HABITAT.—Individuals of this species were collected from burrows above the banks of a brackish water river (salinity 22‰) and in mangrove swamps. Although some specimens were collected in very low salinity water (4–6‰), the species appears to be more common in higher salinities. Some of data given on habitat by Crane (1947) refer to *S. aequatoriale*.

REMARKS.—See *S. aequatoriale*.

Sesarma rhizophorae Rathbun, 1906

FIGURES 3*d,e*, 5*k*, 20

Sesarma (Sesarma) rhizophorae Rathbun, 1906:99; 1918:294, pl. 79.—Von Hagen, 1978:46.
Sesarma rhizophorae.—Crane, 1947:86.—Abele, 1976:268.

MATERIAL EXAMINED.—Costa Rica: Boca del Jesus, 1♂ (holotype), Apr 1905, J.F. Tristan, USNM 32491.

Panama: Panama Province, swamp near Albrook AFB, 9♂, 2♀, 2 ovigerous ♀, 18 Jun 1974, L. Abele; same locality, 1♂, 4♀, 1 ovigerous ♀, 13 Mar 1977, L. Abele; adjacent to Miraflores locks, 2♂, 3♀, 13 Mar 1977, L. Abele; Diablo Heights mangrove swamp, 5♂, 2♀, 13 Mar 1977, L. Abele.

DESCRIPTION.—Carapace broader than long (cl/cb = 0.793±0.03 for males, 0.780±0.05 for females), convex anterior to posterior; regions weakly defined with about four rows of low granules on lateral surface. Anterolateral angle acute, followed posteriorly by a deep sinus and large tooth set laterally and on a higher level than anterolateral angle. Small indentation posterior to lateral tooth. Front slightly expanded distally about 0.534±0.01 of carapace breadth; frontal margin arcuate, weakly concave medially.

Eyes well developed and pigmented.

Chelipeds sexually dimorphic, larger and with more granules in males. Merus weakly serrate on anterior and posterior medial margins, a few tubercles on anterior margin. Carpus covered with short rows of granules. Palm distinctly punctate with row of granules on dorsal surface and larger scattered tubercles on medial surface of males. Movable finger with about eight acute tubercles on dorsal surface extending about half length of finger; ventral surface usually with two large teeth, one basal and one distal in location. Immovable finger similarly armed. Teeth very much reduced on females.

Walking legs relatively slender, ml/mw of third about 2.65±0.20. Merus armed on distal dorsal surface with thin acute tooth. Fine brown-colored pubescence present on walking legs, especially on the propodus, carpus, and dactylus; dactylus length about 0.75 of propodus length.

Male abdomen subtriangular in shape; telson width at base greater than length. Gonopod slender, almost straight, narrow-

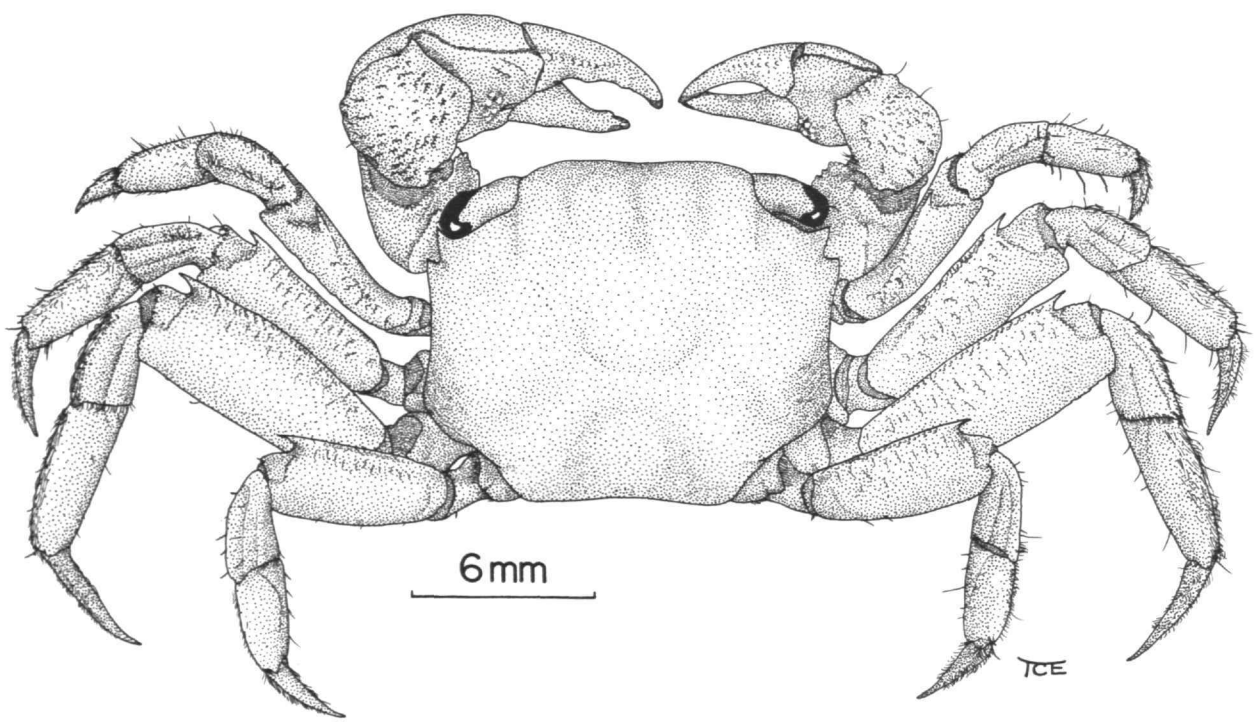


FIGURE 20.—*Sesarma rhizophorae*, male holotype.

ing distinctly in distal portion (about 0.15 of length). Amber-colored endpiece continuous with main shaft, not set off at an angle.

Female abdomen subcircular in outline; telson width at base greater than length. Gonopore recessed in sternum, oblong in lateral axis; operculum longer than wide.

MEASUREMENTS.—Males cb 9.3 to 13.7 mm; females cb 9.6 to 13.4 mm; ovigerous females cb 11.7 to 13.4 mm.

TYPE LOCALITY.—Boca de Jesus Maria, Costa Rica.

TYPE.—Male cb 13.7 mm, USNM 32491.

DISTRIBUTION.—Costa Rica, Boca del Jesus Maria, Puntarenase, Ballenas (Crane, 1947; Rathbun, 1918); Panama, common along Pacific Coast (Abele, 1976); Peru, Puerto Pizarro (von Hagen, 1978). See "Remarks."

HABITAT.—*Sesarma rhizophorae* is common in burrows in mangrove swamps. It was collected in salinities of 20 to 27‰.

REMARKS.—Abele (1976) noted the presence of this species on the Caribbean coast of Panama adjacent to the entrance of the Panama Canal. However, several subsequent attempt to collect the species at the very same site were unsuccessful, and it is possible that the original specimens were mislabeled. Until additional specimens of *S. rhizophorae* are collected from the Caribbean its presence there should be considered doubtful.

Sesarma rubinofforum Abele, 1973

FIGURES 3*f-i*, 5*l*, 21

Sesarma (Holometopus) rubinofforum Abele, 1973b:333.
Sesarma rubinofforum.—Abele, 1976:268.—Hagen, 1978:51.—Abele, 1981:438.

MATERIAL EXAMINED.—Panama: Pacific coast, Canal Zone, Diablo Heights, mangrove swamp on east bank of Panama Canal, 18 Feb 1969, L.G. Abele, LGA 69-30, 1♂ paratype, cb 6.7 mm, UPRC; 1 ovigerous ♀ paratype, cb 8.4 mm (illustrated, Figure 21), USNM; Panama, locality data as above, salinity 22.4‰, temperature 27.9°C, 25 Jan 1971, L.G. Abele, T.A. Biffar, LGA 71-5, male holotype, cb 8.8 mm, 5♂ paratypes, cb 3.3-10.4 mm, 4♀ paratypes, cb 6.0-8.8 mm, USNM; 1♂ cb 8.0 mm, 1♀, cb 7.8 mm (paratypes), RMNH; 1♂, cb 6.8 mm, 1♀, cb 7.0 mm (paratypes), AHF.

DESCRIPTION.—Carapace broader than long (cl/cb= 0.858±0.31 in males, 0.853±0.43 in females), narrowing posteriorly. Frontal region subparallel about 0.60 of carapace width; frontal margin sinuous with broad median depression.

Interorbital region with four distinct lobes; lateral (outer) lobes indistinctly subdivided into two lobes by two patches of pubescence. Regions of carapace distinct. Dorsal and lateral surfaces of the carapace with patches of short, brown pubescence. Outer orbital angle acute; no tooth or lobe posterior to it. About four granular ridges on lateral surfaces of carapace.

Eyes well developed and pigmented.

Merus of chelipeds with margins distinctly serrate; subdistal lobe present on lateral margin. Many subacute granules along border of carpus and dorsal surface; no tooth or lobe at medial angle. A strong granulate ridge extends length of dorsal surface of palm; weakly bifurcate proximally. Other poorly defined rows of granules arise from this ridge and extend onto medial surface of palm. Lateral surface of palm smooth except for a few scattered granules. Movable finger subequal in length to palm; about seven strong, acute tubercles along dorsal surface of finger, median ones strongest.

Walking legs robust with the third (fourth pereiopod) being longest. Length of merus of third about 1.9 times width; superior borders with minute widely spaced teeth and a strong, acute subdistal tooth; inferior border smooth. Short horizontal rows of granules present on meri of walking legs. Carpus with scattered setae on dorsal surface of propodus and less on ventral surface; three pairs of strong, black spines on distal inferior margin. Dactylus with three dorsal and two ventral poorly defined rows of pubescence. Merus slightly less than twice length of carpus; carpus subequal in length to propodus. Dactylus slightly shorter than both propodus and carpus.

Male abdomen subtriangular in shape, narrowing distally from third segment. Telson broadly rounded; length and width subequal. Male gonopod simple, unarmed; endpiece (amber-colored apex) rectangular, directed laterally and covered with simple setae. Female abdomen subcircular in outline. Gonopore small, crescent-shaped area adjacent to operculum.

VARIATION.—Females have less pubescence on the carapace than males; the female chelae are not as robust as those of males, the tuberculation is weaker, and there are three or four rather than seven or eight tubercles on the dorsal surface of the movable finger.

MEASUREMENTS.—Immature males have a cb of about 3.3 mm; immature females, cb 6.0 to 6.3 mm; mature males, cb 6.2 to 10.4 mm; mature females, cb 7.0 to 8.4 mm; ovigerous females, cb 8.8 to 9.0 mm; eggs small and numerous, diameter 0.3 to 0.5 mm.

TYPE LOCALITY.—Pacific coast of Panama on the east bank of the Panama Canal in a mangrove swamp near Diablo Heights, Canal Zone.

TYPE.—The male holotype is deposited in the National Museum of Natural History.

DISTRIBUTION.—Pacific coast of Costa Rica and Panama.

HABITAT.—The specimens were collected from damp areas beneath litter deep inside a mangrove swamp composed primarily of *Rhizophora mangle* L. Salinity in the swamp varies from 16‰ to 24‰. Air temperature varies from about 27°C to 29°C.

REMARKS.—Although Abele (1973b) placed this species in the subgenus *Holometopus*, von Hagen (1978) showed that it belongs to the subgenus *Sesarma*. This species appears to be the Pacific analog of *S. rectum* Randall, 1840. It can be distinguished from *S. rectum* by the following characters: There is a slight emargination posterior to the outer orbital

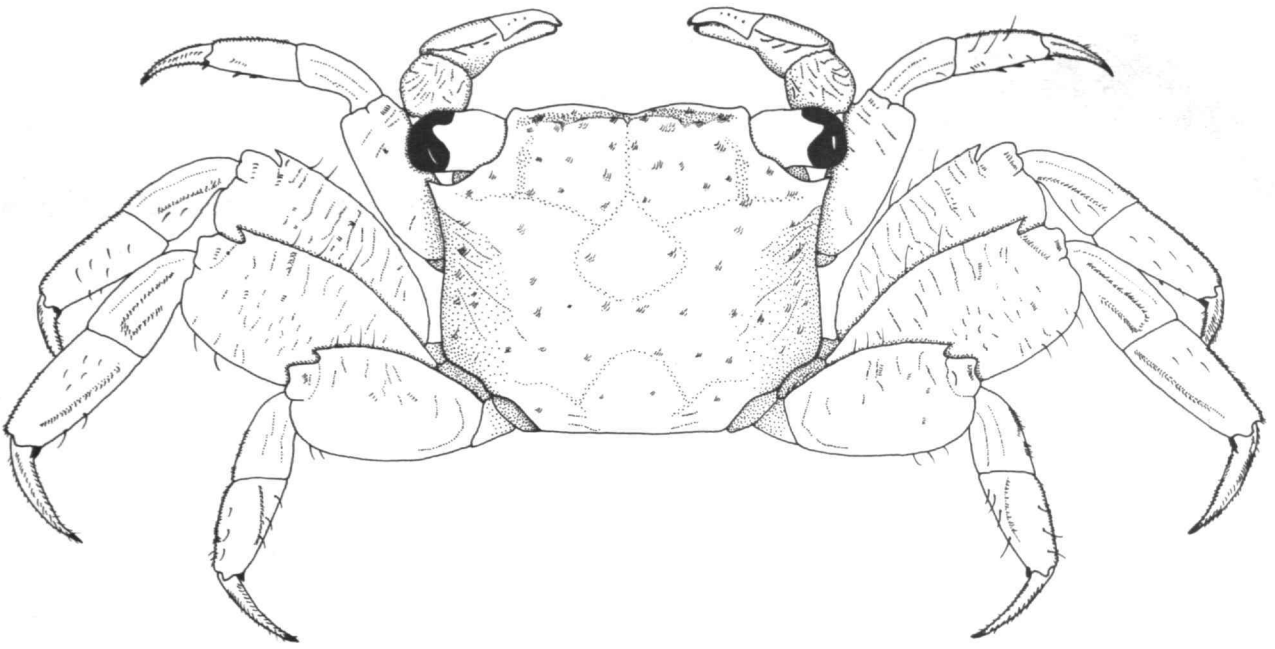


FIGURE 21.—*Sesarma rubinofforum*, paratype female, cb 8.4 mm (from Abele, 1973b, fig. 1).

angle in *S. rectum*, which is lacking in *S. rubinofforum;* the carpus of the cheliped of *S. rectum* is armed with a sharp tooth at the medial angle, whereas that of *S. rubinofforum* is rounded; the movable finger of the chela of *S. rectum* is armed with 14 to 16 acute tubercles, whereas that of *S. rubinofforum* is armed with 3 to 8; the endpiece of the gonopod of *S. rectum* is somewhat flared, whereas that of *S. rubinofforum* is not flared; adult cb of *S. rectum* ranges from 13 to 44 mm, whereas adult cb of *S. rubinofforum* ranges from 6 to 10 mm.

Species of *Armases*, new genus

Armases cinereum (Bosc, 1802), new combination

FIGURES 2*a-c*, 22*a*, 23*b*, 24, 25

Grapsus cinereus Bosc, 1802:204, pl. 5: fig. 1 [type locality *"la Caroline"*].—Latreille, 1806:72.—Say, 1818:442.—Bosc, 1828:258, pl. 5: fig. 1.

Sesarma cinerea.—H. Milne Edwards, 1837:75.—Gibbes, 1850:180.—H. Milne Edwards, 1853:182.—Stimpson, 1862:65.—Smith, 1870:157.—Ortmann, 1897:329 [in part].—Hay and Shore, 1918:449, pl. 36: fig. 11.

Sesarma (Holometopus) cinerea.—Rathbun, 1897a:90.—Tesch, 1917:141.

Sesarma (Holometopus) cinereum.—Rathbun, 1918:300, fig. 149, pl. 83.—Williams, 1965:222, fig. 206.—Abele, 1973a:377, figs. 1B, 1H.

Sesarma cinereum.—Abele and Kim, 1986:63, 671d.

Sesarma (Chiromantes) cinereum.—Williams, 1984:465, fig. 373.

MATERIAL EXAMINED.—Maryland: Arundel-on-the-Bay, Chesapeake Bay, 1♂, 5♀, W.P. Hay, USNM 22158.

North Carolina: Morehead City, 25♂, 15♀, 1971, L. Abele.

Florida: Apalachicola, 5♂, 4♀, USNM 49910; Alligator Harbor 6♂, 12♀, 5 ovigerous ♀, UMML; Cedar Keys, 32♂, 49♀, USNM 6413; Sarasota Bay, 1♂, 1♀, USNM 71160; Gasparilla Island, Tampa, 1♀, USNM 15261; Tampa Bay, 1 ♂, 4♀, USNM 26113; Inglewood, 3♀, USNM 74545; Naples, Collier County, 5♂, 6♀, USNM; Daytona, 1 ♀, USNM 71158; Jupiter, 1♂, 5♀, UMML.

Mexico: Vera Cruz, 9♂, USNM 99827.

DESCRIPTION.—Carapace wider than long (cl/cb = 0.875±0.041 in males, 0.874±0.025 in females), slightly convex medially, more so laterally. Granules dorsally, some with tufts of pubescence especially laterally where granules form short rugae. Interorbital region subdivided into four lobes, median pair slightly larger than lateral. Frontal region with lateral margins straight to slightly expanded; distal margin sinuous with median sinus. Frontal region 0.573±0.027 carapace breadth in males, 0.577±0.012 in females.

Eyes well developed, pigmented.

Chelipeds sexually dimorphic, larger, with palm more inflated in males. Posterior medial margin of merus granulate; anterior margin toothed, expanded distally. Carpus covered with low granules. Low rows of granules on chelae; large and prominent on medial surface in males. Movable finger slightly widened at proximal margin in males, less so in females. Tips of fingers spoon-shaped.

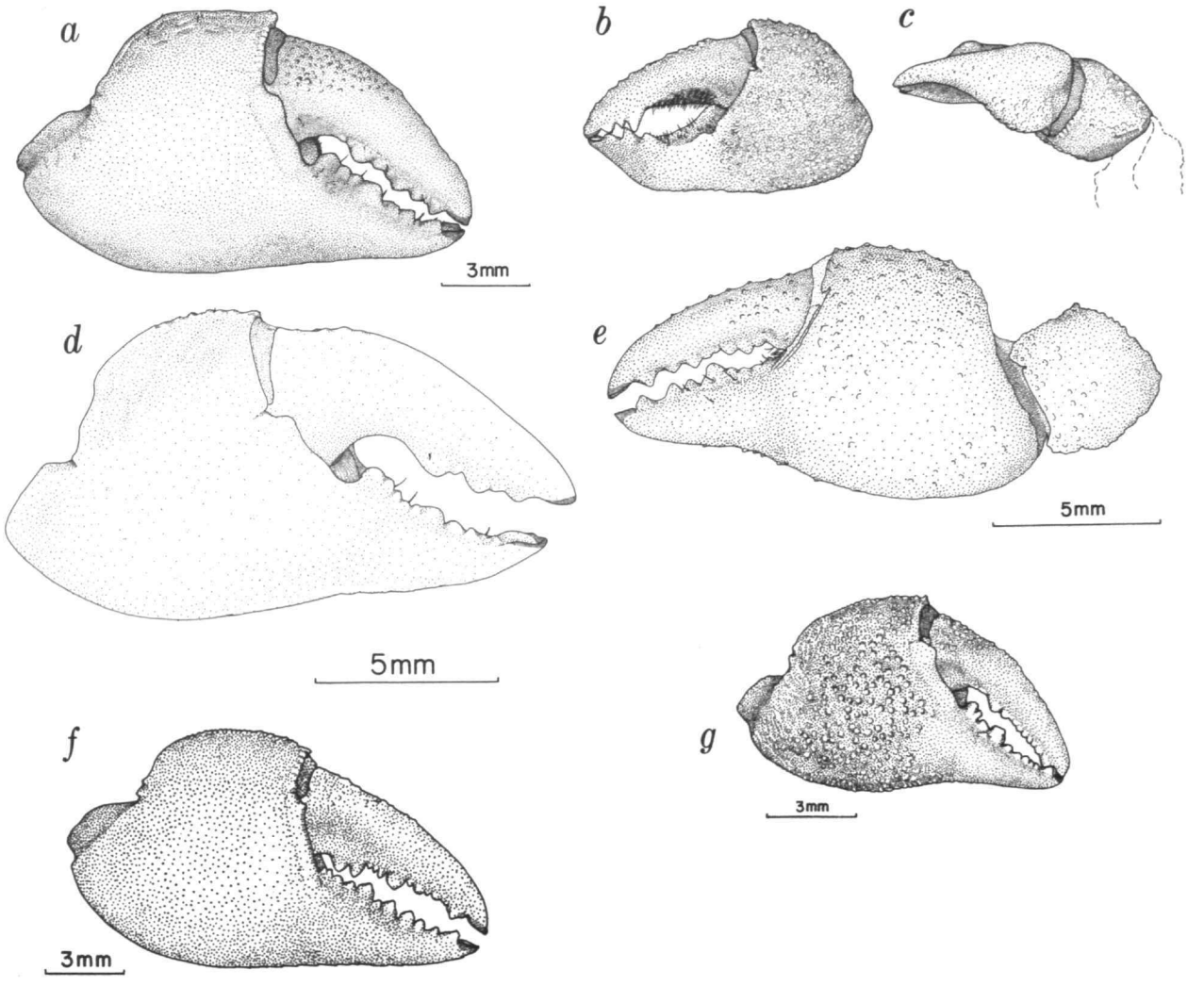


FIGURE 22.—Chelae, *a–b, d–g*, outer view; *c*, dorsal view: *a, Armases cinereum; b,c, A. benedicti; d, A. magdalenense*, paratype; *e, A. angustum; f, A. americanum; g, A. occidentale*.

Walking legs long and relatively slender, merus of third (fourth pereiopod) with l/w ratio 2.65±0.11 in males and 2.65±0.14 in females. Third leg with merus slightly more than twice as long as carpus; propodus about 0.6 merus length, slightly longer than dactylus. Propodi and dactyli of last two legs armed with short black spines on ventral margin of propodus and ventral and dorsal margins of dactylus.

Male abdomen subtriangular in outline; length and width of telson subequal. Female abdomen subcircular in outline; telson slightly wider than long.

Male gonopod relatively short and robust; simple, unarmed and curves laterally proximal to amber-colored endpiece. Distinct (but variable in size) expansion on medial surface of gonopod just proximal to endpiece. Female gonopore distinctly raised above level of sternum. Medial portion greatly expanded distally and raised above rim of gonopore.

MEASUREMENTS.—Mature males cb 10.0 to 18.0 mm; mature females cb 11.2 to 17.2 mm, which was also the size range of ovigerous females.

TYPE.—The type is presumably no longer extant (Rathbun, 1918).

TYPE LOCALITY.—*"la Caroline"* (Bosc, 1802).

DISTRIBUTION.—Magothy River, Chesapeake Bay, Maryland, to Palm Beach County on the east coast of Florida; Collier

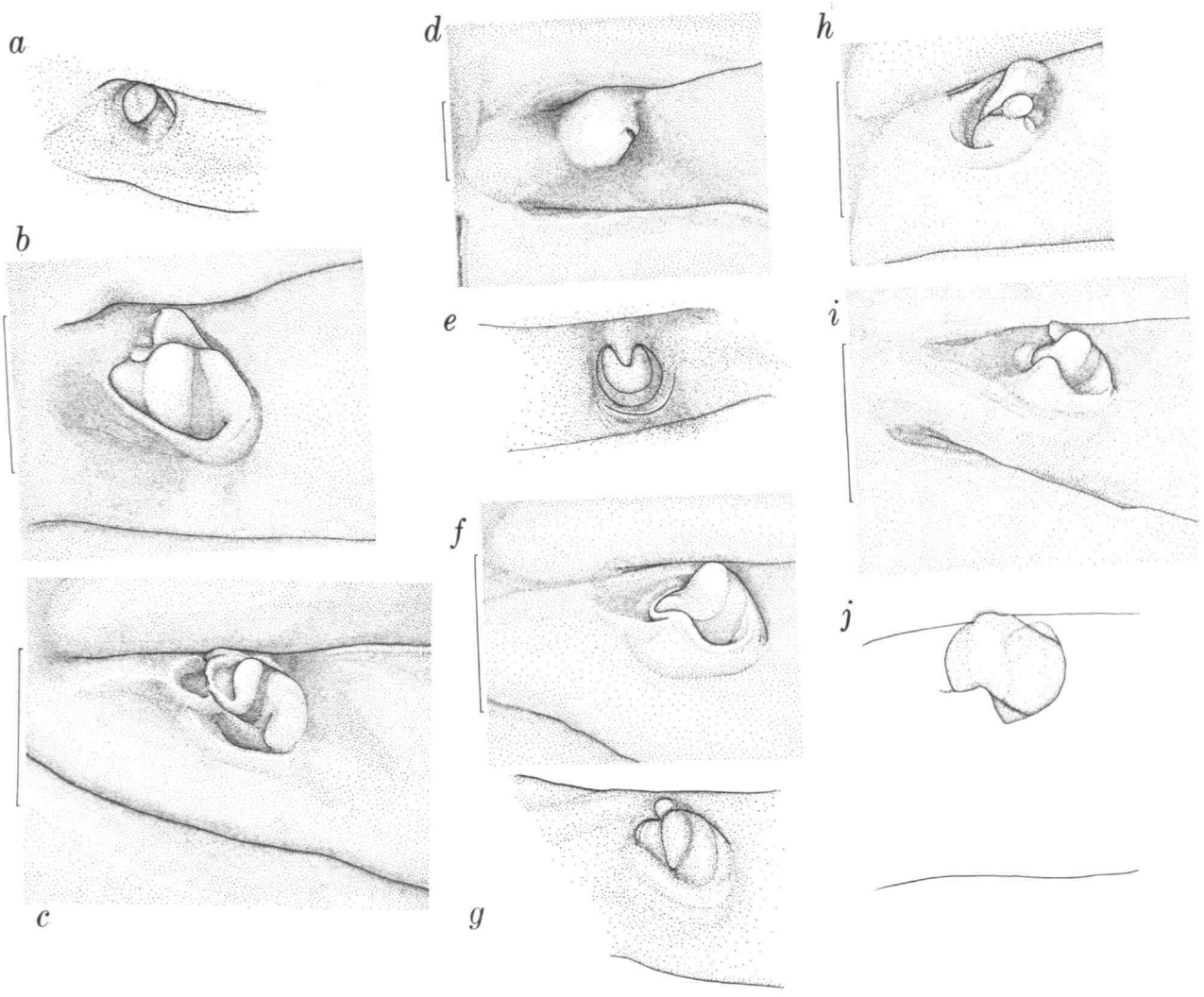


FIGURE 23.—Gonopores: *a, Armases benedicti,* right, Venezuela (USNM 197365); *b, A. cinereum,* Dauphin Island; *c, A. ricordi,* Honduras; *d, A. americanum,* Panama; *e, A. roberti,* Dominica (USNM 126897); *f, A. angustipes,* Brazil; *g, A. miersii,* Bahamas (type, USNM 11372); *h, A. angustum,* Panama; i, A. occidentale, Panama; *j, A. magdalenense,* Peru.

County on the west coast of Florida to Vera Cruz, Mexico. Records of this species from the West Indies and elsewhere were based on misidentified material (Abele, 1973a).

HABITAT.—*Armases cinereum* occurs from the high intertidal to more than 50 m inland in a wide variety of habitats. Individuals are common among rubble and litter above the intertidal, in high areas in *Spartina* and in drier areas of *Rhizophora* swamps. Specimens were also collected from the edge of a pine woods and in grassy areas adjacent to marshes.

Armases ricordi (H. Milne Edwards, 1853), new combination

FIGURES 23*c*, 26, 27

Sesarma Ricordi H. Milne Edwards, 1853:183.
Sesarma guerini H. Milne Edwards, 1853:183.
Sesarma miniata de Saussure, 1858:442.
Sesarma angustipes.—Stimpson, 1858:106; 1859:66; 1862:66.—Smith, 1870:159.—Kingsley, 1880:214 [part, not Brazilian material].—De Man, 1892a:253, pl. 10: fig. 5.—Stimpson, 1907:136.

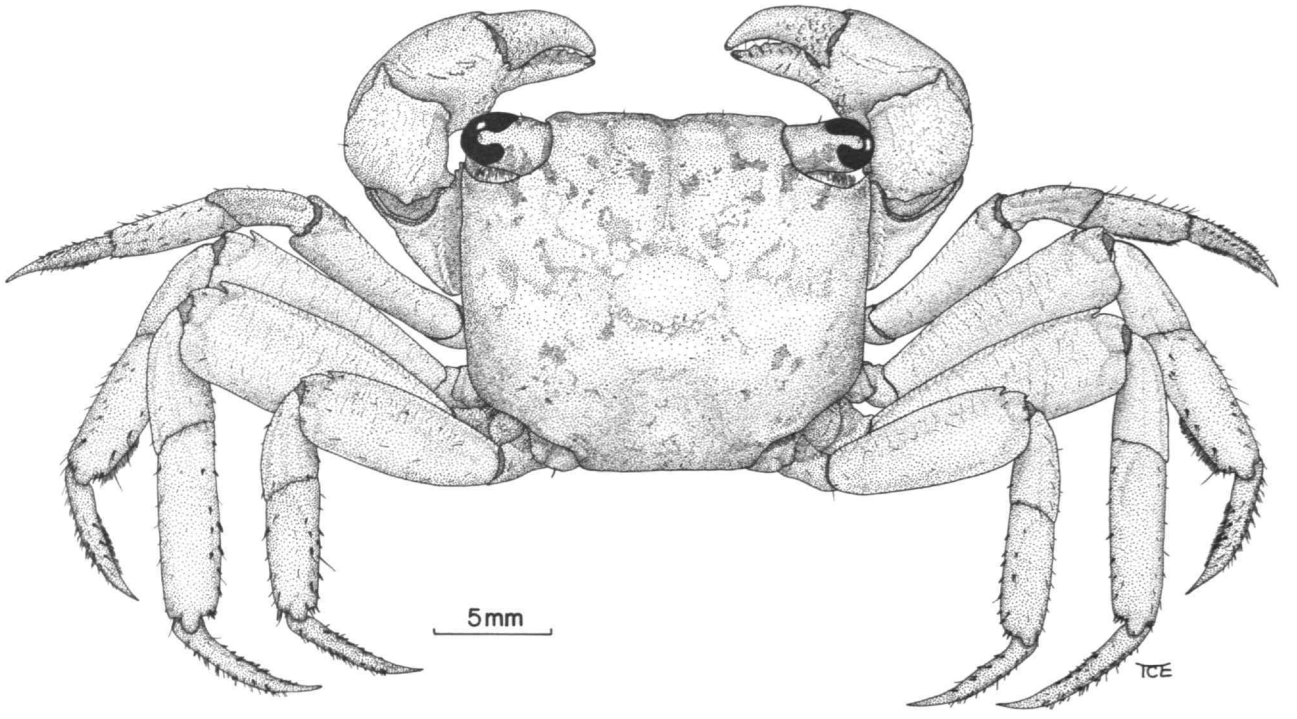


FIGURE 24.—*Armases cinereum*, male, Dauphin Island, Alabama.

?Sesarma angustipes.—Smith, 1869:37 [part, not Brazilian material].

Sesarma ricordi.—Von Martens, 1872:110.—Ortmann, 1894:719.—Diaz and Ewald, 1968:225.—Von Hagen, 1977:37.—Fimpel, 1975:190 [part = *S. angustipes*].—Rodriguez, 1980:384, lam. 60, fig. 107.—Abele and Kim, 1986:63, 671b.

Sesarma stimpsonii Miers, 1881:70 [not *S. stimpsonii* Miers, 1886].

Sesarma cinerea.—Ives, 1891:181.—Heilprin, 1888:320.

Sesarma Ricordi var. *terrestris* Verrill, 1908a:119; 1908b:328, pl. 11: fig. 3.

Sesarma (Holometopus) ricordi.—Rathbun, 1897a:91.—Tesch, 1917:191.—Rathbun, 1918:308, pl. 89 [part, not Brazilian material].—Holthuis, 1959:246, pl. 11: fig. 3.—Hartnoll, 1965:113, 133, figs. 10A, 11A,C, 12.—Chace and Hobbs, 1969:183, fig. 62k.—Abele, 1973a:378, fig. 1j.

Not *Sesarma ricordi*.—Sattler and Sattler, 1965:411, figs. 3, 4 [= *S. angustipes*].

Sesarma ricordi.—Von Hagen, 1967:178; 1968:139; 1975:301.

Not *Sesarma (Holometopus) ricordi*.—Coelho and Ramos 1972:203 [= *?S. angustipes*].

MATERIAL EXAMINED.—Bermuda: Hamilton Island, 7♂, 10♀, MCZ 9116; Hungry Bay, 1♀, MCZ 9121; 1 ovigerous ♀, MCZ 6221; 2♂, 1♀, AMNH 4593, 10833, 89.

Florida: Shell Key off St. Petersburg, Pinellas Co., 5♂, USNM 75554; Naples, Collier Co., 2♂, 3♀, USNM; Key Biscayne, Dade Co., 4♂, 2♀, 1 ovigerous ♀, UMML; Coconut Grove, Dade Co., 1♂, 5♀, USNM 58430; Bahia Honda, Monroe Co., 1♂, USNM 48581; Key West, Monroe Co., 11♂, 6♀, 2 ovigerous ♀, USNM 71151, 71166, 71295, 71298; Key West, Monroe Co., 14♂, 16♀, 1 ovigerous ♀, 1 juvenile, MCZ 6214, 6215, 6218, 9151; Tortugas, 3♂, 1♀, 2 ovigerous ♀, MCZ 6217.

Bahamas: Andros Island, 1♀, MCZ 8640; Alicetown, 1♀, MCZ 11678; Bimini, 5♂, 1♀, 2 ovigerous ♀, AMNH 10834, 1412; 3♂, 1♀, 1 ovigerous ♀, AMNH 2299, 6648.

West Indies: Cuba: Cienfuegos Bay, 1♀, MCZ 8410; Paradones, 2 ovigerous ♀, AMNH 3161; 2♂, 1♀, AMNH 3172.

Jamaica: 1♂, MCZ 1414.

Hispaniola: Aux Cayes, 3♂, 1♀, MCZ 6220; Santa Barbara de Samana, 1♂, MCZ 9845; Porta Playa, 1♂, 1♀, 1 juvenile, MCZ 9864; 1♂, 2♀, 1 ovigerous ♀, AMNH 2430.

Puerto Rico: 9♂, 1♀, 3 ovigerous ♀, 3 juveniles, AMNH 2586, 2700, 2749, 2989, 2778, 2766.

Saint Thomas: 7♀, MCZ 6222.

Saint John: Hurricane Hole, 2♂, 4♀, AMNH 13096; May Creek, 1♂, 1♀, AMNH 13087; 1♀, AMNH 13052.

Saint Croix: Salt River, 4♂, 1♀, 5 ovigerous ♀, AMNH 13042.

Tobago: Doctor's River, Speyside, 1♀, AMNH 13855.

Trinidad: 1♀, MCZ 9563.

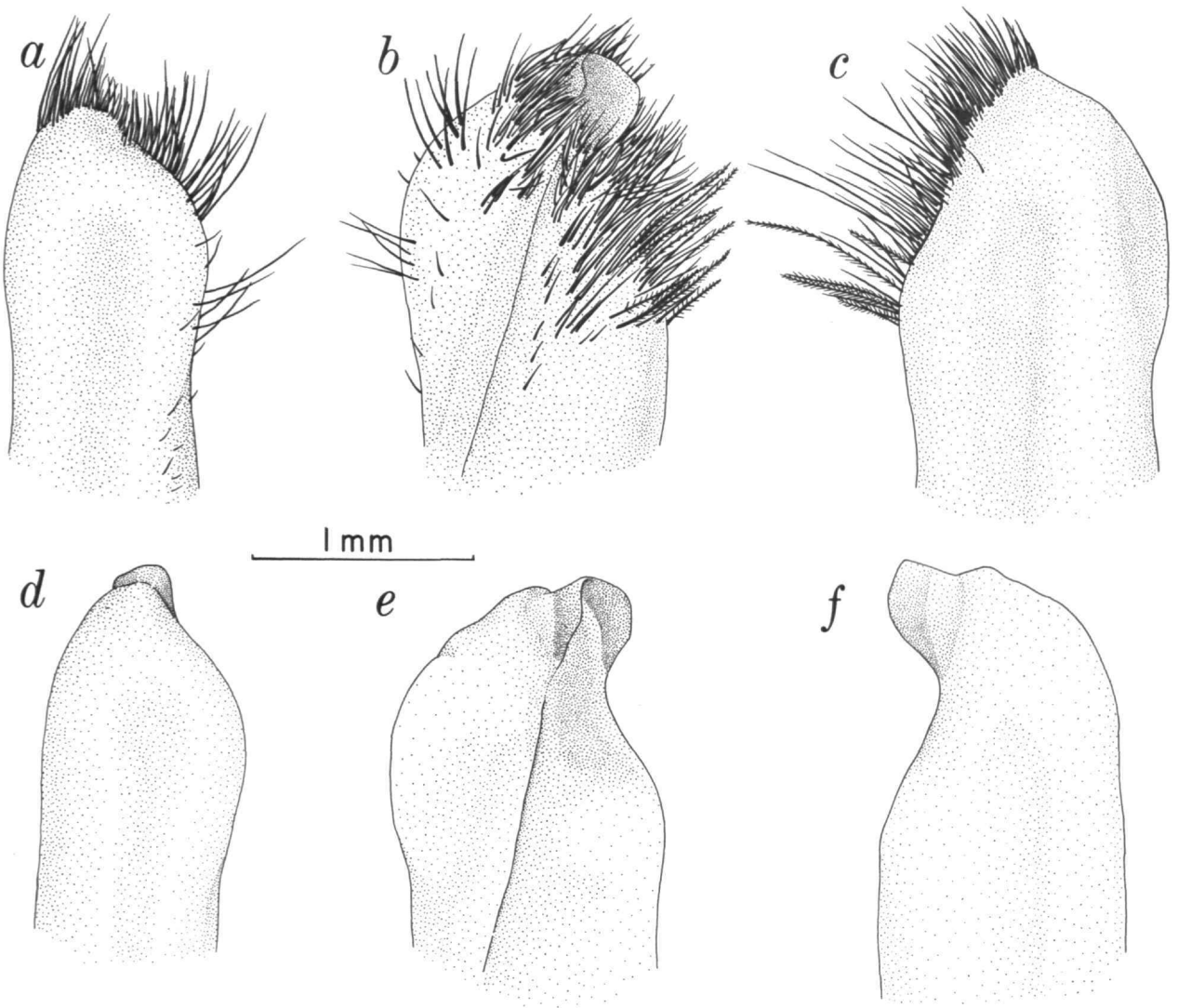


FIGURE 25.—*Armases cinereum*, gonopods.

Nicaragua: ?Corinto (note in jar has ? as to locality; almost certainly not this locality, which is eastern Pacific), 1♀ (ovigerous), MCZ 6223.

Panama: Colon, 1♂, 1♀, MCZ 1307; Fort San Lorenzo, 1♂, 1♀, USNM; Galeta Island, 11♂, 9♀, USNM; Maria Chiquita 2♂, USNM.

Colombia: Turbo, 1 ovigerous ♀, MCZ 1347; 1♀, AMNH 2570.

Guyana: 1♂, AMNH 2632.

DESCRIPTION.—Carapace slightly wider than long; cl/cb = 0.951±0.012 for males and 0.933±0.019 for females. Carapace narrows slightly posterior to anterolateral angle then widens; sides subparallel posteriorly. Carapace almost flat in midline, convex laterally giving slightly inflated appearance. Some specimens with dorsal surface covered with widely spaced pubescence tending to form clumps anteriorly; other specimens with carapace naked. Interorbital region subdivided into four lobes. Frontal region distinctly widens distally; 0.542±0.06 of carapace breadth in males, 0.523 ±0.10 in females.

Eyes well developed and pigmented.

Chelipeds sexually dimorphic; smaller and weaker in

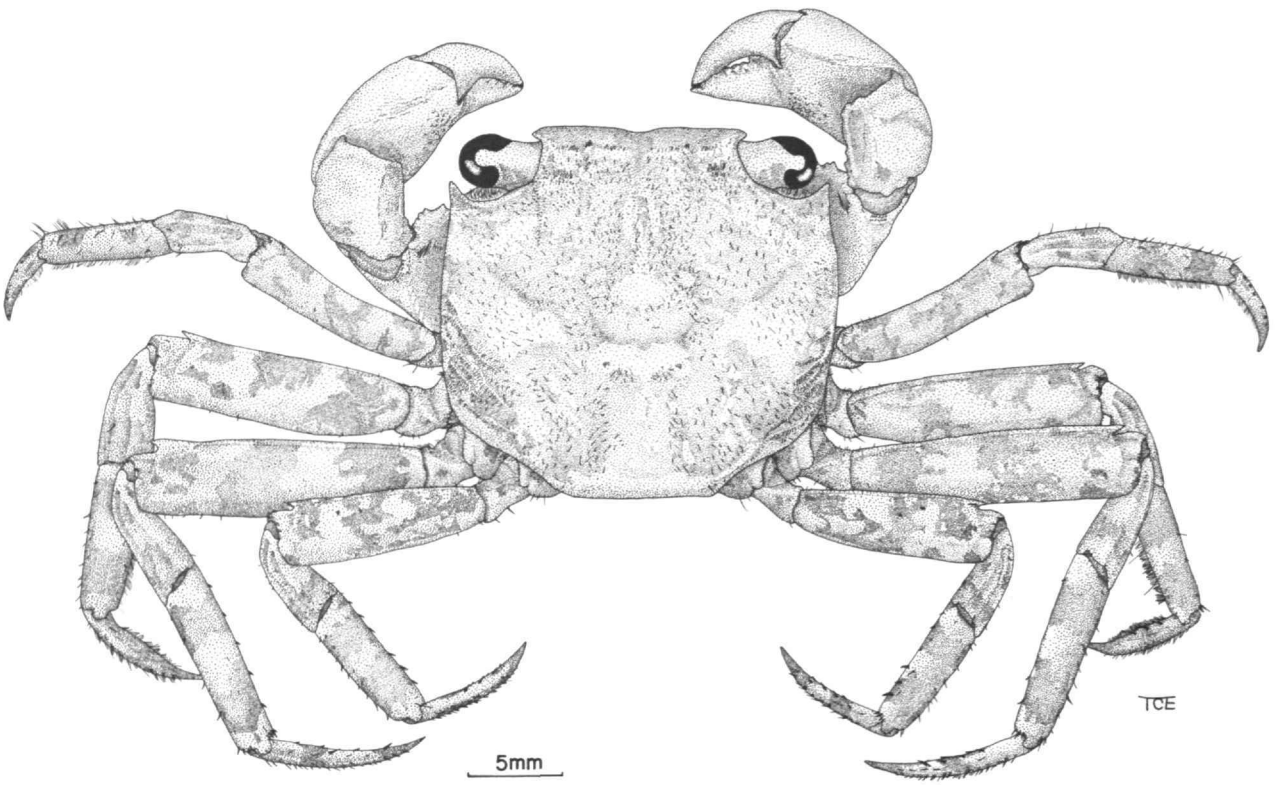


FIGURE 26.—*Armases ricordi*, female, Honduras.

females. Posterior medial edge of merus roughly granular; anterior edge toothed, expanded distally. Carpus weakly granular on distal surface. Palm smoothly punctate with few granules on medial surface. Movable finger widens proximally in males.

Walking legs long, relatively slender; ml/mw ratio varies with size; about 2.55 to 2.70 in small animals; in large animals about 3.0. Third leg (fourth pereiopod) with carpus about 0.5 length of merus; propodus distinctly longer than carpus; dactylus slightly shorter than propodus. Propodi and dactyli armed with small, black spines; on ventral margin of propodus and on both ventral and dorsal margin of dactylus.

Male abdomen subtriangular in outline; telson slightly longer than wide. Female abdomen subcircular in outline; length and width of telson subequal.

Male gonopod simple, unarmed. Endpiece short, blunt, terminating slightly lateral to midline of gonopod. Female gonopore slightly raised from sternum. Two depressions at base; one posterior, one medial. Operculum roughly saddle-shaped to compressed barbell shape.

MEASUREMENTS.—Mature males, cb 10.7 to 18.6 mm; mature females, cb 10.0 to 18.1 mm; cb of ovigerous females ranged from 15.1 to 17.0 mm.

TYPE LOCALITY.—Haiti.

TYPE.—The type specimen is in the Muséum National d'Histoire Naturelle, Paris.

DISTRIBUTION.—Southern Florida north to Fort Pierce on the east coast and to St. Petersburg on the west coast; Bermuda; Bahamas; West Indies; coast of Central America and South America to Surinam. Records of this species from other localities were based on misidentified material (see Abele, 1972, 1973a).

HABITAT.—*Armases ricordi* is one of the more terrestrial species in this group. It occurs among supratidal litter to several hundred meters inland. Specimens were collected from dry areas above mangrove swamps, in pinewoods on islands in Dade County, Florida, in grass above sandy beaches and among limestone rubble at the edge of a reef flat. Verrill (1908a,b) records a "variety" of this species from dry upland fields in Bermuda but doesn't say how far these were from water.

REMARKS.—The identification of this species has been difficult in the past and it has been confused with several other *Armases* species. Males cannot be confused with any other species now that the gonopod has been adequately illustrated

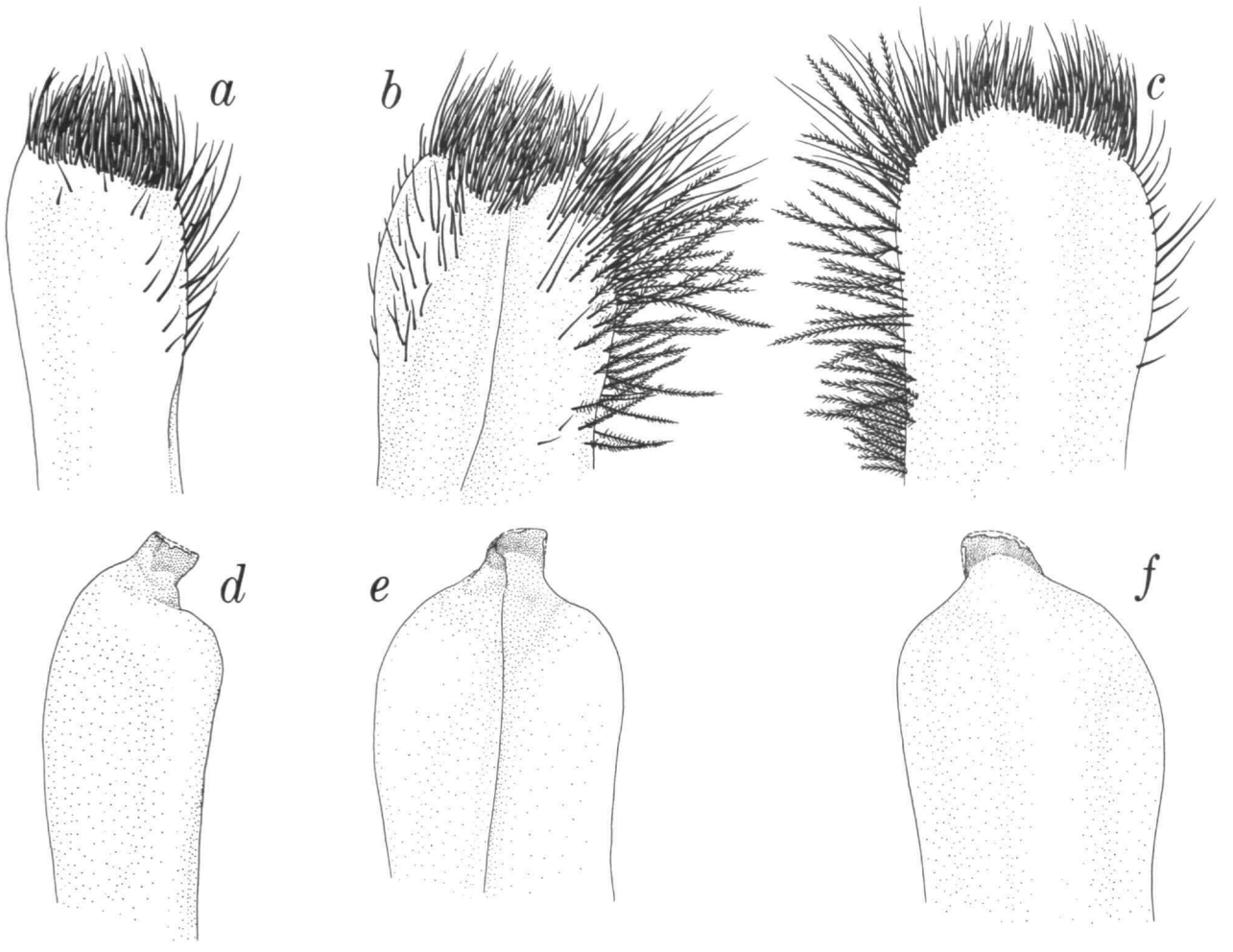


FIGURE 27.—*Armases ricordi*, gonopods, Panama.

by several authors. The female gonopore, figured here, will also serve to distinguish *S. ricordi* from other species.

Armases americanum (de Saussure, 1858), new combination

FIGURES 22*f*, 23*d*, 28*a-c*, 29

Sesarma americana de Saussure, 1858:441 [type locality: Saint Thomas].

Sesarma (Holometopus) tampicense Rathbun, 1914:124, fig. 4, pl. 8 [type locality: Tampico, Mexico].

Not *Sesarma americana*.—Pocock, 1889:7 [= *Sesarma roberti* H. Milne Edwards].—Tesch, 1917:130 [= *Sesarma roberti*].—Rathbun, 1918:311 [= *Sesarma roberti*].

Sesarma (Holometopus) tampicense.—Rathbun, 1918:307, fig. 151, pl. 88.

Sesarma (Holometopus) americanum.—Chace and Hobbs, 1969:178, fig. 62a-f.

MATERIAL EXAMINED.—Mexico: Tampico, 4♂ (includes holotype of *Sesarma tampicense*), 1 Jun 1910, Edward Palmer, USNM 45794.

Honduras, Belize: 2♀, F.E. Meehling, USNM 3286; Rio Sartoon I 20 miles above mouth, 1♂, 1♀, 29-30 Apr 1947, Miller and Holloway, USNM Acc. 174756; Rio Aquan, ~0.5 mile [~1.0 km] from mouth, 1♂, 1♀, 16 Aug 1969, C. Swift.

Guatemala: Isabal, 1.5 miles [2.4 km] W of Livingston, 1♀, Cueva de la Coche, 21 Aug 1969, S. and J. Peck, USNM 128415.

Costa Rica, Caribbean coast, Rio Grand: 1♀, AMNH 2337; 1♀, AMNH 2603.

Panama, Caribbean coast: small stream adjacent to old fort at Portobelo, 1♂, 1 specimen, 14 May 1969, L. Abele, J. Graham; same locality, 16♂, 13♀, 2 ovigerous ♀, 14 Mar 1977, L. Abele, K. Heck; in Panama Canal, dock at Barro Colorado Island, 1♂, 20 Jul 1969, T. Zaret; small stream adjacent to

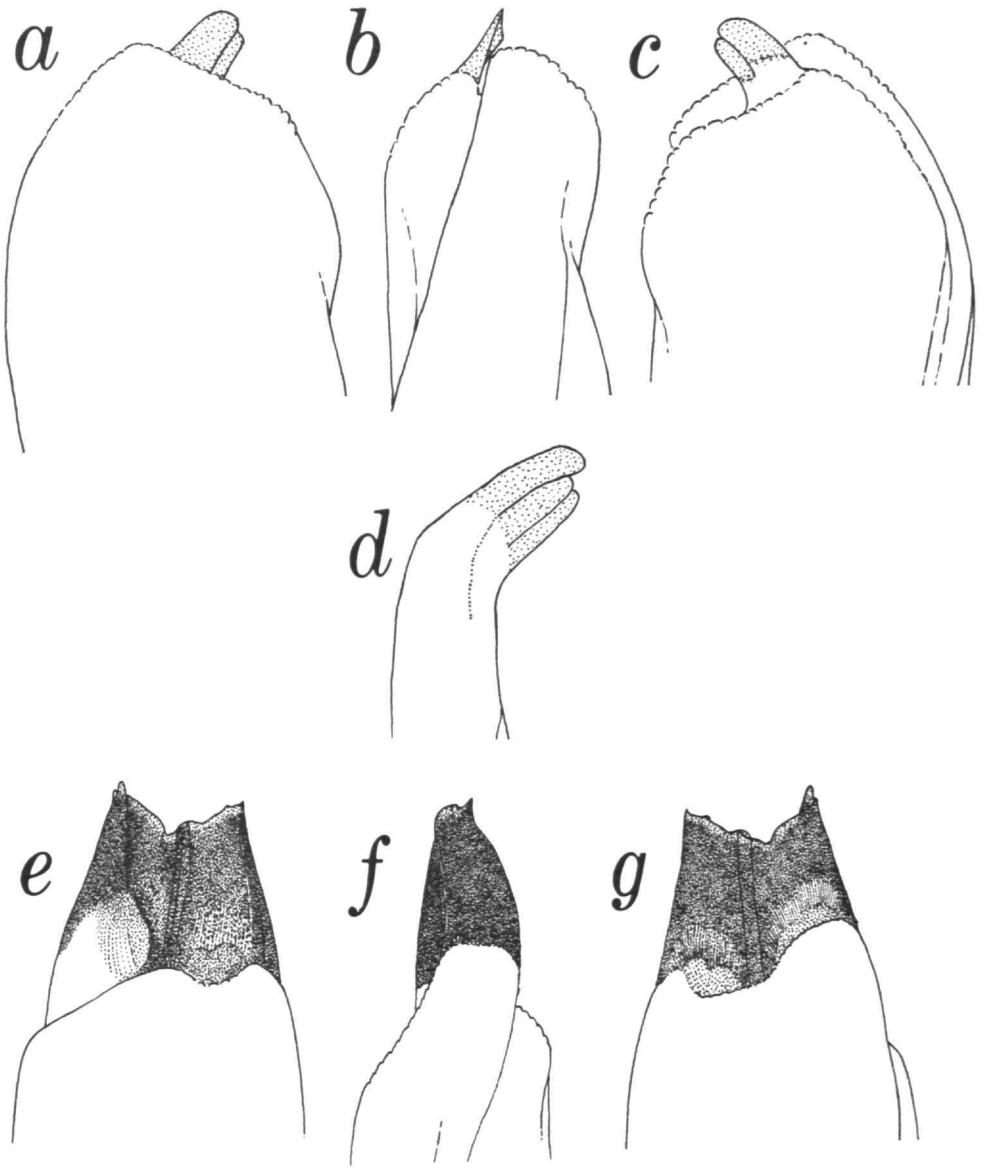


FIGURE 28.—Gonopods: *a–c, Armases americanum* (from Chace and Hobbs, 1969, fig. 62*a–c*); *d, A. benedicti,* Brazil (from Abele, 1973a, fig. 1g); *e–g, A. roberti* (from Chace and Hobbs, 1969, fig. 62*l–m*).

Gatun Locks of Panama Canal, 3♀, 31 Jan 1971, L. Abele, T. Biffar; small stream adjacent to Fort San Lorenzo, 1♂, 15 Jul 1969, L. Abele.

DESCRIPTION.—Carapace slightly wider than long (cl/cb of males 0.950±0.016, and 0.914±0.051 in females. Carapace increases slightly in width posteriorly with a slight emargination posterior to outer orbital angle; slightly convex laterally and medially. Low but distinct granules on the dorsal surface, especially in center. Laterally granules form about six or seven oblique ridges. Interorbital region subdivided into four lobes, medial pair larger than lateral. Lateral margins of frontal region subparallel and at the widest point iw/cb = 0.525±0.008 in males and 0.540±0.016 in females.

Chelipeds sexually dimorphic. In both sexes merus with medial posterior and anterior edge serrated, especially in males. Carpus covered with granules, acute along margins in mature males. Chelae of both sexes granulate; in mature males chelae swollen with subacute granules on medial surface. Fingers

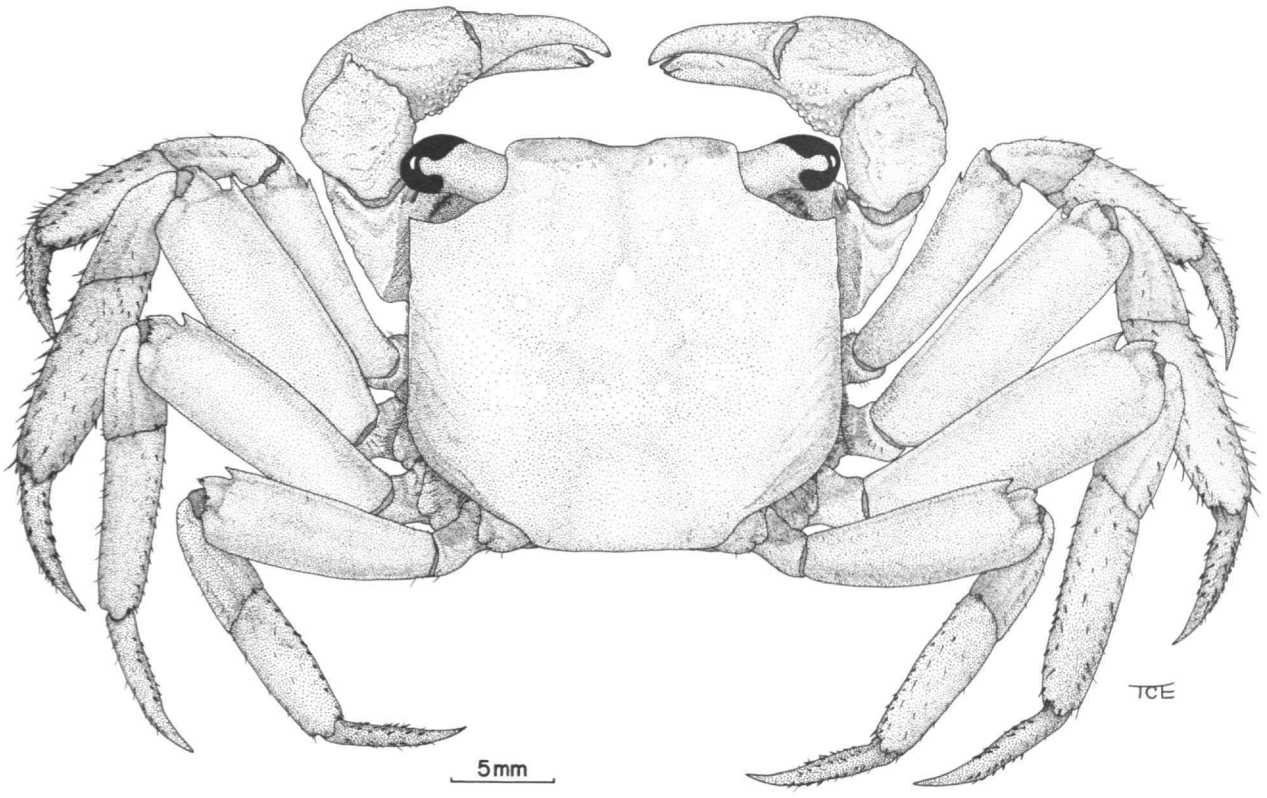


FIGURE 29.—*Armases americanum*, male, Barro Colorado Island, Panama.

come together at narrow spoon-shaped tips.

Walking legs are long and relatively slender, l/w ratio of third walking leg varies with size; about 3.0 in large males and 2.70 in females, swollen in smaller individuals of both sexes. Merus of fourth pereopods about three times as long as carpus; carpus shorter than propodus; dactylus about 0.7 length of propodus.

Male abdomen subtriangular in outline; telson length slightly greater than breadth. Mature female abdomen subcircular in outline.

Male gonopod simple, unarmed; amber-colored end piece small, partially recessed. Female gonopore slightly elevated with a short, lateral suture.

MEASUREMENTS.—Mature males 12.8 to 22.6 mm; mature females 12.7 to 21.0 mm; ovigerous females 18.5 to 18.6 mm.

TYPE LOCALITY.—St. Thomas (probably in error).

TYPE.—Syntypes are deposited in the Museum d'Histoire Naturelle in Geneva, Switzerland (Chace and Hobbs, 1969).

DISTRIBUTION.—Tampico, Mexico; Honduras; Caribbean coast of Costa Rica and Panama.

HABITAT.—The species has been reported from "soft mud of river banks" (Rathbun, 1918:308). In Panama *A. americanum* is common among and under rocks and rubble and among vegetation in small freshwater streams flowing into the Caribbean. Large adults were collected from burrows and crevices in the banks of streams, but it is not known whether the crabs formed the burrows. Most of the streams were less than two meters in width and 0.25 meter depth in shaded areas. A large male was collected on the boat dock at Barro Colorado Island in the Panama Canal, which is adjacent to a small stream.

Crabs were very common from approximately 150 m above the mouth of the stream. The male collected at Barro Colorado was about 5 km from the sea, and a specimen from Honduras was said to have been collected 20 miles [32 km] from the river mouth. Based on my collections the species appeared to be most common from about 150 m to 1 km above the mouth of the stream. Specimens from Portobelo were found with pseudothelphusid crabs. The eggs are small and numerous, suggesting an estuarine or marine larval development.

REMARKS.—*Armases americanum* is similar morphologically and ecologically to *A. roberti*. They can be easily distinguished by the male gonopods and female gonopores (see illustrations and key). Both species are much more variable in their carapace features than was previously thought. There are

specimens of *A. americanum* from Guatemala (USNM 128415) that externally are nearly identical to *A. roberti* but based on the more reliable gonopods and gonopores are clearly *A. americanum*.

Reexamination of maternal in various museums has shown all mainland material identified as *A. roberti* actually to be *A. americanum*, and all West Indian material identified as *A. americanum* to be *A. roberti*. At present *A. americanum* appears to be absent from the West Indies and *A. roberti* absent from the mainland. Although de Saussure (1858) listed Saint Thomas as the type locality, the species has never been reported from that island. Chace and Hobbs (1969) figured the gonopod of a male syntype of *A. americanum* leaving no doubt that this is the common mainland species.

Armases roberti (H. Milne Edwards, 1853), new combination

FIGURES 23*e*, 28*e-g*, 30

Sesarma roberti H. Milne Edwards, 1853:182.—Guinot, 1988:8.
Sesarma americana.—Pocock, 1889:7 [not *S. americanum* de Saussure].
Sesarma bromelium Rathbun, 1896:143.
Sesarma (Holometopus) roberti.—Rathbun, 1897a:90.—Tesch, 1917:193.—Rathbun, 1918:312, pl. 91.—Monod, 1956:443, figs. 602-604.—Chace and Hobbs, 1969:184, figs. 60, 621-62n.
Sesarma (Holometopus) angustipes.—Rathbun, 1918:311, pl. 90.—Hartnoll, 1965:113, 115, 131-133, 144, 146, figs. 10B, 11B,D, 15A,B [not *S. angustipes* Dana].
Sesarma miersi.—Rodriguez, 1980:383, fig. 106 [see p. 493].
Sesarma angustipes.—Rodriguez, 1980:393, fig. 108 [see p. 493].

MATERIAL EXAMINED.—Jamaica: Montego Bay, 1♂, 20♀, 29 Aug 1910, E.A. Andrews, USNM 42878; 8♂, 13♀, 3 Aug 1910, E.A. Andrews, USNM 42876; near Meneague, 1♂, W.G. Lynn, USNM 74544; Gray's Inn, 1♂, 1♀, 1928, C.R. Orcutt, USNM 61367.

St. Lucia: Port Castries, 1♂, USNM 22108.

Cuba: Bahia Honda, 2♂, 1♀, 1 ovigerous ♀, USNM 48580; Soledad, Cienfuegos, 1♂, J. Welsh, USNM 63312; Belmonte Brook, 1♂, 2♀, 23 Aug 1930, R. Dow, MCZ 8990.

Barbados: St. Joe's River, 3♂, 4♀, 20 Apr 1937, Smithsonian-Hartford Expedition, USNM 73317.

Haiti: Near Grant Anse River, 2♂, 2♀, W. Faxon, USNM 81357; same locality, 20♂, 29♀ (3 ovigerous), MCZ 6226; Diquini, 2♂, 3♀ (2 ovigerous), Nov 1912, W. Mann, MCZ 8939; Jeremie, 7♂, 3♀, D.F. Weinland, MCZ 1582.

Trinidad: 3♂, 2♀ (1 ovigerous), Oct 1971, J.M. Stonley, USNM 139302.

Santo Domingo: River 7 km SE of Porto Playa, Jul 1937, W.J. Clench, MCZ 9870; same locality, 1♂, 2♀ (2 ovigerous), MCZ 9865; Barbour Harbor, 3♀ (1 ovigerous), AMNH 10045.

Tobago: Speyside, Doctor's River, 2♂, AMNH 13835.

DESCRIPTION.—Carapace subquadrate (cl/cb = 0.98±0.01), length approximately equal to breadth; slightly convex anteriorly and laterally; lateral striae present; lateral margins converging slightly anteriorly; interorbital region subdivided into four distinct lobes, deep sinus medially, iw/cb = 0.54±0.005; lateral margins of frontal region parallel, anterior margin concave medially.

Eyes well developed, pigmented.

Chelipeds sexually dimorphic, female chelae relatively smaller and smoother than male. Posterior medial margin of merus weakly granular, anteromedial toothed, expanded distally; tuft of setae on distal interior surface. Carpus granular, granules large, sharp on flexor margin. Palm granular, medial surface with large, acute granules. Movable finger granular dorsally; both fingers with corneous spooned tips.

Walking legs long, relatively slender; merus of fourth pereiopod with length about three times width (ml/mw = 2.97±0.09). Propodus and dactylus with long black setae; propodus with short black spine ventrally; dactylus with short black spines on ventral and dorsal surfaces. Females with few setae and spines compared to males. Dactylus slightly shorter than propodus.

Male abdomen triangular in outline; width of telson subequal to length. Male gonopod straight; endpiece flattened with deep sharp sinus distally (V-shaped).

Female abdomen subcircular in outline; width of telson slightly greater than length. Female gonopore subcircular with small projection anteriorly; operculum raised with U-shaped portion around projection. Eggs small and numerous.

COLOR IN LIFE.—From Chace and Hobbs (1969:184-185):

Ground color of carapace tan to dark brown with cream to straw markings: hepatic and protogastric regions with one to four small subcircular cream spots, and protogastric region with larger spot adjacent to posteromesial margin; branchial regions with four or five spots, often smaller than those on hepatic and protogastric regions; mesogasric region often with pair of small spots forming transverse row with large posteromesial spots in protogastric region. Grooves delimiting mesogastric portion of carapace pale, particularly along posterior margin. Anterolateral and, to more marked degree, posterolateral portions of branchial region with series of subparallel, very thin, light lines directed parallel to posterolateral margin of carapace, lines short anteriorly but increasing in length posteriorly. Front dark brown to black.

Eyestalks dark red; cornea chartreuse, often with dark brown spot posterodorsally. Third maxillipeds cream with dark brown to buff fringes of setae. Chelipeds darker above than below; merus magenta fading ventrally to pinkish cream; carpus reddish purple above fading to pinkish mauve below; propodus purple on palm with gradation along base of immovable finger to orange, lower surface diluted with cream or white; dactyl mostly orange with bright red triangular spot at base of mesial surface. Pereiopods dark grayish brown above, bluish gray below; merus and carpus with irreular and variable darker brown and tan splotches; tip of dactyl yellowish straw; setae dark red. Sternum, basal podomeres of legs, and abdomen pinkish cream with reticulate pattern of bluish gray; sternal plate between chelipeds with mauve suffusion; margin of telson orange.

The females of this species seem to have a more regularly banded pattern on the walking legs than do the males, and even the chelipeds bear conspicuous bands and irregular markings.

MEASUREMENTS.—Males, cb 14.8 to 27.0 mm; females, cb 12.5 to 22.3 mm, ovigerous females cb 17.5 to 23.5 mm.

TYPE LOCALITY.—Goree, Senegal (almost certainly an error, Monod 1956).

TYPE.—Seven syntypes are in the Muséum National

FIGURE 30.—*Armases roberti* (from Chace and Hobbs, 1969, fig. 60).

d'Histoire Naturelle, Paris (J. Forest, personal comm.); two syntypes are in the National Museum of Natural History, Smithsonian Institution.

DISTRIBUTION.—West Indies (Cuba, Jamaica, Hispaniola, St. Lucia, Barbados, Tobago, Trinidad). All of the material from the mainland of Central and South America reported to be this species belongs to other species. I have not seen any specimens collected on the mainland.

HABITAT.—*Sesarma roberti* is an extremely common semiterrestrial crab occurring along the banks of freshwater streams and seepage areas. Chace and Hobbs (1969) report them from just above sea level to about 330 m elevation. The same authors report ovigerous females at least 2.5 km upstream from the mouth of the Layou River on Dominica.

REMARKS.—There has been some confusion surrounding the nomenclatural status of this species. Monod (1956) and Chace and Hobbs (1969) have reviewed the problem.

Armases angustipes (Dana, 1852), new combination

FIGURES 23*f*, 31, 32*a-d*

Sesarma angustipes Dana, 1852:353; 1855, pl. 22: figs. 7a-c.—(?)Smith, 1869:37 [in part, reference to Brazil only].—Kingsley, 1880:214 [in part, reference to Brazil only].—Von Hagen, 1968:139; 1977:38.

Sesarma miersii Rathbun, 1897a:91 [in part, Brazilian material only].

Sesarma (Holometopus) miersii.—Rathbun, 1900:138; 1918:303 [in part, Brazilian material only].

Sesarma (Holometopus) miersii iheringi Rathbun, 1918:304, pl. 85.

Sesarma (Holometopus) ricordi.—Rathbun, 1918:308 [in part, Brazilian material only].

Sesarma ricordi.—Sattler and Sattler, 1965:411, figs. 3-4.—Fimpel, 1975:190 [part].

Sesarma miersii.—McWilliams, 1969:80, 3 pls.—Fimpel, 1975:190.

Sesarma (Holometopus) angustipes.—Abele, 1972:168, figs. 1A,D, 2A,D; 1973c:123, fig. 1.—Von Hagen, 1978:46.

Not *Sesarma angustipes*.—Stimpson, 1858:106 [= *Sesarma ricordi* H. Milne Edwards]; 1859:66 [? = *Sesarma ricordi*].—Smith, 1870:159 [= *Sesarma ricordi*].—Cunningham, 1871:493 [= *Metasesarma rubripes* Rathbun).—De Man, 1892a:253, pl. 10: fig. 5 [= *Sesarma ricordi*].—Rodriguez, 1980:393, fig. 108 [see p. 493].

Not *Sesarma angustipes?*—Miers, 1881:70 [= *Metasesarma rupripes*].

Not *Sesarma (Holometopus) angustipes*.—Rathbun, 1918:311, pl. 90 [= *Sesarma roberti* H. Milne Edwards].—Hartnoll, 1965:113, 115, 131-133, 144, 146, figs. 10B, 11B,D, 15A,B, table 6 [= *Sesarma roberti*].

Not *Sesarma miersi*.—Rodriguez, 1980:383, fig. 106 [see p. 493].

MATERIAL EXAMINED.—Bahamas: Andros Island, freshwater sinkhole (Uncle Charlies), 3♂, 2♀, G. Warner, Aug 1981, BMNH.

Mexico: Yucatan, Las Coloradas: On unpaved road from Rio Lagartos/San Felipe junction, under rock on margin of nearly dry salina about 1-2 km from sandy beach on Straits of Yucatan, 1♂, 1♀, 2 Mar 1981, D.L. Felder, S. Snatic, W.W. Foreman, University of Southwestern Louisiana.

Trinidad: Toco, mouth of Salybea River, under coconut husks, 3♂, 3♀, 23 Jul 1966, H. von Hagen, USNM 137890.

Brazil: Rio de Janeiro, 1♀, USNM 40822; Itaparica, State of Bahio, 1♀, USNM 40821; Cabedelo, State of Paraiba, 1♂, USNM 25712; State of São Paulo; 4♂, 3♀, USNM 47830, 122790; Desteoro (Florianopolis), 1♂, USNM 20312; Salvador, 1♂, USNM 48299 (holotype of *Sesarma (Holometopus)*

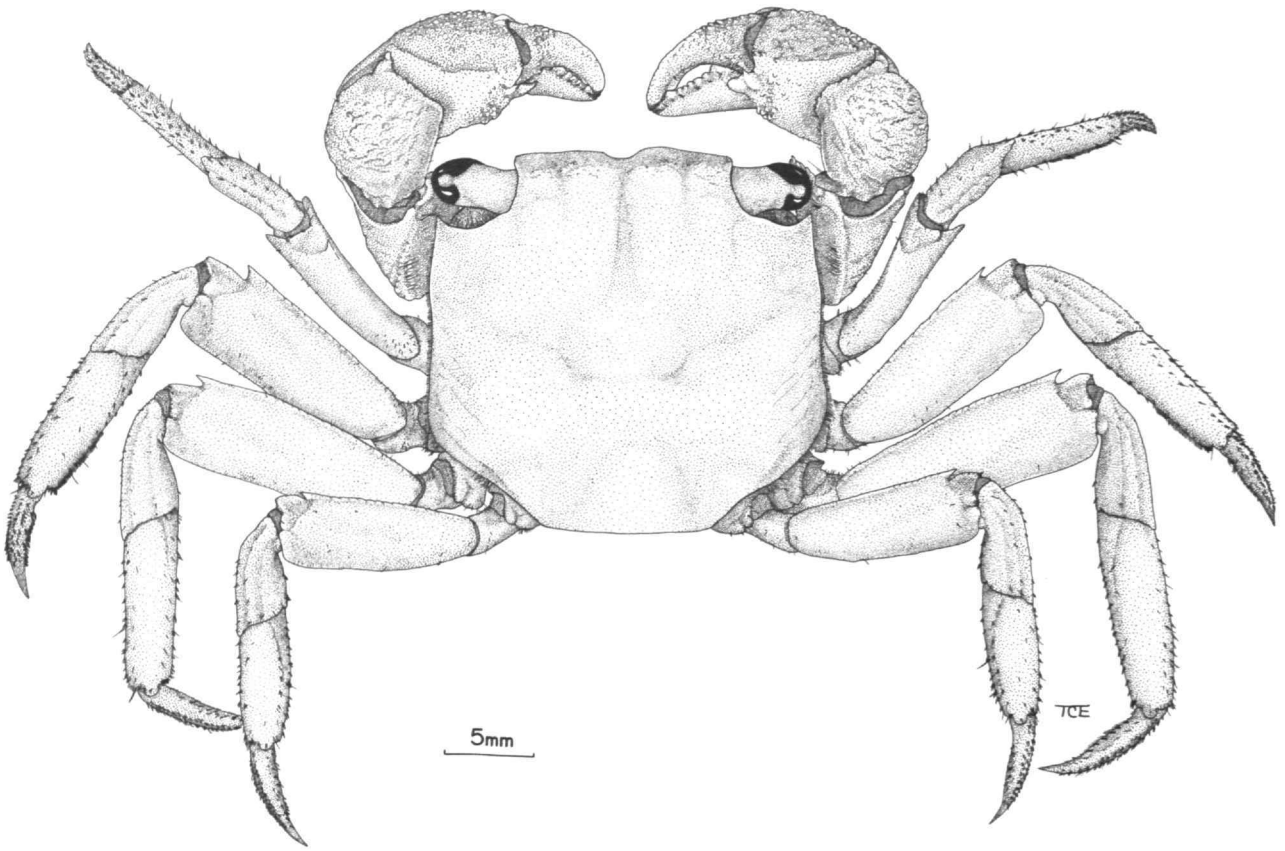


FIGURE 31.—*Armases angustipes*, male holotype of *Sesarma (Holometopus) miersii iheringi* Rathbun, Brazil.

miersii iheringi Rathbun, 1918).

DESCRIPTION.—Carapace slightly wider than long (cl/cb = 0.940±0.026 for males and 0.944±0.031 for females) with subparallel lateral margins; slightly convex laterally and medially with distinct regions. Carapace covered with low granules forming rugae laterally. Interorbital width slightly more than $^1/_2$ carapace width (iw/cb = 0.532±0.032 for males and 0.545±0.025 for females); subdivided into four lobes, median pair being largest. Lateral margins of frontal region expanded distally; frontal margin concave medially. Carapace not inflated.

Eyes well developed, pigmented.

Chelipeds sexually dimorphic, although less so than in other species of genus. Posterior medial margin of merus serrated; anterior margin expanded with well-developed teeth. Carpus covered with closely packed granules forming raised rugae. Chela is covered with distinct granules larger medially than laterally, in a poorly defined ridge on dorsal surface. Male chelae more inflated than female and proximal portion of the movable finger wider in males than in females. Fingers meet in narrow spoon-shaped tips.

Walking legs long, relatively slender: ml/mw ratio of fourth pereopod 2.88±0.140 in males and 2.87±0.265 in females with larger individuals having larger ratios. Merus about twice length of carpus and about 1.25 times length of propodus; propodus slightly longer than dactylus. Propodi and dactyli armed with small black spines on ventral margin of propodus and on ventral and dorsal margin of dactylus; each with three rows of approximately 15 to 18 dorsal spines and two ventral rows of 6 to 10.

Male abdomen subtriangular in outline; length and width of telson subequal. Female abdomen semicircular in outline; telson wider than long.

Male gonopod simple, unarmed, curved laterally in distal portion. Amber-colored endpiece subrectangular in outline and, except for slight basal sinus medially, following outline of gonopod base; deep sinus at endpiece base laterally. Female gonopore distinctly elevated extending anteriorly. Rim of gonopore with lobe medially; operculum narrow medially and expanded laterally.

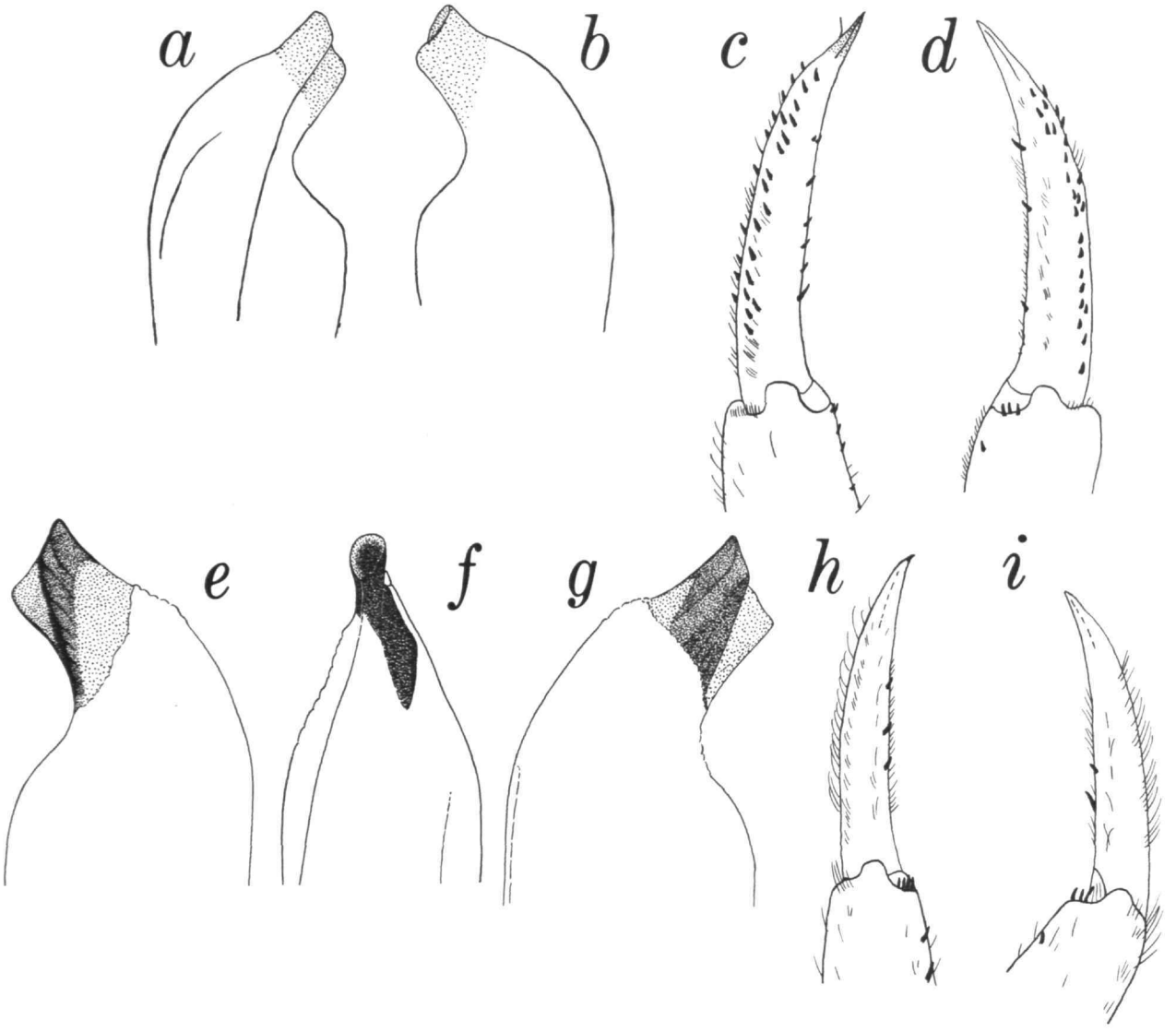


FIGURE 32.—*a,b,e,f,g*, gonopods; *c, d, h, i*, dactyls: *a–d, A. angustipes*, (USNM 48299); *e–i, A. miersii* (*e–g* from Chace and Hobbs, 1969, fig. 62; *a–d, h–i* from Abele, 1972, figs. 1, 2).

MEASUREMENTS.—Males, cb 16.2 to 24 mm; females, cb 14.8 to 18 mm.

TYPE LOCALITY.—South America (Dana, 1852) probably near Rio de Janeiro, Brazil (Smith, 1869; Chace and Hobbs, 1969).

TYPE.—No longer extant (Abele, 1972).

DISTRIBUTION.—Mexico, Yucatan; Bahamas, Andros Island; Trinidad; lower coast of Brazil.

HABITAT.—The species has been reported from the water of the basal leaves (tanks) of the following bromeliads: *Neoregelia cruenta* (R. Graham) L.B. Smith, *Wittrockia superba* Lindman, *Aechmea coelestis* (C. Koch) E. Mor, and *A. pectinata* Baker. The bromeliads were growing in partial shade on granite boulders along brackish streams. Data accompanying some other material from Brazil (Rathbun, 1900) indicates that the species were collected from mangrove areas. In 1982 I received some specimens that had been collected from a freshwater sinkhole in Andros Islands in the Bahamas and some additional specimens that had been collected from a nearly dry salina in Yucatan, Mexico.

Although bromeliads related to those listed above occur in Trinidad, the only data accompanying the specimens from that place indicated that they were collected under coconut husk at the mouth of the Rio Salybea at Toco. The habitat is similar to that described for the Brazilian material from bromeliads, but no bromeliads are mentioned. Von Hagen (1977) reviewed some aspects of the biology of *A. angustipes* and reported that crabs have been taken from tanks of bromeliads in Cocos Bay, Trinidad, but the specific identity of the crabs has not yet been determined.

The stomach contents of specimens collected from bromeliads include chitinous parts of insects, detritus, plant material, and many stellate trichomes, characteristic of bromeliads, suggesting that the crabs feed on the bromeliads. When disturbed the crabs moved quickly backwards into a leaf axis and could be removed from the plant only with difficulty. If the crabs were removed from the plant they would return immediately upon release (Sattler and Sattler, 1965).

McWilliams (1969) notes the adult specimens as having bluish black carapaces with orange markings on the dorsal surface and abdomen. Zahl (1975) presents a color photograph of this species.

REMARKS.—The taxonomic status of *A. angustipes* has been reviewed by Abele (1972, 1973c) and will be summarized here.

Dana (1852, 1855) in his report of the crustaceans of the United States Exploring Expedition described and illustrated *Sesarma angustipes* as a new species with the type locality as "South America." Smith (1869) pointed out that there can be little doubt that Dana's material of *S. angustipes* was collected at Rio de Janeiro, Brazil. Cunningham (1871) referred a specimen from Rio de Janeiro to *S. angustipes*. Miers (1881) doubtfully referred a male specimen from Rat Island, Montevideo, Uruguay, to *S. angustipes*. Miers examined Cunningham's specimen and concluded that his specimen and Cunningham's were identical. Miers was reluctant to refer his specimen positively to *S. angustipes* because he had received from the Smithsonian Institution material from Florida that had been identified as *S. angustipes*, and his specimen was "certainly not identical" with those from Florida. Miers believed that the Florida material had been identified by Dr. Stimpson. He then (p. 70) stated: "If the Florida species be not the true *S. angustipes*, Dana it may be designated *S. stimpsonii*." The specimens from Florida then became the type material of *S. stimpsonii* Miers, 1881. Miers later (1886:270) stated in a footnote: "I have proposed the name (Proc. Zool. Soc. Lond., p. 70, 1881) *Sesarma stimpsonii* as an alternative name for specimens [there is only a single specimen in the British Museum from this locality] from Monte Video." This, however, is incorrect as his earlier (1881) statement is quite clear as to the specimens to which the name *S. stimpsonii* referred. Rathbun (1897a) also recognized that Miers (1881) intended the name *S. stimpsonii* for the specimens from Florida, and correctly determined that *Sesarma ricordi* H. Milne Edwards, 1853, and *S. stimpsonii* Miers, 1881, were synonymous. (She had examined the types of both species.)

In the collections of the National Museum of Natural History, Smithsonian Institution, Washington, D.C., there is a large amount of material identified as *Sesarma angustipes* Dana, 1852. Hartnoll (1965) examined some of this material and additional material from Jamaica and concluded that *Sesarma angustipes* Dana, 1852, was a senior synonym of *S. roberti* H. Milne Edwards, 1853. Chace and Hobbs (1969) disagreed and kept the two species distinct until specimens with the distinctive frontal and pleopodal characters of the Caribbean species were found on the eastern or southeastern coast of South America.

The pertinent parts of Dana's description are as follows: frontal margin very slightly excavate at middle; carpus, hand and upper finger granulate, granules not serrate; hand entire above; eight posterior feet narrow, third joint three times as long as broad; tarsus elongate and spinulous. His figures show these characters. This description fits, in part, several species of *Armases* in the western Atlantic; notably *A. roberti*, *A. americanum* de Saussure, 1858, *A. ricordi* H. Milne Edwards, 1853, and *A. miersii iheringi* Rathbun, 1918. In their work on the West Indian decapods, Chace and Hobbs (1969) established the identity of *A. tampicense* Rathbun, 1914 (a junior synonym of *A. americanum*) and presented diagnoses and illustrations of three of the above-mentioned species. With this solid foundation it is possible to reexamine the status of *A. angustipes*. *Armases ricordi* and *A. roberti* are excluded as possible synonyms of *A. angustipes* because *A. ricordi* lacks granules on the hand, and the granules of *A. roberti* are serrate. *Sesarma americanum* is excluded because the dactylus, although there are a few spines present, cannot be considered spinulose. The species known today as *Armases miersii iheringi* seems to fit the description as well as possible and is the only species of the group that is known to occur in Brazil.

The diversity of habitats from which this species has been reported includes bromeliads, mangroves, an area adjacent to a river, a salt sinkhole, and a freshwater sinkhole. Unfortunately, only one or a few specimens are available from each habitat, yielding little information on morphological variation within and between sites. There are some morphological differences among the specimens, but it will take more material to determine whether one or more than one species is involved in the *angustipes-miersii* complex.

Armases miersii (Rathbun, 1897), new combination

FIGURES 23*g*, 32*e-i*, 33

Sesarma (Holometopus) miersii Rathbun, 1897a:91 [in part, material from Bahamas and Swan Island only].—Tesch, 1917:174.—Rathbun, 1918:303, pl. 84 [not material from Brazil].—Chace and Hobbs, 1969:180, figs. 59, 62g-i.—Abele, 1972:166, 167, figs. 1B,C, 2B,C; 1973a:380, fig. 1I.

Sesarma miersii.—Abele and Kim, 1986:63, 671c.—Guinot, 1988:8.

Not *Sesarma miersii*.—Rathbun, 1900:138 [= *S. angustipes*].—Verrill, 1908b:331 [= *S. ricordi*].—Hartnoll, 1965:133 [= *S. ricordi*].—McWilliams, 1969:80, 3 pls. [= *S. angustipes*].—Fimpel, 1975:190 [*S. angustipes*].

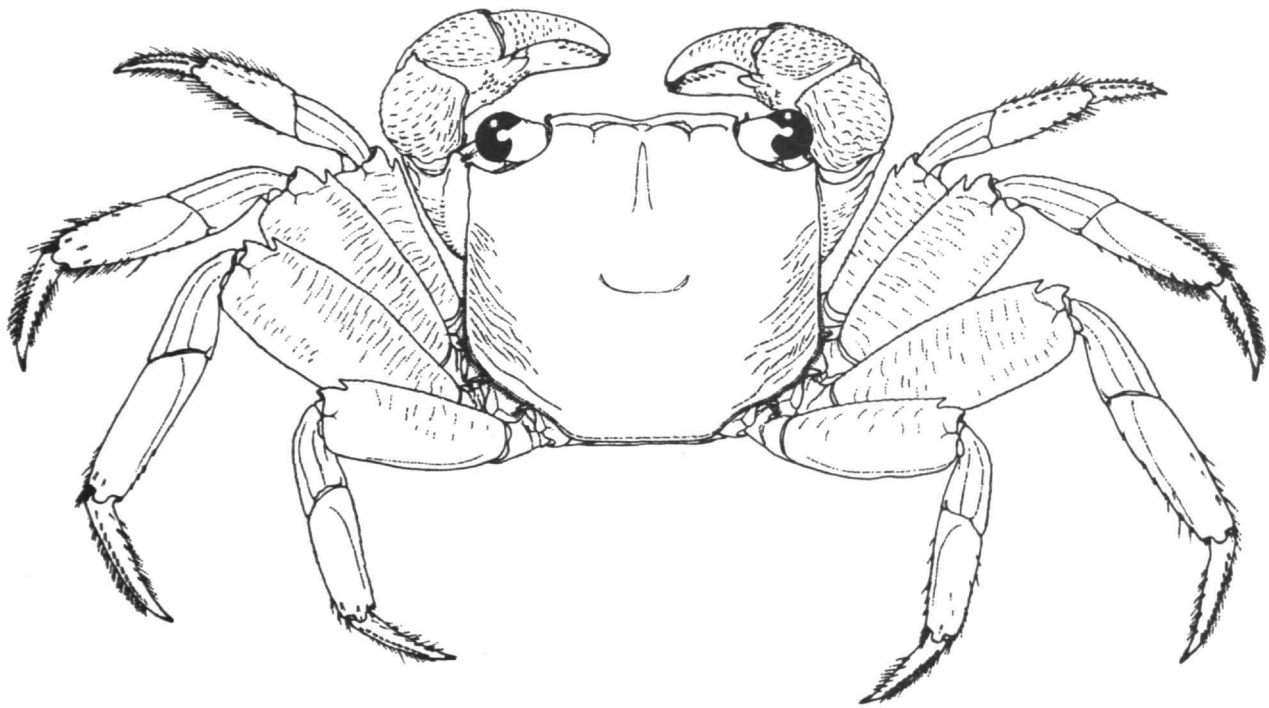


FIGURE 33.—*Armases miersii* (from Chace and Hobbs, 1969, fig. 59).

MATERIAL EXAMINED.—Florida: Key West, 1♂, 2♀, USNM 74536, 74554; exact locality unknown (Florida from L. Agassiz), 1♂, MCZ 6228.

Bahamas: Great Abaco Island, 9♂, 9♀ (1♂ lectotype and 8♂, 9♀ paralectotypes), USNM 11372; San Salvador, 1♂, 4♀, USNM 11414.

Cuba: Isla de Pinos, 1♀, USNM 23815; Santa Clara, Danuge River, 2♂, 1♀, AMNH 3163.

Jamaica: St. Ann's Parish, Runaway Bay, Runaway caves, 1♂, 29 Dec 1972, S. and J. Peck, USNM 18166.

Hispaniola: Dominica, 1♂, USNM 126865.

Caribbean Sea: Swan Island, 1♂, 3♀, USNM 14556; 7♂, 5♀, MCZ 839.

DESCRIPTION.—Carapace slightly wider than long (cl/cb = 0.917 for males and 0.887 for females), moderately convex, dorsal regions distinct; lateral margins diverging posteriorly, lateral striae present. Interorbital width slightly greater than half carapace width (iw/cb about 0.539) subdivided into four lobes; front with shallow median sinus, lateral margins slightly expanded distally.

Eyes well developed, pigmented.

Chelipeds with slight sexual dimorphism; male cheliped with posterior medial margin of merus serrated; anterior margin expanded distally with teeth. Carpus with low granules forming weak striae. Chelae with low granules, stronger on medial surface; poorly defined ridge of granules on dorsal surface of palm; finger spoon-tipped, movable finger with very small tubercles on dorsal surface. Female cheliped similar but with fewer granules and relatively smaller palm.

Walking legs relatively broad; ml/mw ratio of fourth pereiopod about 2.5; merus length slightly less than twice carpal length; propodus longer than dactylus; propodi and dactyli armed with small black spines on ventral surface; dactylus unarmed dorsally.

Male abdomen subtriangular in outline; length and width of telson subequal. Female abdomen semicircular in outline.

Male gonopod simple, unarmed; endpiece subrectangular; distal portion with sinus proximal to endpiece, directed laterally. Female gonopore distinctly elevated medially with deep depression; rim with medial lobes above depression; operculum widening laterally.

COLOR (from Chace and Hobbs, 1969:181).—

Carapace of immature male pigmented in shades of brown, tan, and cream. Submarginal band of cream extending across carapace behind postfrontal lobes and continuing onto eyestalks; light band followed posteriorly by rectangular area of dark brown; three pairs of elongate, subtriangular bands radiating from rectangle with apices on rectangle: anterior pair extending horizontally to lateral margin of carapace and bearing cream spot at level of cornea of retracted eye, second extending posterolaterally to margin and fusing posteriorly with massive dark area in posterior half of carapace, third pair extending posteriorly to cardiac region with narrow light area separating them; one pair of white spots

laterally between first and second dark bands, a second pair in posterior portion of light area separating second and third dark bands, and third pair in dark area posterior to third bands; posterior portion of carapace with pair of light areas posterolaterally and light spot on median line between them; anterolateral spines cream and lateral border tan with dark brown spots.

Eyestalks brown with cream dorsal longitudinal stripe; cornea black. Cheliped cream to tan basally; merus darker with purple markings; carpus tan with irregular purple markings; propodus purplish tan with yellow-tipped finger; dactyl purplish at base and yellow distally. Basal podomeres of remaining pereiopods cream and tan with few brown marks; distal podomeres orange tan with brownish markings, large spots or transverse bands, latter particularly noticeable on propodus; dactyl orange tan with corneous tips.

MEASUREMENTS.—Males, cb 11.2 to 21.1 mm; females, cb 9.3 to 19.5 mm.

TYPE LOCALITY.—Great Abaco Island, Bahamas.

TYPE.—The male lectotype is deposited in the National Museum of Natural History (USNM 11372).

DISTRIBUTION.—Key West, Florida; Bahamas; Cuba; Hispaniola; Swan Island; Jamaica.

HABITAT.—Chace and Hobbs (1969) reported a single male collected from the bank of a large mudflat south of the Indian River at Portsmouth, Dominica. Abundant plants in the area were *Pterocarpus officinalis, Montrichardia arborescens,* and the fern *Acrostichum daneaefolium.* A single specimen was collected in a cave in Jamaica by S. and J. Peck.

REMARKS.—The nomenclatural history of this species was reviewed by Abele (1972). In the original description Rathbun (1897a) indicated Rat Island, Montevideo, as the type locality for this species, indicating that this was a new name for specimens tentatively determined by Miers (1881) as *A. angustipes.* In the same paper she gave additional notes on this species based on specimens from Abaco in the Bahamas. Unfortunately the specimens from Montevideo belong to *Metasesarma rubripes* (Rathbun, 1897a), and those from the Bahamas to *A. miersii.* However, in 1918 Rathbun selected a lectotype for *A. miersii* from the Abaco material and indicated that her earlier designation of Montevideo as the type locality was in error.

Hartnoll (1965:133) indicated that Jamaican specimens of *S. ricordi* and material from the Bahamas (*A. miersii,* USNM 11414) had identical gonopods but that the female genital apertures were slightly different. This is probably an error resulting from Hartnoll's apparently not wishing to modify the USNM material by denuding the gonopod. It is almost impossible to identify species of *Armases* without removing the setae from the gonopod endpiece. All material in the Natural History Museum of Jamaica and my own collections from Jamaica indicate that Hartnoll is correct in concluding that *A. ricordi* is an abundant species there. A single specimen of *A. miersii* is known from Jamaica, and that individual was collected from a nearshore cave.

Armases angustum (Smith, 1870), new combination

FIGURES 22*e*, 23*h*, 34, 35

Sesarma angusta Smith, 1870:159.—Rathbun, 1897a:91.

S[esarma]. ophioderma Nobili, 1901:44.

Sesarma (Holometopus) angustum.—Rathbun, 1910:590; 1918:314, pl. 92.—Bott, 1955:64, fig. 5.—Abele, 1977a:637, figs. 3i-3m, 4, 5.

Sesarma (Holometopus) angusta.—Tesch, 1917:130.

Sesarma (Sesarma) ophioderma.—Rathbun, 1910:590; 1918:297.

Sesarma angustum.—Holthuis, 1954:37.—Von Hagen, 1977:56.—Abele and Blum, 1977:246.

MATERIAL EXAMINED.—Ecuador: Esmeraldas, 1♀ (holotype of *S. ophioderma*), E. Festa, MIZS Cr 138.

Panama, Pearl Islands: Rey Island, 8♂, 3♀, 3 Feb 1973, L.G. Abele; Canas Island, 1♂, 1♀, 18 May 1973, L.G. Abele; Senora Island, 10♂, 6♀, 30 Jan 1971, L.G. Abele, T.A. Biffar; Saboga Island, 9♂, 3♀, 5 Jan 1973, L.G. Abele; Mina Island, 4♀, 13 Jun 1973, L.G. Abele, R. Dressler; Pacheca Island, 1♂, 3♀, 5 Jan 1973, L.G. Abele; Pedro Gonzales Island, 1♀, 13 Jun 1973, L.G. Abele, R. Dressler; 1♀ (holotype of *S. angustum,* YPMNH), F.H. Bradley. Chiriqui Province, Rio Tinat (3 mi [4.8 km] west of Rio Tabasara on Sona-Remedios Road), 1♀, 11 Nov 1961, H.L. Loftin, E.S. Tyson.

Costa Rica: Cocos Island, 1♂, 12 Aug 1973, L.G. Abele.

DESCRIPTION.—Carapace slightly longer at midline than wide (cl/cb = 1.04±0.03 in males and 1.00±0.02 in females). Ratio somewhat biased if cl measurement is taken at midline because front is concave at that point, and the carapace is actually longer on either side of midline. Small males and especially females tend to have cl/cb ratio closer to unity. Lateral margins of carapace about equidistant throughout length; outer orbital angle acute with two distinct emarginations posterior to it. Dorsal surface of carapace covered with depressed granules, subacute on interorbital region. Interorbital region subdivided into four lobes; median pair large and distinct, separated by deep sinus. Lateral lobes low with granules present. Frontal region about 0.50 of carapace breadth and distinctly concave; median sinus and two smaller lateral ones present along distal margin. Frontal region does not increase in width distally. Carapace not inflated.

Eyes well developed, pigmented.

Basal antennular segment swollen, granulated, placed beneath frontal margin. Basal antennal segment arises at lateral portion of antennula forming a portion of lower orbit fitting up against a narrow triangular lobe. A groove (Verwey's groove; von Hagen, 1978) extends from exhalent opening along pterygostomial region to about posterior margin of orbit. An oblique groove extends from each end of Verwey's groove meeting beneath it and forming wide triangular region.

Chelipeds sexually dimorphic; in general male chelipeds more robust than female. In both sexes medial posterior edge and lateral inferior edge serrated. Medial anterior border armed with teeth, expanded distally, especially in males. Carpus covered with acute granules. Chelae of both sexes covered with granules; low on lateral surface but acute on medial surface and margins and on dorsal surface of movable finger. Dorsal surface of palm with a poorly defined row of acute tubercles. Males tend to have four teeth on immovable finger and five

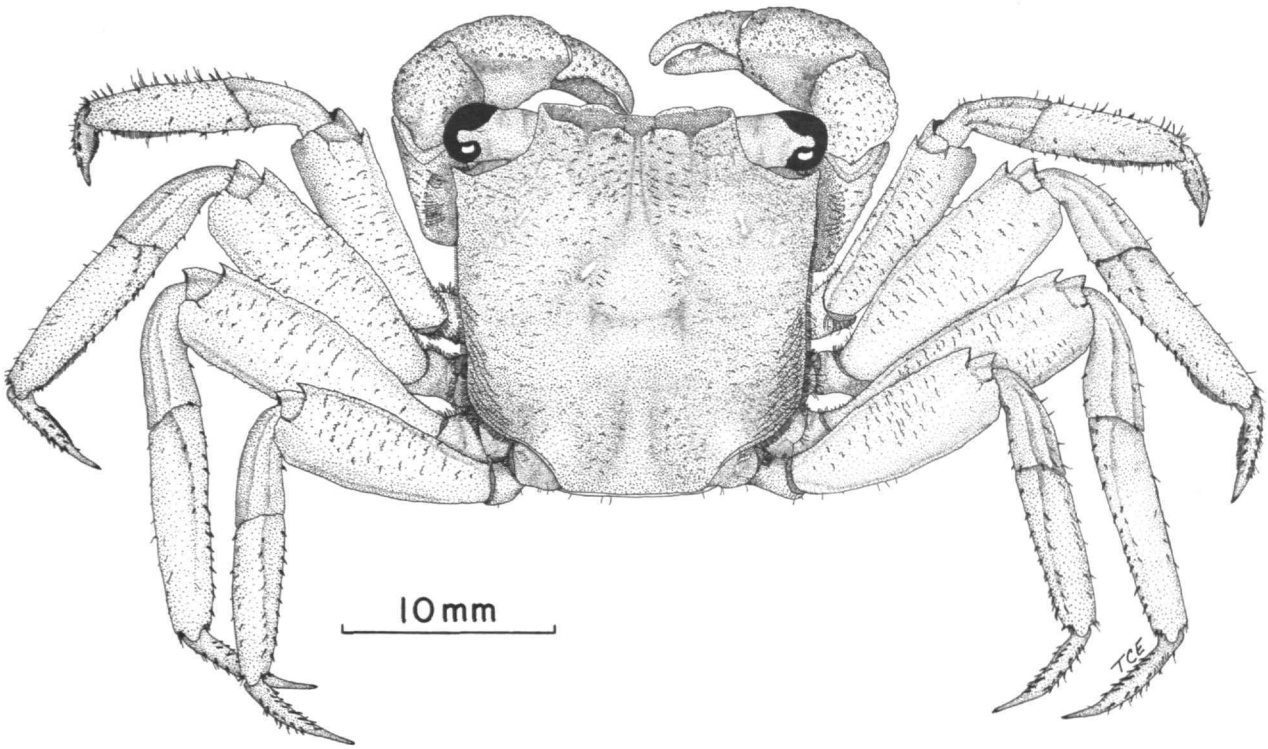


FIGURE 34.—*Armases angustum*, male, Isla Rey, Panama (from Abele, 1977a, fig. 5).

teeth on movable one; tips somewhat spooned but do not meet evenly. Females tend to have five teeth on immovable and six on movable finger; tips are spooned and fit evenly together.

Walking legs long, relatively slender. Merus length to width ratio of third ranges from 2.50 to 3.0 (2.78±0.14); ratio increases with increasing size; greater in males than females.

Merus is slightly less than twice carpal length, about 1.3 times length of propodus, and about twice as long as dactylus. Thick, dark pubescence present along ventral border of propodus and dactylus of first and second male walking legs, absent in females. Propodi and dactyli of walking legs armed with small, black spines; on ventral margin of propodus and on both margins of dactylus. For propodus, 10+2 indicates that 10 spines, each a member of a separated pair, are on ventral border and two paired spines on distal margin. For dactylus 4/3 indicates two poorly defined dorsal rows of four spines each and two poorly defined ventral rows of three spines each.

Male abdomen subtriangular in outline; telson length slightly greater than width. Female abdomen semicircular in outline.

Male gonopod unique among American species of *Armases*. Amber-colored endpiece consists of two unequal lobes laterally compressed with a large sinus. Portions of the shaft are membranous or weakly calcified.

Female gonopore set deep in sternum with an anterior and posterior extension enclosing medial portion.

MEASUREMENTS.—Males, cb 4.9 to 20.9 mm; females, cb 7.5 to 17.8 mm. Males larger than about 11.0 mm appear to be sexually mature, whereas females appear to attain sexual maturity at about 12.0 mm. No ovigerous females were observed during the present study.

TYPE LOCALITY.—Pearl Islands, Gulf of Panama, Panama.

TYPE.—The male holotype is deposited in the YPMNH.

DISTRIBUTION.—This species occurs on the Pacific coast from Tenacatita Bay, Mexico, to Ecuador.

HABITAT.—*Armases angustum* is common in and on the banks of freshwater coastal streams, especially on islands. It was not collected more than 100 m upstream from the mouth of any stream.

REMARKS.—Type material of both *A. angustum* and *A. ophioderma* were examined during the present study. Nobili (1901) placed *S. ophioderma* in the subgenus *Sesarma* because of the presence of two small lobes posterior to the outer orbital angle. Nobili's statement on this character led Rathbun (1918) also to place *ophioderma* in the subgenus *Sesarma*. The presence of anteriolateral lobes plus Nobili's statement that the length and breadth of the carapace are subequal has led to the difficult in identifying this species. However, as Holthuis

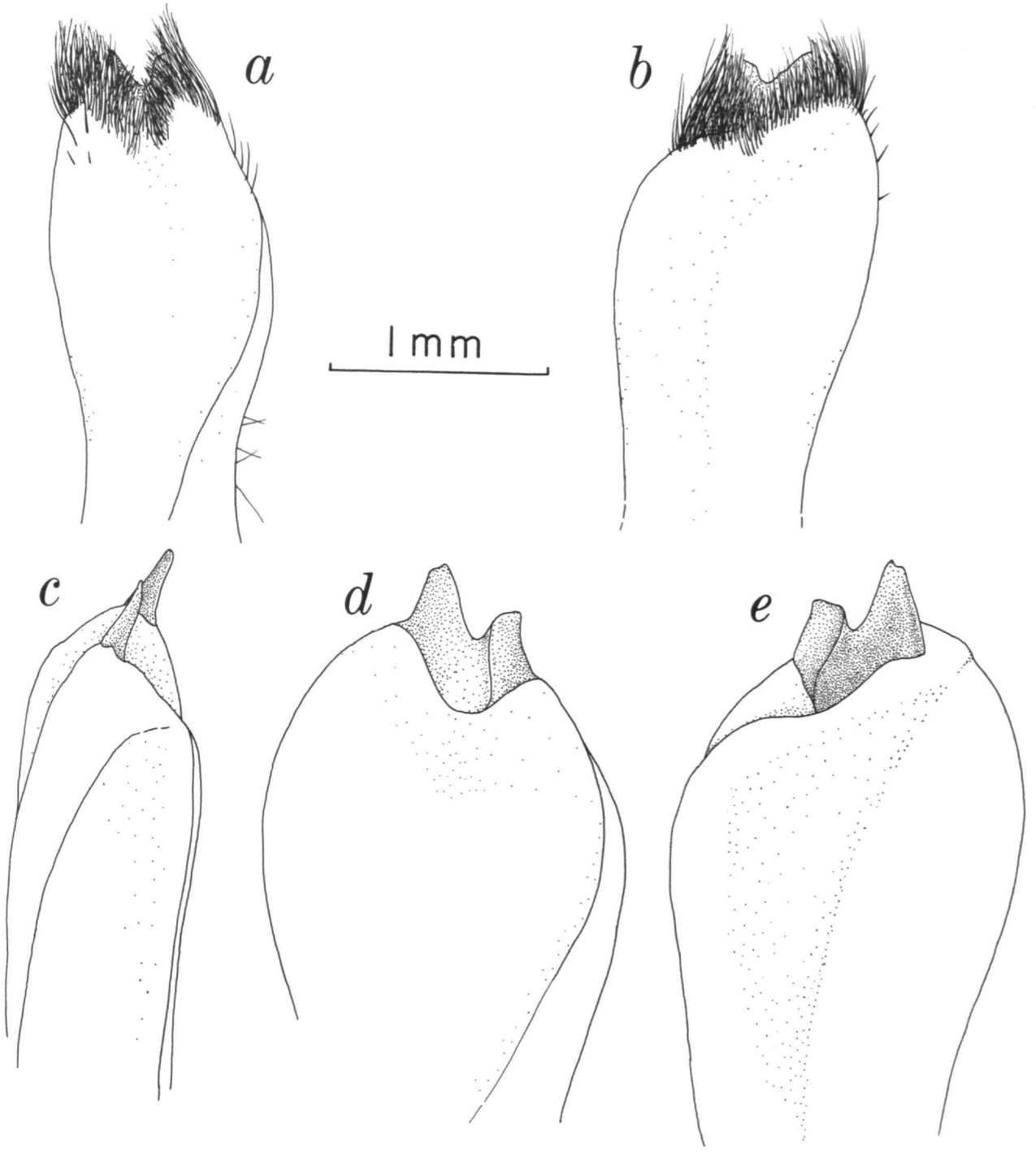


FIGURE 35.—*Armases angustum*, gonopods (from Abele, 1977a, fig. 3).

(1954) has previously noted, there are anterolateral lobes present on *A. angustum*. They are somewhat variable in their development, but they are quite distinct in smaller individuals. In addition smaller specimens, especially females, tend to have the carapace length and breadth subequal. Thus, based on the characters just mentioned and comparison of a series of specimens, it is concluded that *Sesarma ophioderma* Nobili is a junior synonym of *A. angustum* (Smith).

Armases occidentale (Smith, 1870), new combination

FIGURE 23*i*, 36, 37

Sesarma occidentalis Smith, 1870:158.
Sesarma (Holometopus) occidentalis.—Rathbun, 1897a:90.—Nobili, 1901:42.—Tesch, 1917:179.—Bott, 1955:63.
Sesarma (Holometopus) festae Nobili, 1901:42.
Sesarma (Holometopus) biolleyi Rathbun, 1906:100; 1918:299, fig. 148.—Abele, 1977a:632, figs. 1, 2, 3a-3h.
Sesarma (Holometopus) festae.—Rathbun, 1910:590; 1918:313.

MATERIAL EXAMINED.—Ecuador: Esmeraldas, 3♀ (coll. no. 5) (paratypes of *S. festae*), E. Festa, MIZS Cr 198.

Colombia: Tumaco, 3♂, 4♀ (coll. no. 3) (syntype of *S. festae*), E. Festa, MIZS Cr 91.

Panama: Pacific coast, Naos Island, 4♂, 3♀ (coll. no. 2), L.G. Abele, 10 Jun 1969; Albrook Air Force Base, swamp, 1♂ (10 Jun 1969); 3♂, 6♀ (coll. no. 4, 23 Aug 1972), 3♀ (6 Dec 1968), 2♂ (6 May 1969), L.G. Abele; Pearl Islands, Mina Island mangrove swamp, 5♂ (coll. no. 1), L.G. Abele; Pearl Island, Contadora Island mangrove swamp, 2♂, 3♀, L.G. Abele; Rio Mar above beach, 1♂, L.G. Abele.

Costa Rica: Boca del Jesus Maria, 1♂ (holotype of *S. biolleyi*), Jan 1906, P. Biolley and J.F. Tristan, USNM 32490.

El Salvador: Acajutla, 2♂ (syntypes of *S. occidentale*), F.H. Bradley, YPMNH 545.

DESCRIPTION.—Carapace not inflated, slightly wider than long (cl/cb is 0.95±0.02 in males and 0.93±0.02 in females). Carapace increases in width posteriorly, a very slight emargination posterior to outer orbital angle; dorsal surface covered with low but distinct granules. Interorbital region subdivided into four low lobes. Frontal region widens slightly distally (more apparent in larger specimens); about 0.55 of cb.

Basal segment of antennula large, granulated, and located beneath the frontal margin. Basal antennal segment forming portion of lower orbit fitting up against a triangular lobe. A groove (Verwey's groove; von Hagen, 1978) extends from exhalent opening along pterygostomial region parallel to lower orbital margin; a weaker groove runs at an oblique angle from each end of Verwey's groove, delimiting a triangular area below orbit.

Chelipeds sexually dimorphic. In both sexes merus has medial posterior edge serrated; anterior edge expanded with well-developed teeth (especially in mature males) continuing to distal margin. Carpus covered with acute granules, especially along borders. Chelae of both sexes covered with acute tubercles; in males chelae swollen with large process or protuberance on medial surface of palm at base of dactylus. Dactylus broader at base in males than in females.

Walking legs long, relatively slender; ratio of merus length to width varies among legs and with size and sex of animal; ratio of fourth leg (fifth pereiopod) of small males about 2.5, for large males about 3.0. For a series of males ratio of third (longest) leg ranged from 2.6 to 3.0; in females it ranged from 2.6 to 2.9. Ratio increases with increasing size in both sexes. For longest leg merus length slightly less than twice carpus length; about 1.3 times propodus length and slightly less than twice dactylus length. Mature males with row of thick pubescence along ventral portion of propodus and dactylus; also pubescence along dorsal portion of propodus, but the hairs more robust.

Propodi and dactyli armed with small, black spines, on ventral margin of propodus and on both ventral and dorsal margins of dactylus. About five spines in widely separated pairs along ventral portion of propodus with two more pairs on distal margin. Spines of dactylus in two poorly defined rows on dorsal and ventral surface; number and strength of spines increase with increasing size. Spines present in females but reduced in number.

Male gonopod simple and unarmed; endpiece (amber-colored apex) relatively small and set at an oblique angle to main axis of gonopod. Gonopod with distinct expanded portion proximal to endpiece.

Female gonopore raised from sternum and flanked anteriorly and posteriorly by extensions of sternum; between these is a barbell-shaped process.

MEASUREMENTS.—Males, cb 7.3 to 22.0 mm; females, cb 7.3 to 15.0 mm; ovigerous females, cb 10.1 to 14.8 mm. Males larger than about cb 11.0 mm appear to be mature, whereas females appear to attain sexual maturity at about 10.0 mm.

TYPE LOCALITY.—Acajutla, El Salvador.

TYPE.—Two male syntypes are deposited in the YPMNH.

DISTRIBUTION.—The species is widely distributed in the eastern Pacific from Esmeraldas, Ecuador, to at least Acajutla, El Salvador.

HABITAT.—*Armases occidentale* is semiterrestrial and occurs in a wide variety of habitats up to 80 m from water. Individuals were collected from under litter along the edge of a brackish water stream, from a dried river bed along the edge of a red mangrove swamp and from among piles of lumber in back of the bunker of the Smithsonian Tropical Research Institute at Naos Island, Panama.

REMARKS.—Type material of *Sesarma occidentale* Smith, 1870, *S. festae* Nobili, 1901, and *S. biolleyi* Rathbun, 1906, was examined, and in the author's opinion they are conspecific. Bott (1955) had previously suggested that *S. biolleyi* might be a synonym of *S. occidentale*, but he had not examined any type material. The material of *S. occidentale* consists of two males in the Yale Peabody Museum of Natural History (YPMNH 545; cb 17.6 and 13.1 mm). Although Rathbun (1918:300)

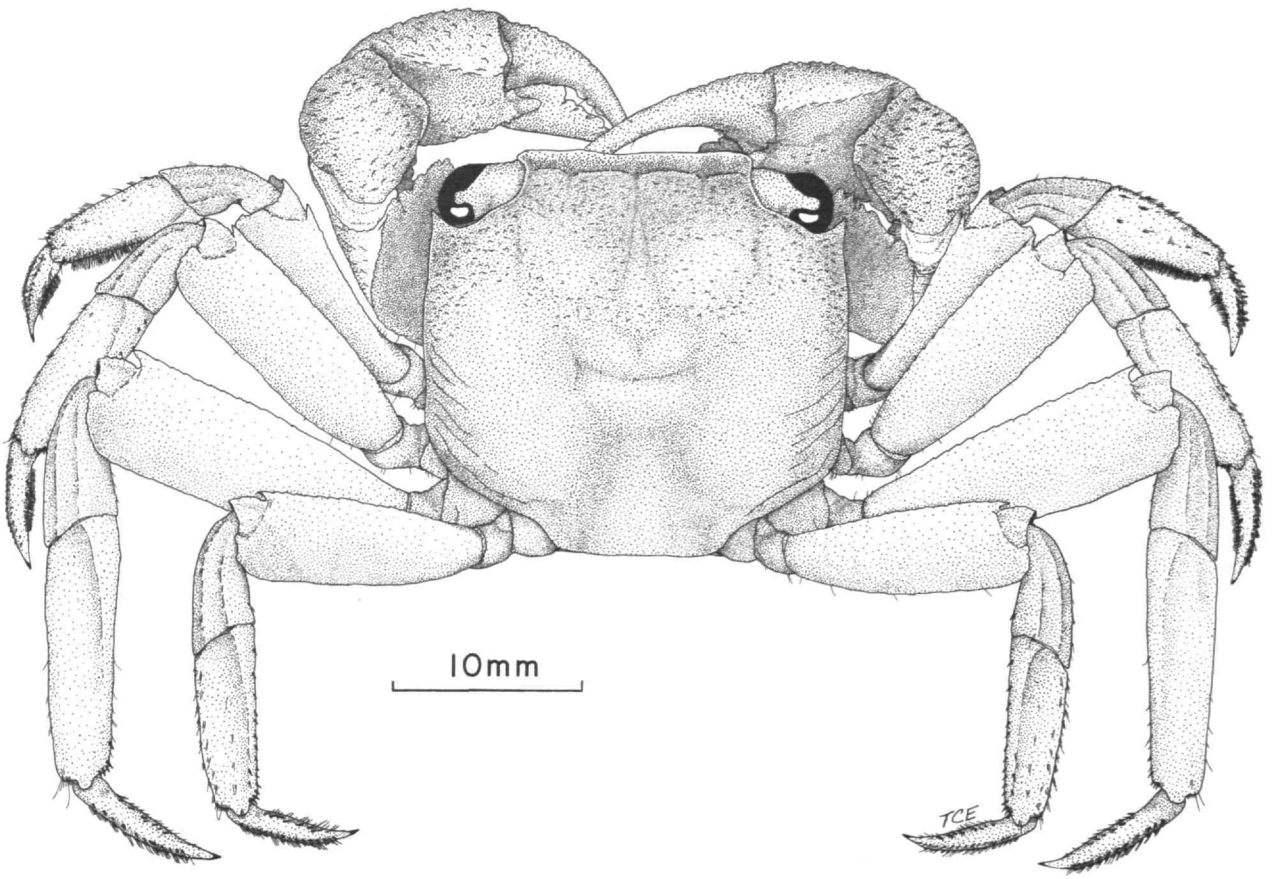


FIGURE 36.—*Armases occidentale*, holotype of *Sesarma biolleyi*, male, Boca del Jesus Maria, Costa Rica (from Abele, 1977a, fig. 1).

indicates that the larger specimen is a holotype, there is no indication of this status in the jar. The specimens were examined in December of 1971 at Yale, but unfortunately the specimens now seem to have been misplaced (W. Hartman, pers. comm.). The material of *S. festae* consists of two lots, three females from Esmeraldas, Ecuador (Cr 198, MIZS) and three males and four females from Tumaco, Colombia (Cr 91, Turin Museum). The later material is indicated to be the type material, and therefore the type-locality is restricted to Tumaco. The material of *S. biolleyi* consists of a large holotype male (cb 20.2 mm, USNM 32490) from Salinas de Caldera, Boca del Jesus Maria, Costa Rica.

There are clear differences among the type material of the three nominal species, but these are due, I believe, to differences in size. The morphological differences listed by Rathbun (1918) in her key are (1) the frontal region does not widen distally in *S. festae*, whereas it does widen in *A. occidentale* and *S. biolleyi*, and (2) the merus of the third leg in *S. biolleyi* has the length about three times the width, whereas it is less than three times the width in *A. occidentale*. There are also some differences between *S. festae* from Ecuador and *A. occidentale* from Panama in the strength of the tubercles on the chelae; the former have stronger tubercles. The differences in the form of the front and in the length-width ratio of the merus are size related. Small specimens have relatively wider legs and a front that does not widen distinctly distally; a size series of specimens from a single locality will contain individuals that bridge the differences listed by Rathbun (1918). The differences in strength of the tubercles seem to depend on the stage of the molt cycle. Newly molted individuals seem to have more acute tubercles than individuals that appear ready to molt.

Armases gorei (Abele, 1981), new combination

FIGURES 38, 39*i-l*

Sesarma gorei Abele, 1981:435, figs. 3, 4A-4D.

MATERIAL EXAMINED.—Peru: Puerto Pizzarro, 1 holotype

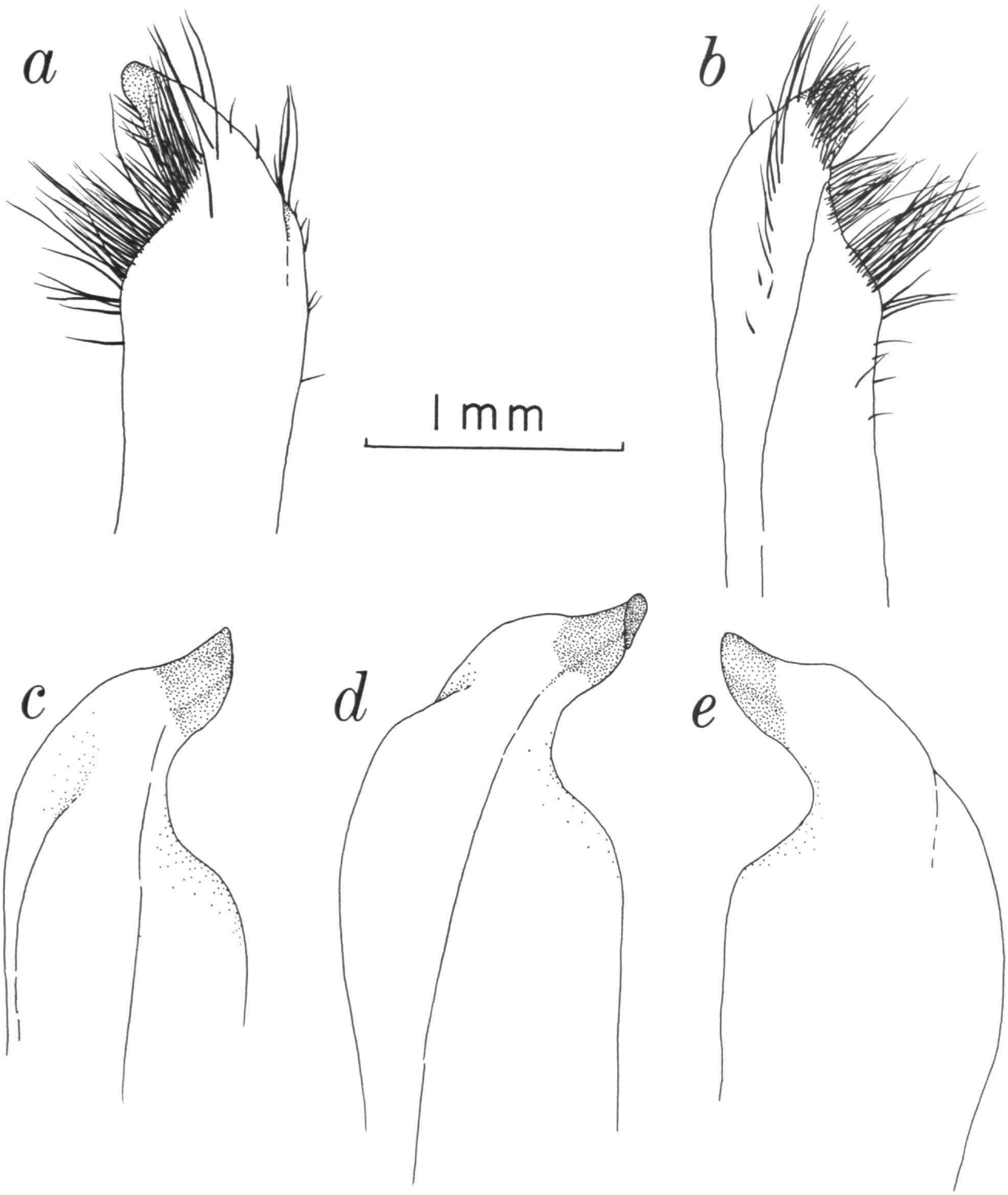


FIGURE 37.—*Armases occidentale*, gonopods, Pearl Islands, Panama (from Abele, 1977a, fig. 3).

♂, 3 Jun 1972, E. del Solar, B-411, AHF Cat. no. 723.

DESCRIPTION.—Carapace broader than long (cl/cb = 0.845), narrowing posteriorly. Outer orbital angle acute with a very slight posterior emargination. Interorbital region subdivided into four low lobes. Frontal region smooth; distal margin concave medially and slightly sinuous to lateral margins, which widen slightly at distolateral angles. Ratio of iw to cb is 0.619. Dorsal surface of carapace smooth; a few striae on lateral surface.

Eyes well developed and pigmented.

Male chelipeds large and robust; posterior medial margin of merus granulate; anterior margin serrate and expanded distally. Dorsal surface of carpus granular with distinct row of granules on medial surface. Palm covered with low indistinct granules; scattered small tubercles on medial surface. Low, acute granules on proximal superior surface of movable finger. Finger tips corneous, spooned; immovable one extends slightly beyond movable one.

Walking leg relatively short; ml/mw of third (fourth pereiopod) about 2.5. Dactylus about as long as greatest length of propodus; carpus about 3/4 of propodus length and half merus length. Very long, widely spaced hairs on walking leg from distal portion of carpus to end of dactylus. Long, dark spines present on distal ventral portion of propodus continuing on flexor margin of dactylus; extensor margin of dactylus has long hairs but no spines present.

Male abdomen subtriangular in outline; telson wider than long.

Male gonopod simple and unarmed; distal portion strongly curved laterally so that amber-colored endpiece almost at right angle to base of gonopod.

MEASUREMENTS.—Male holotype, cb 11.8, cl 10 mm.

TYPE LOCALITY.—Puerto Pizarro, Peru.

HABITAT.—The specimen was collected from mangrove muds.

REMARKS.—*Armases gorei* is very similar to *A. magdalenense* but can be distinguished by the following characters. In *A. gorei* the lateral surface of the palm is covered by low granules, in *A. magdalenense* it is smooth; in *A. gorei* the extensor margin of the dactylus of the walking legs is unarmed, in *A. magdalenense* it is armed with a few long black spines; in *A. gorei* the distal portion of the gonopod is curved laterally almost 90° from the base, in *A. magdalenense* it is only slightly curved.

This is the second species of *Armases* to be reported from Peru. Cano (1889) described *S. barbimanum* from Paita (as Payta), Peru, and subsequent authors (e.g., del Solar, Blancas,

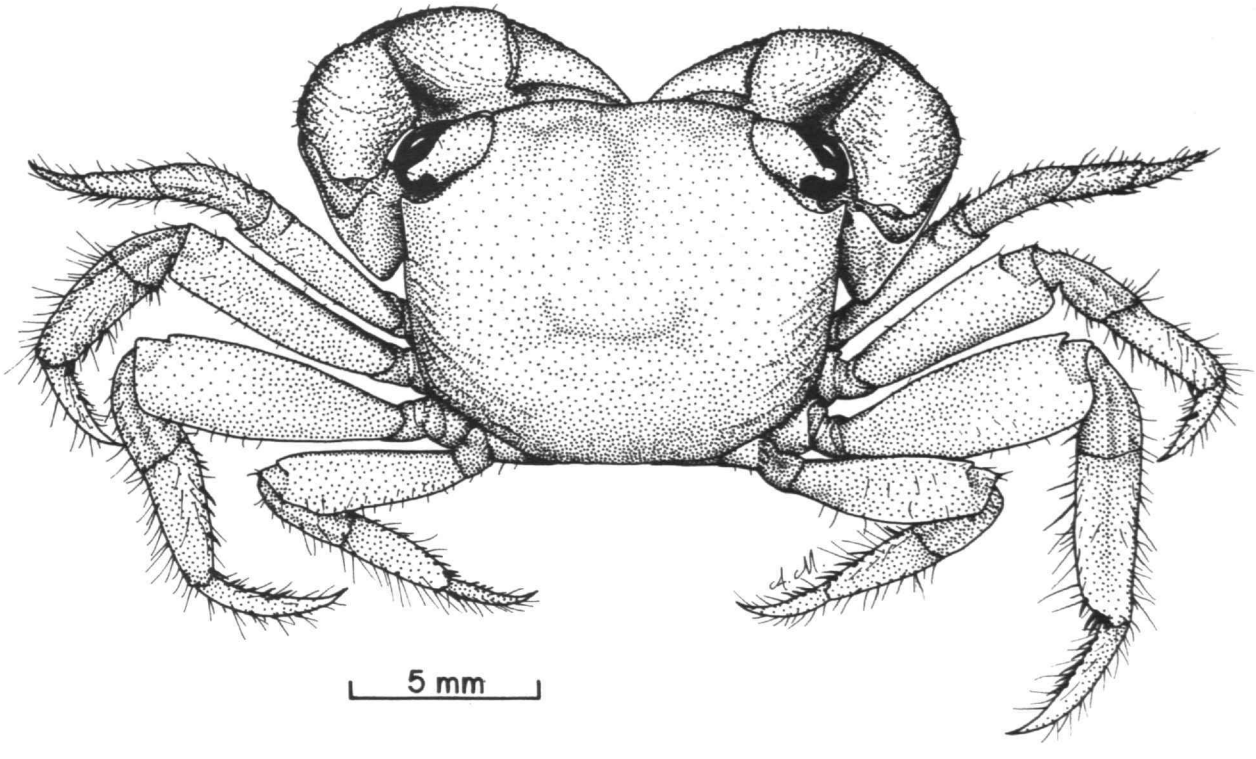
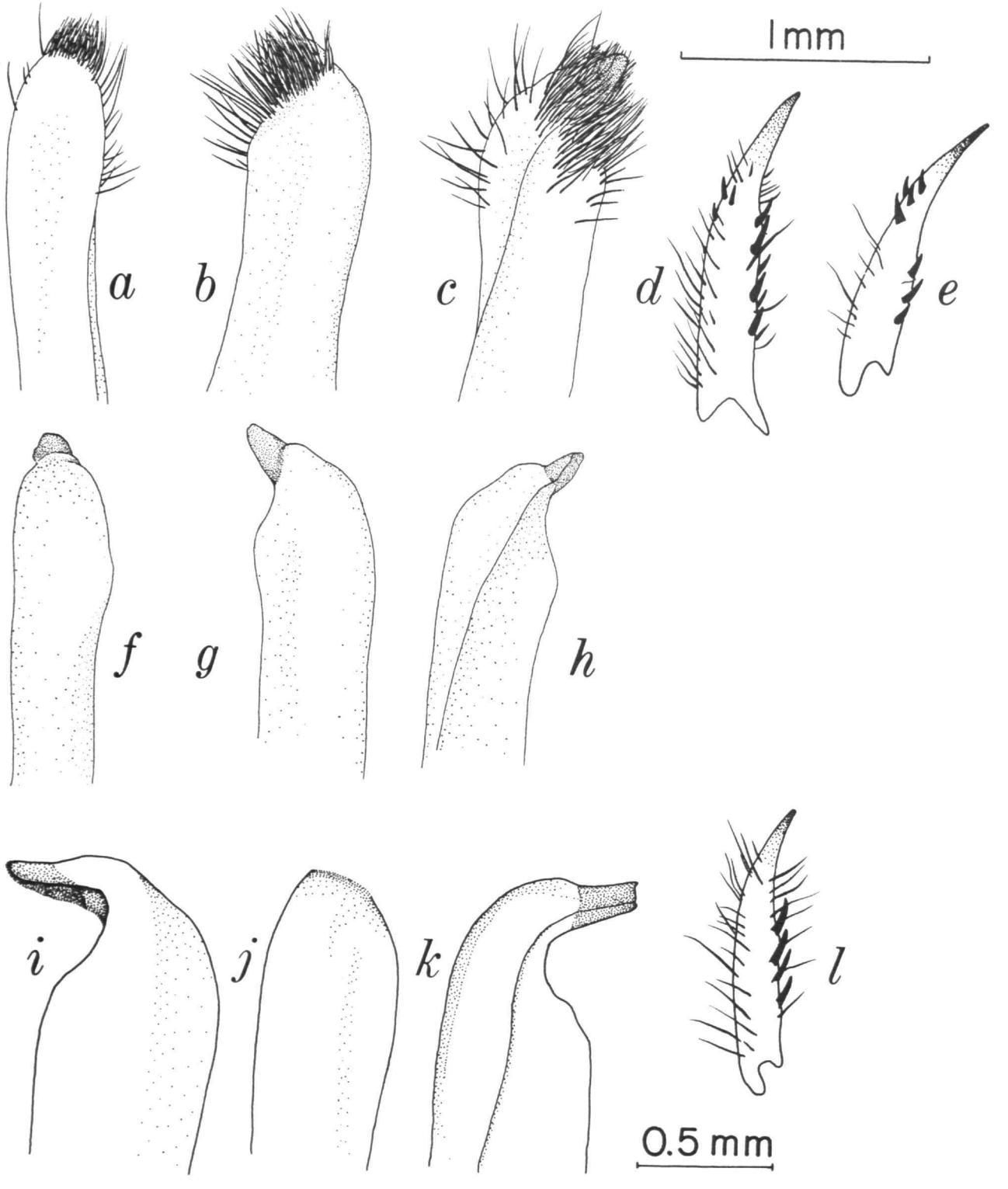


FIGURE 38.—*Armases gorei*, holotype male, Puerto Pizzaro, Peru (from Abele, 1981, fig. 3).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and Mayta, 1970) have listed the species as part of the Peruvian fauna. However, Rathbun (1910) pointed out that many of the species Cano listed from Payta are actually Indo-West Pacific species, and Tweedie (1950) assigned *barbimanum* to the Indo-West Pacific genus *Nanosesarma*. Subsequently Abele (1979) suggested that *N. barbimanum* was based on a specimen of *Nanosesarma minutum* (De Man, 1887) that was incorrectly listed as having been collected at Payta. For the present then *A. gorei* is the only representative of the genus *Armases* known from Peru.

Armases magdalenense (Rathbun, 1918), new combination

FIGURES 22*d*, 23*j*, 39*a-h*, 40

Sesarma (Holometopus) magdalenense Rathbun, 1918:305, pl. 86.
Sesarma magdalenense.—Abele, 1981:433, figs. 1, 2, 4E-G.—Villalobos-Hiriart et al., 1989:94.

MATERIAL EXAMINED.—Mexico: Baja California, Magdalena Bay, Eastern Pacific, Mangrove Island; 1 holotype ♂, 1 paratype ♂, 1 paratype ♀, 20 Mar 1911, *Albatross* collection, USNM 45793.

DESCRIPTION.—Carapace broader than long (cl/cb = 0.818±0.005) narrowing posteriorly. Outer orbital angle acute with a slight posterior emargination. Interorbital region almost smooth with only slight indications of subdivisions. Frontal region smooth; distal margin slightly sinuous; lateral margins widen slightly at distolateral angles. Ratio of iw to cb is 0.591±0.012. Dorsal surface of carapace smooth; a few striae on lateral surface.

Eyes well developed and pigmented.

Chelipeds sexually dimorphic; those of female weaker and smaller; medial posterior margin of merus granulate; anterior margin serrate and expanded distally. Dorsal surface of carpus granular with distinct row of granules on medial surface. Male palm swollen with broken rows of granules dorsally; laterally punctate but smooth; scattered small tubercles present medially. Superior proximal portion of movable finger granular; finger tips narrow and spooned.

Walking legs relatively short; ml/mw ratio of third (fourth pereiopod) about 2.45, of fourth about 2.20. Dactylus of third about as long as greatest length of propodus; propodus distinctly longer than carpus; carpus about one-half length of merus. Long, widely scattered setae on walking legs, beginning in distal portion of carpus and extending onto dactylus. Long, dark spines present on ventral surface of propodus and continuing onto flexor margin of dactylus; a few spines present on extensor margin of dactylus (Figure 40*d,e*).

FIGURE 39 (facing page).—*a-c, f-h, i-k*, gonopods; *d, e, l*, dactyls of fifth legs: *a-c, f-h*, gonopods of *A. magdalenense* (from Abele, 1981, fig. 2); *d-e*, dactyls of fifth leg of *A. magdalenense* (from Abele, 1981, fig. 4); *i-k*, gonopods of *A. gorei* (from Abele, 1981, fig. 4); *l*, dactyl of fifth leg of *A. gorei* (from Abele, 1981, fig. 4).

Male abdomen subtriangular in outline; telson wider than long. Female abdomen subcircular in outline; telson wider than long.

Male gonopod (Figure 40*a-c, f-h*) simple, unarmed, and curving laterally in distal portion; amber-colored endpiece small, narrowing distally and set on distolateral angle of gonopod. Female gonopore (Figure 25*j*) large and raised from sternum. Distinct subtriangular extension (obtuse distally) along the rim of gonopore. Operculum a knob-like process extending beyond rim and subtriangular process.

MEASUREMENTS.—Mature male, cb 14.2 mm; mature female, 9.6 mm.

TYPE LOCALITY.—Mangove Island, Magdalena Bay, Baja California, Mexico.

DISTRIBUTION.—Known only from the type locality.

HABITAT.—Unknown, but probably mangroves.

REMARKS.—See *A. gorei*.

Armases benedicti (Rathbun, 1897), new combination

FIGURES 22*b,c*, 23*a*, 28*d*, 41

Sesarma recta.—De Man, 1892a:249, pl. 10: fig. 4 [not *Sesarma rectum* Randall].
Sesarma (Holometopus) benedicti Rathbun, 1897a:90.—Ortmann, 1897:371.—Tesch, 1917:132.—Rathbun, 1918:316, pl. 93.—Holthuis, 1959:248, fig. 62.—Coelho and Ramos, 1972:203.—Abele, 1973a:379, figs. 1A, 1G.—Von Hagen, 1978:46.
Sesarma benedicti.—Rodriguez, 1980:382.—Abele and Kim, 1986:63, 671a.
Sesarma chiragra Ortmann, 1897:331.—Tesch, 1917:249.

MATERIAL EXAMINED.—Florida: Key West, 1♀, A.S. Packard (?1881), MCZ 6236.

Venezuela: Guayo, Bayo Delta del Orinoco, 1 ♀, 23 Dec 1952, J. Paján, USNM 95991; same locality, 1♂, 17 Dec 1952, USNM 95990; Guanoco dock, 7♂, 6♀, 3 ovigerous ♀, 3 juveniles, 1942, AMNH 13686 (juvenile *Sesarma rectum* and *S. curacaoense* in same jar).

Guyana: 12♂, 4♀, 1 ovigerous ♀, AMNH 463, 4262, 4645, 4643, 4630, 4628, 4639 identified as *Sesarma rectum*.

Brazil: Para, 1♂, 2♀, 1 ovigerous ♀, Oct 1859, MCZ 1615; same locality, 1♂, 1♀, W. Fletcher, MCZ 6237; same locality, 1♀, Agassiz and Bourget, Thayer expedition, MCZ 6224; same locality, 3♂, 4♀ Jul-Oct 1964, P.J. Humphrey, USNM Acc. no. 256380; Tajapource, 40♂, 26♀, 13 ovigerous ♀, Thayer expedition, MCZ no number; 1♂, 1♀, USNM 22838; Rio de Janeiro, 1♀, Thayer expedition, MCZ 6239.

DESCRIPTION.—Carapace broader than long (male cl/cb = 0.933±0.023, female cl/cb = 0.927±0.009), outer orbital angle acute with slight lobe posterior. Interorbial region subdivided into four distinct lobes with groove between median lobes deepest. A few tubercles present lateral to medial lobes. Frontal region depressed posterior to distal margin; margin concave medially, slightly sinuous to parallel distolateral margins. Male iw/cb ratio = 0.666±0.016, females 0.667±0.013. Carapace regions well marked; scat-

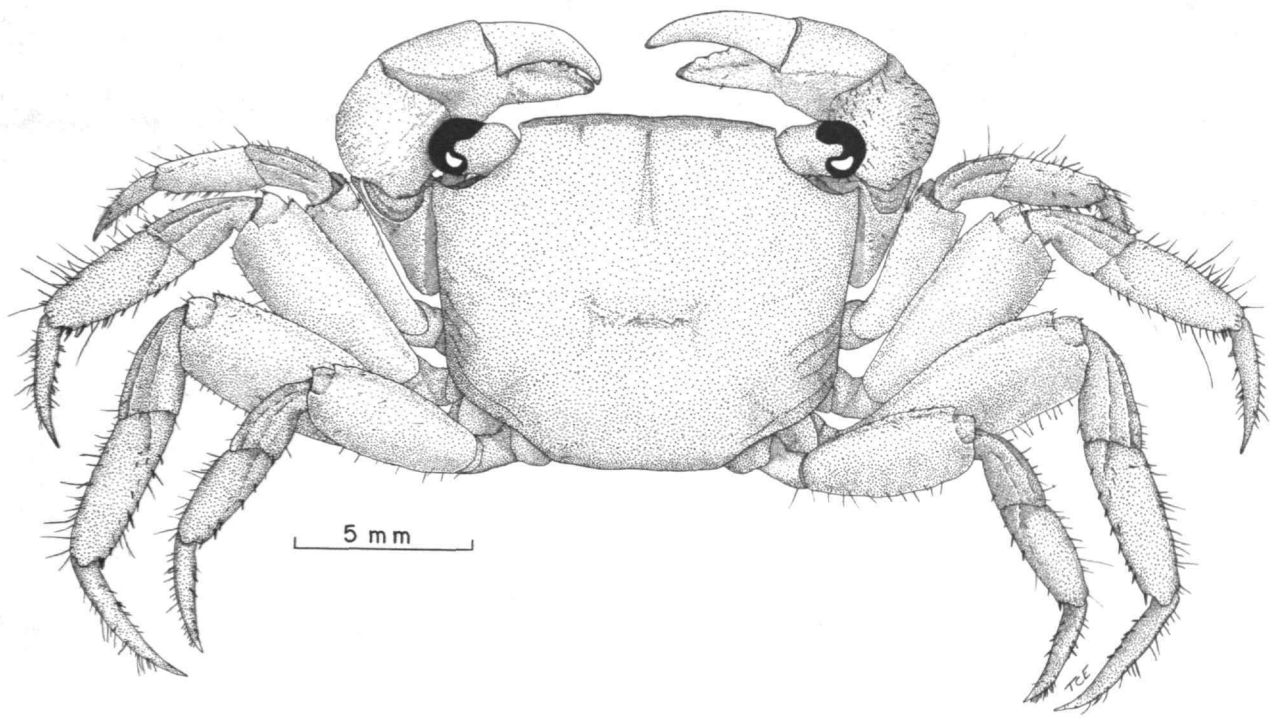

FIGURE 40.—*Armases magdalenense*, holotype male, Magdalena Bay (from Abele, 1981).

tered pubescence dorsally, well marked striae laterally.

Eyes well developed, pigmented.

Chelipeds markedly dimorphic. In mature males merus with medial posterior border roughly granular; anterior margin expanded distally, armed with a series of tubercles. Carpus roughly granulate dorsally, dorsal median margin marked by ill-defined row of granules with distinct row of granules below it; anterior medial margin with about five large tubercles. Palm granulate; dorsal margin marked by ill-defined row of granules, some larger granules on medial surface. Immovable finger greatly expanded, concave with hairs present on proximal half; distal half begins with a large triangular tooth set at lateral angle to main axis of finger. Tooth followed by two smaller, triangular teeth proximal to corneous spooned tip. Movable finger granulate dorsally and greatly expanded laterally in proximal half; concave in ventral half with hairs in concavity; distally armed with three unequal triangular teeth proximal to corneous spooned tip. Chelae of females and immature males not expanded proximally, smaller than those of mature males.

Walking legs relatively short; ml/mw ratio of third (fourth pereiopod) = 2.01±0.049 in male and 1.90±0.106 in females. Dactylus shorter than propodus; propodus longer than carpus; merus about twice length of dactylus. Long widely scattered hairs on walking legs beginning on carpus and extending onto dactylus. A thick pubescence present on ventral borders on distal portion of propodus and dactylus of first two pereopods in sexually mature males. Black spines present on distal, ventral border of propodus and on dorsal and ventral borders of dactylus.

Male abdomen subtriangular in outline; telson slightly wider than long. Female abdomen subcircular in outline with long hairs along marign; telson distinctly broader than long.

Male gonopod simple, unarmed, curves laterally proximal to amber-colored endpiece. Endpiece unique among those of American species; folded over on itself twice, major fold fused, second fold partially fused forming a narrow opening on distal margin. Female gonopore small, simple, with subcircular operculum.

MEASUREMENTS.—Males, cb 12.4 to 18.4 mm; females, cb 9.7 to 16.2 mm. Males reach sexual maturity at about cb 15 mm, females at about cb 10 mm. Ovigerous females cb 10.7 to 16.1 mm.

TYPE LOCALITY.—Surinam.

TYPE.—Nationaal Natuurhistorisch Museum, Leiden (Holthuis, 1959).

DISTRIBUTION.—There is a single record of this species from Key West, Florida, based on a female collected by A.S. Packard probably in 1881. No other records exist despite much collecting in southern Florida (Abele, 1973a). All other records indicate that the species occurs in South America. Specimens

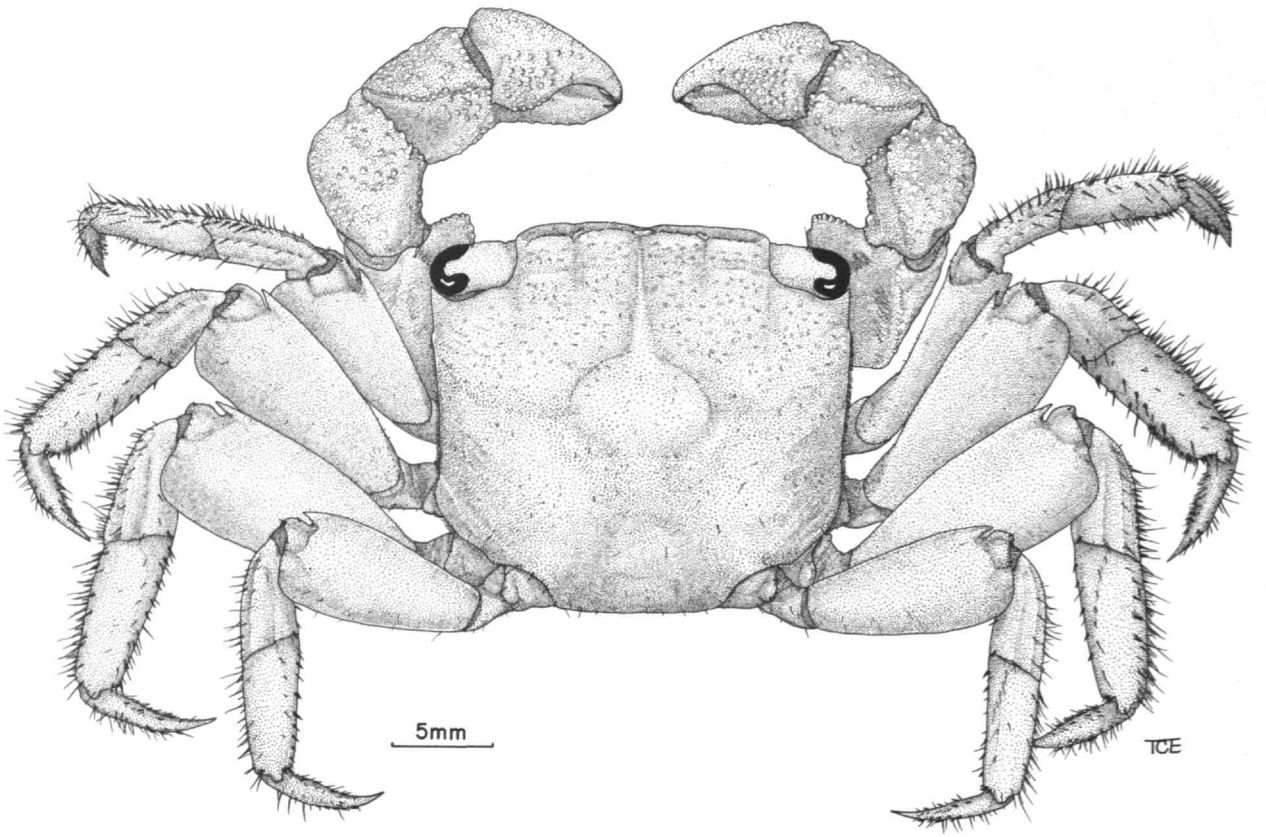

FIGURE 41.—*Armases benedicti*, male, Belem, Brazil.

are known from Venezuela, Guyana, Surinam. The North American record needs verification.

HABITAT.—*Armases benedicti* occurs under wood and stones on the banks of brackish to almost freshwater rivers in Surinam (Holthuis, 1959).

REMARKS.—De Man (1892a) first listed this species including good illustrations and a description. He tentatively referred the specimens to *Sesarma rectum* Randall. Both Rathbun (1897a) and Ortmann (1897) independently concluded that De Man's material was not *S. rectum*, and both authors proposed new names: *S. chiragra* by Ortmann and *S. benedicti* by Rathbun. As Rathbun's paper was published on 26 April and Ortmann's on 20 July, Rathbun's name has priority as noted by Ortmann (1897:371; see Holthuis, 1959).

Ecological Notes

The American species of *Sesarma* and *Armases* occur in a wide variety of habitats that include the tanks of bromeliads, fresh waters of caves, rivers, and streams, mangroves, marshes, dry slopes (terrestrial) of mountains miles from the sea, and the high intertidal zone. Notes on the habitat of each species are given in the systematic section, and here only a summary will be given.

None of the species would be classified as typically subtidal marine, as all are active at least some of the time on land. Three species occur supratidally in marine areas, although they can occur more than 100 m from the shore: *A. cinereum*, *A. ricordi*, and *A. occidentale*. One species, *S. reticulatum*, is common in marshes of eastern North America and the Gulf coast, whereas three other species are common in tropical mangrove forests: *S. rubinofforum*, *S. rhizophorae*, and *S. curacaoense*. Two additional species, *A. gorei* and *A. magdalense*, that appear to be rare have been reported from mangroves. Some species are distributed very roughly along a salinity gradient within estuaries, and these can also be found along the banks in mangroves. *Sesarma aequatoriale* occurs in fresh water out to about 22‰, whereas *S. crassipes*, *S. rectum*, *A. benedicti*, and *S. sulcatum* occur in very low salinities to almost full seawater in estuaries.

Three species, *A. angustum*, *A. roberti*, and *A. americanum*, occur in coastal freshwater streams, especially just landward of

the area where the stream enters the sea. These species almost certainly have larvae that undergo development in the sea. In contrast *S. bidentatum* occurs in streams and rivers far from the sea and completes its life cycle in fresh water. This species is part of a radiation that apparently occurred on Jamaica and that includes the cavernicolous *S. verleyi* and the completely terrestrial species *S. cookei* and *S. jarvisi* (see Hartnoll, 1964a,b, 1965, 1971).

Specimens of *A. angustipes* have been taken in a diversity of habitats, but at least in Brazil the species is common in the tanks of bromeliads (Abele, 1973c). Specimens have also been reported from fresh-brackish sinkholes. A closely related species, *A. miersii*, has been found in a coastal marine cave on Jamaica and on a large mudflat on Dominica.