

# The first zoeal stage of *Lithadia rotundata* A. Milne Edwards, 1880 (Brachyura: Leucosiidae: Ebaliinae) obtained in the laboratory.

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## Abstract

The family Leucosiidae is represented in the South Atlantic by three subfamilies: Ebaliinae, Leucosiinae and Iliinae, representing 20 species all together. The complete larval development is only described for *Persephona mediterranea*. In this paper, the first zoeal stage of *Lithadia rotundata* A. Milne Edwards, 1880, is described, being it the first larval account for the genus. A single ovigerous female was collected by trawling at Ubatuba Bay, Ubatuba (SP) in April 1998, brought to the laboratory and kept in an aquarium containing seawater until hatching. Recently hatched zoeae were preserved in a 1:1 70% ethanol-glycerin solution and approximately 20 specimens were dissected for descriptions. Comparing the examined morphological characters, it is concluded that *L. rotundata* is more alike *P. mediterranea* and species belonging to the genus *Arcania* and *Myra* than to the Ebaliinae described so far.

**Key words:** larval stages, Leucosiidae, *Lithadia*.

## Introduction

There are approximately 5,000 species of brachyuran crabs worldwide (Melo, 1996), representing over half the number of decapod species currently recognized. The southwestern Atlantic region has about 329 species, taxonomically organized into 171 genera and 20 families. Despite this large representation, only 102 species, adding up to less than one third, have their larval stages described (Pohle *et al.*, 1999).

The family Leucosiidae is represented by 9 genera and 20 species, being them distributed in three subfamilies (Ebaliinae, Illiinae and Leucosiinae) in the southwestern Atlantic coast (Melo, 1996; Melo and Torres, 1998 a, b; Torres and Melo, *in press*). Among these species, only *Persephona mediterranea* (Herbst, 1794) has its larval stages described by Negreiros-Fransozo *et al.* (1989). Recently, Ko (2000) described the larval stages of *Philyra platychira* Haan, 1841 and made a comparative larval study involving 28 leucosiid species.

In this study, we present the first larval account for the genus *Lithadia* by describing the first zoeal stage of *Lithadia rotundata* A. Milne Edwards, 1880 and a brief review of its distribution, since previous reports mention this species to be restricted to Rio Grande do Sul in Brazil.

## Material and Methods

In April/98 an ovigerous female of *L. rotundata* was collected in the Ubatuba bay (23°26'48"S and 45°02'12"W), located within the Ubatuba region, northern coast of São Paulo State, Brazil. This specimen was obtained from trawling, using a shrimp fishery boat supplied with double rig nets.

The ovigerous female was transported in an isothermic box containing water from the collecting site. In the laboratory, the crab was isolated in an aquarium filled with 34‰ seawater maintained at constant temperature (24 ± 1 °C) until hatching.

Newly hatched first zoeal stages were preserved in a 1:1 70% ethanol-glycerin solution. First zoeae were dissected under a stereomicroscope and semi-permanent slides were prepared. Images of the examined morphological characters were obtained using a computer connected to a Zeiss Axioskop 2 compound microscope, supplied with a Axio Vision image analysis system. A minimum of 20 specimens was used for descriptions.

## Results

### Zoea I

Size. Carapace length (from front most limit of eyes to posterior margin of carapace)  $0.47 \pm 0.02$ mm.

Carapace (fig. 1A). Globose, smooth, bearing one dorsal, one rostral and a pair of lateral spines. Eyes sessile.

Antennule (fig. 1C). Uniramous, endopod absent, exopod unsegmented with 2 long aesthetascs and 2 simple setae.

Antenna (fig. 1D). Represented by a lobate limb bud; endopod and exopod absent.

Mandible (fig. 1E). With an inner concave surface; teeth asymmetrical. Endopod palp absent.

Maxillule (fig. 1F). Coxal endite with 6 plumodenticulate setae. Basial endite with 2 plumodenticulate cuspidate setae, 2 plumodenticulate setae and a small plumose seta. Endopod unsegmented with 4 terminal plumose setae.

Maxilla (fig. 1G). Coxal and basial endites bilobed with 2+3 and 4+4 plumodenticulate setae on the inner and outer lobe, respectively; endopod unsegmented with 2 subterminal + 2 terminal plumodenticulate setae. Scaphognathite with 4 marginal plumose setae and very stout distal process bearing tiny simple setae.

First maxilliped (fig. 1H). Basis with 8 median plumose setae arranged 2+2+2+2. Endopod 5-segmented with 1,2,0,2,4 plumose setae. Exopod 2-segmented with 4 terminal setae.

Second maxilliped (fig. 1I). Basis with 4 plumose setae arranged 1+1+1+1. Endopod 2-segmented with 0 and 3 (1 subterminal and 2 terminal) setae. Exopod 2-segmented with 4 terminal plumose setae.

Abdomen (fig. 1B). Five abdominal somites; 2<sup>nd</sup> and 3<sup>rd</sup> somites bearing short knobs projecting laterally. Telson wider than long with convex lateral margins and a small terminal spine. Posterior margin slightly concave with 3 pairs of plumose setae. Pleopods absent.

## Discussion

The Leucosiidae are presently included in the Oxystomata, which are distinguished from the remaining brachyurans by the buccal cavern shape and the position of the efferent and afferent branchial openings in the adults. Yet, these features may owe their similarity to convergence due to common burrowing habit (Gurney, 1942).

According to Rice (1980), the main zoeal features which immediately allow the separation of leucosiids from all other crabs is their very characteristic shape of the telson. The cephalic appendages have a simplified segmentation and tend to be reduced compared with the more typical brachyuran condition. As an example, the zoeal antenna is reduced or absent as found in the adult.

In all known examples the telson is like a triangular plate with its postero-lateral margin either toothed as in *Ebalia nux* A. Milne Edwards, 1883 and *Ebalia tumefacta* (Montagu, 1808) (see Rice, 1980 and Salman, 1982), or bearing a small terminal spine as in *Philyra corallicola* (Alcock, 1896) and *P. mediterranea* (see Sankolli, 1961 and Negreiros-Fransozo *et al.*, 1989).

Based on the morphology of carapace spines, telson, and the number of setae present in the maxillule and maxilla, it may be concluded that *L. rotundata* is more similar to *P. mediterranea* and species of the genus *Arcania* and *Myra* than to other members of its own subfamily, the Ebaliinae (Table I). Therefore, further descriptive work on larval forms of the Leucosiidae is likely to elucidate the true phylogenetic affinities within this group. Due to the lack of knowledge on larvae of this group, additional descriptions would also aid in the identification of plankton-caught larvae.

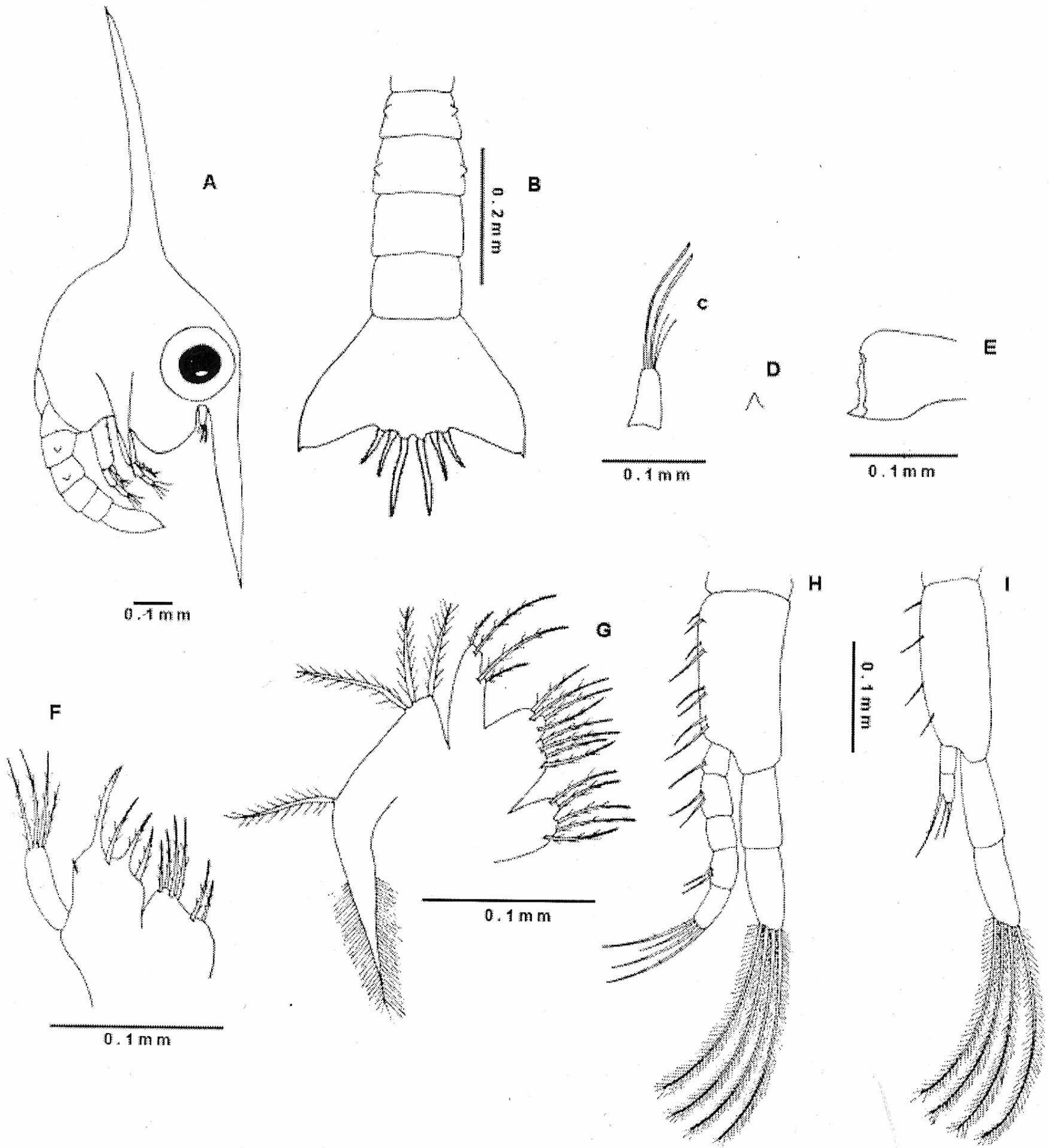


Figure 1: *Lithadia rotundata*. First zoeal stage. A, lateral view; B, abdomen; C, antennule; D, antenna; E, mandible; F, maxillule; G, maxilla; H, first maxilliped; I, second maxilliped.

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**Table I:** Comparison of the first zoeae in the family Leucosiidae. (end. = endopod; bas. = basal endite; cox. = coxal endite; + and - = present and absent; P = protuberance).

	Carapace spine			Maxillule			Maxilla endopod	Telson outer spine
	dorsal	rostral	lateral	end.	bas.	cox.		
<b>Subfamily Iliinae</b>								
<i>Arcania heptacantha</i>	+	+	+	2+2	5	6	2+2	1
<i>A. undecimspinosa</i>	+	+	+	2+2	5	6	2+2	1
<i>A. undecimspinosa elongata</i>	+	+	+	2+2	5	6	2+2	1
<i>A. septemspinosa</i>	+	+	+	2+2	5	5	2+2	1
<i>Philyra corallicola</i>	+	-	+	2+1	5	5	2+1	3
<i>P. syndactyla</i>	+	-	+	2	5	6	2+1	4
<i>P. scabriuscula</i>	+	-	+	2	5	6	2+1	3
<i>P. pisum</i>	-	-	+	2+2	5	5	2+1	3
<i>P. platychira</i>	-	- (P)	+	2+2	5	5	2+1	3
<i>Persephona mediterranea</i>	+	+	+	2+2	4	6	2+2	1
<b>Subfamily Leucosiinae</b>								
<i>Leucosia longifrons</i>	+	+	+	2+2	5	6	2+1	4
<i>L. obtusifrons</i>	+	+	+	2+2	5	6	2+1	4
<i>L. sima</i>	-	-	+	2+2	5	5	2+1	3
<i>L. pubescens</i>	-	- (P)	+	2+2	5	5	2+1	3
<i>Myra fugax</i>	+	+	+	2+2	5	6	2+2	1
<b>Subfamily Eballiinae</b>								
<i>Ebalia nux</i>	-	- (P)	-	2+1	4	5	2+1	3
<i>E. tuberosa</i>	-	- (P)	-	2+2	5	6	2+1	1
<i>E. tumefacta</i>	-	- (P)	-	3	4	5	2+1	4
<i>E. cranchii</i>	-	- (P)	-	3	4	5	2+1	4
<i>Lithadia rotundata</i>	+	+	+	2+2	5	6	2+2	1

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