

## **A Novel Reef-Keeping Method**

*Francesca Geertsma, MD - January 29, 2001*

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I'll be very honest - my success with the "Berlin Method" of reef-tank keeping has been less than impressive. I have been an avid aquarist since age seven, yet my first attempts at keeping a reef-tank using foam fractionation, live rock, a denitrifying substrate bed and kalkwasser additions were only marginally successful. My first reef-tanks were set up about 7 years ago, while I was still a student. Perhaps my busy schedule detracted from some of the necessary attention to detail that is important when first starting up a reef-tank. Or perhaps a student budget led me to purchase less than optimal equipment and live stock. I'm not really sure. What I do know, is that the beautiful fragments of small polyped scleractinian corals that my well-intentioned friends would give to me would invariably die, leaving white skeletons to litter the bottom of my tank.

Despite my lack of success with the "Holy Grail" of reef-keeping (SPS), I continued to maintain an interest in the hobby. I read as many books and journals as I was able to find. I became active in a local aquarium society and through them, met many advanced local reef-hobbyists as well as nationally and internationally acknowledged experts in the field.

My tanks would go through brief episodes of general health followed by the slow decline and eventual demise of more demanding species. Fortunately, my success with fish and lagoonal-type corals was fair and this kept me from giving up my passion for the hobby.

I remember reading an article in *Sea Scope* by Mike Paletta about 3 years ago in which he described a new system of reef-keeping which utilized "Miracle Mud" in what sounded to me like a type of algae scrubber based system. My lack of success with the "Berlin Method" had already fueled my curiosity in such systems. I remember being fascinated by the description of Leng Sy's system - one that did not utilize a protein skimmer, yet in which even the most delicate species seemed to thrive.

Living in Northern California at the time made it fairly easy to attend MACNA X, which was held in the Los Angeles area that year. I had met Mike Paletta previously at a local aquarium lecture and chatted with him at the conference. He invited me to visit the office of the "EcoSystem" creator, Leng Sy, in nearby Irvine. Upon arriving at the office, I was amazed by the health of the corals in his tanks. Equally amazing was the large number of fish that were maintained in these tanks, far more bio-load than I had seen in other successful reef-tanks. At this point, I made the decision to set up an "EcoSystem" tank. I purchased an instruction booklet and 40 pounds of "Miracle Mud" packed in plastic bags from the "EcoSystem" booth the next day.

After returning home from the conference, I began to plan the new tank. It would consist of a glass aquarium 8 feet long, 24 inches wide and 20 inches high for a total volume of 200 gallons. For lighting, I used two 175 watt 10K metal halide lamps, supplemented with VHO actinics and a three-foot power compact fixture with one daylight and one actinic bulb. The "EcoSystem Method" involves the use of a specialized sump, which acts the primary filtration system for the reef-tank. To create the "EcoSystem" sump, I used an old 40 gallon acrylic tank and constructed acrylic partitions approximately 4 inches from each end of the sump. The middle compartment between the two partitions was filled with approximately 2 inches of the "Miracle Mud".

The area behind one of the partitions on the end was filled with bioballs and the drain holes from the main tank's over-flow box emptied into this area. The compartment on the opposite end of the sump was provided with a bulkhead to which the return pump was attached. Water would flow over the bioballs then through holes in the partition into the mud containing portion, and then over the other partition and back into the tank. A few pieces of caulerpa were then introduced on top of the mud, weighted down by small pieces of rock. Florescent lighting was then added over the middle portion of the sump on a 24 hour light cycle. My next step was to add some live rock from my old system into the new main tank. I added the rock directly onto glass bottom without use of substrate. Then I waited.

Very quickly I noted the development of dark slime algae over the mud and caulerpa in the sump. This was frustrating and led to some doubts in my mind as to whether I had made a big mistake. The sump was reminiscent of some of my failed aquarium endeavors as a child, after the fish had died and I had shoved the tank in a corner. Several phone calls to Mike Paletta helped me to be more optimistic and more importantly, patient. After several weeks, I noted less and less of the slime algae. This was key in allowing the caulerpa to spread over the mud. At this point I began to add my corals.

Approximately 2-3 months after setting up the system, I noticed an explosion of life in the sump. Amphipods and copepods were appreciable in large numbers, as were transparent flat worms with cephalic hoods that they would use to snare smaller creatures. Other populations of animals have appeared sporadically - some of which have maintained their numbers and others, which have disappeared. Currently, the sump is populated primarily by small mysid shrimp, amphipods, copepods, orange flatworms, small limpets, small bristle worms and small anemones. The anemones are small and delicate spearing, with clear tentacles tipped with white spheres. I am unsure of their actual identification - perhaps *Pseudocorynactis* species. Interestingly enough, I have never seen any of the worms or anemones in the main tank.

The corals and fish in the tank did well after being placed in the new system. Soon after the tank was set up I found that I was able to keep some hardy species of SPS alive without difficulty. I added a calcium reactor next and was able to boost my alkalinity and calcium levels with minimal effort. I continued to wait for an algae bloom, especially since I had no skimmer. I waited and waited, but it never came. Instead, at about 9 months, I witnessed increased growth, polyp extensions, and color intensity in the SPS. This was concurrent with a general increase in the density of life in the mud sump. I began to take great satisfaction in purchasing an average dull-colored piece of SPS from a store and watch it transform into a brightly colored, fuzzy jewel in my tank.

I have had my "EcoSystem Method" tank up and operational for almost 2 years. I have experienced the greatest rate of coral growth and general health of the animals during the past year - concurrently with the maturation of my sump. I have a fairly heavy fish load in the tank - 15 medium sized fish in addition to a 30 centimeter *Naso vlamingii* who's biomass is equal to twice that of all the other fish combined. My current maintenance consists of blowing all the detritus from under the rocks to one side of the tank (using a power head) every 2 weeks and then siphoning up the detritus along with approximately 15 gallons of tank water, which I then replace. I have added no trace elements, and the only water parameters that I follow are pH, alkalinity and calcium levels. My pH runs between 8.15 and 8.25 depending on the time of day. My alkalinity runs approximately 13dKH and calcium levels are maintained at about 425 ppm.

I am very satisfied with the "EcoSystem Method" of reef-keeping developed by Leng Sy. My tank contains many varieties of SPS, including some challenging species as *A. gemmifera* and *A. nobilis*, which thrive with minimal effort. The coloration and polyp extension on my SPS are exceptional. I attribute much of my success in keeping these corals to a supply of natural plankton from the sump, which acts as a refugia. At night, when I shine a light into my tank, I notice vast amounts of fine particulate matter in the water, reminiscent of what one experiences on a night dive on a tropical reef. I also see many amphipods and copepods covering the rocks, likely feeding on some of the particulate matter in the water column. The density of these animals is much greater than I observed using the "Berlin Method". Recently, I have also noticed a proliferation of small feather dusters (*B. viola*) that are likely thriving on bacteria and plankton. These micro-fauna are in a large enough quantity that they have enabled me to keep a captive-bred specimen of *Hippocampus reidi* alive in a portion of the sump for the past year without any supplemental feedings.

The only negative experience I have had using this system occurred when I allowed the caulerpa in the sump to grow so dense that little light was able to penetrate down to the lower levels. I noted a subtle yellowing of my water, which subsequently led to some fading of color in the corals. I thinned my caulerpa drastically and used some activated carbon for a week with complete resolution of the problem. Now I routinely thin the caulerpa about every three months, and since making this change have had no more problems with yellow water.

In summary, I feel the "EcoSystem Method" of reef-keeping is a viable alternative to the "Berlin Method". Perhaps the "EcoSystem Method" provides a chance for greater diversity of micro-fauna and flora within a reef-tank. This diversity of organisms may provide a closer approximation of an actual reef, thus allowing us to avoid many of the frequent interventions required of other methods. For me, the final result has been a more successful reef-tank, with less upkeep than I experienced using the "Berlin Method".