TITLE: A PIONEERING CHEMOSTAT-FED DEEP SEA SIMULATOR SYSTEM FOR CULTIVATION OF CORALS AND SPONGES FROM THE DEEP OCEAN

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ABSTRACT:

Corals and sponges are important members of marine ecosystems, and their associated microorganisms are key components to support their function and health. While corals, sponges, and their symbiotic microbes have been extensively studied in shallow waters, deep sea communities are considerably less explored. To better understand the symbiotic relationships and key metabolisms in deep sea environments, manipulation experiments are also necessary. However, the lack of systems that are able to reproduce conditions in the deep ocean remains a concern, especially when referring to culturing deep sea microbes. Here, we report the construction of a deep sea simulator (DSS) system that allows for: i) 48 true experimental replicates split in 8 independent, experimental conditions; ii) a temperature range from -2 ^{o}C to 80 ^{o}C and iii) the possibility of running experiments in a recirculating or flow-through mode. The DSS is feed by chemostat to continuously cultivate deep water microorganisms as feed for the corals and sponges. For the chemostat, a volume of 10,000 liters of seawater is treated with ozone and UV light, inoculated with deep water microorganisms and incubated at 7 ^{o}C. To simulate deep sea conditions, oxygen concentrations are also lowered using a degasification chamber. Methods are currently being optimized for microbial cell concentration and stock preparation, as well as for their reactivation and inoculation in the DSS. To do so, cell counts via epifluorescence microscopy and 16S rRNA gene diversity analyses to determine the microbial community patterns for different methodologies are being performed. By the end, we expect to be able to cultivate and perform experiments with deep sea corals, sponges, and their associated microbes mimicking the unique conditions of the deep ocean in our experimental system.

Keywords: deep sea, chemostat, corals, sponges, microbial ecology.

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