

Bathyal and Abyssal Aquariums

Could deep-sea aquariums become accessible to marine hobbyists in the years to come?

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“Going Deep,” in the upcoming February 2010 issue of Freshwater And Marine Aquarium magazine, takes a futuristic look forward at one of the newest biotope aquarium ideas, one not yet available to aquarists. Hopefully, in the future deep-sea bathyal (600 to 13,000 feet) and abyssal (13,000 to 36,000 feet) aquariums will be a part of the hobby.

“Going Deep” authors and husband-and-wife marine scientists Jean-Francois Hamel and Annie Mercier regale readers with their dark, cold “abyssal” tank filled with deep-sea invertebrates collected from between 3,280 and 8,200 feet deep in the northwest Atlantic. Because they are scientists, Hamel and Mercier have access to specimens dredged up from deep-sea trawls and, more recently, those specially collected by a remotely operated vehicle, or ROV, with the capability to descend more than 16,000 feet into the abyss.

Because Hamel and Mercier are only keeping, studying and maintaining deep-sea invertebrates, gas-expansion problems associated with deep-sea fishes brought to the surface have not been a problem for them. Should abyssal tanks ever make their way into the margins of the marine hobby, aquarists will want to take a similar tack in order to increase their chances of success.

The challenges of keeping animals from lightless, frigid depths were many for Hamel and Mercier. To start with, many of the invertebrates they encountered have never been worked with by anyone before; in fact, some of them are completely new to science.

Problem 1 -- Virtually nothing about their “guests” deep-sea lifestyles is known, thus the duo exacted quite a bit of aquarium carnage as they unknowingly put predator and prey together, but this is part and parcel of the scientific journey. Because of Hamel and Mercier’s efforts, were some of these same species ever to become available to rank-and-file hobbyists, the same compatibility mistakes need not be repeated.

Unfortunately, this scenario doesn’t even play out now with standard reef aquaria fauna. Many new entry-level marine hobbyists keep making the same mistakes over and over, killing off innumerable fishes, corals and invertebrates as they go through their own periods of “discovery.” Of course, should deep-sea animals at some point enter the hobby, the inevitable exorbitantly high pricing structure for them would behoove interested aquarists to do their homework before risking losing animals worth hundreds or thousands of dollars.

Problem 2 – How to re-create the dark, cold, clean water conditions associated with these animals? Because the cold, northwest Atlantic sits just outside the doors of their research facility, Hamel and Mercier were able to utilize an inexpensive seawater flow-through system, which performed 100-percent water changes in their multiple tanks (156 to 312 gallons) three times every hour. Of course, this would be entirely impractical for hobbyists. So if abyssal tanks do someday enter the realm of the possible for aquarists, they will need to rely on chillers, insulated tanks and water changes in order to be successful. Hamel and Mercier’s abyssal tanks were kept unlit and the temperatures fluctuated between 30.2 and 48.2 degrees Fahrenheit. Maintaining a constant water temperature at the higher end of this range for aquarists would be doable with the proper equipment and setup. The aquarist could also use red lighting, which would probably not disturb the animals, but would still allow human onlookers the ability to view the tank’s residents and their activities.

Problem 3 – What do you feed things you know next to nothing about? Again, researchers are puzzling the dietary requirements of these animals out, so their future keepers don’t have to. Hamel and Mercier were not able to accommodate all of the diets exhibit by their new deep-sea friends, but a general diet of green sea urchin gonads and shrimp pieces worked for deep-sea anemones, while [Artemia] and artificial marine snow were able to sustain many of the suspension and filter feeders they acquired. Also, blends of mussel bits, crustacean pieces and marine algae as well as the phytoplankton and zooplankton in unfiltered seawater rounds out the dietary fare. A lot of this would not be that difficult for hobbyists to replicate in their own abyssal setups.

Problem 4 – How do these animals get into the hands of hobbyists? Again, this is much down the road, but Hamel and Mercier are not only scientists; they are seasoned aquarists as well. They are carefully studying, and trying to document, the reproductive protocols of many of the newly arrived deep-sea creatures in their midst. They have successfully reproduced a deep-sea sea star, a variety of brooding soft corals and some symbiotic sea anemones. Perhaps, at some

future date, deep-sea broodstock will become available to hobbyists; this would be especially noteworthy if these were captive-produced.

Bringing Environmental Science to Our Systems

One of the hot trends in the aquariumkeeping hobby of late has been the push toward re-creating specific aquatic environments, even down to the kinds of substrates, water flows, plants, etc., within the four glass or acrylic walls we call aquariums. These biotopes try and stay as true as possible to the wild blueprint of a specific aquatic niche. The fishes, corals, other invertebrates and plants kept together in a biotope should be found in close proximity in the wild, that is if the aquarist wishes to stay within the biotope spirit.

Some take it even further by making sure water conditions are similar to what the various animals and plants would face in the wild. Many freshwater aquarists who replicate Amazonian biotopes include tannin-stained, tea-colored water in their biotope setups. For those fishes found in strong-flow areas, the “biotopist” mimics this by incorporating strategically placed powerheads to create similar water movement in their aquarium.

The serious biotopist literally leaves no stone unturned depending on the niche he or she wishes to establish. Freshwater aquarists are light-years ahead in this regard. For example, African Rift Lake setups incorporate fairly hard water and sandy substrate with big, flat rocks for décor. When done properly, such setups encourage natural courtship and spawning behaviors and markedly improve the captive lives of the aquatic animals they hold.

Limitless Opportunities

During the last few years, on FishChannel and in FAMA and Marine Fish & Reef USA, we've covered in detail many different types of biotopes.

In the 2010 Marine Fish & Reef USA (MARU), writer Scott Fellman does a great job expounding the virtues of biotopes in his “Marine Biotopes” article. Fellman gives a nice working definition of what a biotope is: “A ‘biotope marine aquarium’ is an aquarium that is conceived and assembled to resemble a particular environmental niche, such as a lagoon, patch reef, etc. Creating and assembling a biotope system involves researching the types of animals that inhabit the niche, which you are intending to replicate, and designing and building a cohesive aquarium system that will provide an environment in which your chosen animals will thrive.”

Fellman introduces the “Absolutely Faithful to Nature (AFTN) biotope,” where everything in the tank, including substrate, rock, water conditions, corals, inverts and fishes, comes from the same general area in nature. He mentions the “Regional Representation” model, where the tank tries for a larger geographic representation, such as a Caribbean tank, or an Indo-Pacific reef tank. Or the biotopist can re-create a specific aquatic niche; say a sea grass bed, but utilizing animals that inhabit such niches from around the world. You can go with themed aquariums, and the sky's the limit here. Perhaps, you want to try your aquarist creativity and re-create in your tank what goes on under your local pier. Or maybe a Southern California cool-water tank featuring Catalina gobies might be the theme you want to tackle. You could do a Florida sea grass tank, a Florida Keys patch reef, and a tide pool tank with tidal fluctuations – as you can see the only limiting factor in all of this is your own creativity.

Another cool marine biotope covered in Fellman's article is a jawfish setup. It is lots of fun seeing them pop in and out of their burrows in the deep, sandy substrate provided for them in a properly set-up jawfish biotope.

Fellman also offers a complete protocol for setting up a “Rubble Zone” biotope. If interested in giving this biotope a shot, visit FishChannel.com/RubbleZone for details.

Other biotopes covered in the last few years include sea grass setups, a freshwater West African biotope, a Scandinavian coldwater macroalgae setup, a symbiotic clownfish-anemone setup, a South American riverine habitat, a tropical West Atlantic biotope, a “squatty” tank setup, a fiddler crab paludarium, a dwarf lionfish setup, a Myanmar biotope, a tidal-surge tank, a Mexican blind cave tetra tank (including kiln-fired stalagmites and stalactites) and now, perhaps in the future, a deep-sea abyssal tank.

What are Reef Tanks, if not Biotopes?

Are abyssal tanks for hobbyists really that far-fetched? Before aquarists puzzled out how to mimic keeping miniaturized reefs and the many animals that depend on their healthy maintenance, keeping a reef tank was considered outside the scope of all but a handful of knowledgeable and well-equipped researchers and hobbyists.

But today, reef aquaria are commonplace and simple reef setups are at the fingertips of virtually any hobbyist wishing to give setting one up a try.

Lots of information exists on all facets of setting up and maintaining reef systems. Magazines like FAMA and MARU and websites like FishChannel make it their respective missions to continue educating the marine aquarium community (as well as the freshwater community) on the latest developments in reefkeeping and to spur them to take on new, ever-higher challenges in their individual aquariumkeeping journeys (biotopes, for example).

What's Next?

Hamel and Mercier plan to experiment with enclosed, pressurized setups in order to keep and study fishes from the depths. Imagine something like that in the hobby, several decades in the future. By the way, if you'd like to see an "Abyss Photo Album" of some of the animals and setups Hamel and Mercier are working with, visit FishChannel.com/Abyss. BUT, these won't be posted on FishChannel until Nov. 25, 2009 – a nice Thanksgiving gift!

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