

## A New Phreodrilid Species (Annelida: Clitellata: Phreodrilidae) from Lake Biwa, Japan

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A new species of Phreodrilidae is described from Lake Biwa, Japan, using classical morphology and a 658 bp long fragment of the mitochondrial cytochrome *c* oxidase subunit I (COI) gene as a potential “DNA barcode”. *Astacopsidrilus ryuteki* sp. nov. is unusual in possessing dorsal bundles each represented by only a single seta, instead of the usual hair and support setae. Among other phreodrilids, this feature has been reported only in *Nesodrilus isochaeta* Pinder and Brinkhurst, 1997 and *Insulodrilus bifidus* Pinder and Brinkhurst, 1997, both described from Australia. The new species possesses paired spermathecal setae and peculiar voluminous, pendant penes. This is the first record of the family in Japan, a circumstance that contradicts the assumed Gondwanan origin of the Phreodrilidae. Because any hypothesis of a former zoogeographical connection between Japan (or other parts of Asia) and Australia is unsupported by any other biogeographical data, it is probable that *A. ryuteki* was introduced to Japan from the Southern Hemisphere. Conversely, the tubificid *Embolocephalus yamaguchii* (Brinkhurst, 1971) appears to have been introduced into Australia from Japan.

**Key Words:** Clitellata, oligochaetes, Phreodrilidae, *Astacopsidrilus*, new species, Lake Biwa.

### Introduction

To date, there are 51 species in the family Phreodrilidae, excluding *Tasmaniadrilus tasmaniaensis* Goddard, 1909, a taxon too poorly described to be assigned to any of the current genera. Two subfamilies are distinguished, the Phreodrilinae including *Phreodrilus* and *Antarctodrilus*, and the Phreodriloidinae with *Phreodriloides*, *Astacopsidrilus*, *Insulodrilus*, *Nesodrilus*, and *Schizodrilus* (Brinkhurst 1991; Pinder and Brinkhurst 1997). The global distribution of the family indicates a Gondwanan origin (Martin *et al.* 2008). The majority of species occur in the Southern Hemisphere, although a few have been recorded in the Northern Hemisphere: Morocco (Giani *et al.* 1995), Sri Lanka (Stephenson 1913), the Arabian Peninsula (Martínez-Ansemil *et al.* 2002), and Ireland (Gunn *et al.* 2003). In this context, the present new species found in Lake Biwa, Japan, is an especially significant finding, since it falls well outside of the biogeographical range predicted by the hypoth-