J. Parasitol., 85(6), 1999 p. 1036–1040

NEROCILA BENROSEI N. SP. (ISOPODA: CYMOTHOIDAE), AN EXTERNAL PARASITE OF HOGFISHES FROM THE NORTHERN BAHAMAS

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ABSTRACT: *Nerocila benrosei* n. sp. is described from the hogfish, *Lachnolaimus maximus* (Walbaum), and the Spanish hogfish, *Bodianus rufus* (Linnaeus), (Perciformes: Labridae) from the northern Bahamas. *Nerocila benrosei* differs from all species of *Nerocila* by having the body of females 1.4–1.9 times as wide as long, instead of 2.0–3.0 times, and pleopods 1 and 2 lacking accessory lamellae. It differs from the only species of *Nerocila* with which it overlaps geographically, *N. lanceolata* (Say, 1818), by having the lateral margins of pleonites 1–5 strongly produced ventrally, coxae 5–7 manifestly shorter than the posterolateral projection of the respective pereonite, and a vaulted dorsal surface. The species of *Nerocila* in the northwestern Atlantic have almost mutually exclusive geographic ranges: New England to Panama, including Bermuda and the northern coast of Cuba (*Nerocila lanceolata*); Brazil to Trinidad and Tobago (*Nerocila fluviatilis* Schiödte and Meinert, 1881); and the northern Bahamas and Bermuda (*Nerocila benrosei*). No species of *Nerocila* have been reported from the insular Caribbean. *Nerocila benrosei* appears to be highly host and site specific.

The hogfish (*Lachnolaimus maximus* (Walbaum)) is the largest (up to 70 cm and 11.4 kg) and most commercially important wrasse (Family Labridae) in the West Indies and ranges from Brazil to North Carolina. It is resistant to overexploitation by trap and line fishing, but numbers have been greatly reduced in many parts of the Caribbean by spear fishing (Williams and Bunkley-Williams, unpubl. data). This distinctive wrasse is an excellent food fish with firm, white, and mildly flavored flesh but is prone to have ciguatera toxins. The Spanish hogfish (*Bodianus rufus* (Linnaeus)) is a smaller, colorful West Indian wrasse of little food fish importance.

We have found isopods (*Gnathia* spp. (Gnathiidae) and *Rocinela signata* Schiödte (Aegidae)) frequently infecting the gills and sometimes the body of hogfish, and occasionally Spanish hogfish, throughout the West Indies. When we were describing new species of large, external, host-specific cymothoid isopods (*Anilocra* spp.) from West Indian coral reef fishes (Williams and Williams, 1981), we learned of a large, external, host-specific cymothoid isopod on hogfishes in the northern Bahamas.

MATERIALS AND METHODS

Hogfish hosts were collected just off Freeport, Grand Bahama, The Bahamas (26°31′N, 78°39′W), with a Hawaiian sling while the collector was free diving (the only legal method to spear fishes in The Bahamas) (B. J. Rose, pers. comm.). One specimen collected from Bermuda was examined from the U.S. National Museum Crustacean Collection (USNM), Washington, D.C. The authors subsequently made underwater surveys of external fish-parasitic isopods in the type location. Other materials and methods follow Williams and Bunkley-Williams (1992). Types are deposited in the U. S. National Parasite Collection (USNPC), Beltsville, Maryland. We call the structures on pereopod 7 and apex of maxilla 1 (maxillule) "stout setae" although these were called "spines" in the latest revision of the genus (Bruce, 1987).

DESCRIPTION

Sixteen specimens of a new species of cymothoid isopod were collected from 13 hogfish and 1 Spanish hogfish from The Bahamas, and 1 additional specimen collected in Bermuda was examined from the USNM.

Received 14 September 1998; revised 7 May 1999; accepted 7 May 1999.

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Nerocila benrosei n. sp.

(Figs. 1, 2)

Description of ovigerous female (based on 8 specimens): Females 25–29 mm (average 27 mm) long and 14–18 mm (average 16 mm) in maximum width. Total length of body 1.4–1.9 times maximum width, body dorsally vaulted. Body widest at pereonite 5. Cephalon anterior margin subtruncate and gently convex; eyes not apparent. Antennae 1 (antennule) and 2 (antenna) extend to midline of pereonite 1; 1 with 9 articles; 2 with 10 or 11 articles, antennae 1 and 2 subequal in length and robustness. Antenna 1 articles 1 and 2 conspicuously broader than 3–8. Pereonite 1 posterolateral margin not produced, 2 weakly produced, 3 and 4 produced, 5–7 strongly produced; produced portion of 2 rounded, 3–7 acute. Coxae posteriorly acute, 2 and 3 as long as posterolateral projection of respective pereonite, 4 shorter, 5–7 manifestly shorter. Pereopods 6 and 7 longer than 5; pereopod 7 with stout setae. Pleon almost as wide as pereon. Lateral margins of all pleonites strongly produced posteriorly, sometimes curling dorsally. Pleonites all visible in dorsal view, all equal in length. Pleonites 1 and 2 with ventrolateral processes posteriorly directed. Pleotelson concave to flat, subquadrate, wider than long, posterior margin smoothly rounded, sometimes with a median point. Uropods extend slightly to considerably beyond posterior end of pleotelson. Exopod of uropod longer than endopod, terminal apices rounded. Brood pouch made up of oostegites arising from pereonites 1–4 and 6 and enclosed by posterior of 7th sternite forming laminar posterior pocket; last pair of oostegites extends over beginning of pleopods. Mandibular palp elongate, article 1 longest; article 3 as long as or longer than 2 with setae on distolateral margin. Mandibular palp article 3 with 5 terminal setae and 2 short stout setae along lateral margin. Maxilla 1 (maxillule) apex with 4 spines. Maxillipedal palp with 2 stout spines. Maxilla 2 (maxilla) medial lobe partly fused to lateral lobe, 2 curved spines and semilunar pectinate scales on each lobe. Pereopods gradually increase in length from 1 to 6. Dactyli without nodules. Pleopods 1–5 peduncles with folded lateral lobe; endopods of pleopods 3–5 with accessory lamella on proximomedial margin, becoming large and folded on pleopod 5; pleopods 4 and 5 endopod thrown into medial folds, becoming larger on pleopod 5. Pleopod 2 appendix masculina terminating in bluntly rounded end, half the length of endopod.

Nonovigerous female (based on 2 specimens): Females 24–29 mm long and 14–17 mm in maximum width. Total length of body 1.7 times maximum width. Appendix masculina 0.50–0.75 length of endopod of second pleopod.

Male–female transitional (based on 4 specimens): Specimens 15–21 mm (average 18 mm) long and 10–13 mm (average 11 mm) in maximum width. Total length of body 1.4–1.8 times maximum width. Appendix masculina 0.50–1.00 length of endopod of second pleopod.

Male (based on 2 specimens): Males 10 mm long and 3–4 mm in maximum width. Total length of body 2.5–3.3 times maximum width. Body narrower than in female. Head not immersed. Eyes obvious in juveniles and developing male (n = 1), partially degenerate in developed male (n = 1). Pleonites 1 and 2 with ventrolateral margins produced; lateral margins of 1–5 not produced. Appendix masculina 1.00–

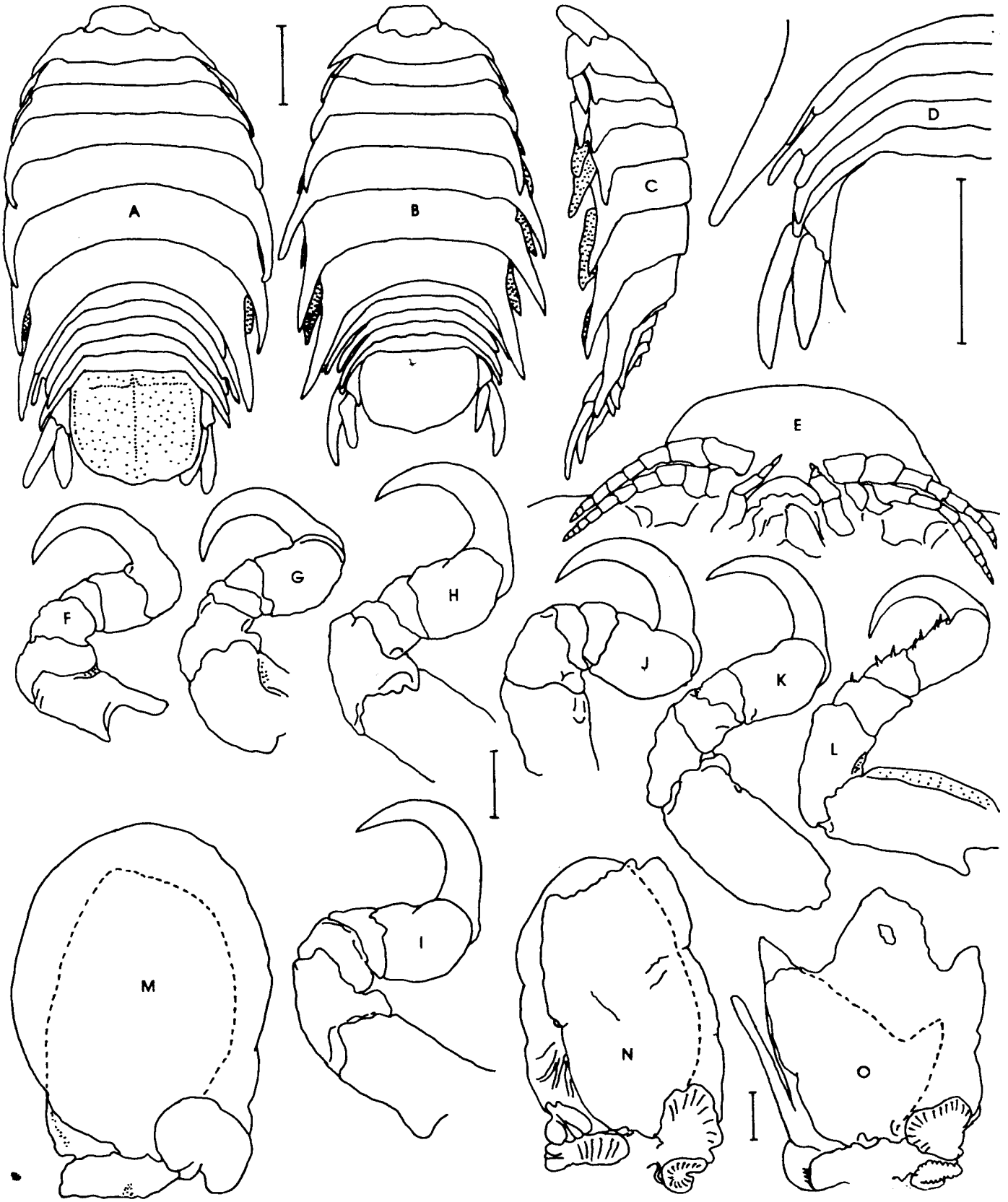

FIGURE 1. *Nerocila benrosei* n. sp. ovigerous female from the hogfish, *Lachnolaimus maximus*. Scale of A–C = 5 mm; D = 5 mm; E–L = 1 mm; M–O (and Fig. 2A–D) = 1 mm. **A.** Female paratype (USNPC #88822). Dorsal view. **B–O.** Female holotype (USNPC #88820). **A–B.** Dorsal view. **C.** Lateral view. **D.** Dorsal view of pleonites and left uropod. **E.** Ventral view of antennae and anterior cephalon. **F–L.** Pereopods 1–7. **M.** Pleopod 1. **N.** Pleopod 3 (distal tip of endopod damaged). **O.** Pleopod 2 (distal ends of endopod and exopod severely damaged).

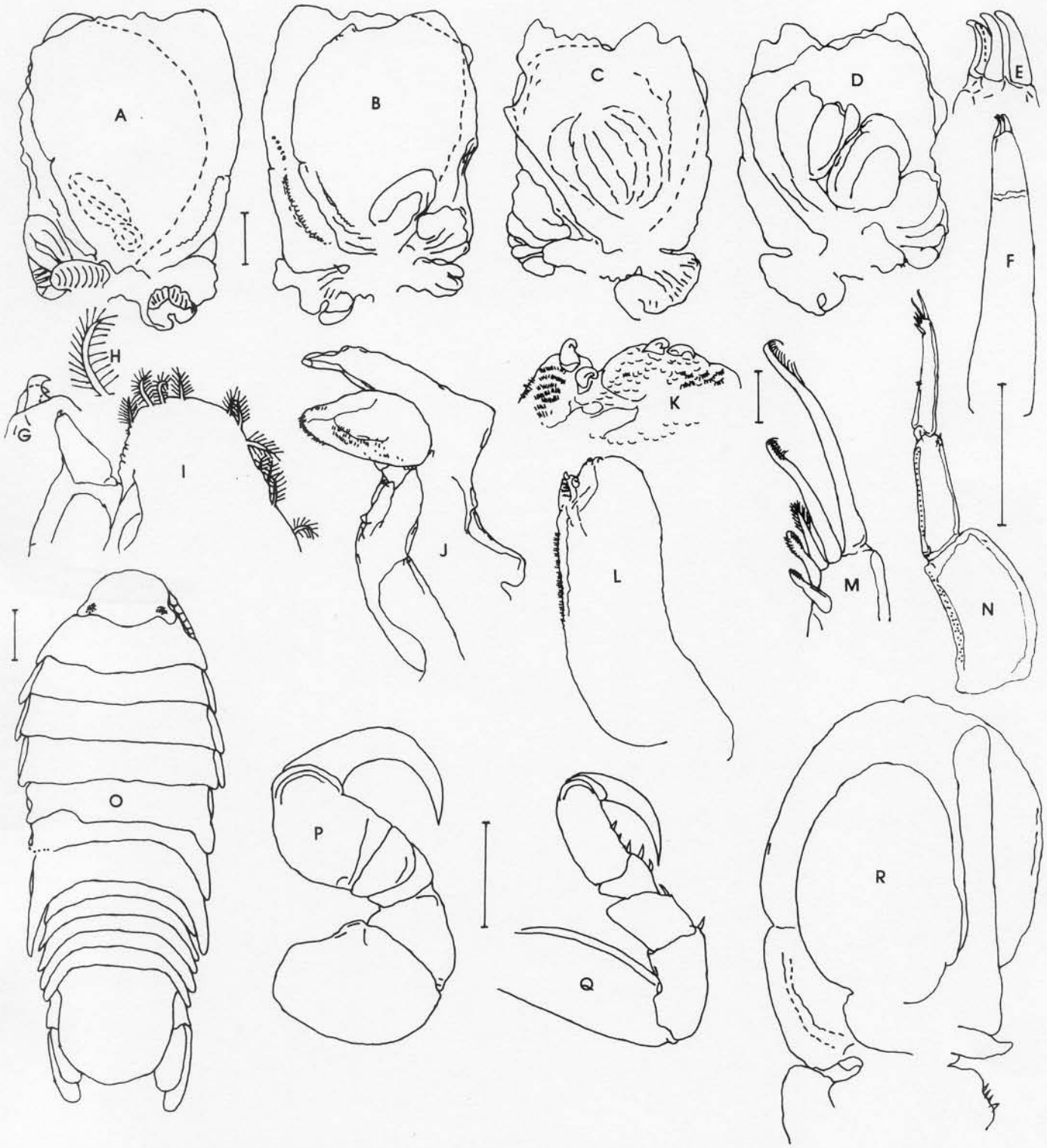

FIGURE 2. *Nerocila benrosei* n. sp. ovigerous female from the hogfish, *Lachnolaimus maximus*. Scale of A–D (and Fig. 1M–O) = 1 mm; E, G, H, K, M = 0.1 mm; F, I, J, L, N = 0.5 mm; O = 1 mm; P–R = 5 mm. **A–N** Female holotype (USNPC #88820). **A.** Pleopod 4, anterior view (distal tips of endopod and exopod slightly damaged). **B.** Pleopod 4, posterior view. **C.** Pleopod 5, anterior view (distal ends of endopod and exopod damaged). **D.** Pleopod 5 of female, posterior view. **E.** Apex of maxilla 1 (maxillule). **F.** Maxilla 1 (maxillule). **G.** Apex of maxillipedal palp. **H.** Setae of maxillipedal oostegite. **I.** Maxilliped. **J.** Mandible. **K.** Distal lobes of maxilla 2 (maxilla) with semilunar pectinate scales. **L.** Maxilla 2 (maxilla). **M.** Apex of mandibular palp. **N.** Mandibular palp. **O–R** male paratype (USNPC #88821). **O.** Dorsal view of male. **P.** Pereopod 1 of male. **Q.** Pereopod 7 of male. **R.** Pleopod 2 of male.

1.10 length of pleopod 2 endopod, expanded and rounded at apex. Otherwise similar to female.

Color (in alcohol): Females and male–female transitionals brown with 2 off-white longitudinal bands, males cream colored.

Variation: The head is not immersed in smaller ovigerous females. Some variation occurs in the body shape of ovigerous females (Figs. 1A, B).

Taxonomic summary

Type host: Lachnolaimus maximus (Walbaum), hogfish (Labridae). Host was not deposited in a museum.

Other host from type locality: Bodianus rufus (Linnaeus), Spanish hogfish (Labridae).

Type locality: Off Freeport, Grand Bahama, The Bahamas (26°31′N, 78°39′W).

Additional locality from type host: Bermuda, 3 August 1903 (USNM 040384) (Richardson, 1905).

Attachment site: On head, usually on cheek under eye, but occasionally observed on uncollected hosts above the eye.

Prevalence: Visual estimate of 5% in the type locality, varying from 0 to 10% in other localities in the northern Bahamas.

Intensity: Usually 1 female and 1 male–female transitional, or 1 female and 1 male, associated pair were observed on each infected host; averaging 1.1 isopods per host. Hosts were rarely observed with 2 females, 1 on each side of the face. Cymothoid isopods infect the host as free-swimming juveniles. Males are smaller, sometimes ignored in field collections, and are usually more prone to abandon a speared host than females. Thus, these numbers may underestimate the number of males on collected hosts. Males are also smaller and more difficult to see underwater than females; thus, observations cannot be used to establish intensity.

Etymology: Nerocila benrosei is named in honor of Benjamin J. Rose, who collected the type material.

Deposition of type series: Holotype (female), paratype (associated male), and additional paratypes deposited in U.S. National Parasite Collection (USNPC 88820, 88821, and 88822–88827, respectively).

Remarks

Nerocila benrosei differs from all other *Nerocila* species by having the body of females 1.4–1.9 times longer than wide instead of 2.0–3.0 times, and pleopods 1 and 2 lacking an accessory lamella. It differs from the only species of *Nerocila* with which it overlaps geographically, *N. lanceolata* (Say, 1818), by having the lateral margins of pleonites 1–5 strongly produced ventrally, coxae 5–7 manifestly shorter than the posterolateral projection of the respective pereonite, and a vaulted dorsal surface.

We chose to draw the pleopods of the female holotype even though these were slightly to severely damaged (Figs. 1M–O, 2A–D). The damage was limited to the distal ends of the lamellae and nothing remarkable or of taxonomic importance was observed in the undamaged portions of pleopods of the paratypes.

We did not observe this isopod on either host as these were collected and observed by. B. J. Rose (pers. comm.). However, the host species are unmistakable, and the collector was a commercial fisherman and is now an experienced commercial resort coral-reef diver, who would probably not mistake these fishes. B. J. Rose (pers. comm.) has observed what was apparently this isopod very frequently on hogfish and less frequently on Spanish hogfish in the northern Bahamas. Numerous observations of what was apparently this isopod on the same species of fishes in the same area have been reported to the authors by scuba divers and photographers over the last 20 yr. R. E. Thresher (pers. comm.) took an underwater photograph of what was apparently this isopod on the hogfish in the northern Bahamas in the 1970s, but he has been unable to locate the slide or the specific data. No reports of similar isopods on other fishes have been received from this area. We were unable to find *N. benrosei* in 16 man-hours of underwater observations (9–13 May 1991) in and around the type locality, during which time we observed 11 hogfish, 23 Spanish hogfish, 5 spotfin hogfish, *Bodianus pulchellus* (Poey), and 11 other species of labrids. External isopods were observed on other fishes during this observational period: *Anilocra chromis* Williams and Williams, 1981 on *Chromis cyanea* (Poey), blue chromis (Pomacentridae); *Anilocra haemuli* Williams and Williams, 1981, on *Epinephelus fulvus* (Linnaeus), coney (Serranidae); *Anilocra chaetodontis* Williams and Williams, 1981, on *Chaetodon ocellatus* Bloch, spotfin butterflyfish (Chaetodontidae); *Anilocra holacanthi* Williams and Williams, 1981, on *Holacanthus tricolor* (Bloch), rock beauty (Pomacanthidae). We did not find *N. benrosei* during research cruises in the central and southern Bahama islands in 1976 and 1977. We examined the *Nerocila acuminata* Schiödte and Meinert, 1881 specimen reported as a parasite of the hogfish in Bermuda (Richardson, 1905; Kensley and Schotte, 1989) and found it was a specimen of *N. benrosei.* Other isopods sent to us for identification (Rand, 1986, Williams et al., 1994) from Bermuda were *Nerocila lanceolata.* The single museum specimen from Bermuda and the lack of additional specimens during extensive collections in Bermuda (Williams et al., 1994, T. G. Rand, pers. comm.) casts some doubt on the Bermuda locality. We consider that this isopod has only been confirmed from the northern Bahamas.

DISCUSSION

Bruce (1987) rediagnosed the subfamily Anilocrinae Schiödte and Meinert, 1881, provided a key to the genera of Anilocrinae, and rediagnosed the genus *Nerocila.* The generic diagnosis of Bruce (1987) should be modified to include specimens 1.4 times longer than wide. The diagnosis would also be more concise if the phrase "coxae . . . usually as long as, or longer than respective pereonite" had "median length of" added before "respective."

The sizes of the nonovigerous females range from just smaller than the smallest ovigerous female to as large as the largest ovigerous female. This suggests that these females may go through growth and feeding or "vegetative" stages without brood pouches between reproductive stages with brood pouches, as we have suggested in other cymothoid isopods (Williams and Williams, 1982).

The species of *Nerocila* in the northwestern Atlantic have almost mutually exclusive geographic ranges: New England to Panama, including Bermuda and Cuba (*Nerocila lanceolata*); Brazil to Trinidad and Tobago (*Nerocila fluviatilis* Schiödte and Meinert, 1881); and the northern Bahamas and possibly Bermuda (*Nerocila benrosei*).

Caribbean marine organisms generally can be divided into two geographic regions: "continental" areas along the coasts of Central and South America, including Cuba and Trinidad and "insular" areas away from continental influence. No *Nerocila* spp. have been found in the insular Caribbean.

Nerocila benrosei also differs in behavior from the other *Nerocila* species in the western Atlantic by being host specific and attachment site specific. *Nerocila fluviatilis* and *N. lanceolata* show no host or site specificity and infect a great variety of hosts. Most *Nerocila* species appear to have little or no host specificity.

Nerocila benrosei also has a much more limited geographic distribution than *Nerocila fluviatilis* and *N. lanceolata,* although its type and preferred host occurs from Brazil to North Carolina, Bermuda, and throughout the West Indies. So far, this isopod is known only from the Little Bahama Bank and possibly Bermuda.

ACKNOWLEDGMENTS

We thank Benjamin James Rose, Underwater Explorers Society, Freeport, Grand Bahama, The Bahamas, for collecting the isopods described in this paper and for accompanying us on scuba dives; the late Thomas E. Bowman, Smithsonian Institution, Niel L. Bruce, Queensland, Australia, and Richard W.

Heard, Gulf Coast Research Laboratory, for reviewing the manuscript; Patrick L. Colin, Caribbean Marine Research Center, for allowing us to participate in his NSF-supported research cruises aboard the R/V *Calanus* to the central and southern Bahama islands; Raymond E. Waldner, Palm Beach Atlantic College, for retrieving one sample collected by B. J. Rose from The Bahamas; Ronald E. Thresher, CSIRO Marine Laboratories, Hobart, Tasmania, Australia, for the information concerning underwater photograph.

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