Marine Aquarium Society of the Carolinas

MASC Newsletter II - Q1 2005

Aquaculturing of Marine Dwarf Angelfishes: An Interview with Frank Baensch of Reef Culture Technologies

BY KEITH STILES

Highlights:

- Aquaculturing Marine Dwarf Angelfishes—p.1-4
- Tank of the Quarter - p.5-7
- Spotlight Species—p.8-10
- Book Review—p.11

MASC Newsletter Team

Story Writer/Editor—Keith Stiles

Assistant Editor/Formatter—Scott Thomas

A growing trend among marine and reef aquarists is selecting species of both fish and invertebrates that have been cultured in a captive environment. To date, the most readily available captive-bred species is the ever-popular clownfish, with numerous species represented. These tank-raised specimens acclimate more readily in our tanks with fewer disease outbreaks and greatly lowered mortality rates.

Recently, a new arrival on the market is captive-raised dwarf angelfishes. In June, 2001, Reef Culture Technologies, LLC, was founded by Frank Baensch. Reef Culture Technologies, RCT for short, is located in Oahu, Hawaii. Visiting RCT's website is truly a treat for both the pictures and the wealth of educational information that is readily available (check it out at http://www.rcthawaii.com/index.html). RCT's objectives are "to develop reliable and cost-effective culture techniques for marine aquarium fish and shrimp species of ecological and economic importance" and "to produce these species for the aquarium hobby."

Recently, Frank graciously provided an interview by e-mail about RCT's activities. After reading the depth of his responses, I decided to include the interview in its entirety for our readers. This will make for a LONG newsletter article, but Frank's activities are an important step in making "tank-raised" marine organisms as readily available as freshwater species are today. The interview follows below:

KS—Describe your background with aquariums that lead to your founding of RCT.

FB—I was fortunate enough to grow up in the Bahamas where I started avidly studying and keeping marine organisms at a very young age. The coral reef was practically part of my backyard. I kept marine and freshwater aquariums through my high school and college years.

I was first exposed to the propagation of marine organisms working in the aquaculture laboratory at the Hawaiian Institute of Marine Biology. Most of our research involved food fish, but nonetheless, I experienced raising a tiny egg through the larval stages to a miniature adult. This was intriguing stuff and all new to me. I wanted to apply what I had learned to marine ornamentals—to the animals I had observed and cared for for so many years.

***Centropyge interruptus*, the Japanese Pygmy Angel**

I specialized in my newfound interest in graduate school, obtaining an M.S. in Aquaculture. My thesis was on the Reproductive Biology of the Dwarf Angelfishes, the *Centropyge*. The research involved spawning *Centropyge* species and evaluating fecundity under different nutritional and environmental conditions.

After graduate school, I was offered a part-time research associate position with Hagen. Hagen produces aquarium products and needed someone to evaluate and expand its saltwater product lines for marine ornamentals, specifically aquarium filters, feeds and water conditioners.

Frank Baensch Interview—Cont.

The testing was to be done at my own facility. Needless to say, my first tank inhabitants were a breeding pair . . . a pair of maroon clownfishes.

In March of 1997, the pair spawned and I set out to raise my first batch of eggs. Fifteen days later, I was the proud papa of one gorgeous, little maroon juvenile. Obviously, hands-on breeding experience was still lacking here, having started out with over 500 eggs. I needed to develop that wet thumb. I read everything that I could get a hold of on the subject of clownfish propagation and breeding ventures improved. In the summer of 1997, my first "ball" of clownfish juveniles was produced. What a vision! Now I wanted to move on to other, more difficult species.

Since back then the literature was limited to information on breeding clownfishes and neon gobies, I developed my own techniques through trial and error and experimentation. Over the next two years, I produced orchid dottybacks, canary blennies, harlequin shrimps, the green-banded gobies and the blackcap basslets, in addition to five clownfish species. This was exciting work, but it was time to move on.

In the back of my mind, I always wanted to follow-up on my thesis work and complete the life cycle of a pygmy angel species. No *Centropyge* has ever been raised in captivity . . . and many people have tried. I too had dabbled with the larvae here and there over the years, but without much success. Maybe my breeding experience was finally sufficient.

Three years later, in November of 2001, I raised my first batch of *Centropyge* larvae into juveniles. Six months thereafter, Reef Culture Technologies was founded.

KS—Your website says that you founded Reef Culture Technologies, LLC, in June of 2001. What has been the most positive experience of your business venture? Most negative experience?

FB—The breeding work is both. It is unique, challenging, often filled with new and exciting discoveries, and rewarding due to its positive, future environmental influence. However, it can also be monotonous, disheartening and incredibly time-consuming.

KS—Could you describe your facilities? How many employees? The basic structure of RCT would be interesting for our readers.

FB—RCT is located inland on Oahu, Hawaii. The entire facility is about 1,500 square feet, which is divided up into rooms for broodstock, quarantine, juvenile grow-out, live food culture, larval rearing, an office and a laboratory. The present hatchery was originally designed as a testing station for Hagen aquarium products (1996), then reconstructed to breed clownfishes, dotties and gobies (1998), and finally redesigned for full-time research on pygmy angelfishes (2000). I started RCT in 2001, after the initial breakthrough breeding *Centropyge*. The expansion and design of RCT's production facility was completed near the end of 2003. Ursula Baensch (my mom) joined the company as a partner, shortly thereafter. Ursula and I run all business activities, which can be categorized into general, administrative, sales, production, and research & development. A part-time volunteer helps with production and R&D.

"(Breeding work) can also be monotonous, disheartening and incredibly time-consuming."

KS—Of the seventeen marine ornamental species you have raised over the years, which was the most challenging to successfully raise and why?

FB—The Fisher's angelfish was by far the most challenging. I worked on the *Centropyge* for almost eight years before raising the first species. The genus, while relatively easy to spawn in captivity, produces larvae that are small and delicate at hatching. Compared to the larvae of commercially propagated marine ornamental fishes, such as clownfishes and dottybacks, *Centropyge* larvae demand a smaller, more nutritious and easily digested food source at hatching; are more sensitive to environmental changes (water quality, lighting, temperature); require optimal nutrition throughout development; and, have a much longer larval phase (take much longer to both reach and complete metamorphosis). The basic technique for pygmy angels was developed with *C. fisheri*.

Frank Baensch Interview—Cont.

KS—For those of us interested in purchasing your fine specimens, could you tell us a little about your shipping methods?

FB—We will ship directly from our facility to the customer with FedEx Overnight. Direct shipping eliminates exposure to disease, a common problem associated with store bought fishes. All fish come with a 5-day live arrival guarantee.

KS—Could you describe what is involved (without giving away any trade secrets naturally) in creating a "cost-effective" method for bringing a captive-bred species to the market?

FB—"Cost-effective" production of a species first requires that all biological and technical rearing constraints have been worked out and that a reliable method is in place for producing the species in numbers. Economics now dictates whether mass production at a profitable level is feasible. The most common problem is that wild-caught species still largely set market prices, which are often far less than what the price needs to be to profitably produce them in captivity. The immediate solutions are to continuously strive to improve rearing methods to lower costs and improve fish quality; to choose to breed species that are not readily available through collection; and, to market the strengths of captive-bred fish to obtain better prices. In the long term, as rearing methods improve and wild-caught reef species become less available due to increased legislation and resource depletion, propagation will become economical.

KS—Your website mentions that your broodstock of pygmy angels receives "a diverse seafood gelatin diet, rich in vitamins, pigments and highly unsaturated fatty acids." What suggestions would you make for proper feeding of pygmy angelfishes to buyers acquiring your fish? Any particular food brands you highly recommend to marine and reef aquarists?

***Centropyge resplendens*, the Resplendent Angel**

FB—We've had best results conditioning our broodstock on two or three daily feedings of a diverse seafood gelatin diet, rich in vitamins, pigments and highly unsaturated fatty acids (HUFA). Important ingredients include fresh salmon and shrimp, fish roe, a multi-vitamin mix, *Spirulina* and astaxanthin (a color-enhancing pigment). Our juveniles are raised on spirulina flakes, quality crumble feed (about 1 mm) and brine shrimp nauplii and then converted to a gelatin diet, pellets and flakes. To our customers, we recommend pure spirulina flakes; a small, quality pellet (such as Hikari micro pellets); a good gel diet (such as Ocean Nutrition's angelfish and/or pygmy angelfish formula) and nutritious frozen food (such as mysis or adult brine shrimp). If you are purchasing a smaller individual (between ¾" to 1.25"), we would also recommend that supplemental feedings of brine shrimp nauplii and/or frozen Cyclopeeze be provided until the fish is more accustomed to larger feeds.

KS—The banggai cardinalfish seems to be a particularly popular species. But, we all know that it only resides in one small habitat. Has RCT considered raising the Banggai?

FB—The company's long-term objective is to develop cost-effective production protocols for reef aquarium fish of ecological and economic importance. So yes, we have considered raising banggai cardinalfish and may do so in the future. Presently, however, our primary focus is to develop a commercial breeding technique for marine angelfishes. We opted to run a privately owned, profitable aquaculture venture to fund our research rather than obtain state or federal funds to meet our goals. Since the cost of producing commonly available angelfish is still too high to compete with wild-caught pricing, we chose to work with rare, more valuable species.

Frank Baensch Interview—Cont.

KS—Why do you think more aquarists don't exclusively purchase captive-raised fish when they have the opportunity to do so? Is it simply a cost issue? Or do you think there are other reasons?

FB—In the past two years, I have noticed an increasing number of hobbyists desiring to exclusively purchase captive-bred specimens. Unfortunately, outside of clownfishes, dottybacks, seahorses and a few goby species, most of the popular and affordable reef fish species are not available through captive breeding. When there is a choice, those who are aware of the benefits will pay the little more, if any to buy captive-bred. Back in the early 90's captive-bred fish acquired a reputation for being small, aggressive and not as vibrantly colored as their wild-caught counterparts. Rearing methods have now been improved to where such fish are a better product. They can be cultured disease free and are healthier when you purchase them. They thrive on conventional aquarium fish foods and more easily adapt to a new tank environment. They are actually less aggressive and often have more color. And best of all, they are an environmentally sound product.

KS—What pointers would you give to a marine aquarist interested in entering this business?

FB—Start small and choose your species wisely, one that you can raise. Learn how to raise it consistently in numbers before making a significant financial commitment. The ocellaris (common) clownfish is still the "bread and butter" species of the captive-bred industry. They are very popular, easy to sell and relatively easy to learn to raise. Read everything you can get a hold of on the subject. A good place to start would be Martin Moe's section on breeding in the classic The Marine Aquarist Handbook. The best culture manual on clownfish breeding, is Hoff's Conditioning, Spawning and Rearing of Fish with Emphasis on Marine Clownfish. Once you've mastered a clownfish species, I would move on to more difficult species, like dottybacks.

KS—Do you have a price list that is available for interested parties?

FB—We presently have two species in production. The Japanese Pygmy Angel (Photo on p.1) , *Centropyge interruptus*, is available for $650.00 and the Resplendent Angel (photo on p.3), *Centropyge resplendens*, is available for $785.00. Please visit our website, www.rcthawaii.com, for more information.

Frank's enthusiasm for what he does comes through clearly in his responses to my questions. I have to admit I'm in awe at what he is attempting to do and trust that he will succeed. The photos included in this article are actual photos of the two species he has available for marine aquarists. As you can see, they are beautiful and healthy. I strongly encourage you to take the time to visit RCT's website and get to know more about the great work they are doing for marine aquarists! —KS

MACO Is Back Online

Marine Aquarist Courses Online (MACO) presents its 2005 course schedule! Learn to work with acrylic, learn exactly what those graphs detailing the function of a halide mean, or just come to expand your reefkeeping horizons. Registration is now open on some of the classes.

http://aquaristcourses.org

Still to come:

- Coral reef conservation/restoration from a real world perspective (taught by the Reefball team).
- Woodworking for reefkeepers (the basics of woodworking and creating a canopy).

Tank of the Quarter—Wade Lehmann's 200 Gallon Reef Tank

By Keith Stiles

This quarter's featured tank is Wade Lehmann's 200-gallon acrylic reef tank set up in May, 2004. This tank is an upgrade from an earlier 150-gallon tank. In addition to the main display tank, there is an accompanying 65-gallon sump in his utility room. The tank sits on a custom metal stand. Water circulation is provided by a Sequence pump with water returns circulating back to the main tank through three Sea Swirl wavemakers. The water is filtered by a custom 46-inch Beckett skimmer driven by an Iwaki70 pump. Biological filtration is accomplished by the 200 pounds of Fiji live rock with a scattering of homemade aragacrete rock and a sandbed of one to two inches of oolitic (Southdown) sand. Calcium levels are maintained with a recirculating single chamber custom calcium reactor.

AQUARIUM PROFILE

Owner & Designer: Wade Lehmann.
Location: Raleigh, NC in Living Room.
Date Established: May 2004 (livestock traces as far back as 1999 in some cases).
Date Photographed: Fall 2004, Winter 2005.

TANK
Configuration: Custom Rectangular.
Display Tank Volume: 200 gallons.
Display Tank Dimensions: 84" x 30" x 24".
Display Tank Material: Acrylic.
Sump Volume: 65 gallons.
Location: Sump is in utility room.
Cabinetry: Custom metal stand (40").

CIRCULATION
Main System Pump(s): Sequence.
Water Returns: Three Sea Swirls (fed by Sequence).
Additional Pumps: Tunze 6100 Stream.
Controllers: Aquacontroller Pro (Neptune Systems, Inc.).

FILTRATION
Skimmer: Custom Beckett driven with Iwaki70 pump (46" tall).

Lighting for this system is provided by two 6-foot VHO actinic bulbs, which are powered by an Icecap 660 ballast. There are also four 400W metal halide bulbs (two 20,000K and two 6500K) placed eight to ten inches above the water that are controlled by digital timers. The intensity of this lighting is clearly evident in the coloration seen in the corals in the accompanying photographs of Wade's tank.

The tank is heavily stocked with between 50 and 75 stony corals, primarily Acroporid species. There is a small scattering of both soft and LPS corals as well as a variety of invertebrates including sea urchins, brittle stars, and black sand cucumbers to name a few. The tank is also home to an impressive list of fish including a spawning pair of percula clownfish who nestle in a particularly nice bubble-tip anemone. This tank is an impressive work of art that clearly illustrates Wade's dedicated attention and care. Take the time to check out his website (see p.7) for more details about his tank.—KS

TEMPERATURE CONTROLS
Heaters: 200W and 300W Ebo-Jager heaters
Fans: 10"above the sump; 6" desk fan on controller, staggered none.
Chiller: None.

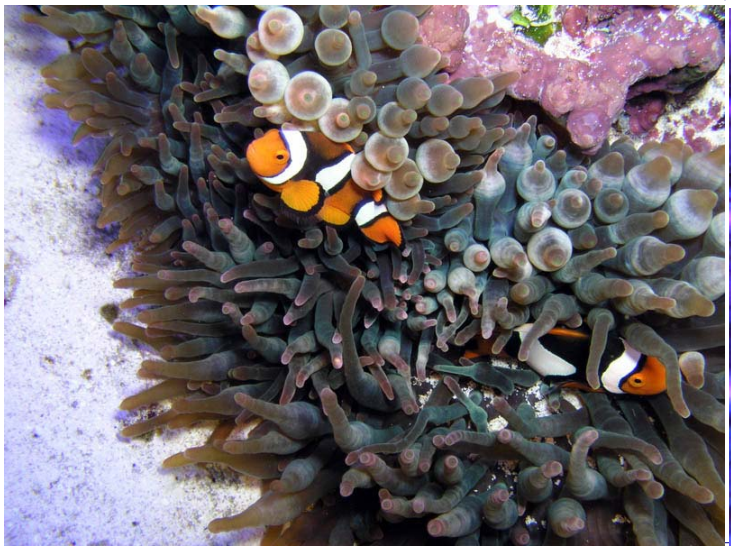
Tank of the Quarter—Cont.

Mechanical Filter: None.
UV Sterilizer: None.
Ozonizer: None.
Carbon: ≈ 1 pint monthly.
Biological Filter: ≈ 220 lbs. Fiji live rock.
Refugium: Sump has miscellaneous rock and a 3-4" sandbed.
Live Rock in Display Tank: 200 lbs. Fiji with a scattering of homemade aragacrete rock.
Live Rock in Sump: 20 lbs. miscellaneous Fiji.
Sand/Substrate in Display: 1-2" oolitic (Southdown).
Sand/Substrate in Sump/Refugium: 3-4" oolitic (Southdown).

LIGHTING
Flourescent Bulbs: Two 6' URI actinic (VHO) on Icecap 660 ballast.
Photoperiod: 12 hours.
How Often Replaced: 12 month cycle.
Metal Halide Bulbs: Two 400W XM 20kK and two 400W Iwasaki 6500K.
Photoperiod: 20kK on 10 hours; 6500K on 4-6 hours staggered.
How Often Replaced: 20kK replaced on 6 month cycle; Iwasaki on 18 month cycle.
Height Above Water Surface: 8-10".
Lighting Controllers: Digital Timers.

System Parameters & Chemistry
Water Temperature: 76-80° F in winter; 79-83° F in summer.
Specific Gravity: 1.026.
PH: 7.8-8.1 (calibration hasn't been done in a while).
Alkalinity: untested.
Calcium: untested.
Calcium Reactor: Recirculating single chamber custom reactor.
Nitrate: (0) untested.
Phosphate: (0) untested.
Resins Used to Reduce Nitrate or Phosphate: None.
Municipal Water Supply: Yes.
Reverse Osmosis: Yes.
Deionization: Yes (RO/DI Unit).
Salt Used: Primarily Instant Ocean; Have used 1,000 gallons of Oceanic.
Water Change Schedule: 2-3 week period, 35-40 gallons.
Additives or Supplements Used: None.
Monitoring Equipment: Refractometer for salinity; pH and temperature by controller.
Dosing Equipment Used: None.
Maintenance Schedule: Weekly scrapings and daily viewings.

LIVESTOCK
Fishes: 24.
Stony Corals: 50-75 species.
Soft Corals: 6 species.
Other Livestock: Urchin, brittle stars, black sand cucumbers.
Spawning Events: *A. percula* spawn bi-weekly.



Tank of the Quarter—Cont.

FEEDING

Regimen for Fishes: Fed heavily every 2-3 days with homemade food, mysis, and Cyclopeeze.

Regimen for Corals/Inverts: No direct feeding, get fed when fish eat.

NOTES

Problems Overcome With This System: None.

Things The Owner Would Like to Change: Prefer a glass tank for maintenance purposes.

Things Owner Likes Best About This System: 30" front to back depth and height of the stand for viewing.

Special About This System: I created it!

Favorite Comments By Others: None . . . it is most meaningful when people just stand and stare at it for minutes on end.

Websites: http://www.earthandh20.com/reef/ & http://www.reefaquariuminstalls.com

FISH LIST

Two Percula clownfish.
Two Pink Skunk clownfish.
Flame angelfish.
Purple tang.
Hippo tang.
Yellow tang.
Lawnmower blenny.
Two Yellow clown gobies.
Banggai cardinalfish.
Firefish.
Female psychedelic mandarin.
Pair of flame fairy wrasses (*C. jordani*).
Female filamentous flasher wrasse.
Six Chromis.
Rainfordi goby.

CORALS

Too many to list, primarily Acroporid sps., with some others and a small scattering of soft and lps corals.

Spotlight Species

Mantis Shrimp—Friend or Foe?

BY SCOTT THOMAS

Mantis Shrimp. Those two words have to be the most frightening words for a saltwater aquarist to hear. The late-night clicking noises. The disappearing livestock. Nothing else brings such frustration, anger or desperation. Why? Because every aquarist who's ever dealt with a mantis shrimp knows the problems they bring to your tank. Maybe the mantis shrimp is just a bit misunderstood.

The truth is that there exists in the hobby a subculture of folks just like us who actually like mantis shrimp and keep them as pets. Perhaps a little more information is required to decide whether or not they are evil incarnate.

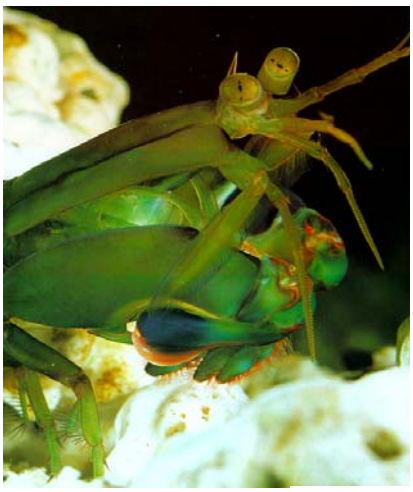
Background

First and foremost, a bit about names. The mantis shrimp is actually not a shrimp at all. It is a stomatopod, and is only distantly related to shrimps. The mantis portion of its name is descriptive of the front appendages that are held bent against the body like those of a praying mantis.

P. ciliata

The stomatopod is found in a wide assortment of colors, which are not an indicator of species. Many species can be found with the same or very similar coloration patterns as many others, with a few exceptions of course.

For example, *Squilla empusa,* which is common off the coast of the Carolinas and Virginia, tend to be a tannish brown color that helps them blend into the tidal mud flats where they make their homes.

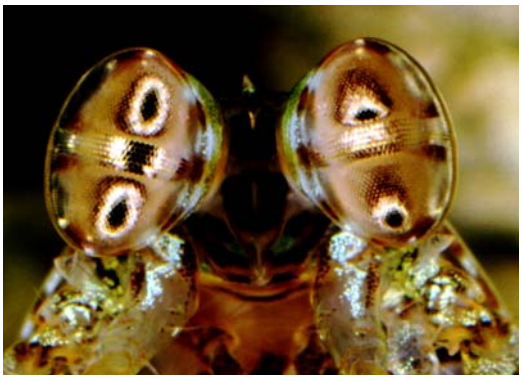


G. smithii

The definitive way to tell which species you have is by the layout of the telson, or tail. The shape of the telson is different in each species, and is like a fingerprint for that particular species.

Stomatopod Vision—The Better to See You With…

It can be said that for a visual predator (one that uses it's sight for hunting), sight is the most important sense, and that vision is usually the most highly adapted. This is particularly true for the stomatopod, which probably has the most highly developed vision of any living animal. The stomatopod has two eyes that are mounted on stalks that have a stunning array of flexibility, allowing for viewing at an assortment of odd angles, up to 70 degrees, independently. In addition, each eyestalk contains three sections that are used for vision. This means that the animal doesn't have simple binocular vision like a human, rather trinocular, and with each eye. This gives the animal complex vision and depth perception from each of its two eyes, and also means that if the animal loses an eye, it can still be a very effective hunter. To further complicate this issue, a human eye contains one visual apparatus containing an iris, cornea, etc. The stomatopod has a compound eye, meaning that it has many of them.



What makes the stomatopod's vision even more incredible is how well it can see. The human eye contains three visual pigments, allowing us to see a wavelength range from around 400 to 700 nanometers, from the violet to the red part of the spectrum. For simplicity's sake, we'll assume that this means that for each pigment, the human eye can see a range of 100 nanometers.

The color vision range of the stomatopod is similar to that of humans. With eight visual pigments covering roughly the same range of vision as the human eye, this means that each pigment covers a range of, again for simplicity's sake, 37.5 nanometers, meaning that slight shifts in color are discernable. A good analogy for this phenomenon is a resolution setting on a computer screen that has been set to a low setting such as 640x480 at 16 colors. This would be that of the human eye. The stomatopod's vision would be more like 1024x768 at millions of colors. At the low setting, fewer individual colors are discernable. So, you can imagine how highly tuned the stomatopod's color vision truly is.

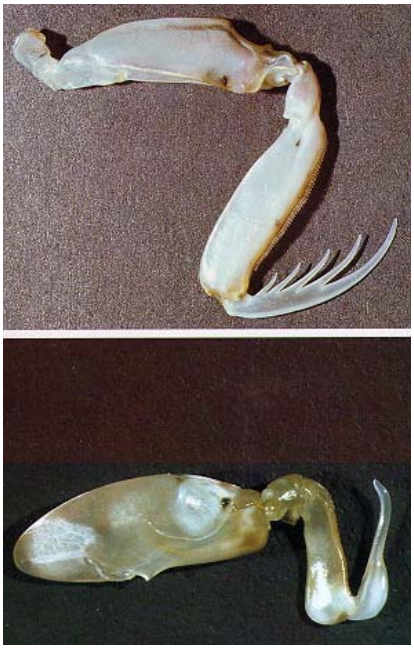
Stomatopods also have two additional visual pigments, which are used for seeing polarized light, as well as intensity of light. Shimmering silver fish scales tend to polarize light, that is, the light wave spirals in a circular fashion. This can confuse some predators, and tends to mask the movements of individual fish in a large school, giving rise to 'safety in numbers'. Stomatopods have a pigment that focuses solely on seeing this light, giving them the ability to target a single fish in a school.

The tenth pigment in the stomatopod's visual arsenal allows the stomatopod incredible resolution with respect to differences in light intensity. This would allow a predator like the stomatopod to see a fish that a human eye would never pick up, such as a skate or ray lying on the bottom, partially covered with sand, or a stonefish lying in wait on a rock that to us appears to be exactly the same color. To the stomatopod, it would be as obvious as a cocktail shrimp sitting in a bowl of cocktail sauce, and thus, would be dinner. Mmm.

Feeding

Understanding stomatopod feeding is quite simple, providing that you know which of the two main groups your specimen falls in – spearer or smasher. The spearers eat shrimp, fish, and any other softer-bodied animals. Smashers eat hard-bodied animals such as clams, crabs, snails, etc.

How do you know which of the two groups your stomatopod falls in? Simple. Look at the large front appendages, those appendages that give the mantis shrimp its name. If they are a bony, club-like appendage, you have a smasher. If they are a clawlike spear, you have a spearer. It couldn't be simpler than that. How the stomatopod feeds is also fairly simple, but this doesn't make feeding it any less impressive.



Stomatopod Feeding Appendages

The feeding mechanism of the stomatopod has been studied in depth. The stomatopod strikes its prey with a swing of the large front appendages, spearing or smashing it. The speed at which it strikes is awe inspiring, and the force generated is downright scary. A stomatopod can strike at 23 meters per second. . What does that mean, exactly? That means that his 'punch' comes at 50 miles an hour, making it the fastest strike movement of any animal alive. Compare the stomatopod's 23 m/s speed to a master martial artist's 10-15 m/s, and that should give you an idea of why these animals are so deadly. The strike has also been shown to be 50 times faster than the blink of a human eye, which means that the animal strikes so quickly that at full strike speed, the human eye wouldn't even register the movement.

We've discussed the speed of the attack, but now for the worst part – the force of impact. The larger stomatopod species can generate over 200 pounds of force, equating it to the impact force of a .22 caliber bullet. Impact force studies have shown the ability to damage most everything they've struck, even going so far to cause pitting in a stainless steel plate. This is why stomatopods have been touted as having the ability to shatter aquarium glass, and cause damage to the aquarist who happens to stick his hand too close to a stomatopod burrow.

Tank Size

Practically any size tank will provide sufficient living conditions for a stomatopod. Because there are so many different species of stomatopods, with widely varying adult sizes, a recommendation for a tank size would be difficult at best. Depending on the species, stomatopods live in burrows constructed either in mud flats, under rock rubble, or other biotopes.

The tank set up for maintaining a stomatopod would need to be outfitted specifically for the individual species' burrow construction habits.

If you have a reef tank, or even a FOWLR (Fish Only With Live Rock), you probably have acceptable filtration for a stomatopod. If the filters are efficient enough for fish, it's probably good enough for stomatopods, which tend to be pretty hardy.

They don't require intense lighting like many photosynthetic invertebrates do, and even some stomatopod species like muted lighting, which is similar to their natural environment. The bottom line is that many tank factors will change depending on the species being kept.

The one issue to consider with respect to stomatopods are their solitary nature. Because of this, only one stomatopod should be kept in a tank, unless it's a very large tank, and the stomatopods can establish their own territory and burrow. If multiple specimens are to be kept in a single large tank, bear in mind that there will most likely be some aggression, as well as the largest most dominant individual randomly attacking and stealing a weaker stomatopod's burrow.

Tank Parameters:

pH—8.0-8.4

Temp—72-78

S.G.—1.020-1.025

Feeding—Carnivorous

Max Size—Varies, may reach 12"

Solitary species can exhibit territorial aggression toward other individuals

Breeding

Stomatopod mating can vary widely depending on the species being kept. In general, stomatopods mate by the deposition of sperm into vesicles in the female's abdomen. This sperm can be stored for brief periods of time, and is used to fertilize eggs, which, in some species, are held under her thorax until they hatch, at which time the young are released into the currents that distribute them about the reef. Other species amass a clutch of eggs in their burrow until they hatch.

Stomatopods, which tend to be solitary by nature, usually only associate with each other during mating. The members of the genus *Lysiosquillina,* on the other hand, tend to mate for life in a monogamous pair bond that has been noted by researchers to last for 20 years or longer. What's interesting about this behavior is that pair bonds are sometimes formed even before the stomatopods are mature enough to mate.

On the flipside, members of the genus *Oratosquilla,* tend to just mate with whoever passes by, it seems. Both the males and females will mate with multiple partners during a mating cycle. This would serve to increase the genetic diversity of the offspring.

Other stomatopod species come together only to mate. The male will stand guard over the entrance to the cave while the female cares for the eggs. Once the eggs are hatched and sent into the water column, the adults go their separate ways. In the water column, the larvae feed on plankton until they reach a sub-adult stage, and ultimately, reach the reproductive adult stage. Stomatopod breeding is extremely rare in home aquaria, but has been witnessed in a laboratory setting, and in some very large aquariums, although survival rates of the larvae are extremely low.

Beauty and the Beast, All Rolled Into One

The mantis shrimp, or stomatopod, is one of the most highly adapted animals nature has produced. It is also beautifully colored and can be fascinating to watch, provided you like watching another animal's demise. For those who wish to keep a stomatopod and don't particularly care to watch the carnage, most will accept pieces of raw shrimp, fish, etc. Some have even been reported to be hand-fed, although I definitely wouldn't recommend it.

While the mantis has a bad reputation for killing prized livestock, what It's really doing is the same thing that other livestock do in an aquarium—eat. If there's food present, an animal will eat it, period. The downside is that they tend to come into our peaceful tanks unannounced. It's not really their fault when their burrow has been pulled off the bottom of the ocean in order to drop some live rock into a glass box in our living room. While you may find a more peaceful specimen for your tank, you may never find something as beautiful, well adapted, or more fascinating to match.—ST

Book Review—*Ultimate Marine Aquariums: Saltwater Dream Systems and How The y Are Created* by Michael S. Paletta

By Keith Stiles

With this newsletter, we are introducing a new element to our quarterly newsletters, a recurring book review. In preparing to set up my own tank, I have learned what a value taking the time to read and plan can be. That reading includes taking advantage of advice from others who are more experienced. Take advantage of online forums like those provided on the MASC website and others like REEFS.ORG. The technology, terminology and logistics of setting up a reef tank are overwhelming for most non-scientists. Reading books by reputable authorities involved in our hobby and daring to ask what some would call dumb questions are good ways to learn how to care for your captive portion of the reef. At roughly 30 dollars and 192 pages, Michael S. Paletta's Ultimate Marine Aquariums, published by Microcosm in June of 2003, is an excellent reference book for reef tank owners of all levels. Although this book really is not designed as a how-to for setting up reef tanks, it is filled with useful information about how 50 "very successful marine aquariums" were set up and how they are maintained.

Each aquarium is profiled with information listing the owner(s), the designer, when it was established, and when it was photographed. If the owner has a website with pictures or information about the tank, the link to that website is included in the profile. Each of the aquarium profiles details the tank size, location, and details concerning filtration, water circulation, lighting, and water parameters. An overall description of the number of corals, fish, and other livestock stocked in the tank is included. Our tank of the quarter section is modeled after this set up with a sidebar containing the tank's profile. Paletta describes each tank and includes pictures from the tank. It is important to know that this book covers dream systems from as small as 40 gallons to as large as 20,000 gallons with the average size being 260 gallons.

This volume is worth the price for the vivid pictures alone. When I first opened it, I found myself leafing from page to page saying "Wow!" The vibrancy of the colors and both the full and partial shots of the tanks are not only breathtaking but informative. Described setups range from the ultra highly technology centered systems to simpler mud-based, algal scrubbing systems. Paletta's work proves that there is not "one magic bullet" solution to successfully maintaining a reef tank. The one common thread throughout is careful attention to detail. Experienced reef tank owners will gain insights to apply to their own systems. Those new to the hobby will gain a better understanding of the elements of good design. Buy it and take the challenge to create your own dream reef tank.—KS

MASC Website

One of the benefits of the Marine Aquarium Society of the Carolinas is our comprehensive website. By registering to use the website, you gain access to our newsletters and our forums where you can correspond with other reef tank hobbyists including engage in frag exchanges, gather information on DIY projects, and read useful scientific information concerning marine sciences. Check out our website at: http://www.masotc.org/.

Upcoming Meetings

February 19th – MASC Board of Director's Meeting

TBA—Quarterly MASC Meeting

MASOTC.ORG

Species Spotlight Bibliography:

The Lurker's Guide to Stomatopods — *www.blueboard.com/mantis*
Mantis Photos Thanks to Dr. Roy Caldwell, Ph.D. — *http://ib.berkeley.edu/labs/caldwell/*
The Secret World of the Stomatopod — *http://www.ucmp.berkeley.edu/aquarius/*
Complete Encyclopedia of the Saltwater Aquarium, Nick Dakin
The Simple Guide to Marine Aquariums, Jeffrey Kurtz