Diversity in the globally intertwined giant barrel sponge species complex

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Two differently colored giant barrel sponge species in Tanzania merge when they grow against each other

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Giant barrel sponges (*Xestospongia* spp.) form a species complex with a globally intertwined evolutionary history and multiple species often co-exist on the same reefs (Chapter 2 this thesis). Subtle species-specific variation in the outer morphology of giant barrel sponge species has been documented (López-Legentil and Pawlik 2009; Swierts et al. 2013), but due to the similarities in their main body plans it remains difficult to taxonomically distinguish between the species, especially in the field. However, in Tanzania (6°42'27S, 39°17'1E) a large population (n= >100) of giant barrel sponges was found that consisted of two clear morphologies. One morphology was purple with a relatively smooth to bumpy surface, and the other was bronze with digitate external structures (Fig. 3.1). DNA barcoding of three genes showed that these morphologies represented two different genetic groups that were described in Chapter 2 of this thesis. The bronze sponges corresponded with genetic group 2 which was omnipresent on Southeast Asian reefs, and the purple sponges corresponded with genetic group 4 which was previously only found in Taiwan and Singapore.

In addition, two individuals with different genetic identities were observed growing against each other, and at the contact zone, the color of the purple sponge diffused into the bronze sponge (Fig. 3.1). The color of sponges is often derived by the composition of the associated microbiota (Blanquer et al. 2011). It is, therefore, not clear whether this blended area is the result of the exchange of hybridizing sponge cells or an exchange of microsymbionts.

Figure 3.1. Two merged individuals of giant barrel sponge species (*Xestospongia* spp.) with distinct color morphologies in Tanzania.

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Section two: Prokaryotes