



*Zootaxa* 3306: 1–60 (2012)  
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**Monograph**

ISSN 1175-5326 (print edition)

**ZOOTAXA**

ISSN 1175-5334 (online edition)

# ZOOTAXA

3306

## **Revision of the Australian Sabellariidae (Polychaeta) and description of eight new species**

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Magnolia Press  
Auckland, New Zealand

*Accepted by A. Nygren: 6 Mar. 2012; published: 9 May 2012*

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(*Zootaxa* 3306)

60 pp.; 30 cm.

9 May 2012

ISBN 978-1-86977-899-6 (paperback)

ISBN 978-1-86977-900-9 (Online edition)

FIRST PUBLISHED IN 2012 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: [zootaxa@mapress.com](mailto:zootaxa@mapress.com)

<http://www.mapress.com/zootaxa/>

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ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

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## Abstract

The family Sabellariidae is represented in Australian waters by eleven species belonging to five genera, including eight of them new to Science: *Idanthyrus nesos* n. sp., *I. willora* n. sp., *Lygdamis wambiri* n. sp., *Phalacrostemma maloga* n. sp., *Sabellaria kooraltha* n. sp., *S. lungalla* n. sp., *S. pyramis* n. sp., and *Tetreres terribilis* n. sp. Three genera, *Phalacrostemma*, *Sabellaria* and *Tetreres*, are newly recorded from Australia. Descriptions of all species are given, accompanied by detailed illustrations, including drawings, photographs and scanning electron micrographs, tables summarising specific diagnostic characters of all species of each genus, and distribution maps within Australia. A key to all genera worldwide and Australian species is given. Maximum parsimony analyses based on morphological features have been performed to assess the position of the new species and relationships with other Sabellariidae. For this purpose, the Australian species, the type species of each genus and some other species, representing the variability within each group, were incorporated into the analyses. Some of the species were recovered within monophyletic genera (*Phalacrostemma* and *Tetreres*), while others have been considered as member of previously recognised genera (*Idanthyrus*, *Lygdamis* and *Sabellaria*) have not been assessed as monophyletic.

**Key words:** Sabellariidae, Polychaeta, systematics, Australia, new species, new records

## Resumen

La familia Sabellariidae está representada en la costa Australiana por once especies pertenecientes a cinco géneros, ocho de las cuales son nuevas para la Ciencia: *Idanthyrus nesos* n. sp., *I. willora* n. sp., *Lygdamis wambiri* n. sp., *Phalacrostemma maloga* n. sp., *Sabellaria kooraltha* n. sp., *S. lungalla* n. sp., *S. pyramis* n. sp., and *Tetreres terribilis* n. sp. Tres géneros, *Phalacrostemma*, *Sabellaria* y *Tetreres*, son citados por primera vez en Australia. Todas las especies han sido descritas y se acompañan de ilustraciones detalladas, incluyendo dibujos, fotografías y micrografías electrónicas de barrido, tablas donde se resumen los caracteres específicos de todas las especies de cada género y los mapas de distribución de la especie en Australia. Se presentan claves dicotómicas de todos los géneros y de las especies australianas. Se han realizado análisis de máxima parsimonia basados en caracteres morfológicos para comprobar la posición de las nuevas especies y las relaciones filogenéticas con otros Sabellariidae. Para ello, las especies australianas junto con las especies tipo y otras especies representativas de la variabilidad morfológica de cada grupo han sido incorporadas en dichos análisis. Algunas especies han sido recuperadas dentro de grupos monofiléticos

(*Phalacrostemma* y *Tetreres*), mientras que otras se han considerado como miembros de géneros previamente reconocidos (*Idanthyrus*, *Lygdamis* y *Sabellaria*) a pesar de no haber sido estos recuperados como monofiléticos.

**Palabras clave:** Sabellariidae, Polychaeta, sistemática, Australia, especies nuevas, nuevas citas.

## Introduction

Sabellariids are an easily recognised group of polychaetes with a well constructed tube of cemented sand grains and an operculum with rows of paleae which almost completely occupy and seal the entrance of the tube. Before the present study, the group was poorly known in Australia, and only four species in two genera were recorded (Day and Hutchings 1979). In Australia, sabellariids appear not to commonly form extensive reefs as found in other parts of the world (e.g., Kirtley 1994), and typically appear isolated or in small colonies. They have been collected from the intertidal to depths of 500 m worldwide but because deep water off Australia have been poorly sampled, we expect that the diversity will increase with further sampling. The number of sabellariid species reported worldwide is of 126, accommodated in 13 genera (Kirtley 1994; Lechapt and Gruet 1993; Lechapt and Kirtley 1996, 1998; Nishi and Kirtley 1999; Nishi et al. 2004; Bailey-Brock et al. 2007; Nishi et al. 2010; Santos et al. 2011). Kirtley (1994) undertook a major and most recent revision of the family, describing 43 new species genera from all over the world and erecting four genera. He established two subfamilies, although he did not perform any phylogenetic analyses to validate these taxonomic emendations. Recently, after the first phylogenetic analysis performed on the group (Capa et al. 2012), most genera established or emended by Kirtley (1994) were recovered monophyletic but subfamilies were found to be paraphyletic.

The aim of the present study was to review the collections in Australian Museums, to describe the species present around the Australian coastline and to provide identification keys and complete illustrations for their characterization. Phylogenetic analyses were performed to assess the position of these taxa within the sabellariid tree and their relationships, especially after the finding that some of them showed a combination of generic features.

## Materials and methods

Sabellariid collections from several localities around the Australian coasts, housed in the main Australian museums were examined. Type and additional material of similar species were also studied for comparison. Material examined is listed in a clockwise direction around Australia, starting from the type locality. The number of specimens examined is shown after the locality data and before the registration number. Gravid individuals were selected as type material, when possible, because sabellariids exhibit considerable morphological changes after settlement, such as the elongation of the trunk, the loss of provisional chaetae, the rotation of the opercular lobes and their tentacular filaments (Wilson 1975: Figs 1–5).

Presence or absence of coelomic oocytes was noted, and this is indicated in the Material Examined section with a '\*'. Total length, including paleae and cauda and maximum width (anterior segments) were recorded for type material of each species and ranges given for the additional material examined. Descriptions are based on type material but in cases of damaged structures, additional information is given based on material from type locality and nearby areas.

Features such as the ultrastructure and types of paleae and chaetae along the body were examined using scanning electronic micrographs (SEM) obtained by a Zeiss EVO LS15 SEM with a Robinson Backscatter detector. In addition, line drawings are provided as well as light microscopy photographs taken with a Leica MZ16 microscope and Spot flex 15.2 camera attached, to illustrate diagnostic characters.

The descriptions were generated using DELTA System (DEscription Language for TAXonomy) to provide standardised species and generic descriptions (Dallwitz 1980; Dallwitz et al. 1993) and then edited. A dichotomic key was also produced with DELTA.

Genera and species are listed alphabetically and synonymies included are those for which we have examined material, so for a complete list of synonymies see Kirtley (1994).