

prehensile edge, strong tooth at  $1/2$  length opposing tip of fixed finger, section proximal to this bearing variable small- to moderate-size teeth, occasionally a moderate tooth at  $1/4$  length, and toothless section basally.

P2 reaching about to distal  $1/4$  of palm; carpus with distodorsal spine and acute or obsolescent subdistal ventral spine; merus with slender subdistal dorsal spine and strong proximal mesioventral spine; coxa with 2 acute spines of variable strength on mesial aspect. Merus of P3 with cluster of spines and spiniform granules ventrolaterally on proximal  $1/2$ , and strong distodorsal spine; coxa with low spine lateral to gonopore and minute spine on distomesial margin. P4 usually with spineless merus, rarely with 2 tiny lateral spines near ischium.

U with small spine on protopod above base of mesial ramus; mesial rib of lateral ramus bearing an obsolete spine proximally; distal margin of rami bearing granules or minute spines.

MEASUREMENTS (in mm).—Holotype ♂, acl 8.6, cl 12.5, chl 7.4, chh 4.0; allotype ♀, same, 9.9, 14.4, 6.8, 2.7.

COLOR.—Light yellowish white dorsally on rostrum, spiny anterior gastric field, chelipeds, and second legs, but shadowy light gray band on distal part of cheliped merus; lighter yellowish white on branchiostegites and central anterior part of telson; darker yellowish on abdominal tergites I–II, and posterolateral parts of tergite VI; thoracic dorsum delimited by cephalic groove and lineae thalassinicae suffused with grayish, still darker gray with olive cast on central part of abdominal tergites III–V and anterior part of tergite VI; legs 4–5 with dorsally exposed articles moderate gray; uropods, sides, and distal part of telson gray. (From color transparency of specimen photographed at mouth of Río Carrizal, Barra del Tordo, Tamaulipas, Mexico, by D.L. Felder, May 1982.)

KNOWN RANGE.—Confined to the material examined. The Río Carrizal estuary was characterized by Rabalais et al. (1989).

REMARKS.—This species has general spination as strong as that of *U. paraffinis* and often has anteriorly projecting terminal spine(s) on the rostrum, but the principal terminal spine, if present, is unbuttressed and usually does not arise in a dorsal position. The rostrum is relatively shorter than in *U. paraffinis*. Anterior spines in the crest on the lateral ridge of the carapace are nestled in setae in *U. affinis*, *U. felderi*, and *U. paraffinis*, but density of the setae in *U. felderi* almost completely obscures these spines, whereas the spines are almost always easily visible in the other two species. As in *U. affinis*, the distal margins of the uropods bear granules or minute spines, more strongly expressed on the lateral than on the mesial ramus. The species thus has morphological characters of both *U. affinis* and *U. paraffinis*, but its color differs from that of its geographically closest neighbor, *U. affinis*. Specimens from the Caribbean region attributed to *U. affinis* now are found to be misidentified. Thousands of kilometers separate *U. felderi* in Texas and northeastern Mexico from the known range of *U. paraffinis*. *Upogebia felderi* and *U. affinis* differ in color, but the color of *U. paraffinis* is not a matter of record, so that

comparison cannot be made here.

ETYMOLOGY.—The specific name is a patronymic, in honor of D.L. Felder.

### *Upogebia inomissa*, new species

FIGURE 20

MATERIAL EXAMINED.—U.S.A.: *Mississippi*: USNM 251396, 1 ♂ (holotype), Dog Keys Pass, W end of Horn Island, in shipworm tunnels in water logged wood, trawl, col. W.B. Sikora, 13 Jun 1991; USNM 251410, 1 ♀ (allotype), same; USNM 91255, 1 ♀ ovig. (paratype), Ocean Springs, col. J.F. Walker, Gulf Coast Research Lab., #10b, summer 1950. *Florida*: FDNR 7EJ83028, 1 ♀ (paratype, poor condition), Indian River Co., ~25.9 km (14 nautical mi), E Vero Beach, 27°40'N, 80°06'W, 27 m, R/V *Delaware II* sta 025, 8-ft scallop tumbler dredge, W. Lyons, D. Camp et al., 21 Apr 1983; HBOM 89:243, 1 ♂ (paratype), Vero Beach, Indian River Co., 274 m (300 yd) E of sand point, inside dead *Pleuroploca gigantea* shell on coquina, 3 m (10 ft) depth, R.P.M., R.G.G., 26 Jul 1972; HBOM 89:2567, 1 ♂ juv., 1 ♀ (paratypes), Martin Co., Seminole Shores, worm reef, intertidal by hand, L.E.S., L.B., R.G.G., G.R.K., sta RGH-138-74, 20 Jun 1974; HBOM 89:2650, 1 ♂ (paratype), St. Lucie Co., Jim Island, Ft. Pierce, in oyster clumps, intertidal, by hand, sta RGH-149-74, L.E.S., L.V.B., M.G.R., 17 Jul 1974; HBOM 89:3381, 1 ♀ (damaged paratype), St. Lucie Co., Jim Island, intertidal by hand, D. Putnam, P. Dudley, 7 Mar 1977; USNM 251411, 2 ♂, 1 ♀ (paratypes), Sawyer Key, Florida Bay side, carbonate sand bar, 0.5–1.0 m, R. and S. Heard, J. Thomas, 10 Apr 1986; USNM 251439, 1 ♀, St. Andrews Bay, from ship worm infested decomposing piece of wood at Panama City marina, 0.9 m (3 ft), water temp 23.9°C, 30 ppt, John M. Foster, 30 Oct 1992.

DIAGNOSIS.—Projections to either side of rostrum ending in acute spine. Postocular spine present. Abdominal sternites unarmed. T subrectangular. Carpus of cheliped with 1 strong and 1 short spine on mesiodistal margin. Merus of P2 bearing 1 proximal mesioventral spine and 2 subdistal dorsal spines; merus of P3 with 1 subdistal dorsal spine; merus of P4 usually spineless.

DESCRIPTION.—Rostrum triangular, short, straight to slightly downcurved in lateral view; tip exceeding slightly upturned eyestalks; dorsal pair of strong subapical spines followed on each side by 2–3 often remote spines; posteriorly divergent lateral ridge bearing crest of 12 or more spines, strongest on process lateral to rostrum and decreasing posteriorly. Shoulder lateral to cervical groove bearing 1–3 tubercles below intersection with thalassinidean line, and sometimes another above this juncture. Postocular spine present.

Abdominal sternites usually unarmed, but some adults show varying development of spines.

T subrectangular, prominent transverse proximal ridge confluent with inconspicuous lateral ridge at each side.

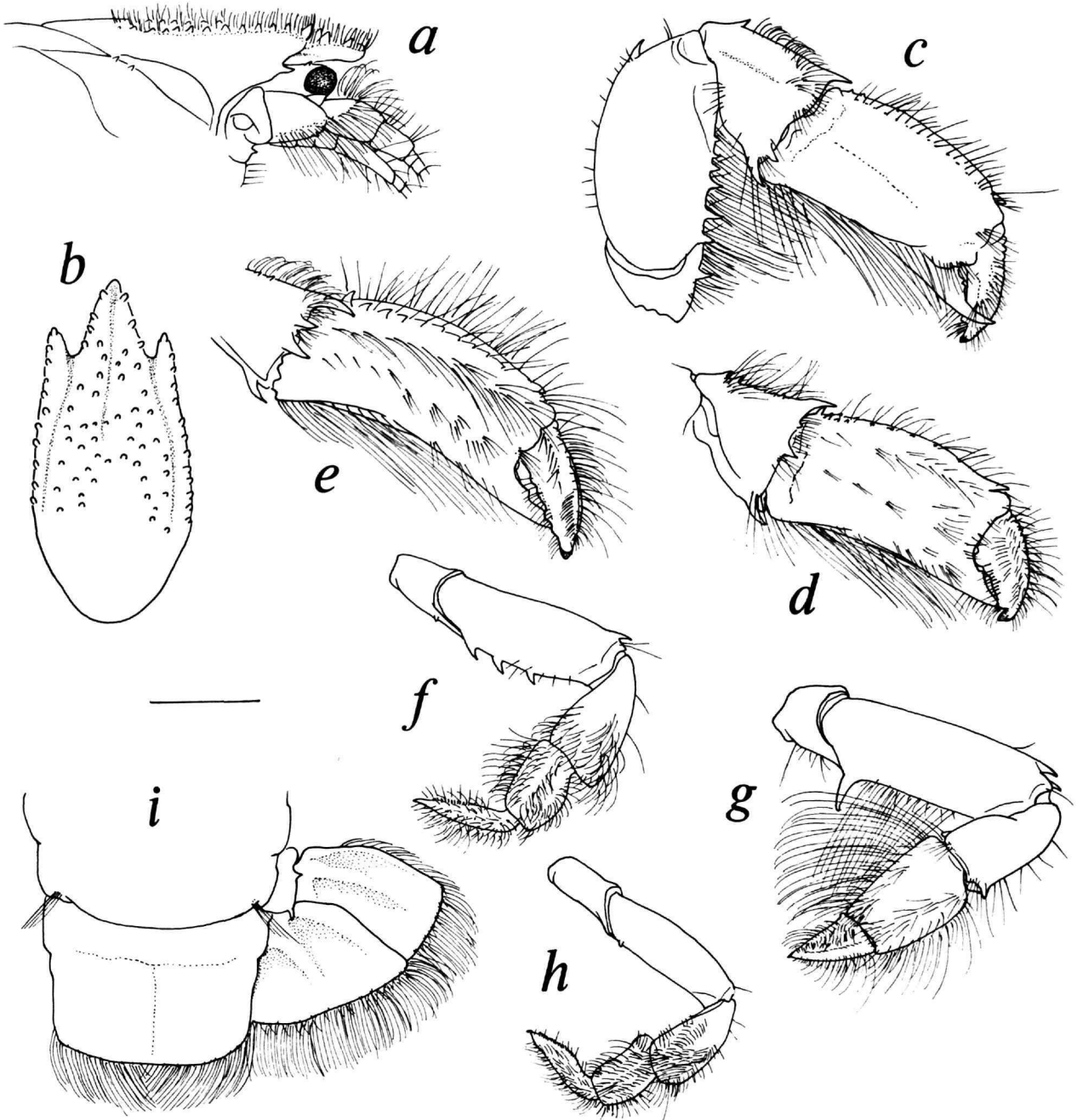


FIGURE 20.—*Upogebia inomissa*, new species (a-d, f-i, USNM 251396, ♂ holotype; e, USNM 251410, ♀ allotype): a, cephalic region, lateral; b, anterior carapace, dorsal; c, cheliped, right lateral, ♂; d, chela and carpus, left mesial, ♂; e, chela and carpus, left mesial, ♀; f-h, legs 2-4; i, parts of abdominal segment 6, telson, and uropods, dorsal. (Scale = 2 mm.)

Eyestalk stout, deepest at about midlength in lateral view, concave dorsally, convex ventrally, more or less obliquely erect in repose; prominent terminal cornea narrower than diameter of

stalk.

A1 peduncle reaching to about 1/2 length of terminal article of A2 peduncle, its proximal 2 articles together slightly longer

than terminal article.

A2 peduncle with about  $\frac{1}{3}$  its length extending beyond tip of rostrum; article 2 bearing subdistal ventral spine; scale moderate, oval.

Mxp3 bearing epipod.

Epistomial projection rather broad in lateral view, bearing 2 small unequal apical spines.

Chelipeds with coxa bearing slender spine on mesiodistal margin. Ventral margin of ischium bearing 1 spine. Merus with row of 4–7 strong spines on ventral margin; single subdistal dorsal spine reaching level of postocular spine. Carpus trigonal, shallow longitudinal groove laterally, strong spine at anterior ventrolateral corner preceded by 1 spine or row of sparse spines; remote mesiodorsal crest of 3–6 small spines behind prominent dorsal spine on anterior margin partly obscured by setae, proximal spine more erect than others, and 2–4 short stout spines obscured by setae on anterodorsal margin mesial to articulation with propodus; 1 strong spine near middle of anteromesial margin, smaller spine (sometimes much smaller and corneous tipped) dorsal to it, and strong slender spine at distoventral corner. Chl about 2.5 times chh; spineless dorsal ridge terminating anteriorly near stout subdistal spine mesial to it; mesiodorsal row of small spines (sometimes obsolescent) beginning with more or less erect spines proximally and becoming obsolescent at about  $\frac{2}{3}$ – $\frac{3}{4}$  length; poorly developed distomarginal spine below lateral and mesial dactylar condyles, 1–3 remote smaller spines ventral to mesial condyle on distal margin; lower mesial surface spineless but low transversely arcuate ridge near proximomesial corner. Fixed finger shorter than dactyl and more slender, slightly downcurved in middle and tapering to slender tip, 4–6 teeth on proximal prehensile edge, not as well developed in female as in male. Dactyl longitudinally ridged and setose; that of female with corneous tip preceded on prehensile edge by either an unarmed interval or 1 or 2 rather stout low spines, then more or less rectangular tooth-like crest increasing proximally to its greatest height, and toothless section basally; curved extensor surface bearing about 3–4 small tubercles proximally; that of male with corneous tip preceded on prehensile edge by strong tooth, then finely multidentate prehensile crest bracketed on each end by larger tooth, and toothless section basally; concave mesial aspect in both sexes bearing 2 unequal rows of tubercles, most numerous in upper row.

P2 reaching about to distal  $\frac{1}{4}$  of palm; carpus with acute distodorsal spine and tiny, nearly equal subdistal ventral spine; merus dorsally bearing slender distal spine and larger subdistal spine, and strong proximal mesioventral spine; coxa with proximal and distal raised areas mesially but no spines. Merus of P3 with slender distodorsal spine, sometimes a larger subdistal spine located closer to it than analog on leg 2, strong ventral spines tending to cluster near ischio-meral articulation, and cluster of smaller spines or spiniform granules proximolaterally; ischium unarmed and coxa with low spine lateral to gonopore. P4 with merus usually unarmed, occasionally a

proximoventral spine, ischium unarmed.

U with acute spine on protopod above base of mesial ramus; lateral ramus with mesial rib bearing blunt spine proximally.

MEASUREMENTS (in mm).—Holotype ♂, acl 6.4, cl 9.3, chl 5.4, chh 2.3; allotype ♀, same, 7.9, 11.5, 6.3, 2.3.

COLOR.—Holotype ♂ (dorsal view): Branchiostegites, antennae, and displayed parts of folded legs milky white; broad dorsal tract running length of cephalothorax olive on setose field of anterior carapace and posterior cardiac region but bluish gray slate colored on gastric region; abdomen dorsally mottled bluish gray slate colored, but with middorsal row of darker polygonal designs, broad triangular patch on tergite 1, roughly trapezoidal patch on tergite 2, narrower but laterally disposed rectangular patch on tergites 3 and 4, and more elongate rectangular spot on tergite 5 and apparently on tergite 6, but full view of latter and tail fan as well as chelae not visible on photograph.

Allotype ♀ (oblique lateral view): General color pattern similar to that of male, but darker slate color on gastric region and pinkish salmon suffused with bluish gray in broad tract on cardiac region; abdomen similarly colored on tergites 1–3, but pleurae of these segments and segment 4 lighter with milky white margin, remainder of segments not visible; pleopods yellowish; oblique joint between ischium and merus of right cheliped slate blue. (From photograph taken by Walter B. Sikora shortly after formalin fixation.)

KNOWN RANGE.—Confined to material examined.

REMARKS.—*Upogebia inomissa*, new species, lacks sternal spines on the abdominal segments, so characteristic of *U. omissa*. *Upogebia inomissa* is similar to *U. omissa* in possessing 2 subdistal dorsal spines on the merus of P2, but unlike the latter almost always has only 1 such spine on the merus of P3, and it lacks spines on the merus of P4, whereas the merus of this leg in *U. omissa* almost always bears spines on the ventral margin. General spination of the carpus and palm of the cheliped of *U. inomissa* is much as in *U. omissa*, but the erect proximal spine in the mesiodorsal palmar row of *U. inomissa* is missing in *U. omissa*, and there are differences in the shape and spination of the fingers.

*Upogebia inomissa* is known only from the coast of Mississippi and southern peninsular Florida, but its geographic range may be broader than that now that possible confusion with *U. affinis* has been clarified.

ETYMOLOGY.—From the Latin prefix *in-* (not), plus *omissa*, the species that it resembles.

### *Upogebia jamaicensis* Thistle, 1973

FIGURE 21

*Upogebia jamaicensis* Thistle, 1973:16, fig. 4.

MATERIAL EXAMINED.—JAMAICA: USNM 41748, ♂ (holotype), Montego Bay, salt water pond, E.A. Andrews, 24 Jun 1910; USNM 138896 ♀ (paratype), same; USNM 138897 ♀

(paratype), same; USNM 138898, 1 ♀, Montego Bay, brackish pond, C.B. Wilson, 2 Jul 1910; USNM 251222, 1 ♀, Montego Bay, brackish pond near sea beach, C.B. Wilson, 24 Jun 1910; USNM 251223, 2 ♀ ovig., Montego Bay, from brackish pond, C.B. Wilson, 29 Jun 1910.

PANAMA; USNM 251176, 5 ♂ (1 juv.), 3 ♀ (1 ovig.), Colon, small embayment 9.1 mi E Maria Chiquita on Portobello Road, 0–0.9 m (0–3 ft), sandy, mud, mangrove, ebb low tide, 31°C, 21 ppt, 0–23 m (75 ft) offshore, noxfish, Dawson and Dawson sta 1491, 3 Jul 1971; USNM 251177, 1 ♂, 3 ♀ (2 ovig.), 8 juvs., Colon, embayment at 9 mi E Maria Chiquita on Portobello Road, 0–0.9 m (0–3 ft), 0–15 m (50 ft) offshore, *Thalassia*, ebb tide, 27 ppt, chemfish, Dawson and Dawson sta 1493, 4 Jul 1971.

COLOMBIA: USNM 251422, 11 ♂, 6 ♀ (2 ovig., 1 juv.), Baru, mouth of Cienaga, Porto Nao, intertidal, yabby pump, R. Lemaitre, SOSC, 24 Jul 1988; USNM 251423, 1 ♂, 1 ♀, same; USNM 256062, 113 ♂, 69 ♀ (36 ovig.), same locality, very shallow mud flat inside lagoon near mouth, some sea grass (*Thalassia*), numerous burrow openings, yabby pump, R. Lemaitre, SOSC, sta B#6A, 18 Jul 1991; USNM 256061, 38 ♂, 41 ♀ (17 ovig.), same, sta B#6B, 19 Jul 1991; USNM 251182, 1 ♂, south coast of Bahía de Barbacoas, Caribbean coast, “Colombiana de Acuicultura” shrimp ponds 1 and 5, with shovel, S. Nates, 13 Dec 1991.

DIAGNOSIS.—Projections to either side of rostrum ending in acute spine. Postocular spines number 4–6. Row of acute spines on shoulder lateral to cervical groove. Abdominal sternites unarmed. T subrectangular. Carpus of cheliped with moderate spine on anteromesial margin. P2 with proximal mesioventral spine on merus; P3 with 2 dorsal spines on merus, distal and subdistal; merus of P4 spineless.

DESCRIPTION.—Rostrum triangular, slightly downturned, long, reaching level of articulation between penultimate and terminal articles of antennal peduncle in male, shorter in female, tip exceeding eyestalks; dorsal pair of strong subapical spines followed on each side, after moderate interval in male and much smaller space in female, by 3–6 spines nearly equal in length; about  $\frac{3}{4}$  of carapace surface anterior to cervical groove bearing pilose tufts, each emerging anterior to elements of an armature changing from spiny anteriorly to subspiny posteriorly; divergent lateral ridge bearing crest of 12 spines, strongest on process lateral to rostrum and decreasing somewhat posteriorly. Adults and subadults with shoulder lateral to cervical groove bearing about 6–11 acute spines below intersection with thalassinidean line, smaller individuals with spines weak or undeveloped, 2–3 of larger spines near notch in anterior carapace margin (incisura clavicularis; see Holthuis, 1974:734, 737) with bases united. Postocular spines numbering 4–6. Clump of about 3 spines on lateral aspect of head below lateral ridge and anterior to thalassinidean line (gastroorbital region).

Abdominal sternites unarmed; AVI with lateral margin sinuous, widest at midlength, dorsal sulcus running obliquely

anterolaterad from notch anterior to posterolateral corner and usually becoming obsolete on dorsal surface; but sulcus becoming obsolescent in large adults and arcing toward anterolateral corner.

T subrectangular, a little wider than long.

Eyestalk stout, convex ventrally; cornea slightly narrower than diameter of stalk.

A1 peduncle reaching to about proximal  $\frac{1}{4}$  of terminal article of A2 peduncle, its proximal 2 articles together slightly longer than terminal article.

A2 peduncle with only terminal article extending beyond tip of rostrum in male, but penultimate article also extending beyond shorter rostrum of female; article 2 spineless; scale moderate, oval.

Mxp3 bearing epipod.

Epistomial projection acuminate in lateral view.

Chelipeds with ventral margin of coxa bearing a hooked spine; ischium bearing 2, rarely 3 slender spines. Merus with row of 5–6 strong acuminate spines on ventral margin, single subdistal dorsal spine reaching level of midpostocular row. Carpus trigonal, shallow longitudinal groove laterally; strong spine at anterior ventrolateral corner and 1 or more spines of variable strength preceding it; mesiodorsal crest of about 4–6 irregular spines behind prominent spine on anterior margin, partly obscured by setae in proximal part of row, and short oblique row of 3 or more spines diverging from proximal end onto dorsal surface in male, 2 moderate spines on anterodorsal margin mesial to articulation of propodus; stout spine near middle of anteromesial margin. Palm length including fixed finger about twice maximal height in male, about 2.7 times in female, lateral oblique row of setae ending anteriorly in patch of long setae near base of fixed finger; dorsal row of spines becoming smaller and more crowded anteriorly; male bearing parallel mesiodorsal row of smaller somewhat irregular spines becoming obsolescent distally, and remote spine on condyle of dactyl; anterolateral row of stout spines increasing to clump of stout spines near condyle of dactyl (much less developed in female); lower mesial surface spineless but bearing low transversely arcuate ridge proximally. Fixed finger of male much shorter than dactyl, stout, hooked, continuing from downcurved ventral edge of palm and tapering to slender tip, 4–6 or more crowded, evenly rounded small teeth on proximal prehensile edge; short triangular with slender apex in female, 4 teeth on proximal prehensile edge. Dactyl much longer than fixed finger, ribbed and bearing dense setae in rows; comeous tip preceded on distally toothless prehensile edge by strong tooth opposing tip of fixed finger at  $\frac{1}{2}$ – $\frac{2}{3}$  length, with about 3–5 smaller rounded teeth proximal to this tooth and 1 similar tooth close by distally; curved extensor surface bearing about 3–6 small proximal tubercles.

P2 reaching about to distal  $\frac{1}{4}$  of palm; carpus with obsolescent distodorsal spine and tiny, acute, subdistal ventral spine; merus with small subdistal dorsal spine and strong proximal mesioventral spine; coxa with strong proximal and

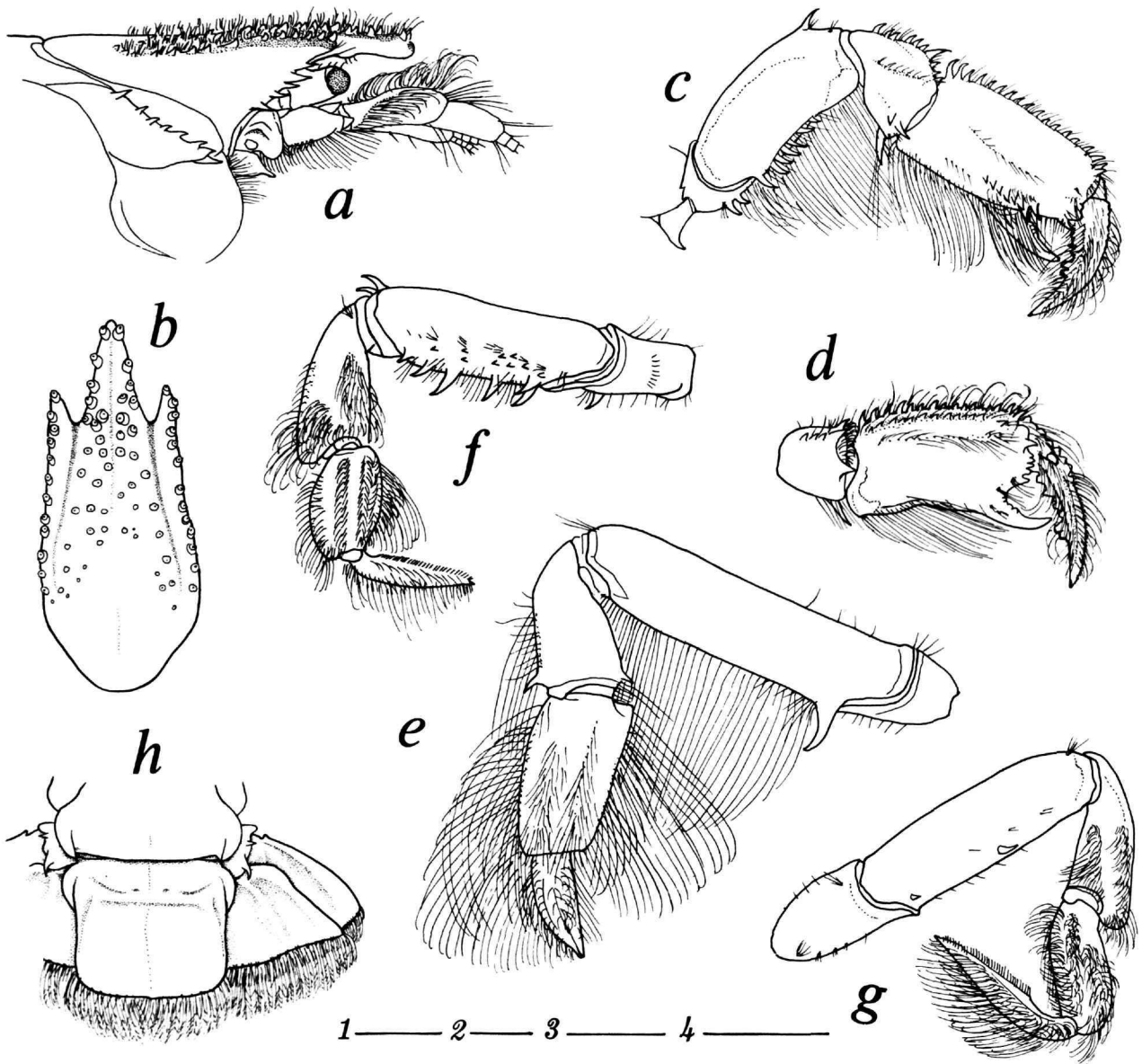


FIGURE 21.—*Upogebia jamaicensis* Thistle, USNM 41748, ♂ holotype: *a*, cephalic region, lateral; *b*, anterior carapace, dorsal; *c*, cheliped, right lateral; *d*, chela and carpus, left mesial; *e-g*, legs 2-4; *h*, parts of abdominal segment 6, telson, and uropods, dorsal. (Scales = 2 mm: 1 = *a,b*; 2 = *c,d,h*; 3 = *e,f*; 4 = *g*.)

smaller distal spine posteromesially. Merus of P3 with distal and subdistal dorsal spines, row of slender ventral spines, and scattered smaller spines posterolaterally; ischium with dis-ventral spine, and mesial spine on coxa. P4 spineless.

U with acute spine on protopod above base of mesial ramus; mesial rib of lateral ramus bearing rounded eminence proximally.

MEASUREMENTS (in mm).—Holotype ♂, ac1 9.0, cl 15.0, chl 6.4, chh 3.8; paratype ♀, same, 7.9, 11.8, 5.1, 1.9.

KNOWN RANGE.—Confined to the material examined.

REMARKS.—Three specimens are known from Jamaica in addition to those studied by Thistle (1973). There, the species apparently is limited to a brackish seaside pond habitat. The Panama specimens are smaller than those from Colombia,

which in turn are smaller than those from Jamaica, but all conform to the type series in other respects than size.

*Upogebia marina* Coêlho, 1973

FIGURE 22

*Upogebia* (*Upogebia*) sp. C. Coêlho and Ramos, 1972:163.

*Upogebia* (*Upogebia*) *marina* Coêlho, 1973b:345.—Coêlho and Rattacaso, 1988:385.

*Upogebia marina*.—Coêlho and Ramos-Porto, 1987:36.

**MATERIAL EXAMINED.**—VENEZUELA: USNM 251405, 1 ♀, Turpialito, ~20 km E of central Cumaná, soft mud over shell mush, faint H<sub>2</sub>S odor, inside pier, 24°C, 35 ppt, M.L. Jones, C-78-2, 17 Jan 1978; USNM 251406, 1 ♂, Laguna Grande on outer peninsula, opposite Cumaná, from coarse sand and rocks, 24°C, 35 ppt, M.L. Jones, C-78-3-1, 17 Jan 1978.

**BRAZIL:** *Alagoas*: MZUSP 8955, 1 ♀ (ovig.), 09°15'S, 35°14'W, *Askaroa* sta 21, 9 Sep 1965.

**DIAGNOSIS.**—Projections to either side of rostrum ending in small acute spine. Postocular spine present. Abdominal sternites unarmed. T subrectangular. Carpus of cheliped with 2 strong spines on distomesial margin. Merus of P2 bearing 1 proximal mesioventral spine and 1 subdistal dorsal spine; that of P3 and P4 spineless.

**DESCRIPTION.**—Rostrum triangular, slightly downcurved; tip exceeding eyestalks in normal position by about width of cornea; dorsal pair of strong subapical spines followed on each side by 3 remote spines; posteriorly divergent lateral ridge bearing crest of 12 or more spines, strongest on process lateral to rostrum and decreasing posteriorly. Shoulder lateral to cervical groove unarmed. Postocular spine present.

Abdominal sternites unarmed.

T subrectangular, transverse proximal ridge confluent with inconspicuous lateral ridge at each side.

Eyestalk stout, deepest at about midlength, slightly concave dorsally, noticeably convex ventrally, almost horizontal in repose; prominent terminal cornea narrower than diameter of stalk.

A1 peduncle reaching to base of terminal article of A2 peduncle, its proximal 2 articles together slightly longer than terminal article.

A2 peduncle with about 1/3 its length extending beyond tip of rostrum; article 2 bearing obsolescent subdistal ventral spine; scale moderate, oval.

Mxp3 bearing epipod.

Epistomial projection broadly rounded in lateral view, bearing small spine on anterodorsal aspect.

Chelipeds slender. Coxa unarmed. Ventral margin of ischium bearing 1 spine. Merus with row of 2–5 small spines on ventral margin; single subdistal dorsal spine reaching level of postocular spine. Carpus trigonal, shallow longitudinal groove laterally, without spine at anterior ventrolateral corner; mesiodorsal crest of 8 small spines behind prominent dorsal

spine on anterior margin partly obscured by setae, and 2–3 short stout spines obscured by setae on anterodorsal margin mesial to articulation with propodus; strong spine near middle of anteromesial margin, slightly smaller spine dorsal to it, and strong slender spine at distoventral corner. Chl about 3 times chh; spineless dorsal and mesiodorsal ridges present; small distomarginal spine below lateral and mesial dactylar condyles, small spine on distal margin of palm ventral to mesial condyle; mesial surface unarmed, but low transversely arcuate ridge near proximomesial corner. Fixed finger much shorter than dactyl and more slender, slightly downcurved in middle and tapering to slender tip, 4–7 teeth on proximal prehensile edge. Dactyl longitudinally ridged and setose; corneous tip preceded on prehensile edge by unarmed interval and strong tooth closing against tip of fixed finger, then a more or less sinuous crenulate crest increasing to strong tooth at its proximal and greatest height, toothless section basally; curved extensor surface bearing about 2–3 small tubercles proximally.

P2 reaching to about distal 1/4 of palm; carpus with obsolescent distodorsal spine and subdistal ventral spine; merus with slender subdistal dorsal spine and strong proximal mesioventral spine; coxa unarmed. Ischium and merus of P3 and P4 spineless, except coxa of P3 with broad low spine lateral to gonopore.

U with blunt spine on protopod above base of mesial ramus; lateral ramus with mesial rib bearing obsolete spine proximally.

**MEASUREMENTS** (in mm).—Ovigerous ♀, acl 5.2, cl 7.2, chl 4.1, chh 1.3.

**TYPE LOCALITY.**—Station SALD 1730, 21 m depth in littoral of Piauí, Brazil.

**KNOWN RANGE.**—Venezuela, this paper, and Brazil from Piauí to Sergipe (Coêlho and Ramos-Porto, 1987, Coêlho and Rattacaso, 1988).

**HABITAT.**—Calcareous algae, reefs, sand, including estuaries (Coêlho and Ramos-Porto, 1987; Coêlho and Rattacaso, 1988).

**REMARKS.**—A Venezuela female, USNM 251405, has a left chela less than 1/2 the length of the right chela, one of two regenerated chelae observed in material examined for this paper.

*Upogebia noronhensis* Fausto-Filho, 1969

FIGURE 23

*Gebia spinigera*.—Pocock, 1890:515.

*Upogebia noronhensis* Fausto-Filho, 1969:1–7, 15 figs.; 1970:58.—Coêlho and Ramos, 1972:163.—Thistle, 1973:2, 12–14, 23 [key].—Williams, 1986:10 [key].—Coêlho and Ramos-Porto, 1987:36.—Coêlho and Rattacaso, 1988:383.

**MATERIAL EXAMINED.**—BRAZIL: *Fernando de Noronha*: LCMC 163, 3 ♀ (1 ovig.) (paratypes), Baía de Sueste, Fausto-Filho, 7 Aug 1968.

**DIAGNOSIS.**—Projections to either side of rostrum ending in spine. Postocular spine present. Abdominal sternites unarmed.

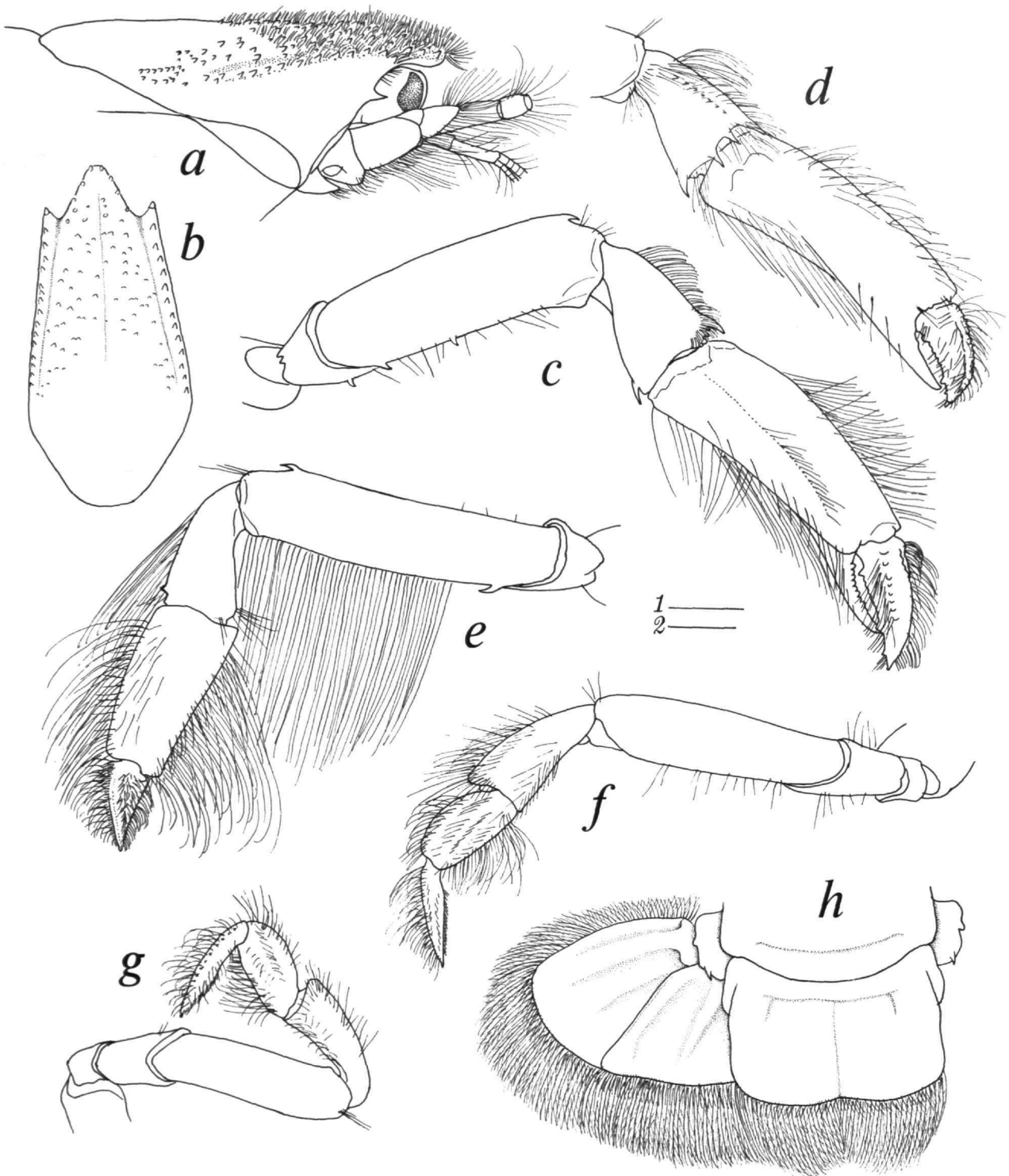


FIGURE 22.—*Upogebia marina* Coêlho, USP 8955, ♀ ovigerous: *a*, cephalic region, lateral; *b*, anterior carapace, dorsal; *c*, cheliped, right lateral; *d*, chela and carpus, left mesial; *e-g*, legs 2-4; *h*, parts of abdominal segment 6, telson, and uropods, dorsal. (Scales = 1 mm: 1 = *a, d-g*; 2 = *b, c, h*.)

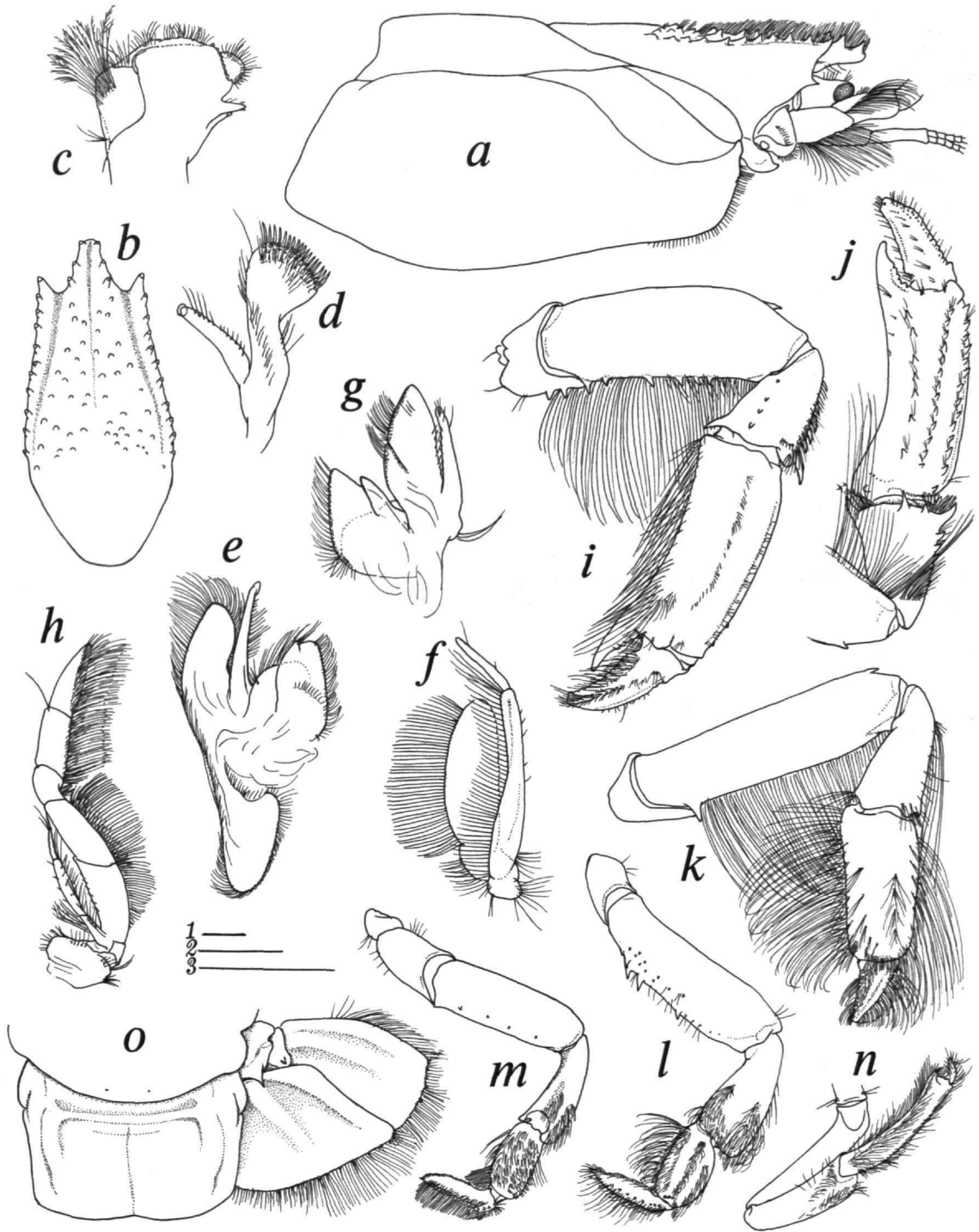


FIGURE 23.—*Upogebia noronhensis* Fausto-Filho (from 3 ♀ paratypes, No. 163, Laboratorio de Ciências do Mar, Universidade Federal do Ceará, Fortaleza, Brazil): a, carapace, lateral; b, anterior carapace, dorsal; c, mandible; d, 1st maxilla; e, 2nd maxilla; f, 1st maxilliped; g, 2nd maxilliped; h, 3rd maxilliped; i, cheliped, right lateral; j, chela and carpus, right mesial; k-n, legs 2-5; o, parts of abdominal segment 6, telson, and uropods, dorsal. (Scales = 1 mm: 1 = a, b, i-o; 2 = d-h; 3 = c.)



T subrectangular. Carpus of cheliped with strong spine on anteromesial margin. Merus of P2 bearing proximal mesioventral spine and subdistal dorsal spine; that of P3 with cluster of ventrolateral spines; that of P4 spineless.

DESCRIPTION.—Rostrum triangular, dorsal pair of strong subapical spines followed on each side by 2 remote spines; straight to very slightly downcurved in lateral view, tip exceeding eyestalks in normal position; posteriorly divergent lateral ridge bearing crest of 11–12 spines, strongest on process lateral to rostrum and decreasing posteriorly. Shoulder lateral to cervical groove usually unornamented, bearing at most 1 obsolescent tubercle below intersection with thalassinidean line. Postocular spine present.

Abdominal sternites unarmed.

T subrectangular, prominent transverse proximal ridge confluent with less conspicuous lateral ridge at each side.

Eyestalk stout, deepest anterior to midlength or with dorsal and ventral margins subparallel; prominent terminal cornea narrower than diameter of stalk.

A1 peduncle reaching to proximal part of terminal article of A2 peduncle, its proximal 2 articles together  $\frac{1}{4}$  longer than terminal article.

A2 peduncle with about  $\frac{1}{3}$  its length extending beyond tip of rostrum; article 2 bearing subdistal ventral spine; scale moderate, oval.

Mouthparts representative of species in genus *Upogebia* illustrated; Mxp3 bearing epipod.

Epistomial projection in lateral view rather broadly rounded distally, bearing 1 small apical spine.

Chelipeds with coxa bearing slender spine on mesiodistal margin. Ventral margin of ischium bearing 1–2 spines. Merus with row of 2–5 widely spaced spines on ventral margin; single subdistal dorsal spine reaching level of postocular spine. Carpus trigonal, shallow longitudinal groove laterally, small spine at anterior ventrolateral corner sometimes preceded by secondary smaller spine; mesiodorsal crest of 5–6 strong spines behind prominent dorsal spine on anterior margin partly obscured by setae, and 2–3 short spines obscured by setae on anterodorsal margin mesial to articulation with propodus; 1 strong spine near middle of anteromesial margin, and strong slender spine at distoventral corner. Chl about 2.8–3.8 times chh; spineless dorsal ridge terminating anteriorly near small subdistal spine mesial to it, mesiodorsal row of about 15 strong spines tending to be staggered in proximal  $\frac{1}{2}$ ; ventral to this row and paralleling it, a row of smaller spines (~10), sometimes more closely spaced in proximal  $\frac{1}{3}$  than in distal  $\frac{2}{3}$ ; below this and more or less paralleling ventral margin of palm, a row of 4–6 strong spines, larger distally than proximally; variable distomarginal spine below lateral and mesial dactylar condyles, and ventral to mesial condyle 2–4 remote small spines on distal margin; ill-defined low transverse ridge near proximomesial corner. Fixed finger about  $\frac{1}{2}$  length of dactyl and more slender, slightly downcurved in middle and tapering to slender tip, about 4 teeth on proximal prehensile edge. Dactyl longitudi-

nally ridged and setose; corneous tip preceded on prehensile edge by unarmed interval, then a more or less rectangular finely toothed crest increasing proximally to its greatest height in strong tooth, toothless section basally; curved extensor surface bearing about 2 small tubercles proximally. Cheliped of male more robust than that of female (see Fausto-Filho, 1969, figs. 1, 9, 10).

P2 reaching about to distal  $\frac{1}{4}$  of palm; carpus with blunt distodorsal spine and obsolescent subdistal ventral spine; merus with slender subdistal dorsal spine and strong proximal mesioventral spine. Merus of P3 with 3–4 strong ventral spines on proximal  $\frac{2}{3}$  of margin, and cluster of smaller spines or spiniform granules proximolaterally; ischium unarmed and coxa with low spine lateral to female gonopore. P4 with merus and ischium spineless.

U with acute spine on protopod above base of mesial ramus; lateral ramus with mesial rib bearing acute spine proximally.

MEASUREMENTS (in mm).—Paratype ♀, acl 9.0, cl 12.8, chl 8.8, chh 2.3; same, 14.1, 9.0, 8.2, 2.9.

KNOWN RANGE.—The species is endemic to Fernando de Noronha, Brazil.

HABITAT.—The species was found on the inner part of a cove on Fernando de Noronha at the limits of the infra and median littoral, below pebbles, in natural cracks, or in burrows excavated by the animals themselves. The small area collected, approximately 5 m<sup>2</sup>, was influenced by fresh water draining from the reservoir of the island (Fausto-Filho, 1969).

REMARKS.—Both Pocock (1890) and Fausto-Filho (1969) inferred the relationships of *U. noronhensis* as near to *U. spinigera* of the eastern Pacific. However, now that more species have come to light, its relationships seem closer to *U. vasquezi*.

Eston et al. (1986), in a survey of benthic marine organisms of Fernando de Noronha that were collected from 25 × 25 cm quadrats taken along four transects of the rocky coasts from the supralittoral fringe to a depth of 30 m, reported no specimens of *U. noronhensis*. Although that study had a botanical emphasis, it would seem from sampling of this intensity on beach areas of the archipelago that *U. noronhensis* is not one of the coral boring species and that it probably is confined to substrates such as those sampled by Fausto-Filho.

### *Upogebia omissa* Gomes Corrêa, 1968

FIGURE 24

*Upogebia omissa* Gomez Corrêa, 1968:98, figs. 1–15, 28, 29.—Fausto-Filho, 1970:58 [distrib.].—Coelho, 1970:56 [estuarine distrib.].—Coelho et al., 1970:508 [habitat].—Coelho and Ramos-Porto, 1987:35 [key], 36 [Brazilian distrib.].

*Upogebia (Upogebia) sp.* B, Coelho, 1971:231.—Coelho and Ramos, 1972:162.

*Upogebia (Upogebia) omissa*.—Coelho and Rattacaso, 1988:383.

MATERIAL EXAMINED.—U.S.A.: Florida: FDNR EJ68027, 1 ♂, Pinellas Co., S end of Dunedin wreckage drop

under limestone rocks, 28°00'02"N, 83°52'06"W, 8.5 m (28 ft), rotenone and dipnet, M.A. Moe, Jr., and T.F. Maloney, 15 May 1968.

DOMINICAN REPUBLIC: USNM 251235, 1 ♀, 2 cephalothoraxes, Playa de Monte Cristi, 19°52.3'N, 71°39.5'W, hard substrate along patio wall pounded by waves on seaward side of hotel, M.L. Jones, sta 26, 22 Feb 1969.

PUERTO RICO: USNM 251236, 1 ♂, Parguera, Lajas, West Maguay Id., Gooding and Humes, 6 Aug 1959.

PANAMA: USNM 251237, 1 ♂, Colon, Limon Bay, Fort Randolph near base of E jetty, 0–1.5 m, *Thalassia*, mud, some rock, low flood tide, 29°C, 30 ppt, ichthyocide, Panama Survey, C.E. Dawson 1650, M.L. Jones, Panama Survey sta 153-2, 3 Nov 1973; USNM 251238, 2 ♂, 1 ♀, Limon, Fort Randolph at base of E Jetty, 09°23.1'N, 79°53.46'W, sieving bare sand patch beyond *Thalassia*, ~1.5 m (5 ft) deep, Panama Survey sta 153-3, Jones and Dawson, 3 Nov 1973.

COLOMBIA: USNM 251181, 3 ♂, 8 ♀ (6 ovig.), south coast of Bahía de Barbacoas, Caribbean coast, "Colombiana de Acuicultura" shrimp ponds 1 and 5, with shovel, S. Nates, 13 Dec 1991.

VENEZUELA: USNM 251727, 1 ♂, Isla Margarita, La Isleta, on inner side of peninsula, thick sticky black mud overlain with about 5 mm oxidized layer, slight H<sub>2</sub>S odor, M.L. Jones, sta 78-1-1, 13 Jan 1978; USNM 251728, 1 ♂, 2 ♀, 1 juv., Isla Margarita, <1 m, dark gray well-sorted sand and shell frags., H<sub>2</sub>S odor, M.L. Jones, sta 78-1-2, 13 Jan 1978; USNM 251729, 1 ♀, Isla Margarita, Boca del Río, 50 m E Mangrove Island N of lab buildings, bare sand in *Thalassia* beds, M.L. Jones, sta M-12, 17 Feb 1977.

TRINIDAD: RMNH 14981, 1 ♂, 7 ♀ (1 ovig.), mouth of Diego Martin River, dug from mangrove detritus, one specimen with bopyrid parasite, H.O. von Hagen, 6 Jan 1966; USNM 7661, 2 ♂, 1 ♀, shore, R/V *Albatross*, no sta no. given, 30 Jan–2 Feb 1884; USNM 120489, 2 ♀ (1 ovig.), Coroni Swamp, Blue River mouth, holes in mud, P.R. Bacon, B.14, 4 Aug 1966.

BRAZIL: Ceará: MZUSP 8054, 1 ♀, Ponta do Trapia, Camocim, Paulo Young, 6 Aug 1982. *Rio Grande do Norte*: MZUSP (unnumbered), 2 ♂, 3 ♀ ovig., Natal, nursery of shrimp project, 27 Jan 1979. *Paraíba*: USNM 25793, 2 ♂, 5 ♀ (1 ovig.), Mamanguape stone reef, A.W. Greeley, Branner-Agassiz Expedition, 22–23 Jun 1899; USNM 25794, 1 ♂, *Rio Paraíba*, on mangroves, Branner-Agassiz Expedition, A.W. Greeley, 21 Jun 1899; USNM 25795, 1 ♀, Contello Bay, A.W. Greeley, Branner-Agassiz Exped., 27 Jun 1899; USNM 222054, 1 ♂, 1 ♀ (ovig.), João Pessoa, Ponta do Cabo Branco, intertidal, M.L. Christoffersen, 6 Oct 1969; USNM 222056, 1 ♀ (ovig.), Cebedelo, *Rio Paraíba do Norte* estuary, M.L. Christoffersen, 15 Feb 1980. *Bahia*: USNM 222053, 1 ♀, Prado Praia do Tororo, intertidal, M.L. Christoffersen, 12 Oct 1982; USNM 222058, 1 ♀ (ovig.), between Ponta Imbucuaba and Cumuruxtiba, corraline reef intertidal, M.L. Christoffersen,

J.S. Mourão, F.J. Mein, 4 Oct 1982. *Espírito Santo*: MZUSP 8615, 1 ♂, 1 ♀, Santa Cruz, H.R. Costa, 8 Jul 1970. *Rio de Janeiro*: MZUSP 8617, 2 ♀, Ilha da Marambaia, 1973; RMNH 28667, 1 ♂, 2 ♀, Septiba, H.R. da Costa, Apr 1958. *São Paulo*: RMNH 28664, 1 ♂, 2 ♀ ovig., São Francisco, taken at night from under stones, H.R. da Costa, Feb 1961; RMNH 28665, 6 ♂, 2 ♀, fragments, same, near Santos, under stones, H.R. da Costa, Jul 1961. *Paraná*: MZUSP (unnumbered), 2 ♂, 2 ♀ (1 ovig.), Isthmus of the Ilha de Canôbá, with *Phragmatopoma*, S.A. Rodrigues, 23 Mar 1978. *Santa Catarina*: RMNH 200A, 5 ♂ juvs., B.N. Basemente?, 10 Mar 1960; RMNH 206A, 1 ♀; USNM 251242, 1 ♂, 2 ♀, Ponta da Cruz, São Francisco, W.L. Schmitt, 29–31 Oct 1925; USNM 251408, 17 ♂, 25 ♀ (14 ovig.), São Francisco, W.L. Schmitt, sta 45–46, 28–29 Oct 1925.

DIAGNOSIS.—Projections to either side of rostrum ending in acute spine. Postocular spine present. Abdominal sternites usually armed with ventral spines. T subrectangular. Carpus of cheliped usually with 2 strong spines on mesiodistal margin, sometimes with 1 strong spine and 1 smaller spine above it. P2 with proximal mesioventral spine and 1 or 2 distodorsal spines on merus; P3 with 1 or 2 distodorsal spines on merus; merus of P4 almost always with ventral spines.

DESCRIPTION.—Rostrum triangular; short, straight, or slightly downcurved, tip exceeding eyestalks in normal position; dorsal pair of strong subapical spines followed on each side by 2–3 spines and often separated from them by wide interval; posteriorly divergent lateral ridge bearing crest of 10–12 or more spines, strongest on process lateral to rostrum and diminishing posteriorly. Shoulder lateral to cervical groove bearing 1–4 spines, tubercles, or granules below intersection with thalassinidean line, and sometimes spine or granule above this juncture. Postocular spine present, occasionally doubled.

Abdominal sternites usually armed with ventral spines, tending to increase in prominence with age.

T with transverse proximal ridge continuous with inconspicuous lateral ridge at each side, transverse sector usually bearing single row of obsolescent granules.

Eyestalk stout, deepest at about midlength, concave dorsally, convex ventrally, obliquely erect in repose; prominent terminal cornea narrower than diameter of stalk.

A1 peduncle reaching to about proximal 1/4 of terminal article of A2 peduncle, its proximal 2 articles together slightly longer than terminal article.

A2 peduncle with about 1/2 its length extending beyond tip of rostrum; article 2 bearing hooked subdistal ventral spine; scale oval, moderate in size.

Mxp3 bearing epipod.

Epistomial projection rather broad in lateral view, bearing 2 small apical spines, lower one occasionally obsolescent.

Chelipeds with coxa usually bearing slender spine on mesiodistal margin. Ventral margin of ischium bearing 2 unequal spines or single spine. Merus with row of 4–7 strong spines on ventral margin (occasionally spine at distal end of

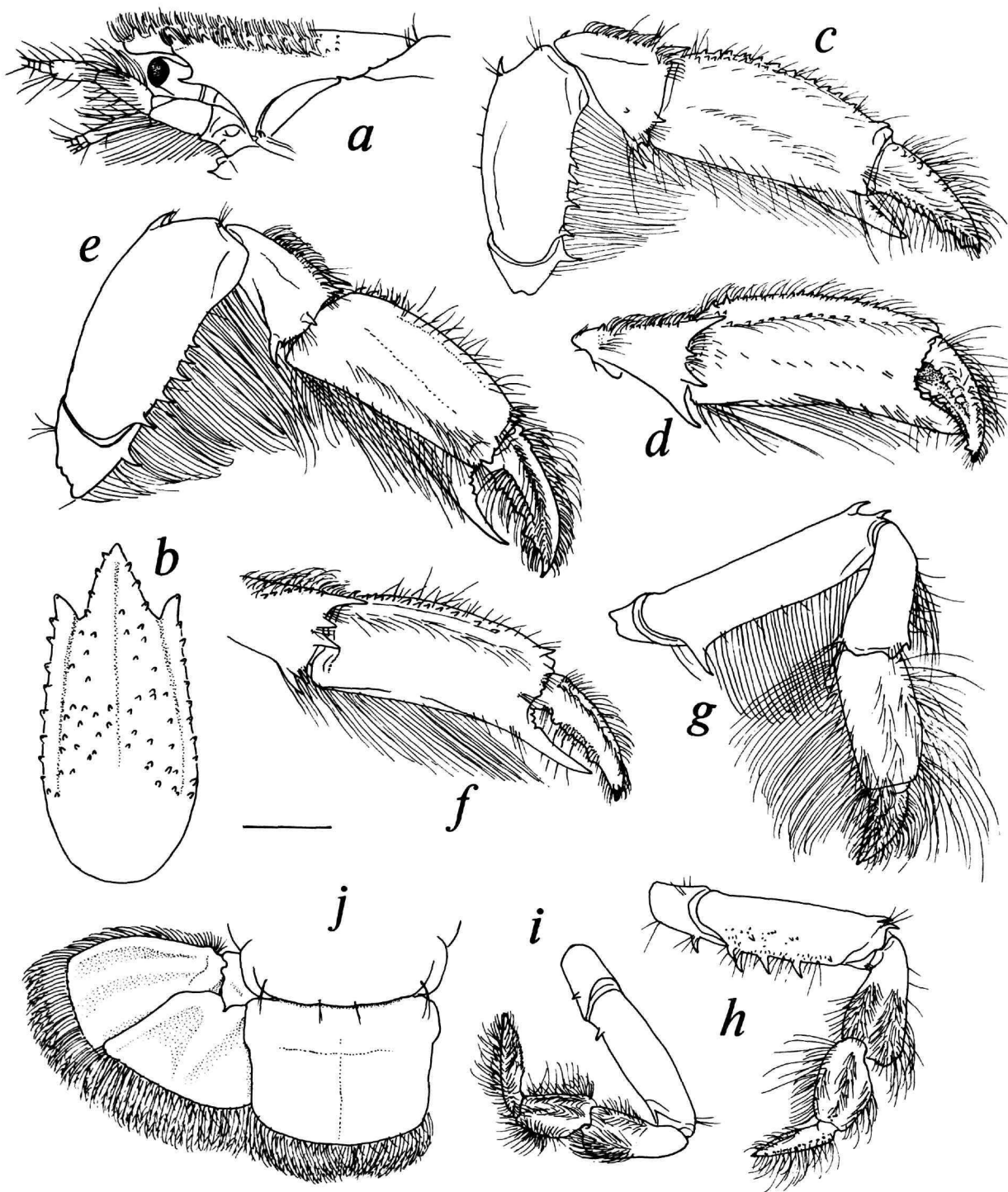


FIGURE 24.—*Upogebia omissa* Gomes Corrêa (a-d, g-j, USNM 25796, ♂; e,f, USNM 25795, ♀): a, cephalic region, lateral; b, anterior carapace, dorsal; c, cheliped, right lateral, ♂; d, chela and carpus, left mesial, ♂; e, cheliped, right lateral, ♀; f, chela and carpus, left mesial, ♀; g-i, legs 2-4; j, parts of abdominal segment 6, telson, and uropods, dorsal. (Scale = 2 mm.)

row reduced); single subdistal dorsal spine reaching level of postocular spine. Carpus trigonal, shallow longitudinal groove laterally, usually with strong spine at anterior ventrolateral corner preceded by 1 or more remote obsolescent spines; mesiodorsal crest of almost uniform small spines behind prominent spine on anterior margin, sometimes remote from it, and partly obscured by setae in proximal part of row, 3–4 short stout spines obscured by setae on anterodorsal margin mesial to articulation with propodus; 1 strong spine near middle of anteromesial margin, smaller spine dorsal to it, and very strong spine below at distoventral corner. Chl about 2.5–2.7 times chh in male, more slender in female; spineless dorsal ridge terminating anteriorly near stout subdistal spine mesial to it; mesiodorsal row of small spines, more erect proximally than distally, becoming obsolescent at about  $\frac{2}{3}$  length; below this a row of obsolescent tubercles leading toward distomarginal spine below mesial dactylar condyle, margin below it bearing 1–3 small spines, row of small to obsolescent spines on lower mesial surface, low transversely arcuate ridge near proximomesial corner, and occasionally a tubercle near midlength on mesial side of ventral keel; lateral dactylar condyle with distomarginal spine below. Fixed finger shorter than dactyl and more slender, slightly downcurved in middle and tapering to slender tip, 3–6 teeth on proximal prehensile edge, sometimes clustered in 2 groups of 2 or 3 spines. Dactyl longitudinally ridged and setose; corneous tip in male preceded on prehensile edge (if not worn) by subdistal tooth, 2nd tooth at  $\frac{3}{4}$  length often opposing tip of fixed finger, then crest of about 7 closely crowded small teeth increasing proximally to larger tooth at  $\frac{1}{4}$  length, basal section toothless, concave mesial surface bearing 2 rows of pearliform tubercles in large male; corneous tip in female preceded by more or less straight prehensile edge, strong tooth at  $\frac{2}{3}$  length opposing tip of fixed finger, section proximal to this with obscure small teeth, then large tooth at  $\frac{1}{4}$  length, basal section toothless; curved extensor surface bearing 2–4 small tubercles proximally.

P2 reaching about to distal  $\frac{1}{4}$  of palm; carpus with obsolescent distodorsal spine and tiny acute subdistal ventral spine; merus with 2 slender rather widely separated subdistal dorsal spines (distalmost rarely missing) and strong proximal mesioventral spine; coxa with variably expressed proximal spine and smaller distal spine mesially. Merus of P3 with 2 slender distodorsal spines, spine on distal margin smaller than subdistal one and occasionally missing, slender ventral spines on proximal  $\frac{1}{2}$  and cluster of spines or spiniform granules ventrolaterally; ischium usually with single ventral spine but sometimes unarmed, coxa with spine lateral to gonopore. P4 usually with row of strong ventral spines on merus and ventral spine on ischium, but spines variable.

U with acute spine on protopod above base of mesial ramus; lateral ramus bearing blunter spine on mesial rib proximally; both rami with sharp granules along distal margin.

MEASUREMENTS (in mm).—♂, acl 7.9, cl 12.2, chl 9.0, chh 3.6; ♀, same, 7.7, 12.2, 6.4, 2.4.

TYPE LOCALITY.—Barra do Ceará, Fortaleza, Brazil.

KNOWN RANGE.—Confined to material examined.

HABITAT.—The species occurs from around the low tide mark to 9 m depths on reefs and in estuaries, generally under rocks (Coelho and Rattacaso, 1988).

REMARKS.—Clearly, there is considerable variation in the spinose ornamentation of this species. Spination on the abdominal sternites is distinctive, although partly suppressed in some individuals. The double distodorsal spines on the merus of P2 and P3 are fairly diagnostic, although some individuals have asymmetrical development of spine number; in one case the merus of these legs on a mature female bears 3 rather than 2 spines each. The merus of P4 usually is spined, but in some individuals it is spineless. Thistle's (1973) comment that there is no sexual dimorphism in the chelae must be modified, because there is some sexually dimorphic palm width and fixed-finger length. Males exhibit "false hermaphroditism," i.e., gonopores are present on the coxa of P3.

Some of the specimens from Trinidad have only 1 distodorsal spine on the merus of P2, and some of them exhibit absence of or extreme obsolescence of spines on the abdominal sternites. These variants, if compared with variants of *U. omissa* over a broad geographic range, appear to be from a population exhibiting provincial morphology. Much more complete sampling will be necessary before such levels of divergence from norms for the species can be evaluated critically.

Coelho and his associates studied a large series of this species, the most complete listing of which is in Coelho and Rattacaso (1988). They noted ovigerous females in all months of the year except March, July, and September; the material studied here does not alter this finding.

Lemos de Castro and Lima (1975) described a bopyrid isopod, *Parione tropica*, from specimens of *U. omissa* collected in Pernambuco, Brazil, and two other parasitized individuals have been observed (Coelho and Rattacaso, 1988).

### *Upogebia omissago*, new species

FIGURE 25

MATERIAL EXAMINED.—BRAZIL: *Piauí*: USNM 222057, 1 ♀ (holotype), Luis Correia, Praia do Coqueiro, P.S. Young et al., 5 Aug 1982; USNM 251412, 1 ♂ (allotype), same; USNM 251413, 1 ♂, 2 ♀ (paratypes), same.

DIAGNOSIS.—Projections to either side of rostrum ending in acute spine. Postocular spine present. Abdominal sternites unarmed. T subrectangular. Carpus of cheliped with 1 strong and 1 smaller spine on mesiodistal margin. Merus of P2 bearing 1 proximal mesioventral spine and 1 subdistal dorsal spine; merus of P3 with 1 distodorsal spine and rarely a subdistal spine in addition; merus of P4 spineless.

DESCRIPTION.—Rostrum triangular, short, straight to slightly downcurved in lateral view; tip exceeding slightly

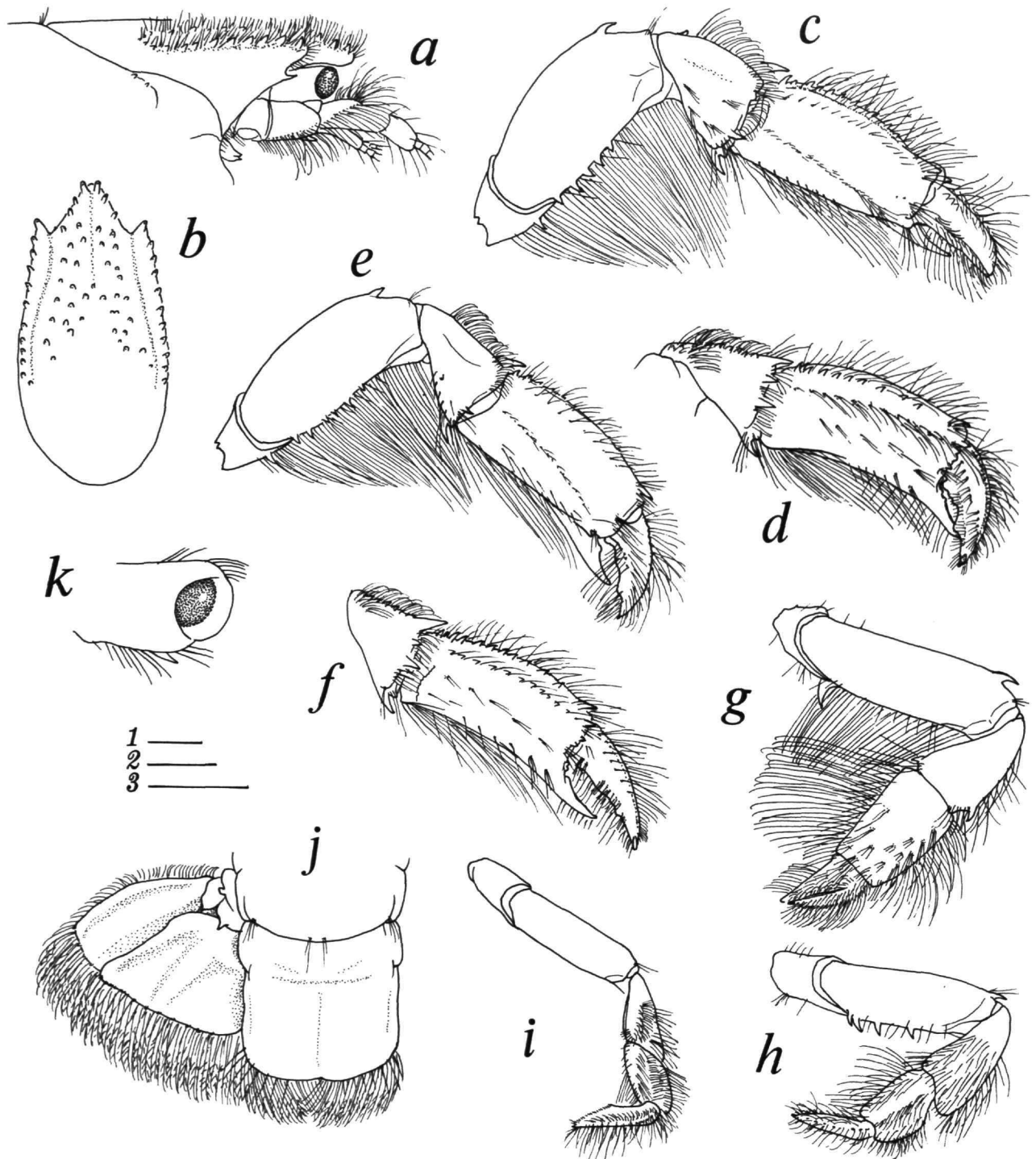


FIGURE 25.—*Upogebia omissago*, new species. *a-d, g, j, i*, USNM 222057, ♀ holotype; *e, f*, USNM 251412, ♂ allotype; *k*, USNM 225413, ♀ paratype): *a*, cephalic region, lateral; *b*, anterior carapace, dorsal; *c*, cheliped right lateral, ♀; *d*, chela and carpus, left mesial, ♀; *e*, cheliped, right lateral, ♂; *f*, chela and carpus, left mesial, ♂; *g-i*, legs 2-4; *j*, parts of abdominal segment 6, telson, and uropods, dorsal; *k*, Right eyestalk showing ventral spine. (Scales = 1 mm: 1 = *a-d, g-i*; 2 = *e, f*; 3 = *k*.)

upturned eyestalks; dorsal pair of strong subapical spines followed on each side by 2–3 often remote spines; posteriorly divergent lateral ridge bearing crest of 11–13 spines, strongest on process lateral to rostrum and decreasing posteriorly. Shoulder lateral to cervical groove usually bearing 2 tubercles, sometimes 1 obsolescent tubercle, below intersection with thalassinidean line. Postocular spine present.

Abdominal sternites unarmed.

T subrectangular, prominent transverse proximal ridge confluent with inconspicuous lateral ridge at each side.

Eyestalk stout, more or less obliquely erect in repose, deepest at about midlength in lateral view, concave dorsally, convex ventral margin variably smooth or bearing 1–2 obsolescent spines, occasionally a single well-developed spine, prominent terminal cornea narrower than diameter of stalk.

A1 peduncle reaching to about  $1/2$  length of terminal article of A2 peduncle, its proximal 2 articles together slightly longer than terminal article.

A2 peduncle with about  $1/3$  its length extending beyond tip of rostrum; article 2 bearing subdistal ventral spine; scale moderate, oval.

Mxp3 bearing epipod.

Epistomial projection rather broad in lateral view, bearing 2 small unequal apical spines.

Chelipeds with coxa bearing flattened, sometimes compound-tipped spine on mesiodistal margin. Ventral margin of ischium bearing 1 spine. Merus with row of 3–6 strong spines on ventral margin, number often bilaterally asymmetrical; subdistal dorsal spine (sometimes asymmetrically doubled) reaching level of postocular spine. Carpus trigonal, shallow longitudinal groove laterally, strong spine at anterior ventrolateral corner preceded by 1–3 much smaller spines; mesiodorsal crest of 5–6 small spines behind prominent dorsal spine on anterior margin partly obscured by setae, and 4–5 short stout spines obscured by setae on anterodorsal margin mesial to articulation with propodus; strong spine near middle of anteromesial margin, slightly smaller spine dorsal to it, and strong slender spine at distoventral corner. Chl about 2.5 times chh; spineless dorsal ridge terminating anteriorly near stout subdistal spine mesial to it; mesiodorsal row of 9–11 spines beginning with more or less erect spines proximally and becoming more or less obsolescent at about  $2/3$ – $3/4$  length; poorly developed distomarginal spine below lateral and mesial dactylar condyles, 2–3 smaller spines ventral to mesial condyle on distal margin; mesial surface spineless, but longitudinal row of setal tufts paralleling mesiodorsal spines and sparser row below this, including 2–3 setal tufts above lower margin near base of fixed finger; low transversely arcuate ridge near proximomesial corner. Fixed finger shorter than dactyl, more slender, and tapering to slender tip, 3–4 teeth on proximal prehensile edge. Dactyl longitudinally ridged and setose; comeous tip in both male and female preceded on prehensile edge by unarmed interval, then strong tooth opposing tip of

fixed finger, preceded in turn by toothed crest increasing proximally to its greatest height in another strong tooth, and toothless section basally; curved extensor surface bearing about 2–3 small tubercles proximally; mesial aspect concave in both sexes.

P2 reaching about to distal  $1/4$  of palm; carpus with acute distodorsal spine and tiny, nearly equal subdistal ventral spine; merus with well-developed subdistal dorsal spine and strong proximal mesioventral spine; coxa with variable blunt spine on proximomesial portion. Merus of P3 with slender distodorsal spine (additional nearly equal-size subdistal dorsal spine on right side in largest female paratype), 3–4 strong ventral spines and cluster of additional spines and spiniform tubercles proximolaterally near ischio-meral articulation; ischium unarmed and coxa with low spine lateral to gonopore. P4 with merus usually unarmed, occasionally a single proximoventral spine; ischium unarmed.

U with acute spine on protopod above base of mesial ramus; lateral ramus with mesial rib bearing blunt spine proximally.

MEASUREMENTS (in mm).—Holotype ♀, acl 6.1, cl 9.3, chl 4.8, chh 1.9; allotype ♂, same, 4.6, 6.5, 3.6, 1.4; largest paratype ♀, same, 7.7, 9.3, 4.8, 1.9.

KNOWN RANGE.—Confined to material examined.

REMARKS.—*Upogebia omissago* lacks sternal spines on the abdominal segments, a feature so characteristic of *U. omissa*. *Upogebia omissago* differs from *U. omissa* in possessing 1 subdistal dorsal spine on the merus of P2 and P3, but the largest female paratype atypically has 2 distodorsal spines on the merus of right P3. *Upogebia omissago* lacks spines on the merus of P4, whereas the merus of this leg in *U. omissa* almost always bears spines on the ventral margin, and occasionally does in *U. inomissa*. General spination of the carpus and palm of the cheliped of *U. omissago* is much as in *U. omissa*, but spines of the mesiodorsal row are larger than in the latter; the pattern of spines on the fingers is the same in the two sexes of *U. omissago*, whereas males have stouter, more heavily toothed fingers in *U. omissa*. The eyestalk of *U. omissago* tends to be spined ventrally, whereas it is unspined in both *U. omissa* and *U. inomissa*.

The geographic range of *Upogebia inomissa* seems to be confined to the northern Gulf of Mexico and southern peninsular Florida, north of the much more widely distributed *U. omissa*, which ranges from the Dominican Republic to southern Brazil. *Upogebia omissago* is known at present from a single locality in the Brazilian state of Piauí, well within the range of *U. omissa*. At first, I tried to fit all three of these forms into a single taxonomic entity, the presumed parent species, *U. omissa*, calling the two less-widely distributed forms mere variants of it. However, each of the two “variants” has a suite of characters that separates it from the fairly widespread sample set of *U. omissa*; therefore, it seems best to regard each of the forms as specifically distinct.

ETYMOLOGY.—A Neo-Latin noun in apposition, derived from the Latin *omissa* plus the suffix *-ago* (resembling).

*Upogebia paraffinis*, new species

FIGURE 26

*Upogebia affinis*.—Rathbun, 1900:151 [NE Brazil].—Williams, 1965a:103 [part, Brazilian distrib.]; 1974b:41 [same]; 1984a:191 [same]; 1986:12 [same].—Coelho, 1966:163, 168 [estuarine distrib.]; 1970:56 [same].—Gomes Corrêa, 1968:107 [Brazilian specimens, not figs. 16–21, 30, 31], 108 [key, part].—Coelho et al., 1970:508 [ecol., distrib.].—Thistle, 1973:1–14, 23 [part, Brazilian distrib.].—Williams and Wigley, 1977:9 [part, Brazilian distrib.].—Coelho and Ramos-Porto, 1987:33 [key, part], 36 [Brazilian distrib.].

*Upogebia (Upogebia) affinis*.—De Man, 1927:50 [part, Brazilian specimens]; 1928:22 [list, habitat, Brazilian specimens], 45, 46 [key appl. to Brazilian material].—Schmitt, 1935:196 [Brazilian distrib.].—Coelho and Ramos, 1972:163 [Brazilian distrib.].—Coelho and Rattacaso, 1988:383 [key, part], 384 [Brazilian distrib., ecol.].

MATERIAL EXAMINED.—BRAZIL: Ceará: MZUSP 8054, 1 ♂ (paratype), Ponta do Trapia, Camocim, Paulo Young, 6 Aug 1982. Paraíba: USNM 22055, 1 ♂, 1 ♀ (paratypes), Cabedelo, Rio Paraíba do Norte estuary, Ilha da Restinga, M.L. Christofferson, 13 May 1980. São Paulo: MZUSP 9103, 1 ♀, Praia do Codo, Saco da Ribera, Ubatuba, in *Halodule wrightii*, Jul 1986; MZUSP 8049, ♂ (holotype), 1 ♀ (allotype), Praia do Araçá, São Sebastião, S. Rodrigues, 10 Nov 1966; MZUSP (unnumbered), 1 ♂, 4 ♀ (2 ovig.) (paratypes), Praia do Araçá, São Sebastião, J.A. Peterson, 11 Nov 1966.

DIAGNOSIS.—Rostrum almost always with anteriorly projecting spine terminating ventral row of spines. Projections to either side of rostrum ending in strong spine. Postocular spine present. Abdominal sternites unarmed. T subrectangular. Carpus of cheliped with 2 very strong spines below mesiodorsal spine on mesiodistal margin. Merus of P2 with proximal mesioventral spine and 1 subdistal dorsal spine; merus of P3 with ventrolateral cluster of spines; merus of P4 spineless.

DESCRIPTION.—Rostrum triangular, slightly broader at base than long, slightly downturned; median ventral keel bearing 2–3 variably developed spines, anteriormost usually projecting strongly forward, usually exceeding eyestalks in normal position by  $\frac{1}{3}$ – $\frac{1}{2}$  their length; dorsal pair of subapical spines followed on each side by 2–4 often asymmetrically arranged spines; middorsal area spineless; posteriorly divergent lateral ridge bearing crest of about 12 spines, strongest on process lateral to rostrum and decreasing almost to obsolescence posteriorly. Shoulder paralleling cervical groove bearing 1 spine below intersection with thalassinidean line. Postocular spine present.

Abdominal sternites unarmed.

T with well-developed median furrow, distal margin biarcuate; transverse proximal ridge confluent with lateral ridges unspined.

Eyestalk stout, deepest at about midlength, convex ventrally, almost straight dorsal side sometimes bearing 1 or 2 small spines and 1 or 2 tiny spines on basal flange; prominent terminal cornea narrower than diameter of stalk and directed ventrolaterally.

A1 peduncle reaching to about midlength of terminal article

of A2 peduncle, its proximal 2 articles together slightly longer than terminal article, proximal article with small distoventral angle mesially.

A2 peduncle with about  $\frac{1}{3}$  its length extending beyond tip of rostrum; article 1 usually spineless ventrally, but sometimes bearing acute spine; article 2 bearing strong subdistal ventral spine; scale moderate, oval.

Mxp3 bearing epipod.

Epistomial projection rather broad in lateral view, bearing 1 strong spine at distodorsal corner.

Chelipeds with coxa in male bearing small spine on mesiodistal margin. Ventral margin of ischium usually bearing 1 strong spine, occasionally 2. Merus with row of 4–5 strong spines on ventral margin, distal ones sometimes diminishing in length, subdistal dorsal spine reaching level of postocular spine. Carpus trigonal, shallow longitudinal groove laterally, strong spine at anterior ventrolateral corner preceded by 1–3 spines (sometimes worn or suppressed); mesiodorsal crest of 5–7 almost uniform moderate spines leading to prominent spine on anterior margin, short strong dorsal spine or pair of unequal spines near articulation with merus partly obscured by setae; 2–3 strong spines on anterodorsal margin mesial to articulation with propodus; strong spine near middle of anteromesial margin, nearly equal spine dorsal to it, and very strong spine near distoventral corner. Ch1 about 1.8 times chh in male, about 2.5 times in female; spineless dorsal ridge with erect dorsal spine or pair of spines near its proximal end; mesiodorsal row of strong spines, more erect proximally than distally and sometimes irregular in size and position, those on female variable in size and becoming obsolescent distally; strong spine below lateral dactylar condyle, reinforced distal margin below mesial dactylar condyle bearing spine and 3–4 rounded spines below it in fully adult male, less well developed in female and immature male; mesial palmar surface bearing arched upper row of obsolescent spines, and male with irregular lower row of spines in proximal  $\frac{1}{2}$  (obsolescent in female), ventral keel bearing row of 3–4 spines proximal to base of fixed finger, low transversely arcuate beaded ridge near proximomesial corner. Fixed finger shorter than dactyl and more slender, continuing contour of lower margin of palm, although slightly bowed ventrally, and tapering to strong rounded tip in male, slender acute tip in female, 3–7 small teeth on proximal prehensile edge. Dactyl tip in male (rarely corneous) preceded on prehensile edge by tooth at  $\frac{2}{3}$  length opposing tip of fixed finger, then row of about 5 closely crowded ragged teeth ending proximally in larger tooth at proximal  $\frac{1}{4}$  of length (sometimes only few large teeth in this row), and toothless section basally; arched extensor surface bearing rows of closely crowded beaded granules separated by grooves and/or dense setae, 1–2 dorsal spines or tubercles proximally but row becoming obsolescent distally, rows of similar beaded granules on mesial and submesial surfaces; corneous tip in female preceded by slightly curved prehensile edge, strong tooth at  $\frac{1}{2}$  length opposing tip of fixed finger,

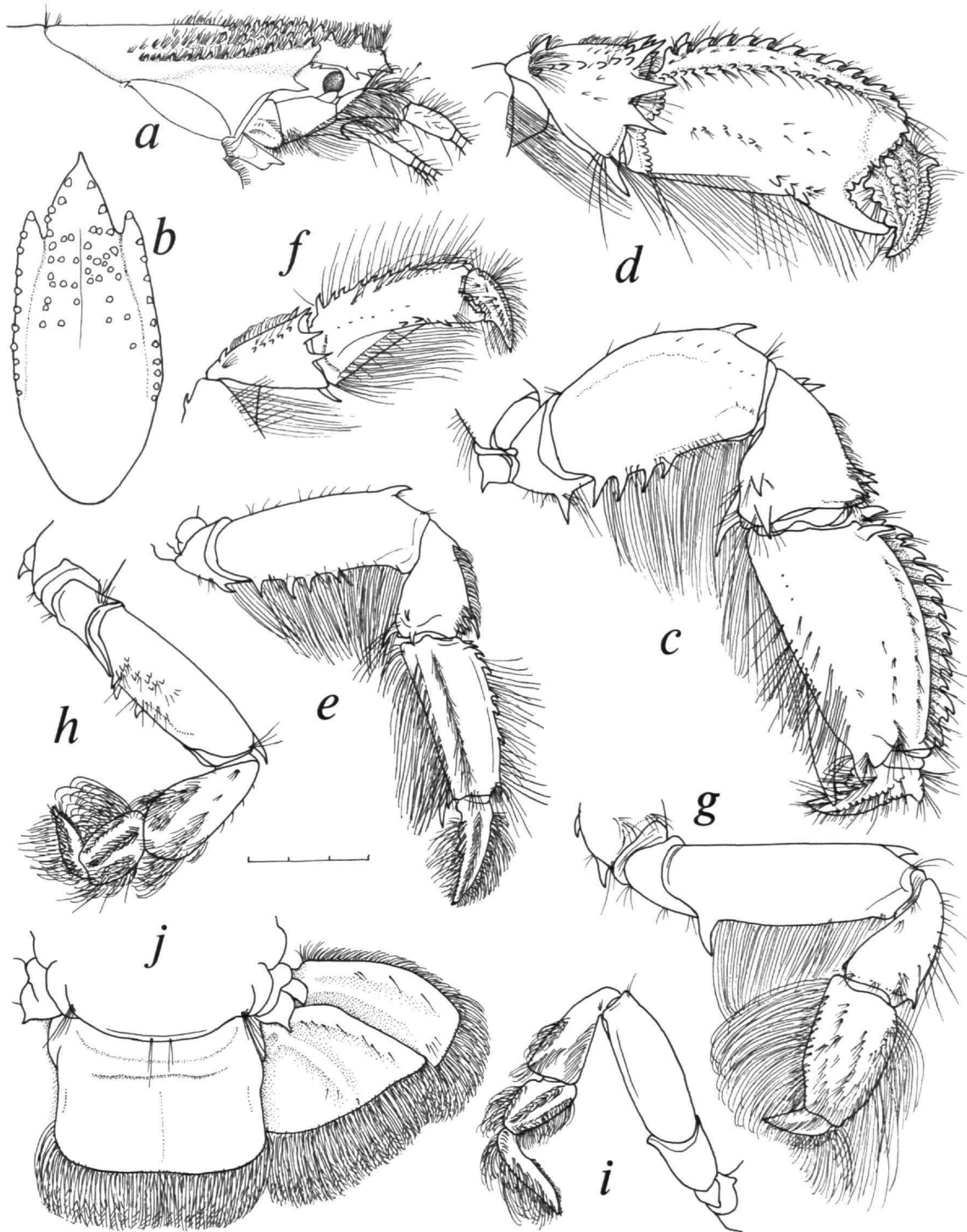


FIGURE 26.—*Upogebia paraffinis*, new species (USP 8049, *a-d, g-j*, ♂ holotype; *e, f*, ♀ allotype): *a*, cephalic region, lateral; *b*, anterior carapace, dorsal; *c*, cheliped, right lateral, ♂; *d*, chela and carpus, left mesial, ♂; *e*, cheliped, right lateral, ♀; *f*, chela and carpus, left mesial, ♀; *g-i*, legs 2-4; *j*, parts of abdominal segment 6, telson, and uropods, dorsal. (Scale = 3 mm.)



proximal to this a section with obscure small teeth, large tooth at  $\frac{1}{4}$  length, and toothless section basally.

P2 reaching about to distal  $\frac{1}{4}$  of palm; carpus with distodorsal spine and tiny acute or obsolescent subdistal ventral spine; merus with slender subdistal dorsal spine and strong proximal mesioventral spine; coxa with 2 acute spines of variable strength on mesial aspect. Merus of P3 with cluster of spines and spiniform granules ventrolaterally on proximal  $\frac{1}{2}$ , and strong distodorsal spine; coxa with low spine lateral to gonopore and minute spine on distomesial margin. P4 usually with spineless merus, rarely with 2 tiny lateral spines near ischium.

U with spine on protopod above base of mesial ramus; mesial rib of lateral ramus bearing an often blunt spine proximally; distal margin of rami bearing no granules.

MEASUREMENTS (in mm).—Holotype ♂, acl 8.2, cl 12.3, chl 6.9, chh 3.7.

KNOWN RANGE.—Known only from the material examined.

REMARKS.—*Upogebia affinis* has long been regarded as having a distribution ranging from the State of Massachusetts in the northeastern United States to Estado de São Paulo, Brazil (summarized in Williams, 1984b). Review of specimens from over this broad range shows that the pattern of spination is similar throughout, with variations, but the strength of spination is distributed individually or in distinct populations. The northern *U. affinis*, sensu stricto, generally is less strongly spined than the southern *U. paraffinis*. I regard these as two distinct species on the basis of spine strength alone. Aside from general spine development, which is difficult to quantify in keys for identification, the rostrum of *U. paraffinis* almost always has a prominent anteriorly directed terminal spine that is separated from the most anterior of the ventral rostral spines. Spines in this position, if present in *U. affinis*, are usually in an inferior position, not terminal. Moreover, presence or absence of granules on the distal margin of the uropods, a character usually relegated to secondary status, separates the two species; granules are present on *U. affinis*, but absent on *U. paraffinis*, the opposite of what one would expect on the basis of overall strength of ornamentation.

ETYMOLOGY.—From the Latin *par* (equal or like), plus *affinis*, for its nearest congener.

### *Upogebia pillsbury*, new species

FIGURE 27

MATERIAL EXAMINED.—COLOMBIA: USNM 251435, 1 ♂ (holotype), Caribbean Sea off Cabo Tiburon, 08°41'N, 77°13'W, 57 m, R/V *Pillsbury* sta 412, 40-ft otter trawl, 18 Jul 1966; USNM 251436, 1 ♀ ovig. (allotype), same; USNM 251437, 5 ♂, 7 ♀ (4 ovig.) (paratypes), same.

DIAGNOSIS.—Projections to either side of rostrum ending in acute spine. Multiple spines and tubercles on postocular margin. Abdominal sternites unarmed. T subrectangular. Merus of cheliped with row of spines on both dorsal and ventral

margins; carpus with erect mesiodistal dorsal spine and 1 strong spine on mesiodistal margin. Merus of P2 lacking proximal mesioventral spine, but with 2 or 3 distodorsal spines, carpus with 4 or 5 dorsal spines and 1 distoventral spine. Merus of P3 with row of spines on dorsal and ventral margins; merus of P4 with cluster of ventrolateral spines and 1 dorsal spine or tubercle.

DESCRIPTION.—Rostrum linguiform, straight in lateral view, long, tip exceeding eyestalks by interval equal to their length; oblique ridge at either side of minutely granulate, rounded tip bearing 2–3 strong, erect spines curved slightly backward; median ventral keel bearing 5–6 spines curved anteroventrally. Pilose-armed field on anterior carapace arranged in row of about 10 short spines to either side of median furrow on rostrum and anterior gastric region, partly obscured by long setae, with row diverging posterolaterally on gastric region and continuing with 7–8 spines on edge of broad furrow lateral to it; gastric region with scattered small spines mesial to lateral row, but posterior region glabrous. Lateral ridge extended into process lateral to rostrum bearing crest of 8 spines on anterior  $\frac{1}{2}$ , and behind interruption at level of gastric region, 8 more spines on posterior divergent part. Shoulder lateral to cervical groove bearing about 4 spines above intersection with thalassinidean line, and 8–9 spines below this juncture; thalassinidean line continuing uninterrupted to posterior margin; gastroorbital region of carapace armed with 4 or 5 sharp spines and additional obsolescent spines; scattered spines variably developed above and below thalassinidean line between cervical and postcervical grooves, on anterior part of branchiostegite, and along ridge below hepatic groove. One or 2 postocular spines present, and other smaller variable spines on postocular margin.

Abdominal sternites unarmed.

T subrectangular, posterior margin shallowly biarcuate; slightly granular transverse proximal ridge, followed by cluster of obsolescent granules, confluent with lateral ridge at each side, bearing 1 or 2 small or obsolescent spines on anterior part and scattered obsolete spines or tubercles posteriorly; lateral margin bearing variably obsolescent granules or spines.

Eyestalk stout, horizontal, reaching midlength of rostrum; slight ventral angle in line with base of cornea and with obsolescent angle on dorsal margin, prominent terminal cornea narrower than diameter of stalk.

A1 peduncle reaching to about  $\frac{1}{2}$  length of terminal article of A2 peduncle, its proximal 2 articles together slightly longer than terminal article; basal article bearing distoventral spine, middle article sometimes with ventral spine.

A2 peduncle with terminal article extending beyond tip of rostrum; article 2 bearing slender, curved, subdistal ventral spine and 2 smaller dorsal spines; third article with 2 slender curved ventral spines; moderate scale bearing anterolateral spine.

Mxp3 bearing epipod.

Epistomial projection rather broad in lateral view, bearing

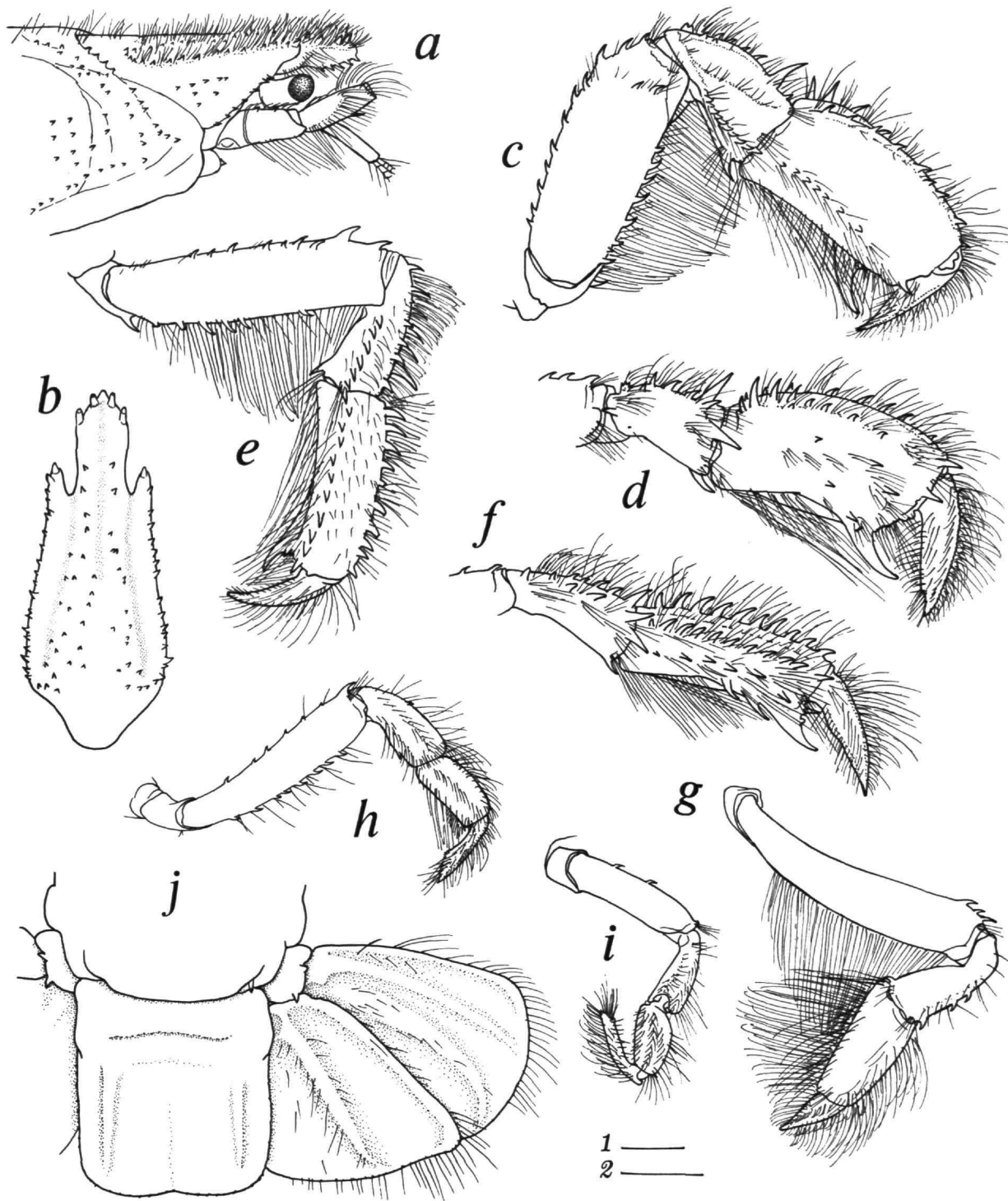


FIGURE 27.—*Upogebia pillsburyi*, new species (a-d, g-j, USNM 251435, ♂ holotype; e, f, USNM 251436, ♀ allotype): a, cephalic region, lateral; b, anterior carapace, dorsal; c, cheliped, right lateral, ♂; d, chela and carpus, left mesial, ♂; e, cheliped, right lateral, ♀; f, chela and carpus, mesial, ♀; g-i, legs 2-4; j, parts of abdominal segment 6, telson, and uropods, dorsal. (Scales = 2 mm: 1 = a,c,d, g-i; 2 = b,e,f,j.)

prominent apical spine.

Chelipeds much more massive in male than in female. Basis bearing mesial angle. Ventral margin of ischium bearing 1 spine. Merus with row of about 10 strong spines on ventral margin; about 10–12 less-erect spines on dorsal margin, except for distal 3 or 4 stronger spines reaching well beyond level of major postocular spines; an oblique row of spines leading from dorsal margin to lateral merocarpal condyle. Carpus trigonal, shallow longitudinal groove laterally, strong spine at anterior ventrolateral corner preceded by variable row of spines; mesiodorsal crest of 4–6 spines running from mesial merocarpal condyle to base of erect dorsal spine on anterior margin, short stout spine on anterodorsal margin mesial to articulation with propodus; strong spine on anteromesial margin and strong slender spine near distoventral corner. Chl about 2.5 times chh; dorsal row of 7–10 spines paralleled by mesiodorsal row of 8–10 spines more or less erect, strong proximally but becoming smaller or sometimes obsolescent distally, field of 4–8 or more scattered spines on mesiodistal surface below this; distomarginal spine below lateral and mesial dactylar condyles, extremely strong spine on distal margin ventral to mesial condyle, then row of about 10 smaller spines leading to hooked fixed finger shorter than dactyl and ending in slender tip. Dactyl hollowed on flexor surface but longitudinally ridged on extensor surface and setose, tip corneous.

P2 reaching about to distal  $\frac{1}{4}$  of palm; carpus with 3–5 acute distodorsal spines and nearly equal subdistal ventral spine; merus with 2–3 slender distal spines on dorsal margin; coxa with proximal and distal raised areas mesially but no spines. Merus of P3 with 7–8 spines on ventral margin and 5–6 spines on dorsal margin, distal spines strongest; carpus with 0–2 tiny dorsal spines and ventral spine. Merus of P4 bearing 2–6 obsolescent ventrolateral spines or tubercles and 1 similar spine on middle of dorsal margin.

Two arthrobranchs arranged in 2 biserial rows of divided (rod-like) lamellae on Mxp3 and P1–4.

U with moderately acute spine on protopod above base of mesial ramus; lateral ramus with mesial rib bearing similar spine proximally; both rami exceeding telson.

MEASUREMENTS (in mm).—Holotype ♂, acI 9.2, cl 15.0, chl 6.4, chh 3.1; allotype ♀, same, 7.2, 11.3, 5.5, 1.7.

KNOWN RANGE.—Confined to material examined.

REMARKS.—*Upogebia pillsbury*, new species, one of the most distinctive species among western Atlantic members of the genus, seems to have a number of characters shared with other species. The linguiform rostrum with ventral spines bears some resemblance to that of *U. bermudensis* and to species of the Indo-Pacific genus *Gebiacantha* Ngoc-Ho, 1989a, although western Atlantic species with rostra more typical of *Upogebia* also have ventral spines (*U. spinistipula*, *U. affinis*, *U. felderi*, and *U. paraffinis*). Numerous spines on the anterolateral margin and along the cervical groove give it some resemblance to *U. jamaicensis*, although it is spinier than that species. The legs are long, longer than in *U. annae* and *U. casis*, and spinier

than any other species in the region. The uropods of *U. pillsbury*, *U. spinistipula*, and *U. bermudensis* overreach the telson, but the former two have a well-developed proximoventral spine on the merus of P2, whereas the latter lacks it. The arthrobranchs of *U. pillsbury* are arranged in two biserial rows of divided (rod-like) lamellae on Mxp3 and P1–4, whereas those of *U. bermudensis* appear to be arranged in biserial rows of undivided lamellae, and those of *U. spinistipula* seem intermediate between these types, being undivided but somewhat rod-like rather than flattened lamellae. The species thus exhibits a complex of specializations.

ETYMOLOGY.—The species name, from the University of Miami R/V *Pillsbury* whose cruises produced many collections of Upogebiidae, is treated as a noun in apposition.

### *Upogebia spinistipula* Williams and Heard, 1991

FIGURES 28, 29

*Upogebia spinistipula* Williams and Heard, 1991:49, figs. 2, 3.

MATERIAL EXAMINED.—U.S.A.: Florida: FDNR EJ67315, 1 ♀, Gulf of Mexico, Hillsborough Co., 65 mi W Egmont Key, 27°37'N, 83°58'W, 55 m, R/V *Hernan Cortez* Hourglass Cruise HC43, sta D, dredge, R. Presley, 1 Sep 1967; USNM 239251, ♂ (holotype), MAFLA sta 2211, 27°56'29.5"N, 83°52'59.5"W, coarse sand, 43 m, Nov 1977; USNM 239252, ♀ (allotype), same, Jul 1976; USNM 239260, 11 ♂, 7 ♀ (2 ovig.), 1 juv. (paratypes), same, Jul 1975 (4 ♂ and 2 ♀ ovig. transferred to GCRL); USNM 239261, 2 ♂, 2 ♀ ovig., 2 other frags. (paratypes), same, Jul 1976; USNM 239262, 1 ♀ ovig. (paratype), same, Feb 1978; USNM 239265, detached legs, MAFLA sta 2211, 9 Aug 1977 and Feb 1978; USNM 239253, 3 ♀ ovig and 1 probable ♂ (paratypes), MAFLA sta 2528, 29°54'58.6"N, 86°04'58.5"W, coarse sand, 37 m, Feb 1977; 1 ♂ cephalothorax, same, Sep 1977; 2 ♀ (1 ovig.) (paratypes), same, Feb 1978; USNM 239254, 3 ♀ (1 frag.) (paratypes), MAFLA sta 2531, 29°47'58.9"N, 86°09'28.9"W; coarse sand, 45 m, 7 Feb 1976; 1 juv., same, Nov 1977; USNM 239255, 1 tiny cephalothorax, MAFLA sta 2532, 29°46'N, 86°12.5'W, coarse sand, 52 m, Jul 1976; USNM 239256, 1 ♀ ovig. (paratype), MAFLA sta 2533, 29°42'59.9"N, 85°15'28.6"W, coarse sand, 67 m, 26 Sep 1975; 1 tiny juv. (paratype), same, 8 Feb 1976; USNM 239257, 1 ♂ (paratype), MAFLA sta 2534, 29°40'N, 86°17'W, coarse sand, 73 m, Jul 1976; USNM 239258, 1 juv. (paratype), MAFLA sta 2419, 29°46'59.8"N, 84°05'00.2"W, medium fine sand, 10 m, Sep 1977; USNM 239259, 1 ♂ (paratype), MAFLA sta 2313, 28°23'59.3"N, 85°15'03.0"W, clayey, sandy silt, 177 m, 20 Jan 1976; USNM 239263, 4 juvs. (2 frags.) (paratypes), MAFLA sta 2748, 27°37.2'N, 83°53.5'W, coarse sand, 50 m, Jul 1976; 1 ♂, 2 ♀ (paratypes), same, Nov 1977; 1 juv. frags. (paratype), same, Feb 1978; USNM 239264, 1 postlarva (paratype), MAFLA sta 2959, 25°40'N, 83°05'W, silty, very fine sand, 60 m, 9 Aug 1977.

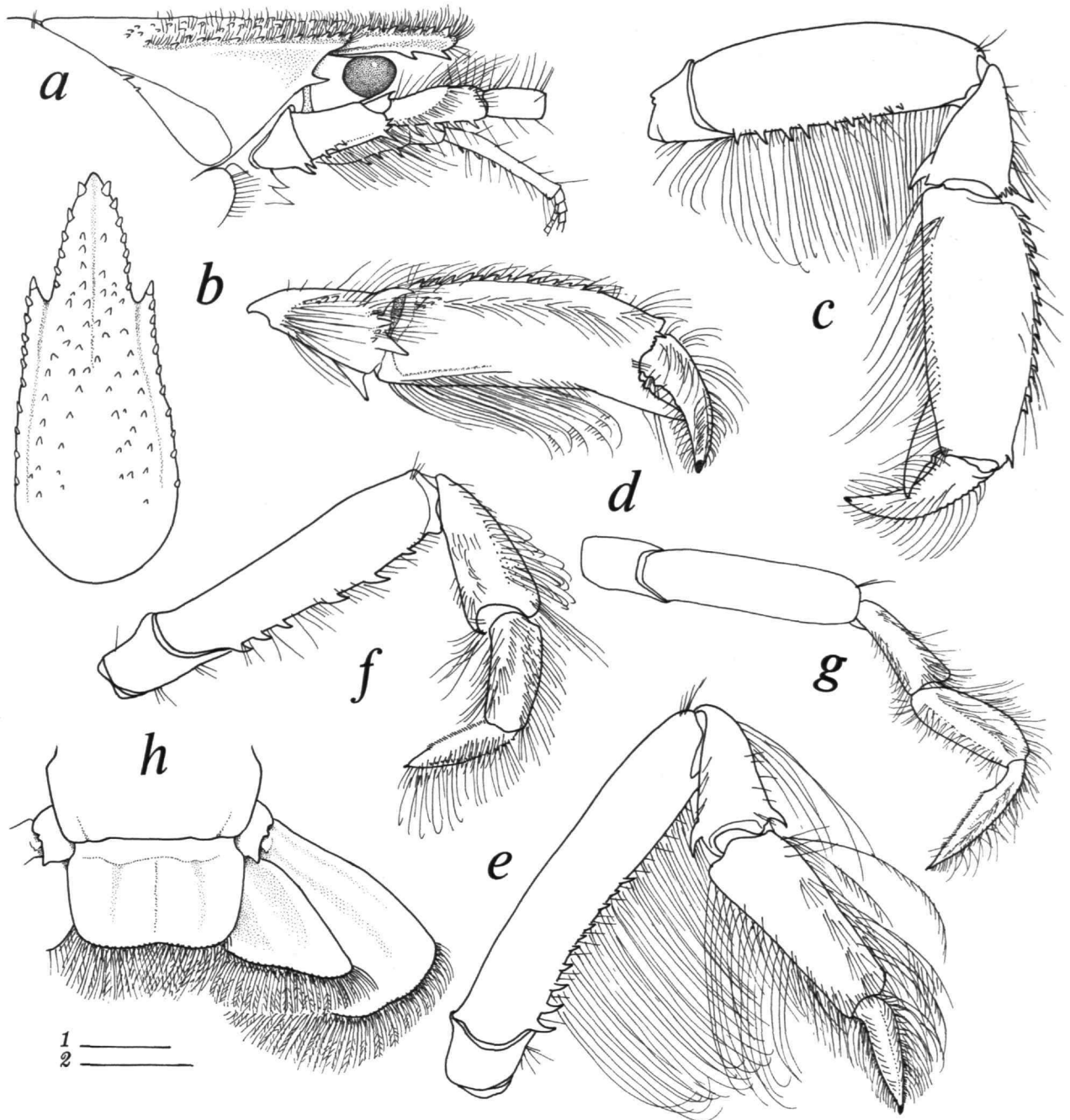


FIGURE 28.—*Upogebia spinistipula* Williams and Heard, USNM 239251, ♂ holotype (from Williams and Heard, 1991): a, cephalic region, lateral; b, anterior carapace, dorsal; c, cheliped, right lateral; d, chela and carpus, left mesial; e-g, legs 2-4; h, parts of abdominal segment 6, telson, and uropods, dorsal. (Scales = 1 mm: 1 = a,c,h; 2 = b, d-g.)

**DIAGNOSIS.**—Rostrum elongate subtriangular, bearing subapical pair of strong spines followed on each side by 5-7

strong spines. Projections to either side of rostrum ending in acute spine. Postocular spine present. Abdominal sternites

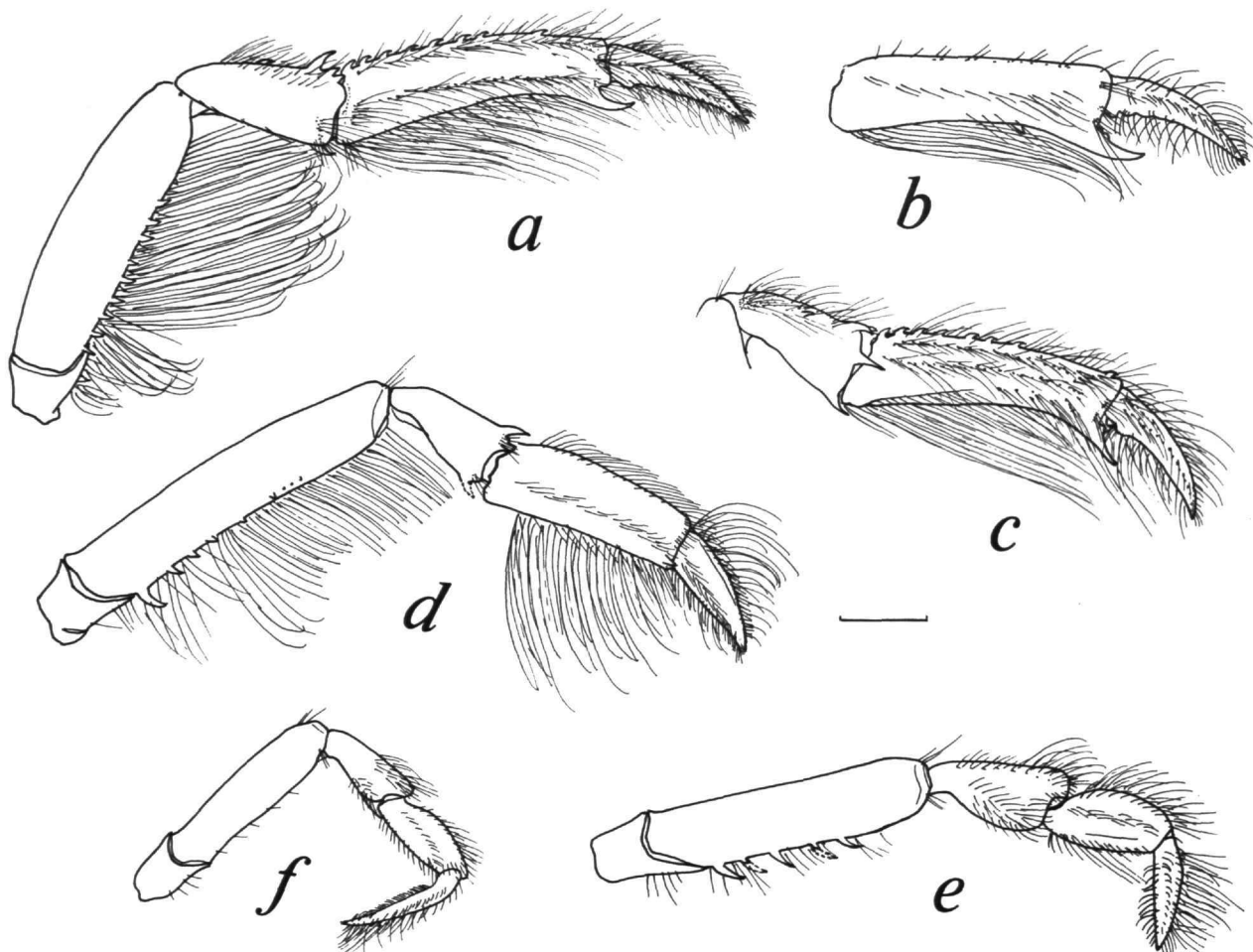


FIGURE 29.—*Upogebia spinistipula* Williams and Heard, USNM 239260, ♀ paratype: a, cheliped, right lateral; b, right chela rotated slightly to show ventral spine on palm; c, chela and carpus, left mesial; d-f, legs 2-4. (Scale 1 mm.)

unarmed. T subrectangular, posterior margin with slight concavity. A1 and A2 peduncles each bearing irregular row of ventral spines. Merus of cheliped lacking subdistal dorsal spine, carpus with 2 very small subequal spines on anteromesial margin. Merus of P2 with proximal mesioventral spine; merus of P4 spineless.

**DESCRIPTION.**—Rostrum subtriangular, narrow, straight in lateral view, tip exceeding eyestalks by distance at least  $\frac{3}{4}$  their length; dorsal pair of strong, subapical spines followed on each lateral margin by 5-7 strong spines, ventral midline bearing 2-3 subapical ventral spines; dorsal surface bearing spiniform tubercles arranged more or less parallel to each lateral margin and confluent with field of similar spines on anterior  $\frac{2}{3}$  of cephalic region; posteriorly divergent lateral ridge bearing crest

of about 8-10 spines, strongest on lateral rostral process and decreasing to obsolescence posteriorly. Shoulder flanking cervical groove bearing 1 or 2 spines below intersection with thalassinidean line; latter continued to posterior margin of carapace with slight interruption. Postocular spine present.

Abdominal sternites unarmed, tergites glabrous, very few setae on margin of pleura III-V.

T subrectangular, obsolescent transverse anterior ridge confluent with broader lateral ridge at each side, posterior margin with shallow concavity.

Eyestalk stout, concave dorsally, convex ventrally in lateral view; cornea as broad as distal diameter of stalk, directed anteriorly and laterally.

A1 peduncle reaching slightly beyond terminal article of A2

peduncle, its proximal 2 articles together slightly shorter than terminal article; uneven row of spines on ventral margin of articles 1, 2, and proximal  $\frac{1}{2}$  of 3.

A2 peduncle with more than  $\frac{1}{3}$  its length (terminal and distal part of penultimate article) extending beyond tip of rostrum, row of spines on ventrolateral margin of articles 1 and proximal part of 2, ventromesial spines on article 2 continued as ventral row on article 3; scale moderate, triangular, tapered to acute terminal spine; flagellum reaching beyond branchiostegite.

Mxp3 without epipod.

Epistomial projection subquadrate in lateral view, bearing 2 strong spines on anterodorsal corner.

Chelipeds with coxa bearing slender anteriorly hooked spine on posteromesial margin. Ventral margin of ischium spineless. Merus lacking subdistal dorsal spine, row of 9–11 slender variably sized and arranged spines or tubercles on ventral margin. Carpus trigonal, shallow longitudinal groove laterally, lacking submarginal spine at anterior ventrolateral corner; mesiodorsal crest of 3 moderate to strong spines behind prominent spine on anterior margin, 3 moderate spines on anterodorsal margin mesial to articulation with propodus; strong spine near middle of anteromesial margin and occasionally 1 or 2 smaller spines on margin above it, male sometimes with tubercles on proximomesial surface near anteromesial spines. Chl about 2.4 times chh in male, 5.5 times that in female; male with obsolescent dorsal ridge, mesiodorsal row of forwardly bent or hooked spines paralleling this, and on proximomesial margin beneath overhanging prominent anterodorsal spine of carpus an S-shape row of spiniform tubercles; distomarginal spine below mesial dactylar condyle, 1–3 smaller spines ventral to this on distal margin; female with lower mesial surface usually spineless, but male often with spine on ventral margin of palm about  $\frac{2}{3}$  distance from proximal margin; low ridge running obliquely anteriorly from heel of palm to become obsolescent at midlength. Fixed finger short, slender, slightly downcurved in middle and tapering to slender tip, 2–5 obsolescent teeth on proximal prehensile edge. Dactyl far overreaching fixed finger, setose; toothless tip corneous.

P2–5 elongate and slender. P2 reaching about to distal  $\frac{1}{4}$  of palm; carpus with slender, acute distodorsal spine and similar but smaller subdistal ventral spine; merus without subdistal dorsal spine, proximal mesioventral spine succeeded distally by 5–7 spines diminishing in size along row; coxa with strong proximomesial spine. P3 with merus bearing ventral row of 5–9 spines; ischium unarmed; coxa of female with flange-like low spine lateral to gonopore. P4 with merus and ischium unarmed.

Two arthrobranchs arranged in 2 biserial rows of undivided (entire but rather rod-like) lamellae on Mxp3 and P1–4.

U with ovate lateral ramus far overreaching subtriangular mesial ramus, tiny acute spine on protopod above base of mesial ramus.

MEASUREMENTS (in mm).—Holotype ♂, acl 6.8, cl 10.9, chl

7.7, chh 2.8; allotype ♀, same, 4.0, 6.8, 2.8, 0.77.

KNOWN RANGE.—Discovered in box core samples taken on the continental shelf of the northeastern Gulf of Mexico. The collections were part of a Minerals Management Service sponsored study referred to as the Mississippi-Alabama-Florida (MAFLA) Outer Continental Shelf Study. Specimens first came from 11 of the 87 MAFLA stations distributed in 9 transects that were sampled for benthic infauna. The species has been taken at stations scattered from southeast of Panama City, Florida, to west of Cape Romano in water depths ranging from 10 to 177 m.

REMARKS.—*Upogebia spinistipula* has an essentially retangular telson, being morphologically similar in this respect to the majority of upogebiid species in the western hemisphere, but it is overreached by the uropodal exopod. The species also differs from western Atlantic congeners in other respects. The spiny antennular and antennal peduncles, for which the species is named, are shared by no other known representatives in the region, but these articles are spined in the recently erected *Gebiacantha* Ngoc-Ho, 1989a, which contains several species from the Indo-West Pacific region. *Gebiacantha acutispina* (de Saint Laurent and Ngoc-Ho, 1979) and *G. reunionensis* Ngoc-Ho, 1989a are perhaps closest to *U. spinistipula* with respect to these structures. The relatively smooth chelipeds of *U. spinistipula*, however, are devoid of the strong ventral spines characteristic of all *Gebiacantha* species.

The long slender rostrum of *U. spinistipula* bears some resemblance to that of *U. lepta* Williams, 1986, from the eastern Pacific, but the dorsal surface of the rostrum of the former bears small spines in addition to those along the rostral margin, whereas the dorsal surface, except for the margin, is spineless in *U. lepta*. *Upogebia spinistipula*, therefore, seems to stand apart in a number of respects from other species in the family.

### *Upogebia vasquezi* Ngoc-Ho, 1989

FIGURES 30, 31

*Upogebia affinis*.—Schmitt, 1936:375 [inferred occurrence].

*Upogebia vasquezi* Ngoc-Ho, 1989b:866, figs. 1, 2.—Markham et al., 1990:424 [distribution].

MATERIAL EXAMINED.—U.S.A.: Florida: USNM 251200, 1 ♀, St. Lucie Co., Ft. Pierce, Indian River, N side Fort Pierce Inlet, S side Coon Island, 27°28.2'N, 80°18.2'W, muddy, hard packed sand along shore, yabby pump, R.B. Manning FP-85-7, M.L. Reaka, W.D. Lee, H. Reichardt, 14 Aug 1985; USNM 251201, 1 ♀, same, R.B. Manning FP-88-3, W.D. Lee, M. Schotte, C. King, 21 Apr 1988; USNM 251240, 1 ♀, Indian River, Fort Pierce Inlet, 27°27'42"N, 080°18'42"W, on sandy flats with seagrass, exposed at low tide, yabby pump, R.B. Manning FP-89-4, R. Brown, W.D. Lee, 1.2 m (4 ft), 11 Aug 1989; USNM 251668, 2 ♂, Broward Co., John U. Lloyd State Park Beach Restoration Project, C. Messing, sta II-BA, Feb