REEF HOBBYIST MAGAZINE

SECOND QUARTER 2013 | VOLUME 7

Adding Motion to Your Ocean

Tatjana's Dream Reef from Ukraine

A Hand-Made 750G Mixed Reef

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NEW PRODUCT SPOTLIGHT

FEATURES

SECOND QUARTER 2013 | Volume 7

ANNOUNCEMENTS

We would like to welcome Sabine Penisson, our new photography advisor, to the RHM team! Sabine is a world-renowned underwater photographer who will be a huge asset in RHM's relentless effort to provide the very best to our readers.

RHM SPONSORED EVENTS

(latest issues available at these events)

- INDMAS 2013 Frag Swap: April 27, Indianapolis, IN – indmas.org
- Ocean State Reef Aquarium Society Conference: May 5, Warwick, RI osrasconference.com
- Marine Breeders Workshop: July 13, Bloomfield Hills, MI – mbiworkshop.com
- Carolina Aquarium Expo and Frag Swap: September 21, Columbia, SC columbiamac.org
- MACNA 2013: Aug 30-Sept 1, South Florida – macna2013.com
- Reef-A-Palooza: October 12-13, Costa Mesa, CA – reefapalloozashow.org

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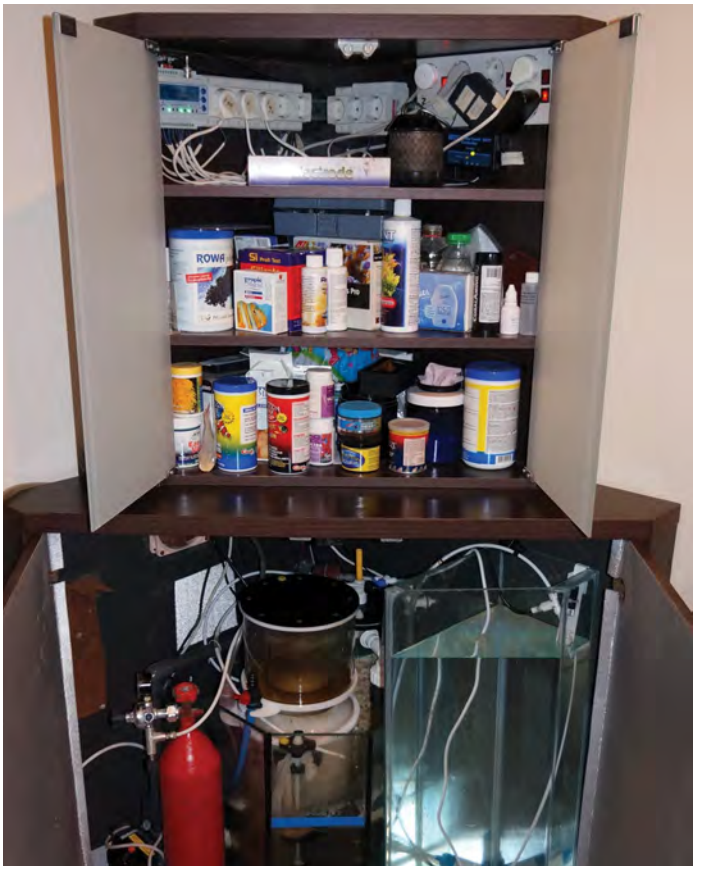
TATJANA SHTEFAN

Dreams Come True

If I had been told 5 years ago that I would have a slice of the ocean in my home, I wouldn't have believed it. I live in Ukraine, and marine aquariums were an exotic and expensive hobby here until not too long ago. It turns out that I started my first aquarium when I was already an adult. When I moved into my new apartment, I had planned a place for a freshwater aquarium. At that time, I didn't suspect that it was even possible to keep a marine tank at home. Nonetheless, after I visited an aquarium store and saw a very modest, not so colorful, and recently completed marine aquarium, the decision was made!



My first aquarium was a marine tank of approximately 80 gallons (300 liters), filled mostly with soft corals. After 18 months, the aquarium became full, and we began planning for a larger tank. And not only that, I hoped to move on to a new level of marine tank and create the proper conditions for SPS to thrive.

We purchased a new aquarium measuring 67”x24”x25” (170x60x63cm), which equals around 170 gallons (~643 liters). Lighting is provided by a DIY T5 fixture with ten 80 watt, ATI T5 bulbs. Because our original plan called for a freshwater tank, we did not set aside space for a large sump. All we could fit was a 13.2 gallon (50 liter) tank where the skimmer and calcium reactor are placed.

We had to order the equipment internationally because the majority of equipment imported to Ukraine didn’t meet our size or technical requirements.

The main water current inside of the aquarium is provided by a Tunze 6055 and Tunze 6155 with the 7096 controller, in addition to two Ecotech MP40’s. A Deltec 4040 was installed as the return pump. There is an aqua computer that controls the temperature inside of the aquarium and also the lights, which are turned on and off in three different stages. In the case of an unexpected energy disconnection, there is a UPS (uninterruptible power supply), which runs the one return pump, one MP40, and the calcium reactor.

Having reviewed a huge quantity of photos and videos via the internet, I had a good idea of what aquascaping design I wanted.

My husband helped me to execute those ideas, and without his moral and physical support, I wouldn't have achieved such a great result; I'm grateful to him for his effort.

The aquarium was started on Koral Zucht chemicals, and in a month's time, the first 20 pieces of SPS were introduced. From my point of view, it was the use of those chemicals and additives at that time that helped me keep my corals alive, although I didn't manage without failures later on. There were both cyanobacteria and salinity problems thanks to low-quality refractometers and

a combination of other circumstances. I believe that regular and detailed observation is the most powerful tool at a reefkeeper's disposal, and I attribute most of my success to this simple practice. The ability of a reefkeeper to be able to notice a problem and find a solution in time is of the utmost importance. This isn't always easy.

Today, I don't use chemicals except Coral Snow by Koral Zucht and iodide fluoride from time to time. The salt that I use is Reef Crystals, with weekly 10% water changes.

WATER PARAMETERS:

- **Salinity: 1.026 (refractometer)**
- **Temperature: 77-80.6F (25-27C)**
- **pH: 8.0-8.2**
- **Calcium: 450-460 ppm**
- **Alkalinity: 8-9 dKH**
- **Magnesium: 1250-1350 ppm**
- **Phosphates: 0.02 ppm**
- **Nitrates: 1 ppm**
- **Potassium: 430-450 ppm**

The fish population in my reef is not big. I feed them twice a day: in the morning with a dry feed and in the evening with a frozen food. Because there are LPS along with SPS in this aquarium, I feed the coral two times a month, and they are growing very well.

Dreams are different...and the ways of their implementation are different too. I hope everyone finds the right way to his or her DREAM!

To view videos of Tatjana's dream reef, scan these QR codes with your smartphone:

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SHAYNE BALLOU

Pumping Iron: a Strong Correlation to Nuisance Algae

A phytoplankton bloom in the iron-rich waters of the North Atlantic Ocean. Image by NASA.

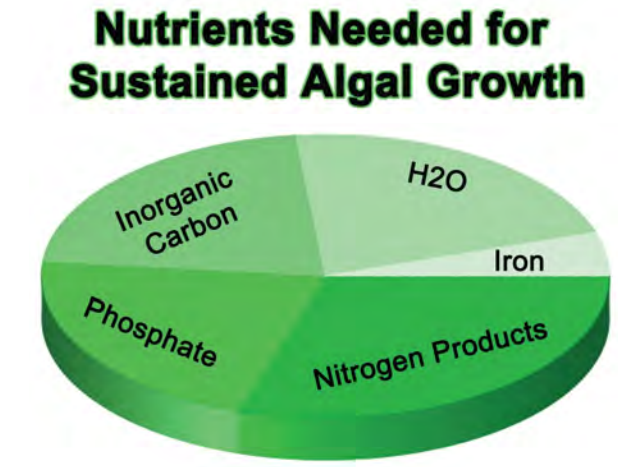
Nuisance algae is every hobbyist's bane; it creeps on our rocks, living like some horrible parasite on left over nutrients. I have seen many an enthusiast surrender under the pressure of algal blooms. But fret not fellow aquanuts, for there may be more to the story than what can be extrapolated from common water tests. In this article, I will cover how iron may be playing an integral role in algal blooms in saltwater aquaria.

While nitrogen products and phosphates are the usual targets of nutrient export when algae is in season, we may need to take a closer look at what can be an algal growth limiting agent within our saltwater tanks. I was often stumped when customers would have algal blooms while maintaining ideal water parameters. While free nutrients may not be testable due to quick uptake by algae, this is not a one-shoe-fits-all explanation.

***Bryopsis* has driven many hobbyists to frustration.**

I have found certain situations where a large system which has active protein skimming and multiple reactors running may still have persistent algal growth, despite timely water changes and controlled feeding. While historically, nitrogen, phosphorus, and potassium are the main ingredients needed for sustained algal growth, evidence shows that the world's oceans are actually iron limited. Scientists have been able to stimulate large plankton blooms which are visible even on satellite, simply by adding water-soluble iron to the environment. This has even been suggested as a possible solution to global warming, as the algal blooms have a high affinity for carbon dioxide uptake directly from the atmosphere. But how does this relate to your saltwater tank sitting in the living room, a controlled environment that is dependent upon your controlled input of nutrients and buffers?

When constraints are put on nutrient availability, such as in a hobbyist's tank, or if a few nutrients are present in high concentrations, the nutrients present in low concentrations tend to be the growth limiting nutrients. Since iron tends to only be added on an indirect basis, it seems possible that this may be a limiting agent for algal growth and must be



Nutrients present in low concentrations tend to be growth limiting nutrients.

considered when approaching a large algal bloom or persistent algal overgrowth. There are many ways in which iron can enter our tanks: foods, buffers, water changes, and the addition of phytoplankton already holding iron within their tissues. As these foods, compounds, and algae are broken down and used within the tank, the iron they contain becomes available for invertebrates or plants, such as nuisance algae, to use.

The next piece of the puzzle requires an understanding of iron availability in a saltwater tank. Coincidentally, there are certain organic compounds in saltwater that have a high affinity for iron binding, particularly FE^{3+}. These compounds are secreted by bacteria within the marine environment and rapidly bind to iron. Upon uptake, these compounds form an octagon-shaped molecule which puts iron on the tail end, in the position to make bonds with other chemicals or to become more readily available for chemical formation and uptake by nuisance algae. While this is a simplification of the actual pathway, it makes the concept more understandable.

Just why is iron so important to algae anyway? Iron plays many important biological roles, including multiple functions in photosynthesis, often involving the nitrogen and carbon cycles. It is also a key oxygen binder. Hobbyists who use well water (often rich in iron) before the softener or without an R.O. system should take extra notice.

Green bubble algae (*Valonia* sp.) is a common nuisance algae encountered in the hobby.

Both nuisance and ornamental algae require iron to thrive.

The good news is that agents that limit primary production are usually taken up quickly and exhausted. So when you manually remove algae from the system, you are also removing the nutrients stored within the algal tissues. If you suspect that you have an iron issue within the system, there are several products that will work to bind and remove the iron; Cuprisorb by Seachem seems effective at heavy metal removal, and activated carbon will also be effective with proper water flow. It's good to note that aiming to remove iron alone to solve an existing algal issue may not yield expected results, as many factors need to be addressed when tackling an algal issue. Remember, the single best thing you can do for your fish tank is a water change!

MARIE-HÉLÈNE NOËL

(left-side view)

A Hand-Made 750G Reef Tank

Four years ago, my boyfriend (JF) and I each had our own tank in the house; I had a 150 gallon, and he had a 180 gallon. We were what you could call reef addicts…both of us. So it didn't take long before we decided to plan for a bigger tank. But when no one in the relationship says, "Stop, it's enough!" well, you tend to go BIG.

THE AQUARIUM

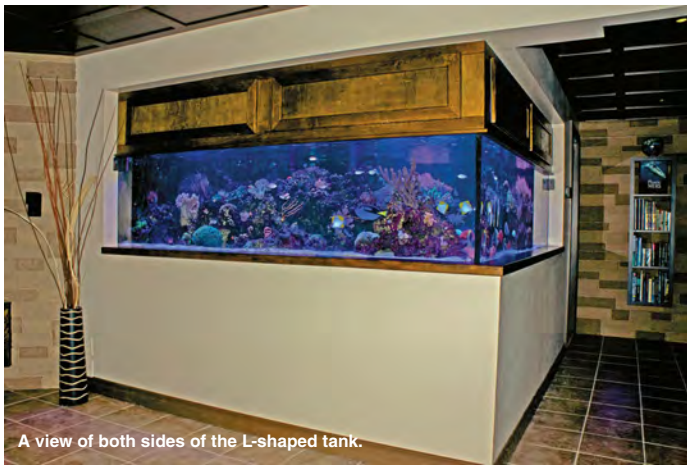
Main tank: 750 gallons, L-shape
Sump: 180 gallons
UV sterilizer: Emperor Aquatics 120w
Skimmer: self-built Marinetech Innovations commercial skimmer with Abyzz 400 needle wheel pump
Return pump: Abyzz 200
Water flow: (4) Vortech MP60 and (2) 6205 Tunze
Lighting: (5) MH 250w 20,000K Radium SE bulbs with reflector + LED strips from Sunrise
Calcium reactor: JNS commercial calcium reactor
Controller: ProfiLux 3
Dosing system: GHL (4) dosing pumps
Live rock: ~700 pounds of Totoka

We planned our aquarium over the course about 1 year to be sure we knew what we really wanted. He wanted an 8 foot long aquarium in his work space; I wanted an 8 foot long aquarium in the basement lounge (next to his work space). Since neither of us wanted to give in, we decide to do an L-shaped aquarium. Each side would be 8 feet long, and this way, we would both have a view of the aquarium where we each spent most of our time.

The aquarium ended up measuring 42 inches wide and 27 inches high, giving us a tank volume of a little less than 750 gallons. With an external overflow in place, we didn't lose any space in the display aquarium. We also utilized a room behind the aquarium as our fish room. It was really important to us to not have to carry water anymore for water changes, and we wanted everything for the aquarium to be nearby. We even installed a small fridge with a freezer so we could keep all the fish and coral food in the fish room.

With such a large tank size, we knew we were in for some challenges. The first challenge arrived with the glass pieces for the aquarium, which were delivered to our house unassembled. We actually had to glue the pieces on site ourselves with no previous experience! But with the help of the company who sold us the

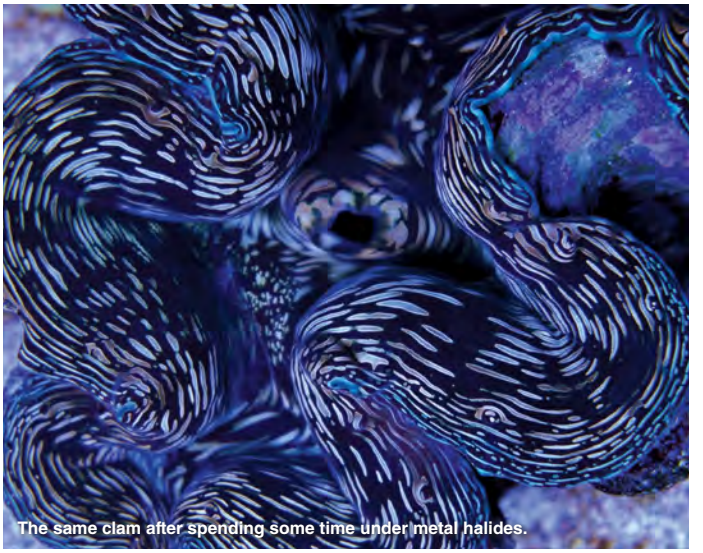
(right-side view)



A view of both sides of the L-shaped tank.

The self-contained fish room.


One of our clams under LEDs.


The same clam after spending some time under metal halides.

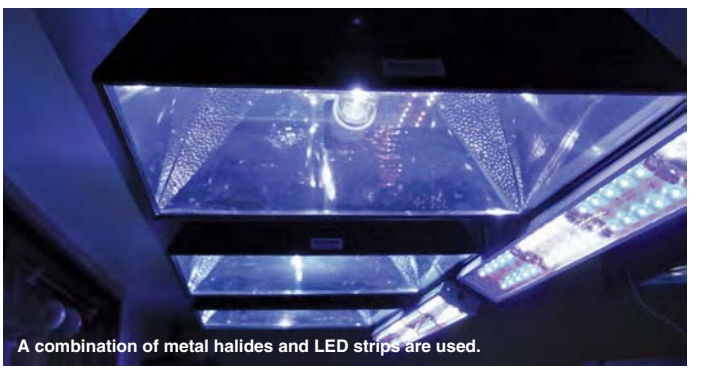
glass, combined with JF's talent, we were able to make it happen.

The aquarium wasn't the only DIY project we had in mind (when I say we…please understand I mean JF). He built the overflow, sump, and all the plumbing as well; it took a long time to finish everything, but we were really happy with the results. In November of 2009, we finally finished building the entire reef system and fish room. At this point, we were able to start putting water into the tank!

OUR LIGHT EXPERIENCE: LED Light… Not for Us

It was really hard to decide what light to put on our aquarium. We started with a 12 bulb, T5HO fixture, but even if the color of the light was good, we were missing the shimmering effect that we were used to seeing with metal halides. So with the popularity of LED lighting growing, we decided to try it, even if it would cost a fortune for an aquarium of this size. We decided to buy one LED light fixture that seemed very promising, and we really loved the effect of it; the colors were fantastic. But after a couple of months, we started feeling disenchanted…something wasn't right. We'd never had such a hard time keeping corals alive and thriving. We started doing all kinds of water tests only to conclude that the problem may have been the lighting. So we switched back to what we knew and loved: metal halides. About 1 month after changing back to metal halides, we started to see positive change in the corals, and the clams recovered the electric markings that they had lost under the LEDs.

Currently, we are using (5) 250w Radium, 20,000K, single ended, metal halide bulbs with 3 strips of LEDs. With this set-up, we are able to recreate a beautiful sunrise, sunset, and moon light but still have the powerful metal halides whose efficacy has been proven over the years.


A combination of metal halides and LED strips are used.

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This pair of *Paracentropyge multifasciatus* angelfish is just one of many beautiful pairs of fish in this display.

An inquisitive *zebra* eel also calls this tank home.

FILTRATION

We used about 700 pounds of Totoka live rock. We love this rock because the pieces are very porous and light for their size, and the branch-like pieces fit into each other and make it easy to aquascape. What was really cool was when the aquascape was finished, we couldn't see where one rock started or ended, as if it was completely natural.

For the skimmer, we again tried a lot of different things before figuring out what really worked for us. We started with an AP1004 from Deltec, which was rated to work for an aquarium of this size. But because of our heavy fish load and some of the fishes being slow eaters (like the Copperband and some of the smaller fishes), we found ourselves feeding a great quantity of food every day. Unfortunately, we didn't have a lot of time to do water changes, resulting in poor water quality.

So we ordered a custom skimmer from JNS; we asked them to make it taller than the SK-7 and add an additional pump. Although it worked really well, since it was an in-sump skimmer, we found that it took practically all the space in the sump and we could not fit anything else in (like frags or live rock). So JF decided to put the pump of the JNS on the AP1004 to make it stronger. It worked pretty well, although the water quality didn't improve.

We then started dosing NitraClean from Coral-Shop. Nitrates started going down, but they wouldn't drop to the desired range without us having to overdose the product.

JF started looking into buying a commercial skimmer, but the prices were too high. On top of that, he couldn't even find what he was looking for: a commercial skimmer with a needle wheel pump.

Having previously built custom skimmers for other tanks, JF decided to make his own commercial skimmer (he was inspired by the MRC commercial model). And what a beast he built! The body is 62 inches high without the head, and it has a diameter of 20 inches. The pump he chose is the Abyzz 400 needle wheel, and he also added a cleaning head. The neck was really the hardest part to make, and JF had to redo it multiple times before getting it right.

We are extremely satisfied with our new skimmer, and after only about 10 days, we no longer needed to overdose NitraClean. With this skimmer, we found what works for us: the right balance between skimmer strength and water changes. And with the products we are dosing in the aquarium, we just made our lives a little bit easier. There was no need for reactors which meant less cleaning.

SALT

We started our aquarium with H2Ocean salt from D&D, but we found that it was too rich for our aquarium. As a result, we started having cyano issues, so we switched to Tropic Marin Pro Reef, and it resolved our problems. Don't get me wrong, the D&D salt is really good; it was just not ideal for our tank.

JF's 5 foot 2 inch Marinetech Innovations skimmer. The inserts show parts of the skimmer before fabrication.

The author's Regal Angelfish.

The author's Gem Tang.

WATER FLOW

Initially, we installed 14 Tunze pumps! But we found that they were too much work to clean, took too much space, and required too many power cords. As a result, we decided to replace them with Vortech pumps by Ecotech Marine. For us, it was good because we were OK with having only 4 pumps. The only down side is that they make more noise than the Tunzes if you set them on pulse mode.

PRODUCTS ADDED TO THE TANK

We are dosing 4 products daily, controlled by a ProfiLux 3, a controller made by GHL in Germany.

1 - DISPOPHOS FROM CORAL-SHOP

This liquid product removes phosphate from the aquarium. With daily dosing, the phosphate level always remains constant. We prefer this to the anti-phosphate resin since it doesn't require us to have a reactor. Additionally, when the resin is new, the phosphate level will go down quickly, but will then start to build up again until the hobbyist changes the resin. With Dispophos, we calculate approximately how much phosphate we bring into the aquarium every week, and we dose Dispophos accordingly in order to keep the phosphate stable at 0.03 ppm.

2 - GROWTH AND COLOR BOOSTER FROM CORAL-SHOP

This product is a supplement which contributes to the sound development, growth, and correct coloration of corals and other marine organisms in a fast and natural way. It contains 24 trace elements, 6 trace noble metals, 3 vitamins, 8 carbohydrates, 21 amino acids, and 2 types of complex acids.

3 - NITRACLEAN

This product is a natural denitrification booster and a source of fast energy and essential mineral nutrition for unicellular organisms. It helps us keep nitrates low.

4 - MAGNESIUM

This is the last product that we are dosing with our dosing pump. We found that with this size aquarium, the corals and coralline algae consume a lot of magnesium. We are dosing it to maintain a steady level of 1350 ppm.

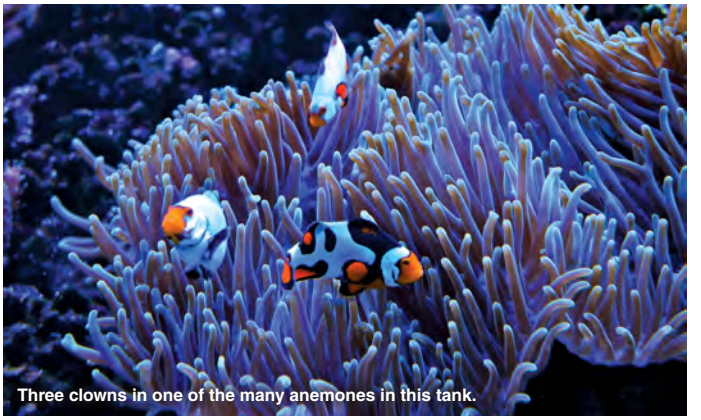
The other products we are adding to our aquarium include fish and coral food. For our corals, we really love all Reef Nutrition products, and we add Reef-Roids by Polyp Lab and phytoplankton (our own culture) too. For our fishes, we add New Era Marine Grazer, pellets and Aegis flake, Two Little Fishies' Sea Veggies (green), PE Mysis, Reef Nutrition R.O.E. and Arctipods, raw sea food, Spectrum and OSI pellets, krill, brine shrimp, and Fish and Reef #1/#2 from H20 Life.

The Profilux 3 and CO2 canisters.

THE DIFFICULT DECISION

JF and I love fishes so much…all kinds of fishes. So we tried a couple of them that are known to be "reef safe with caution," and you can guess what happened next; some of them started eating our corals. Our adult Imperator Angel started eating our zoanthids, *Acanthastrea, Euphyllia*, and open brains; this left us with the options of keeping soft corals and SPS corals. However, our mated pair of *multifasciatus* Angels started eating our SPS polyps too!

So we had to make a very difficult decision: either keep all the fishes and only some corals or keep all the different corals we wanted and only some of the fishes. We finally decided that we



Three clowns in one of the many anemones in this tank.

The author's beautiful, show-sized rose anemone.

Various fishes in the display.

The author's Imperator Angel.

The author's Barnacle Blenny.

FISH POPULATION

TANGS: Gem, Clown, Black, Yellow, Blue Hippo, Powder Blue, Achilles, Blonde Naso
CLOWNFISH: *ocellaris* (mated pair), (2) Extreme Picasso, (2) Platinum
ANGELS: *Paracentropyge multifasciatus* (pair), Flameback (pair), (2) *Genicanthus watanabei* (females), Regal (orange belly), *Pomacanthus imperator*, Masked Swallowtail - (female)
BUTTERFLIES: Copperband, (4) Yellow Zoster, Moorish Idol, Hi Fin Coradion

- Peppermint Hogfish (pair)
- zebra eel
- (10+) Tierra Anthias
- (10+) Dispar Anthias
- (15+) Green Chromis
- 3-Striped Damsels
- (2) Green Mandarin
- Spotted Mandarin
- Flame Hawkfish
- Engineer Goby
- Red-lipped Blenny
- (5) Barnacle Blennies
- Banggai Cardinal (pair)
- Vermiculite Wrasse (female)
- Four-line Wrasse
- Black Bar Chromis (mated pair)

would keep all of our fishes (a lot easier since it would be hard to remove them from a 750 gallon tank) and go with soft corals, anemones, *ricordea*, gorgonians, sun corals, and some others. I think that we will still be able to have a great aquarium full of life, and we will be happy to be able to keep all of our fishes.

Building a tank this size has a lot of challenges, but what guaranteed our success is our passion. Every challenge is an opportunity to experiment with something new and better understand all the complexities of a reef aquarium. It's all worth it in the end when you sit in front of your tank and enjoy the beauty of the sea thriving in your home.

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RICHARD ASPINALL

Adding Motion to Your Ocean

Of all the corals in my systems over the years, the one that has always generated the greatest interest from friends and family is *Xenia*. I know, I know...despite my protestations that it is a weed that overruns the tank, and even with my increasingly graphic descriptions of regular attempts at its eradication, my ill-informed (well, in my biased view) tank viewers continue to urge me to keep some as they like the way it moves.

Now that I've achieved low nutrient levels in my main system, removal of *Xenia* is no longer a problem and the occasional tuft that does pop up is a welcome addition.

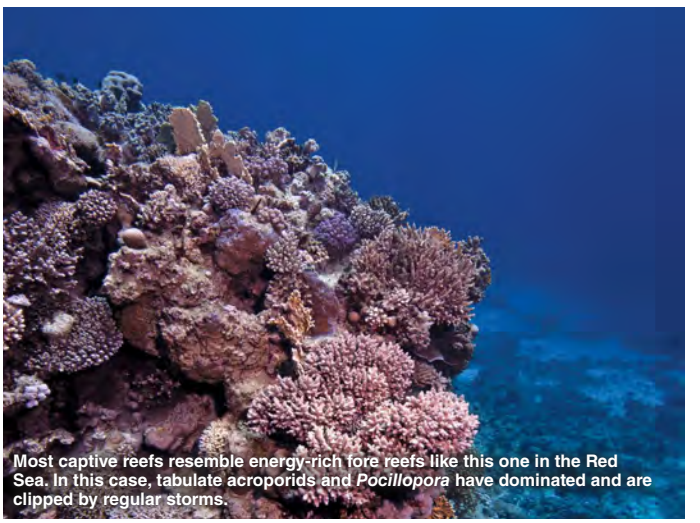
Remembering the sinuous movement of the mass of *Xenia* in my first tank has got me wondering, wondering about the broader aesthetic considerations of movement in reef tanks and how we might allow those carefully crafted and expensive currents to play amidst and amongst the corals in our home reefs.

The prevailing and entirely understandable desire to reach the oft-assumed pinnacle of reef keeping that is the thriving and colorful SPS system, replete with acroporids, *Stylophora, Seriatopora*, and the rest, often produces systems that appear quite static. And as anyone who has ever dived a real reef will attest, this is quite unnatural. Yes, these reefs, at the very forefront of the hobby, which are defining the state of the art, demonstrate a great deal of skill and commitment from their creators and curators, and in no way am I criticizing them. But there is, perhaps, something missing that might render them a little less static and a little more natural. Could that something be movement?

A stunningly beautiful system that is the envy of all who see it. It is, however, very static. Only the fish and the *Euphyllia* offer any large-scale movement.

ACCURACY

I should, before I look at suggested invertebrates for movement, note that the reefs we strive to emulate most closely resemble the high current, high energy, shallow reefs of the tropics. The conditions here favor the survival of robust, plating, and massive corals that can endure the pounding of the surf and the heavy grazing of corallivores like parrotfish and turtles.



Most captive reefs resemble energy-rich fore reefs like this one in the Red Sea. In this case, tabulate acroporids and *Pocillopora* have dominated and are clipped by regular storms.

In contrast, it is the case that soft corals and those with larger polyps and delicate feeding apparatus tend to thrive in areas that are less subject to chaotic and occasionally damaging flow and surge. These habitats can, however, have high laminar flow. These soft corals and large polyp stony (LPS) corals tend to be found below 5 meters depth, and of course, their presence reflects a ready availability of zooplankton. Such areas are often populated with large stands of corals that, without very specialized care, we struggle to maintain in captivity – *Dendronephthya* being a prime example.

Carnation corals such as *Dendronephthya* are tricky to maintain in captive reefs, require a large amount of planktonic nutriment, and should be avoided by all but advanced hobbyists.

CAPTIVE COMPROMISE

A reef with movement, by necessity, will have to be a captive compromise that takes into account the hobbyist's desire to maintain the rich hues of healthy SPS corals along with examples of corals and invertebrates that may in actuality occupy different habitats in the wild.

A good example of this mismatch is the Elegance Coral (*Catalaphyllia jardinei*). This is a species that is found in the wild with its conical base buried in soft substrate, mainly in shallow lagoonal areas where it is frequently associated with sea grass. This is not a species that would be naturally found amidst stands of acroporids; yet in captive reefs, it often is, and despite this biological inaccuracy, it looks stunning.

***Catalaphyllia* – The Elegance Coral varies in its survivability in captive systems. If it can be maintained, it needs to be in a relatively low current zone with its conical base buried in the substrate.**

Another need for compromise will be found in the fact that several genera of coral that would otherwise be ideal candidates for providing movement can be quite toxic to the rest of a tank's inhabitants. In the wild, chemical warfare between corals (or allelopathy, as it's properly known) serves to discourage corallivores and keeps adjacent corals from overgrowing their neighbors. But in the captive reef, except perhaps in the very largest systems, all corals are, in effect, neighbors. This is because toxins released into the system water are not massively and rapidly diluted as they would be in the wild. *Sarcophyton, Litophyton*, and *Lobophyton* corals are considered to be some of the worst exhibitors of this unfriendly behavior and may release an unpleasant cocktail of up to 20 terpenoid compounds. There are several other genera that release toxins to a greater or lesser

extent, such as *Capnella, Sinularia,* and *Lemnalia*. As with any purchase, do your research beforehand!

Coping with general levels of toxicity from such corals is relatively straight forward and something we've understood for many years now. Effective skimming coupled with ozone and the efficient use of good quality activated carbon are tried and trusted ways of dealing with unwanted organic pollutants of all classes and allow many hobbyists to maintain mixed reefs. It is usually the case though, that potentially toxic species are excluded by hobbyists striving to maintain conditions closer to those on a wild reef crest. And it is generally considered wise to exclude organisms that, when damaged or stressed (often by hobbyists trying to move, frag, or remove them), can release significant amounts of toxins that even the best filtration system will be unable to remove quickly.

IDEAL INVERTS FOR MOVEMENT

Despite my apparently doom-laden warnings earlier regarding toxicity, there is a large range of inverts that can introduce movement to a system and which, providing the hobbyist plans ahead, will cause few major problems; here are a few of my favorites.

DUNCAN'S CORAL (*Duncanopsammia axifuga*)

Duncan's Coral is a superb species for the mixed reef aquarium, and in my opinion, deserves a place in every system. In the wild, it is a relatively deep water species. Although it is adaptable to a wide range of lighting conditions, it will require careful acclimation to very bright lighting. Duncan's Coral does possess zooxanthellae, but feeding with *mysis,* Cyclopeeze*,* brine shrimp, or small pieces of sea food will encourage rapid growth in the form of new heads budding from its branching skeleton. My specimens seem to particularly enjoy frozen or fresh copepods.

Duncan's Coral.

Duncan's Coral superficially resembles *Catalaphyllia,* and if you are debating which to purchase, I'd encourage you to choose Duncan's every time. Duncan's Coral is very easy to propagate and frag. Duncan's skeletons can be attached to rockwork with ease, and new specimens will quickly form a dense head of tentacled polyps that enjoy gentle currents and will reward the hobbyist with attractive neon green and subtle pink hues.

TORCH, HAMMER & ANCHOR CORALS (Genus *Euphyllia*)

Corals of the genus *Euphyllia* are also exceptional for the mixed reef, though it should be noted right off the bat that they can sting adjacent specimens and will often produce long sweeper tentacles that can lash nearby organisms. However, if this behavior is planned for when the specimen is introduced, then it need not be a significant concern and may be countered to some extent by providing carefully aimed, moderate currents.

A small specimen of *Euphyllia ancora*. Wild specimens may reach up to 1 meter in width and form quite massive colonies.

For example, in my own system, I have a large Torch Coral *(E. glabrescens)* that has grown approximately ten heads. Every so often, I remove a head to keep the coral in check – this isn't the easiest thing to do, but planning ahead for this eventuality has helped enormously.

Classification within the genus *Euphyllia* is fairly straightforward, but is not helped by confusion regarding common names, as accurate identification relies on the skeletal structure rather than the appearance of the fleshy polyps. The names *E. ancora, E. paradivisa,* and *E. parancora* are often used interchangeably by dealers and hobbyists, in my experience. Suffice it to say that the latter two species form branching colonies, and this may be the most important hobbyist concern, as care requirements are similar.

***E. glabrescens* (Torch Coral) – a long-tentacled species with branching heads that can easily form independent colonies.**

***E. paradivisa* showing the branching nature of this species – this specimen appears to require a little more light to encourage a more compact form.**

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Most *Euphyllia* share the same basic color palette of subtle browns and greens with occasional pinks – more brightly colored and fluorescent specimens will attract higher prices and are frequently offered at frag swaps and local fish stores. It is perhaps worth noting here that fragging and sharing corals can allow for infections and nuisance organisms to be introduced from one tank to another, so hobbyists may want to consider the use of a proprietary coral dip. *Euphyllia* can easily contract infections and play host to parasites, and as someone who has only recently seen the last of a troublesome nudibranch (hopefully), I urge everyone to dip and/or quarantine.

Euphyllia do not require additional target feeding, but like many corals found in that loose assemblage of corals known as LPS (not a term I often use as it has no basis in biological fact), they do appreciate being fed. *Mysis*, specially formatted pellet foods, or small pieces of clam make great foods for *Euphyllia* and will be greedily accepted and transferred to the polyp's centrally located mouth.

ANEMONES (various genera)

Entacmea quadricolor.

My decision to include anemones in this article may be a controversial one, not least for the fact that many anemones are wild caught and have relatively poor survival rates in captivity.

I would, though, sing the praises of *Entacmea quadricolor*, or the Bubble Tip Anemone, which is frequently available as specimens which have budded in captivity. These specimens are often quite hardy and if provided with sufficient food and light will thrive, whether or not they ever play host to clownfish or symbiotic crustaceans as they likely would in the wild.

A lot has been written about 'nems, and I can't provide a full account here. Wiser folk than I have done that before me - just to add, though, that there are few animals in a reef tank that can offer the beauty and movement of a happy anemone. One caveat, however - a happy anemone will stay in one place; an animal that for some reason is not comfortable, be the cause lighting, food availability, current, or something else, is likely to detach and go walking about. Wandering 'nems can do a lot of damage to other organisms with their potent stings or damage themselves – so make sure your powerhead and circulation pump intakes are screened.

I've been lucky with my anemones. I have two bubble tips (originally one specimen which divided), and when the offspring reached a location I was happy with, I fed it quite heavily to encourage it to stay. Many anemones enjoy a crack in the rockwork in which to anchor themselves, but as they outgrow their current homes, they may start moving.

The relationship between a clown, such as this *Amphiprion bicinctus*, and its host is one of the most appealing in the hobby.

TRIDACNID CLAMS

Tridacnids are a firm favorite amongst hobbyists and a very sensible investment – they can be quite expensive, but they just keep on giving and will survive for decades if well cared for in a stable, healthy system.

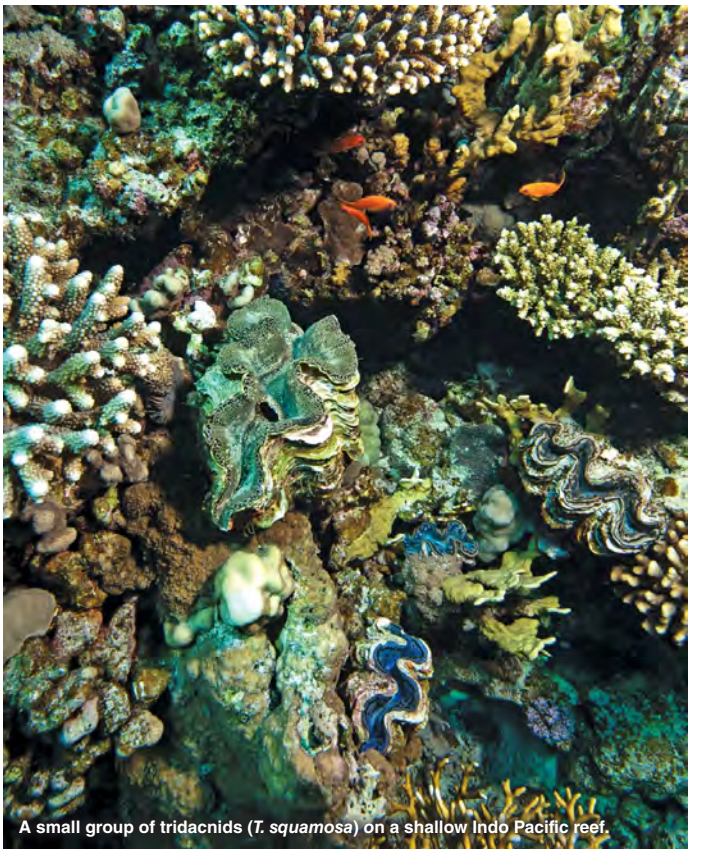
In the wild, tridacnids are found in the upper reaches of reefs and are often found to be part of the reef itself, with only their mantles

visible. This is a result of coral growth around them and the clams' ability to slowly dissolve the surrounding substrate as they settle into the reef. For a further account of this behavior, see James Fatheree's excellent book, *Giant Clams in the Sea and the Aquarium.*

In my experience, wild clams tend to be found on or in hard substrates and not resting on coral sand as is often the case in captive reefs. There is a reason for this, of course. If you plan on moving a clam, you're going to want to do it without trashing the rest of your reef. Resting the clam on a specially designed clam bed or an old clam or scallop shell that you bury in and fill with substrate will give the clam a firm attachment but still allow you to move it if necessary.

In terms of movement, clams offer the occasional opening and closing of their shells as they respond to stimuli around them, but they also offer the gentle and subtle movement of their mantles in the current. It should be noted, though, that if a clam fails to extend its mantle fully, one cause may be currents that are too strong.

The feeding of tridacnids still causes some debate – they are able to filter feed, but do they require particulate food stuffs? Authors disagree on this, with some suggesting that only small specimens require particulate feeding. Personally, I don't know the answer; I have two clams and have never chosen to actively feed either and both are thriving. My suggestion for happy tridacnids would be to spend a little more on larger specimens that tend to show higher survivability rates (for whatever reason) and get the lighting right!



A small group of tridacnids (*T. squamosa*) on a shallow Indo Pacific reef.

The gentle and occasional movements of clams, along with their superb coloration and ready availability from farms, make them a firm favorite among hobbyists.

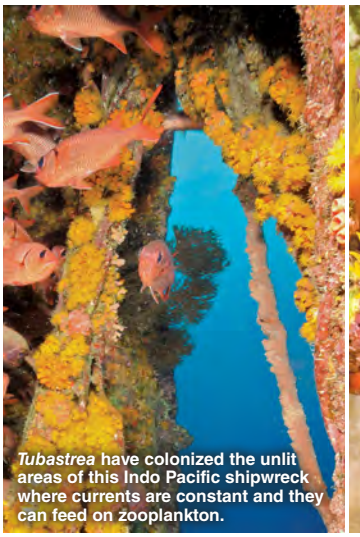
SUN CORALS (Genus *Tubastrea*)

Tubastrea are azooxanthellate and must be fed. They will die without regular feedings, but if fed well (two or three times per week), they will reward the hobbyist with superb colors (yellows and oranges in the case of *T. aurea* and *T. faulkneri* or the rather more subdued tones of the appropriately named Black Sun Coral, *T. micrantha*). In the wild, *T. micrantha* forms large, tree-like skeletons in slightly deeper water, whilst the other species are more encrusting and dome-like in form. The extended polyps look superb in the alternating or chaotic flow which is necessary to remove particulate matter that settles on the skeleton between the corallites.

T. micrantha with nephtheids and sponges on a reef in the Maldives.

Sun corals are best kept in dim lighting; strong lighting will promote algae which will overgrow their skeletons, and tissue recession will occur. As with most corals, look at the locations where they thrive in the wild and replicate them – in this case, overhangs, caves, and wrecks.

Tubastrea thrive in strong currents and will reward the conscientious hobbyist with beautiful, fully extended, healthy polyps. Target feed them with brine shrimp or *mysis,* ensuring each polyp gets fed, and your colonies will grow and spread.



Tubastrea have colonized the unlit areas of this Indo Pacific shipwreck where currents are constant and they can feed on zooplankton.

Full expansion – this specimen was found in a high flow area, deep within a shipwreck.

FEATHER DUSTER WORMS – (Sabellidae, Serpulidae, Spirorbidae & Sabellaridae)

Feather dusters are undeniably beautiful.

These beautiful worms of the class Polychaeta are notoriously difficult to maintain in captivity due to the large amount of organic particulate material they require to survive. Hobbyists who are able and willing to offer phytoplankton may have success, and of course, the products of a refugium and/or deep sand bed will help provide balanced nutrition.

A superb Serpulid. Worms that do not receive sufficient nutriment may shed their feeding apparatus and regrow smaller organs; if this continues, they will perish.

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The feather duster's visible food gathering and remarkably attractive breathing apparatus that makes these segmented worms so desirable to us can also be attractive to some fishes, so check for compatibility before acquiring one.

The requirements of the four families are similar, but their biology is not. Sabellids manufacture tubes of a flexible material and are usually available as large specimens. Spirorbids are very common in many aquariums; they are small and create a calcium carbonate spiral that is frequently found on live rock and often overlooked – so you won't be buying them in your dealer's invert section by choice. Serpulids also use calcium carbonate and often possess door-like opercula to seal their tubes when the worms are retracted and are regularly offered for sale. Sabellarids are occasionally seen in the hobby; they form colonial masses of calcium carbonate tubes that can make up very large reefs in the wild.

Serpulids, like these *Spirobranchus*, live within growing coral colonies, such as this *Porites* – the requirements of both will need to be met.

Feather duster worms are undeniably beautiful, and their movement in the current and retraction and expansion in response to fish, motile invertebrates, and the algae scraper is captivating. But they are often doomed, and sadly, a huge number of animals are destined to perish in tanks where their nutritional needs are not met. As with all purchases, do your research and plan ahead for the needs of your livestock; don't buy on a whim.

NEPHTHEIDS (Cauliflower, Carnation & tree corals) – various genera including *Nephthea, Capnella, Lemnalia, Litophyton, Dendronephthya*

The large amount of planktonic food required by *Dendronephthya* (seen here in the wild) places them beyond the scope of the average hobbyist.

A display of soft corals at a public aquarium in the UK. Here, *Lemnalia*, *Sinularia*, and *Lobophyton* appear to be holding sway.

Nephtheids offer a chance to add some of the most beautiful of all corals to the system, but as touched upon above, they are also some of the most difficult to keep, with *Dendronephthya, Scleronephthya, Nephthea, Stereonephthya*, and the like being beyond the range of the average hobbyist. Having said that, a fantastic display can be created from the slightly less demanding cousins of these beauties – the tree and finger corals from the genera *Capnella, Lemnalia,* and *Litophyton.*

Personally, I find *Capnella* and *Litophyton* difficult to distinguish; both form large, tree-like structures with bare stalks and bushy crowns that respond well to strong currents. Both are heterotrophic, and you are likely to have success with either without providing additional feeding in the form of planktonic matter.

Both genera are easily reproduced in captivity via cuttings, though they can (especially in the case of *Litophyton*) produce terpenoid chemicals when stressed. I should note that *Capnella* spp. are considered to be some of the least toxic of the group and some of the least toxic of all soft corals.

These hardy corals are some of the best for responding well to powerful currents within a tank. They thrive in the wild in areas of strong flow but seem to do best away from the crashing, chaotic conditions of the upper reef slopes. They easily tolerate lower lighting conditions – so gradual acclimation to reef-intensity lighting is advised if you acquire wild-caught specimens.

Some systems are reported to have experienced crashes of these corals for no discernible reason, none that we have been able to quantify anyway. Having said that, other systems seem to allow these corals to grow rapidly, with the effect that tanks can become overgrown by clonal colonies. If you plan to introduce a specimen, it might be advisable to ensure that it is attached to a piece of rockwork that can be removed for periodic pruning rather than attaching it to the main aquascape.

IN CLOSING

I hope the organisms I've looked at will tempt you to make room in your tanks for species that add movement. A tank without the sway of polyps and tentacles this way or that, in response to the patterns of chaotic or pulsing flow is, I believe, missing an important aesthetic element. It's worth noting that all of the above animals require calcium to create and enlarge their hard skeletons or shells with the exception of anemones, and adequate care needs to be taken to ensure calcium, magnesium, and alkalinity levels are maintained within accepted norms.

Further reading:

E. Borneman, *Aquarium Corals, Selection, Husbandry and Natural History.* TFH
J. Fatheree, *Giant Clams in the Sea and the Aquarium.* Liquid Medium
R. Shimek, *Marine Invertebrates, 500+ essential to know aquarium species.* TFH

HEATHER MUTSCHLER & GORDON GREENLEY

Sublime Marine Jungle: An Introduction to Marine Planted Tanks

Today, reef tanks are a common sight in the marine aquarium hobby, with many considering a splendid-looking reef to be the epitome of success. However, the less common and often underrated marine planted and macroalgae tanks can be equally as stunning and deserve to be noticed as well. This article will introduce two examples of macroalgae display aquaria and will hopefully inspire new macroalgae tanks to be established.

A full tank shot of Heather Mutschler's intricate macroalgae aquarium. Image by Christina Jayne.

Heather Mutschler has been in the aquarium hobby since buying her first freshwater tank at the age of 8. At age 17, she began her first saltwater aquarium and currently has three saltwater and a few freshwater aquariums. The marine tanks include an *Acropora* dominated reef tank, a fish-only-with-live-rock aquarium, and of course, a macroalgae tank. Past experiences have included keeping a mixed reef aquarium, keeping and breeding dwarf seahorses, and keeping a very delicate flame scallop that has been in her care since December of 2011. She has also bred a few freshwater fish species. Heather's macroalgae aquarium is a 20 gallon, standard rectangular tank that has been established for about a year and a half. It originally housed a baby Commerson's Anglerfish and now has a spawning pair of Talbot's Damselfish, two Peppermint Shrimp, a few non-photosynthetic corals, and the above-mentioned flame scallop.

A view of Gordon Greenley's complete system.

Caulerpa **species are some of the fastest growing and most invasive types of macroalgae. Here, the dendrite-like holdfasts can be seen reaching for the nearest object for attachment. Image by Gordon Greenley.**

Gordon Greenley has been an avid aquarist since early childhood. He began with freshwater aquariums at 6 years of age and started keeping saltwater aquariums at the age of 14. Over the years, he has made great strides in the aquarium hobby, including successfully keeping Crinoid Feather Starfish (*Davidaster* sp.) for over 3½ years and breeding Copper Cardinalfish (*Apogon margaritophorus*). He currently focuses on small polyp stony corals in the reef setting and macroalgae and seagrass.

Gordon currently maintains a coral reef aquarium, a sponge aquarium, a macroalgae and seagrass aquarium, and three freshwater planted aquariums. His macroalgae tank is based on the concept of a tide pool, with rock lining the back and sides and hang-on-back filters cascading water over the rocks, which stick out of the water. It is filled with numerous macroalgae species, a few seagrass species, a pair of Spotted Mandarins, an Eviota Goby, an Aurora Goby, and many ornamental shrimp species.

A Rock Shrimp (*Urocaridella* sp.) is one of many invertebrates that can be found scavenging in the macroalgae for food. Image by Gordon Greenley.

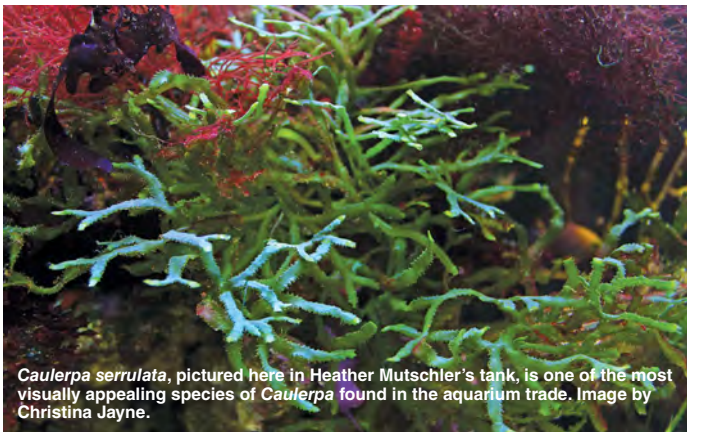
Caring for a macroalgae aquarium is a lot different than caring for any other type of aquarium. Just as corals need different care than say, a clownfish, macroalgae have certain needs that have to be attended to in order to be kept successfully.

Lighting is key for macro growth, just as it is for corals in a coral reef. Different algae need different amounts of light. Red algae generally tolerate the lowest amount of light, similar to the needs of soft corals. Brown algae require the highest amount of light, similar to the needs of SPS corals. And green algae are right in the middle of the two. Heather's tank is 20 inches deep and has a 2 x 24 watt T5 fixture over it, providing just enough light for red and green macros to thrive, but not enough for brown algae. Gordon's aquarium, however, is about 12 inches deep and has a T5 fixture with 4 bulbs, allowing him to keep any species of macroalgae he desires plus seagrass, which requires much higher light than any of the macroalgae.

Ochtodes**, Red Grape Macroalgae (*****Botryocladia*** **sp.), and Flame Algae (*****Halymenia*** **sp.) can be arranged to create a striking scene. Image by Gordon Greenley.**

Water flow is also critical to macroalgae health. Too much, and macros with slow-growing holdfasts will be ripped off the rocks. Too little, and detritus will settle on them, blocking light and allowing cyanobacteria, diatoms, and hair algae to take hold and overgrow the macroalgae. Both Heather and Gordon's macroalgae aquariums have slightly over 800 gallons per hour of flow through their tanks,

Red Grape Algae (*Botryocladia* sp.) is a common find in the trade and is an easy to care for macroalgae. Image by Gordon Greenley.



Caulerpa serrulata, pictured here in Heather Mutschler's tank, is one of the most visually appealing species of *Caulerpa* found in the aquarium trade. Image by Christina Jayne.

turning over the tanks' volumes approximately four times per hour, about the same amount of flow large polyp stony corals like. The authors have experimented with different amounts of flow, but the current amount seems to be perfect, with slightly less or a little more being equally acceptable. The main objective is to make sure all areas of the tank have flow. This will keep detritus in suspension and keep the macros clean and happy. As long as those two goals are achieved, the actual gallons per hour does not really matter since there's no magic number for correct water flow.

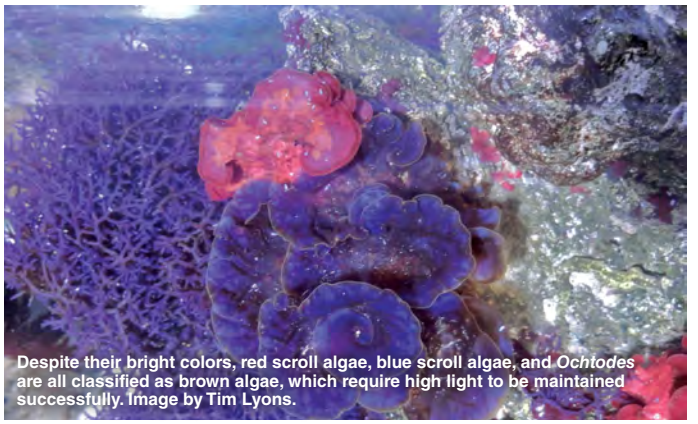
Equally important are nutrients. Macroalgae utilize nitrates, phosphates, iron, iodine, molybdenum, and several other trace elements. The molybdenum and other trace and minor elements are found in sufficient amounts in salt mixes that dosing extra is not necessary. Semi-regular water changes take care of all of those without problem. Phosphate usually takes care of itself as well, since any amount of livestock in the tank usually produces enough for macroalgae. Heather's tank even has a GFO reactor on it to remove phosphate, since the frequent feeding of the non-photosynthetic corals leads to an overabundance of phosphate, which encourages nuisance algae growth. Nitrate, iodine, and iron usually should be dosed at least on occasion. Both authors dose potassium nitrate as a nitrogen source to help the macros grow as fast as possible, keeping the water's nitrate level at about 2 ppm in both tanks. Iodine is essential for the growth of all algae (but particularly red algae) and is depleted from the water very quickly, so it needs to be dosed on a regular basis, usually once or twice a week. Similarly, iron is used by all algae, but green algae in particular. This nutrient isn't depleted as fast, so a small dose of chelated iron every week or two is sufficient. A deficiency of any of these nutrients will cause slowed growth and sometimes muted or pale color in macroalgae, which is easily corrected once the proper nutrients are restored.

The substrate of the tank is not as crucial as the elements discussed above, but it does still bear a mention. Both of the authors' tanks have a medium-grain sand, with Heather's sandbed being about 2.5-3 inches deep and Gordon's being about 4.5 inches deep. Most macros have no reliance on sand, so it isn't completely necessary in a marine planted tank, though having some kind of substrate helps with the natural look most macroalgae tanks strive for. It is also a critical part of any healthy tank's biological filtration. It is possible to have a perfectly healthy aquarium with no substrate, but both authors feel that a sandbed is of utmost importance and should be considered for any macroalgae system, with 1-3 inches of sand sufficing. Gordon's sandbed is extra deep because of his seagrasses. Seagrasses need deep substrate in which to anchor their roots and from which to extract nutrients; otherwise, they would not fare well.

Though the tanks featured in this article are around 20 gallons in volume, any size or shape tank can be used for macroalgae. Shallower tanks allow more light penetration but hinder the vertical growth of tall macros, so a 12 inch-deep tank should be considered about the minimum height unless only short macros are desired. Conversely, taller tanks don't allow much light to the bottom, so a tank of about 24 inches tall would be the maximum height unless intense lighting is used. That said, these are not rules, and it's up to

Stargrass (*Halophila engelmannii*) is a beautiful species of seagrass rarely encountered in the trade. Image by Gordon Greenley.

This spiky red macroalgae, *Bryothamnion* sp., is a difficult species to maintain in captivity. Image by Gordon Greenley.



Despite their bright colors, red scroll algae, blue scroll algae, and *Ochtodes* are all classified as brown algae, which require high light to be maintained successfully. Image by Tim Lyons.

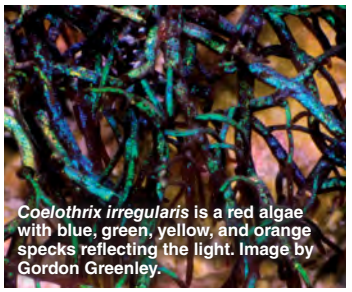
This fine-branched species of macroalgae, *Gracilaria*, is commonly used as fish food; however, it makes for a captivating display specimen as well. Image by Christina Jayne.

the individual to determine what size tank he or she wants.

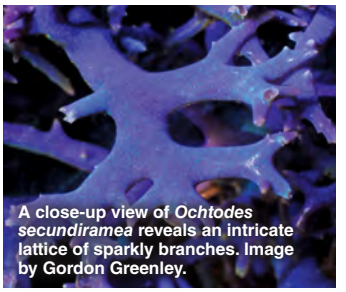
As for gallon size, there's really no guideline as long as the needs of the macros are met. With other tank types, bigger volumes of water are generally easier to care for. However, the majority of macroalgae species are not particularly sensitive to changes in their environment, such as salinity or temperature swings, so the normal concerns of a tiny marine tank aren't as critical.

There is no single ideal system, but there are some guidelines the authors suggest. First off, get the best lighting that is affordable. T5 is the lighting of choice for most macro tanks, so the greatest number of bulbs that will fit over the tank is best. Macroalgae don't bleach from too much light like corals do, so this isn't of concern. Secondly, think about the tank's potential inhabitants carefully. Many snails, such as turbos, will eat macroalgae, as will some crabs. Herbivorous fish like tangs and some omnivorous fish like angels can devour macroalgae in minutes, so these should be avoided. The authors' favorite macroalgae tank inhabitants are small gobies and pipefish, each of which benefit greatly from the copepods that seek refuge in the algae, and ornamental shrimps, which help clean up food so it doesn't settle in between macroalgae blades.

There are quite a few challenges to keeping macroalgae, despite the fact that algae seemingly grows everywhere. As mentioned previously, detritus and nuisance algae can overwhelm ornamental macroalgae, which if not treated quickly enough, will kill the desirable macros. This can happen quickly, as it did in Heather's tank which



Coelothrix irregularis **is a red algae with blue, green, yellow, and orange specks reflecting the light. Image by Gordon Greenley.**



A close-up view of *Ochtodes secundiramea* reveals an intricate lattice of sparkly branches. Image by Gordon Greenley.

was lacking flow when it was first set up, resulting in the loss of a dozen species of macroalgae. Or it can happen slowly, as small amounts of detritus build up in pockets over time that may serve as excellent growth sites for nuisance algae. Another challenge is in discovering which macroalgae are welcome and which are not. A few macros, such as some species of *Dictyota* and *Caulerpa*, can be extremely invasive and may spread too rapidly, choking out other slower growing algae.

Another potential problem is in having a deep sandbed to accommodate seagrass, which may build up pockets of hydrogen sulfide. In a properly oxygenated aquarium, small amounts of released hydrogen sulfide are neutralized the instant they meet with the oxygen in the water. However, there is a small danger that a large amount may bubble up at once, which can rapidly deplete the water's oxygen, causing harm to the tank's inhabitants. This can be mitigated by having organisms that stir the sandbed and keep it oxygenated, such as some worms, *Cerith* and *Nassarius* snails, and sand-sifting starfish.

Macroalgae can be obtained from quite a few sources. Most of the authors' algae came from trades with other hobbyists and from local fish stores. Hobbyists are a fantastic source for aquacultured macros, particularly the common ones. Most macroalgae fans have no problem selling or trading extra clippings to fellow hobbyists. Additionally, macros have become increasingly popular in the trade recently and have therefore been popping up at fish stores with more frequency. Local fish stores are the best place to find wild macros, some of which are unidentified and quite beautiful. With luck, they will become a staple of stores and suppliers, just like fish and coral are.

If you're thinking about keeping a macroalgae biotope or even adding some display macros to your reef, remember that flow and lighting are key, along with proper nutrient balance and management. With proper effort and care, a macroalgae tank can be just as beautiful and intricate as the more commonly seen coral reef aquarium.

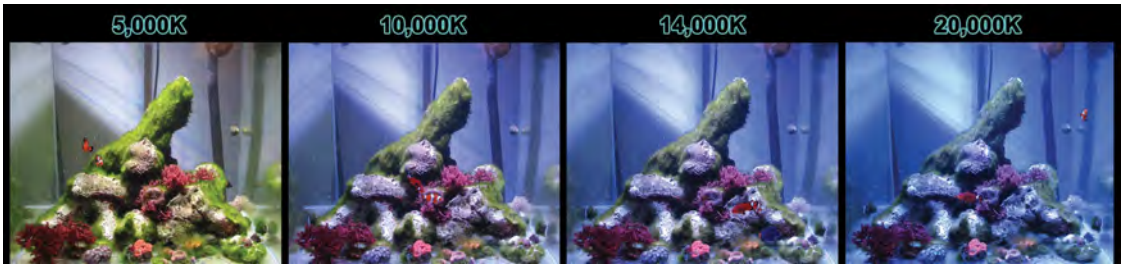
Dragon's Breath Algae (*Halymenia* sp.) develops brilliant fluorescent orange tips in high light. This is one of the few red macros that requires high light to thrive. Image by Tim Lyons.

JIM ADELBERG

Equipment Review: Radion XR30w Pro

DISCLAIMER: Items for review are provided by manufacturers.

I've watched the evolution of LED lighting for reef tanks over many years, and it's only been in the last few (maybe 3 or 4) years that I've begun to see fixtures that look good, make our corals look good, and seem to promote natural looking colony growth over time. Let's start, though, by debunking some of the earliest claims of the 1st generation LED fanatics. The claim that cheap LED fixtures are going to be great for growing all types of coral is nonsense. If you have a quality reef and want a quality LED fixture over it, it won't be super cheap. One of the other early claims was that we would all be able to grow coral much more efficiently using much less wattage. It turns out that the high-end LED fixtures use comparable amounts of electricity to a metal halide system. So let's consider the Radion XR30w Pro from Ecotech Marine. I will admit that Ecotech's reputation for customer service, quality products, and easy upgrades is well known in this hobby, and I think anyone looking at high-end LED fixtures should consider the reputation of the manufacturer. The fixture itself is very minimalist in appearance and is only 11.8"x7" and 1.5" thick. The unit is completely black, and the top is perfectly flat with no buttons or knobs protruding. I used the available hanging kit (that's sold separately) and had no trouble hanging the fixture. The light is pre-loaded with quite a few usable settings and could be run as-is, with just a timer. A quick glance at the specs sheet shows an additional 10 LEDs (including 4 UV LEDs) over the 32 in the Radion XR30w with an increased max power consumption of 170 watts. I should point out that I chose to hang the fixture at the minimum recommended height above the tank (6" above the glass cover) and there was no banding, even when running single color channels. Of course, one of the primary appeals of LED lighting is the ability to customize your reef's light to achieve just the right blend of color and intensity over time and optimize coral growth and color. The control functions are all easily managed through Ecotech's EcoSmart Live software which does everything I can think of and then some. Naturally, you can control your day/night light cycles, and there are some nice templates of natural light cycles which can be used as they are or modified to suit your preferences. And there's a whole bunch of features for connecting multiple units, importing and exporting cycle schedules, acclimating corals to new light intensity levels, etc. But what I find really exciting is the ability to fine tune the color channels to an incredible detail. Being able to individually tune the 8 different colors over many, many control points in a cycle (as well as options for lightning storms and cloud cover) give this light almost infinite versatility. All this power takes a little getting used to, but thankfully, there are some detailed instructional videos built into the software that ease the learning curve. In summary, the unit is beautiful, solidly made, clearly has a lot of thought behind it, and I'm sure Ecotech will support as well as they do their other products. I want to close this review by saying that, although my review fixture was sent to me almost a month ago, it's still too early for me to comment on what settings I find most preferable. Additionally, I have not had the necessary time to judge the long term effects of this fixture on the growth and color of any animals. Hobbyists should seek out tanks that have been lit by these fixtures for an extended period of time for proven results.



MATTHEW GELDOF

The Geldof 7.5G SPS Nano Cube

My interest in aquatic life started early. As a child, one of the things I most looked forward to was my weekly trek to a little pond in our back woods. I would head out, net and jar in hand, and come back with a small assortment of creatures that I was allowed to keep and observe for a few days before returning them to their natural habitat.

Of course, I would have loved to maintain such a diversity of pond creatures in a small container for much longer. It would be years later, after my discovery of the reef aquarium hobby, that I developed the skills to realize the saltwater version of my childhood dream.

Fast forward to today, the 7.5 gallon SPS nano cube is the culmination of the experience I have gained throughout my years of keeping a whole variety of types and sizes of saltwater aquariums. It is nearly impossible to remember a time when I did not have some sort of aquarium setup, to which my wife, family, and good friends can attest.

The Cube

The system has been running for almost 2 years. It is roughly 10 gallons in total water volume, including the sump and after accounting for water displacement from the rock and coral. The display is a Mr. Aqua 12”x12”x12” cube, drilled and plumbed to a 5 gallon sump. The overflow drains from an L fitting with strainer to a vented PVC pipe that leads to a 4 inch filter sock.

The sump is an AGA 5 gallon aquarium with no baffles. All heating, filtration, cooling, auto top-off, and dosing equipment, along with the probes, are contained within the sump.

The 5 gallon sump.

The AI Nano Sol-Blue LED lighting system sits in a custom oak brace that holds it exactly centered and 6 inches above the water surface.

The entire aquarium rests on a repurposed, antique walnut stand that has been internally braced, moisture sealed, and retrofitted to hold the display and all of its components with minimal clutter.

One of the ways I was able to accomplish a clean look with so many power cables involved was to cut the top drawer in half and install the reef controller’s power center immediately behind it. All cables were shortened to the appropriate length to minimize bunching. Additionally, power inverters and relays were all mounted in the same area. The compartment is ventilated 24/7 with a small, 12 volt, DC fan.

The power center is mounted behind the half-drawer.

Substrate and Live Rock

I chose to go bare bottom and use Starboard instead of substrate, with minimal live rock, leaving as much space as possible for coral growth. The central structure was formed using dry Tonga branch rock, fused together with epoxy. I built it in a way that would allow for maximum light penetration through as many angles as possible. If the need arises to move or clean the system, the whole structure can be removed and set in a 5 gallon bucket.

Filtration

Since there is minimal live rock and no sand bed to assist in the process of denitrification, most of the task of maintaining water quality falls on the various components of the filtration system. I have chosen to use a slightly oversized AquaC Urchin nano protein skimmer paired with a Maxi Jet 1200 as the heart of the system. It is always set to skim wet and pulls out a respectable amount of skimmate.

Since I have two fishes, a black and white *ocellaris* clown and a Sixline Wrasse, it was necessary to incorporate a DIY nano bio pellet reactor along with the regular use of PURA PhosLock to keep NO3 and PO4 at low levels. The fine mesh bag of PhosLock sits directly on top of the bio pellet reactor where the water exits. The system is simple, reliable, and has worked great.

My Sixline Wrasse.

Mechanical filtration is accomplished through the use of a 300 micron filter sock, which I add following the weekly water change. The sock is removed after 2 days to prevent NO3 from spiking. I also set a bag of carbon in a medium flow area of the sump as a passive chemical adsorber. Once a month, 1 cup of carbon is replaced.

Interestingly, I have found that an unlit sump with a little live rock stimulates the growth of benthic life, small sponges, sea squirts, and filter feeders. Once established, they assist significantly in lowering phosphates and nitrates. Knowing this, I usually wait 6 months for any sump to establish itself before adding sensitive coral frags to the system.

Flow

The flow in this nano is pretty straightforward. The Vortech MP10 is placed just to the right of the main rock structure, on the back wall, facing the front. It is set at one-third reef crest "yellow" and remains locked there. If I feel that a thorough cleaning is necessary, I insert the filter sock in the sump and turn the MP10 up to full power for half an hour to loosen and remove the detritus that gets trapped in the rock and coral.

Supplemental flow is provided by the Seio 320 powerhead in the bottom left corner and the Danner Mag Drive 190 GPH return pump. The choice of bare bottom and an open rock structure has made dialing in flow a great deal easier than if I had to contend with fine sand or a wall of live rock. With that said, I am sure things will need to be adjusted in the future as this is still a relatively young system with plenty of room for growth.

Lighting and Growth

Experimenting with LED lighting over an SPS aquarium was one of the main reasons for setting up this system. The AI Nano-Sol Blue has proven to be perfectly capable of growing and maintaining color in SPS coral.

The AI Nano-Sol Blue in its custom oak valance.

I have spent a good deal of time transitioning the frags to the much higher PAR values of the AI fixture. I started at 20% for 4 hours a day and in the last 2 years have slowly ramped the lighting and duration up to 85% for 6.5 hours per day. There is a period of blue light at 20% for several hours before and after the main photoperiod.

The coral frags took nearly a year to encrust the main rock structure before they began to branch. I also observed that the majority of SPS remained bright green for the first 10 months, slowly shifting to their permanent colors over the last 12 months. A few of the colonies are still changing, becoming brighter and deeper in color with each passing month.

The LED lighting really shows off the green in some corals.

As you would probably imagine, it becomes necessary to prune some colonies as they begin to intrude on each other. At the moment, the majority of the colonies are growing directly up and toward the light, leaving plenty of areas for the LEDs to penetrate to the lower areas of the cube. I did consider growth characteristics when placing the original frags and so far, it looks as if I made the right decisions. My method for managing the encrusting base of overlapping SPS colonies is to take a long pair of tweezers and scrape away the tissue of intruding coral. This has worked nicely for corals with bases that do not naturally grow away from each other.


A colorful battle between zoanthids and a chalice coral.

Stability

It goes without saying that success with a stand-alone SPS system of this size requires experience, proper planning, attention to detail, and excellent equipment. As with any SPS system, stability is key. Though there is very little room for error, I have made many mistakes, and the corals have always recovered in the end. It is important to note that each time, I was patient in correcting any deviation.

Automation

There is no substitute for the human touch. But since I often travel for work, it was important that this system be able to maintain itself for several weeks at a time. With automation in place, much of the weekly maintenance is taken care of. Timers and a reef computer control nearly every vital component. It has been comforting to know that I will never miss a 2-part dosing, there is always plenty of water in the ATO chamber, and almost every system has some sort of redundancy built in.

I will have a friend or neighbor look in on the nano when my wife and I are away, but only to confirm that there are no obvious equipment failures. I have found it is best to let the system take care of itself, rather than try to explain tank maintenance to a non-aquarist. In the future, I am looking forward to having the ability to monitor and adjust my reef remotely.


The satisfying results of patience, dedication, and stability.

In Parting

Please feel free to continue to follow my 7.5 gallon cube's progress via my thread on Reef Central. I would like to thank Reef Hobbyist Magazine, the aquarium forums, clubs, and local fish stores that make this hobby so much more enjoyable. So much less would be possible if not for the people that make up our community of passionate reef aquarium hobbyists.

MAINTENANCE

- 1 gallon water change 1x/week
- 3 tablespoons magnesium chloride 1x/week
- Blast rockwork with turkey baster 2x/week
- Dose iron, Lugol's, and potassium 1x/week
- Feed fish/inverts pellets, flakes, and tablets 3x/week
- Feed coral with Coral Frenzy, Elos Pro Skimmer, and Omega Amino's 1x/week
- Update maintenance journal of any changes, progress, and/or additions
- Make 5 gallons of fresh RODI every other week
- Peristaltic dosers add 12ml of calcium chloride & soda ash daily
- ATO for top-off
- Test Alk, Ca, PO4, NO3, specific gravity, and temperature every other week

The complete cube system.

EQUIPMENT

- Mr. Aqua 7.5 gallon cube, drilled
- 5 gallon AGA aquarium (sump)
- DIY aquarium stand
- AquaC Urchin nano skimmer with Maxi Jet 1200
- Vortech MP10
- Seio 320 GPH
- Danner Mag Drive 1.9 (190 GPH) return to main display
- DIY nano bio pellet reactor
- AI Nano-Sol Blue LED
- Digital Aquatics ReefKeeper 2 controller
- Eheim Jager 100 watt heater controlled by RK2
- UP Aqua cooling fan & supplemental fan
- ATO paired with Aqualifter (on timer for redundancy)
- BRS 4-stage RODI Unit
- (2) BRS Drew's Doser peristaltic dosing pumps for 2-part additive
- Two Little Fishies Nano Mag
- Acrylic probe holder w/temperature and pH probe
- Acrylic 4" 300 micron filter sock holder
- Hanna and Salifert test kits
- Refractometer

ADDITIVES

- Tropic Marin Pro Salt
- BRS Calcium Buffer System
- Seachem Reef Advantage Magnesium
- PURA PhosLock
- Black Diamond Carbon
- NPX Bioplastics
- Instant Ocean Marine Chips
- Elos sv.M2 Fish Pellets
- Hikari Algae Wafers
- Coral Frenzy
- Bio Mate
- Elos Omega Aminos
- Elos Pro Skimmer
- Brightwell Potassium
- Brightwell Iron
- Kent Lugol's
- Brightwell MicroBacter 7

PARAMETERS

- Alk - 7.17
- Ca - 350
- NO3 - .01
- PO4 - 0
- Mg - 1250
- NH4 - 0
- Spec. gravity - 1.025
- Temp - 78.1 - 78.2
- pH - 8.2 - 8.5

LIVESTOCK

- (4-5) blue/red legged hermit crabs
- (2) Orange Striped Compressor Crabs
- Blood Shrimp named Lorac
- Porcelain Crab
- (2) Emerald Crabs
- Nassarius Snail
- (4) Turbo Snails
- black and white *ocellaris* clownfish named Yolky (tank-raised)
- Sixline Wrasse named Pickle (was a rescue)
- (1) Large Bristle Worm named Stingy

SPS

- Joe The Coral
- Pearlberry
- Red Planet
- Pink Bird's Nest
- Sunset Montipora
- Rainbow Montipora
- *Setosa*
- Teal Stag
- Purple Nana
- Blue *Millepora*
- Tricolor *Valida*
- Bird of Paradise
- Green and Pink Cats Paw
- Wild *Millepora* colony
- Shades of Fall Millepora
- Blue Tip Stag
- Spongodes

LPS

- Bubble Gum Monster Chalice
- Teal and Orange Chalice
- Watermelon Chalice (2 varieties)
- Orange w/Green Chalice
- *Blastomussa wellsi*
- Orange and green *Fungia*
- Tyree Blue Chalice
- *Duncanopsammia axifuga*
- Christmas Faviidae
- War Coral
- *Leptastrea*

To watch a video of the Geldof SPS nano, scan this QR code with your smartphone:

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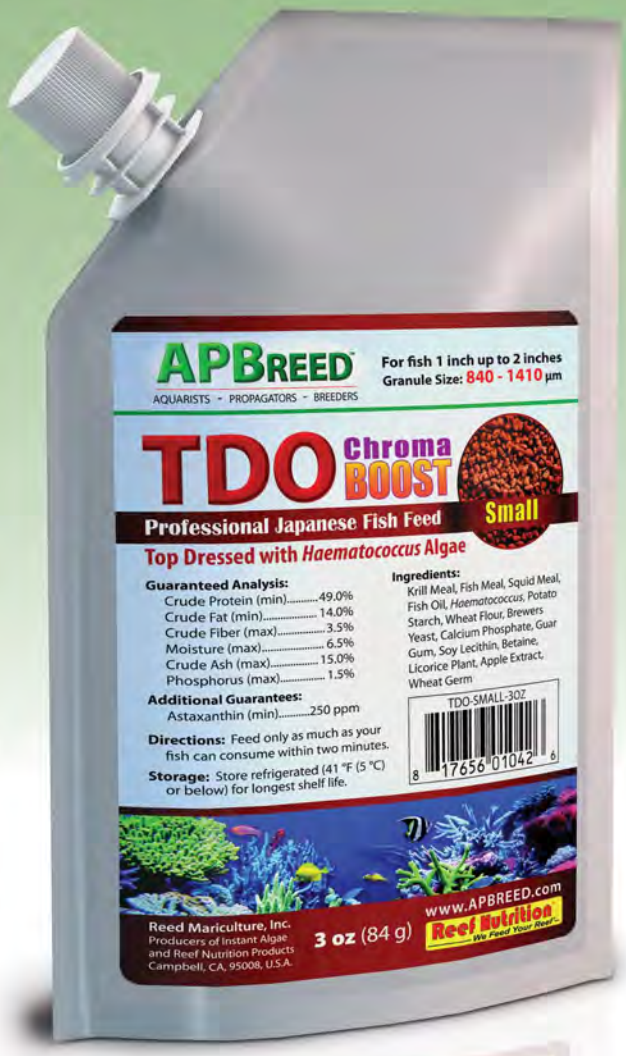

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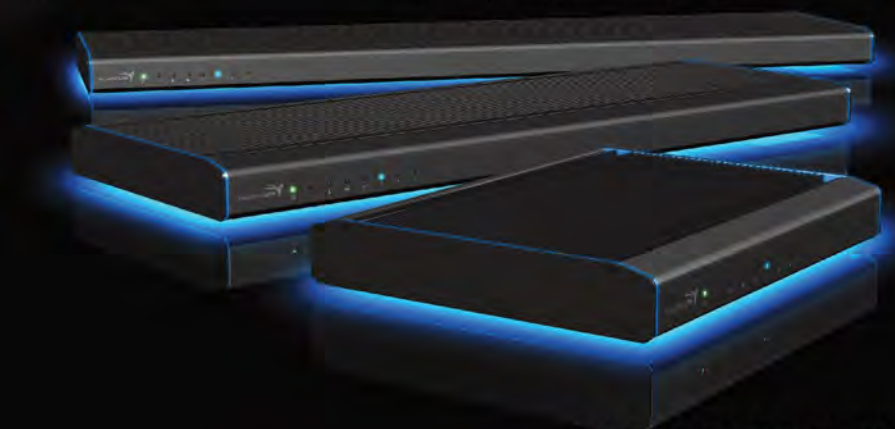

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