

First Zoea of *Sesarmops intermedius* (De Haan, 1835) (Crustacea: Decapoda: Brachyura: Sesarmidae)

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Abstract

The first zoeal characters of *Sesarmops intermedius* (De Haan, 1835) [= *Sesarma* (*Sesarma*) *intermedium*], belonging to the family Sesarmidae, are described and illustrated in detail based on laboratory-hatched material from a female collected from Gangjeung, Seogwipo, Jeju Island. Morphological comparison is performed based on previous descriptions of *Sesarma* (*Sesarma*) *intermedium* from Japan and three other species in the Sesarmidae. The first zoea of *Sesarmops intermedius* can be readily distinguished from those of the three species *Chiromantes haematocheir* [= *Sesarma* (*Holometopus*) *haematocheir*], *Chiromantes dehaani* [= *Sesarma* (*Holometopus*) *dehaani*], and *Parasesarma pictum* [= *Sesarma* (*Parasesarma*) *pictum*] by the presence of two setae on the exopod of the antenna, fine setae on the inner and outer margin of the forked spine of the telson, and three aesthetascs and one simple seta on the antennule.

Key words: *Sesarmops intermedius*, Sesarmidae, First zoea, Decapoda larva

Introduction

The land crab *Sesarma* (*Sesarma*) *intermedium* (De Haan, 1835), belonging to the subfamily Sesarminae, is distributed in Korea, Japan, Taiwan, Hong Kong, the Mergui archipelago, and Surabaya (Kim, 1973). The zoeae of the genus *Sesarma* have been described from various areas, including the zoea of *Sesarma* (*Sesarma*) *intermedium* by Baba and Fukuda (1975) and Terada (1976), that of *Sesarma* (*Holometopus*) *haematocheir* by Fukuda and Baba (1976) and Terada (1974), that of *Sesarma* (*Holometopus*) *dehaani* by Baba and Miyata (1971) and Terada (1974), and that of *Sesarma* (*Parasesarma*) *pictum* by Aikawa (1937) and Terada (1974). The first zoea of *Sesarma* (*Sesarma*) *intermedium* from Japanese waters was described by Baba and Fukuda (1975); however, the description is inaccurate and inadequate for comparative morphological studies.

In this study, the first zoeal stage of *Sesarmops intermedius* [= *Sesarma* (*Sesarma*) *intermedium*] was described and illus-

trated in detail from laboratory-hatched material, and a morphological comparison based on the previous descriptions of Japanese *Sesarma* (*Sesarma*) *intermedium* was performed. In addition, the first zoeal characteristics of *Sesarmops intermedius* were compared with those of the three species *Chiromantes haematocheir* [= *Sesarma* (*Holometopus*) *haematocheir*], *Chiromantes dehaani* [= *Sesarma* (*Holometopus*) *dehaani*], and *Parasesarma pictum* [= *Sesarma* (*Parasesarma*) *pictum*] inhabiting Gangjeung, Seogwipo, Jeju Island.

Materials and Methods

On September 24, 2009, a pair of *Sesarmops intermedius* was collected in Gangjeung, Seogwipo, Jeju Island, transported to the laboratory, and held in an aquarium until hatching, which occurred on September 24, 2010. Newly hatched zoeae

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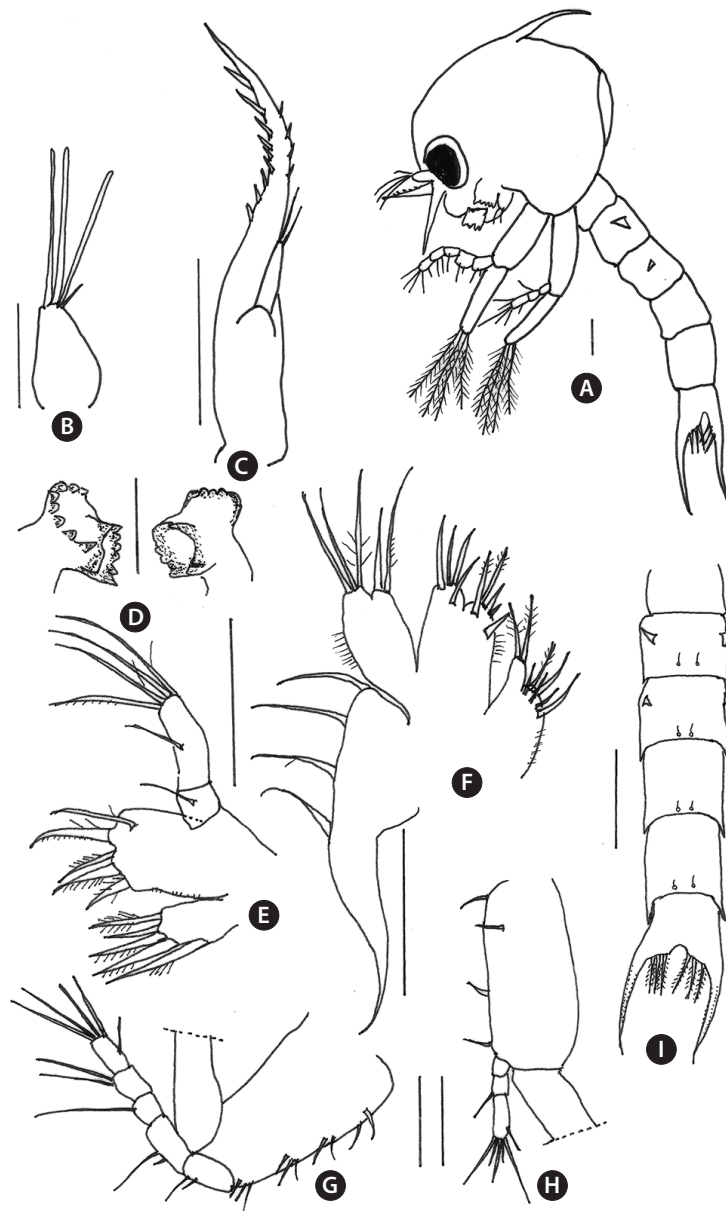


Fig. 1. First zoea of *Sesarmops intermedius* (De Haan, 1835). A, lateral view; B, antennule; C, antenna; D, mandibles; E, maxillule; F, maxilla; G, first maxilliped; H, second maxilliped; I, abdomen and telson, dorsal view. Scale bars = 0.1 mm.

were preserved in 5% neutral formalin, and dissections were performed under a dissecting microscope. To prevent desiccation of specimens, a mixed solution of glycerin and ethanol was used for all dissections. Drawings were performed using the aid of a drawing tube at 100–400× magnification. Rostro-dorsal length (RDL) was measured from the tip of the dorsal spine to the tip of the rostral spine, and carapace length (CL) was measured from the anterior margin between the eyes to the posterior margin of the carapace. The setal formula of the appendages is based on the proximal to the distal segments. The long plumose natatory setae on the exopods of the first and second maxillipeds are drawn truncated. Descriptions of

the chromatophores are based solely on live specimens.

Results

Sesarmops intermedius (De Haan, 1835)

First zoea (Fig. 1)

RDL, 0.79 (0.70–0.84) mm; CL, 0.53 (0.52–0.54) mm.

Carapace (Fig. 1A). With dorsal and rostral spines; lateral spine absent; dorsal spine slightly curved, as long as the rostral spine; rostral spine slightly longer than the protopod of the

antenna; eyes unstalked.

Antennule (Fig. 1B). Uniramous, with three aesthetascs and one simple seta.

Antenna (Fig. 1C). Protopod tapered, slightly shorter than rostral spine, with two rows of small spinules; exopod with two terminal setae.

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

Maxillule (Fig. 1E). Coxal endite with five setae; basal endite with five setae; endopod two-segmented, with one seta on proximal segment and five (one subterminal, four terminal) setae on the distal segment.

Maxilla (Fig. 1F). Coxal endite bilobed, with 2+6 setae; basal endite bilobed with 5+4 setae; endopod bilobed with 2+3 setae; scaphognathite with four marginal setae and one long posterior process.

First maxilliped (Fig. 1A, 1G). Basis with 10 setae arranged 2,2,3,3; endopod five-segmented, with 2,2,1,2,5 (one subterminal, four terminal) setae; exopod with four terminal natatory setae.

Second maxilliped (Fig. 1A, 1H). Basis with four setae arranged 1,1,1,1; endopod three-segmented, with 0,1,6 (one subterminal, five terminal) setae; exopod with four plumose natatory setae.

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

Telson (Fig. 1I). Bifurcated, with three pairs of serrate setae on posterior margin, with fine spinules on inner and outer margin of fork.

Chromatophores. Blackish brown chromatophores present on overall surface of carapace, dorsal carapace spine, base of antennule, antenna, dorsal spine and rostral spine, optic and median ocular center, labrum, mandible, maxilla, basis of first

and second maxillipeds, and on second to fifth abdominal somites and telson.

Discussion

Baba and Fukuda (1975) described the first zoea of *Sesarmops intermedius* [= *Sesarma* (*Sesarma*) *intermedium*]. In the present study, some morphological characteristics were found to differ from their description, in particular the number of aesthetascs and seta of the antennule, the number of setae in the exopod of the antenna and the coxa of the maxilla, and the setation of the basis of the first and second maxillipeds. Moreover, they did not describe a pair of posterodorsal setae on the second to fifth abdominal somites. In addition, Terada (1976) described the first zoea of *Sesarma* (*Sesarma*) *intermedium*. Compared with the specimen described here, there are differences in the number of aesthetascs and seta of the antennule and in the number of setae in the coxa of the maxilla (Table 1).

A detailed comparison of the first zoeae of four sesarminid crabs—*Sesarmops intermedius*, *Sesarma* (*Holometopus*) *haematocheir*, *Sesarma* (*Holometopus*) *dehaani*, and *Sesarma* (*Parasesarma*) *pictum*—is presented in Table 2. The following similarities were found in the first zoeae of the four sesarminid crabs: the absence of lateral spines; the lateral processes on the second to third abdominal somites; the setation of the coxa (five setae), basis (five setae), and endopod (one, five setae) of the maxillule; the number of setae on the coxa (eight setae), basis (nine setae), endopod (five setae), and scaphognathite (four 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 (0,1,6). The most useful criteria for distinguishing the first zoea of *Sesarmops intermedius* from the first zoeae of the other three sesarminid crabs are the exopod of the antenna with two setae and the antennule with three aesthetascs and one simple seta.

Table 1. Morphological differences between the description of the first zoea of *Sesarmops intermedius* given by Baba & Fukuda (1975), Terada (1976) and that obtained in the present study

	Baba and Fukuda (1975)	Terada (1976)	The present study
Antennule	4 aesthetascs	2 aesthetascs and 3 seta	3 aesthetascs and 1 seta
Antenna			
exopod	1 seta	2 setae	2 setae
Maxilla			
coxa	Not bilobed, with 5 setae	Bilobed, with 5+3 setae	Bilobed, with 6+2 setae
First maxilliped			
basis	1,2 setae	2,2,3,3 setae	2,2,3,3 setae
Second maxilliped			
basis	1,1 setae	1,1,1,1 setae	1,1,1,1 setae
Abdomen			
Somites 2-5	No data	Posterodorsal setae	Posterodorsal setae

Table 2. Comparison of the first zoeal characteristics of four species in the Sesarmidae

Species	<i>Sesarmops intermedius</i>	<i>Sesarma (Holometopus) haematocheir</i>	<i>Sesarma (Holometopus) dehaani</i>	<i>Sesarma pictum</i>
References	The present study	Fukuda and Baba, 1976 Terada, 1974	Baba and Miyata, 1971 Terada, 1974	Aikawa, 1937 Terada, 1974
RDL (mm)	0.79	0.69	0.85	0.63
Lateral spine	—	—	—	—
Antennule	3 aesthetascs 1 seta	3 aesthetascs 2 setae	3 aesthetascs 1 or 2 setae	3 aesthetascs 2 setae
Antenna				
exopod	2 setae	2 setae	1 seta	1 seta
Maxillule				
coxa	5 setae	5 setae	5 setae	5 setae
basis	5 setae	5 setae	5 setae	5 setae
endopod	1,5 setae	1,5 setae	1,5 setae	1,5 setae
Maxilla				
coxa	8 setae	8 setae	6 or 8 setae	8 setae
basis	9 setae	9 setae	9 setae	9 setae
endopod	5 setae	5 setae	5 setae	5 setae
scaphognathite	4 setae	4 setae	4 setae	4 setae
First maxilliped				
endopod	2,2,1,2,5 setae	2,2,1,2,5 setae	2,2,1,2,5 setae	2,2,1,2,5 setae
Second maxilliped				
endopod	0,1,6 setae	0,1,6 setae	0,1,6 setae	0,1,6 setae
Lateral process on abdominal somite	Second to third somites	Second to third somites	Second to third somites	Second to third somites
Fine setae on fork	+	+	+	—

+ = presence, — = absent

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