

Discovery of two ‘chimeric’ Gastrotricha and their systematic placement based on an integrative approach

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Sublittoral sand from the islands of Sardinia (Italy) and Flores (Azores) – separated by more than 3700 km linear distance and 8 years between two independent sampling campaigns – yielded conspicuous specimens of two bizarre, yet undescribed, species of the marine gastrotrich clade Macrodasyida. These gastrotrichs combine several character traits that were already known from two, non-related genera. Morphological data were carefully analysed and digitally documented, and nuclear and mitochondrial DNA sequences were used for phylogenetic inference. The results of these analyses claim for the erection of a new genus. Specimens of the new taxon have a body length of less than 400 µm and are characterized by a wide, funnel-shaped mouth opening shielded dorsally by an oral hood and possess a posterior peduncle that ends with a Y-shaped pair of appendages that carry the posterior adhesive tubes. Further tubes occur as anterior, ventrolateral and lateral series; the gonads are unpaired and there is a set of two accessory reproductive organs. Molecular phylogenetic analyses confirm the results of former studies and clearly place the new taxon in Thaumastodermatidae. We hereby propose the establishment of *Chimaeradasys* gen. nov. and describe *C. oligotubulatus* sp. nov. from the Azores and *C. polytubulatus* sp. nov. from Sardinia.

ADDITIONAL KEYWORDS: Azores – biodiversity – integrative taxonomy – Mediterranean Sea – meiofauna – north-eastern Atlantic – new genus – new species – phylogeny – Sardinia.

INTRODUCTION

In the last two decades, phylogenetic studies have profoundly changed our understanding of evolutionary alliances among, and within, traditionally recognized animal taxa. A wave of novelties has also concerned the Gastrotricha, a phylum of minute, acoelomate, aquatic worms. Aquatic ecologists consider gastrotrichs to be permanent and important members of the benthic community known as the meiofauna, but due to their small size and delicate structure, their life habit and biology are largely unknown. Currently, there are more than 850 accepted species of Gastrotricha (WoRMS, 2020), distributed over the two recognized orders

Macrodasyida Remane, 1925 (374 marine and four freshwater species) and Chaetonotida Remane, 1925 (132 marine and 348 freshwater species). Across the oceans of the world, gastrotrichs predominantly occur in sandy habitats of the seashore and the shallow sublittoral (Todaro *et al.*, 2019a), but a few species are also reported from the deep sea (Kieneke & Schmidt-Rhaesa, 2015; Kieneke *et al.*, 2020).

In a Linnean framework, gastrotrichs have long been considered a class of the pseudocoelomate Aschelminthes (Schmidt-Rhaesa, 2013; Kieneke & Schmidt-Rhaesa, 2015). By contrast, recent robust phylogenomic studies have shown them to be nested in the Spiralia together with the acoelomate Platyhelminthes in a subclade named Rousphozoa (Struck *et al.*, 2014; Egger *et al.*, 2015). Studies of relationships within Gastrotricha using DNA sequence data analysed with parsimony, maximum likelihood and Bayesian inference have also been useful at resolving the position and classification of

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