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Australia's deep-water octocoral fauna: historical account and checklist, distributions and regional affinities of recent collections

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Abstract

The number of deep-water (>80 m) octocoral species recorded from Australian waters has more than tripled from 135 to 457 following six surveys undertaken between 1997 and 2008 on the deep continental margin of south-eastern, western and north-western Australia and the Tasman Sea. This rapid increase in knowledge follows a slow accumulation of records since the earliest collections were made by vessels such as the *Géographe* and the *Naturaliste* in the early years of the 19th century. Consistent identification and alpha-labelling of the octocoral fauna between surveys has permitted a multi-region description and comparison. We detail the identities, distributions and regional affinities of 457 octocoral species in 131 genera and 28 families from the orders Alcyonacea and Pennatulacea, including 69 new species, 17 new genera and 43 first records for Australia. Five of the more common genera were widely distributed (present at 35 and 66 sampling stations spanning all of the 4 survey regions), but two were restricted to south-eastern Australia—*Pleurogorgia* Versluys, 1902 and *Tokoprymno* Bayer, 1996—and were only sampled from depths below 700 m. The great majority of species (81%) and nearly half of all genera (47%) were only sampled once or twice. The highest average number of species per sampling station (3.2) was reported from the outer shelf. The proportion of new species was highest ($\geq 22\%$) on the upper and lower slope bathomes, intermediate (13–15%) on the mid-slope bathome and lowest (8%) on the outer shelf bathome. Species overlap between bathomes was low, but all families were shared across bathomes. Most described species (55 of 69) have an Indo-West Pacific affinity, 20 have an Indian Ocean affinity, while three were previously recorded from the Atlantic Ocean only; 20 appear to be Australian endemics. Octacorals can now be added to an emerging set of taxon-specific data sets—including fishes, ophiuroids and galatheids—that permit regional-scale analysis of biodiversity distributions to support Australia's efforts in marine conservation management. However, because so much of the world octocoral literature is inadequate for accurate identifications to species level, there is a pressing need for taxonomic revisions using modern morphological and molecular techniques to fine-tune the current use of octacorals as indicators of vulnerable marine ecosystems in many national and high seas conservation initiatives.

Introduction

Octacorals are a highly diverse group of predominantly sessile, colonial, filter-feeding cnidarians comprising soft corals and gorgonians (order Alcyonacea), sea pens (order Pennatulacea) and blue corals (Helioporacea). Octacorals form a visually prominent part of the epifauna of the deep sea and often form large, erect tree-like structures that extend well above seafloor sediments. They are a major component of deep-sea structural biogenic habitat and are often used by other fauna as substrate or habitat (e.g. Buhl-Mortensen *et al.* 2010; Le Guilloux *et al.* 2010; Baillon *et al.* 2012). Accordingly, their presence has been associated with increased biodiversity in the deep sea (Rogers *et al.* 2007; Yesson *et al.* 2012). Virtually all octacorals have calcified skeletal elements (sclerites and axial elements) rendering them vulnerable to ocean acidification (climate change) (e.g. Guinotte & Fabry 2008).

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APPENDIX 1. Checklist of all the taxa identified from samples collected during 6 biodiversity surveys between 1997 and 2008, showing the number of sampling stations and depth range of collections, identification status and the survey region of collection. Also identified are the first distribution records for Australian regions and the global distribution record for each described species. (Note for summaries where an identification was ‘cf.’ a nominal species it was classed as being ‘described’ unless another specimen(s) had been identified as that species, then the ‘cf.’ identification was classed as ‘uncertain’). Specimens are lodged with Australian museums based on region of collection: (1) North Tasman Region: Northern Territory Museum & Art Gallery (NTM), with some duplicate specimens lodged with the Australian Museum (AM); (2) south-eastern Australia region: Tasmanian Museum and Art Gallery (TMAG); (3) south-western and north-western Australia: Western Australian Museum (WAM).

[Separate Excel Spreadsheet]