



Revision of the larval morphology (Zoea I) of the family Hippolytidae (Decapoda, Caridea), with a description of the first stage of the shrimp *Hippolyte obliquimanus* Dana, 1852

MARIANA TEROSI^{1,2}, JOSE A. CUESTA³, INGO S. WEHRTMANN^{4,5}
& FERNANDO L. MANTELATTO^{1,2,6}

¹Laboratory of Bioecology and Crustacean Systematics, Faculty of Philosophy, Sciences and Letters of Ribeirão Preto (FFCLRP), University of São Paulo (USP), Brazil. E-mail: mterossi@usp.br, flmantel@usp.br; FAX: 55-16-36023656

²Program of Post Graduation on Comparative Biology – FFCLRP (USP)

³Instituto de Ciencias Marinas de Andalucía, CSIC, Avda. República Saharaui, 2, 11519 Puerto Real, Cádiz, Spain. E-Mail: jose.cuesta@icman.csic.es

⁴Unidad de Investigación Pesquera y Acuicultura (UNIP) of the Centro de Investigación en Ciencias del Mar y Limnología (CIMAR), Universidad de Costa Rica, 2060 San José, Costa Rica. E-Mail: ingowehrtmann@gmx.de

⁵Museo de Zoología, Escuela de Biología, Universidad de Costa Rica, 2060 San José, Costa Rica

⁶Corresponding author

Abstract

The aim of this study was to summarize the available data on larval morphology of the first zoea of the family Hippolytidae and describe the first zoeal stage of *H. obliquimanus* from two geographically distinct populations, Brazilian and Caribbean in order to discuss inter- and intraspecific variability. Oviparous females of *Hippolyte obliquimanus* were collected at Cahuita (Limón, Costa Rica) and at Ubatuba (São Paulo, Brazil). We compiled the published descriptions of all available hippolytid Zoea I (66 spp., 21%), and all zoeae share several characteristics. However, such morphological features cannot be used to distinguish the first zoeae of Hippolytidae from other caridean larvae. Historically, the presence of an exopodal seta at the maxillule and the absence of the anal spine/papilla have been considered as characteristic for the Zoea I of the genus *Hippolyte*. The results of our revision, however, did not support these conclusions: although *H. obliquimanus* showed an exopodal seta at the maxillule, four congeners did not bear such structure; moreover, *H. obliquimanus* as well as one other congener have an anal spine/papilla. All morphological characters observed in the first zoeal stage of *H. obliquimanus* are shared with others species of the family Hippolytidae. Intraspecific variability in *Hippolyte obliquimanus* was detected in one morphological aspect: the first zoea had four denticles on the ventral margin of the carapace in the Brazilian population, while specimens from the Costa Rican population had three.

Key words: Crustacea, caridean shrimp, Decapoda, larval development, western Atlantic

Introduction

The family Hippolytidae Bate is distributed worldwide (Bauer 2004) and consists of 318 species divided in 36 genera (De Grave *et al.* 2009). The genus *Hippolyte* Leach comprises 31 species (De Grave *et al.* 2009) occurring all around the world except in extremely cold waters (Udekem d'Acóz 1996). The larval morphology of the family Hippolytidae or some hippolytid genera have been reviewed by several authors (Lebour 1932; Gurney 1937; Gurney 1942; Haynes 1985).

The genus *Hippolyte* is represented in America by eight species (Udekem d'Acóz 2007): three species occur along the Pacific coast (*H. californiensis* Holmes, *H. williamsi* Schmitt and *H. clarkii* Chace), and five species have been reported from the Atlantic coast (*H. coerulescens* (Fabricius), *H. pleuracanthus* (Stimpson), *H. zostericola* (Smith), *H. obliquimanus* Dana and *H. nicholsoni* Chace). The first zoeal stage was studied in five of these species: *H. clarkii* (by Needler 1934 as *Hippolyte californiensis*), *H. coerulescens* (by Gurney