Sponge baths to continue…

PROJECT NAME: Towards closing the life cycle of marine sponges. Benefits for public aquarium display and coral reef conservation.

PROJECT DATES: 2010 – 2011.

PROJECT LEADER: Prof. Rocky de Nys. James Cook University, Townsville, Australia. This project was funded by an Australian Research Council Linkage Grant with Reef HQ Aquarium as the industry partner making a significant direct contribution financially and in-kind.

PROJECT FOCUS: In the wild, sponges are abundant, diverse and functionally important components of the marine environment with crucial associations for many reef fish and invertebrates. In our bathroom, bath sponges often come from aquaculture that relies on collection of seed stock from the wild. Therefore, understanding the sponge life cycle is important.

To improve our ability to produce sponges sustainably, this project focused on sponge's reproduction and development stage of the young larvae. Over the course of two years, researchers collected monthly samples from six Great Barrier Reef (GBR) sponge species to document the reproductive cycle and to test larval settlement and juvenile culture.

Most species of sponges have been successfully transported to Reef HQ Aquarium and spawned within the aquarium system. Larvae have been successfully maintained on artificial surfaces and have been cultured through to juvenile sponges, from days to several weeks.

Above: A typical GBR sponge *(Coscinoderma matthewsi.)*

PROJECT OUTCOMES: Larval culture can be sustainable source of seed stock to support aquaculture operations, thereby replacing wild collection. Field surveys help predict when particular species are spawning, thereby setting timetables for manipulating larval settlement and optimising recruitment in aquaculture or aquaria. Sponge larvae exhibit a markedly higher thermal tolerance than previously expected, with no adverse health effects detected at temperatures up to 36°C (higher than predictions of current climate change scenarios) whereas adults get affected at 32°C. The molecular mechanism that underpins these contrasting thermal tolerances was identified as a heat shock protein induced by increasing temperature, and allowing or inhibiting important biological functions. Larvae settlement is faster in the presence of biofilm or coral rubble compared to sterile surfaces.

We now need to optimise the environment so that juveniles survive and grow to adults, with a focus on the control of algal overgrowth which has been identified as a major barrier to survival and growth. This project involved several university students and Reef HQ Aquarium interns.

Results from this project were published in:

Wahab, Abdul, Rocky de Nys, and S. Whalan. "Closing the lifecycle for the sustainable aquaculture of the bath sponge *Coscinoderma matthewsi*." *Aquaculture* 324 (2012): 281-289.

Webster, Nicole S., et al. "The larval sponge holobiont exhibits high thermal tolerance." *Environmental microbiology reports* 3.6 (2011): 756-762.

Wahab, MA Abdul, Rocky de Nys, and S. Whalan. "Larval behaviour and settlement cues of a brooding coral reef sponge." *Coral Reefs* 30.2 (2011): 451-460.

Webster, N., et al. "A complex life cycle in a warming planet: gene expression in thermally stressed sponges." *Molecular ecology* 22.7 (2013): 1854-1868.

Whalan, Steve, Nicole S. Webster, and Andrew P. Negri. "Crustose coralline algae and a cnidarian neuropeptide trigger larval settlement in two coral reef sponges." *PloS one* 7.1 (2012): e30386.