

First Zoea of *Plagusia dentipes* (Crustacea: Decapoda: Brachyura: Grapsidae) Hatched in the Laboratory

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ABSTRACT

The first zoeal characters of plagusiine crab *Plagusia dentipes* De Haan, 1835, belonging to the family Grapsidae, is described and illustrated in detail based on laboratory-hatched material from an ovigerous female collected from Bomok, Seogwipo in the Jeju Island. Morphological comparison is made with previous description of *Plagusia dentipes* from Japan. The first zoea of *Plagusia dentipes* can be readily distinguished from those of two species of *Plagusia chabrus* and *Plagusia depressa* by having 2 aesthetascs and 3 simple setae on the antennule, and 8 setae on the coxal endite of the maxilla.

Key words: First zoea, *Plagusia dentipes*, Grapsidae, Korea

INTRODUCTION

A subtidal crab *Plagusia dentipes* De Haan, 1835, belonging to the subfamily Plagusiinae, is distributed in Korea, Japan, Soviet Union, and Taiwan (Kim, 1973).

The Plagusiinae is a small subfamily with only two genera (genera *Plagusia* and *Percnon*). In the Plagusiinae, there are limited zoeal descriptions; brief descriptions of the first zoeae of *Plagusia dentipes* (see Aikawa, 1937), *Plagusia chabrus* (see Wear, 1970) and *Percnon gibbesi* (see Lebour, 1944), the prezoa of *Plagusia depressa squamosa* (see Rajabai, 1961) and the first to fifth zoeae of *Plagusia depressa* (see Wilson and Gore, 1980).

The first zoea of *Plagusia dentipes* has been previously described by Aikawa (1937) from Japanese waters. However, his description is not accurate and inadequate for comparative morphological study.

In the present study, therefore, the first zoeal stage of *Plagusia dentipes* is described and illustrated in detail from laboratory-hatched material, and morphological comparison is made with previous descriptions for Japanese *Plagusia dentipes*. The first zoeal characters of *Plagusia dentipes* are compared with those of three species of *Plagusia chabrus*, *Plagusia depressa*, and *Percnon gibbesi*, the other known plagusiine species.

MATERIALS AND METHODS

On 19 October 1986, an ovigerous female of *Plagusia den-*

tipes was collected from the subtidal region in Bomok, Seogwipo, Jeju Island. The female was transported to the laboratory and was held in flowing seawater in an aquarium until hatching. Hatching was occurred on 26 October 1986. Newly hatched zoeae were preserved in 5% neutral formalin, and dissections were made under a dissecting microscope. To prevent desiccation of specimens, a mixed solution of glycerine and ethanol was used for all dissections. Dissected appendages were examined by using an Olympus BH-2 microscope. Drawings were made with the aid of a drawing tube at a magnification of 100X to 400X. Measurements and setal counts were based on ten specimens. All measurements were made by a micrometer. Rostrodorsal length (RDL) was measured from the tip of the dorsal spine to the tip of rostral spine and carapace length (CL) was measured from the anterior margin between eyes to the posterior margin of the carapace. The setal formula of the appendages is described from proximal segment to distal segment. The long natatory setae on the exopods and the exopods of the first and second maxillipeds are drawn truncated. Descriptions of chromatophores were based solely on live specimens.

RESULTS

Plagusia dentipes De Haan, 1835

First zoea (Fig. 1)

RDL, 1.85 (1.84-1.86) mm; CL, 0.59 (0.57-0.61) mm.

Carapace (Fig. 1A, B). Smooth and globose, a pair of small setae posterior to dorsal spine; dorsal spine long, slightly curved, longer than rostral spine; rostral spine slightly

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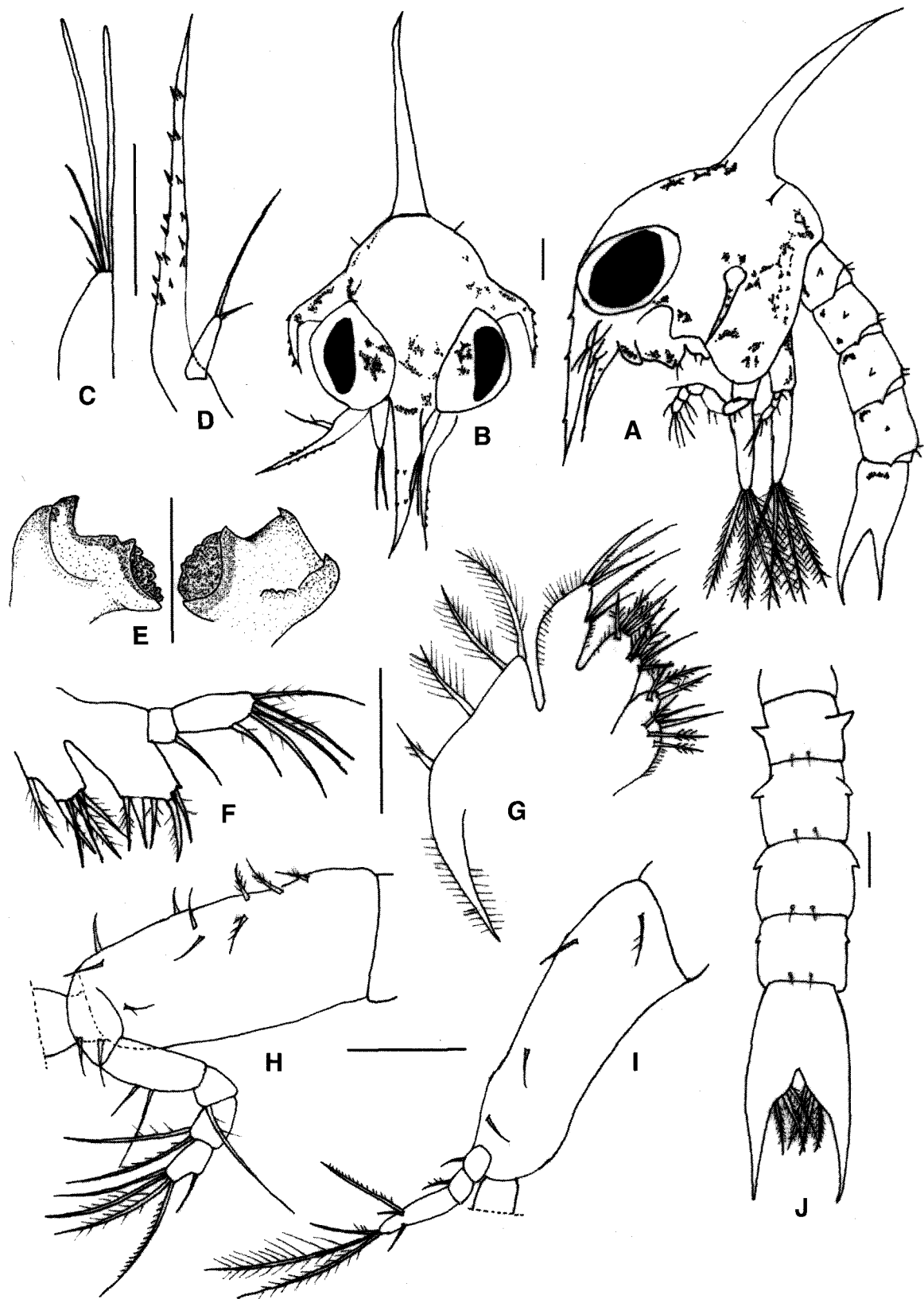


Fig. 1. First zoea of *Plagusia dentipes* De Haan, 1835. A, lateral view; B, frontal view; C, antennule; D, antenna; E, mandibles; F, maxillule; G, maxilla; H, first maxilliped; I, second maxilliped; J, abdomen and telson, dorsal view. Scale bars=0.1 mm (A-J).

longer than protopod of antenna, with several sharp teeth; lateral spine strongly curved downwards, with small, sharp

Table 1. Morphological differences between the description of the first zoea of *Plagusia dentipes* given by Aikawa (1937) and that obtained in the present study

	Aikawa (1937)	Present study
Antennule	No data	2 aesthetascs and 3 setae
Maxillule		
coxa	No data	6 setae
basis	No data	5 setae
endopod	1, 5 setae	1, 5 setae
Maxilla		
coxa	No data	Bilobed, with 5+3 setae
basis	No data	Bilobed, with 5+4 setae
endopod	5	5
scaphognathite	No data	4
First maxilliped		
coxa	No data	Unarmed
basis	No data	2, 2, 3, 3 setae
endopod	No data	2, 2, 1, 2, 5 setae
Second maxilliped		
coxa	No data	Unarmed
basis	No data	1, 1, 1, 1 setae
endopod	1, 1, 5 setae	1, 1, 6 setae
Abdomen		
posterodorsal setae	No data	Second to fifth somites
lateral processes	Second to fourth somites	Second to fifth somites

teeth dorsally; eyes unstalked.

Antennule (Fig. 1C). Uniramous; endopod absent; exopod with 2 aesthetascs and 3 simple setae.

Antenna (Fig. 1A, B, D). Protopod tapered, slightly shorter than rostral spine, with 2 rows of small spinules; exopod less than 1/5 length of protopod, with 2 (1 long, 1 short) terminal setae; endopod absent.

Mandibles (Fig. 1E). Asymmetrical; left mandible with small teeth between incisor and molar processes; right mandible unarmed in that site; palps absent.

Maxillule (Fig. 1F). Coxal endite with 6 plumodenticulate setae; basal endite with 5 (1 cuspidate and 4 plumodenticulate) setae; endopod 2-segmented, with 1 simple seta on proximal segment and 5 (1 subterminal, 4 terminal) plumodenticulate setae on distal segment.

Maxilla (Fig. 1G). Coxal endite bilobed, with 5+3 plumodenticulate setae; basal endite bilobed, with 5+4 plumodenticulate setae; endopod unsegmented, bilobed, with 2+3 plumodenticulate setae; scaphognathite with 4 plumose marginal setae and long setose posterior process.

First maxilliped (Fig. 1A, H). Coxa naked; basis with 10 ventral setae arranged 2, 2, 3, 3; endopod 5-segmented, with 2, 2, 1, 2, 5 (1 subterminal, 4 terminal) plumodenticulate setae; exopod with 4 terminal, natatory setae.

Second maxilliped (Fig. 1A, I). Coxa naked; basis with 4 ventral setae arranged 1, 1, 1, 1; endopod 3-segmented, with 1, 1, 6 (3 subterminal, 3 terminal) setae; exopod with 4 terminal, natatory setae.

Third maxilliped. Not developed.

Table 2. Comparison of the first zoeal characteristics of the subfamily Plagusiinae

Species	<i>Plagusia dentipes</i>	<i>Plagusia depressa</i>	<i>Plagusia chabrus</i>	<i>Percnon gibbesi</i>
References	Present study	Wilson and Gore, 1980	Wear, 1970	Lebour, 1944
R-D spines length (mm)	1.5	1.24	1.6	No data
Lateral spine	+	+	+	+
Antennal type	C	C	C	C
Telson type	B	B	A	B
Lateral process on abdominal somite	Second to fifth somites	Second to fifth somites	Second to fifth somites	Second to fourth somites
Antennule	2 aesthetascs, 3 setae	3 aesthetascs, 1 seta	3 aesthetascs, 1 seta	2 aesthetascs, 1 seta
Maxillule				
coxa	6 setae	6 setae	4 setae	No data
basis	5 setae	5 setae	5 setae	No data
endopod	1, 5 setae	1, 5 setae	1, 5 setae	No data
Maxilla				
coxa	8 setae	9 setae	10 setae	No data
basis	9 setae	9 setae	10 setae	No data
endopod	5 setae	5 setae	5 setae	No data
scaphognathite	4 setae	3 setae	4 setae	No data
First maxilliped endopod	2, 2, 1, 2, 5 setae	2, 2, 1, 2, 5 setae	2, 2, 1, 2, 5 setae	No data
Second maxilliped endopod	1, 1, 6 setae	1, 1, 6 setae	1, 1, 6 setae	No data

+ = presence, antennal and telson types are followed by those of Aikawa (1929).

Pereopods. Not developed.

Abdomen (Fig. 1A, J). Composed of five somites; second to fifth somites with pair of small setae postero-dorsally; second somite with pair of forwardly directed dorsolateral processes; third to fifth somites with pair of backwardly directed dorsolateral processes; pleopods not developed.

Telson (Fig. 1J). Bifurcated, with 3 pairs of serrate setae on posterior margin.

Chromatophores (Fig. 1A, B). Blackish brown chromatophores present on anterior base of dorsal carapace spine, lateral carapace spine, base of lateral carapace spine, base of rostral spine, posterior and ventral parts of carapace, between eyes, median ocular center, labrum, mandibles, maxilla, basis of first and second maxillipeds, and on second to fifth abdominal somites and telson.

DISCUSSION

Even though, Aikawa (1937) described the first zoea of *Plagusia dentipes*, he had no comment on the presence of a pair of setae base of dorsal spine on the carapace, a pair of posterodorsal setae on the second to fifth abdominal somites, and small teeth on the lateral and rostral spines. Moreover, some morphological characteristics in the present study, particularly on the setation of the endopod of the second maxilliped, and the presence of the lateral processes on the abdominal somites, differ from those of his description (Table 1).

A detailed comparison of first zoeae of three known *Plagusia* species including *Plagusia dentipes* and *Percnon gibbesi* is presented in Table 2. In the first zoeae of the genus *Plagusia*, some similarities could be found in *Plagusia dentipes*, *Plagusia chabrus* and *Plagusia depressa*. They are in the presence of lateral spine, the antennal type (C type), the lateral processes on the second to fifth abdominal somites, the setation on the basis (5 setae) and the endopod (1, 5 setae) of the maxillule, the number of setae on the endopod (5 setae) of the maxilla, the setation of the endopod of the first maxilliped (2, 2, 1, 2, 5), and the setation of the endopod of the second maxilliped (1, 1, 6). Table 2 shows that *Plagusia*

dentipes is closer to *Plagusia depressa* than *Plagusia chabrus* by having the telson of the type B, the number of setae on the coxa of the maxillule with 6 setae, the number of setae on the basis of the maxilla with 9 setae. However, the most useful criteria for distinguishing the first zoea of *Plagusia dentipes* from other *Plagusia* zoeae seems to be in the antennule with 2 aethetasc and 3 simple setae, the coxal endite of the maxilla with 8 setae, and the rostral and the lateral spines with small teeth.

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