



## Redescriptions of five species of marine peritrichs, *Zoothamnium plumula*, *Zoothamnium nii*, *Zoothamnium wang*, *Pseudovorticella bidulphiae*, and *Pseudovorticella marina* (Protista, Ciliophora)

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### Abstract

The significant similarity of congeners and an accumulation of inaccurate descriptions or misinterpretations in previous studies can make it difficult to separate species of peritrich ciliates from one another. Isolates collected from Chinese coastal waters allowed investigation and redescription of three marine species of peritrichs, *Zoothamnium plumula* Kahl, 1933, *Z. nii* Ji *et al.*, 2005 and *Z. wangi* Ji *et al.*, 2005, emphasizing in particular details of characters observed *in vivo*, infraciliature and comparisons with morphologically similar congeners. Brief redescriptions based on new material also are provided for two other marine peritrichs, *Pseudovorticella bidulphiae* (Stiller, 1939) Ji *et al.*, 2009 and *P. marina* (Greff, 1870) Ji *et al.*, 2009.

**Key words:** Peritrichia, *Zoothamnium*, *Pseudovorticella*, morphology, marine ciliate

### Introduction

The subclass Peritrichia is one of the two largest and taxonomically diverse groups of ciliates, containing over 1000 nominal species (Kahl 1933, 1935; Kent 1880–1882; Song 1986, 1991; Stiller 1971). Identification of peritrichs is frequently very difficult because congeners in larger genera are often very similar in their morphology, with overlapping characteristics in many cases, and inaccurate or incomplete descriptions with misinterpretation of characteristics or misidentifications of taxa have accumulated in the taxonomic literature over the years.

In recent years, details of the infraciliature and silverline system have been used in more and more taxonomic studies of peritrichs to identify and separate species within genera. These characteristics are species-specific, but exhibit high variability among congeners (Clamp 1992, 1993, 1994, 1997, 2005, 2006; Foissner *et al.* 1992; Ji & Kusuoka 2009; Ji & Song 2004; Ji *et al.* 2004, 2005a-c, 2006a, b, 2009; Norf & Foissner 2010; Sun *et al.* 2005, 2006a, b, 2007; Wu *et al.* 2011). The techniques of silver staining needed to observe both types of characters are not easy to master on a consistent level, even for experts, but the results are worth the effort because reliable taxonomic identifications based on morphology provide a firm support for related molecular phylogenetic studies and identification of species by matching DNA sequences (Chen *et al.* 2010; Clamp & Williams 2006; Foissner *et al.* 2009; Hu *et al.* 2009; Li *et al.* 2008; Sun *et al.* 2010, 2011; Zhan *et al.* 2009).

In the present study, three marine peritrichs, *Zoothamnium plumula* Kahl, 1933, *Z. nii* Ji *et al.*, 2005 and *Z. wangi* Ji *et al.*, 2005, which were reported in recent studies, but not described fully owing to insufficient material (Ji *et al.* 2005c; Song *et al.* 2002), were reinvestigated with new material to describe details of the morphology of