

**First Zoea of *Rhynchocinetes uritai*  
(Decapoda: Caridea: Rhynchocinetidae)**

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**ABSTRACT**

The first zoea of *R. uritai* is described in detail, based on laboratory-hatched material. The first zoea of *R. uritai* can be distinguished from that of *R. conspicuocellus* and *R. durbanensis* by the rostrum downwards, overreaching distal margin of the outer flagellum of the antenna, the endopod of the antenna with short seta as well as long plumose seta distally, and the scale of the antenna six-segmented. The shape of the telson can be a distinguishing character of the first zoea of *Rhynchocinetes* from that of *Cinetorhynchus*.

Key words: first zoea, *Rhynchocinetes uritai*, Rhynchocinetidae, Caridea

**INTRODUCTION**

The Rhynchocinetidae characterized by having the typically movable rostrum (Okuno, 1997a), are currently represented by two genera *Cinetorhynchus* and *Rhynchocinetes*. The shrimps of *Rhynchocinetes* are widely distributed through the Indo-Pacific (Okuno, 1997b); however, only one species *Rhynchocinetes uritai* Kubo, 1942 is known from Korean waters (Kim and Kim, 1997).

Larvae are known for *Cinetorhynchus* and *Rhynchocinetes* as belonging to nine species: five species of *C. erythrostickus* Okuno, 1997, *C. hendersoni* (Kemp, 1925), *C. reticulatus* Okuno, 1997, *C. rigens* (Gordon, 1936), and *C. striatus* (Nomura and Hayashi, 1992) (see Burkenroad,

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1939; Gurney and Lebour, 1941; Gurney, 1942; Maihara and Kyoya, 2001a, b; Maihara, 2002b); four species of *R. conspicioellus* Okuno and Takeda, 1992, *R. durbanensis* Gordon, 1936, *R. typus* H. Milne Edwards, 1837, and *R. uritai* (see Alborno and Wehrtmann, 1997; Matoba and Shokita, 1998; Maihara, 2002a, b). Several unidentified larvae of *Rhynchocinetes*, collected from the northern Red Sea, have been described by Williamson (1970). Maihara (2002a) reported the complete larval development of *R. uritai* from Japanese waters; however, his description was limited to a brief and inaccurate illustration.

This study, therefore, re-describes the first zoea of *R. uritai* in detail, compares its morphological characteristics with those of *R. conspicioellus* and *R. durbanensis*, and distinguishes the first zoea of *Rhynchocinetes* from that of *Cinetorhynchus*.

## MATERIALS AND METHODS

On October 2000, ovigerous females of *Rhynchocinetes uritai* were collected from Jeju-do Korea. Newly hatched zoea was preserved in 7% neutral Formalin for later examination. Drawings were made with the help of a camera lucida. Measurements and setal counts were based on five specimens. Carapace length (CL) was measured from the postorbital margin to the posteromedian margin of the carapace. The setal armature of appendages is described from proximal to distal segments.

## RESULTS

### First zoea (Fig. 1)

CL. 0.360 (0.328–0.368) mm.

Carapace (Fig. 1A, B). Rostrum downwards, overreaching distal margin of outer flagellum of antennule; anterior and posterior dorsomedian papillae present; pterygostomian spine present; supraorbital and antennal spines absent; anteroventral and posteroventral denticles absent; eyes sessile.

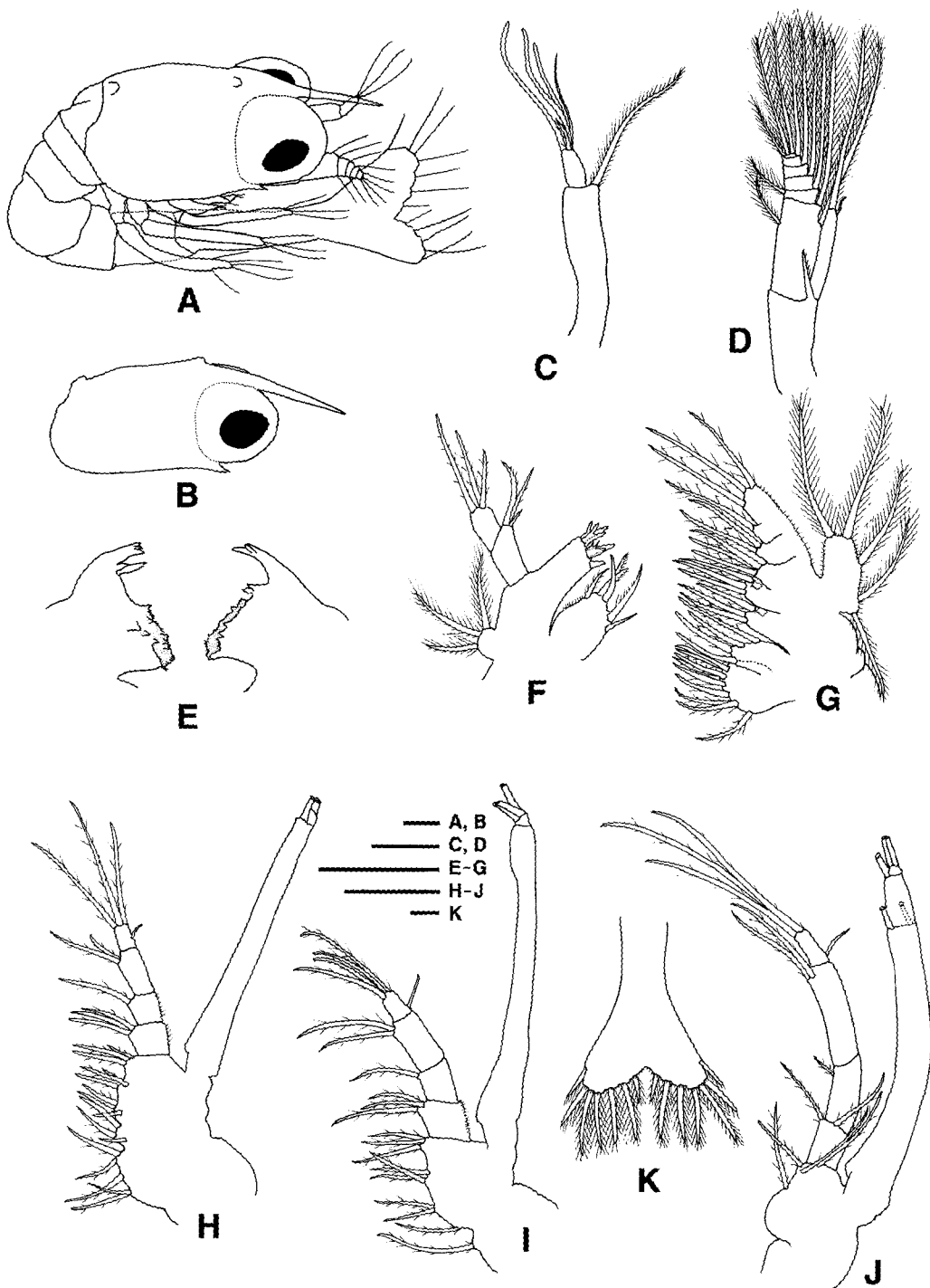
Antennule (Fig. 1C). Peduncle unsegmented; inner flagellum with long plumose seta; outer flagellum with 3 aesthetascs, short plumose seta, and long simple seta.

Antenna (Fig. 1D). Peduncle with denticulate spine on inner distal margin; endopod rod-like, reaching 0.64 of exopod (scale), with long plumose seta and short simple seta distally; scale 6-segmented, with 11 plumose setae and distolateral spine.

Mandibles (Fig. 1E). Incisor and molar processes well-developed, without palps; left mandible with lacinia mobilis between molar and incisor processes; right mandible with 2 teeth in that angle.

Maxillule (Fig. 1F). Coxal endite with 6 plumodenticulate setae; basal endite with 5 cuspidate setae; endopod 2-segmented: proximal segment with short simple seta and 2 long plumodenticulate setae; distal segment with 3 plumodenticulate setae; lobule present, with 3 plumose setae.

Maxilla (Fig. 1G). Coxal endite bilobed, with 9+4 plumodenticulate setae; basal endite bilobed, with 4+4 plumodenticulate setae; endopod with 9 setae arranged 3, 2, 1, 3 and fine hairs on outer



**Fig. 1.** First zoea of *Rhynchocinetes uritai*. A, habitus, lateral; B, carapace, lateral; C, antennule; D, antenna; E, mandibles; F, maxillule; G, maxilla; H, first maxilliped; I, second maxilliped; J, third maxilliped; K, telson and uropod, dorsal. Scale bars = 0.1 mm.

margin; scaphognathite with 5 plumose setae and fine hairs on margin.

First maxilliped (Fig. 1H). Coxa with 5 plumodenticulate setae; basis with 12 plumodenticulate setae, arranged 3, 3, 3, 3; endopod 4-segmented, with 3, 1, 2, 3+1 setae; first two segment with fine hairs on inner margin; exopod with 3 distal natatory setae.

Second maxilliped (Fig. 1I). Coxa with plumodenticulate seta; basis with 9 plumodenticulate setae, arranged 1, 2, 3, 3; endopod 4-segmented, with 3, 1, 2, 4+1 setae; first segment with fine hairs on inner margin; exopod with 3 distal natatory setae.

Third maxilliped (Fig. 1J). Coxa unarmed; basis with 4 plumodenticulate setae; endopod 4-segmented, with 2, 1, 2, 3+1 setae; exopod with 5 (2 subdistal, 3 distal) natatory setae.

Pereopods (Fig. 1A). Absent.

Abdomen (Fig. 1A). Composed of 5 somites, sixth somite not differentiated; all somites without spines; third somite slightly dorsal hump back in lateral view; pleopods absent.

Telson and uropod (Fig. 1K). Telson subtriangular, with deep median concavity; median concavity reaching base of outermost pair of posterior setae; posterior margin with 7+7 setae; bases of all setae except outermost with row of minute spinules; outermost 2 pairs plumose only on inner side; fifth seta as long as fourth seta. Uropod absent.

## DISCUSSION

Although our description of the first zoea of *R. uritai* somewhat coincides with that provided by Maihara (2002a), there are a number of differences between the descriptions. Differences in number of setal counts of the endopod of the maxillule, coxal endite of the maxilla, and the endopod of the first maxilliped may be due to intraspecific variation as this can be also seen in other caridean zoea of *Nauticarid magellanica* (A. Milne Edwards, 1891) (see Thatje and Bacardit, 2000). However, differences in the endopod of the maxilla, and the telson are questionable (Table 1). Maihara (2002a) described and illustrated the setation of the endopod of the maxilla in *R. uritai* as being variable through zoeal stages, as well as the outermost pair of posterior setae of the telson in the first zoea only being plumose on the inner side. In general, the setation of the endopod of the maxilla is usually consistent throughout caridean zoeal stages. Also the telson, in the case of planktotrophic first caridean zoea, has usually 7+7 posterior setae, of which outermost two pairs are plumose on the inner side. Thus, discrepancies for the endopod of the maxilla and the telson in descriptions likely resulted from his inaccurate observation.

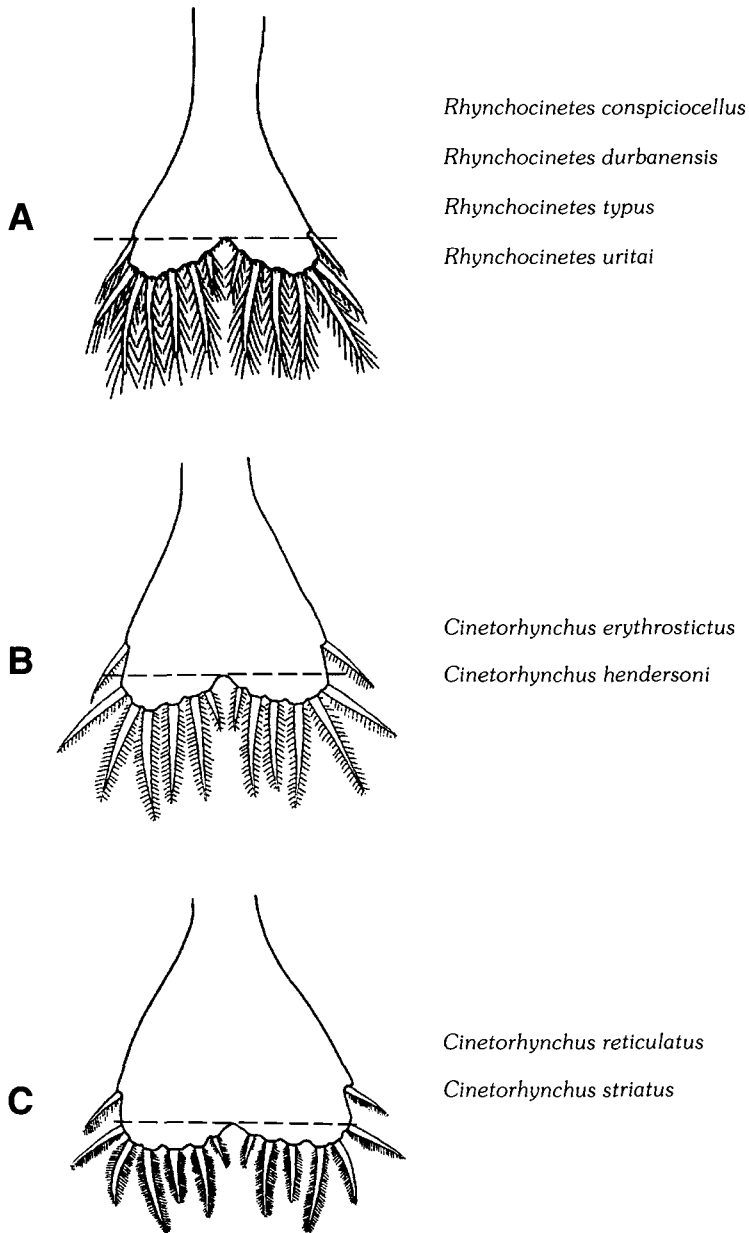
There are larval descriptions for two species of *Rhynchocinetes* from Japan: *R. conspiciocellus* (see Matoba and Shokita, 1998); and *R. durbanensis* (see Maihara, 2002b). The first zoea of *R. uritai* can be separated from that of *R. conspiciocellus* and *R. durbanensis* by the rostrum downwards, overreaching distal margin of the outer flagellum of the antenna, the endopod of the antenna with short seta as well as long plumose seta distally, and the scale of the antenna six-segmented. In the first zoea of *R. conspiciocellus* and *R. durbanensis*, the rostrum is straight, reaching distal margin of the outer flagellum of the antenna, the endopod of the antenna has long plumose seta only, and the scale of the antenna is five-segmented.

In his description on the rhynchocinetid larvae, Maihara (2002b) regarded it impossible to

**Table 1.** Descriptions between the first zoea of *R. uritai*. \* = data from figure; ? = data unknown.

	Maihara (2002a)	Present study
Rostrum	straight, reaching distal margin of peduncle of antenna in lateral view*	downwards, overreaching distal margin of outer flagellum of antenna in lateral view
Carapace		
pterygostomian spine	absent*	present
Antennule		
peduncle	1 distal seta*	unarmed
inner flagellum	3 aesthetascs	3 aesthetascs, 1 simple seta, 1 plumose seta
Antenna		
peduncle	1 inner naked distal spine*	1 inner denticulate distal spine
scale	11 plumose setae	11 plumose setae, 1 distolateral spine
Mandible		
lacinia mobilis	?	present
Maxillule		
basal endite	?	5 cuspidate setae
endopod	2, 3 setae	3, 3 setae
Maxilla		
coxal endite	6+2 setae*	9+4 setae
basal endite	2+4 setae*	4+4 setae
endopod	2+1, 1+2 setae	3, 2, 1, 3 (9) setae
First maxilliped		
coxa	?	5 setae
basis	?	3, 3, 3, 3 (12) setae
endopod	2, 1, 2, 3+1 setae*	3, 1, 2, 3+1 setae
Second maxilliped		
coxa	?	1 seta
basis	?	1, 2, 3, 3 (9) setae
endopod	3, 1, 2, 4+0 setae*	3, 1, 2, 4+1 setae
Third maxilliped		
coxa	?	unarmed
basis	2 setae	4 setae
endopod	1+1, 1+1, 1, 3+1 setae	2, 1, 2, 3+1 setae
Telson		
posterior setae	first pair plumose only on inner side	first two pairs plumose only on inner side
row of minute spinules	?	base of second to seventh pairs of plumose setae

distinguish the larvae of *Rhynchocinetes* from those of *Cinetorhynchus*. The shape of the telson of both genera, however, differs from each other and can be a distinguishing character of the first zoea of *Rhynchocinetes* from that of *Cinetorhynchus*. As shown in Fig. 2, in *Rhynchocinetes*, distal margin of the median concavity of the telson is deep and reaches the base of the outermost



**Fig. 2.** Telson in rhynchocinetid first zoea (B and C are modified from Maihara, 2002b and Maihara and Kyoya, 2001a, respectively).

pair of posterior setae. The degree of the median concavity of the telson in *Cinetorhynchus* is variable from species to species; however, the median concavity of the telson is shallow and never reaches the base of the outermost pair of posterior setae. More detailed descriptions of *Cinetorhynchus* larvae are required to establish other generic differences.

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### 끄덕새우 (갑각강: 생이하목: 끄덕새우과)의 제1조에아 유생

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#### 요 약

실험실에서 부화한 끄덕새우 (*Rhynchocinetes uritai*)의 제1조에아 유생을 상세히 기재하였다. 끄덕새우의 제1조에아 유생은 아래로 향한 이마뿔이 작은더듬이의 바깥채찍을 지나며 더듬이 안다리 끝에 긴 우상모와 짧은 강모가 있고 여섯마디로 된 더듬이비늘을 가져 동 속 *R. conspicicellus*와 *R. durbanensis*의 제1조에아 유생과 구별된다. 끄덕새우속과 *Cinetorhynchus*속의 제1조에아 유생은 꼬리마디의 모양으로 각각 구별할 수 있다.