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Four new species of Acoela from Chile

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Abstract

Acoels are with few exceptions marine worms and a common component of the interstitial meiofauna. In this study we present new species to science belonging to Isodiametridae and Solenofilomorphidae. The new species, *Isodiametra finkei* n. sp., *Postaphanostoma nilssoni* n. sp., *Pseudaphanostoma hyalinorhabdoida* n. sp. and *Solenofilomorpha pellucida* n. sp. were all collected in Chile during March 2012. Nucleotide sequences for the ribosomal genes 18S rDNA and 28S rDNA as well as COI mtDNA have been determined for the new species and used in a maximum likelihood analysis to further support their classification.

Key words: Isodiametridae, Solenofilomorphidae, Interstitial, Meiofauna, Southeastern Pacific Ocean

Introduction

Acoela are small marine worms that live interstitially in sandy or muddy sediments, among algae, or, more rarely, in the pelagic zone. They occur in all oceans and climates, often in very high abundance. Acoel diversity and taxonomy has mostly been studied in the North East Atlantic (e.g. Westblad, 1942, 1945, 1946, 1948; Dörjes 1968), the Sao Paulo Area (Marcus 1948, 1950, 1954a, 1957) and in parts of the East Coast of the United States (e.g. Hooge and Tyler 2003, Hooge and Smith 2004). In spite of their evolutionary significance and controversial phylogenetic position (see Edgecombe *et al.* 2011 with references), the appreciation of acoel diversity outside of the above-mentioned areas is virtually non-existing.

From the whole Pacific Coast of South America only four species of Acoela are known, all of them from southern Chile: *Amphiscolops gemelliporus* Marcus, 1954b, *Haplogonaria idia* (Marcus, 1954b), *Isodiametra urua* (Marcus, 1954b) and *Rimicola glacialis* Böhmig, 1908. Compared to the 83 species known from the North Sea island Heligoland (Germany), this low number is illustrative of the lack of knowledge on acoel biodiversity in the South Pacific. A database summarising what is known about acoel diversity and distribution and presenting the current classification can be found at <http://acoela.myspecies.info>. A subset of these data is also available at <http://www.marinespecies.org/aphia.php?p=taxdetails&id=2847>

Here we report on four new species of Acoela from the central Chilean coast collected in 2012 during a visit to the Estación Costera de Investigaciones Marinas in Las Cruces, Metropolitan province. To reconstruct the phylogenetic position of the new species and to provide molecular “barcodes” to facilitate their identification we sequenced the nuclear ribosomal SSU (18S) and LSU (28S) genes as well as a portion of the mitochondrial Cytochrome oxidase subunit I (COI) from each species. For phylogenetic analysis the sequences were appended to the acoel dataset published in Jondelius & Wallberg *et al.* (2011).

Material and methods

Sampling and documentation

Samples were collected by SCUBA diving, snorkeling or simply by scooping up the top layer of the sediment

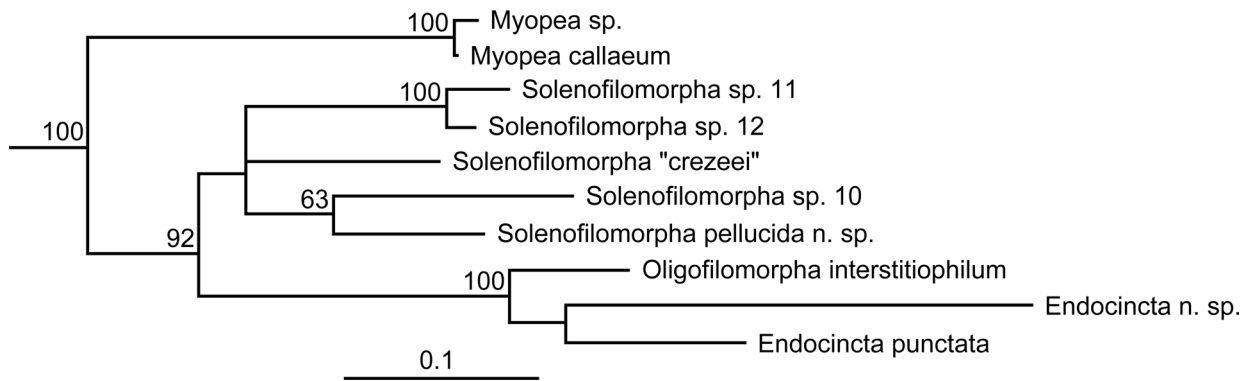


FIGURE 16. *Solenofilomorpha pellucida* n. sp. Details of the 50% consensus tree after bootstrap analysis of the concatenated 18S, 28S and COI dataset showing the position of this species.

the single testis, and the position of the ovaries posterior to the male copulatory organ supports the position within Solenofilomorphidae. The lack of rhammites and a penis further supports the position within *Solenofilomorpha* according to the diagnoses in Dörjes (1968) and Crezee (1975). The maximum likelihood analysis of the concatenated 18S, 28S and COI sequences provides high support for a clade containing *Solenofilomorpha*, *Endocincta* and *Oligofilomorpha* corresponding to the family Solenofilomorphidae. The individual monophyly of these genera based on molecular data has not yet been addressed. Hence, classification of the new species within *Solenofilomorpha* is reasonable since this is the type genus for Solenofilomorphidae (Fig. 16).

TABLE 2. Selected characters for species within *Solenofilomorpha*.

	<i>S. pellucida</i> n. sp.	<i>S. funilis</i> Crezee, 1975	<i>S. guaymensis</i> Crezee, 1975	<i>S. justinei</i> Nilsson <i>et al.</i> 2011	<i>S. longissima</i> Dörjes, 1968
Length/width-ratio	1:18	1:14	1:14	1:5	1:19
Body pigmentation	Absent	Absent	Absent	Absent	Present
Position of ovaries	Reaches to posterior-most part of body	Mid-body region	Mid-body region	Posterior third of body not reaching posterior-most part of body	Mid- to posterior third of body
Antrum	Absent	Present	Present	Present	Present
Seminal bursa	Absent	Present	Present	Absent	Absent

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