

**New records of marine Isopoda from Cuba (Crustacea: Peracarida)**

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*Abstract.*—Seven new species are described from localities on both the north and south coasts of Cuba: *Cyathura (Cyathura) esquivel*, *Mesanthura frances*, *Joeropsis juvenilis*, *Joeropsis unidentata*, *Dynamenella nuevitas*, *Paraimene ibarzalalae*, *Paraimene tumulus*. Several new records, including *Carpias harrietae*, *Caecijaera horvathi*, and *Sphaeromopsis mourei* are noted. The material was collected from a range of habitats, including shallow coral reefs, mangroves, seagrass beds, coastal lagoons, river mouths, rocky and sandy shore inter-/and shallow infratidal areas.

Knowledge of the marine, freshwater, and cave isopod fauna of Cuba has grown slowly, from the earliest records of two species of *Aega* by Schioedte & Meinert in 1879. Numerous short papers, often describing a single species, have accumulated over the years. The first cave isopod was described by Hay in 1903; since then several additional species especially in the genus *Cyathura* have been added to the list. Coineau & Botosaneanu (1973) produced the only report on interstitial isopods from Cuba. Ortiz et al. (1987) provided an updated list of Cuban isopods along with a bibliography. From the relatively small number of species in this list, it is obvious that many more await discovery, as many regions of the island's shallow and deep waters have not been collected. In an attempt to fill some marine distributional gaps, and to document the diversity of several groups of shallow water marine organisms, two collecting trips, in April 1994, and May/June 1995, were carried out jointly by Cuban and Smithsonian Institution scientists. This work was sponsored chiefly by the Center for Marine Conservation, Washington, D.C. The 1994 trip was based aboard the *R/V Ulises*, which travelled along the north coast through the Archipiélago de Camagüey as far as Bahía de Nuevitas, stop-

ping at several localities to carry out intensive sampling. The 1995 trip was to the south-western part of the island, mainly in the region around the Isla de la Juventud.

The material reported in this paper was collected primarily by the authors, although several other individuals assisted. K-CUBA station numbers refer to field notes for the two trips. Holotypes have been deposited in the Centro Colecciones Naturales Marinas, Instituto de Oceanología (IO), Havana, Cuba; paratypes and additional materials are deposited in both the CCNM and the National Museum of Natural History (USNM), Smithsonian Institution. An annotated checklist of the marine isopod fauna of Cuba is being compiled, based on a variety of sources of material.

Dimensions in millimeters are always total length measured along the dorsal midline.

## Systematic Section

Suborder ANTHURIDEA Leach, 1814

Family Anthuridae Leach, 1814

*Cyathura (Cyathura) esquivel*, new  
species

Figs. 1, 2

*Material.*—Holotype, IO-12.055, ♂ 2.5 mm, Allotype, IO-12.057, ovigerous ♀ 4.0

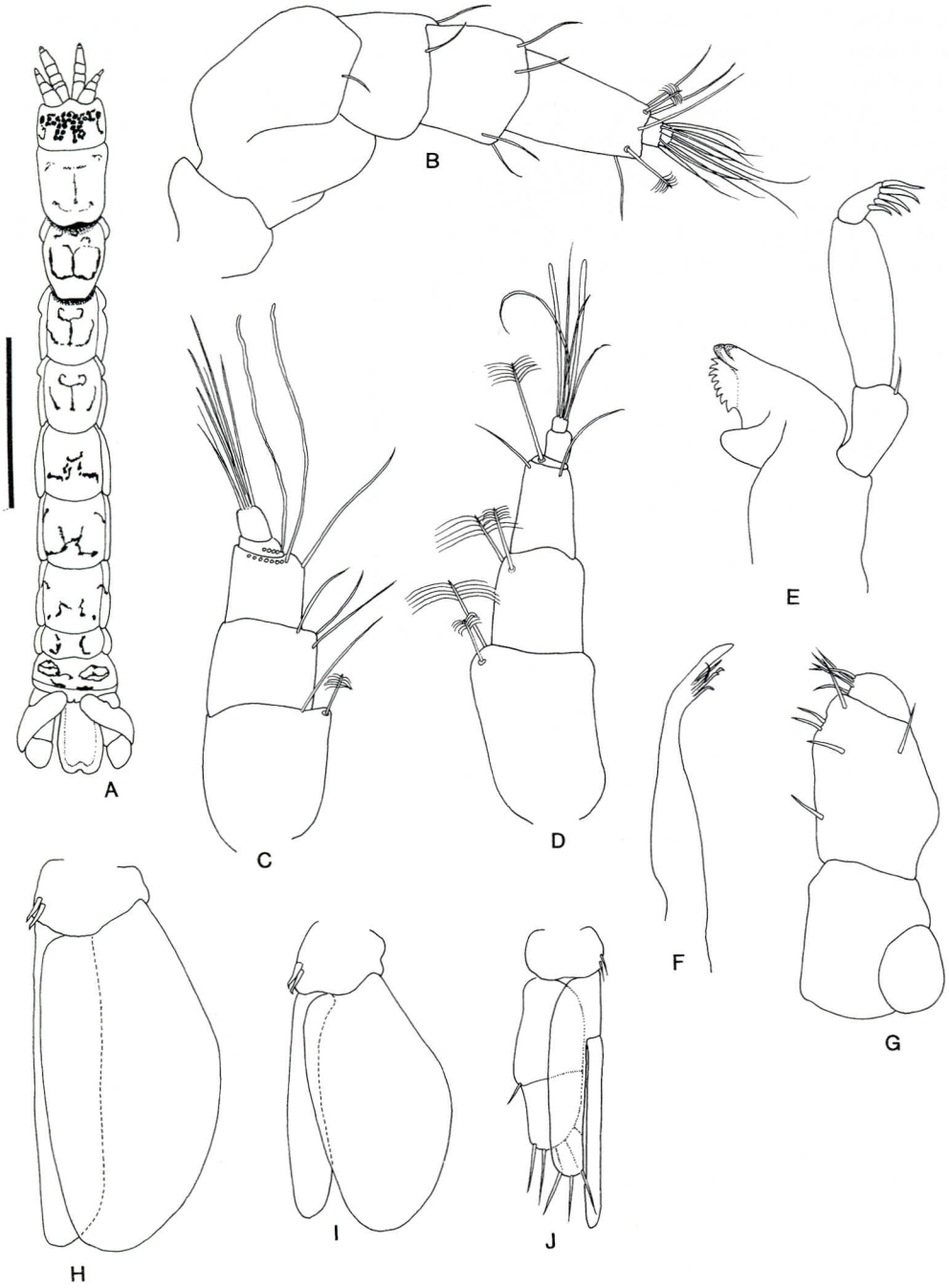


Fig. 1. *Cyathura esquivel*, new species. A, Ovigerous female in dorsal view, scale = 1 mm; B, Antenna; C, ♂ Antennule; D, ♀ Antennule; E, Mandible; F, Maxilla; G, Maxilliped; H, ♀ Pleopod 1; I, ♂ Pleopod 1; J, ♂ Pleopod 2.

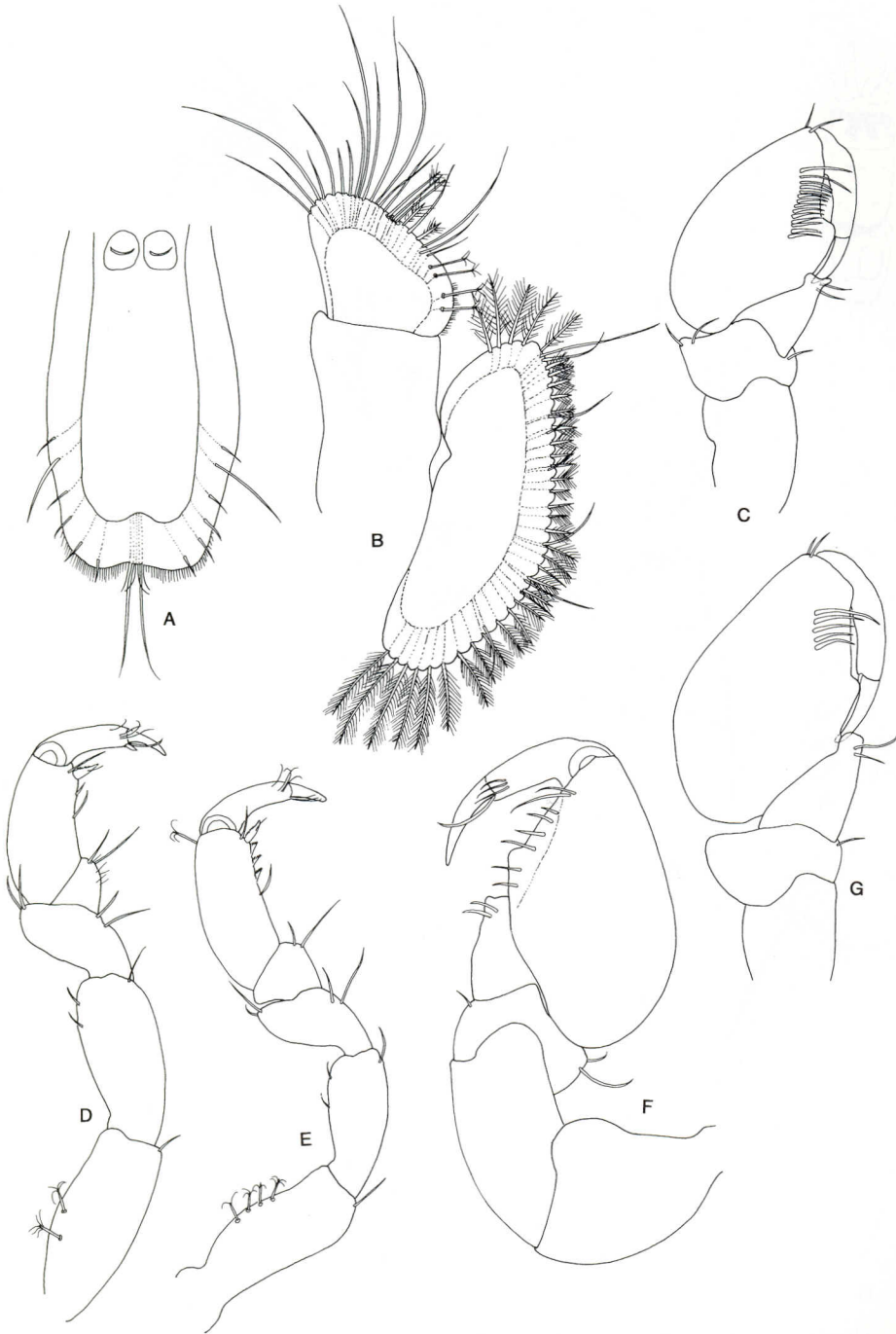


Fig. 2. *Cyathura esquivel*, new species. A, Pleotelson; B, Uropodal endopod and exopod; C, ♂ Pereopod 1, mesial surface; D, Pereopod 2; E, Pereopod 7; F, ♀ Pereopod 1, lateral surface; G, ♀ Pereopod 1, mesial surface.



mm, Paratypes, IO-12.056, 4 ♂, 4 ovigerous ♀, 5 non-ovigerous ♀; Paratypes, USNM 253270, 5 ♂, 4 ovigerous ♀, 9 non-ovigerous ♀, 4 manca, sta K-CUBA-22, Cayo Esquivel, north coast of Cuba, coral rubble from exposed side of cay, 2–2.5 m, 12 Apr 1994.—4 ♂ 2.5 mm, 2 non-ovigerous ♀, 12 manca 1.8–2.2-mm, sta K-CUBA-35, Cayo Coco, north coast of Cuba, coral rubble from shallow reef area, 1.5–2 m, 14 Apr 1994.

*Description*.—Male: Antennule with peduncle article 3 shorter than in female, carrying distal band of fine aesthetascs; flagellum of 2 articles, basal article also carrying band of fine aesthetascs. Pereopod 1, mesial surface of propodus having row of about 14 setae. Pleopod 1, endopod shorter than, and about  $\frac{1}{3}$  width of exopod. Pleopod 2, endopod having slender, parallel-sided copulatory stylet articulating in proximal half of mesial margin, with 3 distal plumose marginal setae; exopod with transverse suture in distal half, 5 plumose marginal setae distally.

Pigment pattern similar in male and female, with large red-brown chromatophores in band between eyes and forming 2 posterior lobes on dorsal cephalon. Pereonites each with fine dorsal squiggles, those on pereonite 2 forming 2 contiguous rings being most characteristic. Pleon with pair of irregular lateral rings often with intersecting line.

Ovigerous female: Body proportions:  $C < 1 > 2 > 3 = 4 = 5 = 6 > 7 > P$ . Cephalon wider than middorsal length, with low rounded rostrum. Eyes well pigmented. Body bent between pereonites 1 and 2. Anterior fused segments of pleon short. Pleotelson with broad transparent marginal band, having 6 pairs of submarginal setae in posterior half, slightly bilobed posterior margin with elongate pair of setae submesially.

Antennule having 3 relatively large articles; flagellum of 3 short articles, together shorter than peduncle article 3; terminal article bearing 2 aesthetascs. Antennal peduncle with article 2 stout, grooved to accom-

modate antennule; articles 3 and 4 subequal; article 5 longer than 4; flagellum of 2 very short setose articles. Mandibular incisor of 3 sclerotized cusps; lacinia dentata having 8 teeth; molar thin-walled, distally rounded; palp with article 2 twice length of article 1; article 3 short, bearing 5 stout setae. Maxilla having single strong spine and several slender subsidiary spines. Maxilliped of 3 articles, article 2 slightly longer than 1, with few setae submesially; article 3 semicircular, with 5 mesial setae; endite lacking. Pereopod 1, carpus short, lacking free anterior margin, with 2 setae distally; propodus expanded, with transparent palmar flange bearing 6 setae on lateral surface, with low rounded proximal protuberance, with row of 5 setae on mesial surface; unguis  $\frac{2}{3}$  length of rest of dactylus. Pereopods 2 and 3 with short triangular carpus lacking free anterior margin; propodus roughly rectangular, with stout serrate posterodistal spine; unguis  $\frac{1}{2}$  length of rest of dactylus, with small accessory spine at its base. Pereopods 4–7 similar, carpus triangular, with short free anterior margin; propodus with several posterodistal scales and stout serrate posterodistal spine. Pleopod 1 protopod with 2 coupling hooks; exopod opercular; endopod subequal to exopod in length, between  $\frac{1}{2}$  and  $\frac{1}{3}$  width of exopod. Uropodal endopod roughly ovate, with broad transparent border and numerous marginal setae; exopod with broad transparent border, almost 3 times longer than wide, lateral margin crenulate with plumose setae set in each gap.

*Remarks*.—The only species of the subgenus *Cyathura* previously recorded from Cuba (and from the general Caribbean region), is *C. cubana* Negoescu, 1979, an estuarine species also known from the mainland of Belize (Kensley & Schotte 1989). *Cyathura cubana* differs from *C. esquivel*, which occupies fully marine habitats, in having a more heavily pigmented and setose body, in having an evenly rounded posterior margin of the pleotelson, a much shorter uropodal exopod, a much shorter



endopod of pleopod 1, and a more elongate mandibular palp. *Cyathura tridentata* Wagner, 1990, from the interstitial intertidal of the Dominican Republic, is a blind and unpigmented species, differing in many appendage characters from the present species.

*Etymology*.—The specific name derives from the type locality, Cayo Esquivel.

*Mesanthura frances*, new species

Fig. 3

*Material*.—Holotype, IO-12.058, non-ovigerous ♀ 8.2 mm, Paratypes, IO-12.059, 2 non-ovigerous ♀, Paratypes, USNM 253271, 3 non-ovigerous ♀, sta K-CUBA-27, Cayo Francés, from clumps of *Halimeda* in *Thalassia* flat, shallow infratidal, 13 Apr 1994.—Non-ovigerous ♀ 4.1 mm, sta K-CUBA-35, Cayo Coco, coral rubble from shallow reef area, 1.5–2 m, 14 Apr 1994.

*Description*.—Non-ovigerous female: Body proportions:  $C < 1 = 2 < 3 < 4 = 5 > 6 > 7 < P$ . Cephalon having low rostral point; with well pigmented eyes. Pleonite 6 short, dorsally demarked by pair of posteromedial points. Pleotelson ovate, widest at mid-length, posteriorly evenly rounded, bearing 4 pairs of setae.

Antennule with basal article subequal to 2 following articles; flagellum of 3 articles, terminal article bearing 3 aesthetascs. Antennal flagellum of 4 articles. Mandible with 4 serrations in lacinia dentata; molar low, rounded; palp article 3 bearing 6 fringed setae. Maxilla having 6 distal spines. Maxilliped with terminal article set lateral to mesial line of rest of articles, bearing 2 circumplumose setae; short endite with short terminal seta present. Pereopod 1, carpus triangular, with 3 rounded scales forming posterodistal apex; propodus expanded, palm having low lobe formed by 3 or 4 scales, 6 simple setae along palmar margin; unguis about half length of rest of dactylus. Pereopod 2, carpus triangular, lacking free anterior margin; propodus,

rectangular, with serrate posterodistal spine. Pereopods 4–7, carpus having short free anterior margin, short sensory posterodistal spine present; propodus rectangular, bearing serrate posterodistal spine. Pleopod 1, exopod operculiform, with 15 plumose marginal setae; endopod slightly shorter than, and about one-third width of exopod, bearing 5 plumose marginal setae distally. Uropodal endopod distally ovate, basal width about  $\frac{3}{4}$  greatest length, bearing numerous simple marginal setae; protopod bearing 7 plumose marginal setae; exopod about twice longer than greatest width, with slight subdistal notch in lateral margin, bearing numerous plumose marginal setae.

*Color pattern*: Strong red-brown patches on cephalon, pereonites, pleon and telson, patches continuous across articulations, each having open unpigmented central area and one or two lateral lobes extending ventrolaterally on pereonites.

*Male*: unknown.

*Remarks*.—The color pattern of *M. frances* bears some resemblance to *M. bivittata* Kensley, 1987, from Belize, and *M. looensis* Kensley & Schotte, 1987, from the Florida Keys, but the shape of the individual patches which run together middorsally is distinctive. Of the nine species of *Mesanthura* known from the broad Caribbean region, only *M. paucidens* Menzies & Glynn, 1968, and *M. reticulata* Kensley, 1982, have six spines on the terminal mandibular palp article. The color patterns of these two species are so distinctive as to prevent any confusion with the present species.

*Etymology*.—The specific name derives from the type locality, Cayo Francés on the north coast of Cuba.

Suborder Asellota Latreille, 1803

Family Janiridae Sars, 1899

*Caecijaera horvathi* Menzies, 1951

Fig. 4

*Caecijaera horvathi* Menzies, 1951:3, Figs. 1–3.—Cooke, 1977:105, Fig. 1.—Mal-

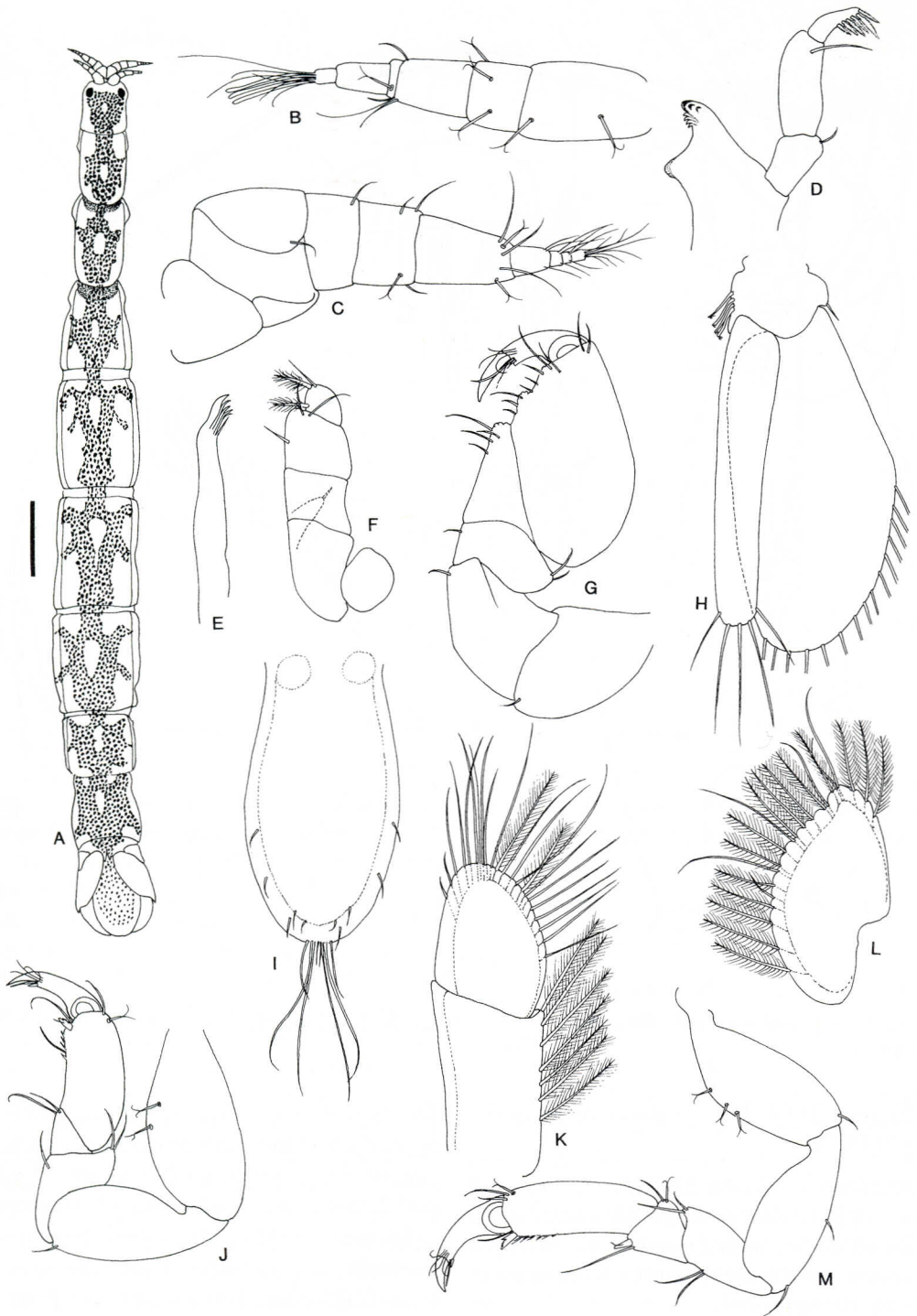


Fig. 3. *Mesanthura frances*, new species. A, Holotype, non-ovigerous ♀, scale = 1 mm; B, Antennule; C, Antenna; D, Mandible; E, Maxilla; F, Maxilliped; G, Pereopod 1; H, Pleopod 1; I, Pleotelson; J, Pereopod 2; K, Uropodal endopod; L, Uropodal exopod; M, Pereopod 7.

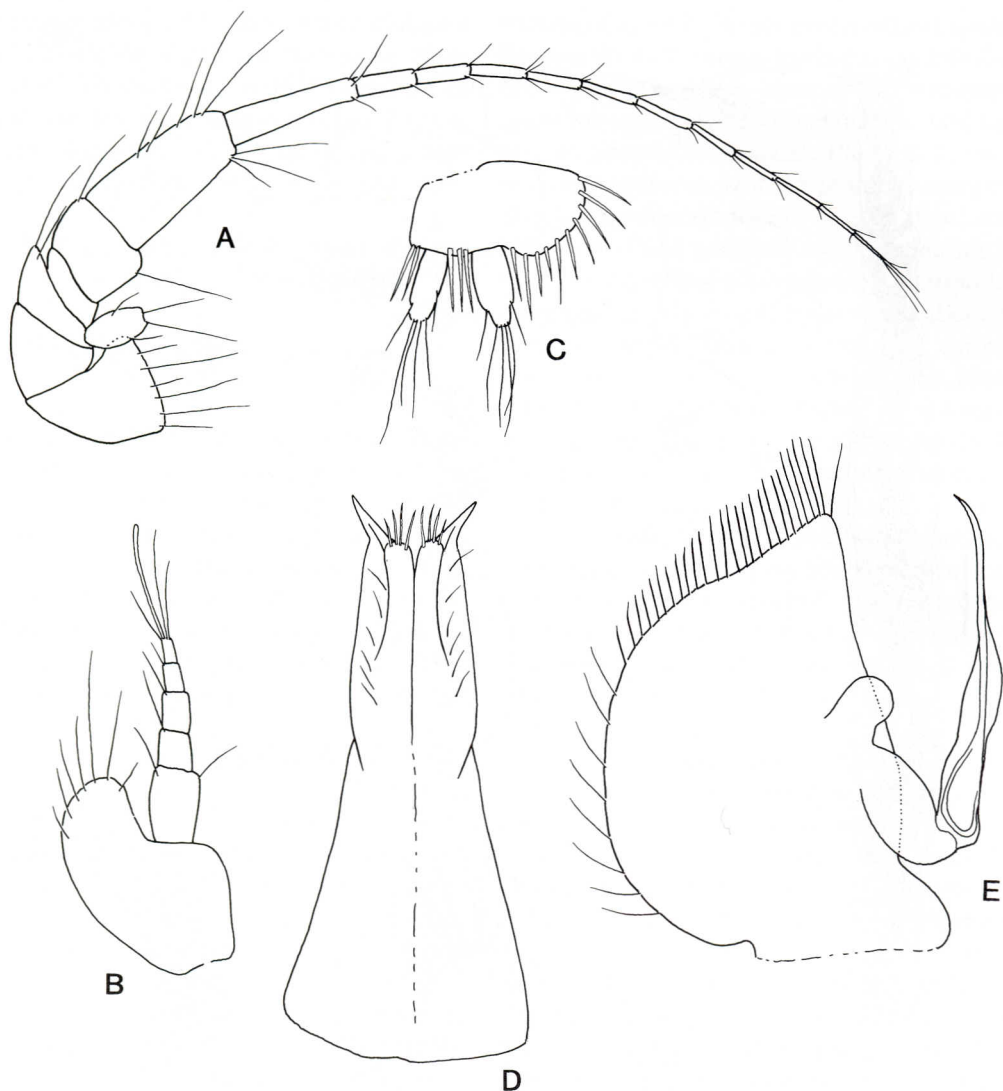


Fig. 4. *Caecijaera horvathi* Menzies, 1951. A, Antenna; B, Antennule; C, Uropod; D, ♂ Pleopod 1; E, ♂ Pleopod 2.

yutina, 1994:33.—Wilson & Wägele, 1994:694.

**Material.**—USNM 253273, 5 ♂ 1.0–1.5 mm, sta K-CUBA-6, Cayo Mendoza, north coast of Cuba, with *Limnoria* sp. in wood of rotten and decaying barges lying in mud, 0.5 m, 10 Apr 1994.

**Remarks.**—Ortiz & Lalana (1993) described *Caecijaera cojimarensis* from limnoriids in wood pilings from Cojimar Bay, close to Havana. The present material dif-

fers from *C. cojimarensis* in having four (as opposed to three) apical setae on each ramus of ♂ pleopod 1, a more slender ♂ pleopod 2, and more slender rami of the uropod.

Menzies (1951) described *Caecijaera horvathi* as a commensal of *Limnoria* sp. from California. The species was later recorded from Hawaii (Cooke 1977). The present material closely resembles this species, in overall proportions, and in the details of the antennules and antennae, uro-



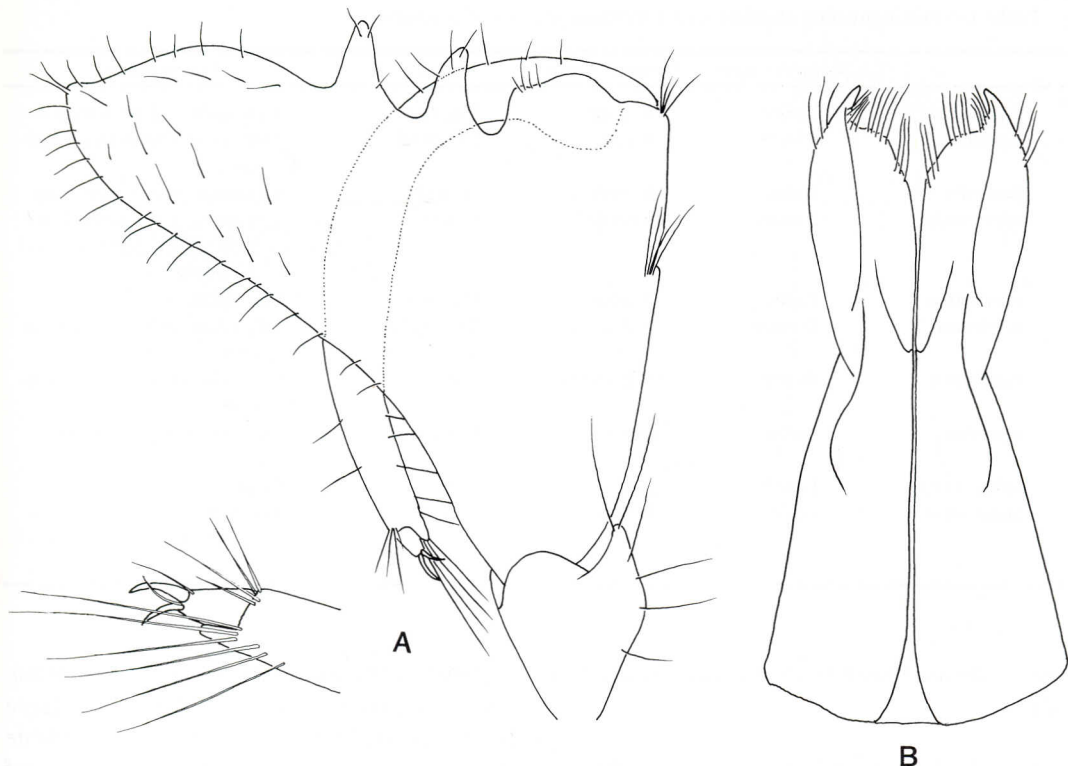


Fig. 5. *Carpias harrietae* Pires, 1981. A, ♂ Pereopod 1, with dactylus enlarged; B, ♂ Pleopod 1.

Pods, and especially in the structure of pleopod 1 ♂ as illustrated by Cooke (1977, fig. 1b), (see Fig. 4D). Wilson & Wägele (1994:695), however, suggested that the Hawaiian material might be a separate species, based on the structure of pleopod 1 ♂. Three of the five previously described species of *Caecijaera* (subgenus *Caecijaerella* Kussakin, 1962), all from the Pacific, are characterized by a distally broadly truncate pleopod 1 ♂, and an extremely elongate coiled stylet of pleopod 2 ♂. *C. kussakini* Malyutina, 1994, from Vietnam, however, is very similar to Menzies' species, even agreeing in the number of antennular flagellar articles. Given the commensal habit of *Caecijaera* with the wood-boring *Limnoria*, a broad, perhaps disjunct distribution would not be surprising. A degree of uncertainty must remain regarding the identity of both the earlier Cuban species as well as the present material. More specimens

would give some idea of variation, and careful dissections may resolve the issue.

*Carpias harrietae* Pires, 1981  
Fig. 5

*Carpias harrietae* Pires, 1981:206, figs. 1-20.—Kensley & Schotte, 1989:84, fig. 38F, G.

*Material*.—USNM 253272, 7 ♂, 3 ovigerous ♀, 6 ♀, sta K-CUBA-35, Cayo Coco, north coast of Cuba, coral rubble from shallow reef area, 1.5–2 m, 14 Apr 1994.

*Remarks*.—The Cuban material reported here includes males with first pereopods as illustrated by Pires (1981), but also two males having an even larger first pereopod, with a far more expanded posterodistal region of the carpus. It is concluded that the male of Pires' original description is the penultimate stage in the maturation of the

Table 1.—Distinguishing characters of Caribbean species of *Joeropsis*.

	Cephalon margins	Pleotelson margins	Rostrum	Pigment pattern
<i>bifasciata</i>	Entire	6 teeth	Convex	Cephalon and pereonite 4
<i>coralicola</i>	Entire	5 teeth	Indented	Overall reticulation on dorsum
<i>juvenilis</i>	Entire	6 teeth	Straight	Cephalon wider than long
<i>nigricanita</i>	Entire	5 teeth	Indented	Cephalon; pereonites 2–4; light on pereonites 6 and 7, pleotelson
<i>paradubia</i>	Entire	5 teeth	Convex	Cephalon
<i>personata</i>	Serrate	7–8 teeth	Triangular	Cephalon dark, reticulation on rest of dorsum
<i>rathbunae</i>	Entire	5–6 teeth	Convex	Overall reticulation on dorsum
<i>tayronae</i>	Entire	Entire	Indented	Patches on cephalon, pereonites 1, 2, and 4
<i>tobagoensis</i>	Entire	3 teeth	Convex	Cephalon
<i>unidentata</i>	Entire	1 tooth	Convex	Dimorphic; ♂ cephalon; ♀ cephalon and pereonites 2–4

male, the final molt being the one illustrated here.

Family Joeropsidae Nordenstam, 1933  
*Joeropsis* Koehler, 1885

*Remarks.*—The genus *Joeropsis* is well represented in coral reef habitats, often with three or more species co-occurring. Five primary characters serve to distinguish the species: pigment pattern, body setation, presence or absence of cephalon serrations, presence or absence of pleotelson serrations, and shape of the rostrum. More subtle differences such as the general body proportions, and the shape of the lateral parts of the pereonites are also apparent. Of the 11 species from the broad Caribbean region, eight have a dark pigmented dorsum of the cephalon, while three have additional dark banding on pereonites 2–4 or just on pereonite 4. One of the species described here displays sexually dimorphic color patterns. Dimorphic color patterns are also known for an undescribed species from Dominica, and an undescribed species from the Indian Ocean. In the case of *J. unidentata* from Cuba, the three dark dorsal pereonites in the female correspond with the

position of the brood pouch on the ventrum. These pigment patterns presumably have some camouflage function in reef rubble habitats, and can be seen in a range of reef organisms, including the anthurids *Minyanthura coralicola* and *Mesanthura punctilata*, the amphipods *Concarnes concavus* and *Anamixus hanseni*, as well as in tanaidaceans and cumaceans.

Table 1 distinguishes the 11 species of *Joeropsis* recorded from the Caribbean and Bermuda.

*Joeropsis juvenilis*, new species  
Fig. 6

*Material.*—Holotype, IO-12.053, ♂ 2.2 mm, Paratype, USNM 253274, ♂ 2.0 mm, sta K-CUBA-80, Punta del Este, Isla de la Juventud, coral rubble with mixed algae, 2–3 m, 11 Jun 1995.—2 ♂ 1.3–1.6 mm, sta K-CUBA-78, Punta del Este, Isla de la Juventud, coral rubble and algae between coral heads, 1.5 m, 11 Jun 1995.

*Description.*—Body length slightly less than 3 times greatest width. Rostrum 2.5 times wider than median length, anterior margin straight. Lateral margins of cephalon entire. Anterolateral angle of pereonite

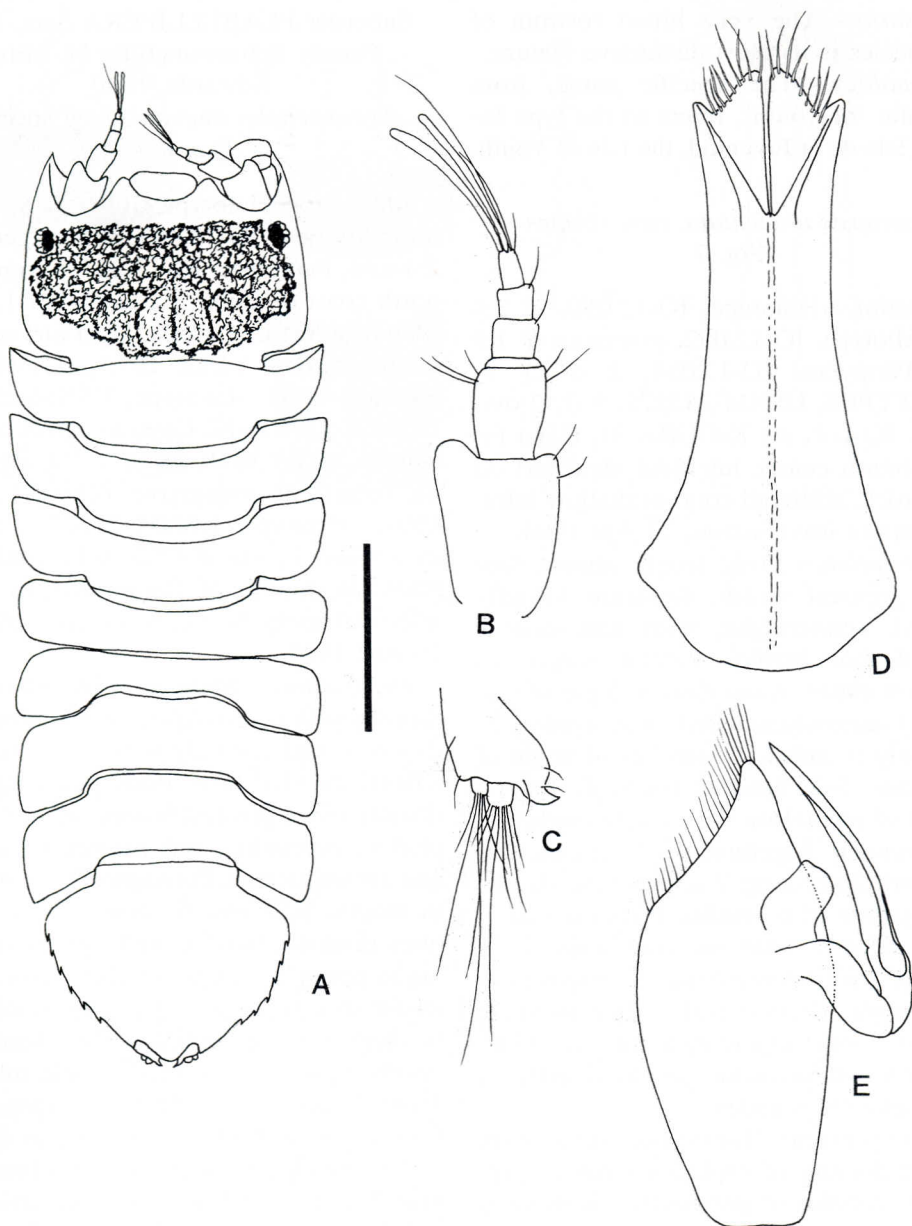


Fig. 6. *Joeropsis juvenilis*, new species. A, ♂, Dorsal view, scale = 0.5 mm; B, Antennule; C, Uropod; D, ♂ Pleopod 1; E, ♂ Pleopod 2.

1 acute, of pereonites 2 and 3 almost right-angled, of pereonite 4 rounded. Lateral margins of pleotelson having 6 teeth.

Antennular flagellum of 3 articles, terminal article bearing 2 aesthetascs. Antenna missing in all specimens. Pleopod 1 of ♂ having 9 setae on distomesial lobe. Pleopod

2 with row of setae on distolateral margin, apex narrowly rounded. Uropod with strong mesially directed tooth.

Female: unknown.

Color pattern: Dense patch of pigment on cephalon, stretching between eyes and covering most of dorsum.



*Remarks.*—The very broad rostrum of this species is its most distinctive feature.

*Etymology.*—The specific name, from the Latin 'of youth', refers to the type locality, Isla de la Juventud, the Isle of Youth.

*Joeropsis unidentata*, new species

Fig. 7

*Material.*—Holotype, IO-12.050, ♂ 2.0 mm, Allotype, IO-12.052, ovigerous ♀ 1.9 mm, Paratypes, IO-12.051, 2 ♂, 3 ♀, PARATYPES, USNM 253275, 3 ♂, 2 ovigerous ♀, 4 ♀, sta K-CUBA-31, Cayo Francés (north coast), intertidal algal turf on beach rock, scattered coral in shallow infratidal, strong wave action; 13 Apr 1994.

*Description.*—Body length almost four times greatest width. Rostrum broadly rounded, semicircular, with anteromesial band of short bristles. Lateral margins of cephalon entire. Anterolateral angle of pereonite 1 narrowly rounded, of pereonites 2–4 broadly rounded. Posterolateral angle of pereonites 5–7 broadly rounded. Lateral margin of pleotelson with single tooth.

Antennular flagellum of 3 articles, terminal article bearing 2 aesthetascs. Antennal flagellum of 6 articles. Pleopod 1 of ♂ having 8 or 9 setae on distomesial lobe. Pleopod 2 with dense band of setae on lateral margin. Uropod with strong mesially directed tooth. Operculum of ♀, width slightly less than median length, distally tapered, apically rounded.

Color pattern: Dimorphic; male with most of dorsum of cephalon strongly pigmented; dorsum of pereonite 4 with solid band posteriorly across segment, becoming more diffuse anteriorly. Female with most of dorsum of cephalon strongly pigmented; pereonites 2–4 with most of dorsum strongly pigmented.

*Remarks.*—The single tooth on the pleotelsonic margin is the most distinctive feature of this species.

*Etymology.*—The specific name refers to the abovementioned single tooth on the lateral margin of the pleotelson.

Suborder FLABELLIFERA Sars, 1882

Family Sphaeromatidae H. Milne Edwards, 1840

*Dynamenella nuevitas*, new species

Fig. 8, 9

*Material.*—Holotype, IO-12.048, ♂ 2.4 mm, Allotype, IO-12.049, non-ovigerous ♀ 2.4 mm, Paratypes, IO-12.047, 6 immature, north coast of Cuba, sta K-CUBA-1, Cayo Mendoza, off La Isabela, algal turf on scattered intertidal rocks, 10 Apr 1994, coll. BK, MS et al.—Paratype, USNM 253276, ♂, sta K-CUBA-17, Cayo Esquivel near La Isabela, 80°03'30"W, 23°02'12"N, algal turf on intertidal mangrove roots, 12 Apr 1994.—Paratype, USNM 253277, 1 non-ovigerous ♀, sta K-CUBA-47, Bahia de Nuevitas, mouth of Saramaguacan River, intertidal rocky beach, hand net, coll. MS, 16 Apr 1994.

*Description.*—Male: Eubranchiata sphaeromatid with posterolateral margins of pleotelson curved ventrally to form closed, posteriorly-directed tube. Body length approximately twice greatest width; surface of cephalon, pereonites and pleotelson smooth and unornamented. Pereonites 2–6 subequal in length, pereonite 7 shortest. Coxal sutures distinct. Two pleonal sutures extending to posterior margin of pleon only. Pleotelson strongly domed, tapering to relatively short tube, in ventral aspect about 17% length of pleotelson. Pleotelsonic tube entirely closed ventrally in mature specimens, foramen broadly oval to circular in shape.

Antennular peduncle articles colinear, article 1 not extended anteriorly; articles 1 and 3 subequal in length, article 2 considerably longer; article 3 with 2 plumose setae. Antennular flagellum of 7 articles, aesthetascs present on articles 5 and 6. Antennal peduncle with article 5 longest; flagellum of 9 articles.

Epistome somewhat triangular in shape with small lateral bulges; anterior margin truncate, length about 1.7 greatest width, somewhat shorter than labrum. Right mandible with four-cusped incisor, lacinia mob-

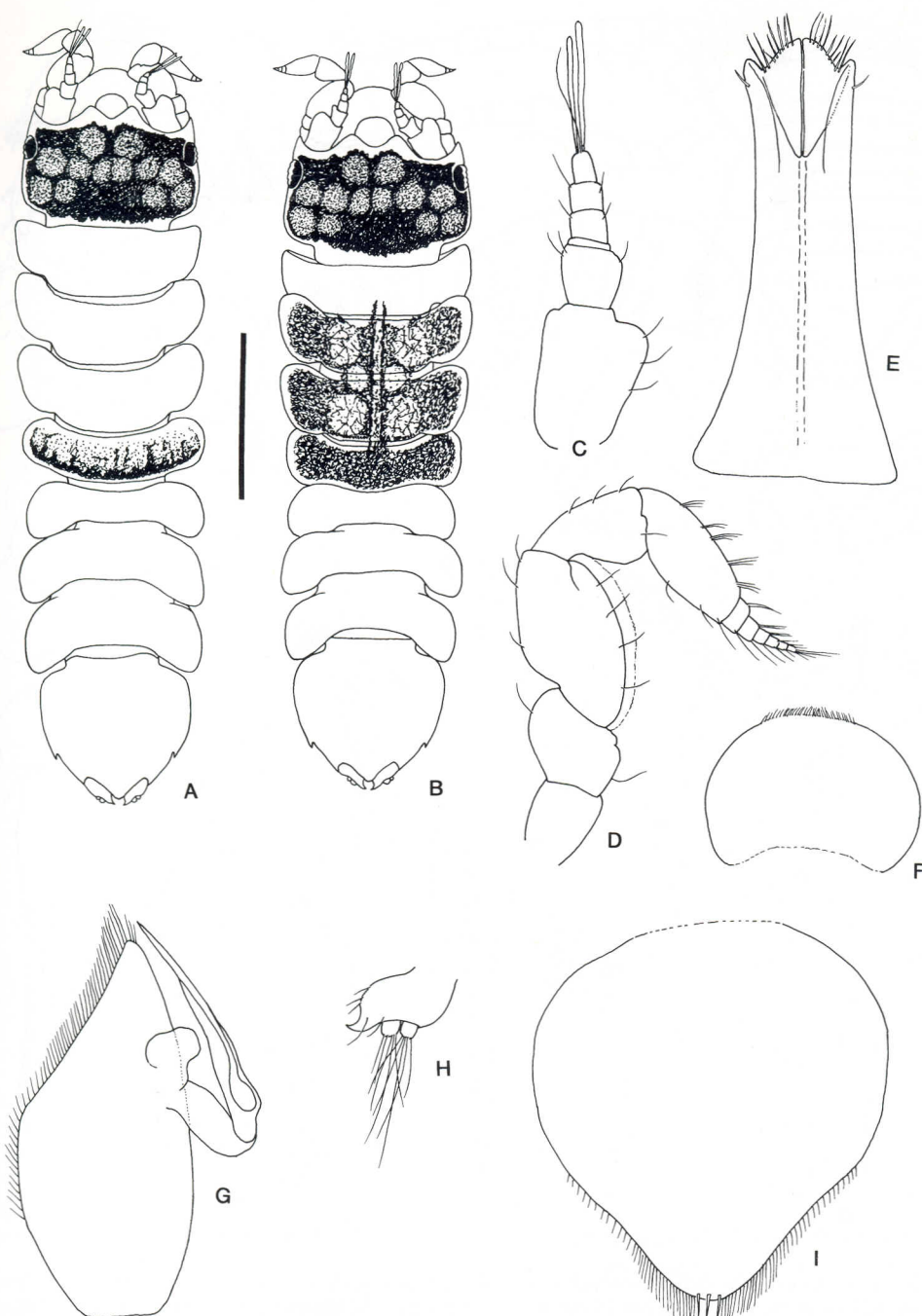


Fig. 7. *Joeropsis unidentata*, new species. A, ♂ Dorsal view, scale = 0.5 mm; B, Oviparous ♀ dorsal view; C, Antennule; D, Antenna; E, ♂ Pleopod 1; F, Rostrum; G, ♂ Pleopod 2; H, Uropod; I, ♀ Operculum.

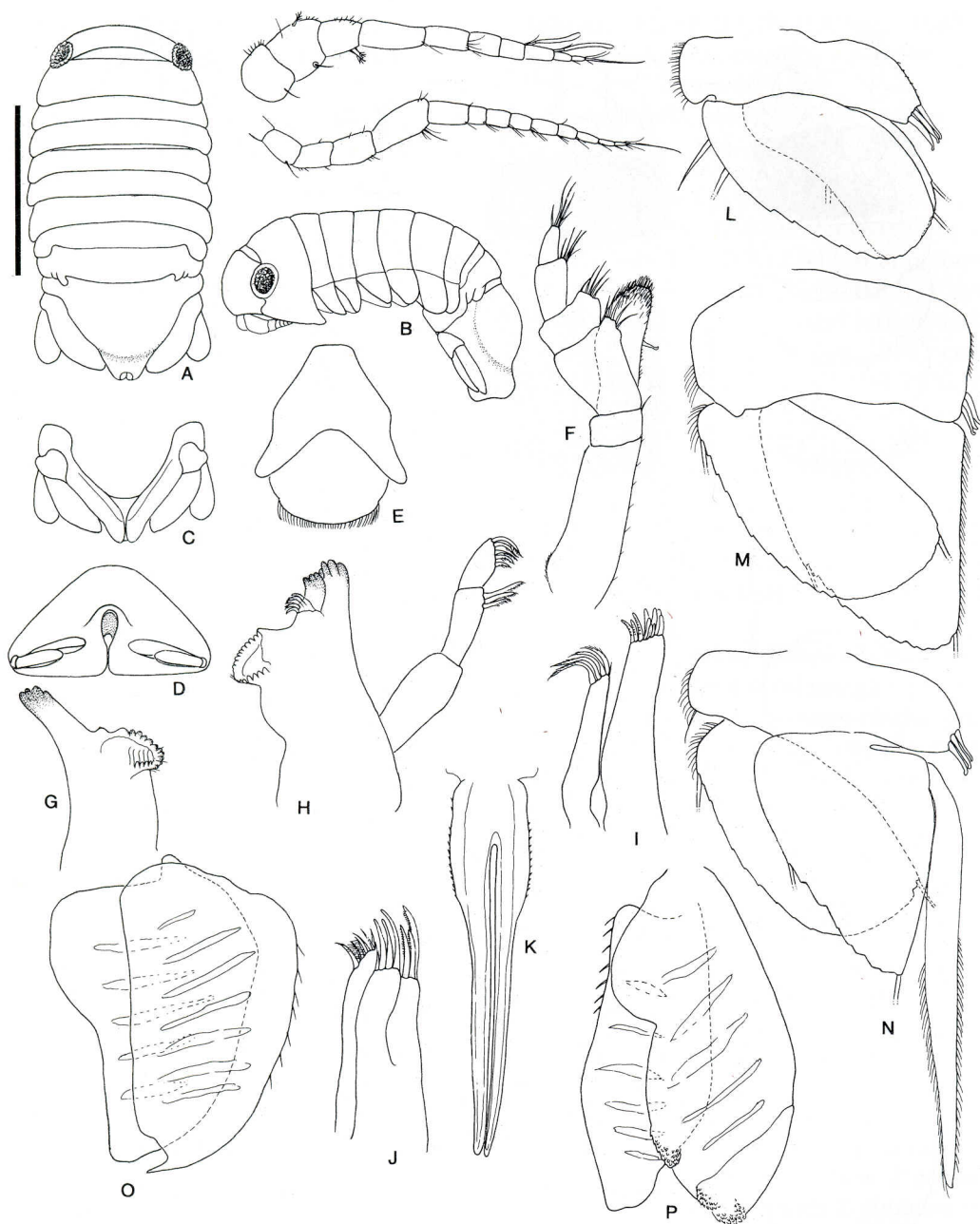


Fig. 8. *Dynamenella nuevitas*, new species. A, ♂ Dorsal view, scale = 1 mm; B, ♂ Lateral view; C, Posterior pleotelson in ventral view; D, Posterior pleotelson viewed end-on; E, Epistome; F, Maxilliped; G, Left Mandible; H, Right mandible; I, Maxilla 1; J, Maxilla 2; K, Penes; L, Pleopod 1; M, Pleopod 3; N, ♂ Pleopod 2; O, Pleopod 4; P, Pleopod 5.



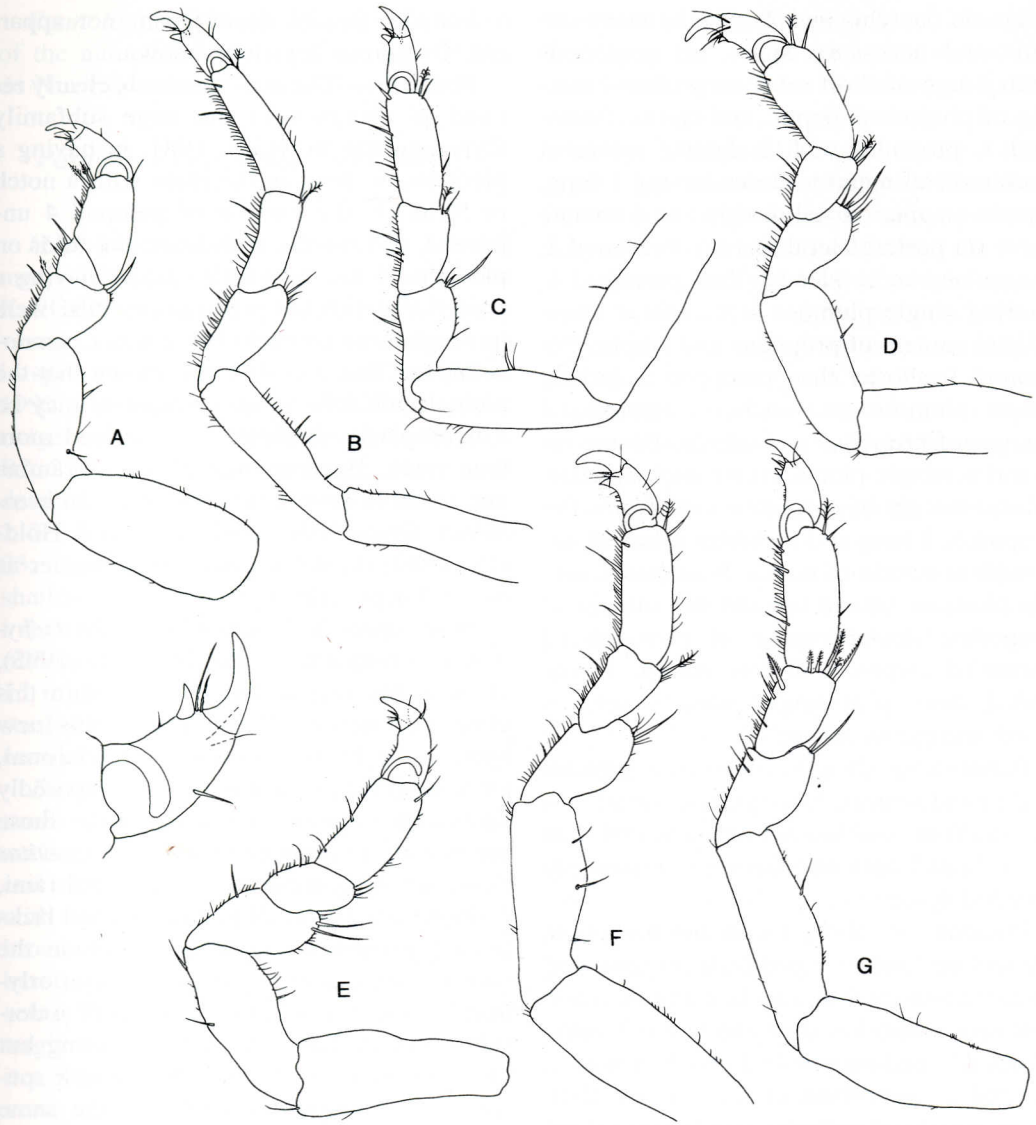


Fig. 9. *Dynamenella nuevitas*, new species. A, Pereopod 1, with dactylus enlarged; B, Pereopod 2; C, Pereopod 3; D, Pereopod 4; E, Pereopod 5; F, Pereopod 6; G, Pereopod 7.

illis with 3 cusps, spine row of 5 setae, 3 or 4 of which fringed; molar process as figured; palp of 3 articles, decreasing in length distally, terminal article bearing 5 setose spines, penultimate article with 3 dentate spines. Left mandible with incisor of 4 cusps, molar as figured. Maxillule, inner ramus with 4 fringed setae and single short spine; outer ramus with 7 rather blunt spines and 3 sharper, dentate spines. Max-

illa, outer ramus of exopod with 3 fringed spines, inner ramus with 4 simple spines, endopod bearing 6 shorter spines, 2 or 3 fringed. Maxillipedal endite somewhat narrow, with one coupling hook; several small, blunt spines on distal margin and setose distally; palp with 5 articles, all setose on distomedial margins; lobes 2 and 3 somewhat produced distomedially.

Pereopods 1-7 with simple accessory

spine on dactylus and 2 setae between unguis and accessory spine; all pereopods with fringe of short setae on posterior margin of propodus, carpus, and merus. Pereopod 1, propodus with 2 dentate spines at posterodistal margin; merus having 1 long, simple on anterodistal margin and 1 dentate spine on posterolateral margin. Pereopod 2, longer and more slender than pereopod 1, bearing single plumose seta each at anterodistal corners of propodus and carpus. Pereopod 3, shorter than pereopod 2, having single plumose seta each on anterodistal margin of propodus and carpus. Pereopods 4 and 6, single plumose seta each at anterodistal margin of propodus and carpus. Pereopod 5, 2 long and 1 shorter spine on anterodistal margin of merus. Pereopod 7, single plumose seta at anterodistal margin of propodus; dentate spine at posterodistal corner of carpus; 4 dentate spines, 2 long and 2 short, plus single plumose seta on distal margin of propodus.

Penes long (length five times greatest width) and slender, fused at base, fused area about  $1/6$  of total length; rami narrowing at about  $1/5$  of length and tapering to narrowly rounded apices.

Pleopod 1 neither indurate nor triangular, 3 coupling hooks on peduncle; exopod and endopod subequal in length, endopod much narrower, width less than one-half of length. Pleopod 2, peduncle with 3 coupling hooks; appendix masculina slender, more than twice length of endopod and bearing short marginal setae on distal half of length. Exopod of pleopod 3 without articulation. Pleopod 4, both rami with pleats; exopod with several setae on outer margin, apex produced into acute tip. Pereopod 5, exopod with distal suture and 3 spinulose bosses; endopod with setae on proximal half of outer margin; both rami pleated.

Uropodal rami unornamented, setose along external margin and apically, shorter than pleotelson; exopod broadly rounded at apex,  $2/3$  to  $3/4$  length of endopod; endopod narrowly rounded apically.

Female: Sexual dimorphism not apparent. Ovigerous female unknown.

*Remarks.*—The new species is clearly related to members of the large subfamily Dynameninae Bowman, 1981, in having a pleotelsonic apex in the male with a notch or foramen, the exopod of pleopod 4 unjointed, and usually with branchial folds on pleopods 4 and 5. Those species having a posteriorly-directed pleotelsonic tube were most often assigned to the genus *Cymodocella*, but Bruce (1995) has shown that the pleotelsonic tube in sphaeromatids may be a homoplastic character that evolved more than once. Because pleotelsonic foramina are variable within genera (e.g., *Ischyromene*), Bruce (1995) and Harrison & Holdich (1982) do not regard that character as useful for generic separation.

With regard to characters for the *Ischyromene* group enumerated by Bruce (1995), *D. nuevitas* seems not to fall within this cluster of genera. Placement of this new species in *Dynamenella* is provisional, since it differs in a number of supposedly significant generic characters. Like those species of *Dynamenella s.s.*, *D. nuevitas* possesses long, tapering fused penial rami, a simple unguis on all pereopods, and lacks dorsal processes. Differences include the lack of sexual dimorphism, a posteriorly-directed pleotelsonic tube instead of a dorsally-directed foramen, and a tapering but elongate appendix masculina. The new species differs from *Paradella* for the same reasons. The lack of information on the morphology of the brood pouch and oostegites in the ovigerous female further obscures its correct placement. Discovery of similar specimens and the description of the female sexual features may justify erecting a new genus in the future.

The samples containing this species were all collected in the intertidal on exposed sides of islands with strong wave action, either among pebbles on a rocky beach, on algal-covered rocks (with *Padina*, *Caulerpa*, etc.) or on *Rhizophora* mangrove roots.



*Etymology.*—The specific epithet is part of the name of a paratypic locality, Bahía de Nuevitas, on Cuba's northern coast.

*Paraimene ibarzabala*, new species

Fig. 10, 11

*Material.*—Holotype, IO-12.045, ♂ 2.8 mm, Allotype, IO-12.046, 3.0 mm, sta K-CUBA-74, Punta Francés, Isla de la Juventud, coral rubble with mixed algal turf in spoil bank near reef flat, 2–4 m, 10 Jun 1995. Paratypes, USNM 253279, 1 ♂, 1 ovigerous ♀, 25 ♀, 9 immature, sta K-CUBA-22, Cayo Esquivel, large chunks of dead coral rubble from exposed side of cay, 2–2.5 m, 12 Apr 1994.—1 ♀, sta K-CUBA-35, Cayo Coco, rubble from hollows in shallow reef area, 1.5–2 m, 14 Apr 1994.—1 ♂, sta K-CUBA-38, off Cayo Coco, coral rubble encrusted with coralline algae, 12–15 m, 14 Apr 1994. Other material—1 ♂, sta K-CUBA-45, Bahía de Nuevitas, algae on rocks and pebbles, 0.5 m, 16 Apr 1994.

*Description.*—Male: Body length 2.1 times greatest width; dorsal integumental surface smooth, with scattered setae at lateral margins and on pleotelson. Cephalon with rostral point dorsally visible; epistome broadly rounded, crescent shaped, "arms" barely extending over labrum; labrum very setose distally; eyes large, dorsal. Pereonal tergites 1–4 without ornamentation; pereonites 5 and 6 each with single, low, transverse carina, extending nearly full width of segment; pereonite 7 shorter than, and overlapped by, 6. Suture lines on pleon reaching posterior margin only. Pleotelson markedly domed with 8 small protuberances in 2 rows of 4 each, all bearing a single short seta; posterior half tapering to narrow apex in dorsal view, edges of pleotelson folding ventrally to form vertical slit when viewed posteriorly. Lateral margins of tergites 2–7, pleon and anterior pleotelson upcurved to produce concave submarginal area.

Antennule with 3 basal articles subequal in length; flagellum with 7 articles, 5–7 bearing aesthetascs. Antenna slender, with

9 setose articles in flagellum. Mandible bearing incisor with 3 cusps; lacinia mobilis of 5 cusps, spine row of 2 fringed spines; palp of 3 articles, article 2 with 3 fringed setae on distolateral margin, article 3 bearing 5 fringed setae distolaterally. Maxilla 1, inner ramus with 4 fringed setae; outer ramus bearing 10 blunt spines. Maxilla 2, inner ramus with 7 spines, 3 of which fringed; outer lobes with 3 and 5 spines each. Maxillipedal endite with 4 blunt spines plus 3–4 slender, fringed spines on distal margin; 1 coupling hook; palp with 5 articles, articles 2–5 with distomesial lobe bearing numerous setae. Pereopod 1 shortest, with stout spines on posterodistal margin of propodus, carpus, and merus. Pereopod 2 with plumose seta at anterodistal margin of propodus and several small, slender setae on posterior margins of propodus, carpus, merus and ischium. Pereopod 3, with dense fringe of setules on posterior margins of propodus, carpus, merus and posterodistal margin of ischium; 2 long spines each on anterodistal margins of propodus and merus. Pereopod 4, dense fringe of setules on posterior margins of propodus, carpus, merus, and posterodistal margin of ischium; plumose seta on anterodistal margin of propodus; two strong spines on anterior margin of merus. Pereopod 5, fringe of setules on posterior margin of propodus, carpus, and merus; anterior margin of ischium indented to accommodate merus, having two long spines on anterodistal margin. Pereopod 6, fringe on setules on posterior margin of carpus, merus, and posterodistal margin of ischium. Pereopod 7, fringe of setules on propodus and merus; carpus with 6 fringed spines at distal margin. Penes short, unfused, and distally rounded. Pleopod 1 with 3 coupling hooks on basis; strong spine on anterolateral margin of endopod. Pleopod 2, appendix masculina articulating basally, width ca. 9 times length, tapering to rounded apex, extending beyond endopod by 1/6 of length. Pleopod 3 with 3 coupling hooks on basis; complete transverse suture in dis-



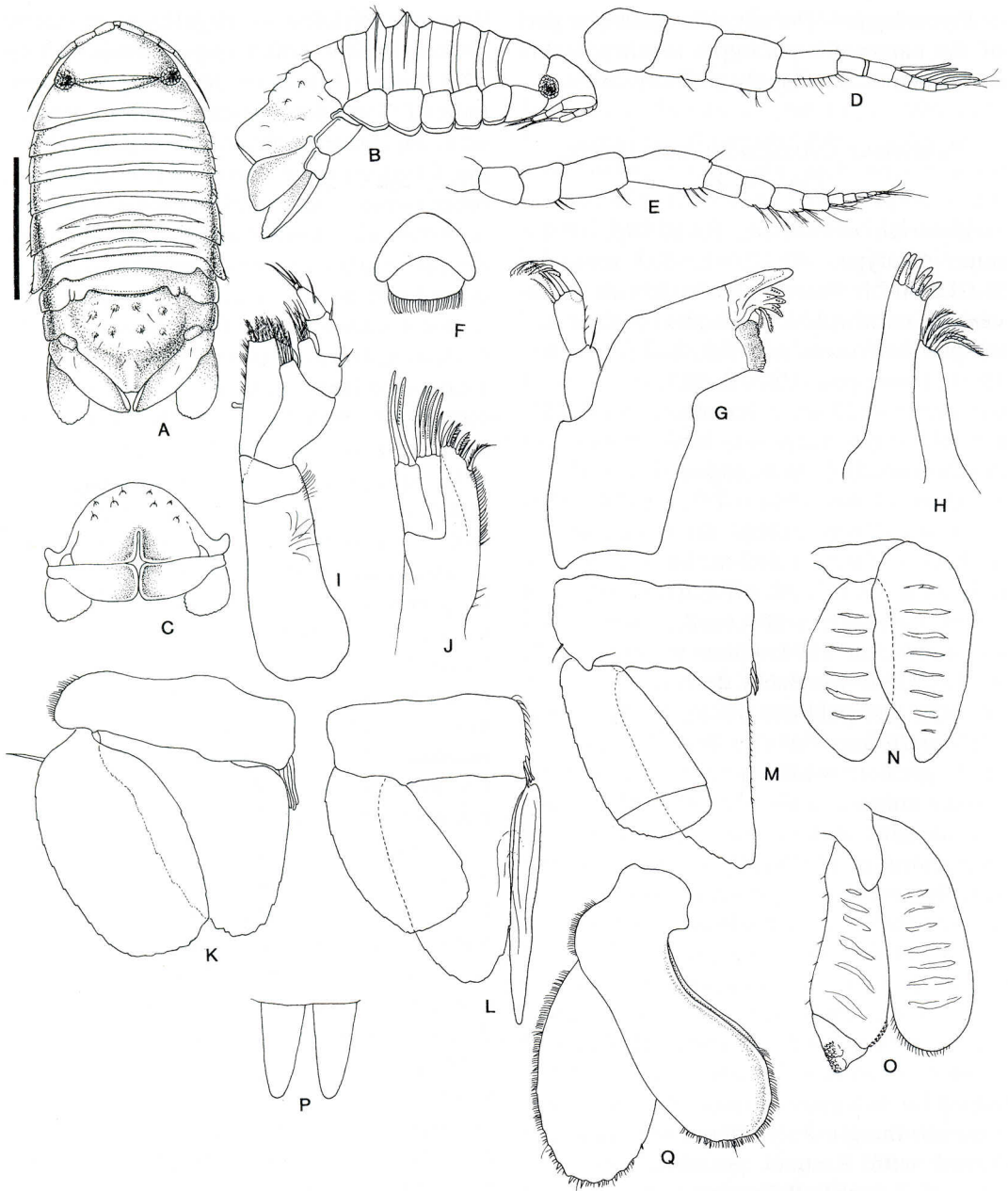


Fig. 10. *Paraimene ibarzabalae*, new species. A, ♂ Dorsal view, scale = 1 mm; B, Lateral view; C, Posterior pleotelson viewed end-on; D, Antennule; E, Antenna; F, Epistome; G, Left mandible; H, Maxilla 1; I, Maxilliped; J, Maxilla 2; K, Pleopod 1; L, ♂ Pleopod 2; M, Pleopod 3; N, Pleopod 4; O, Pleopod 5; P, Penes; Q, Uropod.

tal fifth. Pleopod 4, both rami membranous, pleated, endopod acute distally. Pleopod 5, both rami membranous, pleated; exopod with 3 spinulose bosses, sparse setae on outer margin; endopod with setae distally.

Endopods of uropod distally setose, up-turned distally to meet at midline; mesial margin deeply grooved to accommodate margin of pleotelson. Exopod densely fringed on lateral and distal margins, ex-

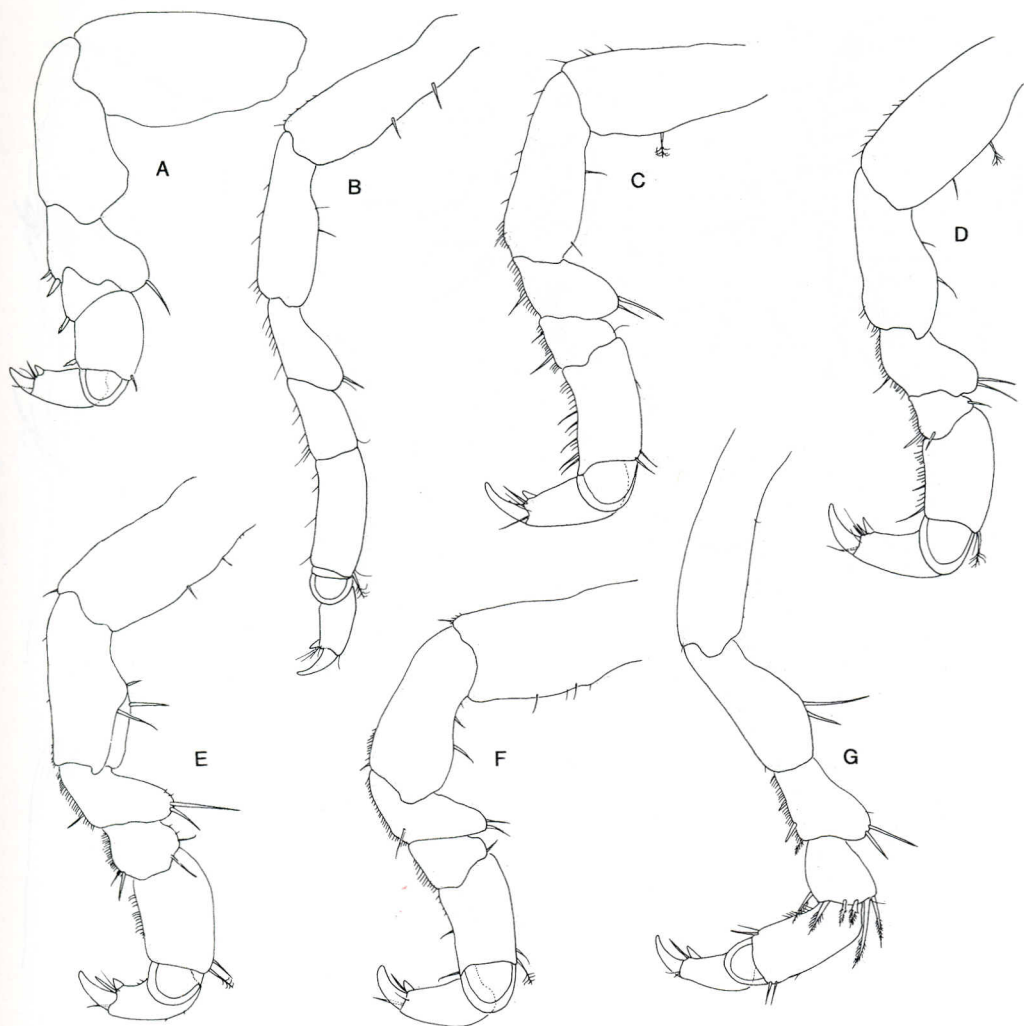


Fig. 11. *Paraimene ibarzabalaе*, new species. A, Pereopod 1; B, Pereopod 2; C, Pereopod 3; D, Pereopod 4; E, Pereopod 5; F, Pereopod 6; G, Pereopod 7.

tending somewhat beyond endopod; both rami of uropod reaching well beyond apex of pleotelson.

Female: Differs from male in absence of carinae on tergites 5 and 6.

Color pattern: Brown pigmentation somewhat variable, sometimes dense, often on pereonites 1, 6, 7, pleon and pleotelson; scattered chromatophores sometimes on rami of uropods.

Remarks.—The present species is the second to be discovered in the western hemisphere, following *Paraimene charle-*

*sae* Kensley & Schotte, 1994, from Dominica. *Paraimene ibarzabalaе* is easily separated by the presence of eight protuberances on the pleotelson, upturned lateral margins of the tergites, uropodal endopods with distomesially upturned margins which meet at midline of body, and by the presence of low carinae on pereonites 5 and 6 in the male.

Further differences in the epistome, mandible, maxilla 2 and in the relative length of the appendix masculina are also noted. As in the type species *P. tuberculata* Javed

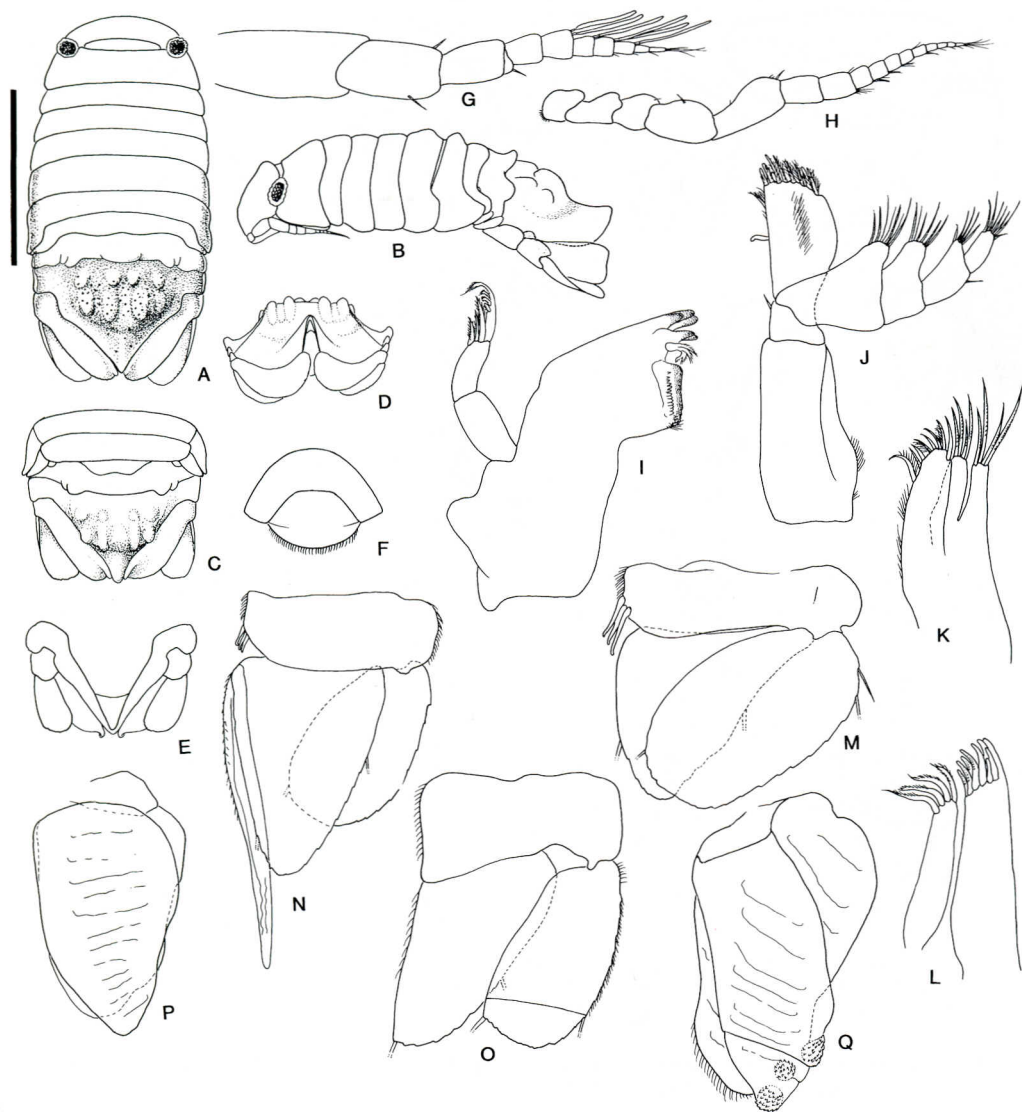


Fig. 12. *Paraimene tumulus*, new species. A, ♂ Dorsal view, scale = 1.5 mm; B, ♂ Lateral view; C, ♀ Pleotelson; D, Posterior pleotelson viewed end-on; E, Posterior pleotelson in ventral view; F, Epistome; G, Antennule; H, Antenna; I, Left Mandible; J, Maxilliped; K, Maxilla 2; L, Maxilla 1; M, Pleopod 1; N, 6 Pleopod 2; O, Pleopod 3; P, Pleopod 4; Q, Pleopod 5.

& Ahmed, 1988, from Pakistan, the second pereopod in both Caribbean species is longer, more slender and less sclerotized than either pereopods 1 or 3. This feature is probably a generic feature. In the generic diagnosis the coxa of pereopod 7 is described as a narrow dorsally curved tubular structure. In both Caribbean species, it is a

subtriangular and not overlapped by the coxa of pereopod 6. Differences between the new species and the Pakistani type are most readily seen in the ornamentation of the pleotelson and pereonites.

*Etymology*.—The species is named for Mrs. Diana Ibarzabal, who kindly aided us in field work and collected the new species.



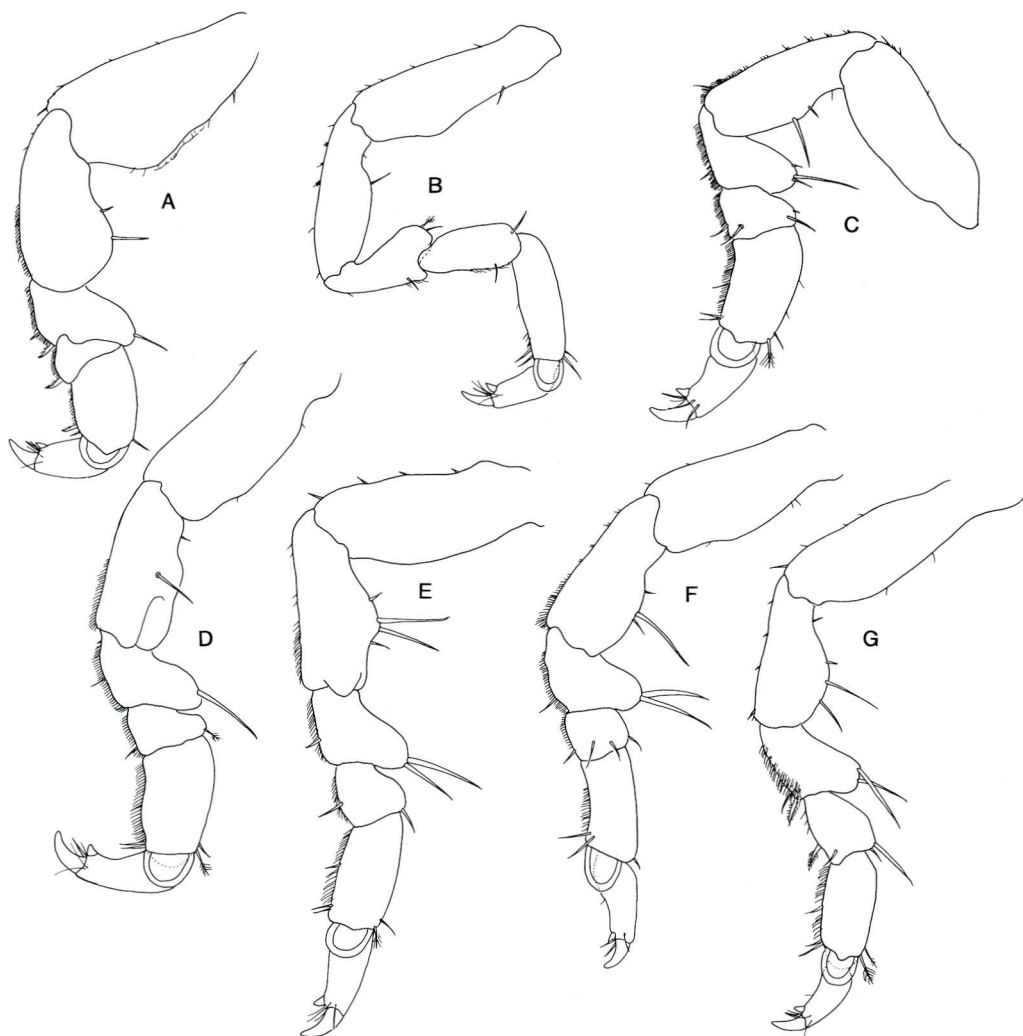


Fig. 13. *Paraimene tumulus*, new species. A, Pereopod 1; B, Pereopod 2; C, Pereopod 3; D, Pereopod 4; E, Pereopod 5; F, Pereopod 6; G, Pereopod 7.

*Paraimene tumulus*, new species

Fig. 12, 13

**Material.**—Holotype, IO-12.060, ♂ 3.0 mm, Allotype, USNM 253280, ♀ 2.6 mm, Paratype, USNM 253281, ♂, sta K-CUBA-31, Cayo Francés, algal turf on beach rock on exposed side of cay, shallow infratidal, 13 Apr 1994.

**Description.**—Male: Body length twice greatest width; dorsal integument of pereon smooth, glabrous. Cephalon domed, tiny rostral point barely visible in dorsal view;

epistome nearly semi-circular anteriorly, diverging extensions squared distally; eyes large, dorsolateral. Pereonites unornamented; pereonite 6 with slightly raised transverse ridge posteriorly. Lateral margins of pereonites 6 and 7 slightly upcurved. Pleonite short with posterior midsection projecting dorsally, lateral margins upcurved. Pleotelson anteriorly bulbous, granular and pitted, bearing row of 4 rounded bosses anteriorly and 4 elongate bosses posteriorly; posterior half tapering to rounded apex.

Antennule with peduncular articles decreasing in relative length distally; flagellum of 7 articles, second and fourth articles each bearing 2 aesthetascs, articles 3 and 5 with single aesthetasc. Antenna subequal in length to antennule, fifth article longest; flagellum with 11 articles. Mandible with incisor of 3 cusps, sclerotized lacinia mobilis with 2 cusps; spine row of 4 fringed setae; molar broad with marginal teeth and few setae; palp of 3 articles, article 2 with 3 fringed setae, article 3 with 5 fringed setae distally. Maxilla 1, inner ramus with 4 stout fringed setae; outer ramus with 9 blunt spines, 4 of which faintly dentate. Maxilla 2, inner ramus bearing 6 setae on distomesial margin and 2 setae distolaterally; both lobes of outer ramus with 4 fringed spines. Maxillipedal endite with one coupling hook and single fringed spine on mesial margin, distal margin with 8 stout, fringed setae; palp of 5 articles, each with developed distomesial setose lobe. Pereopod 1 with dense fringe of setules on posterior margins of propodus, carpus, ischium and merus; single stout fringed seta at posterodistal margin of propodus, carpus, and merus. Pereopod 2 markedly more slender and less setulose than pereopods 1 or 3. Pereopods 3–6 with fringe of short setae on posterior margin of propodus, carpus, merus, and posterodistal margin of ischium; long setae as figured on anterior margins of carpus, propodus, merus and ischium. Pereopod 4, ischium indented to receive carpus. Pereopod 7, fringe of setules on posterior margin of propodus and merus; stout dentate spines on posterodistal margins of carpus and merus. Penes unfused, short, stubby, rounded distally. Pleopod 1, 3 coupling hooks on distomesial margin; endopod triangular, exopod elliptical. Pleopod 2, basis with 3 coupling hooks; exopod elliptical and shorter than endopod; endopod with appendix masculina attached basally, extending beyond apex of ramus by one-third of length, with fine setae on anterior half of mesial margin. Pereopod 3, exopod with complete transverse suture in distal

fifth; row of fine setae on mesial margins of basis and endopod and lateral margin of exopod. Pereopod 4, both rami membranous, endopod distally narrow. Pleopod 5, both rami membranous, exopod with distal transverse suture and 3 spinulose bosses. Uropodal rami subequal, extending somewhat beyond apex of pleotelson, not meeting in midline; exopod rounded apically; endopod slightly emarginate distally with distomesial edges upturned against pleotelson.

Female: Lacking raised ridges on posterior margins of pereonite 6 and pleonite; sculpturing on pleotelson less distinct than in male; uropodal rami subequal in length to pleotelson, endopod lobed distomesially and strongly upturned against pleotelson.

*Remarks.*—This second *Paraimene* from Cuba is most closely related to *P. diana*e but differs in the sculpturing of the pleotelson, the length of the uropods, the shape of the epistome, and in the relative length of the appendix masculina. The uropodal endopod differs in shape and is not grooved along the inner margin to fit against the pleotelson as in the male of *P. diana*e. The absence of strong carinae on pereonites 5 and 6 in the latter species helps further to distinguish the new species. *Paraimene charlesae* Kensley & Schotte, 1994, described from Dominica, can be readily identified by three protuberances on each side of the pleotelson in the male. The bifid accessory dactylar spine found in *P. charlesae* and in the type *P. tuberculata* Javed & Ahmed, 1988, from Pakistan is not a consistent feature in the two species from Cuba, although in both of these there is at least one spine placed between the unguis and accessory spine in all pereopods.

The habitat of the *P. tumulus* is similar to that of the type species and of *P. charlesae*, namely, algal turf in the infra-intertidal zone of rocky beaches.

*Etymology.*—The specific name, used as a noun in apposition, is from the Latin *tumulus*, a raised mound or hillock, and refers to features on the pleotelson.

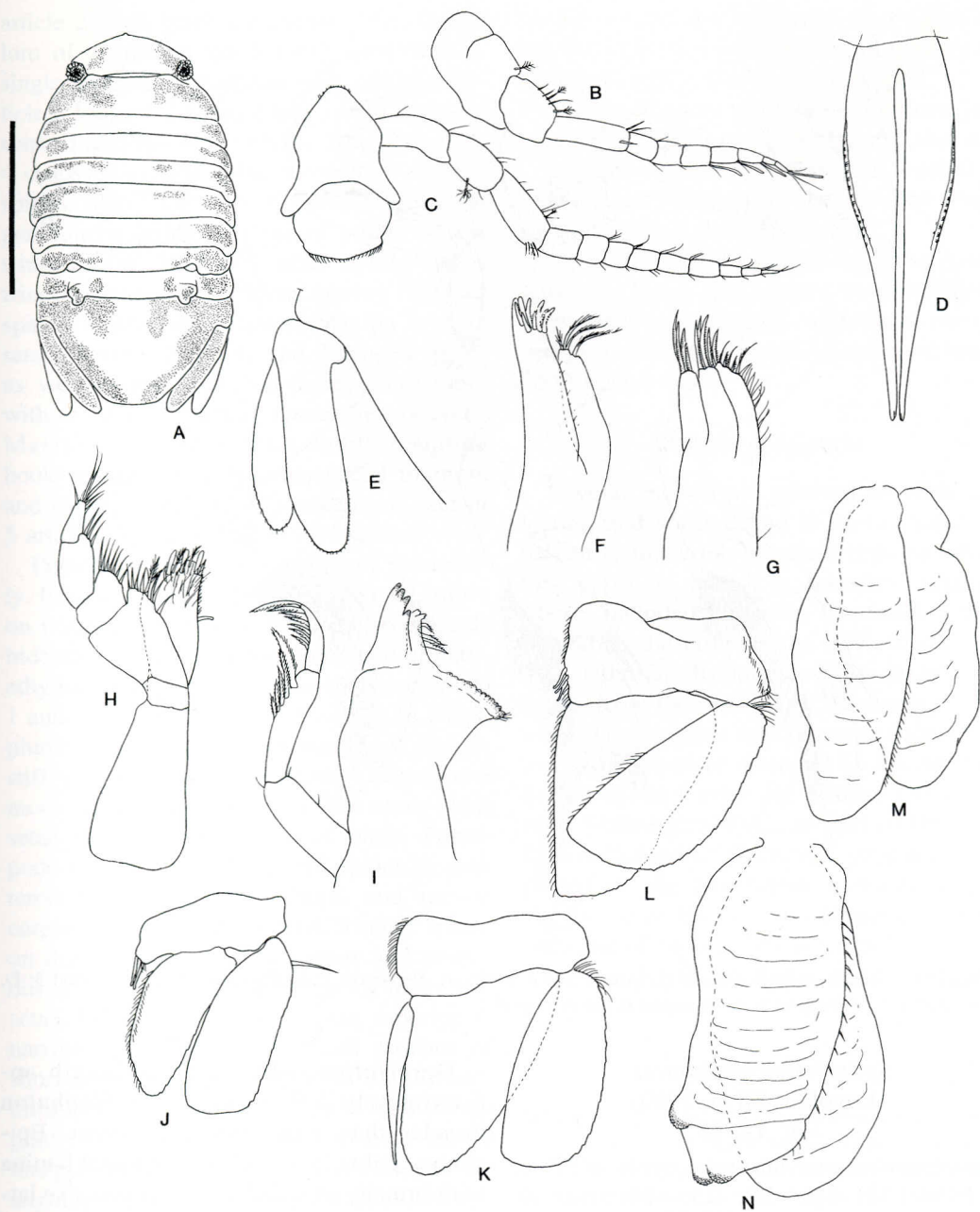


Fig. 14. *Sphaeromopsis mourei* (Loyola e Silva, 1960). A, ♂ Dorsal view, scale = 2 mm; B, Antennule; C, Epistome and antenna; F, Maxilla 1; G, Maxilla 2; H, Maxilliped; Pleopod 1; K, ♂ Pleopod 2; L, Pleopod 3; M, D, Penes; E, Uropod; F, I, Left mandible; J, Pleopod 1; K, ♂ Pleopod 2; L, Pleopod 3; M, Pleopod 4; N, Pleopod 5.



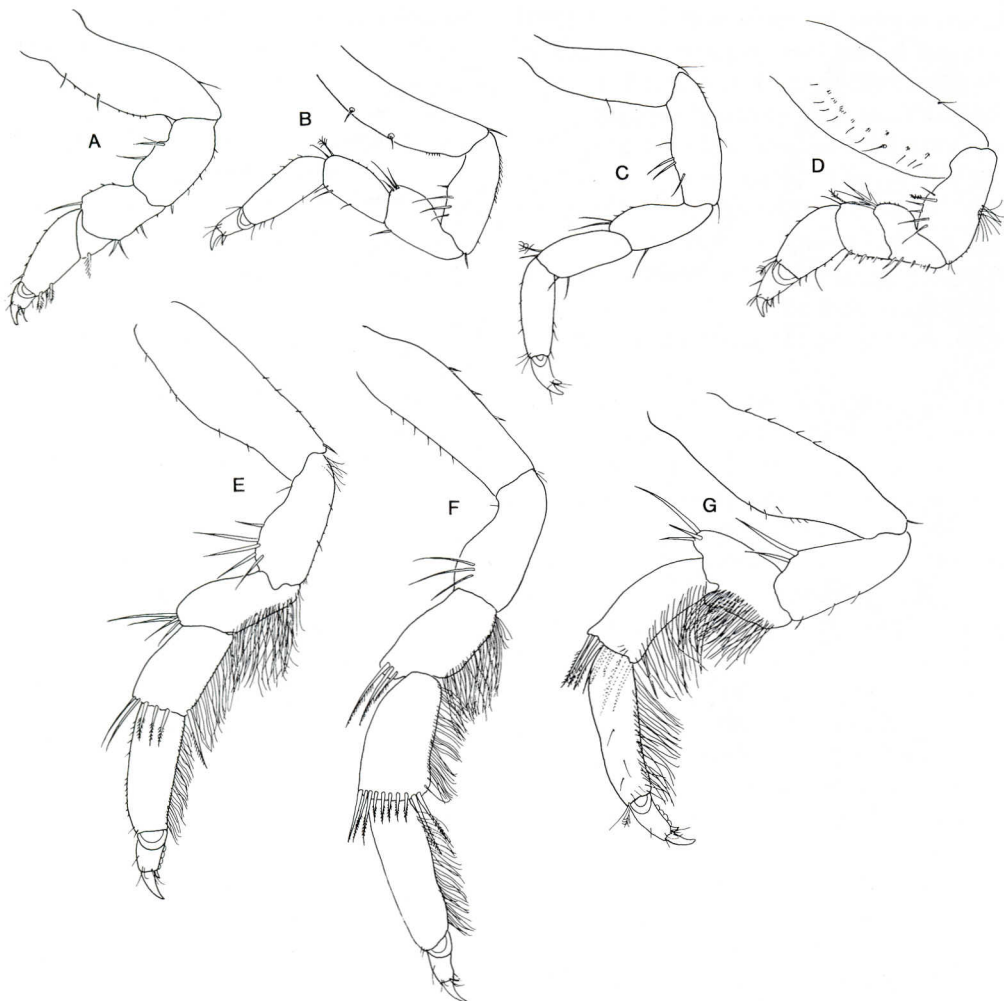


Fig. 15. *Sphaeromopsis mourei* (Loyola e Silva, 1960). A, Pereopod 1; B, Pereopod 2; C, Pereopod 3; D, Pereopod 4; E, Pereopod 5; F, Pereopod 6; G, Pereopod 7.

*Sphaeromopsis mourei*  
(Loyola e Silva, 1960)

Fig. 14, 15

*Pseudosphaeroma mourei* Loyola e Silva, 1960:138, figs. 22, 23.—Menzies & Glynn, 1968:66.—Holdich & Jones, 1973:393.

*Sphaeromopsis mourei*: Holdich & Harrison, 1981:295.

*Material*.—USNM 253282, 5 ♂, 2 ovigerous ♀, 2 ♀, 2 juveniles, sta K-CUBA-16, Cayo los Dromedarios near La Isabela, algae and sponges on mangrove roots, 0.5–1 m, 11 Apr 1994.

*Description*.—Male: Body length approximately 1.9 times width. Cephalon broader than long, smooth, convex. Epistome visible in dorsal view. Frontal lamina with broadly rounded apex and concave lateral margins, somewhat more than twice length of clypeus. Pereonites smooth. Pleon having single free pleonite with two incomplete sutures. Pleotelson very broadly rounded apically, almost truncate, smooth. Pigment of brown chromatophores, densest at margins of tergites and pleotelson, absent in medial areas, especially of telson.

Antennular basal article 1.5 times length of

article 2, both bearing plumose setae; flagellum of 7 articles, articles 4–7 each bearing single aesthetasc. Antenna with peduncle article 3 longest, articles 2 and 3 with plumose setae; flagellum of 9 articles. Mandible with 4 cusps on incisor, spine row with 3 fringed spines; palp with 5 stout, dentate spines on penultimate article, distalmost article with 7 fringed setae. Maxilla 1, inner ramus with 4 fringed setae; outer ramus having 9 blunt spines, innermost 3 dentate. Maxilla 2, inner ramus bearing 2 simple and 3 fringed spines as well as thin marginal setae; outer lobes with 4 and 6 fringed spines respectively. Maxillipedal endite with single coupling hook, distal margin having several plumose and simple setae and 4 stout spines; palp of 5 articles, article 3 shortest, all setose.

Pereopods increasing in length posteriorly. Pereopod 1 with 2 stout, bidentate spines on posterior margin of propodus and single bidentate spine on carpus. Pereopod 2 markedly longer and more slender than pereopods 1 and 3; pereopods 2 and 3 each with single plumose seta on posterior margin of carpus, stiff setae on merus and ishium. Pereopod 3 more setose than previous 2 with many short setae on posterior margin of basis. Pereopods 4–7 each with long, stiff spines on posterodistal margins of ischium and merus; carpus in each with several fringed spines on distal margin; merus, carpus and propodus of each with dense fringe of long, fine setae. Penile rami fused at base, tapering to narrow apices and with small patches of short setae on lateral margins at middle one-third of length. Pleopod 1, basis with 3 coupling hooks; fine setae on and near mesial margin of endopod. Pleopod 2, endopod triangular, appendix masculina attached basally and tapering gradually to very narrow apex, not reaching apex of endopod. Pleopod 3, basis with 3 coupling hooks, both rami undivided and with fringe of fine setae on mesial margins. Pleopod 4, both rami with transverse pleats and setae on outer distal margin of exopod. Pleopod 5, exopod with fine setae on outer margin and 3 spinulose bosses distally. Uropods extending slightly

beyond pleotelson, both rami bearing short, fine setae distally; endopod faintly crenulate apically, slightly shorter than exopod.

Female: Tergites as in male; pigment patterns not as pronounced or, largely absent.

*Previous records.*—Off several beaches in Brazil from Fortaleza in the north to Florianopolis in the south, 6–15 m.

*Remarks.*—It was thought useful to redescribe and figure this species, as the original description is sometimes difficult to obtain, and given this great range extension of about 5000 kilometers.

#### Acknowledgments

Several individuals assisted us with collecting and sorting, and in numerous ways helped to make the two field trips on which this paper is based, a scientific success. These included Kristian Fauchald, Diana Ibarzabal, the crew of the R.V. *Ulises*, and especially Dr. Rodolpho Claro, expedition leader from the Institute of Oceanology, Havana. The logistics and financial support for the two trips were arranged by Dr. Michael Smith of the Center for Marine Conservation, Washington, D.C., as part of the U.S./Cuban Scientific Exchange program, supported by the MacArthur Foundation, and the Office of Biodiversity Studies, National Museum of Natural History, Smithsonian Institution. To all of these, our sincere and grateful thanks.

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