci. 79(1): 38–41.
- . 1981. The species of *Automate* (Caridaea: Alpheidae) in the eastern Pacific Ocean. Proc. Biol. Soc. Wash. 94(4): 1104–1109.
- and T.H. Butler. 1983. *Eualus lineatus* new species, with a redescription of *Heptacarpus herdmani* (Walker) (Caridea: Hippolytidae). Proc. Biol. Soc. Wash. 96(1): 1–6.
- and M. Méndez. 1982. Nuevos registros de camarones carideos en el Perú. Bol. de Lima 25.
- Williams, A.B. 1965. Marine decapod crustaceans of the Carolinas. U.S. Dept. Int. Fishery Bull. 65(1): 298 pp.
- Word, J.Q. and D. Charwat. 1976. Invertebrates of southern California coastal waters II. Natantia. El Segundo: So. Calif. Coastal Water Res. Project. 238 pp.
- Zarenkov, N.A. 1965. Revision of the genera *Crangon* Fabricius and *Sclerocrangon* G.O. Sars (Decapoda, Crustacea). Zool. Zh. 44(12): 1761–1775. (In Russian).

Accepted for publication 4 August 1982.

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.