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# The ascidian-associated mysid *Corellamysis eltanina* gen.nov., sp.nov. (Mysida, Mysidae, Heteromysinae): a new symbiotic relationship from the Southern Ocean

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## Abstract

A new mysid species representing a new genus is described based on specimens collected in the 1968 cruise of the U.S. Navy Ship Eltanin from the Macquarie Island region (Southern Ocean). The new mysid, *Corellamysis eltanina*, is characterized by the globular eyes lacking definite eyestalks, the seven and eighth thoracic endopods specialized as gnathopods forming a strong subchela, and by the armature and shape of the uropod endopod and telson. *Corellamysis eltanina* lives only in the branchial sacs of the ascidian *Corella brewinae* suggesting an obligate endocommensal symbiotic association. Therefore, this is the first known report of a mysid living symbiotically with a benthic tunicate, as well as the first report of a mysid symbiosis from the Southern Ocean. The distribution and habitats of known symbiont mysids are reviewed. An update of identification key to world genera and subgenera of Heteromysinae is suggested.

**Key words:** new genus, Heteromysinae, Symbiosis, Ascidians, Macquarie Island

## Introduction

The phenomenon of symbiosis has for a long time attracted the attention of biologists because such interspecific interactions are essential for the foundation of many species, in shaping the social behaviour of marine invertebrates and in affecting the organization, structure, and function of benthic communities (Roughgarden 1975; Vermeij 1983; Margulis & Sagan 1995; Hay *et al*. 2004; Baeza 2007; Thomsen *et al.* 2010).

Ascidians are well known as hosts of symbionts belonging to many taxa (Monniot 1990) from protozoans to fishes. Nemerteans (Monniot 1961; Dalby 1996) and crustaceans including shrimps, crabs, amphipods isopods and copepods are the most numerous symbionts in invertebrates. They have been described living symbiotically on, in or with other marine organisms all around the world (Thiel & Baeza 2001). The adoption of a symbiotic life style represents one of the most important environmental adaptations of these species (Ross 1983) and, depending on the type of host inhabited and the form of association between host and symbiont a great diversity of relationships can be expected. Copepods represent the largest part of the ascidian crustacean symbionts with varied families. Since their first record (Thorell 1859) the ascidian copepods, sometimes highly modified, have interested many authors (monographies by Illg 1958; Illg & Dudley 1980; Monniot 1990) and still give rise to studies with description of new genera and species (Marchenkov & Boxshall 2005; Boxshall & Marchenkov 2007; Ooishi 2009, 2012). Amphipods are also frequently encountered inside the pharyngeal and cloacal cavities of solitary or compound ascidians (Vader 1984; Thomas 1997; Thiel 1999, 2000; Darwin 1997) either as true symbionts or only occasionally sheltered by their host. Also, decapods, mainly shrimps, have been found to live in large solitary ascidians (Fransen 2006; Marin & Anker 2008; Baeza & Díaz-Valdés 2011; Kneer *et al.* 2013).

Although the great majority of mysids are strictly free-living, a small proportion of species exhibit diverse types of associations with other macro-invertebrates. Sponges, cnidarians, gastropod shells and echinoderms are described as the main hosts in the bibliography (e.g. Mauchline 1980; Fukuoka 2005). Among mysid relationships with other marine invertebrates, symbioses are in most cases assumed rather than clearly demonstrated (Mauchline

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8. Antennule with two modified setae on distomedial corner of third segment, medial seta linguiform with subterminal flagellum, lateral seta simple, very long, directed laterally . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . *H. (Olivemysis)* Bacescu, 1968
- Antennule with two pairs of simple setae on distomedial corner of third segment, pairs diverging from each other. Fourth pleopod with the two apical setae longer than the fourth pleonite. . . . . . . . . . . . . . . . . . . . . . . . *H. (Neoheteromysis)* Bacescu, 1976
9. Telson with clear apical cleft . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 10
- Telson without or with minute apical cleft . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 14
10. Male pleopod 3 very long, 2-segmented . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . *Harmelinella* Ledoyer, 1989
- Male pleopod 3 rudimentary, unsegmented . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 11
11. Penes extremely thick, large to giant in length; provided with erectile capability due to a variously folded cuticle . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . *Mysifaun* Wittmann, 1996
- Penes without variously folded cuticle . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 12
12. Eyes without cornea . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . *Burrimysis* Jaume & Garcia, 1993
- Eyes with well-developed cornea . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 13
13. Inner margin of endopod uropod with row of cuspidate setae (except *M. hanseni* Zimmer, 1914) . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . *Mysidetes* Holt & Tattersall, 1906
- Inner margin of endopod uropod without cuspidate setae . . . . . . . . . . . . . . . . . . . . . . . . *Bermudamysis* Bacescu & Iliffe, 1986
14. Inner margin of endopod uropod without cuspidate setae . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 15
- Inner margin of endopod uropod with row of cuspidate setae . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 17
15. Eye strongly dorso-ventrally flattened, with latero-external visual part. Telson armed with three lateral setae . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . *Platyops* Bacescu & Iliffe, 1986
- Eyes normal. Telson armed with 4–6 lateral setae . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 16
16. Eye cornea narrower than the eyestalk. Antennal peduncle much longer than the antennal scale, with the distal two segments subequal in length; antennal scale without distal transverse suture. Male second thoracic endopod with notches on outer margin *Kochimysis* Panampunnayil & Biju, 2007
- Eye cornea as wide as the eyestalk. Antennal peduncle as long as the antennal scale, with the third segment longer than the second one; antennal scale with a distal transverse suture. Male second thoracic endopod without notches on outer margin . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . *Deltamysis* Bowman & Orsi, 1992
17. Eyes with definite eyestalks. Distal segment of endopod of maxilla with five very powerful triangular spines strongly serrated. Endopod of thoracopods 5–8 slender and feeble. Telson long and narrow . . . . . . . . . . . . . . . *Pseudomysidetes* Tattersall, 1936
- Eyes without eyestalks. Distal segment of endopod of maxilla without powerful spines. Endopod of thoracopods 7–8 forming a powerful subchela. Telson linguiform . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . *Corellamysis* **gen. nov.**

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