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## Digitate and capitate soft corals (Cnidaria: Octocorallia: Alcyoniidae) from Western Australia with reports on new species and new Australian geographical records

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### Abstract

We report on digitate and capitate Octocorallia within the genera *Parasphaerasclera* McFadden & Ofwegen, 2013, *Eleutherobia* Pütter, 1900, *Sphaerasclera* McFadden & Ofwegen, 2013, and *Paraminabea* Williams & Alderslade, 1999 from tropical Western Australian waters. Three new species (*Parasphaerasclera kimberleyensis*, *Eleutherobia australiensis*, *Eleutherobia imaharai*) are described, with a discussion of their taxonomic placement in the light of a recent treatment of the genus *Eleutherobia* and related taxa by McFadden & Ofwegen (2013). In addition, range extensions for three species are reported, *Parasphaerasclera grayi* (Thomson & Dean, 1931) known from Indonesia and the Pacific Ocean, *Eleutherobia somaliensis* Verseveldt & Bayer, 1988 from Somalia, and *Eleutherobia splendens* (Thomson & Dean, 1931) recorded from Indonesia and the Philippines. Additionally, one new Australian geographical record (*Sphaerasclera flammicerebra*) (Williams, 2003) with a known distribution from Palau to Mauritius, has been included. We complement mor-

phological taxonomy with molecular data (*mtMutS*, 28S rDNA) to analyse and clarify phylogenetic placement of these species. The mitochondrial *mtMutS* phylogeny supported *Eleutherobia*, *Paraminabea*, *Parasphaerasclera* and *Sphaerasclera* as distinct monophyletic genera. Phylogenetic analyses based on 28S rDNA lacked resolution and were largely unresolved. Additionally, the molecular data corroborated our proposed morphological hypothesis of the placement of the new species *P. kimberleyensis* **sp. nov.** with no anthocodial armature in the genus *Parasphaerasclera*, and the assignment of the new species, *E. australiensis* **sp. nov.** and *E. imaharai* **sp. nov.**, with distinct polyps sclerites in the genus *Eleutherobia*.

**Key words:** *Eleutherobia*, *Paraminabea*, Parasphaerascleridae, *Parasphaerasclera*, *Sphaerasclera*, Kimberley, Indian Ocean

## Introduction

The tropical marine environment of Western Australia extends northwards from the Tropic of Capricorn at 23.44° S and encompasses several marine bioregions, which reflect the region's diverse macro-scale habitat structure. The soft coral fauna of this large area, while largely unknown, is represented in many of the region's habitats, including inlets, estuaries, coastal and off-shore reefs and islands. Deep water soft coral communities are even less well known having received little collecting effort. Since 2009 the Western Australian Museum has been undertaking comprehensive biodiversity surveys off the Kimberley coast, in the state's far north (Bryce & Sampey 2014). Examination of soft coral species from these recent collections, paired with historical material from the Western Australian Museum's collection, has provided a base-line dataset on soft coral species occurrence and community composition.

In this account we focus on small, digitate and capitate species of the genera *Eleutherobia*, *Parasphaerasclera*, *Sphaerasclera* and *Paraminabea*; genera that are often represented by one or few species (*Eleutherobia* 11, *Parasphaerasclera* 6, *Sphaerasclera* 1, *Paraminabea* 10), and often have very narrow geographic distributions (Table 1; McFadden & Ofwegen 2013). To date only three relevant species have been recorded from Australian waters; *Eleutherobia rubra* (Brundin, 1896) was described from the north west coast of the continent (Verseveldt & Bayer 1988), *Parasphaerasclera zanahoria* (Williams, 2000) was more recently recorded from the north east coast on the Great Barrier Reef by one of us (Alderslade, unpublished) and *Paraminabea aldersladei* Williams, 1992 from the north east and north west coasts of Australia (Williams 1992; Williams & Alderslade 1999). More than half of the described species of these genera were collected during two expeditions, the *Siboga* Indonesia Expedition in 1899 (Thomson & Dean 1931); and the German deep-sea expedition in 1906 (Kükenthal 1906a). Considering the limited survey effort in remote areas in comparison to more readily accessible areas it is hypothesized that the number of recorded deep-water species will increase with further collecting effort. The same holds true for the small species found in shallower habitats, which have adapted to a cryptic lifestyle preferring low light areas, such as overhangs and caves (Williams & Alderslade 1999; Williams 2000, 2001, 2003). Sampling in these rather inaccessible, high energy areas, in combination with the small colony size and apparent low abundance, makes them difficult to find. This present contribution describes three new species of soft coral within the genera *Parasphaerasclera* and *Eleutherobia*. The species, *P. kimberleyensis* **sp. nov.** was collected under an overhang at Long Reef, north Kimberley. *E. australiensis* **sp. nov.** was collected from deep-water off the Dampier Archipelago and *E. imaharai* **sp. nov.** off North West Cape, which is in the Pilbara region of Western Australia. Further, we report on range extensions of a number of species of *Eleutherobia*, *Parasphaerasclera*, *Sphaerasclera* and *Paraminabea*, and discuss the taxonomic placement of all included species which we establish using an integrative taxonomic approach (see Dayrat, 2005; Will *et al.* 2005; McFadden *et al.* 2014), combining morphological examinations with molecular phylogenetic analyses derived from two independent markers (i.e. *mtMutS* and 28S rDNA).

## Abbreviations

WAM      Western Australian Museum, Locked Bag 49, Welshpool DC, WA 6986, Australia.  
QM        Queensland Museum.  
AIMS     The Australian Institute of Marine Science.