

LARVAE OF THE XANTHID CRAB (CRUSTACEA, BRACHYURA) FOUND IN THE SOUTHERN OCEAN

Kensaku MURAOKA

Kanagawa Prefectural Museum, 5-60, Minami-nakadori, Naka-ku, Yokohama 231

Abstract: The survey of the brachyuran larvae occurring in the surface plankton was made during the KH-83-4 cruise (BIOMASS SIBEX I) of the R. V. HAKUHO MARU of the Ocean Research Institute, University of Tokyo, in the Southern Ocean south of Australia from 22 November 1983 to 24 February 1984.

The larvae were taken only at Stn. 1 in the Southern Ocean, and not obtained in other areas. The samples were classified into two larval stages, zoea and megalopa. It seems likely that the specimens of two kinds are composed of the fourth stage zoea and megalopa of the family Xanthidae and of the same species. These larvae are described and illustrated.

1. Introduction

The survey of brachyuran larvae occurring in the surface plankton was performed at 11 stations in the Southern Ocean south of Australia during the period from December, 1983 to February 1984. The larvae consisting of two stages, zoea and megalopa were obtained only at Stn. 1 in the Southern Ocean. The specimens were identified with a species of the family Xanthidae.

According to GRIFFIN and YALDWYN (1968), who made an attempt to review the crabs recorded from Australia, 47 genera and 166 species of the family Xanthidae have been recorded from Australian waters including the crabs of the southern continental shelf area. However, the larvae of a large number of species within the Xanthidae have not yet been reported, and furthermore, the studies of the larvae occurring in the Southern Ocean south of Australia are not yet done. The present specimens are, therefore, of a considerable interest.

The present paper deals with the description and illustration of the morphological features of zoeal and megalopa stages belonging to the xanthid species.

2. Materials and Methods

The survey was made during the KH-83-4 cruise of the R. V. HAKUHO MARU of the Ocean Research Institute, University of Tokyo, for a period from 22 November 1983 to 24 February 1984.

The samples for the examination were collected with an ORI 100 net (160cm in mouth diameter, 1mm in mesh size) from a total of 11 stations. The net was towed horizontally along the sea surface at a speed of 2kn for 10 to 30min at each station. The brachyuran larvae were taken on 14 December 1983, at Stn. 1 (44°59.7'S, 150°04.7'

E). They were composed of 5 zoeae and 15 megalopae, and were fixed in formalin seawater of about 5%. The larvae were dissected in 50% ethylene glycol for study of appendages.

3. Description

The major characteristics of each larval stage are as follows.

3.1. *Xanthid* zoea (Fig. 1A–K)

Dimension: Tip of dorsal to tip of rostral spines: about 5.8mm. Proximal to distal portions of lateral spine: about 0.3mm.

The cephalothorax has a dorsal spine, a short rostral spine and a pair of lateral spines. The ventro-lateral border of the carapace bears several small serrated spines. The eyes are distinctly stalked (Fig. 1A).

The antennule consists of a short flagellum and a small endopod (Fig. 1B).

The antenna has a long tapering protopod (spinous process), of which the distal end bears a few minute spines. The endopod is approximately three-fifths the length of the spinous process. The exopod is slightly shorter than the endopod and bearing two fine spinules on the middle portion (Fig. 1C). The type of antenna is B3 (AIKAWA, 1933).

The mandible has an unsegmented palp (Fig. 1D).

The maxillule consists of the coxal and basal endites and endopod. The bisegmented endopod bears one seta on the first segment and four terminal plus two sub-terminal setae on the distal segment (Fig. 1E).

The maxilla consists of the coxal and basal endites, endopod and scaphognathite. The unsegmented endopod bears three setae subterminally and five setae terminally. The scaphognathite bears about 35 soft plumose hairs along the external margin (Fig. 1F).

The first maxilliped consists of the endopod and exopod. The setation of the five-segmented endopod is 3, 2, 1, 2, 6 from the proximal to terminal segments. The exopod bears 9 long natatory hairs on its apex (Fig. 1G).

The second maxilliped consists of the endopod and exopod. The setation of the three-segmented endopod is 1, 1, 6 and the exopod bears 11 long natatory hairs (Fig. 1H).

The other thoracic appendages are present below the ventral margin of the carapace.

The third maxilliped is present as a bud, which is biramous (Fig. 1I, J).

The cheliped (thoracic limb) has an incomplete chela (Fig. 1J). The first to fourth ambulatory legs (thoracic limbs) are all rudimentary (Fig. 1J).

The abdomen is composed of six segments and a telson. The second to fourth segments bear a pair of knob-like projection on their lateral surface. The lateral margin of the third to fifth segments has long spines, extending backward. The telson is bifurcated. The outer lateral margin and the ventral margin of the furca are furnished with a pair of minute spines at the base, respectively. The posterior margin of the telson bears four pairs of spines, of which the innermost pair is very minute (Fig. 1K). The telson is A-type according to AIKAWA (1929).

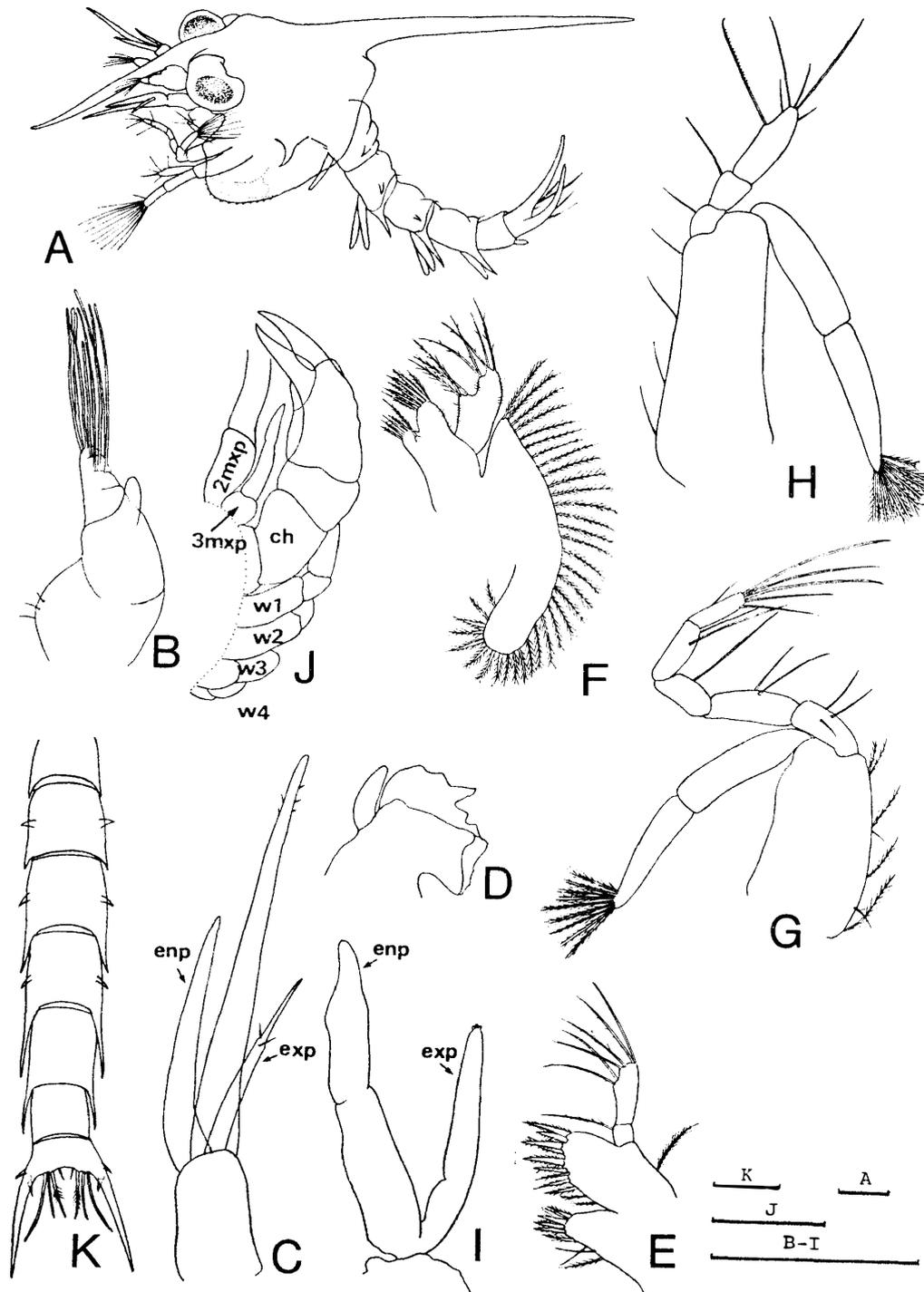


Fig. 1. Xanthid zoea, fourth zoeal stage (A-K).

A: zoea, lateral view, B: antennule, C: antenna, D: mandible, E: maxillule, F: maxilla, G: first maxilliped, H: second maxilliped (natatory hairs of figs. G and H are shortened), I: third maxilliped, J: maxillipeds and thoracic limbs, dorsal view, K: abdomen, dorsal view. 2mxp: second maxilliped, 3mxp: third maxilliped, ch: cheliped, w1-w4: first to fourth ambulatory legs, enp: endopod, exp: exopod. Bar scales represent 0.5 mm.

3.2. *Xanthid megalopa* (Fig. 2A–B, Fig. 3A–M)

Dimension: Carapace length; about 2.9 mm.

Carapace width; about 2.1 mm.

The carapace has no long dorsal spine, but bears a pair of stout spinules projecting horizontally forwards on the protogastric region. The dorsal surface is sparsely covered with fine hairs. The front protrudes directly forwards; the median portion is slightly concave and the lateral portion has a spiniform tooth projecting anteriorly (Fig. 2A).

The antennule is composed of a peduncle and two flagella. The unsegmented flagellum bears four terminal and three subterminal setae. The segmented flagellum is divided into four segments, of which the second to fourth segments are provided with long sensory hairs (Fig. 3A).

The antenna is composed of 11 segments, of which sixth and eighth ones bear conspicuous 2 or 3 long sensory setae (Fig. 3B).

The mandible bears a three-segmented palp with 15 setae on the terminal segment (Fig. 3C).

The maxillule consists of the coxal and basal endites and endopod. The endopod is divided into two segments (Fig. 3D).

The maxilla consists of the coxal and basal endites, endopod and scaphognathite. The basal and coxal endites are divided into two lobes, respectively. Each lobe bears numerous setae on the lateral and distal margins. The unsegmented endopod bears 7 hairs along the lateral margin. The scaphognathite is fringed with numerous plumose hairs (Fig. 3E).

In the first maxilliped, the coxal and basal endites bear numerous setae. The unsegmented endopod bears 2 subterminal and 5 terminal setae. The exopod is divided into two pieces, of which the terminal one bears 5 plumose hairs on the distal end (Fig. 3F).

In the second maxilliped, the endopod bears marginal setae on the penultimate and ultimate segments. The exopod is divided into two portions, of which the proximal one bears 4 short setae along the outer margin and the distal one has 5 plumose hairs on its apex (Fig. 3G).

The third maxilliped has an endopod composed of five segments, all of which are furnished with numerous rigid spines (Fig. 3H). The exopod is divided into two pieces,

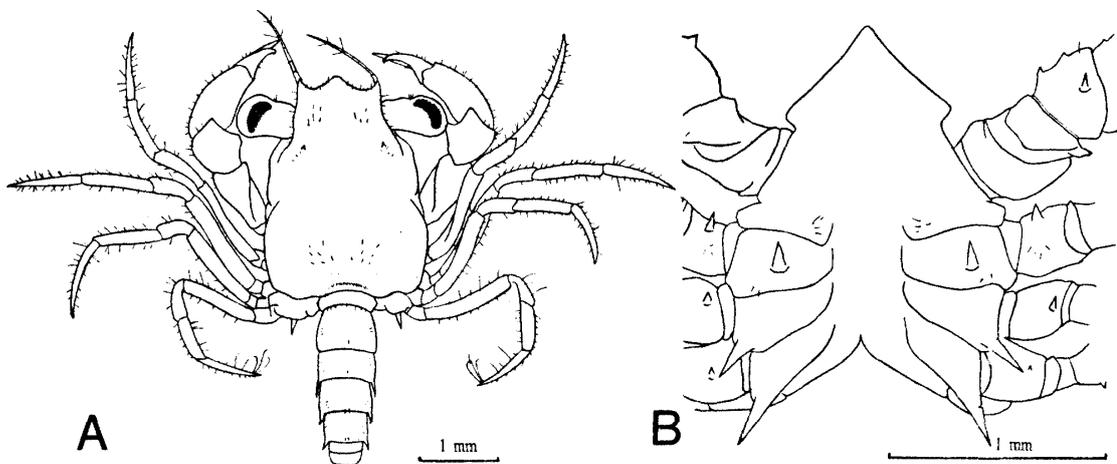


Fig. 2. *Xanthid megalopa*. A: dorsal view, B: thoracic sternum.

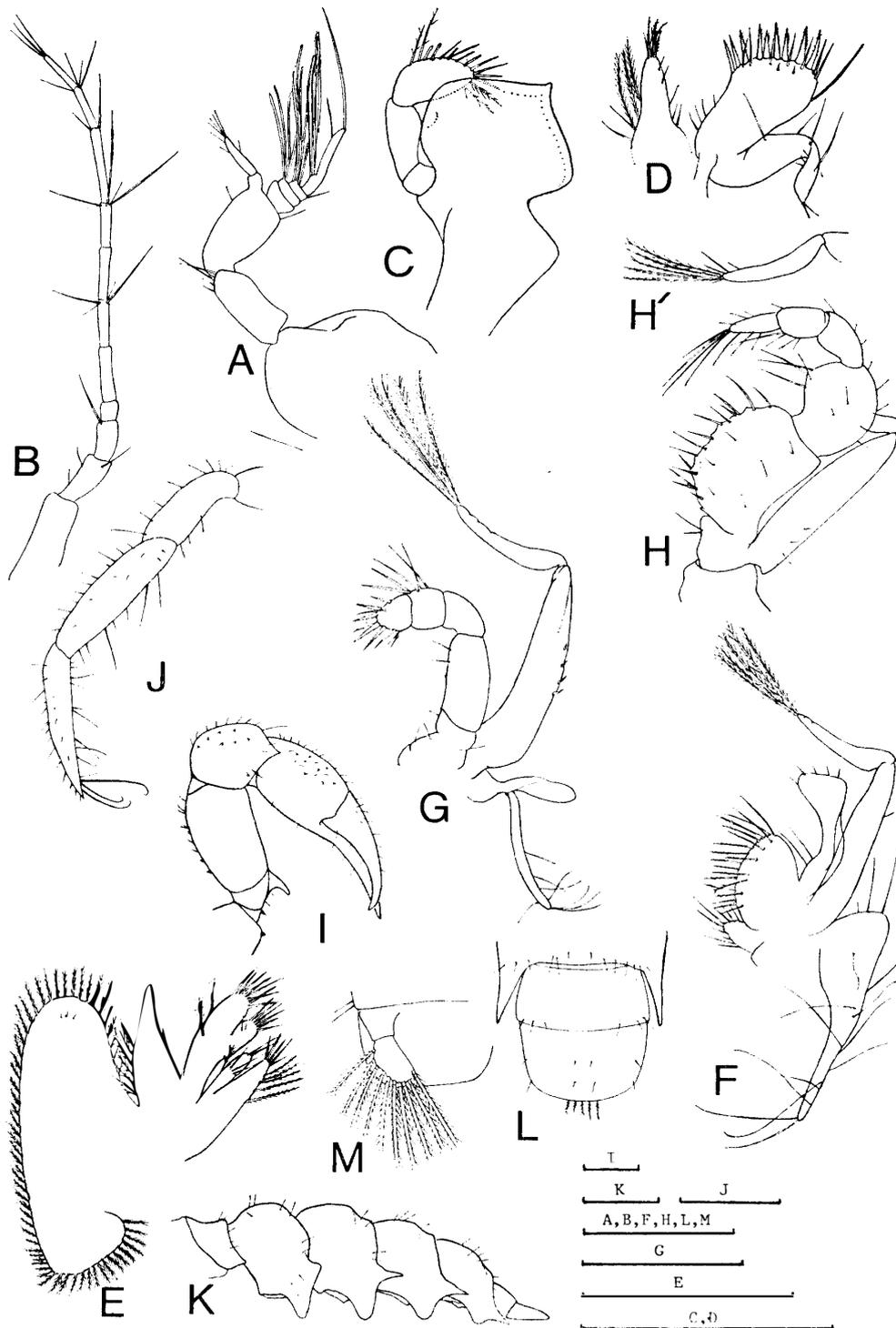


Fig. 3. *Xanthid megalopa* (A-M).

A: antennule, B: antenna, C: mandible, D: maxillule, E: maxilla, F: first maxilliped, G: second maxilliped, H: third maxilliped, H': distal portion of exopod, I: cheliped, J: fourth ambulatory leg, K: abdomen, lateral view, L: sixth abdominal segment and telson, M: uropod (natatory hairs are shortened). Bar scales represent 0.5mm.

the distal one of which has 5 long plumose hairs on its apex (Fig. 3H').

The thoracic sternum is divided into five portions, of which the second one is armed with a pair of spines projecting forwards and the third and fourth ones have the spines projecting obliquely backwards near the proximal portion of walking legs, respectively (Fig. 2B).

Chelipeds are nearly equal; the ischium is provided with a prominent hooklet on the lateral border; the outer surfaces of the carpus and propodus are fairly covered with spinules and fine setae (Fig. 3I).

Ambulatory legs are functional. The first and second legs are nearly equal in length. The third leg is slightly smaller than the first two. In the anterior three pairs each of the coxa and ischium carries a stout spine on the ventral surface. The dactylus is not armed with the denticulated teeth on the inner margin. The last leg is slightly smaller than the preceding ones. The dactylus has 3 long feelers at the distal end (Fig. 3J).

The abdomen is composed of six segments and a telson. The second to fifth segments are provided with a pair of biramous pleopods. The endopod bears 5 small hooked setae on the inner margin. The number of setae on the exopod of the pleopods 2 to 5 is 24–26, 23–25, 23–24, 20–22, respectively. The sixth segment is provided with a pair of uropods, which is divided into two segments. Its proximal segment bears no hairs, but the distal one bears 9–10 long natatory hairs along the lateral margin (Fig. 3K, L, M).

4. Remarks

As to classification of larvae of the family Xanthidae, RICE (1980) noted that the zoea is characterized by several features: 1. spines on carapace, 2. form of antenna, 3. setation of endopod on the maxillae and maxillipeds, 4. numbers of lateral knobs and spines on abdomen, and so forth.

The zoea obtained from the surface plankton material conforms fairly to RICE's definition in the following characteristics: carapace armed with three kinds of spines, antenna bearing a well-developed spinous process, setation of endopod on the maxillule and maxilla and abdomen bearing three pairs of lateral knobs. Furthermore, this zoea is closely similar to that of the family Xanthidae described by GURNEY (1938), COSTLOW and BOOKHOUT (1968), SUZUKI (1978), MURAOKA (1981), and others. In the number of natatory setae on the exopods of maxillipeds, this zoea is in agreement with the fourth stage zoeae of *Paramedaeus noelensis* (WARD) and *Cycloxanthops truncatus* (DE HAAN) reported by SUZUKI (1979).

The present megalopa has many of the larval features which have previously been described for other xanthid crabs (COSTLOW and BOOKHOUT, 1968), that is, the front of carapace bearing a pair of spiniform teeth on the lateral portion, the cheliped with a conspicuous hook on the ischium, and the dactylus of the fourth ambulatory leg bearing a few long feelers. These features may be useful for the identification of the xanthid megalopa as LEBOUR (1928) pointed out.

The specimens of two kinds seem likely to be a fourth stage zoea and megalopa of the family Xanthidae and specimens of both larval stages may belong to the same species.

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