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Joel W. Martin
Natural History Museum of Los Angeles County

Donald B. Cadien
Marine Biology Laboratory, Los Angeles County

Todd L. Zimmerman
University of California, Los Angeles

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FIRST RECORD AND HABITAT NOTES FOR THE GENUS *LIGHTIELLA* (CRUSTACEA, CEPHALOCARIDA, HUTCHINSONIELLIDAE) FROM THE BRITISH VIRGIN ISLANDS

Joel W. Martin¹, Donald B. Cadien², and Todd L. Zimmerman^{1,3}

¹Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, California 90007, USA

²Marine Biology Laboratory, County Sanitation Districts of Los Angeles County, 24501 South Figueroa Street, Carson, California 90745, USA

³Department of Organismic Biology, Evolution and Ecology, University of California, Los Angeles, 405 Hilgard Avenue, Los Angeles, California 90024-1606, USA

INTRODUCTION

The crustacean class Cephalocarida, as currently understood, is composed of five genera and ten species (Hessler and Elofsson 1996, Hessler and Wakabara 2000). Although in some instances numerous specimens have been collected in a single locale (e.g., the nearly 120 specimens of *Lightiella incisa* Gooding, 1963 from Puerto Rico studied by Sanders and Hessler (1964), and the numerous specimens of *Hutchinsoniella macracantha* Sanders, 1955 now known from Buzzards Bay, Massachusetts, see Hessler and Sanders 1973:193), most reports are based on very few specimens. For example, the original description of the genus *Hutchinsoniella* Sanders, 1955 was based on only eight specimens from Long Island Sound, New York (Sanders 1955); the genus *Sandersiella* was originally described by Shiino (1965) on the basis of only one specimen from Japan; the genus *Chiltoniella* Knox and Fenwick, 1977 was based on two specimens from New Zealand (Knox and Fenwick 1977), and the genus *Lightiella* Jones, 1961 was based on seven specimens from San Francisco Bay (Jones 1961). *Lightiella moniotae* was described for a single individual from New Caledonia (Cals and Delamare-Deboutteville 1970); *Sandersiella calmani* for two specimens from Peru (Hessler and Sanders 1973); and *Sandersiella bathyalis* for two specimens from the deep ocean off southwest Africa (Hessler and Sanders 1973). The single eastern Caribbean record (Barbados) of a cephalocarid also was based on two specimens (Gooding 1963), although Gooding also discussed two specimens from Puerto Rico in that account.

Cephalocarids are of such interest morphologically and phylogenetically, and are found so infrequently, that their presence anywhere is noteworthy. As part of an ongoing survey of the cryptic marine invertebrates of certain Caribbean islands, we obtained a single specimen of a cephalocarid from Guana Island, British Virgin Islands, that matches most closely the description by

Gooding (1963) of *L. incisa*. The find is of interest not only because it is the first record for the far eastern Caribbean other than Gooding's (1963) two type specimens from Barbados, but also because of the unusual habitat in which it was found.

There are three additional records of cephalocarids in the Caribbean other than Gooding's (1963) original description of *L. incisa* from Barbados and southwestern Puerto Rico. Sanders and Hessler (1964) reported *L. incisa* from the Puerto Rican site. This same species also is known from the Yucatan Peninsula (De Troch et al. 2000) and Carrie Bow Cay, Belize (Schiemer and Ott 2001).

Several records of cephalocarids are known for waters just outside the Caribbean. Wakabara (1970) recorded *Hutchinsoniella* from Brazilian waters, and the genus *Sandersiella* was also reported from Brazil by Wakabara and Mizoguchi (1976). The latter record was corrected by Hessler and Wakabara (2000), who described the species in question as new, making it the type of their newly erected genus *Hampsonellus*. There are several reports of *Lightiella* from the east and west coasts of Florida (Hessler and Sanders 1973, McLaughlin 1976, Saloman 1978, Stoner 1981) and a single record from the coast of Alabama (Heard and Goeke 1982).

MATERIALS AND METHODS

The single specimen was collected during a biodiversity survey of the cryptic marine invertebrates of Guana Island, British Virgin Islands (18°28'33"N, 64°34'29"W), led by T.L. Zimmerman and J.W. Martin. Various collecting methods were employed during that survey, including light traps, hand collecting, yabby pumps, and arrays of artificial reef matrices (ARMs). The cephalocarid was found by sorting through a collection of sand (a mixture of siliceous and calcium carbonate) and gravel collected by hand using SCUBA on July 8, 2001. The sand and gravel were from an area of large

boulders among scattered coral heads, sponges, and soft corals at a depth of approximately 5 m immediately south of Long Point, Muskmellon Bay, Guana Island (2001: Station 12 of the Zimmerman and Martin survey, individual specimen number Vd 0054). Observations and illustrations of the preserved specimen were made with a Wild M5APO dissecting stereoscope and a Nikon Labophot, both with drawing tubes. The specimen has been catalogued in the Crustacea collection of the Natural History Museum of Los Angeles County as LACM CR 2001-005.1.

DESCRIPTION

The single specimen (Figure 1) measures 2.1 mm from the tip of the cephalic shield to the tip of the telson. The body (Figure 1A, B) consists of a cephalic shield followed by 9 thoracic and 12 post-thoracic somites including the telson; the first thoracic somite is covered to some extent by the cephalic shield, possibly an artifact of preservation. All of the post-thoracic somites except the telson bear acute lateral spines, increasing in size toward the posterior somites. The telson bears a ventral comb row of spine-like teeth across its full width (Figure 1D); no other somites bear such a row. The dorsal medial surface of the telson (Figure 1C) is extended posteriorly as a pair of triangular teeth that project beyond the posterior margin of the ventral comb row. The caudal rami are relatively short and thick, and each is shorter than the combined length of the last abdominal segment and the telson. The tip of each ramus is strongly indented, with an acute medial spine-like tooth and a shorter and less acute lateral tooth. Each ramus bears one long and two short setae (one of the short setae is broken on the left side); a much longer seta on each ramus was present in life but has been broken and is not figured. The single egg is attached to the tip of the modified 8th limb on the ventral surface of the animal's right side. In dorsal view (Figure 1A), the egg protrudes to the right of the body; in ventral view (Figure 1B) it appears directed slightly to the posterior.

REMARKS

Characters visible to us without dissection are in general agreement with those described for *L. incisa* by Gooding (1963) and Sanders and Hessler (1964). In particular, the low number of thoracic limbs (7 total, excluding the modified egg-bearing limb), the relatively short and stout caudal rami, the single comb row on the ventral border of the telson, and the single extruded egg

are together indicative of the genus *Lightiella* and serve to separate members of this genus from other cephalocarids (e.g., see Hessler and Sanders 1973, McLaughlin 1976, Hessler et al. 1995). Mouthpart morphology was not examined because of our reluctance to dissect the single specimen.

Hessler et al. (1995) noted that the large extruded egg of *H. macracantha* is "cemented to the knob which forms the tip of the small ninth thoracic limb." The situation is similar in *Lightiella*, except that a single egg is attached to what appears to be a modified "eighth" limb (which is located on the ninth thoracic segment but is numerically the eighth because of the missing thoracopod in *Lightiella*; see Sanders and Hessler 1964). Sanders and Hessler (1964) examined 17 ovigerous adults of *L. incisa*, and 16 of them carried a single egg sac (the other individual carried paired egg sacs as in *Hutchinsoniella*). Although to our knowledge the present paper contains the first illustrations of the extruded egg of *L. incisa*, its occurrence has been noted previously (Gooding 1963, Hessler and Sanders 1964, De Troch et al. 2000). Hessler et al. (1995: Figure 1) illustrated the paired egg sacs in *H. macracantha*.

Notes on Movement

The specimen was sorted from the sample while it was still alive. In fact, what brought the small animal to our attention, and distinguished it from the surrounding copepods that it resembled, was its movement pattern. The animal moved in a very graceful and smooth way reminiscent of a branchiopod notostracan. It would often make very tight reversals upon itself when changing direction. This type of movement was noted also by Sanders (1963:9–13, Figures 12, 13) in his classic work on functional morphology and anatomy of *H. macracantha*.

Habitat Notes

The habitat is of interest because it is atypical for cephalocarids. Station/Sample 12, 2001, of the Zimmerman and Martin survey is an apparently well oxygenated shallow (5–10 cm) layer of sand and pea gravel overlying a more or less solid rock base at the bottom of a fissure (1–2 m wide at the base) in the bedrock that slopes away from the base of the island. The fissure runs perpendicular to the shore and slopes slightly upward; the depth where the sand and gravel were collected was approximately 5 m. This was in an area characterized by large boulders calved from the cliff face above. At the base of the boulder field, at a depth of about 7 m, the bottom consisted of coarse gravel, sand, and

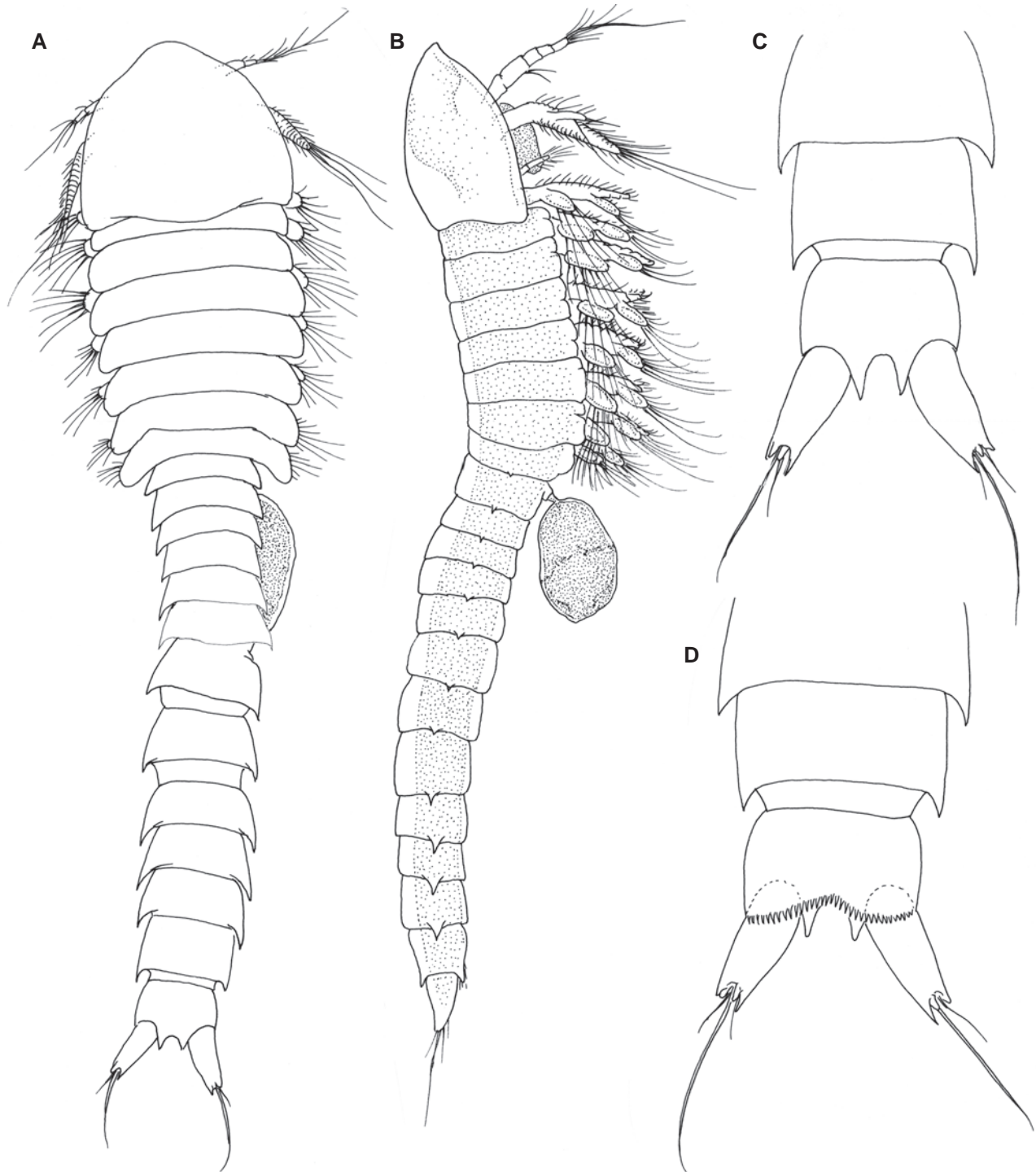


Figure 1. *Lightiella incisa* Gooding, 2.1 mm specimen from Long Point, Guana Island, British Virgin Islands, Caribbean (LACM CR 2001-005.1). A, entire animal, dorsal view. B, same, lateral view. C, posterior two somites, telson, and caudal rami, dorsal view. D, same, ventral view showing comb row of spine-like teeth on posteroventral border of telson.

cobble with scattered small coral heads, sponges, and soft corals. Further seaward the coral heads coalesce into reef. The bottom sediment is often covered with a thin layer of fine calcareous algae and flocculent matter, although this material was less prevalent in 2001 than in the two previous years of our survey. Other organisms sorted from the sand and gravel in the rock fissure (Station 12) included lancelets, polychaete worms, molluscs (chitons, bivalves, and gastropods), pycnogonids, and varied crustaceans (amphipods [including some that appear to be ingolfiellids], decapods, tanaidaceans, and ostracods).

Gooding's (1963) original four specimens of *L. incisa* (two from Barbados and two from Puerto Rico) were all from flocculent sediment within a *Thalassia* grass bed; three of the four were aspirated from decapod burrows. Similarly, De Troch et al. (2000) found large numbers of specimens "between the roots of sea grasses." Hessler and Sanders (1973:195) noted that "the single common feature of all cephalocarid habitats is the flocculent nature of the superficial sediment to which these animals are intimately bound by their basic mode of life." Schiemer and Ott (2001) recently shed additional light on the microhabitat of *L. incisa*, documenting its occurrence only below the redox potential discontinuity layer and with a maximum density at 12–15 cm below the surface at a shallow sand bar on Carrie Bow Cay, Belize. Schiemer and Ott (2001) suggested that *L. incisa* inhabits "oxygen-rich microzones" in deeper sediments. This was also suggested by De Troch et al. (2000), in their study of *L. incisa* from the Yucatan Peninsula. De Troch et al. (2000) concluded that *L. incisa* was "an endobenthic species occupying anoxic sediments oxygenated by bioturbation (e.g., Polychaeta) rather than being an animal living in the oxygenated top layers." Thus, its occurrence in anoxic flocculent sediments may be tied to the occurrence in these same sediments of polychaete worms or other burrowing organisms that provide limited oxygenation via their burrowing and ventilatory activities. Although we found our specimen among sand and gravel, it is possible that the gravel acts in a manner similar to turtle grass beds as a "sediment trap," collecting the flocculent material that in turn supports cephalocarids (see Sanders and Hessler 1964).

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