

First record of Microzoanthidae (Anthozoa: Hexacorallia: Zoantharia) in Palau and as a biofouling organism

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Here we report on the first record of the family Microzoanthidae (Cnidaria: Anthozoa: Hexacorallia) from Palau, and by extension in Micronesia. Unusually, the species Microzoanthus kagerou was found not in a coral reef environment as has been previously reported elsewhere, but instead inhabiting shaded seawater outflow pipes at the Palau Maricultural Developmental Center on Malakal Island, Koror.

Keywords: Palau, zoanthid, biofouling, microzoanthid, first record

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INTRODUCTION

The nation of Palau is situated in south-western Micronesia, and is noted for its beautiful coral reefs, despite being impacted by the worldwide bleaching event of 1998 (Bruno *et al.*, 2001). Regardless of the overall good health of coral reefs, and a long history of coral reef research (Kawaguti, 1940, 1941, 1942), very little is known about the species diversity of many groups of marine invertebrates in Palau, and no focused museum collection exists for this part of the world.

One such taxon for which almost no records from Palau exist are the zoanthids (Anthozoa: Hexacorallia: Zoantharia), an order of benthic cnidarians most closely related to the sea anemones (Fujii & Reimer, 2011; Kayal *et al.*, 2013). Zoanthids are found in most marine environments, and some species are very common in shallow subtropical and tropical waters (Karlson, 1980; Irei *et al.*, 2011). While recent research has reported on species diversity from several locations in the Pacific (e.g. Australia in Burnett *et al.*, 1997; Galapagos in Reimer *et al.*, 2008), there are very little data from Micronesia in general (but see Paulay *et al.*, 2003), and Palau in particular (Colin, 2009).

Within the zoanthids, the family Microzoanthidae Fujii & Reimer, 2011 was recently described from specimens collected from numerous locations across the Pacific, including Okinawa, mainland Japan, Singapore, Thailand, Australia, and the Galapagos. Currently, there is only one genus and two species described in this family, *Microzoanthus occultus* Fujii & Reimer, 2011 and *M. kagerou* Fujii & Reimer, 2011. However, given the small size of individual polyps (diameter approximately 0.5 mm) and their cryptic habitat in cracks or on the undersides of coral rubble in shallow coral reefs, it has been speculated that these species may be widely

distributed throughout the subtropical and tropical Pacific, and perhaps locally common (Fujii & Reimer, 2011).

As part of a research project investigating the biodiversity of marine invertebrates in Palau, surveys were conducted to assess the biodiversity on zoanthids in Palau. Here, we report on one unexpected finding of Microzoanthidae from these surveys.

MATERIALS, METHODS AND RESULTS

During surveys of zoanthid diversity in Palau in December 2012 and March 2013, clusters of small colonial anthozoans (polyp diameter approximately 5 mm) were noticed in shaded areas on the sides of seawater outflow pipes at Palau Mariculture Development Center (Malakal Island, Koror; 7°19'43"N 134°27'1"E) (Figure 1A) and were the dominant benthos, far outnumbering the only other benthic organism observed (*Aipstasia* anemones). Detailed images, collection, and examination identified these to be the microzoanthid *Microzoanthus kagerou*, as polyps were clearly zoanthids with two rows of tentacles and sand encrustation, and had a white zigzagged pattern around the edge of oral discs with narrow stolons between polyps as is characteristic of this species (Figure 1B).

Specimens are currently housed at the Palau International Coral Reef Center (PICRC), Koror, under specimen number PICRC-SATREPS no.1. It is planned to deposit this specimen in the Belau National Museum, Koror once a marine invertebrate collection is established there in the near future.

DISCUSSION

This is the first record of Microzoanthidae from Palau, and by extension in Micronesia. Previous reports exist for Japan,

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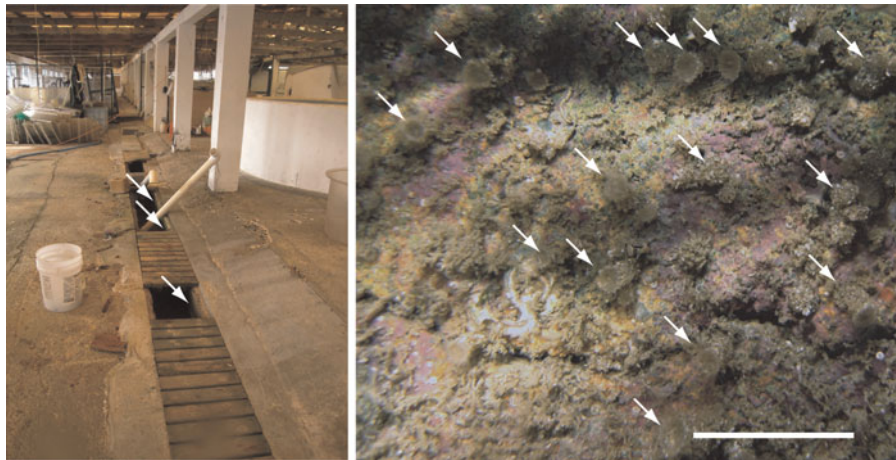


Fig. 1. Sampling locality of Microzoanthidae: (A) location of outflow pipes at Palau Mariculture Development Center (PMDC), Malakal Island, Koror. Arrows indicate areas of the outflow pipes where specimens were found; (B) *Microzoanthus kagerou* in situ at PMDC. Arrows indicate individual polyps. Scale bar: approximately 1 cm.

Singapore, Thailand, Australia, and the Galapagos (Reimer *et al.*, 2008, 2011; Fujii & Reimer, 2011), and other photographic evidence exists from Indonesia (Reimer & Hoeksema, unpublished data). This record helps to confirm the hypothesis put forward in the original description that Microzoanthidae are likely widespread throughout the Pacific (Fujii & Reimer, 2011).

Azooxanthellate Microzoanthidae has previously been reported from shaded cracks and the undersides of coral rubble (Reimer *et al.*, 2008, 2011; Fujii & Reimer, 2011). This is the first report of their occurrence as a biofouling organism. However, based on their ecology, the presence of Microzoanthidae in outflow pipes was not unexpected as planktonivores can find outflow pipes to be potentially excellent sources of nutrition (e.g. O'Neill & MacNeill, 1991). Outflow pipes are also safe from wave action and severe weather disturbances common in shallow reefs. It is interesting to note that, despite extensive searches during a zoanthid diversity survey of Palau by the first author in March 2013, no Microzoanthidae were found in coral reef environments.

Species in this family evidently prefer dark, shaded areas on reefs in small cracks or under rocks, in environments with high levels of current or waves, and outflow pipes fit well with this description. Future biodiversity surveys that include Microzoanthidae in their scope would be well served by checking outflow pipes of any seawater fisheries hatcheries.

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