Giant Clam Basics

Tridacnids are beautiful and often feed themselves – isn't it time you added one to your reef tank?

By Barry Neigut

Like most other species of clams, tridacnids use their gills (the vertical structures visible inside this tridacnid) both for respiration and to filter food particles from the water column.
PHOTO CREDIT: Barry Neigut

The giant clams are best known for being real giants, as the largest species can reach a record size of more than 4 feet in length. However, the smallest of these giants reaches a full size of only 6 inches in length, and the remaining six species fit somewhere in between. Aside from this, they can also be exceptionally attractive, are common members of most Indo-Pacific reefs and make a great addition to any hobbyist's reef aquarium.

Giant clams are biologically distinct from all other clams for a number of reasons. As a result, some aspects of their care requirements will surprise those who are not familiar with them. For example, some require intense lighting in order to stay alive.

With this in mind, it is imperative that you learn at least the very basics about these clams and their needs before buying one for your aquarium. The essential information that every hobbyist should know is covered in this article. But there is far more to learn than can be covered in one article, so I highly recommend that you do some additional reading about these clams.

Basic Biology
All of the giant clams are members of the family Tridacnidae and are thus called tridacnids. They're an usual bunch as far as clams go. It's not just their large sizes, either. Most all clams, including the tridacnids, feed by filtering tiny food particles from the surrounding waters, but tridacnids are unique because they also house an internal population of single-celled algae called zooxanthellae.

These are the same type of algae that reef-building corals contain and rely on for much for their nutritional needs. Zooxanthellae are housed in a specialized tridacnid structure called the mantle. Actually, all clams have a fleshy mantle, but in tridacnids it is very large and can extend well beyond the shell borders of most species.

As with corals, when this mantle tissue, which contains the zooxanthellae, is extended and exposed to strong lighting the zooxanthellae within can make food via photosynthesis. And they can make a lot of it. In fact, they make far more food than they need for themselves, and the excess sugars and other nutrients are donated to the tridacnid host they are living in. This is the reason that tridacnids are always seen sitting on what would appear to be their backsides, instead of spending their lives buried in sediments or lying on their sides with only one shell in contact with the bottom. As long as they are sitting upright in clear well-lit waters, with their mantle tissue facing upward, they can gain a great deal of their nutritional needs from their zooxanthellae.

Most all small tridacnids will attach firmly to a solid substrate. When they get larger in size they can rely on their weight to keep them in place.
PHOTO CREDIT: Barry Neigut

Water Quality
Tridacnids should be maintained under conditions that are suitable for other reef-aquarium inhabitants and have no special water quality requirements. The temperature is best kept between 77 to 82 degrees Fahrenheit. The salinity should be around 1.025 (when measured as specific gravity). The pH should be around 8 to 8.4. Alkalinity should be kept between 9 dKH to 12 dKH. And the concentration of calcium should be maintained in the range of 380 ppm to 450 ppm.

About the only additional thing to note is that tridacnids use calcium to build their shells, and they can draw it from seawater or tank water surprisingly fast. As the shell grows, it thickens on the inside as the outside dimensions also increase. This means that there is more new shell material being produced than meets the eye, and the hobbyist needs to pay particular attention to calcium and alkalinity, especially if keeping a larger clam or clams.

Lighting
When it comes to lighting for tridacnids, the best for them is a metal halide system with fluorescent bulbs included. This is particularly true for Tridacna crocea, which is a shallow-water-only species, but even the deeper-living species will do well under such intense lighting. Still, hobbyists have had successes at times when keeping specimens under fluorescent-only lighting systems, but generally only in very shallow tanks, or when a clam is placed up on the rockwork in deeper aquariums, where they can sit only a few inches from the bulbs.

AQUACULTURED GIANT CLAM
Hippopus hippopus
PHOTO CREDIT: Barry Neigut

Placement
Tridacnids can produce an attachment structure called a byssus to affix themselves to hard surfaces. This structure is made by an organ (called the byssal organ) found on the underside of the clam's body, which secretes a liquid substance that hardens quickly to form a number of tough fibers. These fibers emerge from an opening in the bottom of the shell, with one end of the fibers solidly attached to a rock, coral, etc. and the other side held inside the shell by the byssal organ. This keeps them from being knocked over or moved around by waves or predators.

Thus, it is best to place a specimen directly onto a hard substrate like a piece of live rock, or to place it on sand with a flat piece of rock just under the surface. A tridacnid can dig down through the sand and still attach to the hard piece, even if it is shallowly buried.

Specimens that use a byssus will firmly attach themselves to the rock, typically within a few days. However, it is important to note that many clams stop using a byssus once they grow to a particular size and then slowly close off the byssal opening at the bottom of the shell. Oftentimes, they can stay in place simply due to their weight.

What you don't want to do is place any specimen with an obvious byssal opening into a gap between pieces of live rock, with the opening left exposed and nothing for it to attach to. You should never place a clam in a spot that prevents it from opening its shell normally or in a location where strong direct currents may keep it from fully extending its mantle tissue.

Spawning in Aquariums

Tridacnids reproduce by spawning, as they spew millions of sperm and eggs into the surrounding waters where they can mix with those of other nearby clams. This does occur in aquariums at times, if a clam is mature and healthy. But it can occur if a specimen is greatly stressed too.

While this might sound exciting and you may think you are about to end up with lots of new baby clams, it is not a good thing. In such a small volume of water the abundance of sperm will very likely kill the eggs, as too many will attempt to fertilize each egg. This is called polyspermy and means that the odds of any released eggs surviving to become new clams are essentially nil.

In addition, even if fertilization is successful for any number of eggs, tridacnids go through a free-swimming larval stage that can last for many days, which means they are likely to be captured and eaten by other tank inhabitants or killed by a filter or pump before they settle to the bottom.

Unfortunately, I have never heard of a single case of a spawning event producing new clams in an aquarium.

Feeding
Tridacnids are indeed filter feeders and will capture and eat a variety of particles. These include various sorts of phytoplankton and zooplankton and minuscule bits of detritus. Detritus is typically quite plentiful in aquariums, as it is primarily composed of fish wastes and tiny bits of uneaten foods. There are several products available to hobbyists that contain preserved or even live phytoplankton.

These products can be used to feed specimens, but tridacnids also have their zooxanthellae and can absorb dissolved nutrients directly from seawater as well. Thus, feeding is unnecessary in well-stocked tanks. As long as there are a good number of fish, there will always be detritus present, and the ammonia given off by fish as a waste product can be absorbed by tridacnids and used as well. Many hobbyists successfully kept numerous tridacnids of all sizes in aquaria before any sorts of phytoplankton products became popular or even available in the hobby.

Still, in the case of one or more tridacnids being kept in a very sparsely populated aquarium, there may not be enough food and dissolved nutrients present, making feeding a requirement. This would be an unusual situation, though.

Basically, if all other conditions are acceptable, a specimen should grow, which can be seen when new, white shell material is added to the edge of the shell. If it does not, and you have a very low fish population, then you should use a quality food. Follow the manufacturer's directions for use, and see if it makes a difference.

Conversely, you could also start using food from the start, and then if you can see shell growth, you may want to cut back on the amount of food being used and see if a specimen continues to grow. If it does, you can cut back more and more, until you are satisfied that no food is needed and quit using it altogether.

Choosing Specimens

When it comes to selecting the best specimen, there are a few things in particular to look for and avoid. First, you should avoid any specimen that stays closed up or stays opened further than what would seem normal. Failing to open up for long periods is a sure sign of trouble for any species of tridacnid, as they obviously need light to stay alive. Conversely, if a specimen simply gapes wide open and the mantle is not well extended, or even worse, is tightly retracted or looks receded within the shell, something is certainly wrong. A gaping shell and lack of mantle extension is typically followed by death.

You should also avoid any specimen that has any sort of obvious tissue damage. Any damage to the extendable portion of the upper mantle should be obvious, but you should also check any visible tissue in the area around the byssal opening. Bad collectors have been known to simply rip clams off the bottom at times, which can damage the byssal organ, rather than carefully cutting the byssus to release them. This can result in a serious injury that is often fatal.

Likewise, if there is any sort of rock or gravel attached to the bottom of a specimen, it is imperative that you do not attempt to pull it off. If such materials are a problem, they can be cut away, but you must be exceptionally careful not to cut any of the specimen's living flesh. This can be a difficult task and is not recommended.

The next thing to look for is bleaching. Under adverse conditions (such as shipping) tridacnids may lose some or even all of their color and turn plain white. This occurs when some or essentially all of the zooxanthellae within a specimen are expelled or die and the clam's own pigments are absorbed, which then leaves the mantle tissue without color.

Also, watch out for a specimen that has pinched mantle disease. The typically smoothly edged curves of a tridacnid's upper mantle will have a contorted or pinched look to them if it is affected, and this disease is fatal and far from rare. It can be treated if it should show up at a later time, but if you are shopping for a new specimen it obviously makes good sense to choose a healthy specimen rather than taking a chance on successfully treating an unhealthy one.

Lastly, if everything else looks good, be sure to take a close look at the underside of a specimen in case any parasitic snails are hiding there. A number of tiny cone-shaped snails, called pyramidellids, are known parasites of tridacnids, which can reproduce rapidly and cause real troubles. They are light in color and only a quarter inch or less in size, so look closely. Again, these can be dealt with, but it would be best to let the store handle it rather than doing it yourself.

As a last note here, I also recommend that you make sure that the tankmates in you aquarium are compatible with keeping tridacnids. Some that come to mind are angelfish and some others are hit and miss. Quarantine anything prior to placing it into your main display tank.

References

Ellis, S. 1998. Spawning and Early Larval Rearing of Giant Clams. Center for Tropical and Subtropical Aquaculture Publication. 130. 55 pp.

Fatherree, J. W. 2006. "Troubles with Tridacnids: A Look at Two Common Problems." Reefkeeping.

Fatherree, J. W. 2006. Giant Clams in the Sea and the Aquarium. Liquid Medium. Tampa, Fla. 227 pp.

Neigut, B. 2004. "A Brief Guide to the Selection and Placement of Tridacnid Clams." Conscientious Aquarist 1(3).