PROC. BIOL. SOC. WASH.
93(1), 1980, pp. 573–592

FOUR NEW SPECIES OF *RENOCILA* (ISOPODA: CYMOTHOIDAE), THE FIRST REPORTED FROM THE NEW WORLD

Ernest H. Williams, Jr. and Lucy Bunkley Williams

Abstract.—*Renocila colini* sp. n. is described from the flamefish, *Apogon maculatus* (Poey), and the belted cardinal fish, *Apogon townsendi* (Breder), from Mona Island, Puerto Rico; *R. waldneri* sp. n. from the harlequin bass, *Serranus tigrinus* (Bloch), from La Caleta, near Santo Domingo, Dominican Republic; *R. bowmani* sp. n. from the harlequin bass from Saona Island, Dominican Republic; and *R. thresherorum* sp. n. from *Apogon retrosella* (Gill) from Loreto, Baja California Sur, Mexico.

Limited data suggests that members of this genus possess extremely restricted geographic ranges, high rates of infestation, and a high degree of host specificity. Oostegites of *Renocila colini*, and possibly other species in the genus, are formed during a single molt.

Introduction

The genus *Renocila* is represented by 5 known species, *R. dubia* (Nierstrasz, 1931) Barnard, 1936; *R. heterozota* Bowman and Mariscal, 1968; *R. indica* Schioedte and Meinert, 1884; *R. ovata* Miers, 1880; and *R. periophthalma* Stebbing, 1900, from the Indopacific Region. Four new species of the genus are described from the West Indies and the American Pacific Regions.

Materials and Methods

Parasitized cardinalfishes were located at night using underwater lights and scuba. They were collected with quinaldine or microprong spears propelled by miniature Hawaiian slings. Later in the work, fishes were captured by forcing them into plastic bags with the face of underwater lights. Parasitized harlequin bass were collected during the day with a macroprong spear and an elastic band speargun or with a microprong spear. Hosts were immediately sealed in individual plastic bags, and stored in a dive bag for no longer than 60 minutes. Location of isopods on each host was recorded on an underwater slate.

Hosts were weighed to the nearest 0.1 g, measured for standard and total lengths to the nearest mm, and examined for damage associated with the isopod under 10× power of a dissecting microscope. Isopods were measured

for total length and maximum width to the nearest 0.1 mm, while alive. They were preserved in 70% ethanol. Eggs and larvae were removed from female isopods, counted, and a random sample of 10 measured for total length and maximum width to the nearest 0.01 mm. Mouthparts and appendages were mounted in glycerine jelly. Drawings of appendages were made with the aid of a Bausch and Lomb Trisymplex microprojector, whole specimens were drawn from projections of 35 mm slides made with a Nikon F2, 55 mm Nikon macro lens and bellows. Telsons of the illustrated species were drawn in a natural or some what depressed position; therefore, the length of telsons in the dorsal views do not represent the actual total lengths.

Renocila cohni, sp. n.
Figs. 1–27 and 105

Type-host and locality (date and depth).—Flamefish, *Apogon maculatus* (Poey), Carmelita, Mona Island (23 April 1976) (10 m).

Additional hosts and localities (date and depths).—Belted cardinal fish, *Apogon townsendi* (Breder), east of Playa Carahinero, Mona Island (20 April 1976) (15 m); Playa Sardinera, Mona Island (22 April 1976) (15 m); flamefish, Playa Carahinero (27 December 1975) (30 m), east of Playa Carahinero (20 April 1976) (15 m), Playa Sardinera (21, 22 and 23 April 1976; 25 May 1977) (17 m); and Carmelita (23 April 1976) (10 m).

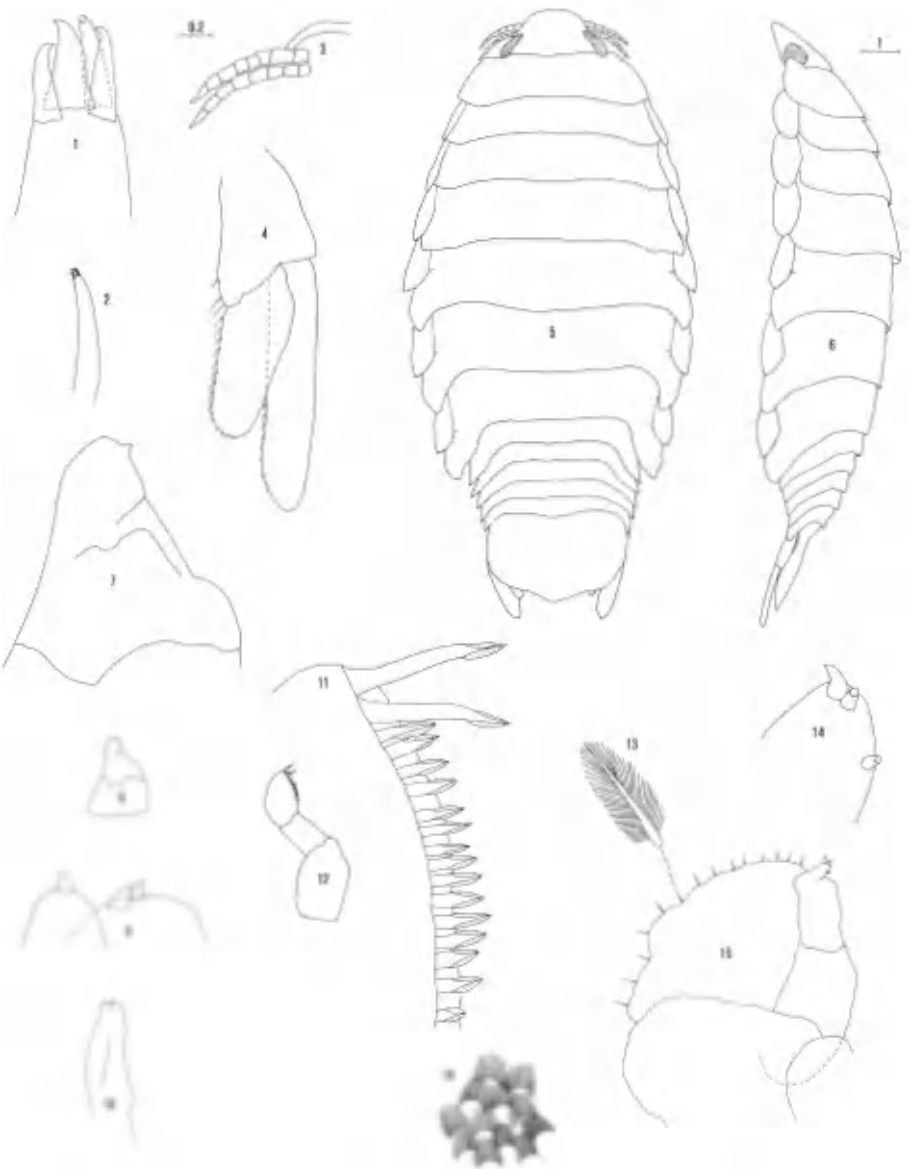
Location.—Male-female pair or occasionally female, male, or transitional specimens attached to dorsal surface along side of the dorsal fin. Male anterior to female (Fig. 105).

Specimens studied.—42 (all type-material).

Type-specimens.—Holotype (female), USNM 173920; allotype (associated male) USNM 173921; 8 paratypes, USNM 173922–25; 32 paratypes in authors' collection.

Diagnosis.—Anterior margin of head reflexed, not produced into lobe between bases of antennae 1. Posteroventral angle of pereonites 5–7 produced, that of pereonite 7 overlapping only pleonite 1. Telson ⅓ to ½ wider than long. Antennae 1 slightly broader and slightly shorter than antennae 2. Pereopods 1–3 without swelling in dactyl and without lobe at posterodistal corners of basis. Pereopods 6–7 subequal in length. Inner ramus of uropod more than half as long as outer ramus.

Further details.—Antennae 1 8-merous. Antennae 2 8-merous. First segment of mandibular palp expanded, 3rd segment with 7 to 15 stout setae with broad distal ends along outer margin, and 2 similar, but longer apical setae; 2nd segment with 3 closely spaced setae on inner margin similar to marginal setae of 3rd segment. Incisor process of mandible broad pointed with a fine tip. Maxilla 1 with 4 recurved apical spines. Distal lobes of



Figs. 1–16. *Renocila columnifera*, n. sp. 1, Apex of maxilla 1; 2, Maxilla 1; 3, Antennae and anterior margin of head, ventrale; 4, Right uropod, dorsal; 5, Dorsal view; 6, Lateral view; 7, Apex of mandible; 8, Mandible; 9, Apex of maxilla 2; 10, Maxilla 2; 11, Apex of 3rd segment, left mandibular palp; 12, Left mandibular palp; 13, Seta of maxilliped; 14, Apex of palp, maxilliped; 15, Maxilliped; 16, Setae on maxilla 2. (Whole mouthparts and pereopods 28×; enlargements of portions of mouthparts 280×.) (Scales in mm.)

maxilla 2 each with 2 blunt spines, occasionally 1 (Fig. 9). Distal segment of maxillipedal palp with 3 stout recurved spines.

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex (terminal setae on apex of juvenile male). Females possess a reduced appendix masculina 33 to 67% the length found in the male.

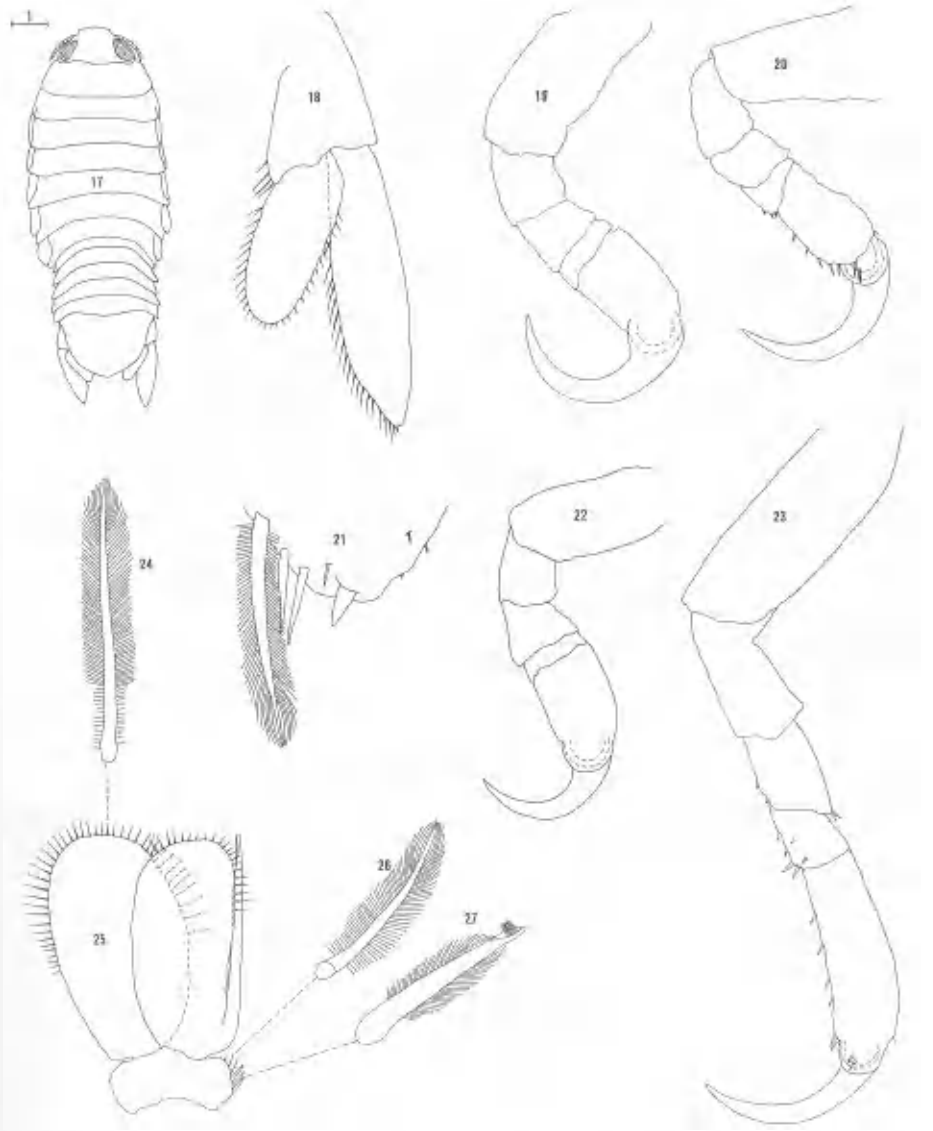
Color.—Dorsal and appendages of living specimens uniform yellowish brown.

Variation.—Posteroventral angle of pereonite 4 occasionally slightly produced. Pereonite 7 occasionally extends slightly beyond pleonite 1. Telson averages ⅓ wider than long with a range of ¼ to ½. Antennae 1 occasionally equal in length to antennae 2, but occasionally much longer than antennae 2.

Remarks.—Of the 42 specimens of *Renocila colini* collected from 29 hosts, 20 were females, 18 males, and 4 transitionals; no juveniles were collected. Nine females with oostegites were 12.0 to 17.5 mm in length, mean 16.2 mm; 5.9 to 9.0 mm in width, mean 8.0; lacked penis lobes; and possessed reduced appendix masculina ranging from approximately 42 to 67% of the length found in the male. Eleven females lacking oostegites were 10.2 to 16.2 mm long, mean 13.2 mm; 4.5 to 9.0 mm in width, mean 6.6 mm; lacked penis lobes; and possessed reduced appendix masculina ranging from approximately 33 to 67% the length found in the male. Four transitionals with reduced penis lobes were 8.0 to 13.0 mm long, mean 10.7 mm; 4.5 to 5.5 mm in width, mean 4.8 mm, and possessed reduced appendix masculina ranging from approximately 67 to 25% of the length found in male. Males were 7.5 to 13.0 mm long, mean 9.9 mm, and 2.8 to 4.5 mm in width, mean 3.6 mm.

Only 1 of the 9 females with oostegites possessed an empty brood pouch. Numbers of eggs or young in the other females varied from 46 to 175 and averaged 115. The smallest and apparently least developed brood numbered 157 and were spherical to subspherical embryos 0.83 to 1.08 mm (averaging 0.95 mm) long by 0.74 to 0.88 mm (averaging 0.81 mm) wide. Broods of 3 females, numbering 46 to 152, were oblong embryos 0.99 to 1.18 mm (averaging 1.08 mm) long by 0.81 to 0.91 mm (averaging 0.89 mm) wide. One female contained 74 oblong embryos with a cephalic end formed, but not possessing eyes, 1.22 to 1.37 mm (averaging 1.27 mm) long by 0.74 to 0.83 mm (averaging 0.78 mm) wide. Broods of 3 females, numbering 94 to 175, were larvae with 6 pereonites and a loose cuticle, apparently ready to molt, 2.60 to 2.78 mm (averaging 2.69 mm) long by 0.86 to 0.95 mm (averaging 0.93 mm) wide.

The average feminity index (Legrand, 1951 width/length × 100) of the males associated with females (N = 13) is 36.7; males not associated with



Figs. 17–27. *Remocala colmi*. **17**, Dorsal view, male; **18**, Right uropod, male; **19**, Pereopod 1, female; **20**, Pereopod 7, female; **21**, Distal end, outer ramus of uropod, male; **22**, Pereopod 1, male; **23**, Pereopod 7, male; **24**, Seta of pleopod 2, male; **25**, Pleopod 2, male; **26–27**, Setae of pleopod 2, male. (While mouthparts and pereopods 280×; enlargements of portions of mouthparts 560×.) (Scale in mm.)

females (N = 5) 33.6; transitionals (N = 4) 46.4; females not associated with males (N = 7) 49.8; females associated with males (N = 13) 50.5.

The 27 infested flamefish were 2.8 to 7.1 cm in standard length, and averaged 5.1. Male-female pairs of isopods were equally abundant on all sizes of hosts. The belted cardinalfish infested were 4.0 and 6.3 cm in standard length. Damage to the host was minor to unnoticeable, occasionally occurring at the attachment point of the female isopod.

The position of the male and female on the host as discussed above and shown in Figure 105 was consistent in all the specimens collected and in numerous other specimens observed in the field. Pairs or individual isopods occurred as frequently on the left as on the right side of the dorsal fin. Charles Arneson (pers. comm.) observed a cardinalfish at Mona Island which possessed 3 *Renocila* sp. on 1 side of the dorsal fin and 2 on the opposite side. Unfortunately this specimen was not captured.

Four abnormalities were noted. The first left pleopod of a female with oostegites was reduced to less than ½ normal size; and the first right pleopod of female lacking oostegites was reduced to approximately ½ normal size. The left perenpod 7 of a female lacking oostegites was reduced to approximately ⅔ of the size of the normal right perenpod 7. The right uropod of a transitional specimen was reduced and did not extend to the posterior end of the telson; the outer ramus was the most reduced portion, the basis the least reduced portion.

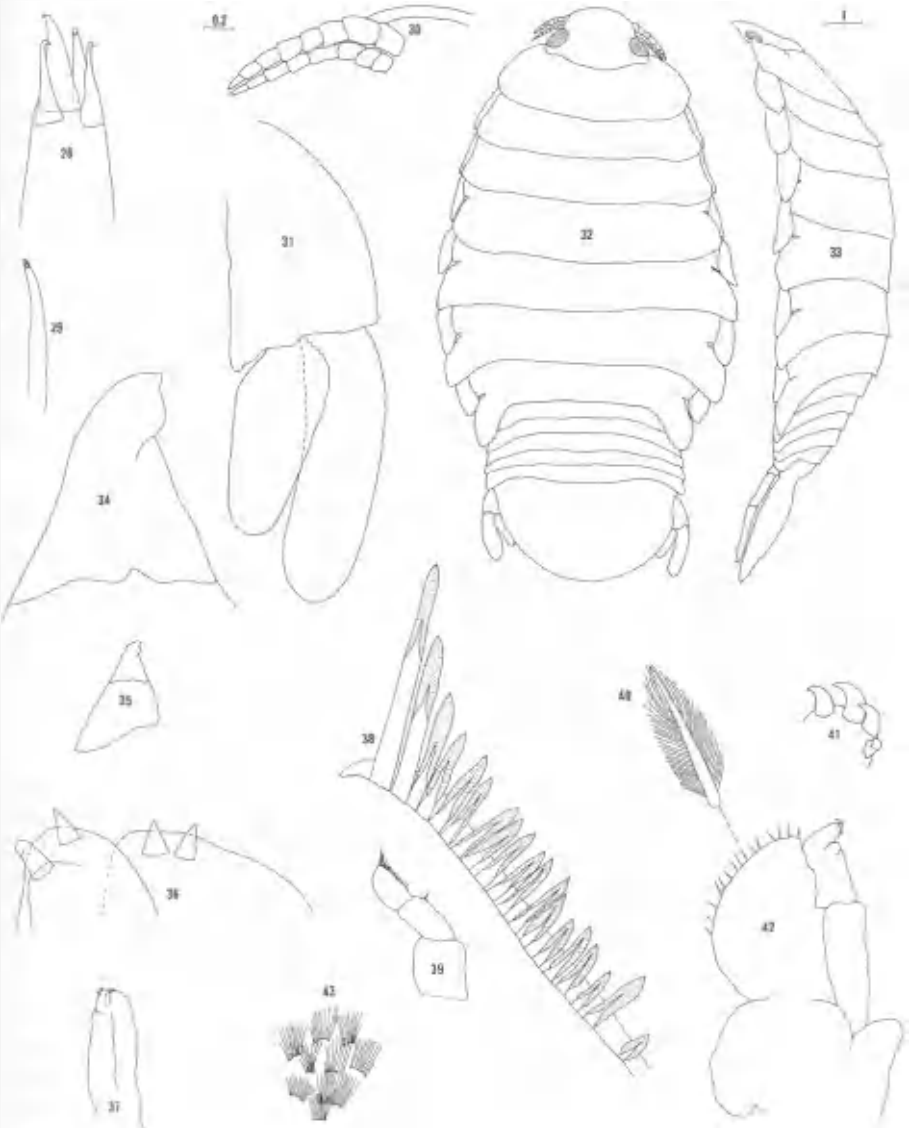
All females with oostegites were associated with males, which suggests either the presence of a male is necessary to form oostegites in the female, or the presence or process of producing oostegites attracts males. However, the one female in the process of molting with ⅓ of the oostegites exposed was associated with a male. Oostegite formation seems to be independent of the size of the female as some of the largest and smallest collected lacked these structures.

The prolonging of the male stage by the associated female as noted in *Anilocra physodes* (Linnaeus) by Legrand (1951) and in *Livoneca pubi* Bowman by Bowman (1959), apparently occurs in *Renocila colini*. Some of the males associated with females were longer (lengths 7.5 to 13.0 mm) than any of singly occurring males (lengths 8.0 to 10.1 mm); which indicates males associated with females tend to retain male characters to a larger size than non-associated males.

The specific name is in honor of the discoverer and collector of the first specimen of this isopod, Dr. Patrick L. Colin.

Renocila waldneri, sp. n.
Figs. 28–52 and 106

Type host and locality (date and depth).—Harlequin bass, *Serranus tigrinus* (Bloch), La Caleta, near airport, Santo Domingo, Dominican Republic (23 November 1978 and 17 May 1979) (17 m).



Figs. 28–43. *Renocila waldneri*, female holotype. **28**, Apex of maxilla 1; **29**, Maxilla 1; **30**, Antennae and anterior margin of head, ventral; **31**, Right uropod, dorsal; **32**, Dorsal view; **33**, Lateral view; **34**, Apex of mandible; **35**, Mandible; **36**, Apex of maxilla 2; **37**, Maxilla 2; **38**, Apex of 3rd segment, left maxillular palp; **39**, Left maxillular palp; **40**, Seta of maxilliped; **41**, Apex of palp, maxilliped; **42**, Maxilliped; **43**, Scales on maxilla 2. (Whole mouthparts and pereopods 28×; enlargements of mouthparts 280×.) (Scales in mm.)

Location.—Male-female pair or single male, transitional, or female specimens attached to dorsal surface alongside of the dorsal fin. Male in contact with female along lower anterior side (Fig. 1f6).

Specimens studied.—18 (all type material).

Type-specimens.—Holotype (female) USNM 173926; allotype (associated male) USNM 173927; 8 paratypes USNM 173928–32; 8 paratypes in authors' collection.

Diagnosis.—Anterior margin of head inflexed, not produced into lobe between bases of antennae 1. Posteroventral angle of pereonite 5 moderately produced, of pereonites 6–7 produced, that of pereonite 7 overlapping pleonites 1 and 2. Telson ½ to ⅔ wider than long. Antennae 1 much broader and slightly shorter than or equal in length to antennae 2. Pereopods 1–7 without swelling in dactyl and without lobe at posterodistal corner of basis. Pereopods 6–7 subequal in length. Outer ramus of uropod slightly longer than inner ramus.

Further details.—Antennae 1 8-merous. Antennae 2 8-merous. First segment of mandibular palp expanded; 3rd segment with 16 stout setae with broad distal ends along outer margin, and 2 similar, but longer apical setae; 2nd segment with 3 closely spaced setae on outer margin similar to longer apical seta of 3rd segment. Incisor process of mandible broad pointed. Maxilla 1 with 4 recurved apical spines. Dorsal lobes of maxilla 2 each with 2 blunt spines. Distal segment of maxilliped palp with 3 stout recurved spines occasionally 4 (Fig. 4I).

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex, arising near base of endopod, about as long as endopod. Female possessed a reduced appendix masculina 33 to 67% the length found in the male.

Color.—Dorsal of living specimens uniform brown, appendages yellowish brown.

Variation.—Posteroventral angle of pereonite 5 occasionally not produced. Telson averages ½ wider than long with a range of ½ to ⅔.

Remarks.—Of the 18 specimens of *Renocila waldneri* collected from 12 hosts, 9 were females, 8 males, and 1 a transitional; no juveniles were collected. Four females with oostegites were 15.3 to 19.3 mm in length mean 17.4 mm; 8.0 to 9.3 mm in width, mean 8.6 mm; lacked penis lobes; and possessed reduced appendix masculina ranging from approximately 33 to 50% of the length found in the male. Five females lacking oostegites were 12.7 to 15.7 mm long, mean 14.6 mm; 6.8 to 8.1 mm in width, mean 7.6 mm; lacked penis lobes; and possessed reduced appendix masculina ranging from approximately 33 to 67% the length found in the male. A transitional 10.8 mm long and 5.8 mm wide with reduced penis lobes, possessed a reduced appendix masculina approximately 63% of the length found in the male.

Males were 5.0 to 10.8 long, mean 8.1 mm; 1.5 to 4.9 mm in width, mean 3.3 mm.

Two females possessed 221 and 279 spherical to subspherical embryos 0.93 to 1.08 mm (averaging 0.98) long by 0.85 to 0.99 mm (averaging 0.93) wide. One female contained 155 oblong embryos with a cephalic end formed, but not possessing eyes, 1.34 to 1.54 mm (averaging 1.44) long by 0.72 to 0.82 mm (averaging 0.77) wide. The marsupium of one female contained 135 larvae with 6 pereopods and 13 embryos with eyes, but no appendages. Internal segmentation was apparent in the embryos, which were evidently ready to molt. Embryos were 1.10 to 1.20 mm (averaging 1.15 mm) long by 0.72 to 0.82 mm (averaging 0.77 mm) wide. Larvae were 2.11 to 2.26 mm (averaging 2.16) long by 0.77 to 0.86 mm (averaging 0.82 mm) wide.

The average feminity index of the males associated with females (N = 6) was 38.0; males not associated with females (N = 2) 44.9; transitionals (N = 1) 53.7; females not associated with males (N = 3) 51.7; females associated with males (N = 6) 49.7.

The 12 infested harlequin bass were 5.7 to 8.1 cm in standard length and averaged 7.0 cm. Damage to the host was very slight to unnoticeable.

Approximately 10% of the dorsal surface of two gravid female *R. waldneri* were covered with growths of algae. Twelve species of algae occurred in these growths (David L. Ballantine, pers. comm.). Numerous mites (Arachnoidea: Acarina) were associated with either the algae or these two isopods.

The distribution of *R. waldneri* seemed extremely limited. Extensive observations along the 17 m depth contour approximately 800 m to the north and south of the type locality indicated general habitat and abundance of the harlequin bass which were very similar to the type-locality, but no *R. waldneri* were observed. *Renocila waldneri* were not observed at 6 other localities on the south coast of the Dominican Republic.

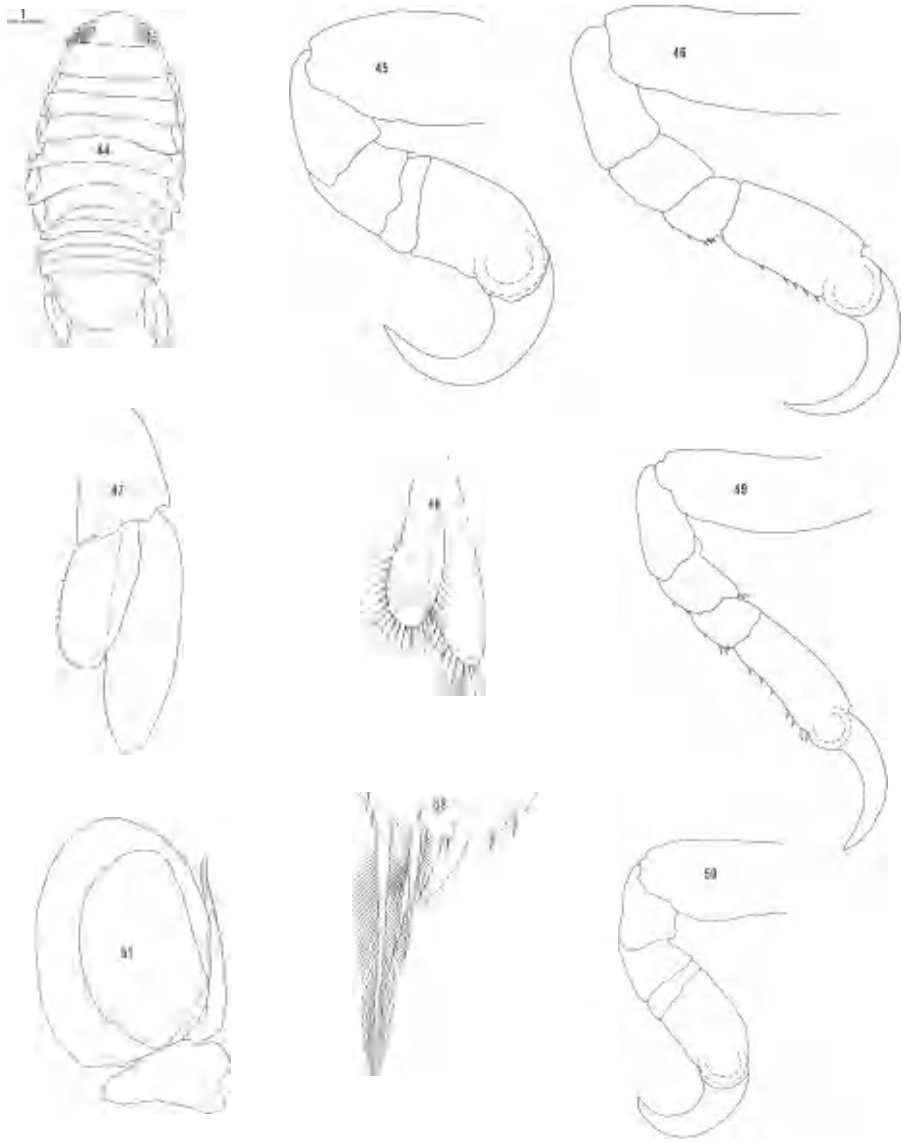
The specific name is in honor of Raymond E. Waldner, who first noted this isopod during a scuba dive with the authors.

Renocila thresherorum, sp. n.
Figs. 53–79

Type-host and locality (date and depth).—*Apogon retrosella* (Gill), Loreto, Baja California Sur, Mexico (17 October 1978) (4.6 m).

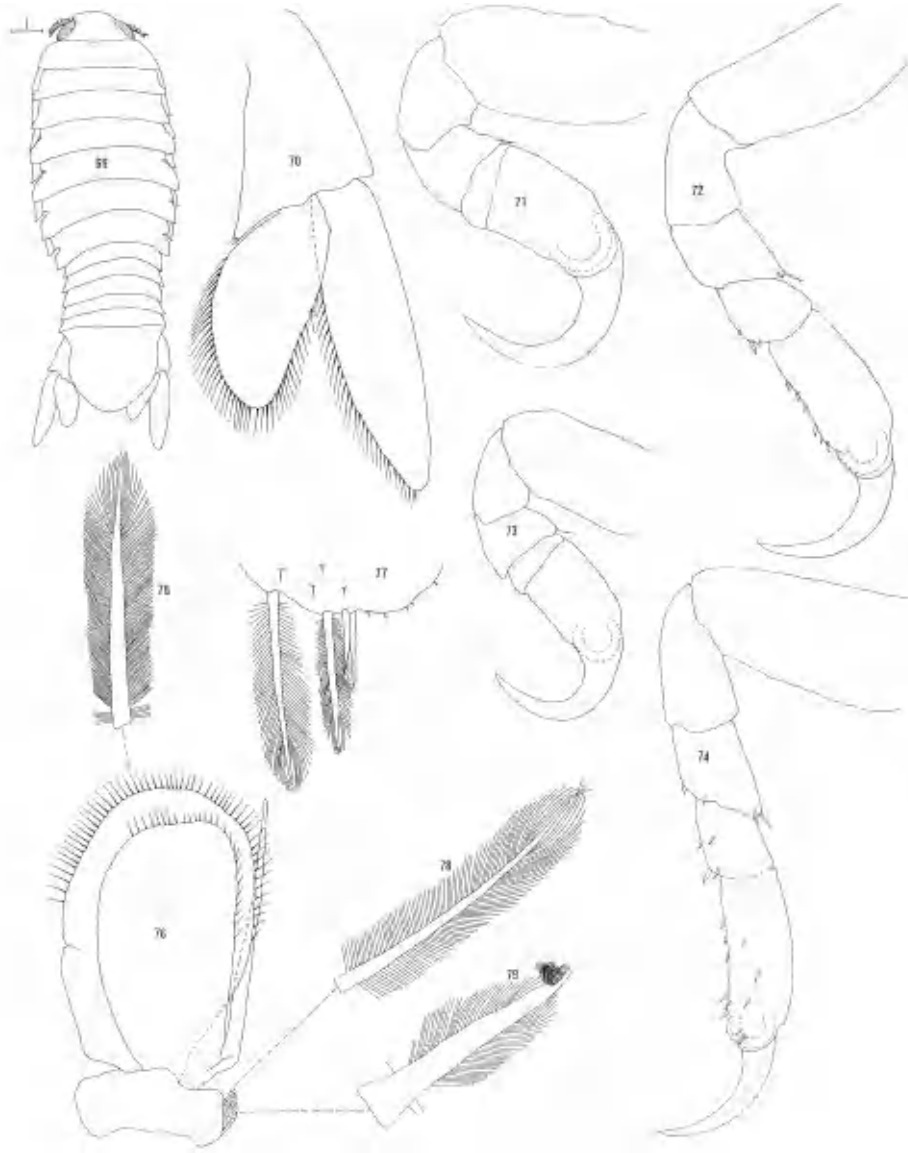
Location.—Male-female pair (and one singly occurring specimen: not collected), attached to dorsal surface alongside of the dorsal fin. Male and female on either side of the dorsal fin.

Specimens studied.—2.



Figs. 44–52. *Renocila waldneri*: 44, Dorsal view, male allotype; 45, Pereopod 1, female holotype; 46, Pereopod 7, female holotype; 47, Right uropod, male allotype; 48, Right uropod, male paratype; 49, Pereopod 7, male allotype; 50, Pereopod 1, male allotype; 51, Pleopod 2, male allotype; 52, Distal end, outer ramus of uropod, male paratype. (Whole mouthparts and pereopods 28×; enlargements of portions of mouthparts 280×.) (Scale in mm.)


53
54
55
56
57
58
59
60
61
62
63
64
65
66
1



Figs. 69–79. *Renocila threshercrum*. 69, Dorsal view, male allotype. 70, Right uropod, male allotype; 71, Pereopod 1, female holotype; 72, Pereopod 7, female holotype; 73, Pereopod 1, male allotype. 74, Pereopod 7, male allotype. 75, Seta of pleopod 2, male allotype. 76, Pleopod 2, male allotype. 77, Distal end outer ramus of uropod, male allotype. 78–79, Setae of pleopod 2, male allotype. (Whole mouthparts and pereopods 28×, enlargements of portions of mouthparts 260×.) (Scale in mm.)

Type-specimens.—Holotype (female) USNM 173933; allotype (associated male) USNM 173934.

Diagnosis.—Anterior margin of head inflexed, not produced into lobe between bases of antennae 1. Posteroventral angle of pereonite 5 not produced, of pereonite 6 moderately produced, and of pereonite 7 produced, that of pereonite 7 overlapping pleonite 1. Lateral margins of pereonites 2–3 somewhat notched, of 4–7 notched. Telson ¼ wider than long. Antennae 1 much broader and slightly shorter to equal in length with antennae 2. Pereopods 1–3 without swelling in dactyl and without lobe at posterodistal corner of basis. Pereopods 6–7 subequal in length. Outer ramus longer than inner ramus of uropod.

Further details.—Antennae 1 8-merous. Antennae 2 8-merous. First segment of mandibular palp slightly expanded; 3rd segment with 4 stout setae with broad distal ends along outer margin and 2 similar, but longer apical setae. Incisor process of mandible broad pointed with a fine tip. Maxilla 1 with 4 recurved apical spines. Distal lobes of maxilla 2 with 2 and 3 blunt spines. Distal segment of maxillipedal palp with 3 stout recurved spines.

Penis lobes of allotype male fused medially, forming a short bilobate process. Appendix masculina of male pleopod 2 linear, with unmodified apex, arising near base of endopod, about as long as endopod. The female (holotype) possessed a greatly reduced appendix masculina.

Color.—Dorsal of living specimens dark brown, more intensely marked on margins of pereonites and pleonites. Telson light brown centrally and on distal end. Appendages light brown.

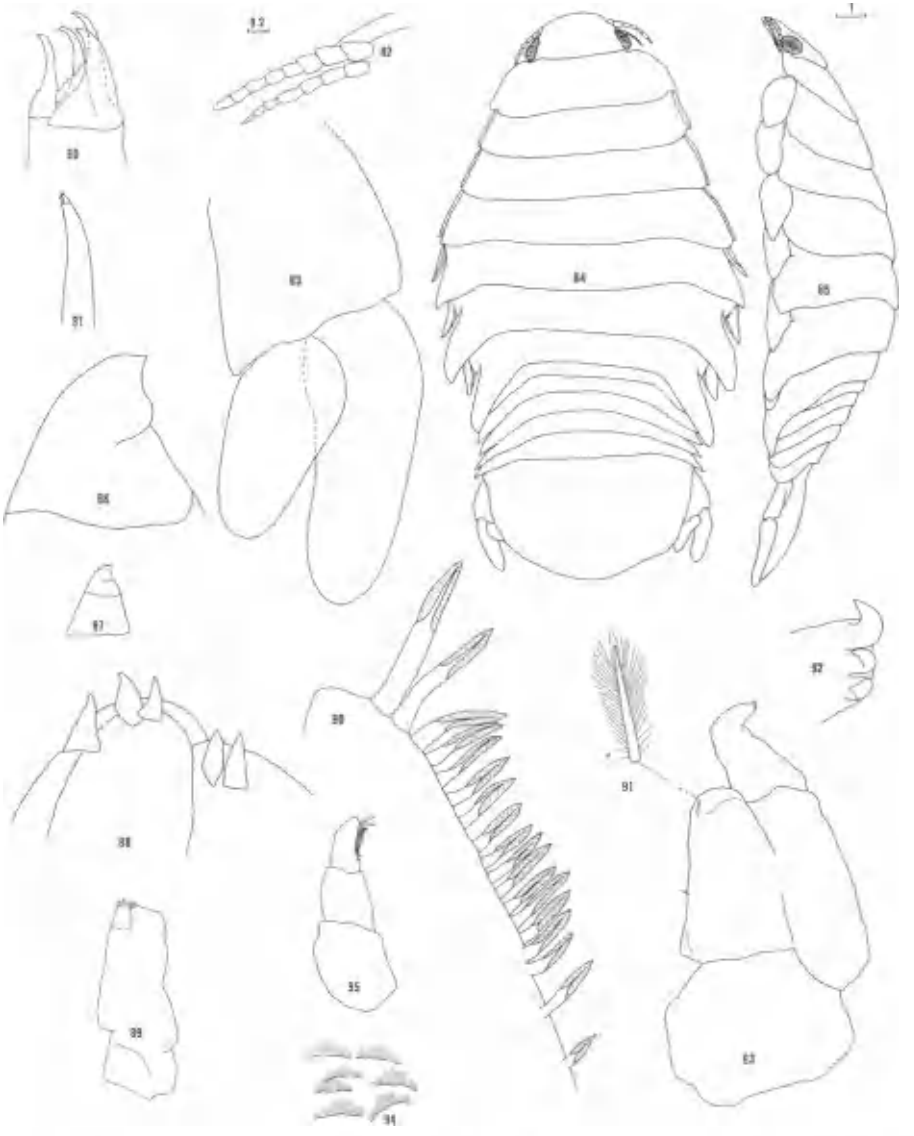
Remarks.—The female was 16.7 mm in length and 9.5 mm in width, the associated male was 12.0 mm in length and 4.3 mm in width, and the host was 5.2 cm in standard length.

The marsupium of the female contained 147 larvae with 6 pereopods and 33 embryos with eyes, but no appendages. Internal appendages and segmentation were apparent on specimens of the later group of young when cleared in glycerine jelly. Apparently the group of young were in the process of molting when preserved. Embryos were 1.47 to 1.81 mm long and averaged 1.50 mm, and 0.78 to 0.88 mm wide and averaged 0.85 mm. Larvae were 2.55 to 2.84 mm long and averaged 2.67 mm, and 0.82 to 0.98 mm wide and averaged 0.88 mm. The female possessed a rudimentary appendix masculina.

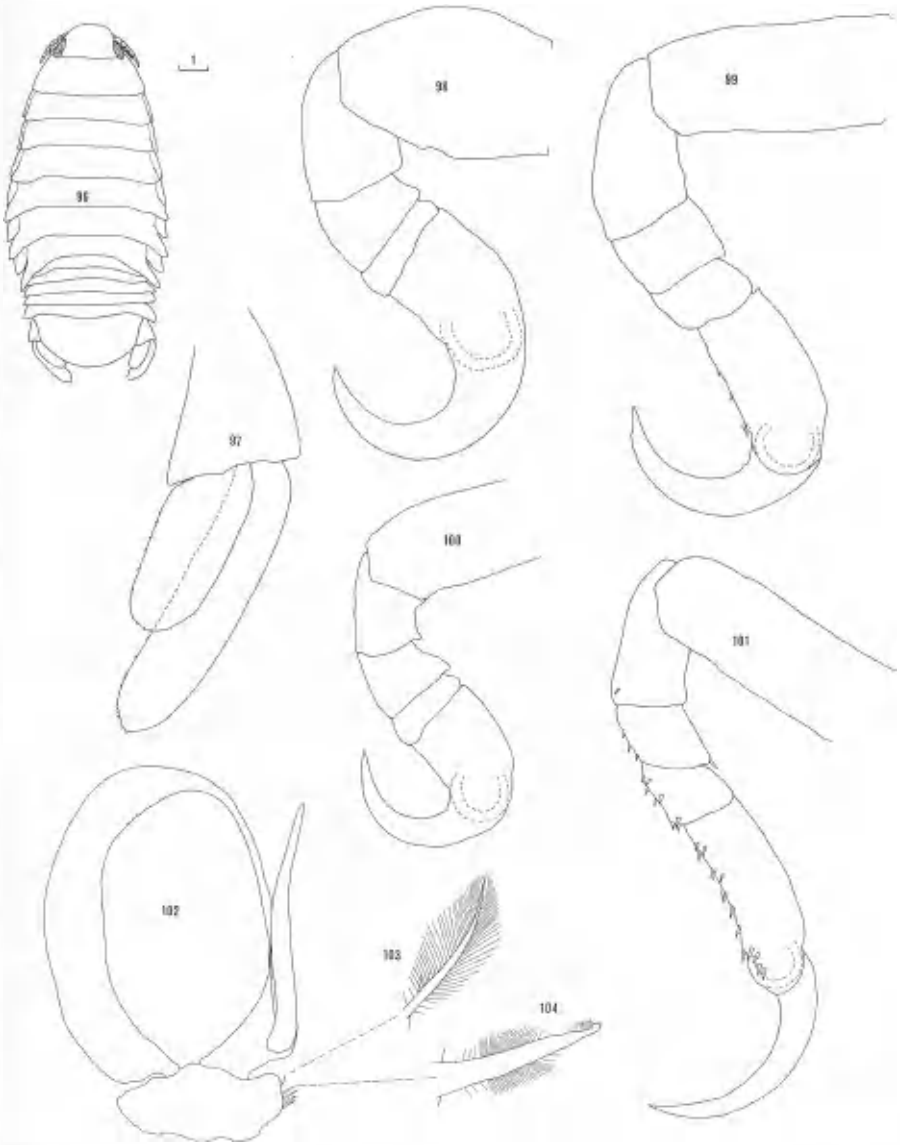
The specific name is in honor of the discoverers and collectors of this isopod Dr. Ronald E. and Ann G. Thresher.

Renocila bowmani, sp. n.
Figs. 80–104 and 107

Type-host locality (date and depth).—Harlequin bass, *Serranus tigrinus*



Figs. 80–95. *Renarda bowmani*, female holotype: **80**, Apex of maxilla 1; **81**, maxilla 1; **82**, Antennae and anterior margin of head, ventral; **83**, Right uropod, dorsal; **84**, Dorsal view; **85**, Lateral view; **86**, Apex of mandible; **87**, Mandible; **88**, Apex of maxilla 2; **89**, Maxilla 2; **90**, Apex of 3rd segment, left mandibular palp; **91**, Seta of maxilliped; **92**, Apex of palp, maxilliped; **93**, Maxilliped; **94**, Scales on maxilla 2; **95**, Left mandibular palp. (Whole mouthparts and pereopods 28×; enlargements or portions of mouthparts 280×.) (Scales in mm.)



Figs. 96–104. *Rencalla bowmani*. 96, Dorsal view, male allotype; 97, Right uropod, male allotype; 98, Pereopod 1, female holotype; 99, Pereopod 7, female holotype; 100, Pereopod 1, male allotype; 101, Pereopod 7, male allotype; 102, Pleopod 2, male allotype; 103–104, Setae of pleopod 2, male allotype. (Whole mouthparts and pereopods 28×; enlargements of portions of mouthparts 280×.) (Scale in mm.)

(Bloch), south central coast of Saona Island, Dominican Republic (18 May 1979) (10.5 m).

Location.—Male-female pair attached to dorsal surface alongside of the dorsal fin. Male in contact with female along lower anterior side (Fig. 107).

Specimens studied.—2.

Type-specimens.—Holotype (female) USNM 173915; allotype (associated male) USNM 173916.

Diagnosis.—Anterior margin of head inflexed, not produced into a lobe between bases of antennae 1. Posteroventral angle of pereonites 5–7 produced, that of pereonite 7 overlapping pleonites 1–3. Telson ¾ wider than long. Antennae 1 much broader and slightly longer than antennae 2. Pereopods 1–3 without swelling in dactyl and without lobe at posterodistal corner of basis. Pereopods 6–7 subequal in length. Outer ramus of uropod longer than inner ramus.

Further details.—Antennae 1 8-merous. Antennae 2 7-merous. First segment of mandibular palp expanded; 3rd segment with 16 stout setae with broad distal ends along outer margin, and 2 similar, but longer apical setae. Incisor process of mandible broad pointed with a fine tip. Maxilla 1 with 4 recurved apical spines. Dorsal lobes of maxilla 2 each with 2 blunt spines. Distal segment of maxillipedal palp with 3 stout recurved spines.

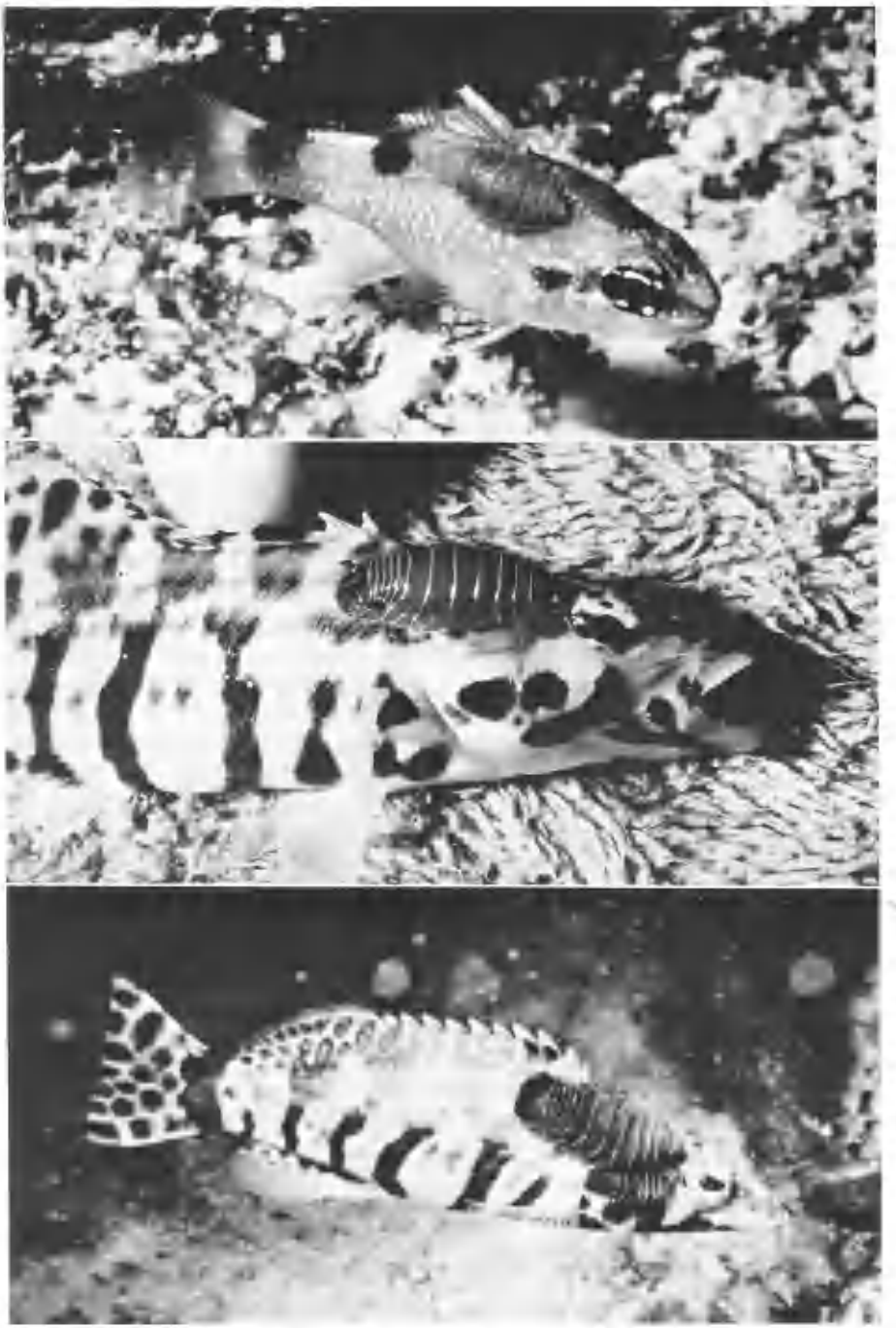
Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex, arising near base of endopod, about as long as endopod. Female (holotype) possessed a reduced appendix masculina approximately ¼ the size occurring in the male.

Color.—Dorsal of living specimens and appendages uniformly black.

Remarks.—The female was 18.0 mm in length and 9.2 mm in width; the associated male was 11.5 mm in length and 4.8 mm in width; and the host was 7.8 cm in standard length. The female did not possess a marsupium.

Eight of 48 harlequin bass observed on a uniform rock bottom 10.0 to 10.5 m deep with dense growths of soft corals and scattered small coral heads were infested with *R. bowmani*. All infestations consisted of male-female pairs. Density of harlequin bass was low averaging 5 to 7 along 100 m by 5 m transects. The fish seemed to be somewhat clustered in some areas and absent in others. Infested hosts were normally isolated with only 2 parasitized fishes occupying adjacent territories.

Fig. 105 (top). Male and female *Remacla colini* on the flamefish, *Apogon maculatus* (Poey), underwater photograph. Fig. 106 (middle). Male and female *Remacla wolfendeni*, sp. n., on the harlequin bass, *Serranus tigrinus* (Bloch), photograph in ship laboratory. Fig. 107 (bottom): Male and female *Remacla bowmani*, sp. n., on the harlequin bass, *Serranus tigrinus* (Bloch), underwater photograph.



The specific name is in honor of Dr. Thomas E. Bowman and his work with cymothoid isopods of fishes.

Discussion

Bowman and Mariscal (1968) found *Renocila heterozota* only in Port Victoria, Seychelles, although Mariscal had examined numerous other populations of *Amphiprion* spp. in the Pacific and Indian Oceans. In the present study *R. colini* was only observed at Mona Island and *R. waldneri* and *R. bowmani* were only observed at the separate locations off the south coast of the Dominican Republic, although extensive collections and examinations were conducted throughout Puerto Rico, Desecheo Island, Caja de Muertos, Culebra Island, Vieques Island; St. Thomas; St. John; St. Croix; Virgin Gorda; Anagada; Chub Cay, Eleuthera, Cat Island, Conception Isle, Rum Cay, Crooked Island, Long Island, Great Exuma, Great Inagua, Little Inagua, Acklins Island, and Long Island, Bahamas; and Santa Marta and Cartagena, Colombia. *Renocila heterozota* occurred on 5 to 10% of the single species of host infested (Bowman and Mariscal, 1968); *R. colini* occurred on 25 to 33% of 2 host species; *R. waldneri* on 40 to 50% of one host species and *R. bowmani* on 16.7% of one host species. On the 4 species *Renocila* for which any biological data is available, a pattern of extremely limited geographic range, high levels of infestation, and strong host specificity is indicated. More data is needed for the remaining species to determine the extent of this pattern in other members of the genus.

Another genus of external parasitic isopods in the West Indies, *Anilocra*, contrasts markedly with the 3 species of *Renocila* described from this area. The 8 species of *Anilocra* possess wide geographic ranges, low levels of infestation, and usually specificity to several species in 1 or more genera or families of hosts. They also differ by being generally much larger and by infesting much larger hosts (Williams and Williams, unpubl. data). The known populations of *Renocila bowmani* and *R. waldneri* are separated by less than 100 km; and *R. bowmani* and *R. colini* by less than 50 km. Possibly other isolated species of *Renocila* will be discovered when the remainder of the West Indies is thoroughly examined for external isopods of fishes.

Females of *Renocila colini*, *R. waldneri*, *R. thrasherorum* and *R. bowmani* possess a reduced appendix masculina. Retention of this structure has not been noted in members of the genus *Renocila*, but has been discussed by Trilles (1964).

Menzies, Bowman, and Alverson (1955) suggested that oostegites were produced during a single molt in *Tyroneca convexa* Richardson, 1905, because they failed to find incompletely developed oostegites. In *Renocila colini* one female specimen possessed fully formed oostegites on pereonites

5 through 7 which had molted, but not on pereonites 1 through 4 which had not molted. Apparently the oostegites of *Renocila colini* are formed during a single molt, and possibly this may be the case for other, if not all, members of the genus.

Juveniles of *Renocila colini* and *R. waldneri* have not been collected from or observed on their host species. These isopods may not settle on their final host until they developed into males. Also lack of bone deformation suggests that these isopods do not become associated with juveniles of their final host as juvenile isopods. Possibly intermediate hosts are involved, because a prolonged planktonic existence is not compatible with the very restricted distributions of these isopods.

Key to the Species of *Renocila*

The key is modified from a previous key by Bowman and Manscal (1968) prepared when only 5 species were known in the genus.

1a. Dactyls of pereopods 1–3 with swelling on outer margin 2
1b. Dactyls of pereopods 1–3 without swelling 4
2a. Antennae 1 shorter than antennae 2 ..... *dubia*
2b. Antennae 1 longer than antennae 2 3
3a. Telson wider than long ..... *indica*
3b. Telson longer than wide ..... *periophthalma*
4a. Posteroventral angle of pereonite 7 reaching pleonite 1 5
4b. Posteroventral angle of pereonite 7 reaching pleonite 2 or beyond 6
5a. Posteroventral angle of pereonites 5 produced, coxae of pereonites 6–7 broad-pointed ..... *colini*
5b. Posteroventral angle of pereonite 5 not produced, coxae of pereonites 6–7 narrow-pointed ..... *thresherorum*
6a. Posteroventral angle of pereonite 7 reaching base of telson .... *ovata*
6b. Posteroventral angle of pereonite 7 reaching pleonite 2 or 3 7
7a. Outer ramus of uropod more than twice as long as inner ramus ... . *heterozona*
7b. Outer ramus of uropod only slightly longer than inner ramus 8
8a. Brown in color, antennae 2 8-merous, antennae 1 slightly shorter than antennae 2 ..... *waldneri*
8b. Black in color, antennae 2 7-merous, antennae 1 slightly longer than antennae 2 ..... *bowmani*

Acknowledgments

Thanks are expressed to Michael J. Dowgiallo, Raymond E. Waldner, Cecilio Díaz Carela, Adolphus G. Bunkley, Jr., Dr. Patrick L. Colin, A. Charles and Deborah A. Arneson, Tracey L. Wolfe, Dr. Ronald E. and Ann

G. Thresher for help in collecting isopods; and to Charles Arneson for one of the underwater photographs. Appreciation is expressed to Dr. Thomas E. Bowman, U.S. National Museum of Natural History for reviewing the manuscript. This project was supported in part by a grant from Dr. Ismael Almodovar, President of the University of Puerto Rico.

Literature Cited

Bowman, T. E. 1959. Description and notes on the biology of *Livoneca puhi* n. sp. (Isopoda: Cymothoidae), parasite of the Hawaiian moray eel, *Gymnothorax eurostus* (Abbott). — Crustaceana 1: 83–91.

———, and R. N. Marscal. 1968. *Renocila heterozota*, a new cymothoid isopod, with notes on its host, the anemone fish, *Amphiprion akallopisos*, in the Seyche les.—Crustaceana 14: 97–104.

Legrand, J. J. 1951. Étude statique et experimentale de la sexualité d' *Anilocra physodes* L. (Crustac. Isopode, Cymothoidé) —Bull. Soc. Hist. Nat. Toulouse 85: 176–183.

Menzies, R. J., T. E. Bowman, and P. G. Alverson. 1955. Studies of the biology of the fish parasite *Livoneca convexa* Richardson (Crustacea, Isopoda, Cymothoidae). —Wassmann Jour. Biol. 13: 277–295.

Trilles, J. P. 1964. Sur la presence et l'evolution regressive de l'appendix masculina chez les Isopodes Cymothoidae.—C. R. Hebd. Seanc. Acad. Sci., Paris 258: 1239–1241.

University of Puerto Rico, Department of Marine Sciences, Mayaguez 00708.