Zoeal Morphology of the Sesarmine Crab, *Helice leachi* (HESS) (Crustacea : Decapoda : Brachyura)

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Reprinted from the Memoirs of the Faculty of Education, Kumamoto University
No. 33, Natural Science, October 30, 1984

Mem. Fac. Educ. Kumamoto. Univ.,
Nat. Sci., No.33, 5–10, 1984

Zoeal Morphology of the Sesarmine Crab, *Helice leachi* (HESS) (Crustacea : Decapoda : Brachyura)

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(Received 23 May 1984)

The first and second zoeas of *Helice leachi* from the Ryukyus are described and illustrated. The absence of carapacial lateral spines in *H. leachi* provoked a discussion on Rice's (1980) grouping of the Grapsidae. Relationships between *Helice* and allied genera are discussed.

Introduction

Helice leachi (HESS) is a medium-sized sesarmine crab inhabiting mud fringes of the tropical or subtropical mangrove swamps, grassy upper tidal zones near estuary or inland sea; this species is known to occur in Japan from Izu Oshima, Yoron Island southward to Iriomote-jima of the Ryukyus, the Bonin Islands, Formosa, the Carolines, the Moluccas, Lombok, New Caledonia, Sydney, Madagascar and east coast of Africa (SAKAI, 1976). In spite of a rather wide distribution in the Indo-West Pacific, there is no information on the larval morphology or larval development of *H. leachi*. Only available are papers for other species. WEAR (1970) described the first zoea of New Zealand *H. crassa*. BABA and MORIYAMA (1972) provided a full description of the complete larval development of Japanese *Helice tridens tridens* and *H. tridens wuana* (the latter now called *H. japonica* SAKAI, according to SAKAI (1980)).

Helice leachi is ovigerous in late March through late June in Yuhi River estuary on the south coast of Okinawa-jima, the Ryukyu Islands. In 1980, Mr. Kazutaka UYENOHARA, then a student of Y. Nakasone of the University of the Ryukyus, engaged in a study of the biology of *H. leachi* there, and attempted to rear the zoeal larvae. His rearing was not successful, only obtaining first three stage zoeas. Through his courtesy the first and second zoeas have been made available to K. Baba for study.

The zoea of *H. leachi* shows a few unusual characteristics, notably the absence of a carapacial lateral spine being what is supposed to be present in *Helice* and absent in *Sesarma* (BABA and MORIYAMA, 1972; BABA and FUKUDA, 1972). And therefore, this brief note of the larval morphology will add much to our understanding of the relationships among genera of the Grapsidae recently reviewed by RICE (1980).

Description of Zoeal Stages

FIRST ZOEA

Size. — Tip of rostral spine to tip of dorsal spine, 0.92 mm.
Carapace. — Smooth, inflated, anterolateral margin minutely dentate. Rostral spine rela-

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tively short, nearly as long as dorsal spine, about half as long as carapace without spines. Eyes sessile.

Abdomen. — Five somites; second somite with anteriorly directed dorsolateral spines, third somite with posteriorly directed ones, posterolateral margins of fourth and fifth somites produced moderately.

Telson. — Fork moderately widening, furcae relatively short, only slightly longer than basal portion of telson, bearing minute hairs on inner and outer margins, no lateral spines, posterior margin with 6 (3+3) plumose setae.

Mandible. — Typical as in *H. tridens* (BABA and MORIYAMA, 1972).

Antennule. — Conical, somewhat inflated rod with 3 long aesthetascs and 1 short seta.

Antenna. — Spinous process well developed, twice as long as protopod, bearing two rows of denticles; exopod with short median seta, rod-like, tapering, slightly shorter than spinous process.

Maxillule. — Endopod typical of Grapsidae (RICE, 1980); basal endite with 2+3 hairy spines, coxal endite with 4 hairy spines; no plumose setae on basal segment.

Maxilla. — Endopod with 2+2 setae; basal endite with 3+4 hairy setae, coxal endite with 5 hairy setae; scaphognathite with 4 plumose setae on distal margin, apical process tapering, fringed with fine setae in distal half.

First maxilliped. — Basis with 10 medial setae; segments of endopod with 2, 2, 1, 2 and 5 setae respectively; 4 natatory setae on exopod.

Second maxilliped. — Basis with 4 medial setae, segments of endopod with 0, 1, and 6 setae respectively; 4 natatory setae on exopod.

SECOND ZOEA

Size. — Tip of rostral spine to tip of dorsal spine, 11.1 mm.

Carapace. — Only increasing in size; eyes movable.

Abdomen and telson. — As in first zoea.

Antennule. — Basal segment more inflated; 4 aesthetascs.

Antenna. — Spinous process and exopod relatively longer, more than twice as long as remaining basal segment.

Maxillule. — Endopod as in first zoea; basal segment with 1 plumose seta; 3+4 hairy spines on basal endite, 5 on coxal endite.

Maxilla. — Endopod as in first zoea; basal endite bilobed, distal lobe with 3 setae, proximal lobe with 5+1 setae, coxal endite with 6 setae; scaphognathite with 5 plumose setae on distal margin, apical process flattened, distally rounded with 3 plumose setae.

First and second maxillipeds. — Natatory setae increased to 6; other portions as in first zoea.

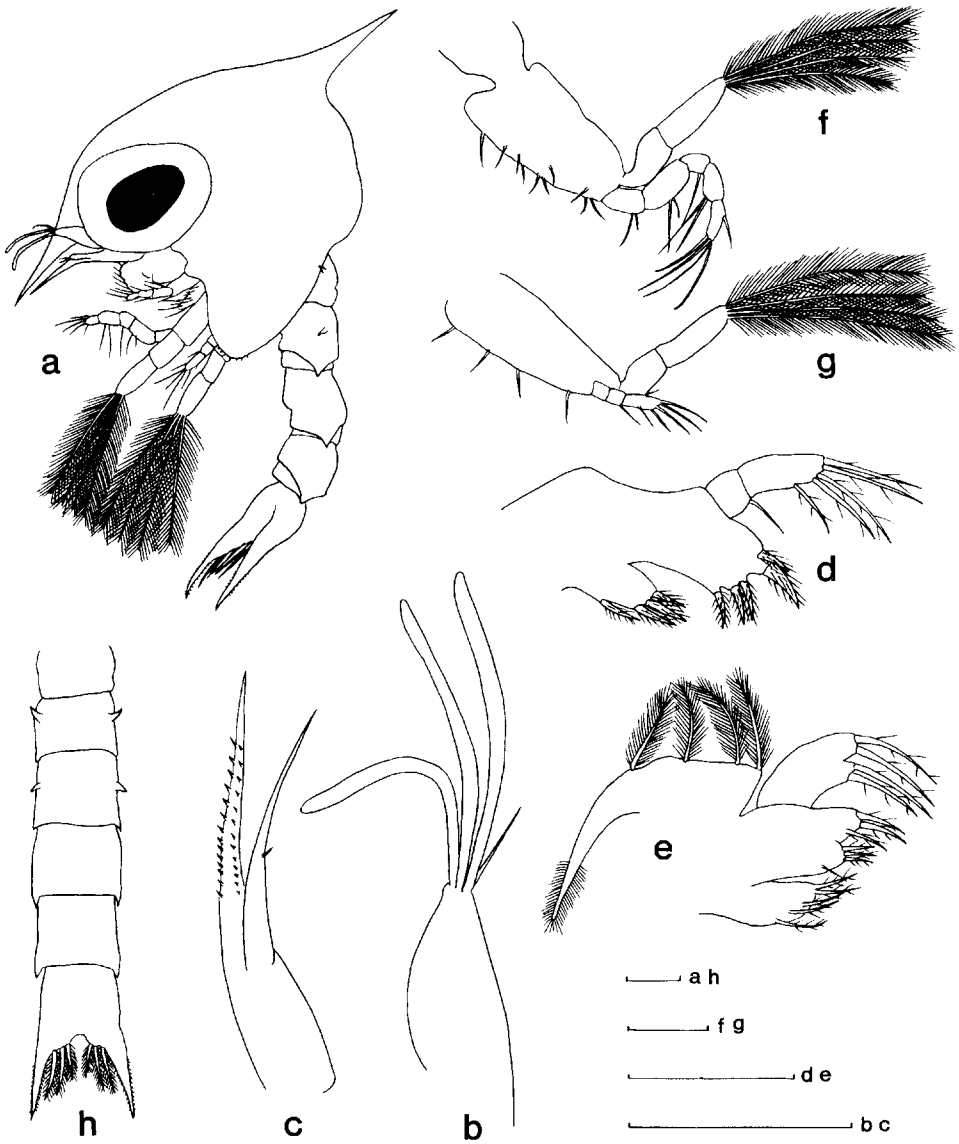

Fig. 1. *Helice leachi* (HESS), first zoea; a, lateral view; b, antennule; c, antenna; d, maxillule; e, maxilla; f, first maxilliped; g, second maxilliped; h, abdomen. Scales represent 0.1 mm.

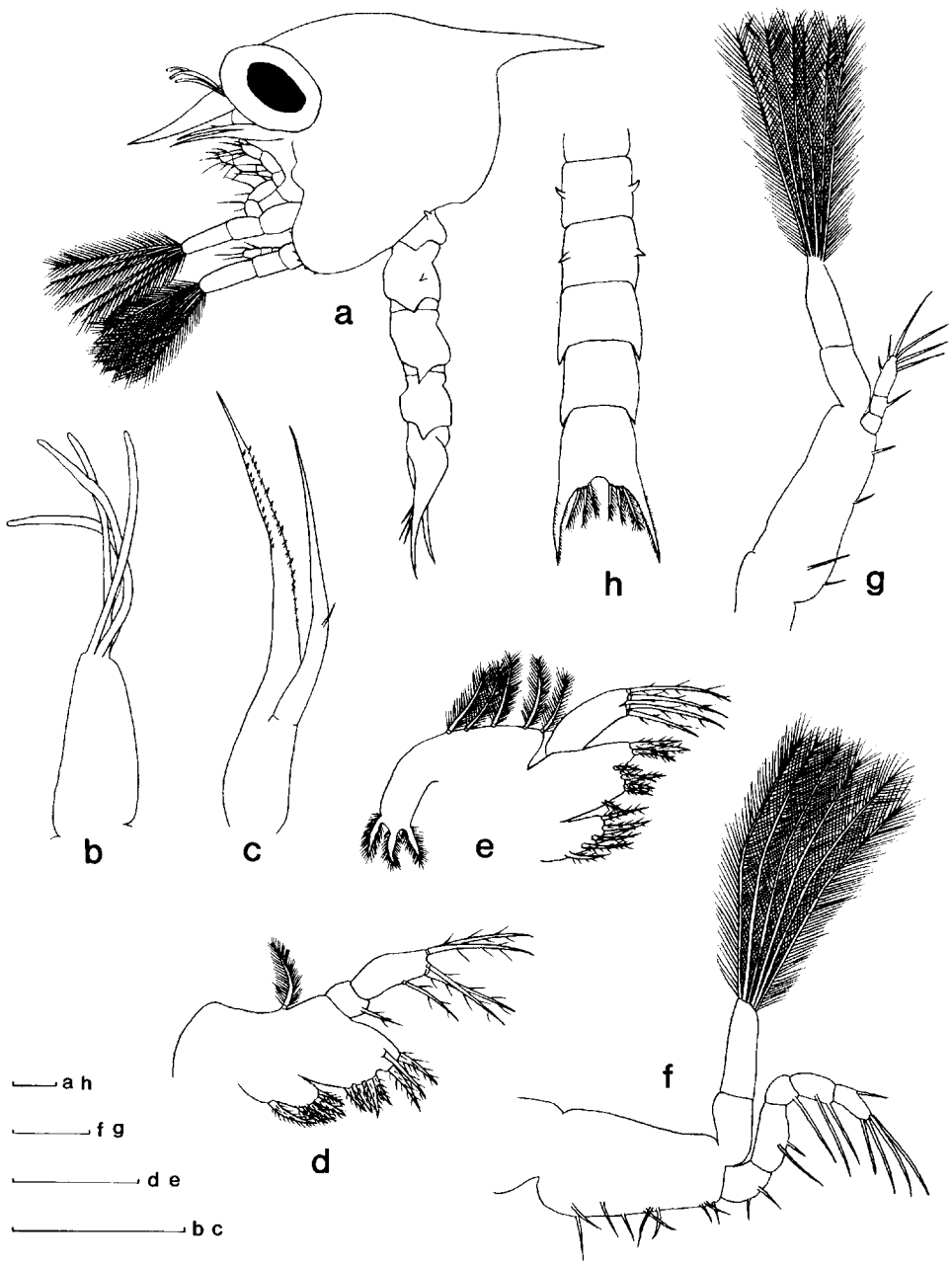

Fig. 2. *Helice leachi* (HESS), second zoea; a, lateral view; b, antennule; c, antenna ; d, maxillule ; e, maxilla; f, first maxilliped ; g, second maxilliped; h, abdomen. Scales represent 0.1 mm.

Discussion

According to Mr. UYENOHARA an ovigerous female with the carapace 14.9 mm wide released zoeas on 14 May 1980, the larvae then molted to the second stage on 23 May, and the third stage on 27 May. Specimens of the third zoea are not available for our study since he spent them all for dissecting, but relevant sketches of that zoea were placed at our disposal.

RICE (1980), admitting four groups of zoeas in the Grapsidae distinguished by WEAR (1970), mentioned that the presence or absence of carapacial lateral spines used for the primary division of the zoeas does not seem to be tenable, due to the work of SCHLOTTERBECK (1976) who reported that *Pachygrapsus crassipes* has no carapacial lateral spine in the first zoea but it acquires that spine in the second stage. It will be an addition to support RICE (1980) that the lateral carapacial spine, supposed earlier to be present in *Helice* (BABA and FUKUDA, 1972), is absent in *H. leachi* at least through the third zoea and very possibly in all stages. RICE (1980) added several elucidatory notes to complement the distinctions of the third and fourth groups of WEAR (1970) and pointed out that there exists another intermediate group. His grouping is thus blurred by *H. leachi* without lateral carapacials, just as done by SCHLOTTERBECK (1976) against WEAR (1980); however, we believe that RICE's grouping is useful and meaningful; it should be noted here in order to support RICE that UYENOHARA's illustration clearly displays that the increase of the posterior telsonal processes occurred in the third zoea of *H. leachi*.

The antennal exopod in both the Varuninae and the Sesarminae is well developed and 1/2-3/4 as long as the spinous process (RICE, 1980). This exopod in *H. leachi* seems to be the greatest in the Grapsidae ever reported, falling slightly short of the spinous process.

The two Japanese species of *Helice* are known to have five zoeal stages in their life histories (BABA and MORIYAMA, 1972). In *H. leachi*, UYENOHARA's drawing of the third zoea shows no sign of pleopods on the abdominal segments which clearly indicates that there are five zoeal stages in *H. leachi*.

In the previous paper (BABA and FUKUDA, 1972), *Helice* is thought to be close to *Chasmagnathus* and differ from *Sesarma* in having lateral carapacial spines and 2+2 setae on the maxillary endopod. *H. leachi*, however, approaches *Sesarma* in sizes of the carapace and of dorsal and rostral spines; either the dorsal spine or the rostral spine is nearly half as long as the carapace in *Sesarma* while about as long in *Helice* and *Chasmagnathus*. This fact seems at variance with WEAR's (1970) definition of the group 2(a) that contains *Helice*. Although there is no other correlating character, the absence of the lateral carapacial spine in *H. leachi* and its appearance in the second stage in *Pachygrapsus crassipes* (SCHLOTTERBECK, 1976) suggest that *Helice* and very possibly *Chasmagnathus* originated from an ancestor much like *Sesarma*.

Acknowledgements

We thank Dr. S. MIYAKE, Professor Emeritus of Kyushu University for his comments on the manuscript. We also thank Mr. K. UYENOHARA for his assistance in rearing the larvae, for making the larvae available and for providing us with sketches of the third zoea of *Helice leachi*.

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