



Description of four new species of *Limnadopsis* from Australia (Crustacea: Branchiopoda: Spinicaudata)

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Abstract

Four new species of *Limnadopsis*, *L. bloodwoodensis* **sp. nov.**, *L. paratatei* **sp. nov.**, *L. brevirostris* **sp. nov.** and *L. centralensis* **sp. nov.**, are described for Australia. Three of these were delineated in an earlier study based on an integrative taxonomic approach. The fourth (*L. centralensis* **sp. nov.**) was not part of that study but can be distinguished from all other *Limnadopsis* morphologically. The morphological variation in *L. tatei* is described here in detail as *L. paratatei* **sp. nov.** and *L. tatei* closely resemble each other and have in earlier studies been grouped together as *L. tatei*.

Key words: Australia, Spinicaudata, *Limnadopsis*

Introduction

The genus *Limnadopsis* inhabits temporary water bodies in the semiarid and arid zone of Australia (Richter & Timms 2005; Timms 2009). *Limnadopsis* belongs to the Spinicaudata (Branchiopoda), which are commonly known as clam shrimps. Molecular phylogenetic studies support the monophyly of *Limnadopsis* (Schwentner et al. 2009; Weeks et al. 2009) and suggest that it evolved from *Limnadia*-like ancestors within Australia (Schwentner et al. 2009). The presence of numerous growth lines which cover the carapace and terminate in a dorsal serration is characteristic of several species of *Limnadopsis*.

Eight species of *Limnadopsis* are currently recognized, five of which were described for the first time in a recent review by Timms (2009). The species *Limnadopsis brunneus* Spencer & Hall 1896 is considered a *nomen dubium* (Timms 2009). An integrative taxonomic approach based on two molecular (COI and EF1 α) and one morphological marker has supported the delineation of all currently recognized species (Schwentner et al. 2011) and pointed to the existence of three hitherto unknown species, all of which were consistently delineated. These species were provisionally referred to as *Limnadopsis* sp. ‘Roskos’, *L.* sp. ‘Lagoon’ and *L.* cf. *tatei* ‘Carter’s’ (*L. tatei* was split into two species, the other referred to as *L.* cf. *tatei* ‘Titanic’; Schwentner et al. 2011).

The morphological character studied consisted of scales on the tip of the movable finger of the male claspers. As the males grasp the female with the claspers during the mating process (the movable finger is then on the inside of the female’s carapace), we suspected the presence of structures allowing for species-specific mate recognition (Schwentner et al. 2011). The scales proved a reliable character by which to delineate *Limnadopsis* species. Species delineation was based on six different species concepts including the Phylogenetic Species Concept (*sensu* Wheeler & Platnick 2000), the Evolutionary Species Concept (*sensu* Wiley & Mayden 2000) and the Biological Species Concept (*sensu* Mayr 1942).

In this study we will formally describe and name the three species uncovered in the course of the 2011 study. The species referred to as *L.* cf. *tatei* ‘Titanic’ in Schwentner et al. (2011) is determined to be *L. tatei* Spencer & Hall 1896. In addition, a previously unknown fourth species is also formally described, thus raising the number of recognized species of *Limnadopsis* to twelve.