

Exploring the biodiversity of tube-dwelling coral simbiotes from the Faafu atol (Maldives)

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Coral reefs are highly productive ecosystems. Species associated with coral reefs are estimated in over than a million, of which about 90% are still not described. The Maldives islands are characterized by a very diverse marine faunal assemblage associated with one of the world's most biodiverse coral reef ecosystems. This study aims to investigate the diversity of tube-dwelling coral symbiotic fauna associated with reefs around the Faafu atoll (Maldives archipelago), focusing on their host prevalence and dominance. Two underwater visual census campaigns were performed in different sites near Magoodhoo island, Faafu Atoll (Sep 2024, Feb 2025), meanwhile sampling the live and dead hard coral portion hosting the symbiotic organisms. Photo-video recording of domicile openings of the different animal taxa was carried out, to avoid over-sampling and to set a non-impacting method to identify the coral reef's associated animals. Samples were transported to MaRHE Center laboratory in Magoodhoo for a first morphological identification of associated macrozoobenthic fauna and photo reporting of their associated bores. Samples of corals and associated animals were stored in ethanol and transported to the Messina University laboratories for molecular identification. Porites and Echinopora represented the most monitored coral genera, while Plesiastera and Pleuractis genera were found less inhabited and therefore sampled. Interestingly, even dead coral resulted in housing epibionts, especially for the relationship between crustaceans and dead Echinopora coral. The preliminary analyses on 44 collected coral samples showed the presence of about 110 specimens of several taxa belonging to three main phyla, Crustacea (61%), Anellida (18%), and Mollusca (21%). The most represented orders resulted in Decapoda, Sabellida, and Mytilida. The crossing of both sampled and underwater photo-videographic material analyses helped to create a taxa-domicile opening relation, indirectly identifying 181 additional specimens in total (53% Crustacea, 27% Anellida, 20% Mollusca). Photographic determination is currently ineffective for species discrimination, but can certainly be improved. Further studies are needed to assess symbiotic species identification, type of interaction, and species-specific relationships with corals. Focusing on these relationships in changing environments is essential and these data shed light on interesting insights, achievable through non-invasive sampling methods.