



## New Macrostylidae Hansen, 1916 (Crustacea: Isopoda) from the Gay Head-Bermuda transect with special consideration of sexual dimorphism

TORBEN RIEHL<sup>1,2,\*</sup>, GEORGE D.F. WILSON<sup>3</sup> & ROBERT R. HESSLER<sup>4</sup>

<sup>1</sup> Universität Hamburg, Biozentrum Grindel & Zoologisches Museum, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany

<sup>2</sup> Senckenberg am Meer, Deutsches Zentrum für Marine Biodiversitätsforschung (DZMB), c/o Biozentrum Grindel.

\*Corresponding author. E-mail: t.riehl@gmx.de

<sup>3</sup> George D.F. Wilson, Australian Museum, 6 College Street Sydney, NSW 2010 Australia. E-mail: Buz.Wilson@austmus.gov.au

<sup>4</sup> Robert R. Hessler, UC San Diego, 9500 Gilman Drive, La Jolla, CA 92093, USA. E-mail: rhessler@ucsd.edu

### Abstract

In the Asellota, sexual dimorphism is often characterized by males that show pronounced morphological differences after the final moult compared to females but also to sub-adult males. Such a sexual dimorphism may strongly complicate allocation of these terminal males to conspecifics. Consequently, we regard it to be a likely explanation for why in 50% of the described species of the family Macrostylidae Hansen, 1916, only one sex is known. Based on detailed description of two previously unknown species of the isopod genus *Macrostylis* Sars, 1864, the changes in the morphology that can occur during the final moult of the males are highlighted. *M. dorsaetosa* n. sp. is unlike any other species owing to the row of spine-like setae on the posterior margins of pereonites 5–6. *M. strigosa* Mezhov, 1999 shows remarkable similarity but lacks these setae. In *M. papillata* n. sp., cuticular ridges overlap posteriorly with the margin of the pereonites 1–4 and head forming a warty appearance. This species is easily identifiable and unlike any previously described macrostylid owing to the presence of the tergal articulation between pleonite 1 and pleotelson. Information for the identification of terminal males is provided and implications of our results for future taxonomic and systematic work on this isopod family are discussed.

**Key words:** Janiroidea, deep sea, benthos, bathyal, abyssal, North Atlantic, DELTA, SEM, new species

### Introduction

The phenomenon of sexual dimorphism occurs widely among the animal kingdom. Its evolution is driven by both sexual selection due to mating preferences or competition for mates and natural selection (Darwin 1874; Lande 1980). Sexual dimorphism is common among isopod crustaceans (e.g., Veuille 1980; Jormalainen & Merilaita 1995; Lefebvre *et al.* 2000) and also among deep-sea asellotes (e.g., Svavarsson 1984; Wilson 2008a; Brökeland 2010; Riehl & Brandt 2010). In Asellota, sexual dimorphism is often characterized by mature males showing strong morphological differences when compared to sub-adult males and females only after the final moult.

Since the first description of a species belonging to the deep-sea isopod family Macrostylidae by G.O. Sars (1864), 80 species have been formally described (Riehl & Brandt 2010). 50% of these have been based on only one sex and often (22 species, i.e., 17.6%) only on a single specimen. Observations of behavior (Hessler & Strömberg 1989), morphological characteristics (Thistle & Wilson 1987), as well as sampling evidence (Hessler & Sanders 1967; Wilson 2008b) suggest an infaunal lifestyle for macrostylids. Therefore, macrostylids have probably been undersampled by epibenthic apparatus often used in deep-sea research. Low numbers of specimens available in the samples have been a frequent impediment to their description. Males tend to be especially rare compared to females (personal observation) and this might explain the above mentioned numbers. The morphological evidence presented here suggests that another explanation for descriptions based on only one sex (at least in some cases) can be found in a pronounced sexual dimorphism. Substantial morphological differences may strongly complicate allocation of conspecifics.

The terminal-male concept will be introduced to macrostylid taxonomy in this article. Based on two new species, *Macrostylis dorsaetosa* n. sp. and *M. papillata* n. sp., the changes in the morphology that occur during the