

Two Copepods (Crustacea) Parasitic on the Blue Mussel, *Mytilus galloprovincialis*, from the Yongsan River Estuary in Korea

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Two species of the poecilostome copepod were recovered in the mantle cavity of the blue mussel, *Mytilus galloprovincialis* taken from the Yongsan River estuary, Korea. Both species, *Pseudomyicola spinosus* (Myicolidae) and *Modiolicola bifidus* (Sabelliphilidae), are new to the Korea fauna.

Introduction

In order to complete our knowledge of the parasitic copepod fauna of Korean blue mussel, a year-round survey of the copepod parasitic on the blue mussel was carried out. We examined more over three thousand mussels from the Yongsan River estuary, and recovered two species of the poecilostome families: *Pseudomyicola spinosus* in Myicolidae and *Modiolicola bifidus* in Sabelliphilidae. Both species new to the Korea fauna are described.

except in February and March. However, only two females of *Modiolicola bifidus* were collected on March and December, 1989. Body length was measured from anterior margin of prosome to posterior margin of abdomen. In the description of armature, Roman and Arabic numerals indicate spines and setae, respectively. All figures were drawn with the aid of a camera lucida. Body structures are described according to the terminology of Kabata (1979).

Materials and Methods

Sampling of the blue mussels was taken monthly one year between February, 1989 and February, 1990 at the lower part of intertidal zone in the Yongsan River estuary (34°47'N, 126°27'E). We examined the blue mussel with the shell length more than 2 cm for observations. All mussels were opened in a Petri dish, and the copepods were collected by washing the mantle cavity with filtered sea water. After collection, all copepod parasites were fixed and preserved in 5% formalin-seawater solution buffered with sodium tetraborate.

Numerous ovigerous females and males of *Pseudomyicola spinosus* were found throughout the year

Results and Discussion

Order Poecilostomatoida Thorell, 1859

Family Myicolidae Yamaguti, 1936

Pseudomyicola spinosus

(Raffaele and Monticelli, 1885)

Fig. 1.

Lichomolgus (Sabelliphilus) spinosus Raffaele and Monticelli, 1885, pp. 302~307, figs. 1~12.

Pseudomyicola ostreae, Yamaguti, 1936, pp. 113~127.

Pseudomyicola spinosus. Korringa and Lambert, 1951, pp. 18~19, 23; Humes, 1968, pp. 205~226, figs. 1~34; Ho, 1980, pp. 296~298, fig. 1; Do and Kajihara, 1986, pp. 23~24, figs. 9~10.

Description: Body length: female, 1.56~2.27mm (mean=1.88mm, $n=20$); male, 1.23~1.73mm (mean=1.45mm, $n=20$). Prosome well delimited from sixth segment, narrow posteriorly. Egg sac slightly larger than urosome, carrying 6~10 eggs in each sac (Fig. 1A). Urosome (Fig. 1B); length 1.65 and 1.99 times width in female and male, respectively. First antenna (Fig. 1C) 6-segmented, with the armature of I+5, 15, 9, 4+1 aesthete, 2+1 aesthete, and 7+1 aesthete. Second antenna (Fig. 1D) 3-segmented, with two rows of 10~20 spinules on the basal segment, third segment armed with one terminal claw and a variable number (4~6) of spinules or setae. Fifth leg (Fig. 1E) 2-segmented. Distal segment subcircular, with four naked setae, several rows of spinules along the ventral edge; dorsal seta on the first segment naked. Terminal segment of second maxilla (Fig. 1F) equipped with a short seta and a barbed lash. Mandible (Fig. 1G) armed with two long, barbed lash.

Remarks: This myicolid copepod was known to live in 39 species of Pelecypoda, and also known as cosmopolitan species (Humes, 1968; Ho, 1980). Raffaele and Monticelli (1885) described this species for the first time from *Mytilus galloprovincialis* from Italy. Ho (1980) proposed *Pseudomyicola ostreae* as a synonym of *P. spinosus*, based on the re-examination of the Japanese *Pseudomyicola*. Moreover, the discovery of the typical male of *P. spinosus* both in nature and in vitro experiments indicated that *P. levis* is conspecific with *P. spinosus* (Do and Kajihara, 1986). Thus, there is the sole species hitherto reported in the genus *Pseudomyicola*, namely *P. spinosus*. According to the formula of the armature of the first and second antennae and the fifth leg, our present species is clearly identified as *P. spinosus*.

Family Sabelliphilidae Gurney, 1927

Modiolicola bifidus Tanaka, 1961

Fig. 2.

Modiolicola bifidus Tanaka, 1961, pp. 266~269, pl. 32, figs. 6~11, pls. 33~35; Do and Kajihara, 1984, pp. 10~14, figs. 21~45; Do and Kajihara,

1986, pp. 15~17, fig. 6.

Description: Body length: female, 1.08~1.50mm ($n=2$). The body shape (Fig. 2A) relatively slender, cephalosome separated from the first leg-bearing segment. Leg-bearing segments gradually diminishing in size toward the posterior end, with the fifth segment being the smallest. Urosome (Fig. 2B); length 2.78~2.82 times width, with a row of spinules on the posteroventral margins of genital complex and each of 3 abdominal segments, with 6 setae on uropod. First antenna (Fig. 2C) 7-segmented, with the armature of 4, 13, 6, 3, 4+1 aesthete, 2+1 aesthete, and 7+1 aesthete. Second antenna (Fig. 2D) 4-segmented, with the armature of 1, 1, 3, 4+3 claws. Fifth leg (Fig. 2E) uniramous, with a seta on the basal segment, 2 distal spines and a row of spinules along the posterior margin in the free segment. Maxilliped (Fig. 2F) 3-segmented, with 2 spines on the second segment. Second maxilla (Fig. 2G) 2-segmented, with broad basal segment. Mandible (Fig. 2H) finely spinous on either side, inner margin setose only on the proximal one third of the lappet.

Remarks: The first description of *Modiolicola bifidus* was made by Tanaka (1961) from *Paphia*. There are four species of *Modiolicola* reported from blue mussel: *M. insignis*, *M. gracilis*, *M. gracilicaudus* and *M. bifidus* (Ho, 1980; Do and Kajihara, 1984). On the other hand, *M. bifidus* was found from four hosts: *Paphia* (Tanaka, 1961), *Tapes japonica* (Ko, 1969), *Mactra sulcataria* (Ko et al., 1962) and *Mytilus galloprovincialis* (Do and Kajihara, 1984). The Korean blue mussel, *Mytilus galloprovincialis* should be considered as an fortuitous host of this species because only two species were recovered from more over three thousand mussels examined.

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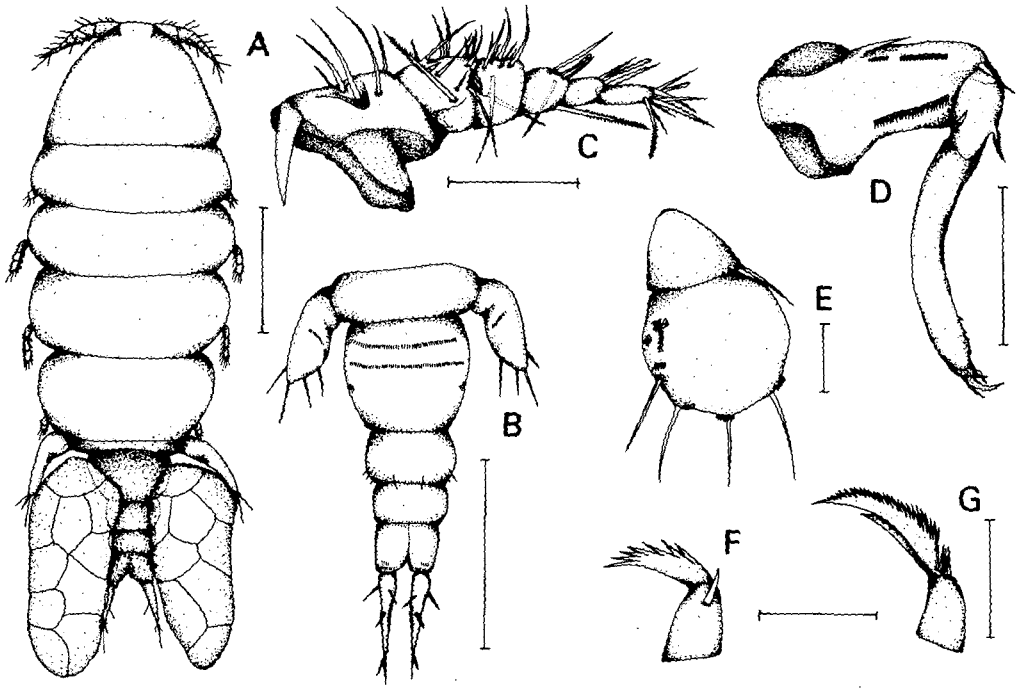


Fig. 1. *Pseudomyicola spinosus*. (A) Ovigerous female, dorsal. (B) Urosome, dorsal. (C) First antenna. (D) Second antenna. (E) Fifth leg. (F) Tip of second maxilla. (G) Mandible. Scales: 400 μm in A, B; 100 μm in C, D, E; 50 μm in F, G.

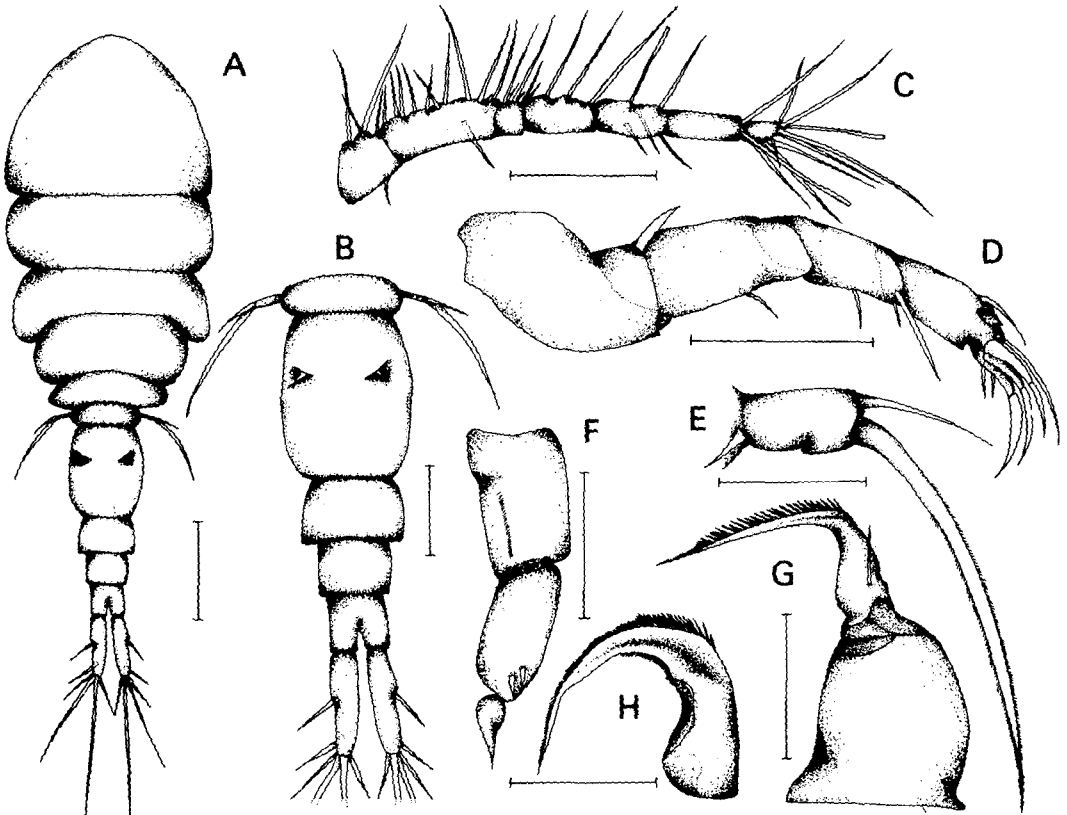


Fig. 2. *Modiolicola bifidus*. (A) Female, dorsal. (B) Urosome, dorsal. (C) First antenna. (D) Second antenna. (E) Fifth leg. (F) Maxilliped. (G) Second maxilla. (H) Mandible. Scales: 200 μm in A; 100 μm in B, C, D; 50 μm in E, F, G, H.