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New records of isopods from the Indian River Lagoon, Florida (Crustacea: Peracarida)

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Abstract.—Fifteen species of isopod are recorded for the first time as occurring in the Indian River Lagoon. Two species are described as new: the janirid asellote *Iais floridana,* n. sp., which occurs commensally with *Sphaeroma terebrans* in low salinity water, and the sphaeromatid flabelliferan *Sphaeromopsis sanctaluciae,* n. sp., which is also recorded from the Orange River, Lee County, Florida, and from Islas de Juventud, Cuba. A brief discussion of protogyny in the sphaeromatid *Paradella dianae* is included.

The Indian River Lagoon, Florida, is the most biologically diverse estuarine system on the east coast of North America. As part of the Intra-coastal Waterway, it is subject to heavy usage by commercial and sport/recreational water traffic, and has seen heavy residential development along its shores. Given its important mixed-use resources, intensive study of the lagoon has been carried out for some time (see Richards 1995). Ongoing investigations by the authors of the crustacean fauna of the lagoon have revealed a number of isopod species not recorded in earlier studies (e.g., Kensley, Nelson, & Schotte 1995), although some of these may be known from the wider Florida region (see Camp, Lyons, & Perkins 1998). In part, these new records are the result of sampling in a wide variety of habitats, both in the main lagoon as well as in its tributary rivers and in the inlets that open to the sea. Twenty-five marine isopod species had previously been recorded from the IRL. The present paper documents 15 additional species and adds to the knowledge of the biodiversity of the Indian River Lagoon. Restricted synonymies, which include the original description plus any Florida records, and references that contain fuller synonymies are provided for most species. Collecting stations designated 'FTP' are those of the authors'. Unless otherwise stated, all material is deposited in the collections of the National Museum of Natural History, Smithsonian Institution.

Suborder Anthuridea
Family Anthuridae
Cyathura polita (Stimpson, 1855)

Anthura polita Stimpson, 1855:393.—Harger, 1880:398–402, pl. XI, figs. 68–69.
Cyathura polita: Burbanck, 1959:507.—Kruczynski & Subrahmanyam, 1978: 93.—Camp et al., 1998:132.

Material examined.—1 ♀, FTP-1, St. Lucie River, rotten wood in mangroves, 0.5 m, salinity 15–20 ppt., 29 May 1995.—1 ♀, FTP-22, Fort Pierce, Taylor's Creek near Rt. 1, rotten wood on muddy bank with cattails and *Spartina,* intertidal, 10 ppt., 25 Apr 1996.

Previous records.—East coast of America from the Gulf of Mexico to Canada.

Mesanthura pulchra Barnard, 1925

Mesanthura pulchra Barnard, 1925:145, fig. 9e.—Kensley & Schotte, 1989:49, fig. 19b; 52–53.—Camp et al., 1998:132.
Mesanthura decorata Menzies & Glynn, 1968:26, fig. 8a–i.

Mesanthura floridensis Menzies & Kruczynski, 1983:28–30, fig. 9a–i.

Material examined.—1 ♀, 1 ♂, FTP-4, Fort Pierce Inlet, south of South Jetty, mixed algal turf on sand bag barrier on beach, intertidal, 30 May 1995.—1 ovigerous ♀, FTP-89, Sebastian Inlet State Park, 100 ft inside south jetty, encrusting orange sponge with red branching alga on jetty rocks, 0.5 m, 19 Sep 1996.—1 ♀, 1 juv., FTP-51, Sebastian Inlet State Park, south side, algal clumps on granite boulders on shore inside bridge, 0.5 m, 25 Jun 1997.

Previous records.—Belize; Puerto Rico; Florida; intertidal to 36 m.

Ptilanthura tenuis Harger, 1878
Fig. 1

Ptilanthura tenuis Harger, 1878:377.—Kensley, 1996a:763, figs. 1, 2.—Kensley, 1996b:278, fig. 5B–D.—Camp et al., 1998:132.

Material examined.—5 ♀, Indian River Lagoon, south of Sebastian Inlet, 27°49.64′N, 80°27.04′W, 1.6 m, salinity 30.15 ppt., 1995, coll. R. Heard.

Previous records.—Florida, Alabama, to Maine; intertidal to 253 m.

Remarks.—The material from the region of Sebastian Inlet had a distinctive and persistant color pattern, which is recorded here.

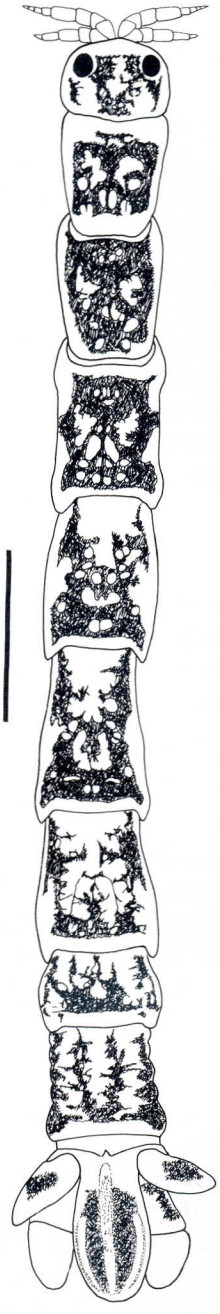

Fig. 1. *Ptilanthura tenuis:* Female in dorsal view, showing persistent color pattern. Scale = 1 mm.

Suborder Asellota
Family Janiridae
Carpias algicola (Miller, 1941)

Janira algicola Miller, 1941:318–320, fig. 4a–n.

Bagatus algicola.—Pires, 1982:247–250, fig. 47–55.

Carpias algicola.—Kensley & Schotte, 1989:82–83, fig. 38a–g.—Camp et al., 1998:133.

Material examined.—1 ♂, 4 ♀, FTP-38, Sebastian Inlet State Park, gravel and pebbles in pockets around boulders, infratidal, 0–0.8 m, 19 Sep 1996.—2 ♂, 1 ovigerous ♀, 11 immature, FTP-40, Sebastian Inlet State Park, clumps of *Caulerpa racemosa* and branching red alga on granite boulders inside inlet, 0.5–1.0 m, 19 Sep 1996.—2 ♂,

4 ♀, 2 immature, FTP-42, Sebastian Inlet State Park, off south jetty about 50 yds. west of bridge, on *Caulerpa* 0.25 m, 19 Sep 1996.—18 specimens, FTP-51, Sebastian Inlet State Park, south side, granite boulder shore inside bridge, algal clumps on boulders, 0.5 m, 25 Jun 1997.—3 ♂, 7 ovigerous ♀, 60+ immature, FTP-53, same locality, algal clumps and sponge on boulders outside of bridge, 0.5–1.0 m, 26 Jun 1997.—3 specimens, FTP-65, Sebastian Inlet State Park, orange sponge on rocks inside of inlet, low tide level, 0–50 cm, 18 Aug. 1998.—1 ovigerous ♀, 5 immature, FTP-68, Sebastian Inlet State Park, gravel rubble, empty shells in pockets between rocks inside inlet, 0–20 cm, 18 Aug 1998.—12 ovigerous ♀, 8+ immature, FTP-69, Sebastian Inlet State Park, algal turf and hydroids on granite boulders inside inlet, 0–50 cm, 18 Aug. 98.

Previous records.—Venezuela; Jamaica; Yucatan, Mexico; Belize; Looe Key, Florida; intertidal to 2 m.

Carpias triton (Pires, 1982)

Bagatus triton Pires, 1982:251–254, figs. 72–84.

Carpias triton.—Kensley & Schotte, 1989: 83, 87, fig. 39e–f.

Material examined.—20+ specimens, FTP-5, Ft. Pierce Inlet, large barnacle clumps with orange sponge and algal turf on boulders inside inlet, shallow infratidal, 30 May 1995.

Previous records.—Belize, intertidal.

Iais floridana, new species
Figs. 2, 3

Material examined.—Holotype, USNM 243843, 1 ♂ tl 1.35 mm, Paratypes, USNM 243844, 10 ♂ tl 1.26–1.40 mm, 12 ovigerous ♀ tl 1.71–1.82 mm, 10 non-ovigerous ♀, 50+ juveniles, sta FTP-22, on *Sphaeroma terebrans* in rotten wood, Taylor Creek near Rt. 1, intertidal, 10 ppt., 25 Apr 1996.

Additional material.—10 specimens, sta FTP-2, on *Sphaeroma terebrans* in rotten wood, Port St. Lucie, Florida, 29 May 1995.—100+ specimens, sta FTP-12, on *Sphaeroma terebrans* in rotten wood, Riverside Park at Port St. Lucie Boulevard, intertidal–1 m, 10 ppt., 1 Jun 1995.—1 specimen, sta FTP-13, on *Sphaeroma terebrans* in dead wood, north fork of St. Lucie River, at Prima Vera Boulevard, 2.5 ppt, 0.1 m, 1 Jun 1995.—2 specimens, sta FTP-17, on *Sphaeroma terebrans* in rotten wood, Riverside Park on St. Lucie River, 0 ppt, 0.1–0.5 m, 23 Apr 1996.—3 specimens, sta FTP-27, on *Sphaeroma terebrans* in rotten wood, near mouth of St. Sebastian River, 15 ppt, 0.5 m, 17 Sep 1996.—2 specimens, sta FTP-29, on *Sphaeroma terebrans* in rotten wood, island in mouth of St. Sebastian River, 15 ppt., 0.5 m, 17 Sep 1996.—14 specimens, Estero River mouth, Lee County, Florida, 26°26′05″N, 81°50′52″W, coll. A. S. Walton.—1 specimen, Hendry Creek, off Estero Bay, Lee County, Florida, coll. A. S. Walton, 14 Apr 1993.

Description.—Male: Body about 2.5 times longer than greatest width at pereonite 4. Cephalon about twice wider than long, anterolateral corners rounded. Anterolateral corners of pereonites, especially of 3–5, rounded, setose, coxae visible on all pereonites in dorsal view. Pleon consisting of short anterior pleonite lacking free lateral margins, plus subcircular pleotelson. Eye consisting of 2 ommatidia. Antennular flagellum of 3 articles, terminal and subterminal articles each bearing single aesthetasc. Antennal flagellum of 13 articles. Mandibular palp of 3 articles, article 2 with 2 stout setae, article 3 with distal row of 7 setae; incisor of about 6 sclerotized cusps; spine row of 4 or 5 setae; lacinia of 2 cusps; molar distally truncate with 2 distomesial setae. Maxilla 1, inner ramus with 4 distal setae, outer ramus with about 10 pectinate distal setae. Maxilla 2, 2 outer lobes each with 4 distal fringed setae. Maxilliped; endite broad, distolaterally convex, with about

7 fringed setae and 8 simple setae; palp articles setose on mesial margins.

Pereopod 1, dactylus bearing 2 claws; pereopods 2–3, 5–7, dactyli each with 3 claws. Pereopod 4 considerably shorter than 3 or 5, dactylus with 2 claws, propodus with single stout distal claw. Pleopod 1, rami fused for about 4/5 of total length, distal lobes rounded, bearing 9 setae distally per side. Pleopod 2, protopod semicircular, canula not reaching beyond distal angle of protopod. Uropodal rami both longer than protopod, exopod about 1/3 longer than endopod, each with 4 elongate distal simple setae.

Female: Brood pouch containing up to 8 eggs. Pleonal operculum ovate, midlength about 2/3 greatest width, with 4 or 5 fine marginal setae.

Remarks.—Of the eight described species of *Iais* (see Wilson & Wägele 1994), at least three occur commensally with sphaeromatid isopods, as does the present species, which is found in association with *Sphaeroma terebrans.* Several species (e.g., *I. aquilei* Coineau, 1977; *I. elongata* Sivertsen & Holthuis, 1980; see Kensley 1994) also perform mate-guarding as is seen in the present material, with the male clasping a manca female with the shortened specialized pereopod 4.

Given that some species of *Sphaeroma,* especially those that bore into mangroves, have wide distributions, and have been implicated in introductions along with their commensals (Rotramel 1972, 1975), it is necessary to compare the present material closely with *I. californica* (found on *Sphaeroma quoyanum*), in case the present species was somehow introduced to the east coast of the United States, where *Sphaeroma terebrans* is the available host. However, *Iais floridana* more closely resembles *I. singaporensis* Menzies & Barnard, 1951 (see Müller & Brusca 1992) especially in the general habitus and in possessing rounded anterolateral lobes on the pereonites, than *I. californica* (Richardson, 1904). Comparison with recently collected material of both *I. californica* and *I. singaporensis* reveals several differences that reinforce the view that the Florida material represents an undescribed species. The two distal articles of the antennule differ in proportions, the penultimate articles especially being more slender and elongate on the two previously described species. The antennal flagellum has fewer articles in the Florida material (13) than in *I. californica* (20) and *I. singaporensis* (24). The distal propodal spine of pereopod 4 in the male of *I. californica* is noticeably more elongate than in the Florida and Asian material. *Iais californica* is a larger species (♂ 2.49 mm mean length, $n = 15$; ovigerous ♀ 2.55 mm mean length, $n = 11$) than either the Florida species (♂ 1.34 mm mean length, $n = 10$; ovigerous ♀ 1.76 mm mean length, $n = 10$) or *I. singaporensis* (♂ 1.3–1.7 mm, ovigerous ♀ 1.4–1.7 mm). The stylet of pleopod 2 of the male is more slender and elongate in the Florida species than in *I. singaporensis.*

Etymology.—The specific name derives from Florida, from whence the species is recorded.

Family Joeropsidae

Joeropsis coralicola Schultz & McCloskey, 1967

Joeropsis coralicola Schultz & McCloskey, 1967:103–107, figs. 1–39.—Kensley & Schotte, 1989:88, fig. 40g.—Camp et al., 1998:133.

Material examined.—11 specimens, sta FTP-5, Fort Pierce Inlet, on large barnacle clumps with orange sponge and algal turf on boulders inside inlet, shallow infratidal, 30 May 1995.

Previous records.—North Carolina to Florida Middle Grounds, Gulf of Mexico, 25–33 m.

Joeropsis tobagoensis Kensley & Schotte, 1994

Joeropsis tobagoensis Kensley & Schotte, 1994:482, 486, fig. 1a–o.

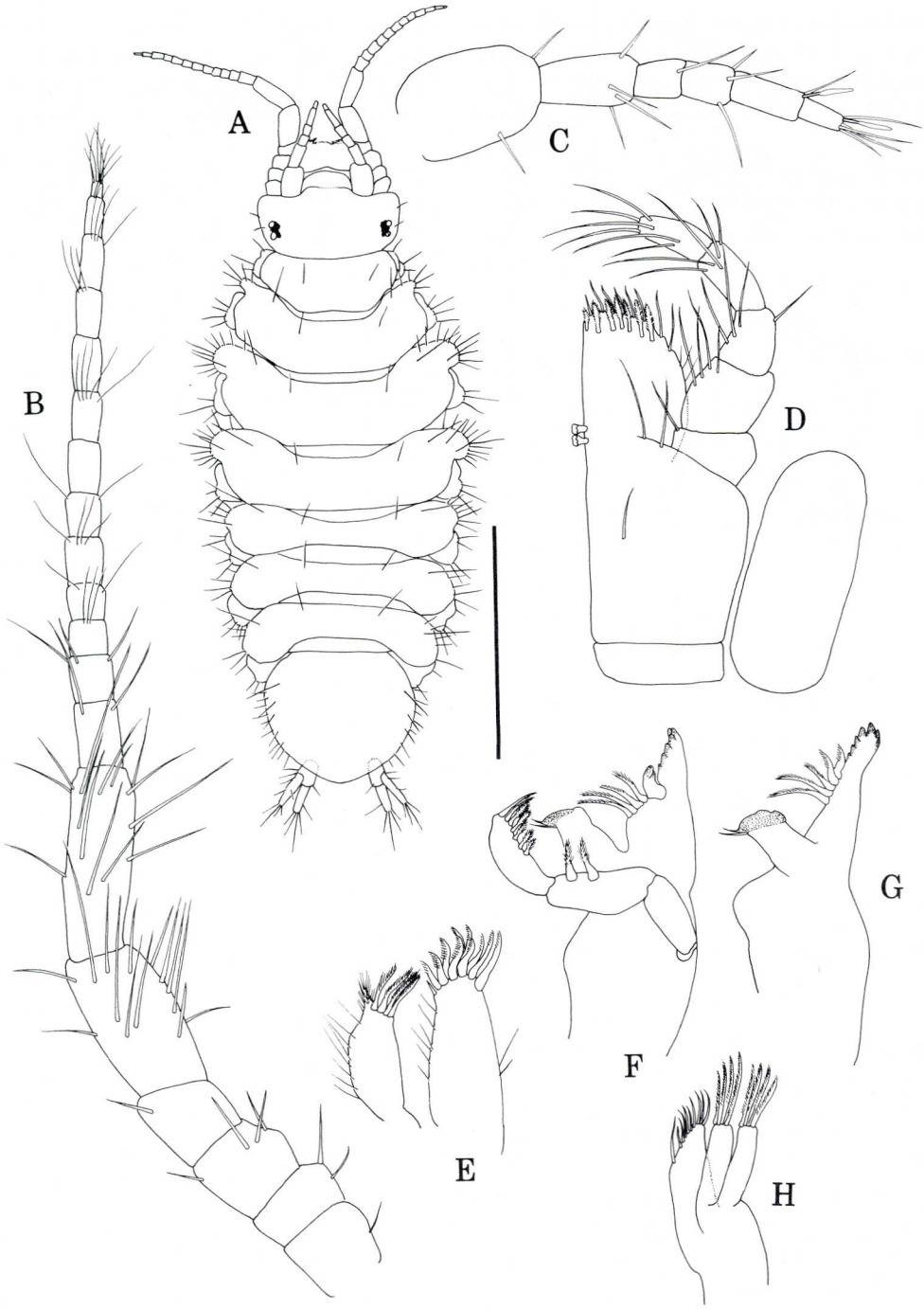

Fig. 2. *Iais floridana,* new species: A, habitus, dorsal view, scale = 0.5 mm; B, antenna; C, antennule; D, maxilliped; E, maxilla 1; F, left mandible; G, right mandible (palp omitted); H, maxilla 2.

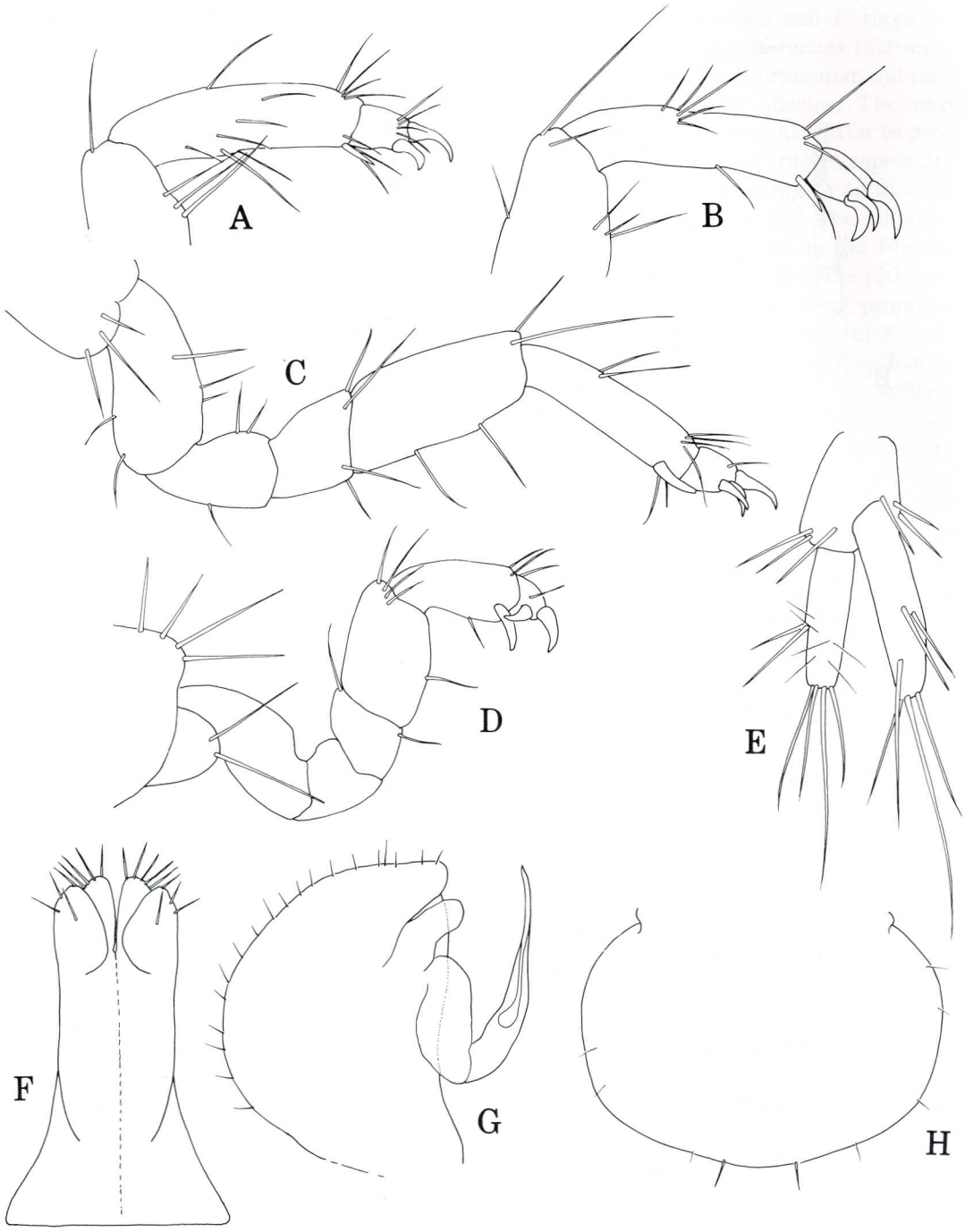

Fig. 3. *Iais floridana,* new species: A, pereopod 1 propodus and dactylus; B, pereopod 2, propodus and dactylus; C, pereopod 3; D, male pereopod 4; E, uropod; F, male pleopod 1; G, male pleopod 2; H, female operculum.

Material examined.—18 specimens, sta FTP-5, Fort Pierce Inlet, on large barnacle clumps with orange sponge and algal turf on boulders inside inlet, shallow infratidal, 30 May 1995.

Previous records.—Tobago, intertidal to 5 m.

Suborder Flabellifera
Family Cirolanidae
Anopsilana jonesi Kensley, 1987

Anopsilana jonesi Kensley, 1987:565–568, fig. 5a–j, 6a–h.—Camp et al., 1998:135.

Material examined.—1 ♀, sta FTP-12, North Fork St. Lucie River at Riverside Park on Port St. Lucie Blvd., rotten wood around dock, intertidal to 1 m, salinity 10 ppt., 1 Jun 1995.—1 ♂, 1 juv., sta FTP-27, Indian River Lagoon near mouth of Sebastian River, rotten submerged wood on small island, in low turf of *Enteromorpha* and *Ceramium,* 0.5 m, salinity 15 ppt., 17 Sep 1996.—1 ♂, 1 ♀, sta FTP-29, Sebastian River, first island inside mouth, on rotten wood at shore, salinity 15 ppt., 17 Sep 1996.

Previous records.—Belize; Florida; in estuarine mangroves.

Cirolana parva Hansen, 1890

Cirolana parva Hansen, 1890:340–341, pl. II, fig. 6–6b, pl. III, fig. 1–1d.—Bruce & Bowman, 1982:325–333, figs. 1, 2.—Kensley & Schotte, 1989:135, fig. 59d–e, 60.—Camp et al., 1998:135.

Material examined.—2 ♀, sta FTP-38, Sebastian Inlet State Park, gravel and pebbles in pockets around granite boulders, infratidal, 19 Sep 1996.—1 ♀, 1 juv., sta FTP-51, Sebastian Inlet State Park, south side of inlet, algal clumps on granite boulders, 0.5 m, 25 Jun 1997.—1 juv., sta FTP-52, Sebastian Inlet State Park, south side, shallow embayment at campsite in State Park, 1/2 mile from mouth in lagoon, 0.5 m, 25 Jun 1997.—1 juv., sta FTP-57, Sebastian Inlet State Park, lagoon near Coconut Point, sweep through *Syringodium* on Inlet side, 0.5–1 m, 26 Jun 1997.—1 juv., sta FTP-60, Wabasso Causeway Park, submerged rotten wood, 20–40 cm, 26 Jun 1997.

Previous records.—Panama; Belize; Cozumel, Mexico; Antilles to Florida Keys; Gulf of Mexico; N. & S. Carolina; intertidal to 55 m.

Family Corallanidae
Excorallana sexticornis (Richardson, 1901)

Corallana sexticornis Richardson, 1901: 518, fig 9.

Excorallana sexticornis: Delaney, 1989: 38.—Kensley & Schotte, 1989:165, figs. 75e–f, 76d–f.—Camp et al., 1998:135.

Material examined.—1 ♀, sta FTP-14, Ft. Pierce Inlet, barnacles, sponges, algal turf on blocks in inlet, intertidal, 23 Apr 1996.—1 ovigerous ♀, sta FTP-15, Ft. Pierce State Recreational Area, rotten wood piles with encrusting algae, intertidal, 23 Apr 1996.—1 ♀, 3 juvs., sta FTP-17, North Fork St. Lucie River, Riverside Park, rotten submerged wood on mud with numerous barnacles and shells, 10–50 cm, 23 Apr 1996.—2 ♀, sta FTP-33, Jim Island near Ft. Pierce Inlet, dead submerged wood at edge of mangrove island, with algal mat, 0.–0.5 m, 18 Sep 1996.—1 ♀, sta FTP-38, Sebastian Inlet State Park, gravel inlet, south side, east of bridge, algal clumps, sponge on boulders, strong wave and wash action, 0.5–1.0 m, 26 Jun 1997.—1 ♀, sta FTP-61, North Hutchinson Island, near causeway, rocks with algal turf, 0.1 m, 27 Jun 1997.—1 ♂, 1 ♀, 1 juv., sta FTP-71, Ft. Pierce Inlet, north bank, algal turf on boulders, low tide level, 19 Aug 1998.

Previous records.—Belize; Puerto Rico; Cuba; Florida; shallow infratidal.

Family Sphaeromatidae
Cassidinidea ovalis (Say, 1818)

Naesa ovalis Say, 1818:484–485.—Richardson, 1900:224, 1901:537.

Cassidena lunifrons: Richardson, 1900: 222.
Cassidina lunifrons: Richardson, 1901:533, fig. 14.
Cassidisca lunifrons: Richardson, 1905: 273, figs. 283–284.—Schultz, 1969:115, fig. 158.
Cassidinidea lunifrons: Hansen, 1905: 130.—Menzies & Frankenberg, 1966:44, fig. 20.—Kussakin, 1979:336, figs. 199–200.—Bruce, 1994:1151.
Cassidinidea ovalis: Schultz, 1969:115, fig. 159.—Kensley & Schotte, 1989:208, fig. 92b–e.—Bruce, 1994:1151, fig. 45.—Camp et al., 1998:136.
Dies arndti Ortiz & Lalana, 1980:161–164, figs. 1–8.
Dies barnardi Carvacho, 1977:14–17, figs. 4a–f, 5a–i.

Material examined.—1 ♀, FTP-1, North Fork St. Lucie River, rotten wood in mangroves, 0.5 m, salinity 1–20 ppt., 29 May 1995.—3 specimens, FTP-12, North Fork St. Lucie River at Riverside Park, Port St. Lucie Boulevard, rotten wood around dock, intertidal, salinity 10 ppt., 1 Jun 1995.—specimen, FTP-13, North Fork St. Lucie River at marina on Prima Vera Boulevard, dead submerged wood in shore grass at river's edge, 0.1 m, salinity 2.5 ppt., 1 Jun 1995.—4 specimens, FTP-17, Riverside Park on North Fork St. Lucie River, rotten submerged wood on mud with numerous barnacles and shells, 10–50 cm, salinity 0 ppt., 23 Apr 1996.—30+ specimens, FTP-23, mouth of North Fork St. Lucie River at U.S. Rt. 1 and Fern Rd., oysters shells and rocks on muddy bank, intertidal, salinity 0 ppt., 25 Apr 1996.—1 ovigerous ♀, FTP-29, Sebastian River, first island west of mouth, rotten submerged wood at shore, salinity 15 ppt., 17 Sep 1996.—1 specimen, FTP-30, same locality as above, in organic detritus, intertidal, 17 Sep 1996.—1 specimen, FTP-31, Sebastian River, island opposite MacDonald State Campground, submerged leaf litter, *Typha* and *Crinum* in shallow water, salinity 0 ppt., 17 Sep 1996.

Previous records.—Panama; Belize; Trinidad; Dominica; Cuba; Gulf of Mexico; Florida to New Jersey; intertidal–1 m.

Paradella dianae (Menzies, 1962)
Figs. 4, 5

Dynamenopsis dianae Menzies, 1962:341, fig. 3.
Paradella dianae: Harrison & Holdich, 1982:103, fig. 6.—Kensley & Schotte, 1989:224, fig. 98a–c.

Material examined.—3 ♂, FTP-14, Ft. Pierce Inlet, barnacles, sponges, algal turf on blocks in inlet, intertidal, 23 Apr 1996.—6 ♂, 14 ovigerous ♀, 30+ immature, FTP-15, Ft. Pierce Recreational Area, rotten wood piles with encrusting algae, intertidal, 23 Apr 1996.—6 ♂, 4 ovigerous ♀, 25+ immature, FTP-17, Riverside Park on North Fork St. Lucie River, rotten submerged wood on mud with barnacle shells, salinity 0 ppt., 10–50 cm, 23 Apr 1996.—1 ♂, 2 ovigerous ♀, 15+ immature, FTP-19, Jack Island near Ft. Pierce Inlet, *Caulerpa* and empty shells near oyster bank, 0.5 m, 24 Apr 1996.—100+ specimens, FTP-38, Sebastian Inlet State Park, gravel and pebbles in pockets around granite boulders lining inlet, infratidal, 0–32″, 19 Sep 1996.—92 specimens, FTP-39, same locality, on encrusting orange sponge with red branching algae on jetty rocks ca. 100 ft from end of south jetty, 0.5 m, 19 Sep 1996.—2 ♂, 1 immature, FTP-42, same locality, 50 m west of bridge off south jetty, in Caulerpa, depth 6″, 19 Sep 1996.—38 specimens, FTP-44, same locality, 50 ft inland from bridge, mixed algae on sandy/shelly bottom with rocks and boulders, 0.5 m, 19 Sep 1996.—1 ♂, 7 ♀, 2 juvs., FTP-45, same locality, red filamentous alga on rocks and south jetty wall, 30 cm, 19 Sep 1996.—1 ♂, 4 ovigerous ♀, 3 immature, FTP-46, Sebastian Inlet State Park, north side, gravel and pebbles among granite boulders ca. 100 m inside inlet, 10–50 cm, 20 Sep 1996.—12 ♂, 11 ovigerous ♀, 73 ♀, 40 juvs., FTP-48, Sebastian Inlet State

Park, south side, rubble and stones in 3″ pools at top of shore, with blue-green alga, 25 Jun 1997.—1 ♂, 5 ♀, 1 juv., FTP-50, same locality, granite boulder shore inside of bridge, stones and rubble with low algal turf, at bottom of shore with strong wave and wash action, 25 Jun 1997.—6 subadult ♂, 3 ovigerous ♀, 4 ♀, 6 juvs., FTP-51, same locality, algal clumps on boulders inside of bridge, 0.5 m, 25 Jun 1997.—2 ♀, FTP-53, same locality, outside of bridge, algal clumps and sponge on boulders in strong wave and wash action, 26 Jun 1997.—1 ♂, 1 subadult ♂, FTP-54, same locality, boulders outside bridge, chunks of reef worm rock, 26 Jun 1997.—7 ovigerous ♀, 14 juvs., FTP-56, Sebastian Inlet State Park, lagoon near Coconut Point, *Enteromorpha/Ulva* mats exposed at low tide on boulders at top of shore, surface, 26 Jun 1997.—1 ♂, 4 ovigerous ♀, FTP-63, large boat canal at Smithsonian Marine Station, in floating *Sargassum,* at surface, 25 Jun 1997.—1 ♂, 4 ovigerous ♀, FTP-66, Sebastian Inlet State Park, chunks of reef worm tubes on rocks at low tide level, inside inlet, 0–50 cm, 18 Aug 1998.—4 subadults, 1 ovigerous ♀, FTP-68, same locality, gravel rubble and empty shells in pockets between rocks, inside inlet, 0–20 cm, 18 Aug 1998.—3 ovig ♀, FTP-69, same locality, algal turf with hydroids on granite boulders inside inlet, 0–50 cm, 18 Aug 1998.—3 ovigerous ♀, FTP-70, Ft. Pierce Inlet, north bank, reef worm tubes on boulders in inlet, low tide, surface, 19 Aug 1998.—2 ovigerous ♀, FTP-71, same locality, algal turf at low tide level on boulders, surface, 19 Aug 1998.

Previous records.—Baja California, Mexico; Queensland, Australia; Western Australia; Marshall Islands; Hong Kong; Puerto Rico; Florida; intertidal.

Remarks.—While *Paradella dianae* has previously been recorded from the IRL, an aspect of its biology has come to light that demands mention.

Fifty-one ovigerous females out of 182 examined (about 28%) were observed to possess penes, suggesting that a protogynous sex change occurs in *P. dianae.* In Fig. 4C, a scanning electron micrograph, the ovigerous female shows both the opening of the marsupium between the fourth pereopod bases, and penes that are characteristic of a subadult male. The penes of the adult male are long, very slender in the distal half, tapering to acute apices and extending beyond the endopod of pleopod 1 by nearly 50%. The ovigerous hermaphrodites show no retention of either appendix masculina or adult penes, which suggests that protandry is not the condition here. This would seem to be the first record of protogyny in the sphaeromatid subfamily Dynameninae. Among the Isopoda, protandrous sex change is well known in the families Anthuridae (Wägele 1979), Cymothoidae (Brusca 1981), several families of the suborder Epicaridea (Kozloff 1987), and in at least one oniscidean (Brook et al. 1994). Members of the Sphaeromatidae known to exhibit protogyny are members of other subfamilies: *Gnorimosphaeroma oregonense* (Dana, 1853), *G. luteum* Menzies, 1954 (both Sphaeromatinae), and *Paraleptosphaeroma glynni* Buss & Iverson, 1981 (Cassidininae). Bruce (1994:1132) further mentions observing hermaphroditism in *Paracassidina munna,* having "developed male characters in . . . pleopod 2" as well as oostegites in the same specimen. Pleopod 2 in the ovigerous females of *P. dianae* did not display any male characters. The proportion of ovigerous females with penes in *G. oregonense* (31% of females collected in the field) is comparable to that of *P. dianae* recorded here. Brook et al. (1994) provide a discussion of the adaptive value of protogyny as compared to protandry, the commoner reproductive strategy in Crustacea.

Paradella quadripunctata (Menzies & Glynn, 1968)
Fig. 6

Dynamenella quadripunctata Menzies & Glynn, 1968:60–61, fig. 28a–n.

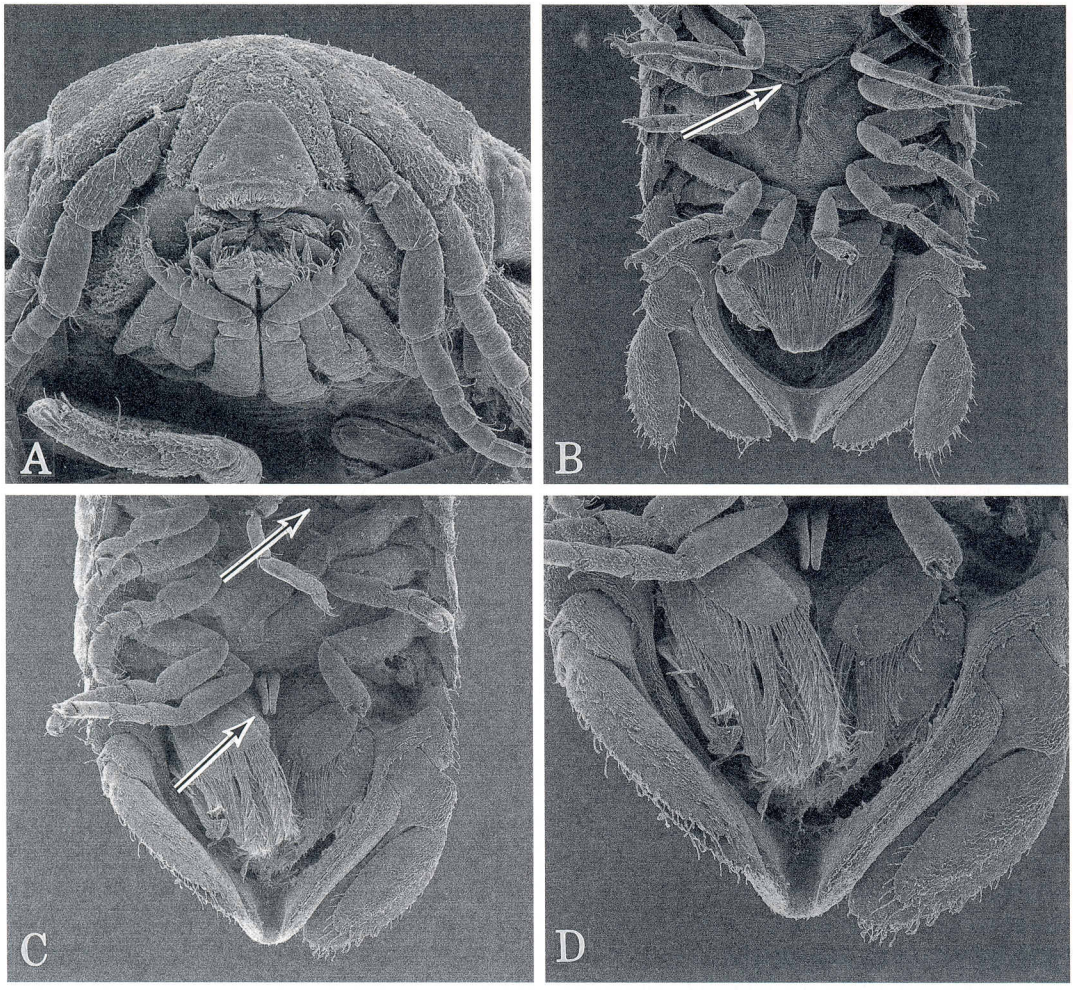

Fig. 4. *Paradella dianae:* A, ventral cephalon; B, ovigerous female, ventral view, arrow indicating opening of brood pouch between fourth pereopods; C, ovigerous female with brood pouch opening and penes; D, ovigerous female, close-up of ventral pleotelson and penes.

Paradella quadripunctata: Harrison & Holdich, 1982:101.—Kensley & Schotte, 1989:224–225, fig. 98f–g.—Camp et al., 1998:136.

Material examined.—1 ovigerous ♀, FTP-38, Sebastian Inlet State Park, gravel and pebbles in pockets around granite boulders lining inlet, infratidal, 0–32″, 19 Sep 1996.—1 immature, FTP-50, Sebastian Inlet State Park, south side, granite boulder shore inside of bridge, in stones and rubble with algal turf at bottom of shore with strong wave action, 25 Jun 1997.—24 immature, FTP-51, same locality, algal clumps on boulders, 0.5 m, 25 Jun 1997.—25+ immature, same locality, FTP-53, south side, outside bridge, algal clumps and sponge on boulders in strong wave and wash action, 0.5–1.0 m, 26 Jun 1997.—1 subadult ♂, 80+ immature, FTP-54, same locality, south side, boulders in inlet, outside of bridge, in chunks of reef worm rock, 26 Jun 1997.—5 immature, FTP-59, Sebastian Inlet State Park, lagoon near Coconut Point, 26 Jun 1997.—25+ immature, FTP-62, North Hutchinson Island, Recreation Park,

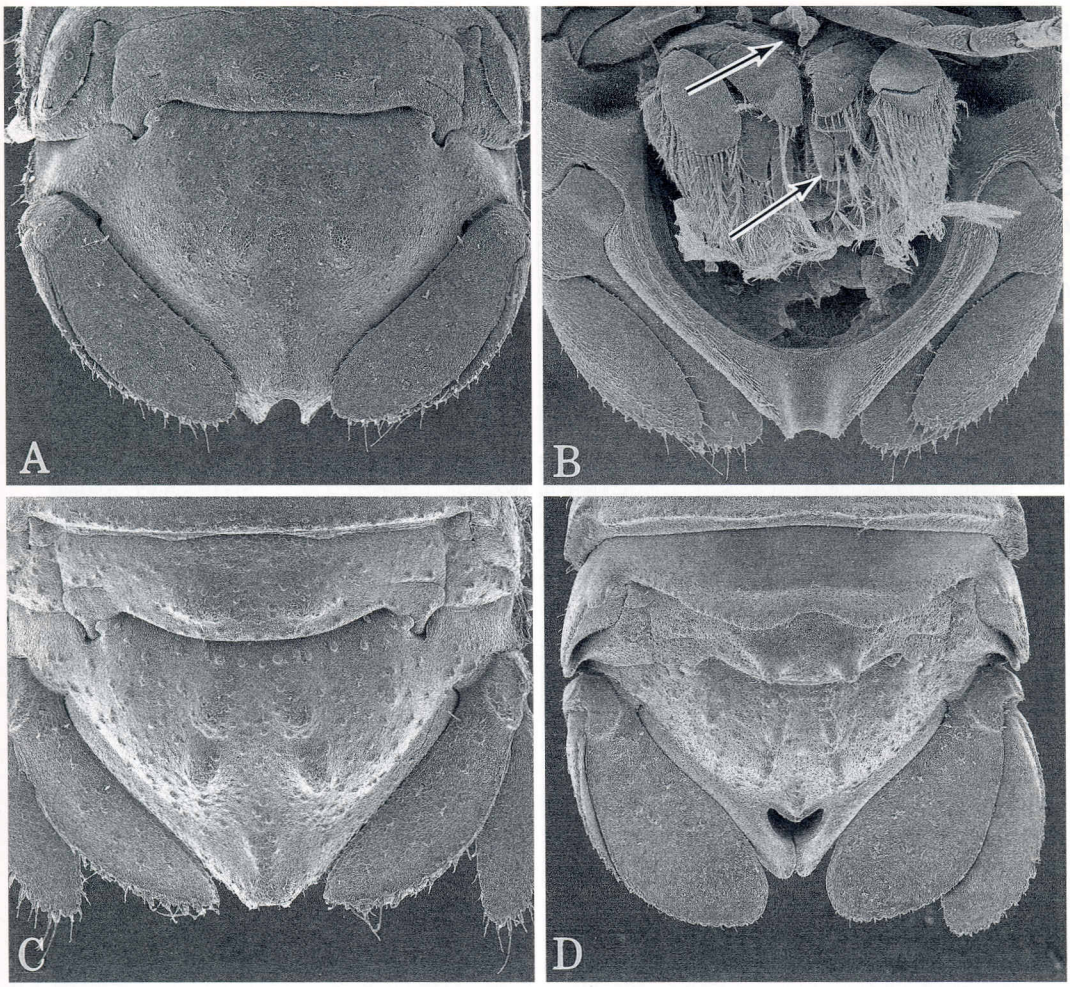

Fig. 5. *Paradella dianae:* A, sub-adult male, dorsal pleotelson; B, sub-adult male, ventral pleotelson, arrows indicating immature penes and appendix masculina; C, ovigerous female, dorsal pleotelson; D, mature male, dorsal pleotelson.

rotten wood in shallow water, < 1 m, 27 Jun 1997.—8 subadult ♂, FTP-66, Sebastian Inlet State Park, chunks of reef worm tubes on rocks at low tide, inside inlet, 0–50 cm, 18 Aug 1998.—1 ovigerous ♀, FTP-67, same locality, algal turf at low tide inside inlet, 0.5–1 m, 18 Aug 1998.—1 ovigerous ♀, FTP-68, same locality, gravel rubble, empty shells between rocks inside inlet, 0–20 cm, 18 Aug 1998.—1 ovigerous ♀, 3 immature, FTP-69, same locality, algal turf mixed with hydroids on granite boulders inside inlet, 0–50 cm, 18 Aug 1998.—2 subadult ♂, 1 ovigerous ♀, FTP-70, Ft. Pierce Inlet, north bank, reef worm tubes on boulders in inlet, low tide, 19 Aug 1998.—2 subadult ♂, 2 immature, FTP-71, same locality, algal turf on boulders at low tide level, 19 Aug 1998.—2 subadult ♂, 3 ovigerous ♀, FTP-72, Warton Beach rocks off Rt. A1A, algal turf growing on beach rock at bottom of shore, 0–50 cm, 20 Aug 1998.

Previous records.—Dominican Republic; Puerto Rico; U.S. Virgin Is.; Florida; Bermuda; intertidal–1 m.

Remarks.—Although no adult males were collected, identification was based on

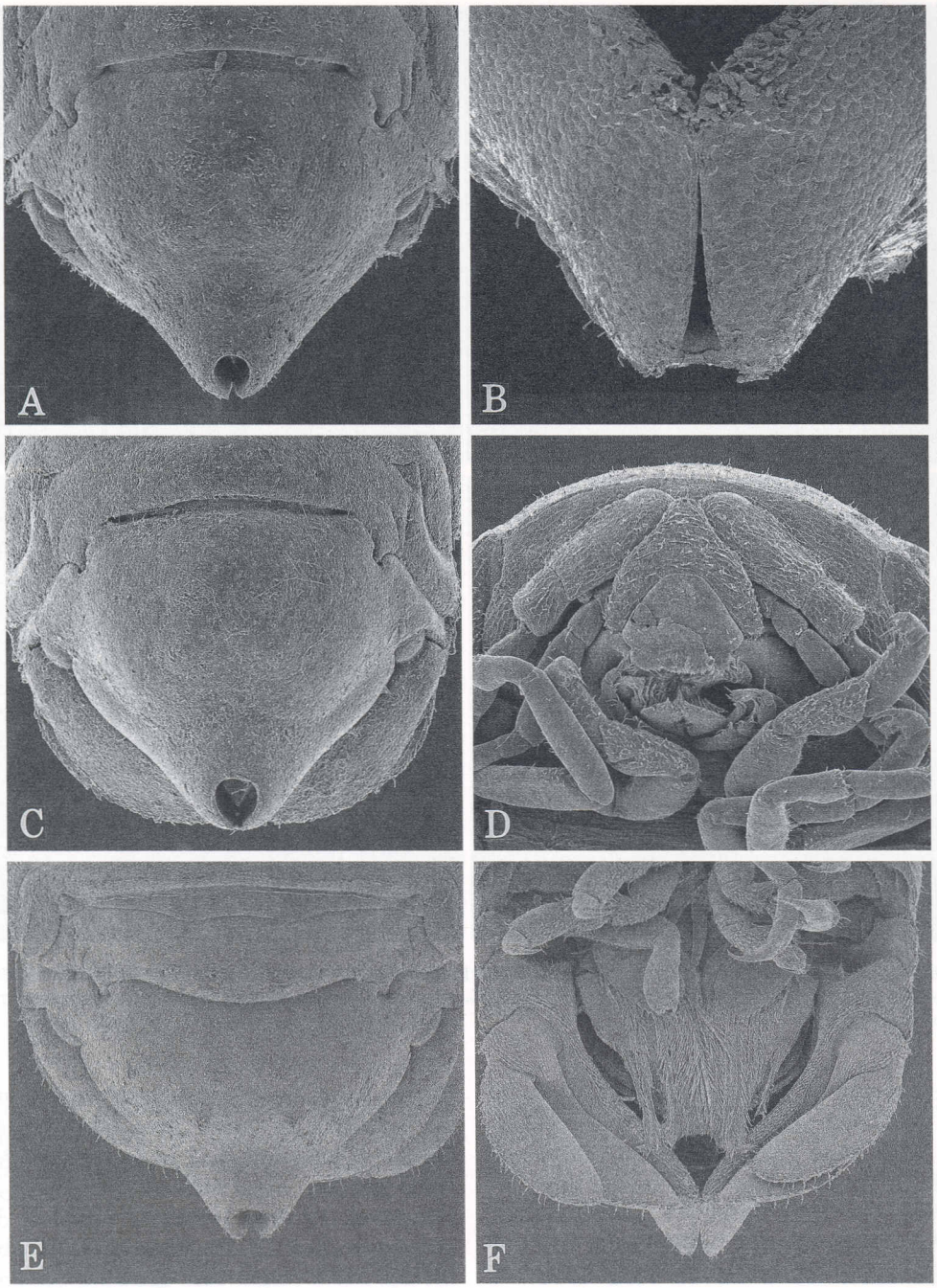

Fig. 6. *Paradella quadripunctata:* A, allotype, ovigerous female, ex USNM 119307, dorsal pleotelson; B, ventral pleotelson; C, ovigerous female, Indian River specimen; D, ovigerous female, ventral cephalon lamina; E, sub-adult male, dorsal pleotelson; F, sub-adult male, ventral pleotelson.

comparison of ovigerous females and subadult males to the ovigerous allotype (Fig. 6A–F).

Sphaeromopsis sanctaluciae, new species
Figs. 7–9

Material examined.—Holotype, USNM 285356, 1 ♂ tl 3.1 mm, Allotype USNM 285357, 1 ♀ tl 2.0 mm, Paratypes, USNM 285358, 45 ♂, 29 ♀, 39 juvs., sta FTP-13, North Fork of St. Lucie River at Prima Vera Boulevard, Port St. Lucie, Florida, in dead, submerged wood, 0.1 m, 1 Jun 1995.

Additional material.—USNM 285359, 2 ovigerous ♀, 2 ♀, 1 juv., sta K-CUBA-64, Islas de Juventud, Ensenada de la Siguanea, Cuba, in algal carpet on *Rhizophora* roots, 0.5 m, 9 Jun 1995.—USNM 285360, 5 ♀, 1 juv., sta FTP-8, Merritt Island at boat ramp, Indian River Lagoon, on dead wood, 0.5 m, 31 May 1995.—USNM 285361, 1 ♀, 3 juvs., sta FTP-11, on ring of metal plates in Banana River off Merritt Island, Indian River Lagoon, amongst encrusting oysters, barnacles and algal turf, 0.5 m, 31 May 1995.—USNM 285362, 1 ♀, 2 juvs., sta FTP-24, mouth of North Fork of St. Lucie River at US 1 and Fern Rd., in algal turf with *Enteromorpha* on boulders, intertidal, 25 Apr 1996.—USNM 285363, 1 ♀, Indian River Lagoon at Jensen Beach, in algae in mangrove roots, 29 May 1995.—USMN 285364, 3 ♂, 1 ovigerous ♀, 1 ♀, Orange River, Lee County, Florida, coll. A. Walton, 15 Aug 1994.—USNM 285365, 1 ♂, Orange River, Lee County, Florida, coll. A. Walton, 18 Jan 1995.

Diagnosis.—Sexes similar, cephalon and pereon smooth, pigmented; pleotelson domed, smooth, apex broadly truncate. Margins of uropodal rami entire. Appendix masculina of male broad proximally, tapering to narrowly rounded apex. Rami of penes elongate, widening in proximal half before tapering to narrowly rounded apices.

Description.—Adult male: Body length about 1.9 times greatest width. Cephalon broader than long, frontal margin undulating, rostral point small and acute. Frontal lamina narrowly truncate distally. Brown pigment pattern somewhat variable, strong in fresh specimens, densest on pleotelson. Pleon with two short suture lines reaching posterior margin. Pleotelson broadly triangular, domed, with apex broadly truncate in posterior view.

Antennule with basal article equal in length to articles 2 and 3 combined; flagellum of 9 articles; articles 5–8 each bearing single aesthetasc. Antenna with articles 1 and 2 subequal in length; article 3 shorter than 2; article 4 somewhat shorter than 2 and 3 together; article 5 longest; flagellum of 13 articles. Mandible having incisor of 3 cusps, spine row of 5 spines, 3 of which fringed, molar process with numerous small teeth; palp, article 2 having 4 fringed setae, terminal article with 7 fringed setae. Maxilla 1, inner ramus with 4 fringed setae, outer ramus with 4 stout spines and 4 slender, fringed spines. Maxilla 2 bearing 3 unarmed and 4 fringed spines on inner ramus; outer ramus having 4 fringed spines on each lobe. Maxillipedal endite with 1 coupling hook on mesial margin; dense, fine setae distally; distal margin with 5 blunt spines and several fringed setae; palp of 5 articles, articles 2 and 3 with distomesial lobe bearing several setae, article 4 longer and more slender than 3, article 5 short with terminal setae.

Pereopods with fringe of short setae on posterior margins of propodus, carpus and merus, very sparse on merus of pereopod 5. Pereopod 1, propodus and carpus each with single plumose seta at anterodistal margins; merus with anterodistal lobe bearing 3 long setae. Pereopod 2 slender, longer than 1; propodus with single plumose seta anterodistally; carpus with single plumose setae on posterodistal margin; merus having anterodistal lobe bearing 4 long setae; ischium with several long setae on anterior margin. Pereopods 3–7 equally robust, increasing in length posteriorly. Pereopod 3 shorter than 2; propodus with 2 fringed posterodistal spines; carpus triangular with

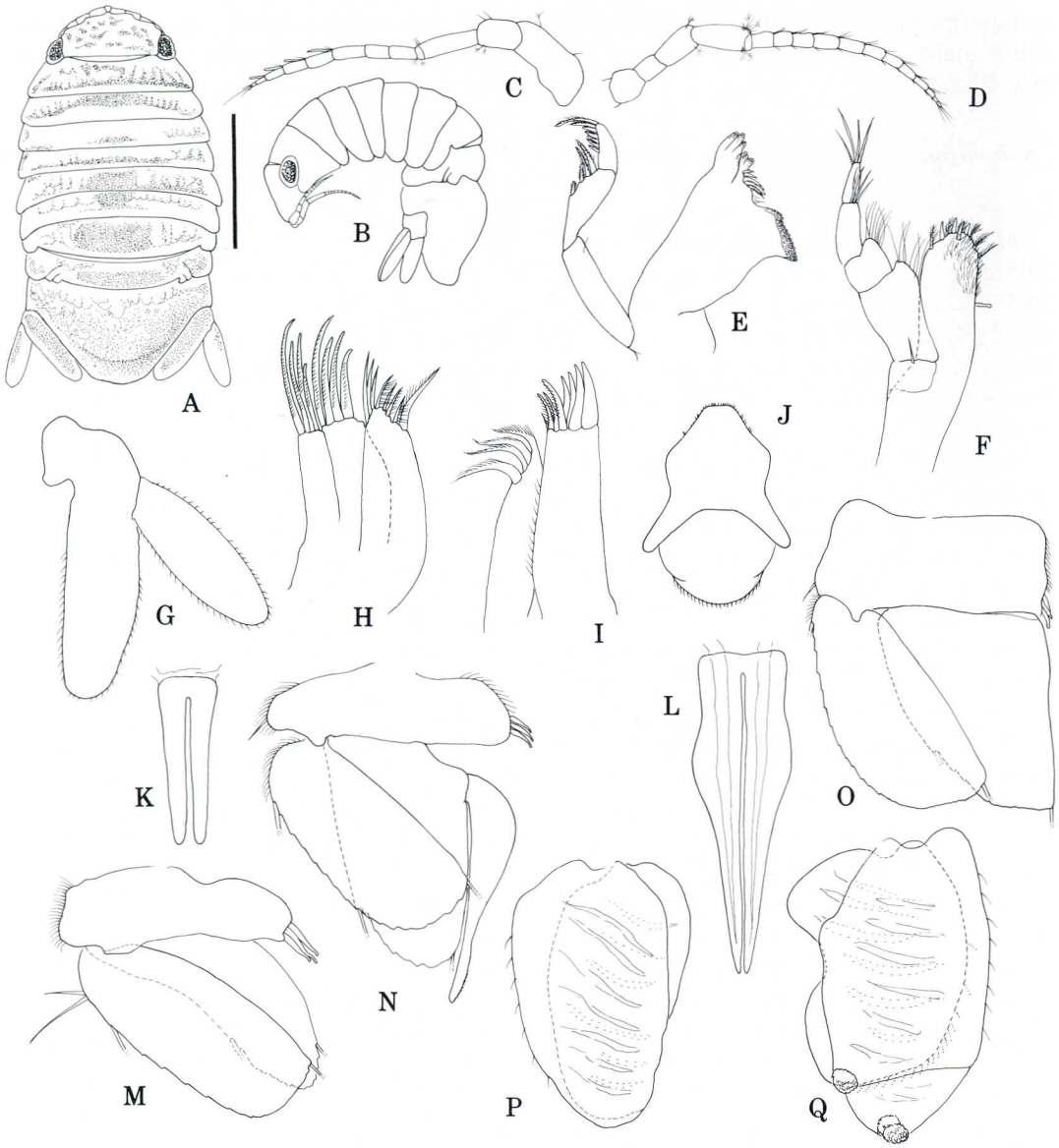

Fig. 7. *Sphaeromopsis sanctaluciae,* new species: A, adult male, habitus. Scale = 1 mm; B, lateral view; C, antennule; D, antenna; E, mandible; F, maxilliped; G, uropodal rami; H, maxilla 2; I, maxilla 1; J, ventral cephalon; K, penes of sub-adult male; L, penes of adult male; M, pleopod 1; N, pleopod 2; O, pleopod 3; P, pleopod 4; Q, pleopod 5.

fringed spine at posterodistal corner; merus with small anterodistal lobe and single fringed, posterodistal spine. Pereopod 4, propodus having single plumose seta at anterodistal angle; carpus with single plumose seta at each distal margin; merus with anterodistal lobe bearing several long setae. Pereopod 5, carpus with single stout fringed spine at posterodistal margin; anterodistal lobe of merus having several long setae. Pereopod 6, carpus with plumose seta and stout fringed spine at antero- and poster-

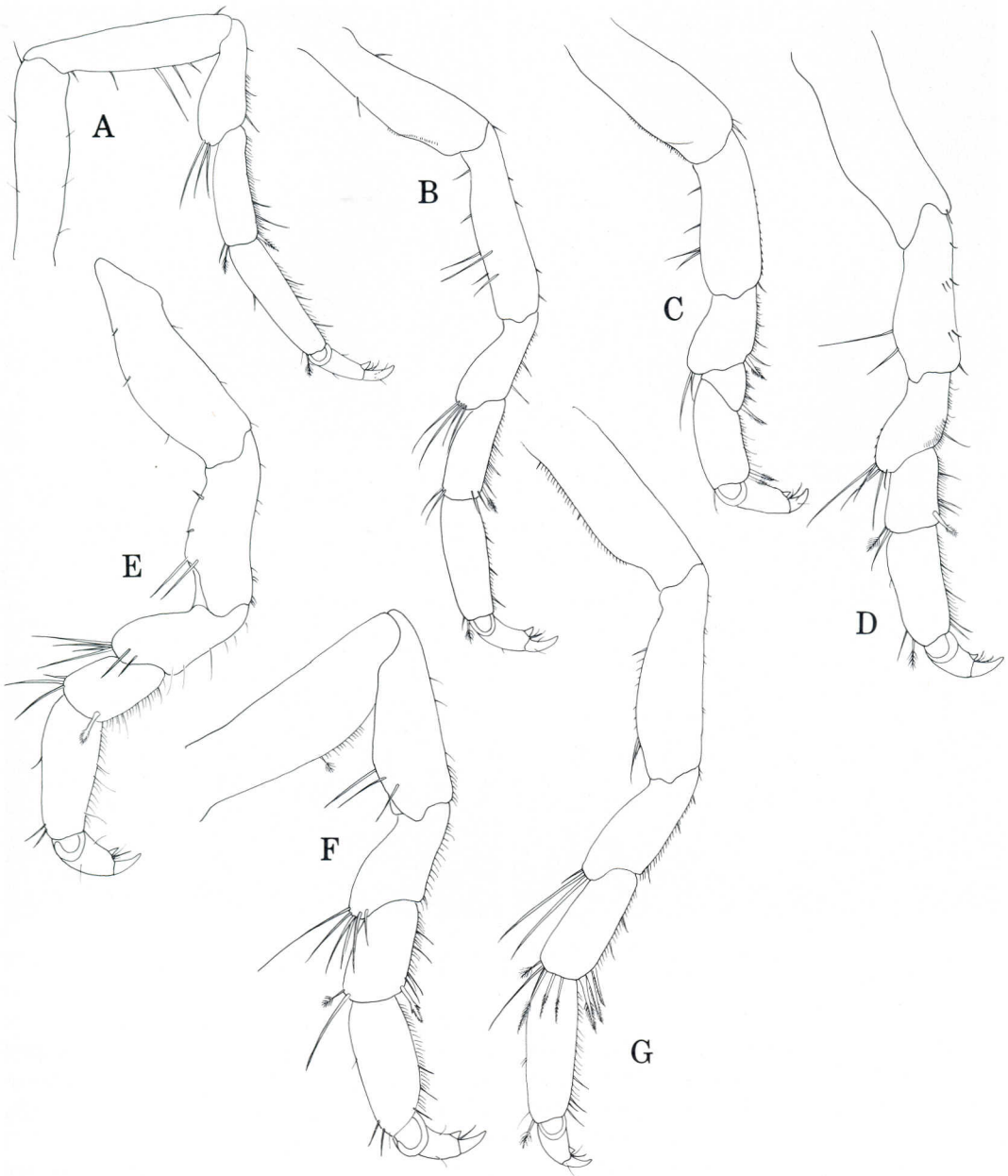

Fig. 8. *Sphaeromopsis sanctaluciae,* new species: A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pereopod 6; G, pereopod 7.

odistal margins respectively; anterodistal lobe of merus with several long setae; ischium bearing 3 long setae on anterodistal margin. Pereopod 7, propodus with single plumose seta at anterodistal corner; distal margin of carpus with 3 fringed spines, 3 fringed, 2 unarmed, and 1 plumose setae; anterodistal margin of merus with 2 long and 1 short setae; ischium and basis with several setae on anterior margins.

Penial rami basally fused, elongate, widening at 1/3 length and tapering to narrowly

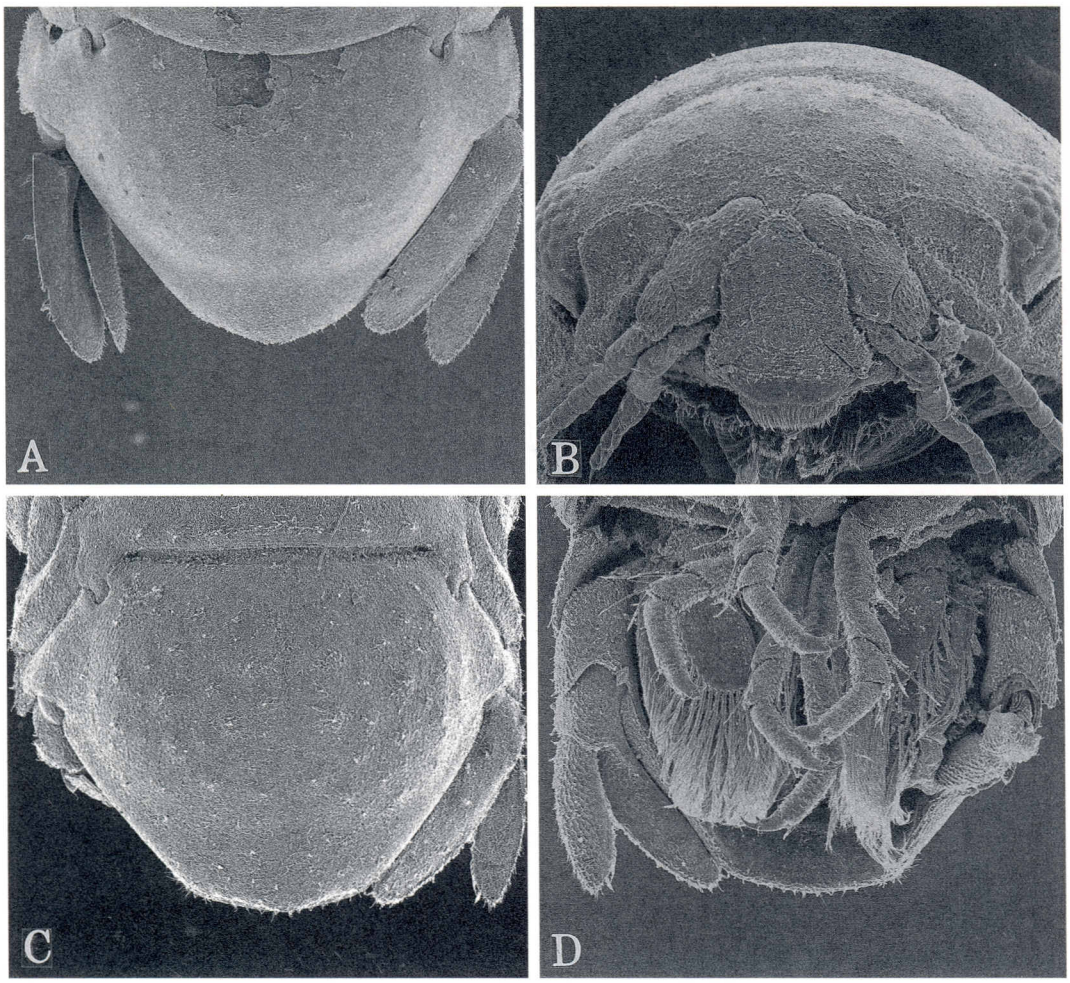

Fig. 9. *Sphaeromopsis sanctaluciae,* new species: A, adult male, dorsal pleotelson; B, ventral cephalon; C, adult female, dorsal pleotelson; D, adult female, ventral pleotelson.

rounded apices. In subadult male, penial rami fused basally with subparallel margins and rounded apices. Pleopod 1, basis with 3 coupling hooks; exopod subrectangular in shape, slightly broader than endopod. Pleopod 2, basis and exopod as in pleopod 1; endopod broad, subrectangular; appendix masculina articulating basally, broad proximally, tapering to narrow apex extending somewhat beyond apex of endopod. Pleopod 3, basis broadly rectangular with 3 coupling hooks; endopod triangular without articulation; exopod somewhat ovate. Pleopod 4, both rami broad with transverse pleats. Pleopod 5, both rami with transverse pleats and setae on mesial margins; exopod with transverse suture and 3 spinulose bosses. Rami of uropods subequal in length, margins entire, bearing short setae.

Female: As in male except in secondary sexual characters; generally smaller.

Remarks.—The new species is the seventh member of the genus to be described and the third from the western hemisphere, following *S. mourei* Loyola e Silva, 1960 and *S. heardi* Kensley & Schotte, 1994. Like *S. minutus* Javed & Yousef, 1995, it lacks the "dense pads of setae" on posterior margins of the pereopods, previously thought to be a generic character (Holdich

& Harrison 1981). The comparatively sparse nature of the setal fringe plus morphological details of the appendix masculina and penes serve to separate *S. sanctaluciae* from *S. mourei* and *S. amathitis* Holdich & Jones, 1973, both of which it superficially resembles. In contrast to the other two species, the appendix masculina in *S. sanctaluciae* is markedly inflated near the base and extends beyond the apex of the pleopod endopod.

Whereas almost all cogeners have been collected from sandy beaches and intertidal habitats (Holdich & Harrison 1981), *S. sanctaluciae,* like *S. serriguberna* Holdich & Harrison 1981, can also tolerate low salinity, e.g., 2.5 ppt. in the St. Lucie River.

Etymology.—The species is named for its type locality, St. Lucie River.

Suborder Valvifera
Family Idoteidae
Erichsonella filiformis (Say, 1818)

Stenosoma filiformis Say, 1818:424.
Erichsonella filiformis: Kensley & Schotte, 1989:258, fig. 108c.—Camp et al., 1998: 137.

Material examined.—7 specimens, 1 ovigerous ♀, FTP-40, Sebastian Inlet State Park, clumps of *Caulerpa racemosa* and branching red alga on granite boulders inside of inlet, 0.5–1.0 m, 19 Sep 1996.—1 ♀, FTP-41, Sebastian Inlet State Park, south side, sheltered cove ca. 1/2 mile from mouth, small boulders with clumps of algae, 0.5–1 m, 19 Sep 1996.—3 ♀, 2 juvs., FTP-42, same locality, 50 yds. west of bridge, in *Caulerpa* sp., depth 6″, 19 Sep 1996.—1 ♀, 1 juv., FTP-44, same locality, 50 ft west of bridge, mixed algae on sandy/shelly/rocky bottom, 0.5 m, 19 Sep 1996.—1 ♀, 4 juvs., FTP-51, Sebastian Inlet State Park, south side, granite boulder shore inside of bridge, algal clumps on boulders, 0.5 m, 25 June 1997.—2 ♂, 4 ♀, 7 juvs., FTP-52, same locality, south side, shallow embayment at camp site 1/2 mile from mouth in lagoon, algal clumps on stones and rocks, 25 Jun 1997.—1 ♀, 1 juv., FTP-53, same locality, south side, boulders outside of bridge, algal clumps and sponge on boulders in strong wave and wash action, 0.5–1.0 m, 26 Jun 1997.—3 ovigerous ♀, 1 ♀, FTP-55, Sebastian Inlet State Park, lagoon near Coconut Point, algal clumps in shallow embayment, 1 m, 26 Jun 1997.—1 juv., FTP-65, Sebastian Inlet State Park, orange sponge on rocks at low tide level, inside of inlet, 0–50 cm, 18 Aug 1998.—1 ♀, FTP-68, same locality, gravel rubble, empty shells between rocks inside inlet, 0–20 cm, 18 Aug 1998.—1 ♂, FTP-69, same locality, algal turf mixed with hydroids on granite boulders inside inlet, 0–50 cm, 18 Aug 1998.

Previous records.—Brazil; Yucatan, Mexico; Puerto Rico; Turks & Caicos Is.; Bahamas; Gulf of Mexico; shallow infratidal–109 m.

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