



## **Extraordinary diversity and patterns of distribution in tiny subterranean crustaceans: Parabathynellidae (Bathynellacea) of Western Australian arid zone.**

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Parabathynellidae are small interstitial/subterranean crustaceans that have been restricted to groundwater habitats for a long time, as suggested by the absence of extant surface species, potentially millions of years longer than contemporaneous taxa within the same assemblages. Their present-day ranges are influenced by a combination of restricted habitats, complex lifestyles, and biogeographical patterns reflecting ancient hydrology. Providing ecosystem services such as water purification and nutrient cycling, species in this important stygobitic (organisms inhabiting only groundwater) group are still poorly described. To date, only 52 species are formally recognised in Australia. However, an abundance of material, routinely collected and sequenced for environmental impact assessment surveys related to mining developments, has uncovered an extraordinary diversity, especially in the northern Western Australia, with intriguing distribution patterns. Australian Parabathynellidae include nine mostly endemic genera, and two genera that have 'cosmopolitan' and 'Gondwanan' distributions: respectively, *Hexabathynella* (25 described species to date), and *Atopobathynella* (17 described species to date). Recent morphological and molecular studies conducted have revealed an abundance of species within these two genera, with complex distribution patterns. Understanding Parabathynellidae diversity and species boundaries is crucial for the conservation of stygobitic taxa and their important groundwater habitats in a landscape increasingly impacted by human activities.

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