Owning Clones in Aquariums and Aquaponic Systems

In the not too distant past, clones were the subjects of science fiction. Animals, which were later cloned in laboratories, drew heated discussions of religious morality. But did you know that there is a new species of animal that clones itself? And, this animal is found only in freshwater aquariums – it has no known natural origin. It is a TRUE CLONE!

It is a crayfish, which has no official scientific name, but is collectively called Marmorkrebs, commonly known as the Marbled Crayfish. It was discovered in a German aquarium shop in the 1990's. Some crayfish enthusiasts speculate that it is an offshoot of the Procambarus species, but this has not been established as a fact.

Marbled crayfish's gender is always female, and she does not need a partner at all to reproduce (they reproduce parthogenically). As the name implies, it features an attractive brown marbled pattern, which is identical from individual to individual, and as they mature, they develop deep blue legs and even red and green colors in the claws. Their colors can also be affected by diet.

Because this unusual crayfish clones itself, it is gaining popularity by the scientific community, particularly genetics and stem cell research. In the classroom, it is used by biology teachers to demonstrate evolution (and cloning) in a current, real-world environment. Aquarium hobbyists now use the Marbled Crayfish as a self-replicating source of feeders for carnivorous fishes of all sizes. Sport fishermen are raising colonies to use as fishing bait, particularly saltwater fishing. It is rumored that this species is being farmed by the Chinese government for use as a source of cheap food for humans!

They grow very quickly to reach the adult stage (usually is around 8 to 12 cm when fully developed inside the aquarium) in which they can start to reproduce. From the time a baby is born, it takes about 5-7 months for the crayfish to have babies of its own. Each of these female crayfish is capable of holding 400-1000 eggs each time she "breeds" in brooding (gestation) periods between 22 and 42 days (of pregnancy). The younger adults have smaller numbers of babies; the brood sizes increase as they age. Unlike other crayfish, the mothers do not eat their young. Also unlike other crayfish species, they can co-inhabit in the same aquarium together with very little cannibalism, although the young ones sometimes overtake a sibling in a power play. Like other crayfish species, they grow by molting, or literally crawling out of their shell. Being efficient, they then eat their previous exoskeleton.

When doing an Internet search on the Marbled Crayfish, there are a number of articles from the British press, featuring frantic horror stories about this animal taking over ecosystems in Europe. While the Marbled Crayfish was discovered in Germany, it is considered an American animal. Hysterical, sensational hype found in British articles – in science journals and the tabloid press - also claim this species carries a virus (or fungal plague) that can kill crayfish species only found in European rivers and lakes. However, biologists in the USA tend to downplay these stories, as no outbreak has ever been factually recorded in Europe or elsewhere. But, because of these stories and good common sense, ecologically-savvy sportsmen use frozen crays as bait for freshwater fishing. To date, Marbled Crayfish are legal to keep in the United States, with the exception of Nevada. It is always wise to check your state and local "Illegal Species List" to insure you comply with local laws before acquiring Marbled Crayfish or other unusual species.

The diet of the Marbled Crayfish is mainly vegetarian, and it will eat most live plants found in aquariums, particularly Anacharis and Cabomba. It is my experience that Marbled Crayfish will not chase and eat aquarium fishes, unlike other cray species. However they will eat bloodworms, and very finely chopped pieces of raw tuna, when mixed in with a vegetarian diet. Marmorkrebs

also enjoys eating aquarium snails of all sizes, and are very good to wipe out snail populations in overtaken tanks. It is possible to modify the color of this cray species with diet! For example, feeding it green colored algae tablets over time will cause the entire animal to take on green colors overall. Likewise, feeding them foods rich in the red algae Astaxanthin (*Haematococcus pluvialis)*, will cause the crayfish to turn cherry red!

Like any crayfish, they tend to be messy. This is a positive thing when being used in aquaponics! The water will reflect the color of their diet if not properly filtered. Having tried a number of filtering setups, the best answer seems to be a dual situation – running an undergravel filter with power head through lava rock, plus an external filter, works best. The output of undergravel and canister filters should be routed into the bed of your aquaponic trays, without filter medium in the filters. The plant bed medium acts to filter out the "gunk" which the plants use as food, and water then drips back into the tank in a recirculating system. The intake of any external (or canister) filter should be covered with a sponge or filter media bag, to prevent newborn crays from being sucked into the filter, and this also creates a feeding station for the smaller crayfish.

Since the Marbled Crayfish is quite prolific, the size of the aquarium it lives in can be a concern for hobbyists interested in keeping it. Like all crayfish, the Marbled Crayfish likes to hide, and this trait lends itself to keeping large numbers in relatively small places. PVC tubes, stacked in pyramids or other configurations, invite the crayfish to hide, feel safe, and develop eggs in. The addition of the PVC tubes effectively increases the size of the aquarium it is in.

When a crayfish becomes pregnant, it is said to be "berried", as the strands of eggs resemble berries. There are now videos online showing the various stages of a Marbled Crayfish being berried, both on YouTube and MySpace video.
http://vids.myspace.com/index.cfm?fuseaction=vids.individual&videoid=41486071
http://www.youtube.com/user/MarbledCrayfish

This is a very good crayfish for a community tank, and is very hardy for beginners to aquarium keeping. Most other species of crayfish will eat the fishes of an aquarium, but not the Marbled Crayfish, in my experience. The Marbled Crayfish seems at home with most livebearers and tetras, as well as with most freshwater aquarium Caridina shrimp. However, all Marbled Crayfish babies are going to be a treat for all fish, even small tetras, guppies and others with small mouths. All cichlids are particularly fond of attacking and eating these crays at any size. Again, many people have a separated tank to raise a colony of Marbled Crayfish to feed many carnivore fishes, such as African Cichlids, Oscars, Piranhas, Arowanas, and marine carnivores like Lionfish and Groupers. Basically, if a fish likes to eat some shrimp or krill in the diet, these crays are moving targets – and very nutritious for fishes! There are also amphibians and reptile owners who feed these animals from Marbled Crayfish colonies.

Some unscrupulous individuals and companies will sell 'fake' crayfish, which do resemble the Marbled Crayfish, for very cheap prices. After all, many crayfish have similar colors and patterns. However, the fakes will chase and eat fishes and other aquarium residents, which the Marbled Crayfish does not do. And of course, the fakes cannot reproduce by cloning themselves. This crayfish is still considered rare, so it is wise to be wary of someone selling this species for very cheap prices.

There are forward-thinking World Hunger groups who are beginning to use the Marbled Crayfish to help feed starving people in many countries. For people who cannot eat shellfish for religious reasons, the colonies of Marbled Crayfish can be used to feed Tilapia, and other fishes, which are edible by humans. This brings us to the use of Aquaponics, where both edible plants and fishes are raised in a circulating system:

Those already familiar with the basics of aquaponics are prone to using large plastic containers – 150 gallons and up – to grow tilapia, bass, trout, perch and other edible fish. Their water is recirculated through a plant bed and drained back into the plastic container, thus feeding the plants from the natural waste materials from the fish. MARBLED CRAYFISH provide a steady supply of "feeders" for the fishes, and provide enough waste on their own to flush a plant bed for optimal plant growth. However, as they grow and breed in a honeycomb of PVC tubing, and crawl the bottom always search for food (algae tabs, etc), they are not a good choice to have co-exist with the game fish. The game fish will eat them before they are given a chance to multiply. So, it is best to have a separate tank specifically to raise the Marbled Crayfish in, and use the water from their tank to water and feed a variety of plants. Tank size should start at the 40-gallon range and go up from there.

Having experimented quite a bit with designs of systems, I can offer some specific advice on using lava rock with an undergravel filter and power head, which lends a hand to the process of the babies which live in the substrate to grow, and allows a better means of natural filtration.

Marbled Crayfish are also very successful in SMALL sized aquaponic systems, for people who live in apartments, small houses, who would like a compact aquaponic system to supply them with vegetables, either indoors with plant lighting, or outdoors as seasons allow. We are particularly excited about these mini-systems. We offer Do-It-Yourself design plans for "mini" setups of aquaponics using Marbled Crayfish, at website www.AquaponicsTexas.com.

For further information, pictures and more, please visit http://www.MarbledCrayfish.com

References – a few of many:

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