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THE OCCURRENCE OF *LIGHTIELLA* JONES, 1961 (CRUSTACEA: CEPHALOCARIDA) IN MOBILE BAY, ALABAMA

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ABSTRACT During July 1979, two adult specimens belonging to the cephalocaridan genus *Lightiella* Jones, 1961 were collected in a box core sample taken at the mouth of Mobile Bay, Alabama. These two specimens were compared to the four described species of *Lightiella*, and found to be most similar to the northeastern Atlantic species of *L. incisa* Gooding, 1963 and *L. floridana* McLaughlin, 1976. Due to a combination of differences in the thoracopodal setation and incisor process of the mandible, the Mobile Bay form cannot at this time be assigned to any of the described species of *Lightiella*. The two Mobile Bay specimens may represent an undescribed species or an ecophenotypic variant of *L. incisa*, but until more specimens from Mobile Bay and adjacent waters are available for study, no conclusions can be made on specific identity of this form. Interpretive problems concerning morphological characters of the Mobile Bay specimens and previously described species of *Lightiella* are briefly discussed.

The subclass Cephalocarida Sanders, 1955, contains four genera represented by nine species known from marine habitats scattered throughout the world (Hessler and Sanders 1973, McLaughlin 1976, Knox and Fenwick 1977). Of the four genera, *Lightiella* Jones, 1961, is the largest with four species, followed by *Sandersiella* Shiino, 1965, with three species. The type genus for the subclass *Hutchinsoniella* Sanders, 1955, and the most recently described genus, *Chiltoniella* Knox and Fenwick, 1977, are both monotypic. The species of *Lightiella* occur in both the Atlantic and Pacific Oceans. *Lightiella incisa* Gooding, 1963, and *L. floridana* McLaughlin, 1976 are northwestern Atlantic forms known from the Caribbean and eastern Gulf of Mexico (Gooding 1963, Sanders and Hessler 1964, McLaughlin 1976, Saloman 1978, Stoner 1981). The other two species, *L. serendipita* Jones, 1961, and *L. monniotae* Cals and Delamare Deboutteville, 1970, were described from the Pacific, San Francisco Bay, and New Caledonia, respectively (Jones 1961; Cals and Delamare Deboutteville 1970).

The two specimens of *Lightiella* on which this report is based were collected on 6 July 1979 from a tidal pass at the mouth (south end) of Mobile Bay, Alabama, 2.5 km east of Fort Gaines (30°15′13″N. 88°3′8″W.) from 5.0 m in depth. Hydrographic measurements at time of collection included temperature (29.7°C), salinity (26.9‰), and D.O. (4.5 ppm). The benthic community at this site represents a transitional fauna between that of coarse sands and fine sand-silt-clay substrata. Sediments characteristic of this station are moderately sorted (medium well sorted to coarse) sands with moderate amounts (10–15%) of silt and clay. The dominant polychaete species at this site were *Magelona* cf. *cincta* Ehlers, 1908, and *Malacoceros vanderhorsti* (Augener, 1927) with seasonal peaks in *Mediomastus* spp., *Myriochele oculata* Zars, 1923, and the archiannelid *Polygordius* sp. Additional invertebrates common at the sampling site were the bivalve *Mulinia lateralis* (Say, 1822), the brittle stars *Micropholis atra* (Stimpson, 1852) and *Hemipholis elongatus* (Say, 1825) and the cephalochordate *Branchiostoma carribaeum* Sundevall, 1853.

Samples were taken with a box corer that sampled an area of 0.093 m^2. The sample was initially washed in a flotation step with the suspended material collected on a 0.5-mm mesh sieve. The material was then preserved in a 10% buffered formalin-seawater solution and later transferred to 70% ethyl alcohol for identification. For comparison, specimens of *L. floridana* from the Gulf coast of Florida were examined; a single 2.1-mm specimen from the type locality (Anclote Anchorage) and two specimens (2.4 and 2.6 mm) from the Apalachee Bay series reported by Stoner (1981) were made available to us for study.

Our specimens of *Lightiella* from Mobile Bay superficially both appear to be adults measuring 2.7 and 2.9 mm in length and were slightly damaged (some pseudepipods and expodites of the posterior thoracopods and the long terminal setae of caudal rami were missing). The smaller specimen was dissected and the larger one was left intact in a temporary glycerin slide mount. The dissected remains of the smaller specimen are in the collection of the senior author; the larger specimen has been deposited in the Gulf Coast Research Laboratory Museum, Ocean Springs, Mississippi.

The Mobile Bay specimens appear to be most closely related to *L. incisa*, but also share some characters of *L. floridana*. A comparison of the four described species of *Lightiella* and the Mobile Bay form, with nine different morphological characters, is presented in Table 1. *Lightiella* sp. (Mobile Bay) differs from *L. floridana*, the only cephalocaridan previously known from the Gulf of Mexico, by having (1) an incisor process on the mandible with large

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TABLE 1.

Comparison of *Lightiella* sp. from Mobile Bay, Alabama, with the four described species of the genus using nine morphological features (summarized from the literature and this study).

	Lightiella sp. Mobile Bay	*L. floridana*	*L. incisa*	*L. serendipita*	*L. monniotae*
mandible: teeth on incisor process	medial tooth small	both teeth nearly equal	medial tooth small	medial tooth small	both teeth nearly equal (?)
cephalic shield length to total body length	16%	19%*	12%*	16%*	19%*
pseudepipod of maxilla 2: number of marginal seta	4	4–5	5	4	not reported or illustrated
exopodite of maxilla: number of setae on medial margin of proximal segment	3	3	2	1	not reported or illustrated
thoracopods 1–6: number of setae on pseudepipods	5	5	5	4	not reported or illustrated
telson: pair of sharp, distal, dorsal processes	present	present	present	absent	not reported
caudal rami: length compared to combined length of telsonic and last abdominal segments	distinctly shorter	approximately equal	distinctly shorter	distinctly shorter	distinctly shorter
thoracopodal exopodites: notch on lateral margin of distal segment	present, weakly developed	absent	present	absent	not reported or illustrated
8th thoracomere: spinose process on pleura	absent	present	absent	absent	present

*based on illustrations from original species descriptions

lateral tooth and small medial tooth or "denticle" (Figs. 1A, 3A), (2) some thoracopodal exopodites with lateral notches (not illustrated), (3) caudal rami distinctly shorter than the combined length of the last two abdominal segments[1] (Fig. 2E), (4) no spinose process on the "pleura" of the last (8th) thoracomere (Figs. 2B, D), (5) more elongate body (Fig. 2A) and (6) relatively shorter head length in relation to total body length. Our two Mobile Bay specimens share all of these characters with *L. incisa*; however, they differ from it in other characters. *Lightiella incisa* has two setae on the medial margin of the first exopodal segment of the maxilla, whereas three setae are present at the same location on the maxilla of the Mobile Bay specimens (Fig. 1C). Although not specifically mentioned in the text, McLaughlin (1976) illustrated (Fig. 2A:596) three setae on the medial margin of the first exopodal segment on the maxilla of *L. floridana*. The pseudepipod of the maxilla of *L. incisa* has five plumose marginal setae; whereas, the Mobile Bay specimens have four (Fig. 1C). The number of these setae was reported by McLaughlin (1976) to vary between four and five for *L. floridana*. Another character, which may be unique to the Mobile Bay form, is the apparent absence of a "short" marginal setae (5th from lateral margin in both *L. floridana* and *L. incisa*), on the distal exopodal segments of both 7th thoracopods of the 2.7-mm specimen (Fig. 1E). Unfortunately the exopodites of the seventh thoracopods are missing on the 2.9-mm specimen. It is possible that the short setae on both the 7th thoracopods could have been broken during handling; however, these "short setae" were not present on the 7th thoracopods of a 2.3-mm specimen of *L. floridana* that we examined from collections made by Stoner (1981) at Apalachee Bay, Florida. The total number of marginal setae on the Apalachee Bay specimens was seven, two less than observed on the Mobile Bay specimens. This difference in setal number (and the absence of a short seta) may be due to the size and molt stage of Apalachee Bay specimens. The meristic characters of the labrum, maxillule, antennule, antenna and other thoracopods of the Alabama specimens fall within the described ranges for *L. incisa* and *L. floridana*. *Lightiella incisa, L. floridana, L. floridana* reported by Stoner (1981) and the Mobile Bay specimens all have fine teeth on the posteroventral margin of pretelsonic abdominal segments (Fig. 2F).

Based on the morphological variation reported for several cephalocaridan species (Hessler and Sanders 1964, Wakabara 1970, Wakabara and Mizoguchi 1976, McLaughlin 1976, Saloman 1978) which include both *L. incisa* and *L. floridana*,

[1] Specimens of *L. floridana* collected by Saloman (1978) in shallow offshore waters near Tampa Bay, Florida, like the Mobile Bay specimens, are reported to have distinctly shorter caudal rami than the type material from Anclote Anchorage. We were unable to obtain any of Saloman's specimens for study.

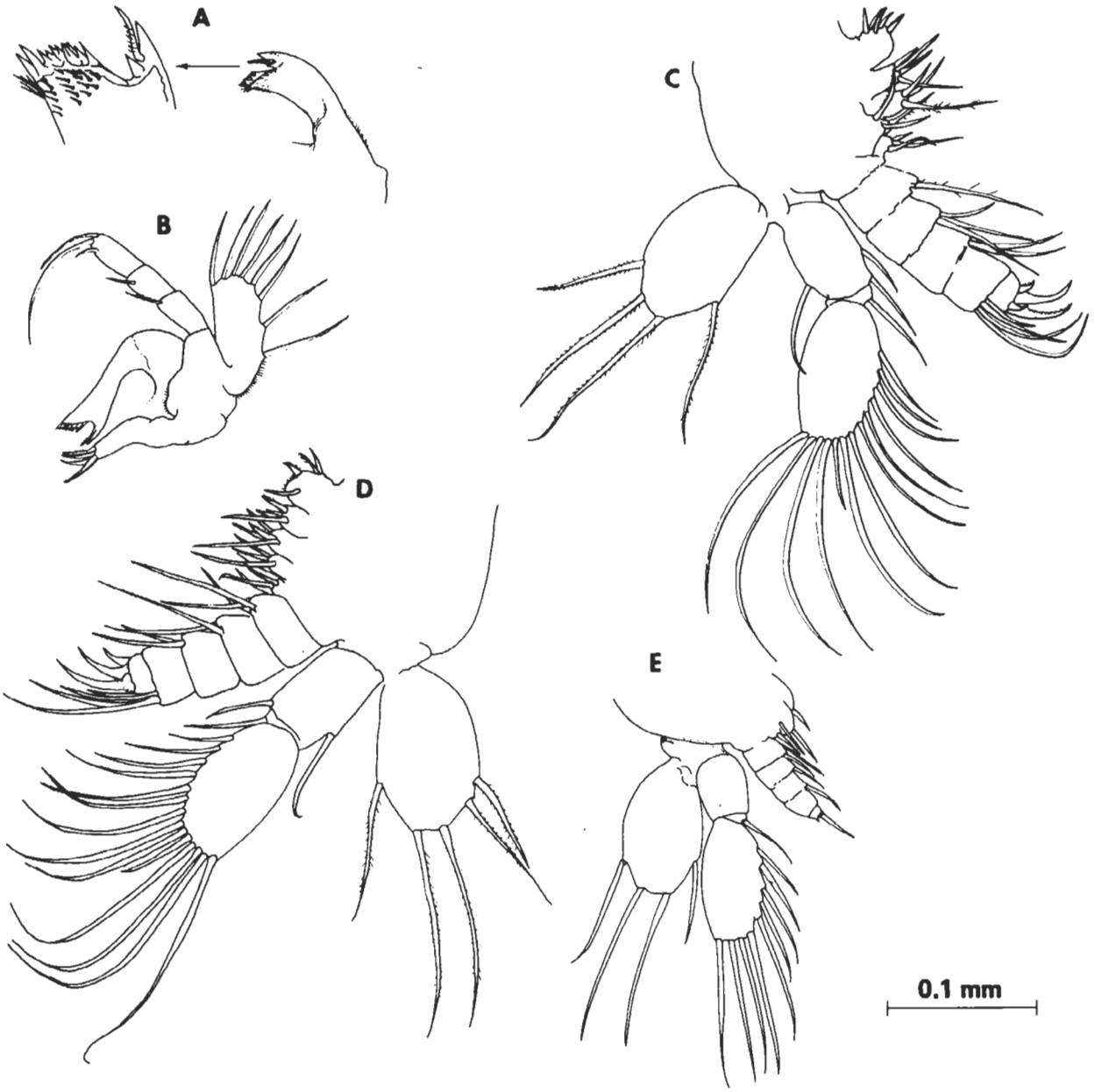

Figure 1. ***Lightiella*** **sp. from Mobile Bay, Alabama (2.7 mm). A, right mandible showing incisor process. B, right mandible and right maxillule. C, right maxilla. D, posterior view of thoracopod 1. E, frontal view of thoracopod 7.**

we hesitate to designate a new species based on only two specimens. A larger series of adult and subadult specimens of the "Mobile Bay form" is needed to clarify its specific status. If, based on additional material, the setation differences between our Alabama material and *L. incisa* are found to be consistent, and if the "short" marginal seta indeed does not occur on the exopodite of thoracopod 7, we feel the Mobile Bay form should be named and designated as a new species. Until additional specimens become available for study, we consider our material to be most closely related to *L. floridana* and *L. incisa* and possibly a northern ecotype of the latter species.

Both specimens of *Lightiella* from Mobile Bay were infested with an unidentified and possibly new species of suctorian protozoan. These stalked sessile ciliates occurred primarily along the posterior lateral and posterior ventral margins of the abdominal somites (Fig. 3C), with each somite usually having from one to four specimens. Lighter infestations of a similar or conspecific suctorian were present on the three Florida specimens of *L. floridana* that we examined. The taxonomic status of this protozoan awaits study of living and properly fixed material. This report constitutes the first record of suctorians associated with the Cephalocarida.

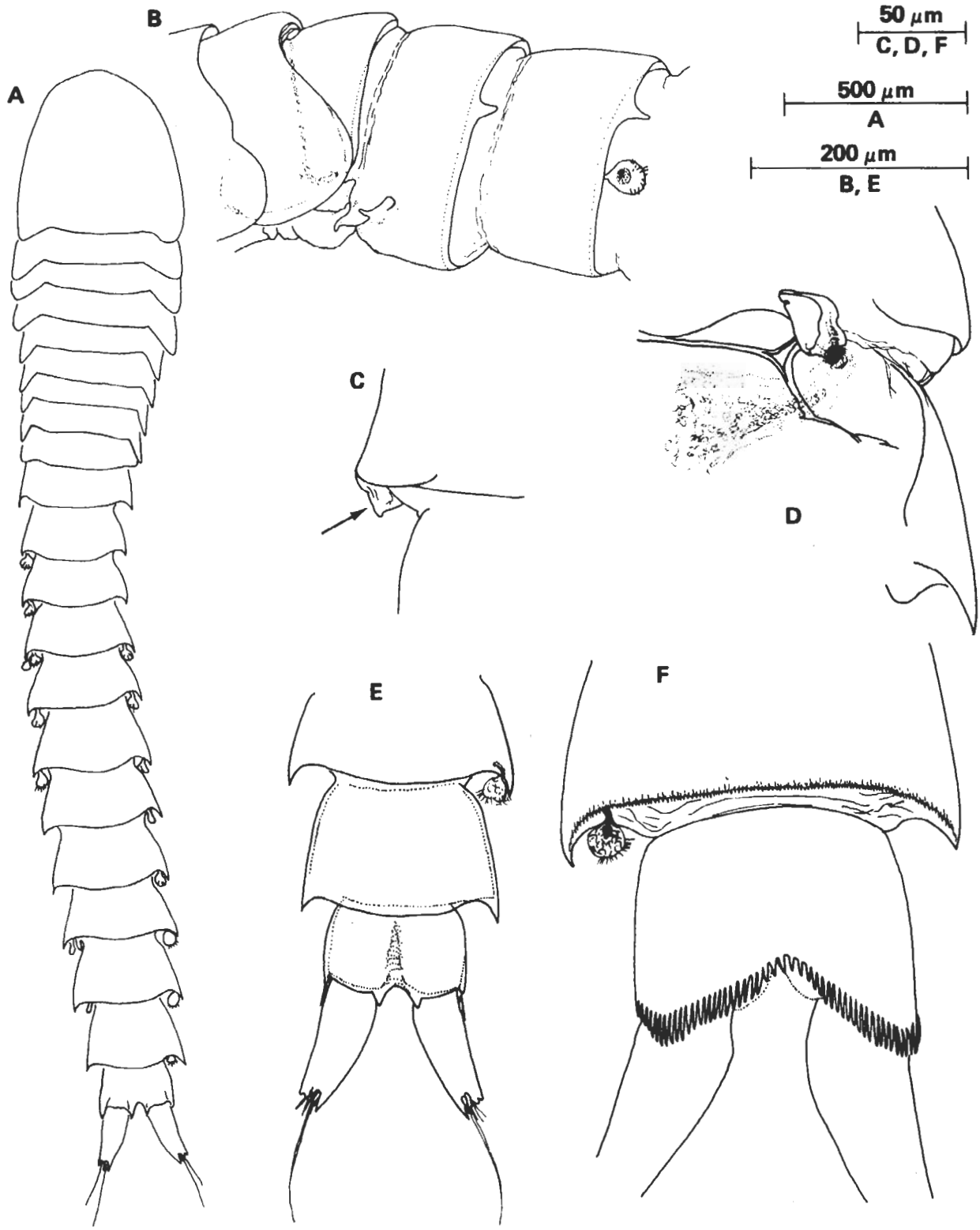

Figure 2. *Lightiella* sp. from Mobile Bay, Alabama (2.9-mm specimen). A, dorsal view of whole specimen. B, lateral view of last three thoracomeres and first two abdominal segments. C, dorsal view of left, lateral, posterior margin of thoracopod 8. D, ventral view of the first thoracomere (left side) showing opening of genital duct. E, dorsal view of last three posterior segments and caudal rami. F, ventral view of abdominal segment 11 and telsonic segment.

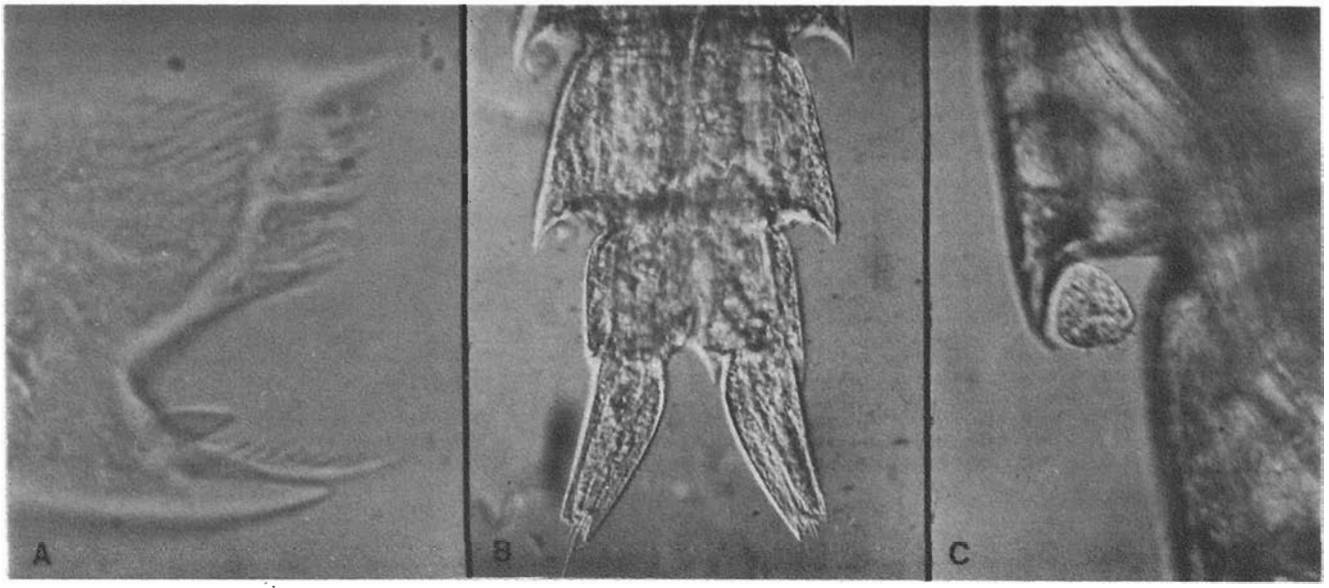

Figure 3. A, incisor process (2.7-mm specimen). B, last abdominal segment, telsonic segment and caudal rami (2.7-mm specimen). C, suctorian protozoan attached to base of lateral process of abdominal segment 6 (2.9-mm specimen).

Supplemental comments

During our observation it was noticed that coverslip pressure may cause modification of important taxonomic characteristics. For example, Figure 2C shows an apparent spinose process on the posterior lateral margin of the eighth thoracic segment of the 2.9-mm specimen. This "process" is an artifact resulting from folding of chitin at the posterior margin of the segment while under coverslip pressure. We suggest that specimens should be examined without a coverslip for such characters as the presence or absence of this spinose process and length-width ratio of the somites since they might be altered or distorted by coverslip pressure in temporary or permanent slide preparations.

We had difficulty interpreting the number of segments in the exopods of the thoracopods, especially the maxilla. Jones (1961) in his original description of the type species *L. serendipita*, described four segments in the exopods of the thoracopods. He considered the common base for the exopod and pseudepipod and the compressed, wedge-shaped structure, which bears a single medial seta, to be proximal (segment 1) and penultimate (segment 3) segments, respectively. Gooding (1963), however, considered exopodal segments 1 and 3 of Jones' description not to be true segments but "functional subdivisions" of the protopod and the proximal exopodal segment (segment 2 of Jones). This interpretation has been followed by McLaughlin (1976). Based on our observations we agree that segment 1 of Jones (1961) is not a true segment and is part of the protopod; however, the status of segment 3 of Jones (1961) is more difficult for us to interpret. With reservations we have followed Gooding's interpretation in this report, but feel that the small wedge-shaped structure (penultimate segment of Jones) should be re-examined carefully to check the attachment of the muscles. Based on the limited material available to us, we are unable to draw any definitive conclusions on the status of this structure. It is hoped that investigators having access to living or properly fixed specimens and using tools such as Nomarski optics and carefully prepared histological sections will be able to settle this question.

We should also like to suggest that features of the lateral incisor tooth of *L. serendipita* may have been misinterpreted. Examination of the mandibles of our material and a specimen of *L. floridana* from the type locality, as well as the published descriptions for those of *L. incisa*, *L. monnitae* and *L. floridana*, indicate that all of these species have two, simple, unarmed incisor teeth with a serrate or unipectinate spinelike seta arising between them (Figs. 1A, 3A). We noticed in our specimens that the serrate spinelike seta, under certain light conditions and orientations, especially when viewed from ventral aspect, appeared to coalesce or merge with the inner margin of the larger lateral incisor tooth. Under such conditions, the fine serrations on the seta appeared erroneously to arise from the inner margin of the lateral incisor tooth. Jones (1961) did not mention the presence of a serrate seta between the smaller inner and larger lateral incisor teeth of *L. serendipita*; however, he did state that "there are many fine hairs inserted between. . . [these] two teeth." Since *L. serendipita* is the only species of the genus described as having "fine hairs" on its incisor teeth and as lacking a serrate or unipectinate spinelike seta between these teeth, we suggest that its mandible should be re-examined to determine if the "fine hairs" actually may be fine serrations of a previously overlooked seta which is

in close proximity to the lateral incisor tooth. If Jones' (1961) description of the mandible proves correct, we feel the lack of a seta between the incisor teeth and the presence of hairlike seta on these teeth represent important characters that should be taken into consideration in any future systematic or taxonomic treatments of the genus *Lightiella*.

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