

## Parasitic Copepod *Lernaeopoda galei* Krøyer, 1837 (Copepoda: Siphonostomatoida): A First Record from Turkish Seas\*

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**Abstract:** The parasitic copepod *Lernaeopoda galei* and corresponding order Siphonostomatoida are recorded from Turkish seas for the first time. The parasites were collected from the cloacal region of *Mustelus mustelus* from Edremit Bay in the Aegean Sea. Descriptions of both sexes were given in detail and the differences observed in the present specimens were compared with previous descriptions of *L. galei*.

**Key Words:** *Lernaeopoda galei*, parasitic copepod, *Mustelus mustelus*.

### Parazitik Kopepod *Lernaeopoda galei* Krøyer, 1837 (Copepoda: Siphonostomatoida): Türkiye Denizlerinden İlk Kayıt

**Özet:** Bu çalışma ile, parazitik kopepod *Lernaeopoda galei* ve böylelikle Siphonostomatoida takımı Türkiye denizlerinden ilk defa kaydedilmektedir. Parazitler Ege Denizi, Edremit Körfezi'nden yakalanan *Mustelus mustelus*'un kloak bölgesinden toplanmıştır. Her iki eşeyin detaylı deskripsiyonları verilmiş ve gözlenen farklılıklar *L. galei*'nin daha önce yapılan deskripsiyonları ile karşılaştırılmıştır.

**Anahtar Sözcükler:** *Lernaeopoda galei*, parazitik kopepod, *Mustelus mustelus*.

### Introduction

Although Turkey has a very long coastline, nothing is known about the parasitic copepods in Turkish seas. The only record of a parasitic copepod is a freshwater species, *Ergasilus sieboldi* Nordmann 1832 (Oguz, 1991; Aydogdu et al., 2001).

*Lernaeopoda galei* Krøyer 1837 is a parasitic copepod that belongs to a large order Siphonostomatoida containing about 1500 species in about 40 families (Kabata, 1979; Huys and Boxshall, 1991). Although the genus *Lernaeopoda* Blainville 1822, contains about 16 species, only two of them, *L. galei* and *L. bidiscalis* Kane 1892, are regarded as true members of this genus (Kabata, 1979, 1992). The taxonomy of the genus is still problematic and needs revision.

*L. galei* is a species abundantly occurring on small sharks along the Atlantic sea-board of Europe (Kabata, 1979), and off the Atlantic coast of South America (Brian,

1944). A record given by Pogoreltseva (1970) extends its range to the Black Sea. Raibaut et al. (1998) provided host records for the Mediterranean on *Mustelus asterias* Cloquet 1821, *M. mustelus* (Linnaeus, 1758), *M. punctatus* (Risso, 1826), *Myliobatis aquila* (Linnaeus, 1758), *Scyliorhinus canicula* (Linnaeus, 1758), and *S. stellaris* (Linnaeus, 1758). Barnard (1955) mentioned its occurrence on *Mustelus laevis* Risso 1826 in South African waters. Capart (1953, 1959) found it on *Paragaleus grueveli* Budker 1935 off the coast of Senegal, and Etchegoin and Verónica (1999) confirmed its attachment at the base of the pectoral fins of *Mustelus schmitti* Springer 1939.

The diversity of hosts on which *L. galei* has been recorded and its cosmopolitan distribution lead us to suspect that more than one species may be involved under the name of *L. galei*. Therefore, we give the complete description of both sexes in order to provide a basis for comparison in future revisionary studies.

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## Materials and Methods

The parasites were collected from the cloacal region of the *Mustelus mustelus* caught by trawl hauls in Edremit Bay in the Aegean Sea; specimens of *L. galei* were kept in 70% alcohol. Before dissection, the parasites were kept in lactic acid for a few hours in order to clear the specimens. The habitus of the female specimens was drawn under a Wild Typ. 256575 HEERBRUGG model stereomicroscope. The rest of the drawings were made with the aid of drawing tube using Nomarski differential interference contrast (DIC) attached to an Olympus BX 50 microscope and all measurements were made with an ocular micrometer. The anterior appendages were dissected and mounted in lactophenol. Broken glass-fibres were added to prevent the appendages from being compressed by the coverslip and to facilitate rotation, which allowed viewing from all sides. Three females were kept in the collection of the Natural History Museum (London), and three females and three males are deposited in the Zoology Department at Balıkesir University (Turkey). Kabata's (1979) terminology is adopted for the description of some structures.

## Results

*Female:* Cephalothorax short, dorsoventrally flattened, inclined ventrally to long axis of trunk; strong posterior margin of cephalothorax rounded, slightly inflated, anterior narrower (Figure 1A). They lack coloration on the head shield. Constriction between cephalothorax and trunk deep and well marked laterally, but shallow dorsally and ventrally (Figures 1A,B,C). Trunk about two or three times longer than cephalothorax, dorsoventrally flattened with rounded anterolateral and posterolateral corners; dorsal and ventral surfaces of trunk with two parallel rows of depressions, but without definite external segmentation. Total length (uropods included) 3.5 mm, uropods 1 mm.

Mandible as in Figures 1D,E. Second antenna (Figure 1F) with one-segmented exopod with two spines, larger than endopod; endopod reduced, two-segmented, proximal segment with small ventral patch of delicate denticles (arrowed in Figure 1F), distal with one prominent seta and two spiniform setae; ventral wall with denticles similar to those of proximal segment. Tip of labrum (Figure 1G) bluntly rounded, marginal fringe

distributed into many groups. First antenna (Figure 1H) indistinctly four-segmented, division between first and second segments not always discernable; ventromedial wall of short second segment with moderately long seta (homologous to whip described by Kabata, 1979: 342); third segment with dentiform seta; fourth (apical) segment armed with three setae and four tubercles. First maxilla (Figure 2A) with lateral, well developed exopod armed with two longer setae inflated at base; distal end of endopod wider than base, armed with three terminal papillae. Second maxilla almost as long as trunk, cylindrical, profusely wrinkled; tapering maxillary arms without conspicuous rounded lobes distally. Maxilliped (Figures 2B,C) robust; myxa with short seta and denticulated pad; another pad present distally near the base of subchela; shaft with short seta; claw with two secondary teeth, conical and blunt.

*Male:* Variable in shape (Figures 2D,E,F,G). Cephalothorax as long as trunk, posteriorly rounded and not well delimited from trunk by deep constriction; posterior part ventrally inflated at bases of second maxillae and maxillipeds. Trunk rounded and about twice as long as maximum width. Inflated uropods pointing anterodorsally tapering at tip. Total length (uropods excluded) 1.1 mm.

First antenna (Figure 3A) and first maxilla (Figure 3B) similar to those of female. Second antenna (Figure 3C) also similar to those of female, but spines on the endopod more slender. Mandible as in Figure 3D. Second maxilla (Figure 3E) with naked claw; shaft narrower than female; corpus almost square in shape with round protuberance in anteromedial corner covered with prominent denticles, supporting tip of subchela. Maxilliped (Figure 3F) arising from common base; corpus nearly oval, articulating distally with subchela; myxa prolonged into two processes, distal larger, with concave surface, ridged and accommodating tip of subchela; proximal process smaller; subchela with 2 outgrowths on convex margin.

## Discussion

Although *Lernaepoda galei* has been recorded from various localities throughout the world (Kabata, 1979; Brian, 1944; Pogoreltseva, 1970; Raibut et al., 1998; Barnard, 1955; Capart, 1953, 1959; Etchegoin et al., 1999) no parasitic copepod record from Turkish seas was found in the literature. *L. galei* and its order

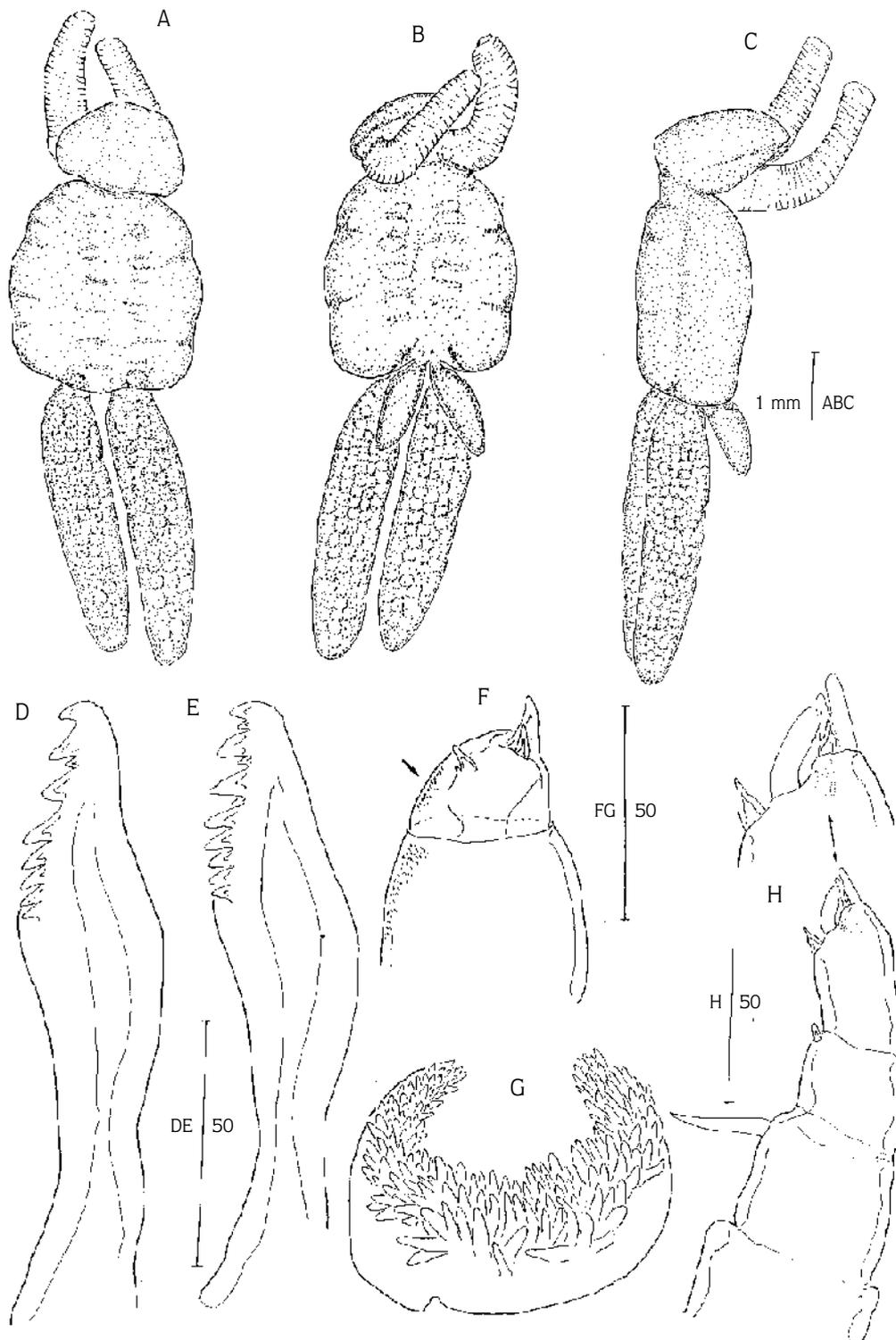


Figure 1. *Lernaepoda galei* Krøyer, 1837, female. A habitus, dorsal; B habitus, ventral; C habitus, lateral; D,E mandible, lateral; F endopod of second antenna, lateral; G labrum, ventral; H first antenna, lateral. Scales for D,E,F,G,H in  $\mu\text{m}$ .

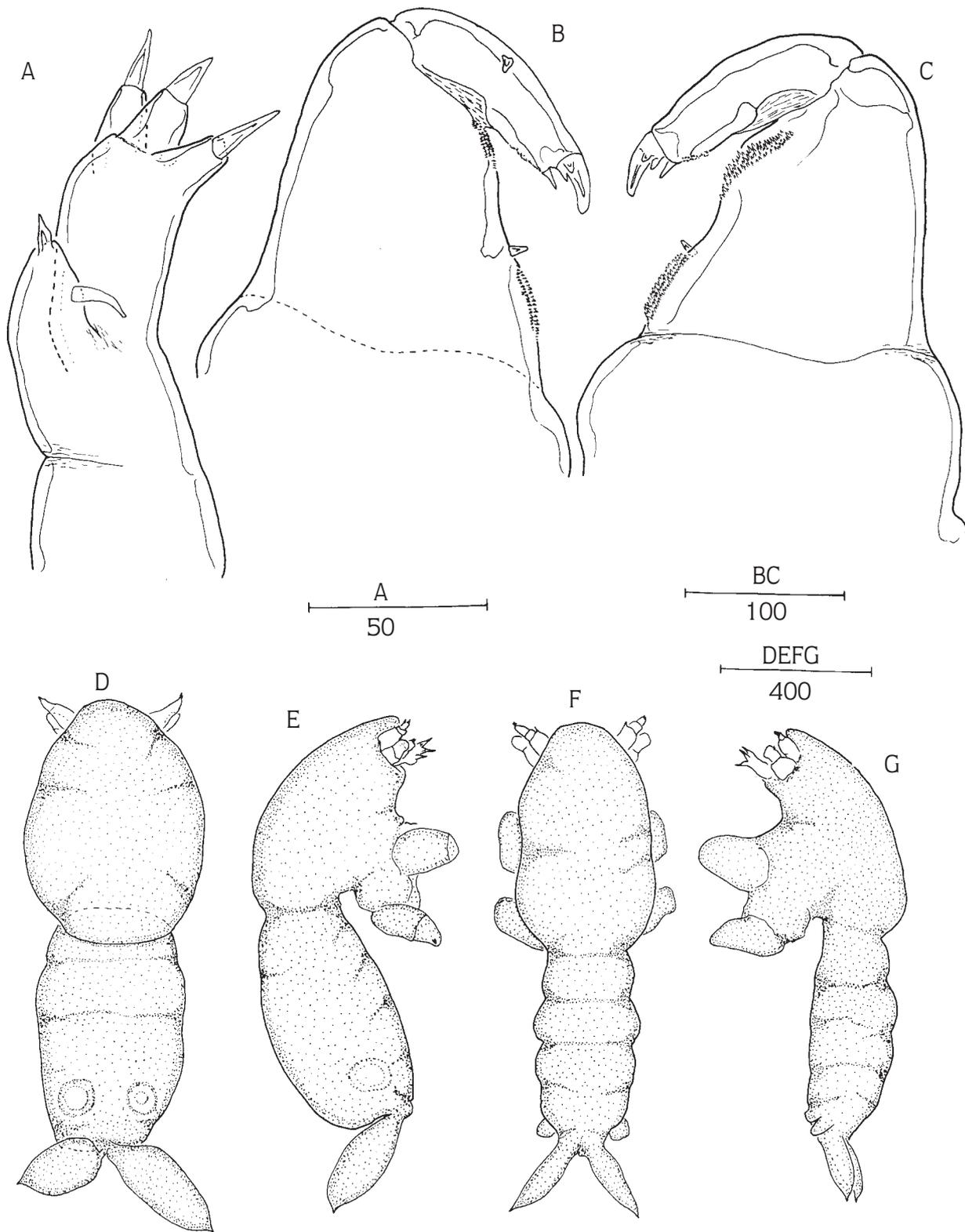


Figure 2. *Lernaepoda galei* Krøyer, 1837, female. A first maxilla, lateral; B,C maxilliped, lateral. First male, habitus, D dorsal; E lateral. Second male, habitus, F dorsal; G lateral. Scales in  $\mu\text{m}$ .

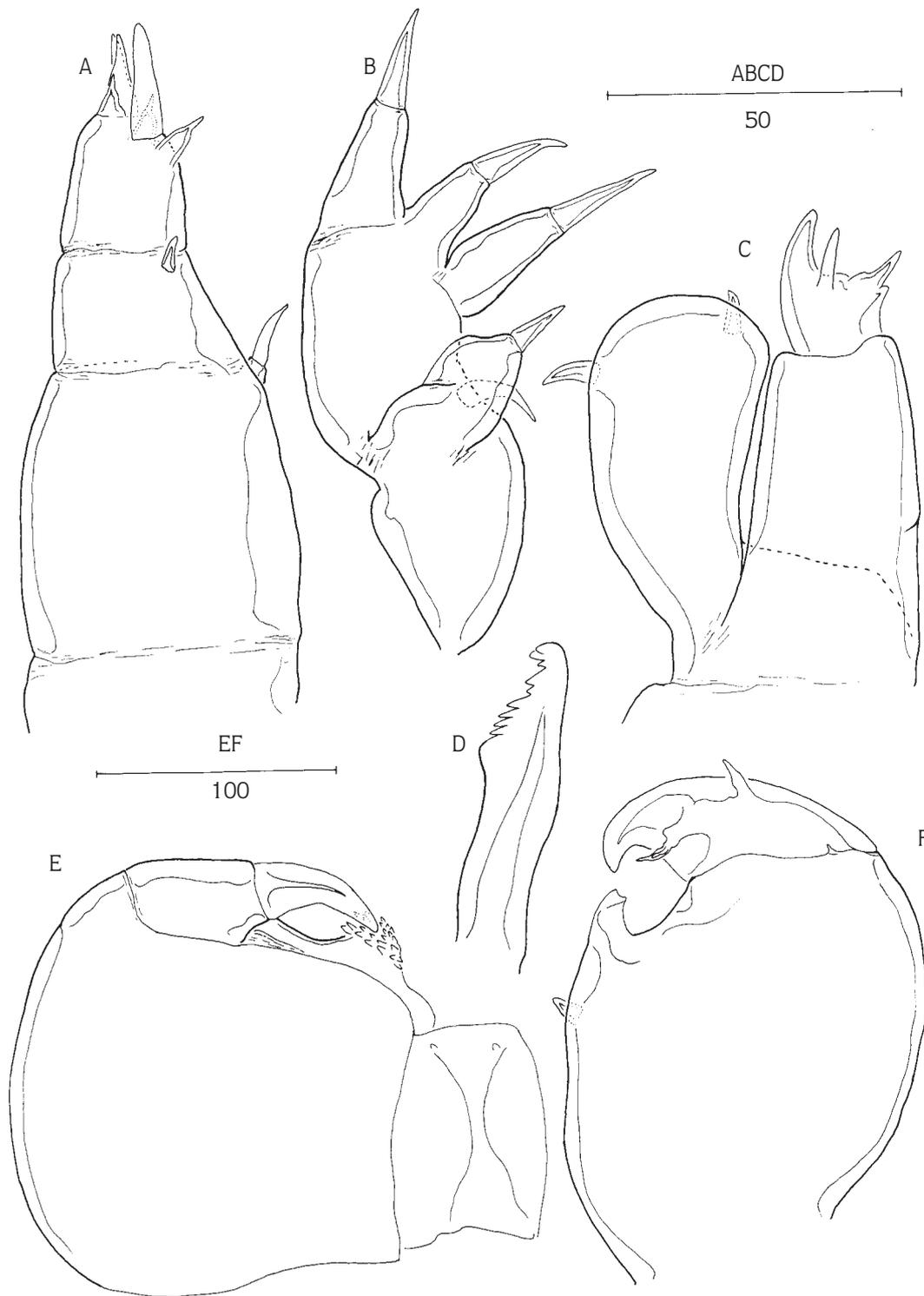


Figure 3. *Lernaeopoda galei* Krøyer, 1837, male. A first antenna, lateral; B first maxilla, lateral; C second antenna, ventral; D mandible, lateral; E second maxilla, ventral; F maxilliped, ventral; Scales in  $\mu\text{m}$ .

Siphonostomatoida are recorded for the first time by this study.

*L. galei* can be differentiated from other congeners in having tapering maxillary arms without conspicuous rounded lobes distally, (just where they attach to the anchor) and they lack coloration on the head shield (which is present even in preserved forms). In body proportions our materials resemble *L. bidiscalis* in having a trunk that is almost as long as it is wide (wider than long in *L. galei*). However, our specimens can be best identified as *L. galei* rather than *L. bidiscalis* (Kabata, 1979).

However, the following differences between Kabata's (1979) and our own drawings should be mentioned. In the female, seven elements were found in the distal segment of antennule, in contrast Kabata (1979) gives eight elements. The most important differences were found in the male. The differences that are used by

Kabata (1979) to separate males of *Lernaepoda* and *Albionella* should be used with caution as these differences overlap in our specimens. These characters are: 1) the proportion of cephalothorax 2) trunk with or without posterodorsal swelling and 3) distinct or indistinct separation between the cephalothorax and trunk. These three characters in our specimens of *L. galei* are similar to those of *Albionella* (Kabata, 1979).

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