

A New Genus and Species of Earthworm (Oligochaeta: Megascolecidae) from Semi-Arid Australia

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ABSTRACT. A new genus and species of terrestrial oligochaete, *Aridulodrilus molesworthae* (Megascolecidae) is described from a new species found in a semi-arid habitat in New South Wales, Australia. The location of this species provides additional evidence that localized landscape and pedologic factors have allowed isolated populations of native earthworms to persist in areas where low rainfall averages were previously thought to preclude their occurrence. The genus has a combination of morphological features that distinguish it from all other Australian genera. While it shares some features with genera in Western Australia, the wide geographic gap (some 2300 km) appears to preclude any close phylogenetic affinity with these taxa.

Introduction

Genomic studies currently support a Pangaeian origin for earthworms, with vicariance into distinct Northern and Southern Hemisphere clades following its breakup (Anderson *et al.*, 2017). The Megascolecidae is one of the largest earthworm families in the Southern Hemisphere and the zoogeographic affinities of members of the family in disparate Gondwanan fragments (Jamieson, 1981) suggests that they have existed in Australia well before the dismemberment of that supercontinent, persisting and diversifying throughout the many subsequent climatic and geological shifts.

The lack of fossil records notwithstanding, it is a reasonable assumption that earthworm populations were more widespread across the Australian continent when more mesic habitats were prevalent. The last significant drying period in Australia during the late Miocene likely precipitated a retreat of earthworms to wetter coastal areas and the major river systems of the continent, but the climatic shift may have been sufficiently gradual to allow earthworm populations to persist and vicariate within drier habitats where critical

soil, topographic and groundwater factors intersect. The new taxon described herein may be an example of such a survival.

The earliest studies of the Australian earthworm fauna were centred on New South Wales, with J. J. Fletcher of the Australian Museum publishing several papers (e.g., Fletcher, 1886) and predicting that “the earthworms of this Colony... as regards both individuals and species, will compare favourably in point of numbers with earthworms in other parts of the world.” More than a century of subsequent research has revealed a remarkable biodiversity in the Australian earthworm fauna, with nearly 800 endemic species in 55 genera having now been described. The anatomical features and taxonomy of Australian earthworms have been summarized in Jamieson (2001), Blakemore (2000a) and Dyne & Jamieson (2004). Molecular analysis has shown that the Megascolecidae is monophyletic, with acanthodrilid earthworms, once considered a separate family, to be an included clade (James & Davidson, 2012). Unique combinations of anatomical features clearly define many Australian earthworm genera, but the taxonomic distinctions between others are less clear, because a very long evolutionary history in Australia has likely included

Keywords: *Oligochaeta*; *Megascolecidae*; *Aridulodrilus*; semi-arid Australia; earthworm taxonomy; climate adaptation; microhabitat

Zoobank registration: urn:lsid:zoobank.org:pub:92DD3DC4-7991-4054-B345-0E56BBF7B168

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Received: 12 February 2021 **Accepted:** 9 August 2021 **Published:** 10 November 2021 (in print and online simultaneously)

Publisher: The Australian Museum, Sydney, Australia (a statutory authority of, and principally funded by, the NSW State Government)

Citation: Dyne, Geoffrey R. 2021. A new genus and species of earthworm (Oligochaeta: Megascolecidae) from semi-arid Australia. *Records of the Australian Museum* 73(4): 123–129. <https://doi.org/10.3853/j.2201-4349.73.2021.1769>

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