

Montipora dilatata Propagation Project

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Background to the Project

Montipora dilatata is a rare coral restricted to parts of the Hawaiian archipelago, more specifically, in Kaneohe Bay on Oahu, and in the Northwestern Hawaiian Islands at Midway Atoll and Maro Reef.

Following a coral bleaching episode in Kaneohe Bay in the summer of 1999, several large stands of *M. dilatata* died off and did not recover. A survey of the Bay conducted by Waikiki Aquarium and Department of Land and Natural Resources (DLNR) personnel in May 2000 found only three living colonies. Three samples were taken from one of the colonies. One sample was taken for taxonomic investigation. The other two samples were each fragmented into two, producing four pieces that were taken back to the Aquarium. At the time of collection these fragments were approximately 10 cm long and 1.25 cm wide. Two of these pieces were placed in a holding tank in the research area and two were placed on exhibit; unfortunately, the two on display died a few months later.

Propagation Efforts at the Waikiki Aquarium

By 2002, the two fragments in the Aquarium's research area had increased in size to several colonies over 20 cm in diameter and so it was decided to remove two small colonies into an outdoor exhibit, the Edge of the Reef, a 26.6 m³ open system containing Hawaiian corals and fish. Each of these colonies is now (March, 2007) over 30 cm in diameter and 15 cm in height.

In 2004, the Waikiki Aquarium received a small grant from the DLNR to construct a coral "ark" tank behind the scenes. The purpose of this 900 l open system was to house rare Hawaiian corals to serve as a genetic and specimen repository. The first specimen placed in this system was a 10 cm diameter colony of *M. dilatata* in October of 2004; that colony is now (March, 2007) over 40 cm in diameter and 20 cm high, and consists of three distinct colonies; a result of incidental fragmentation.

Thus, after six years, the fragments at the Waikiki Aquarium have flourished into healthy colonies, even though colonies in the wild continue to be sparse.

Montipora dilatata Propagation System

Based partly on this previous success, in August 2006 the National Marine Fisheries Service (NMFS) awarded a grant to the Waikiki Aquarium for the construction of a *M. dilatata* propagation system, as well as research system for the brachiopod *Lingula reevi*. Modeled after other coral propagation systems at the Aquarium, the *Montipora* propagation system consists of a 2.7 m long, 1.2 m wide and 0.75 m high fiberglass tank with an attached overflow/sump built onto one end; the total volume of the system is 2.5 m³. The tank uses a ½ HP pump for water circulation, and airstones for additional turbulence and to break up the water surface.

The system is open and saltwater from a saltwater well 24 m deep is used as the sole water source. The chemical and physical characteristics of this water have been described elsewhere (see Atkinson et al., 1995; Delbeek and Sprung, 2005; Delbeek, 2006), but compared to natural seawater it is high in dissolved inorganic carbon, silicate, nitrogen, phosphorous, iron, manganese and a host of other inorganic compounds, but very low in dissolved organics. This makes for accelerated algal growth after initial setup but also excellent coral growth.

Construction of the system was completed in October 2006. At that time, live rocks were added to the bottom of the tank. To facilitate the placement of fragments off the bottom of the tank, plastic shelving mounted onto fiberglass threaded support rods was added, onto which was mounted 25 pieces of *M. dilatata* fragmented from the coral “ark” tank specimen and ranging in length 5.5 cm to 10 cm. Herbivores (four Hawaiian convict surgeonfish *Acanthurus triostegus* and ten collector urchins *Tripneustes gratilla*) were added to control diatom and algal growth. At this time (March, 2007), the fragments have attached to base rock and have begun to exhibit growth.

Photographs

Photo A. *Montipora dilatata*, August 2006

Photo B: Same colony as in Photo A, four months later, January 2007.

Photo C. *Montipora dilatata* propagation system, January 2007.

Photo D. *Montipora dilatata* fragments mounted in live rock for grow out, January 2007.

Photo E. *Montipora dilatata* fragments mounted in live rock for grow out, March 2007.

Photo A. Montipora dilatata, August 2006



Photo B: Same colony as in photo A, four months later, January 2007.



Photo C. *Montipora dilatata* propagation system, January 2007.



Photo D. *Montipora dilatata* fragments mounted in live rock for grow out, January 2007.



Photo E. Montipora dilatata fragments mounted in live rock for grow out, March 2007.



Budget breakdown

Fiberglass tank	\$4,963.51
Plumbing fixtures	\$447.50
Two ½ HP pumps	\$1,206.46
Two ¾ HP pumps	\$463.50
Minus credit	(\$194.25)
Shipping	<u>\$134.34</u>
Total	<u>\$7,201.06</u>

References

Atkinson, M.J., B. Carlson and J. Crow, 1995. Coral growth in high-nutrient low-pH seawater: A case study of the Waikiki Aquarium. *Coral Reefs* 14(7):1-9.

Delbeek, J.C., 2006. Plenums: A path toward thriving tanks. *Marine Fish and Reef USA* 2007 Annual (9):16-22.

Delbeek, J.C. and J. Sprung, 2005. *The Reef Aquarium: Science, Art and Technology*, volume 3. Ricordea Publishing, Coconut Grove, FL, USA: 680 pp.