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FOURTH QUARTER 2017 | VOLUME 11

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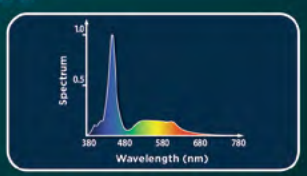

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38 ON THE COVER

FROGFISHES:
MASTERS OF DISGUISE

Sabine Penisson is a French photographer and author with a focus on coral reef fauna. A walking fish, a fishing fish…all in one creature! No, it isn't a psychedelic dream, it's a reality. Frogfishes are some of the most amazing fishes in the sea.
Cover image by Sabine Penisson

FOURTH QUARTER 2017 | Volume 11

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GORGEOUS GORGONIANS
A REEFKEEPER'S CARE GUIDE

One of my most memorable diving experiences came when I visited one of the few atolls in the Caribbean, on the Mesoamerican Barrier Reef off the coast of Belize, close to the famous Great Blue Hole. Being quite familiar with Indo-Pacific corals, I was excited to see what these reefs had to offer, both to my eyes and to my underwater camera. I was quite aware that the level of coral diversity was much lower than in the Pacific, but also that I would see plentiful soft corals in the form of zooxanthellate (photosynthetic) gorgonians, sea fans, and whips.

Many of these gorgonians were mature colonies of various species, some as big as a car and some as delicate in appearance as the finest lace. I was quickly entranced by their movement, swaying back and forth in the surging, plankton-rich current. The natural beauty and graceful movement of the gorgonians was amazing where the sunlight illuminated their various shades of purple, yellow, pink, and brown. The love I had for these soft corals only grew with that experience and reaffirmed my commitment to keep these exquisite and delicate corals in my own home reef aquarium. Over the years I've been keeping reefs, what led me to want this type of aquarium was my desire to see some level of movement, especially from the soft corals.

AQUARIUM DETAILS

When designing my aquarium, I decided to focus on two key components I felt would be crucial to success: lighting and flow. I placed the aquarium near my south-facing windows so that the gorgonians are bathed in sunlight during the morning hours. Flow was an important consideration as well, given the variety of corals I wanted to keep and my plan to allow them to grow as big and tall as my aquarium would allow.

Many of the inhabitants are from the Caribbean/Atlantic region and consist primarily of octocorals of the order Alcyonacea. The aquarium is also populated with leather corals, such as *Lobophytum*, *Sarcophyton*, and *Sinularia*.

My system is a custom-made, 94-gallon rimless cube with a 30-gallon refugium/sump. I designed the system's flow with the overall goal of doing away with the need for powerheads and other

in-tank water movement devices (and their unsightly wires) as I wanted to reserve as much space as possible for the fish and corals. The aquarium has a standard corner overflow, which over the years has been all but covered in neon-green *Briareum* sp. The overflow feeds into a 100-micron filter sock, which then feeds into a custom-built skimmer that is rated for a 400-gallon tank. The skimmer runs part-time on a wet skim an average of 1 to 2 weeks per month. Carbon is run actively for 3 to 4 days a month. A 25 percent water change is carried out once every 3 to 4 months, and calcium, alkalinity, and magnesium are maintained at usual reef-aquarium levels.


Giant Slit-pore Sea Rod (Runaway Bay, Jamaica)

SPECIES SELECTION

Caribbean gorgonians and soft corals (octocorals) commonly found in the aquarium trade are almost all photosynthetic in nature. This makes their selection for the home aquarium a relatively easy and straight-forward task. One need only consider their aesthetic qualities, such as shape, pattern, and form, and where on the rockscape you want them attached.

My aquarium has a multitude of photosynthetic species from the families Plexauridae and Gorgoniidae, and while most are species endemic to the Caribbean and Atlantic region, I do have two that originate from the Indian Ocean and Indo-Pacific region, respectively. These corals have shown no aggression or otherwise unsavory behavior toward each other and have, rather, shown that they can live in close proximity to each other and still thrive.

Non-photosynthetic gorgonians should be avoided unless you have the experience and patience to provide for their very demanding feeding requirements.

COMMON GENUS/SPECIES TO KEEP

The following species list describes the corals I've collected over the years that are all currently living and thriving in my aquarium:

***Pterogorgia* spp.**
Some of the more commonly found gorgonians in the wild are the *Pterogorgia* species of gorgonians, which have an unmistakable blade-like appearance and the ability to shed their waxy skin in response to algae build-up. These corals love very strong lighting and flow.

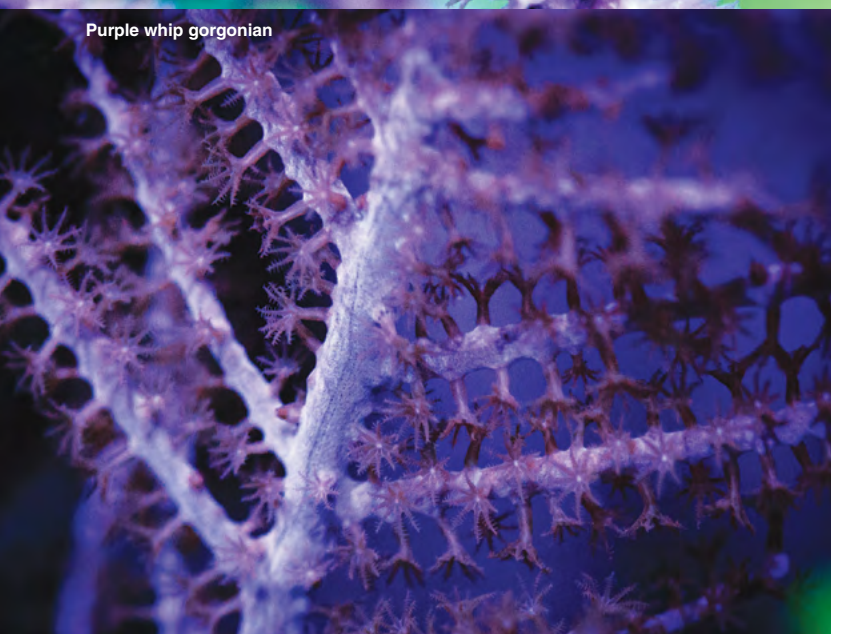
***Eunicea* spp.**
These corals are commonly known as knobby sea rods and enjoy strong surging flow in the home aquarium. In healthy colonies, polyp extension is pronounced, with some developing a yellow/orange color over a purple/lavender base. The raised calyxes (the "knobs") are reminiscent of *Acropora* spp. in appearance.

***Pseudopterogorgia* spp.**
The species in this genus are typified by their feathery or "pinnate" appearance. These are some of the most delicate-looking gorgonians one can keep in the home aquarium and come in a variety of shades, from gray to purple to yellow.

***Plexaurella* and *Pseudoplexaura* spp.**
These are the Slit-pore Sea Rods and other round sea rods that are by far the largest individuals of the Caribbean octocorals commonly

Corky Sea Finger (*Briareum asbestinum*)

Knobby sea rod



Purple whip gorgonian

available to the hobbyist. These are also very easy to keep and can be placed in a variety of spots in a typical reef aquarium. With proper lighting and feeding, growth can be considerable. My *Plexaurella* is one of the corals I have to trim most frequently as its growth rate is very high compared to other corals in my tank.

(species list continued)
- *Plexaura flexuosa* (Purple Candelabra, Caribbean)
- *Pterogorgia guadalupensis* (Grooved-blade Sea Whip, Caribbean)
- *Pterogorgia citrina* (Yellow Sawtooth, Caribbean)
- *Briareum asbestinum* (Corky Sea Finger, Caribbean)
- *Antillogorgia bipinnata* (Sea Plume, Caribbean)
- *Pinnigorgia flava* (ORA Grube's Gorgonian, Indo-Pacific)

PLACEMENT

My goal with the design of the aquarium was to not limit myself on coral placement. And while some species of gorgonians require more light than others, I did not want that fact alone to limit the layout for my aquarium. Lighting is provided to all corners of the tank, and variable lighting intensity as well as spot lighting allows me the freedom to place gorgonians where I want.

After a few years of growth, it was evident to me that this system and approach worked. All the gorgonians and soft corals have both survived and more importantly, thrived, as long as I was able to accommodate their lighting needs.

The species that seem to show the most vigorous growth response to the lighting conditions in my tank are the Slit-pore Sea Rod (*Plexaurella nutans*), ORA Grube's Gorgonian (*Pinnigorgia flava*), and the knobby sea rod (*Eunicea* sp.). Coincidentally, these are also some of the easiest specimens to start with if you are considering keeping these corals for the first time.

LIGHTING

I made sure all of the gorgonians and soft corals stocked in this aquarium were photosynthetic. That meant a lot of thought was given to the lighting system. Initially, the lighting system would need to provide just enough light to allow the gorgonian frags to acclimate and grow, but as the colonies grew larger, I would need to be able to ramp up the system to ensure light penetration to shadowed depths and corners.

I've found that LED lights have been quite up to the task; much of the gorgonians' overall growth response has been exceptional. I use a mix of LED fixtures and LED spot lighting to provide adequate photosynthetically active radiation (PAR) to the gorgonians and soft corals.

Each of the four independent light sources is focused on a different section of the aquarium at any given time. I vary the

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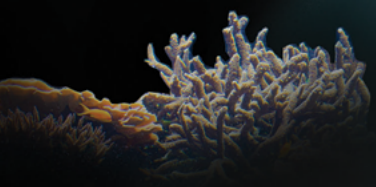

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Knobby sea rod

focus, intensity, and color temperature (Kelvin) of the lighting from time to time. This configuration was necessitated by the gorgonians' fast growth rates. The flexibility of being able to move any one of the light sources from one position to another to accommodate growth was invaluable, but more importantly, it helped keep the growing gorgonians well lit.

EQUIPMENT

- (2) Kessil A350 (blues are run at 40 to 60 percent of total output and whites are run at 20 to 40 percent of total output)
- (2) PAR38 LED spotlights

Photoperiod is 8.5 hours with both Kessils and the first PAR38. The second PAR38 runs for 2 hours to simulate the high-noon sun. Lighting is controlled with an Apex controller.

FEEDING PREPARED FOODS

Keeping any type of gorgonian—either photosynthetic or non-photosynthetic—does require a level of care and attention to food and nutrition beyond most other corals. These are benthic filter feeders, and they show a vigorous feeding response with the right food.

If you look at a gorgonian, it's quickly evident that these corals look and behave somewhat differently from other more typical aquarium corals. They have multiple tiny polyps on multiple branches forming fine lattices or mesh-like structures in the shape of fans, rods, or whips. These shapes allow the gorgonians to collect suspended plankton very effectively from the passing currents.

Regardless of their photosynthetic nature, these corals have evolved to capture food from the surrounding water column. Therefore, it is highly recommended that a frequent feeding routine be established. Their instantaneous feeding response to fine particulate foods, such as Cyclop-Eeze, Reef Roids, and oyster eggs, is enhanced by strong turbulent flow, which helps push more water through the polyps, allowing each polyp to capture food.

ROUTINE

I feed once a day, usually in the mornings. The food consists of a mix of finely chopped mysis (for the fish), Cyclop-Eeze (larger particles), and oyster eggs (smaller particles). The inclusion of the two different sizes of food is intended for the larger- and smaller-polyped gorgonians, respectively. Once a week, I use a turkey baster to blast the rockwork, loosening any detritus and adding more particulates into the water column for the gorgonians to filter out.

I was initially concerned when I started to feed them a mix of frozen foods. Would I be able to provide enough food and nourishment for their long-term survival? Would the food be nutritious enough to allow them to thrive and grow in my aquarium? Thankfully, after more than 3 years, I can see the approach of feeding a mix of frozen foods has indeed worked. The gorgonians exhibit exceptional polyp extension and color, show great resilience to disease, and have rewarded me with healthy growth.

FLOW

Flow was obviously of great concern, given the type of corals I was hoping to keep. As was evident on many of my dives, gorgonians were found scattered over rocky channels, walls, and outcrops of the near-shore reefs. This varied topography, coupled with the strong surging motion of the water, created dynamic and random flow. Strong random flow is one of the most important components of keeping gorgonians healthy and thriving.

I settled on a closed-loop design based on a combination of a 1,300-gallon-per-hour (GPH) pump and an OceansMotions 4-Way. In addition, the return flow passes through a set of four aquarium eductors. In a gorgonian-specific aquarium with many large colonies, there will come a time when flow will need to be increased to help counter any dead spots created by the growth of the gorgonians themselves.

Front view of the author's aquarium with many mature varieties of soft coral in relative harmony

As gorgonians grow, one will need to dial up the flow to keep everything balanced. Eductors are the only way I could accomplish a minimal no-powerhead look in the aquarium while still maximizing the flow from the closed loop. Aquarium eductors are an industrial tool used for mixing liquids. As water moves through the eductor at high velocity, it generates a pull from the surrounding water, thereby enhancing the flow and mixing capacity of the entire system.

ORA Grube's Gorgonian

While the pump and the aquarium eductors generate the strong flow needed to move the water, it's the OM 4-Way that does the crucial job of creating the random, surging flow so important for the overall health of the gorgonians. This is especially the case with the *Pterogorgia* genus of gorgonians since these corals need strong flow to help them shed their waxy skin. If you have a sick or injured gorgonian, strong flow also serves to thwart the growth of nuisance algae that could smother and kill the gorgonian.

UPKEEP

One of the most pleasant surprises I encountered with these gorgonians was their incredibly fast growth rates. With flow, lighting, and feeding aspects well covered, one simply has to maintain the aquarium systems, and the gorgonians will do the rest. And what a wonderful problem it is to have to deal with too much growth!

One of my other hobbies is bonsai, and throughout the years, I learned that pruning is not just necessary to maintain the shape of the tree, but it is also the means for a more artistic presentation. I prune my gorgonians in the same way I prune my bonsai: with the goal of maintaining a visually pleasing, mature-looking colony while keeping a small footprint.

As I prune, I'm also creating distance between each colony and thereby reducing the likelihood of chemical warfare with other corals. Pruning also plays the role of simulating the real-world scenario of storm and hurricane damage and subsequent fragmentation that is responsible for gorgonians colonizing many reefs throughout the Caribbean.

Pruning is done on an as-needed basis, but I would suggest one take the time once in while to shift a gorgonian from a lower to higher position and vice versa, as I have done in my system. I have found that some gorgonians do prefer to be closer to the lights than others, with polyp extension and color benefiting in these cases.

CONCLUSION

Keeping photosynthetic gorgonians has often been described as easy for the home aquarist, but from my experience, I would suggest that putting in a little extra effort does reap much sweeter rewards. While it is true that photosynthetic gorgonians can do well with just light and whatever particulates they can filter out of the water, optimizing your system for these animals is quite worthwhile.

These corals have captivated me from the start—from their relatively low level of care, to their gorgeous show-sized shapes and patterns, to their mesmerizing movements in the water flow. Even more surprising to me is that you can successfully keep such a wide variety of species, all cohabiting and thriving in peace.

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My name is Kadir Aytar, and I live in Istanbul, Turkey. I have been a dedicated hobbyist since 1996. I consider myself to be one of those lucky people who was able to turn a hobby into a job. I am a co-owner of APG Aquarium Systems, and we have been in the reef aquarium business since 2008.

I go to Indonesia almost every month to hand pick corals for our customers and our store. I dive in many different places, visit sea farms around various islands, and have had the chance to see facilities in numerous countries, including Indonesia, Vietnam, Singapore, and Sri Lanka. Seeing corals in their natural habitat and at sea farms is a great opportunity to observe how corals react and color up at different depths and under different weather conditions throughout the year. It is a big luxury for a hobbyist, and I enjoy every minute of my trips.

I believe that mariculturing corals is an important way to keep our hobby going without damaging the natural reefs. Also, mortality of maricultured corals in shipping is very low because of the smaller coral size and reduced handling compared to large wild colonies, which often experience high mortality in shipping and holding. Are maricultured corals easier to keep? I believe it depends on how and where they are maricultured. In my personal opinion, it is very hard for hobbyists to maintain the colors of some maricultured corals grown at very shallow depths. It is almost impossible to replicate similar environmental conditions in our tanks. I go on these buying trips to select beautiful corals, but my first priority is to select healthy corals that can be kept easily in aquariums.

My partner and I are both hobbyists. We had been complaining about not having a shop tank where we could enjoy our hobby while conducting business. Finally, we made the decision to build a tank in our office and took the plunge in August 2016. This tank has been running since September 2016.

EQUIPMENT

- **Display Tank**: Custom rimless ~350-gallon tank with bottom bracing (~87" × 37" × 26"); coast-to-coast overflow box on the left side; ¾" extra-clear glass
- **Sump**: ~125 gallons (60" × 24" × 20")
- **Return Pump**: ~2,100 gallons/hour
- **Internal Flow**: ~7,900 gallons/hour
- **Lighting**: (2) 6 × 80-watt T5 fixtures

WATER PARAMETERS

- **Nitrate**: 0 ppm with Salifert test kit
- **Phosphate**: 0 ppm with Hanna Phosphorus Checker
- **Specific Gravity**: 1.026
- **Alkalinity**: 8–8.3 dKH dosed manually daily
- **Calcium**: 420–430 ppm dosed manually daily
- **Magnesium**: 1,350 ppm dosed manually weekly

CORALS

- (70+) colonies of small-polyped stony (SPS) corals
- Some large-polyped stony (LPS) corals
- Some soft corals

FISH

- XL Sohal Tang
- XL Blue Tang
- XL Red Sea Sailfin Tang
- XL Magnificent Foxface
- XL Yellow Tang
- Royal Gramma
- Yellow Wrasse
- Rosy Scale Wrasse
- Solarensis Wrasse
- (6) Green Chromis
- (5) Lyretail Anthias
- a breeding pair of black Ocellaris clowns

I always try to build open rock structures to allow for good water movement. In this tank, water flows all around the rockwork and thus does not allow detritus to build up. The only additives I use are ReeFlowers brand additives to keep calcium, magnesium, and

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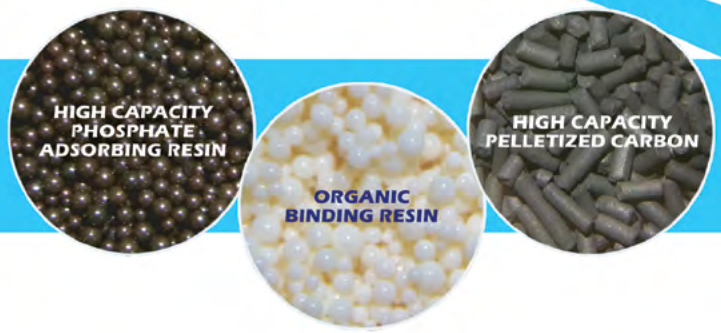

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alkalinity stable. I prefer not to dose anything that I cannot measure, so I try to do 40-gallon water changes every week to replenish the minor elements. I also don't like to rely on dosing pumps and calcium reactors, so I rely on Mr. Timur, our staff, and he doses manually every day.

Everything with this tank is really very simple. There are no maintenance duties other than weekly water changes, daily manual dosing to keep alkalinity, calcium, and magnesium stable, and glass cleaning. There is no additional equipment other than what I listed above. Temperature control is achieved by a home-style fan blowing between the water surface and light fixtures during hot summer days. It does a wonderful job and keeps the water temperature around 77° F, even when the room temperature is around 86° F. I also notice light intensity is higher and color of light is more bluish when the fan is on.

The biggest problem I have been dealing with is undetectable nitrate and phosphate. Despite feeding a lot, I cannot get these parameters up. I am planning to add 15 more Green Chromis, 10 more Lyretail Anthias, around 30 Blue Eye Cardinal Fish, and a Blonde Naso Tang. I hope that will help to get the nutrients up a little bit.

The only equipment upgrade we are planning is a replacement of the present light fixtures with a fully open-top 14 × 80-watt T5 unit. When I have time and energy, I want to rearrange the placement of the LPS and soft corals at the bottom and play around with the rock work a little bit.

I would like to thank *Reef Hobbyist Magazine* for giving me the opportunity to share our display with hobbyists in the USA. Happy reefing to all!

TINY GREEN TIGERS

MATT PEDERSEN

Meet the Greenbanded Goby, *Tigrigobius multifasciatus*. This species is only sporadically available in the aquarium trade and isn't produced by any of the large-scale commercial breeders at this time. For those of you who want to try breeding this species, be sure to snatch any up when you see them.

ABOUT THE GREENBANDED GOBY

In the span of only a few decades, this species has been placed in three separate genera; first *Gobiosoma*, then *Elacatinus*, before ultimately coming to reside in the genus *Tigrigobius*. FishBase currently recognizes 12 species within the genus *Tigrigobius*. The only other species most aquarists will recognize is the more commonly available Tiger Goby, *Tigrigobius macrodon*.

Originating from the Western Atlantic, the Greenbanded Goby is known to be native to 27 countries, yet it is notably absent from Mexico and any of the states in the U.S. bordering the Gulf of Mexico, most prominently Florida. Over the years, I've repeatedly heard that Puerto Rico is the country where most imported Greenbanded Gobies are collected.

The Greenbanded Goby is found in shallow water, specifically surf zones, including pitted limestone walls and tide pools. It will hide underneath rocks and seek refuge in crevices at night, but during the day, it is often found underneath or in the spines of rock-boring urchins.

BASIC CARE

FishBase puts the maximum adult size at 2 inches. The male I kept in my first pair easily reached that size in his old age, but most Greenbanded Gobies will be considerably smaller than this. The male in my first pair also developed an elongated first dorsal spine, which the female did not have.

A single specimen could easily live its entire life in a small pico tank. My first Greenbanded Gobies were purchased as captive-bred individuals and housed in a 24-gallon NanoCube. Initially, they bickered, presumably until the larger of the two switched sexes and became the male of the pair. I've seen other aquarists keep this species in groups, which probably works better in larger tanks. Fish of the same sex tend to quarrel, males more so than females. While your fish are sorting out their social hierarchy, be sure to watch

A mature Greenbanded Goby hugs the substrate in search of tiny copepods to feed upon.

A young, wild-collected Greenbanded Goby is added to the author's new vase reef, which holds only 1.25 gallons of water.

for damage, particularly to the tail. You'll want to intervene if the quarrels go beyond bluffing and posturing as it *is* possible for one Greenbanded Goby to kill another.

The Greenbanded Goby is not a fussy eater, particularly if you can procure a captive-bred individual. Being small micro-predators, they require appropriately sized foods. Baby brine shrimp, whether live, jarred, or frozen, is a good first step. Copepod-based feeds are certainly appropriate and will provide better nutrition than brine shrimp. Ultimately, these fish will also readily consume small pellet foods (including those intended for corals) or fine particles of frozen fare and may learn to take flake foods as well. While they can be secretive, they will always come out for food when hungry. Being so small, they will benefit from multiple small feedings per day versus one larger offering. Obviously, this is a small fish that can be outcompeted by bolder feeders, but these gobies are also so small that they could easily become food themselves! I have not tried keeping this species alongside other gobies of similar size, but I would not anticipate problems with dissimilar species.

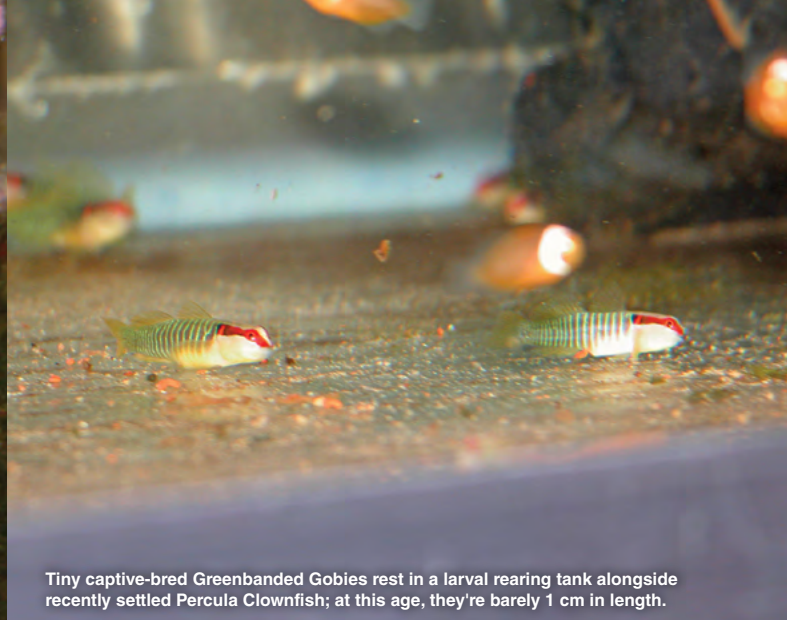
BREEDING

Interestingly, this species is generally considered to be one of the more challenging small gobies to breed, but this was not my experience (this species was the first marine fish I ever successfully bred). I owe much of that success to the insights of Edgar Diaz, a long time marine fish breeder who worked at C-Quest and later with his own Addy-Zone Hatcheries. His valuable advice was to make sure to use the brown phytoplankton, T-Iso (*Tisochrysis lutea*), which is rich in DHA, an important fatty acid that is often crucial for the development of marine fish larvae.

These gobies are protogynous hermaphrodites; you can think of them as all being born female. Sex change can happen when they're as small as 2 cm, with the largest, most dominant fish turning male over a period of only 3 to 5 weeks. Given this, any two young fish will form a mated pair in a relatively short amount of time. These fish don't necessarily form bonded pairs, and in fact, they can be established in haremic groups, where a dominant male courts and mates with multiple females. That said, they can easily be kept and bred as pairs in aquaria as small as 2.5 gallons.

Well-conditioned fish will spawn frequently, often in the morning, laying up to 250 eggs. They will spawn in lengths of PVC tubing,

Ten years ago, this large male Greenbanded Goby fathered many clutches for the author.



Tiny captive-bred Greenbanded Gobies rest in a larval rearing tank alongside recently settled Percula Clownfish; at this age, they're barely 1 cm in length.

holes and caves under rocks, or even in the corner of the aquarium if a better location isn't available.

While Dr. Matthew L. Wittenrich notes that the eggs hatch on the evening of the 5th or 6th night, my personal observations showed my male initiating hatching in the morning hours, and browsing YouTube, one can find many other examples of Greenbanded Gobies apparently hatching during daylight hours. With my pair, it appeared that the male actually took the eggs up into his mouth, hatched them, and then spat the larvae into the water column.

The larvae of the Greenbanded Goby are about 3 mm in length and are ready to feed immediately. Rotifers are a known first food, and small strain rotifers may present an advantage. I managed to culture this species with regular L-strain rotifers and live T-Iso phytoplankton for greenwater in a 10-gallon tank with blacked-out sides, although a black round tub (BRT) may be better. Brine shrimp nauplii can be introduced as early as day 10 and should always be enriched. However, these days, the utilization of readily available copepods at any point in the larval stage would probably yield superior results. Healthy larvae can settle out as early as 27

days after hatching, initially being 1 cm in length, clear in color, and just starting to use their fused ventral fin suction cup to rest on the substrate. At 24 hours post-settlement, their trademark coloration begins to develop. Given their short lifespan, anyone breeding this species should probably establish the next generation of breeders sooner rather than later.

It's surprising that such a colorful and desirable species isn't routinely cultured in abundance by any of the large-scale commercial hatcheries, but this leaves the door wide open for a hobbyist to breed them profitably.

PUT A TINY GREEN TIGER (OR SEVERAL) IN YOUR REEF

Greenbanded Gobies are model citizens in any aquarium, likely to show aggression only to conspecifics and other small gobies of similar color or pattern. They are easily cared for, ideal for beginning reefkeepers, and could make for an interesting group display in a larger reef aquarium. Buy captive-bred specimens when they can be found, as they'll be even easier to care for and will help ensure a larger supply of this species in the future.

REFERENCES

Wittenrich, M. L. (2007). *The Complete Illustrated Breeder's Guide to Marine Aquarium Fishes*. Neptune City, NJ: T.F.H. Publications.

The Evolution of a Reef

THE PAST:

My father was a nature lover and was the one who really got me into aquariums. One day in the late 70s, he brought home a metal-framed aquarium and some freshwater fish. He took care of the tank, but I know he did it for me because I had always been fascinated with aquatic life.

In 1986, I started my own reefing adventure at the age of 16 (limited by the budget of a 16-year-old). It was a simple 10-gallon tank complete with an actinic bulb and under-gravel filter. At that time, the Internet as we know it today didn't exist, which made information gathering quite difficult. I tried to gain knowledge through books and magazines, but it was complicated, and I didn't comprehend everything that I read. Success was elusive, and after an anemone attached itself to my heater and died, that tank was done.

In the 90s, I had several additional tanks, including a 100 gallon with just a Picasso Trigger and my dream tank at the time, which was a 24" × 24" × 32" cube with a metal halide pendant. When I moved in 1999, I decided to sell the tank that I had. Fast forward to late 2015, when I re-entered the hobby with a simple 14-gallon BioCube. That was the catalyst for me to really grow and develop as a reefer and again enjoy the fantastic level of relaxation that only staring at an aquarium provides.

THE PRESENT:

My current tank is a DSA NEO 65 gallon. I saw one about 3 years ago and fell in love with the clean lines and overall design. I did a lot of research before purchasing this tank.

My vision for this tank was to create the look of an artificial reef, where man-made materials were overgrown with sea life. I initially set the tank up with a PVC superstructure supporting the live rock and corals.

In late 2016, I had to move again, and when I set the tank back up, I decided that the PVC had to go because it was very difficult to work around. I chose to add a little more live rock for a somewhat more natural look. I like my tanks to have an appearance of fullness.

This *Leptastrea* is my slowest growing coral, but it is so pretty when it's happy.

Yuma mushrooms are my favorite softies.

At night, very long tentacles come out of this Mummy Chalice to sweep its surroundings.

This plate coral is one of my newer acquisitions.

My engine room doesn't always look this organized.

When I look straight at them, I like to see a wall of sea life.

Scouring through various online forums for secrets of success, I found it pretty difficult to discern a common thread. One consistent theme that I read was the notion of stability. I've found over the last couple of years that regardless of what the ideal parameters should be, as long as they are within a tolerable range, the fact that they are stable is what allows corals to be happy. Knowing that, I've had the courage to add some harder-to-keep corals, such as *Goniopora*, *Acropora*, *Millepora*, and others. What I enjoy most is watching small frags grow into large colonies and seeing what crazy growth patterns emerge. I think of myself as much more of a coral guy than a fish guy, as you can probably tell from the photos.

I have nine fish in the tank:

- Yellow Tang
- Blue Hippo Tang
- Lyretail Anthias
- Arc-eyed Hawk
- (2) Platinum Snowflake Clown
- Maroon Clown
- Midas Blenny
- Starry Blenny

There is also a cleanup crew consisting of a few conchs, various snails, and shrimp.

I've chosen equipment based primarily on my perception of its quality, with form factor being a secondary, but still important, element. The main water pump is an Aqua Excel 5000 DC that is rated at just over 1,300 gallons per hour, but I only run it at about 65 percent output. The tank also has two EcoTech MP10wQDs running at roughly 50 percent power in pulse mode.

Lighting is always so controversial. There are many opinions on the topic, so it's a tough (and expensive) decision to make. Living in Phoenix, Arizona, makes lighting efficiency (light vs. heat output) one of the main criteria for choosing lighting (what you heat up, you must cool down). LED makes sense to me from that perspective. For most of the past year or so, I've had a combination of LEDs and T5s on the tank. What I found was that LEDs caused some shadowing issues with small-polyped stonies (SPS) once they grew into larger colonies.

The tank temperature averages 79° F in the summer with a swing of 2 degrees from day to night. In the winter, it never goes over 78. I have a fan that blows into the sump that is connected to my APEX controller; it is programmed to turn on at 78.5 and turn off at 78.

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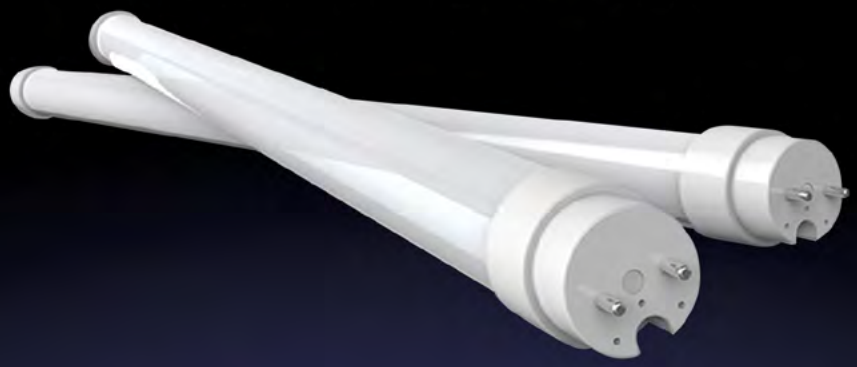

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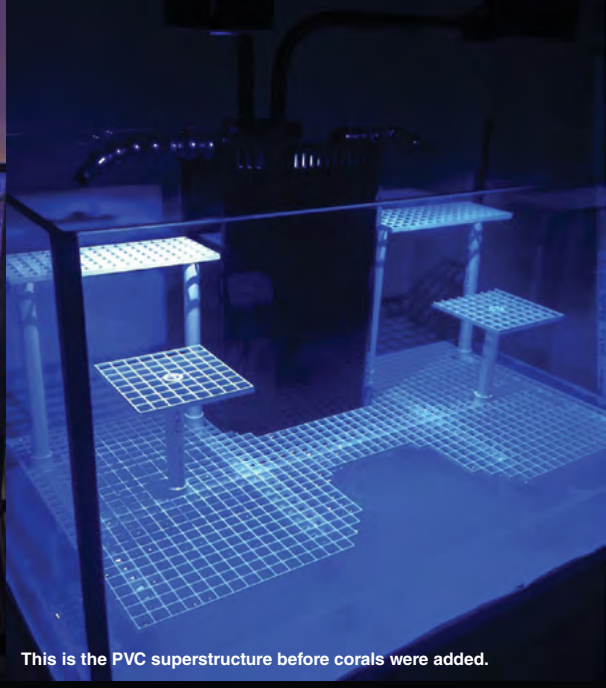
This is an early photo of the display when it had the original overgrown PVC superstructure.



This is the PVC superstructure before corals were added.

I also employ an auto-doser, as well as a carbon and a biopellet reactor. Being somewhat old school, one of the things I do differently from most aquarists is run a kalk reactor that pumps kalkwasser into the system for 20 seconds every 2 hours. This saves me some money on alkalinity and calcium dosing and has helped me maintain pH a bit closer to my target. Running the reactor this way wouldn't be possible without one of my favorite pieces of equipment, which is my control/automation system. Having most of my equipment automated and being able to check on it from my phone is a really enjoyable part of reefing.

The tank's pH averages 8.0 with a swing of .3 from day to night. Typical maximum pH during the day is just over 8.1. Alkalinity averages 7.8 dKH, calcium is rock steady at 445 ppm, and magnesium is 1,300 ppm.

One experiment I'm currently engaged in is doing fewer water changes. It used to be my weekend routine to change 20 percent of the water. After seeing my friend Antonio's amazing tank that almost never receives water changes, I began to do them less often. To be clear, I'm not recommending this approach for everyone's reef. I still test parameters at least once per week, with alkalinity testing done every few days, but the lack of frequent water changes has seemingly had no negative impact on the tank.

THE FUTURE:

All good things must come to an end. My goals are now focused on a bigger setup. I've purchased a new home and am currently working on a dedicated fish room that will hopefully be done before I move in. I've procured a 180-gallon, 8-foot acrylic tank. I also plan on setting up a 60-gallon frag tank that is connected to the main tank. My current tank will probably be emptied and sold by the time this article is published. All of the livestock will soon have room to grow, and the fish will be amazed by the additional swimming space. This little 65-gallon tank has been a great adventure with an amazing amount of learning and enjoyment. I'm looking forward to sharing my next build with you.

This flower pot coral sends out long polyps when it senses danger.

My Starry Blenny rests on a bed of *Palythoa*.

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JF Flame under blue LEDs

MARK ROSENBLATT

ACHIEVING COLORFUL SPS

Every reefer dreams of having a tank full of brilliant, vividly colored corals that practically glow in the dark. Coral color and vitality are dictated by your water chemistry, lighting, and flow, and understanding your corals' requirements will allow you to maximize their colors. I have some facts, some hunches, and likely a fair amount of fiction in my strategy for maintaining beautiful small-polyped stonies (SPS). After reading this article, I will let you decide which of my facts, fiction, or hunches, if any, you want to include in your reefing knowledge base.

CHOOSING FRAGS

In my opinion, the starting point for having great-colored colonies is acquiring great frags, so choose wisely. I know that sounds both obvious and trite, but this is a must. If you truly want the brightest, craziest-colored corals, you need to start with frags that came from mother colonies that are beautifully colored and have been established in captivity for a good while. I do occasionally make an exception and choose a frag from a newly imported colony that is just too pretty to pass up, but quite frankly, most of those decisions have not turned out well.

I have purchased many spectacular-looking frags over the years in this hobby. My experience has been that most have turned out wonderfully, and others have turned out to be duds. Sometimes they don't turn out well because my tank is just not meeting their needs. It's hard to understand why almost all of my corals look great, but there are a few stubborn frags that just refuse to color up.

I make a point of not judging color success too quickly. I give a frag at least 12 months before I judge its color in my tank. And because of all that commitment of time, tank real estate, and let's not forget expense, I try to choose wisely.

NAMED CORAL

Let's discuss the usefulness of established lineage names in choosing frags. I have been growing, or at least been attempting to grow, corals for almost 20 years now. I have always preferred named corals because as a hobbyist, I felt that if I purchased a named coral, it had a greater likelihood of growing into a colony that would mirror what I had liked about the parent colony. And for those of you who have been in the hobby for a long while, you can likely remember the pleasure in getting an actual Steve Tyree Limited Edition. I don't know him personally, although his corals are the stuff of reefing history.

Corals occasionally morph colors. They can change colors when moved from one tank to another or even to a different position in the same tank, which may sometimes account for color differences in corals of the same name. Regardless, I still seek named corals, particularly fabled ones, but I appreciate the potential for color variability. To share a personal example, I have purchased about six Pink Lemonade frags from six different sources over the years. Five of them never colored up to what they looked like in the photos, and I ultimately removed them. The sixth one met my expectations. I am not suggesting that the first five were fakes; I don't know what they were. Perhaps morphs, perhaps inferior look-a-likes, or maybe my tank just wasn't ready to make those frags' colors shine.

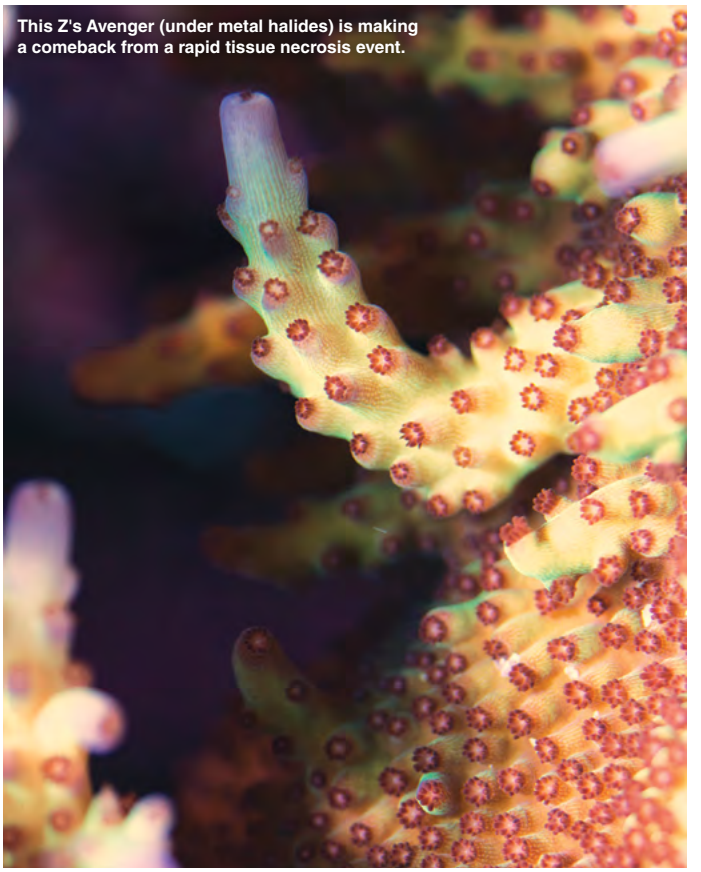
Names get misused in many ways. Some vendors have made it much more confusing by reusing names so that two corals with the same name may be totally different colors or even different species. So, you not only need to know the name of the coral but the vendor lineage that goes with that named coral.

HEALTHY FRAGS

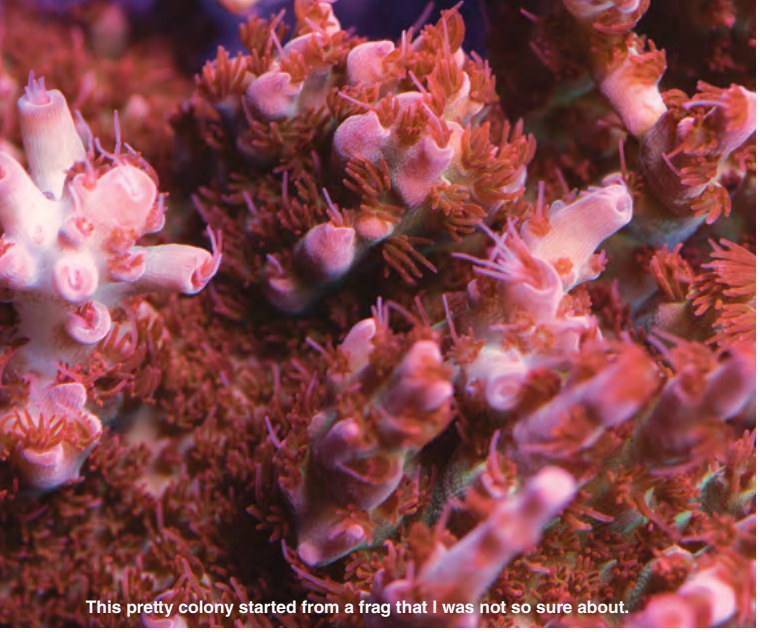
So now we have a frag that will hopefully be worthy of our investment of time and tank real estate. First, carefully inspect the frag for pests. I look for Acro-eating Flatworms (AEFW), black bugs, red bugs and egg clusters. There are other pests, but these are the main ones I keep an eye out for. If I see something suspicious on a new frag, I won't add it to my display, even though there are other options like quarantine or using a dip. I may be paranoid, but pests are devastating. If the frag looks pest-free, I cut the frag off the old plug and dip the coral as a safety measure. I have used Bayer as a dip for years now, but there are a host of dips available, including Two Little Fishies' ReVive. Choose your dip and protocol and be diligent. Pests are a heartache and a challenge to your entire tank, so careful observation, removal of the frag from the plug, and dipping are necessary. Using a quarantine tank is even better and adds an additional layer of protection.

FRAG PLACEMENT

I primarily choose frag locations based on the potential of the frag to grow into a beautiful colony. If it is potentially spectacular, then it gets prime real estate in the tank. The longer my tank matures, the less prime real estate (or any real estate) is available. I am willing to relocate an established mini-colony to a less visible spot to make room for a new frag that just might be prettier. And if real estate is getting extremely precious, I will remove frags from my display



This Z's Avenger (under metal halides) is making a comeback from a rapid tissue necrosis event.



This pretty colony started from a frag that I was not so sure about.

RR USA Pink Floyd under metal halides

that have not blossomed to my expectations. Getting the seller's input on flow and lighting requirements is extremely helpful. Overall, I have found that most frags have been agreeable to my choice of locations for them.

FLOW

It seems that variable multi-directional flow is best, presumably because it mimics the natural flow of the ocean. And I generally accept the premise that more flow is almost always better. Flow certainly impacts a coral's nutrient absorption and excretion because with higher flow, more food is brought to the coral and more waste is washed away. I don't know what optimum flow is, so I simply strive for a kind of back and forth movement of the polyps. If you can see polyps in the daytime, that generally seems to be a good sign. I describe that as a happy coral, but then I like to anthropomorphize. I think happy corals tend to grow faster and might be more colorful. I have certainly observed unidirectional flow affect a coral's growth pattern. If you like rounded or circular colonies, then flow must, to some extent, be multi-directional.

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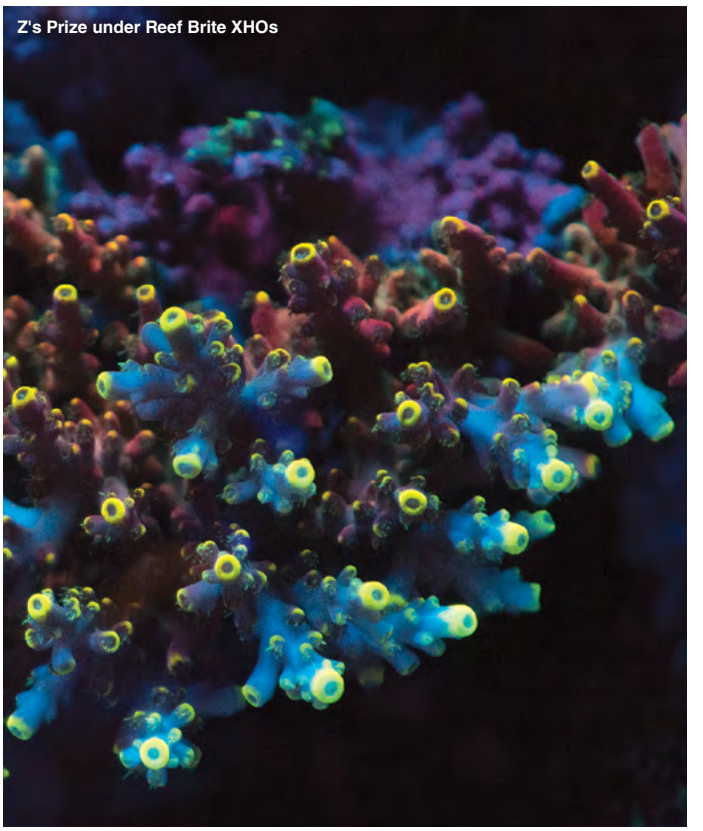
NUTRIENTS

There are many approaches to nutrient levels, from ultra-low nutrient systems (ULNS) to systems that run high levels of nitrates and phosphates. I have never been comfortable with either extreme. I am too concerned about living near the edge, so to speak, and prefer being somewhere closer to the middle of the range. I shoot for nitrate levels around 2–5 ppm and phosphate levels around .03–.1 ppm.

In the last couple of years, I've found that I need to supplement my tank with powdered potassium nitrate to keep nitrates up. I utilize a refugium with chaeto and also use Siporax filtration media. I employ a protein skimmer, perform 10 percent weekly water changes, and change out my filter socks weekly (or more frequently if required). All of this is done to maintain nutrients at consistent levels, but this has been keeping my nitrates so low that I've needed to supplement. On the other hand, my phosphates seem to be better managed as a result of the nitrate supplementation. Filtration is such a fascinating topic because our views are always evolving regarding sand beds, skimmers, and water changes.

LIGHTING

I have been reefing for so long that I have seen almost all the lighting schemes. My first tank had fluorescent bulbs of some sort, but I don't remember what they were called. My current tank utilizes



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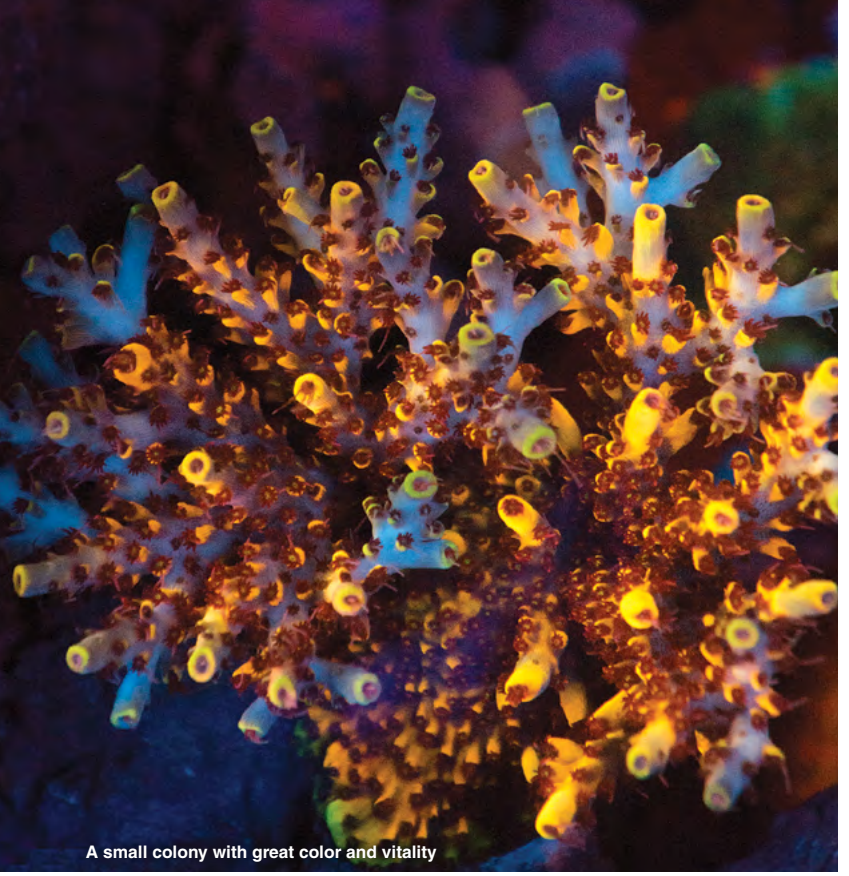


A small colony with great color and vitality

metal halides, T5s, and Reef Brite XHOs. My frag tank has T5s, and I just purchased an EcoTech Radion to experiment with.

I have metal halides because when I started, serious reef tanks had metal halides, so it was my goal to light my tank with them. T5s seem to love SPS and vice versa. Blue LEDs make corals fluoresce and their colors pop. Radions, as well as other new-generation LED fixtures, virtually duplicate T5 and metal halide lighting schemes and add much more color variability. I enjoy my combination fixture over my display, but heat and bulb changes are issues that require significant attention.

There's always new research that seems to be quantifying and qualifying lighting parameters. I am not up on the specifics because photosynthetically active radiation (PAR) numbers just haven't been that fascinating to me, nor, quite frankly, do I understand what to do with that information. Since I haven't started using LED fixtures as my main lighting, I find that somewhere between 8 and16 inches above the tank seems to be the sweet spot for my non-LED fixtures.

PARAMETERS

Environmental stability through consistent water chemistry is the goal. Color, growth, and vitality are all intertwined. Interestingly, it seems consistency may be more important than absolute numbers. Years ago, the aim was a high level of carbonate hardness (dKH) of around 11–12 and nitrates and phosphates were seemingly less tracked, or maybe I just wasn't aware of them being tracked at that time. It is fascinating that when high alkalinity levels were in vogue, many reefers struggled with high nutrients. Current trends are favoring seawater-like parameters, so alkalinity is often in the 7–8 dKH range, and nitrates are either low or undetectable. A requirement of lower nutrients is lower alkalinity; otherwise, SPS tips tend to "burn." Coral colors are good in both high and low alkalinity tanks as long as the values are consistent and stable.

SUPPLEMENTS

I try to follow all the exciting information that Triton, Aquaforest, Dutch Synthetic Reefing, Zeovit, Red Sea, and others provide on supplements. From time to time, I am open to trying a new product. All these manufacturers' supplement systems seem to produce beautiful tanks and corals of every color of the rainbow. I find it hard to separate fact from fiction, but those hobbyists that follow these programs do indeed have tanks that display a measure of success.

FISH

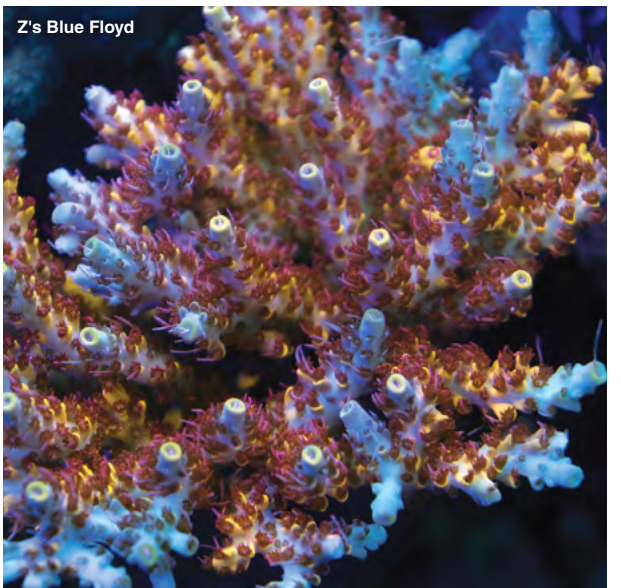
Not only do I love fish, I love what they provide my corals—fish poop. I feed my fish mostly dry foods, such as flakes and pellets, from a variety of manufacturers daily. I also feed frozen food. I think fish food, both consumed and uneaten, ends up providing an array of nutrients to acros. Of course, there needs to be a balance with nutrient export. Otherwise, the potential exists for an excess of nitrates and/or phosphates. I don't know what the ideal food is, and that is why I use many different ones.

SUMMARY

Below is my formula for brightly colored SPS:

1. Choose frags from brightly colored colonies that have been established in a tank for some time.
2. Ensure the frags are pest free.
3. Make sure you have adequate flow, lighting, and nutrients.
4. Keep your parameters consistent and stable.
5. House a decent amount of fish and feed them well.

For me, coral colors most definitely pop when I follow these simple steps. I wish you the best color possible with your corals, and hopefully, I provided some tidbit of information that you can add to your reefing knowledge base.



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FROGFISHES

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Antennarius pictus


Antennarius coccineus

Frogfishes have round faces, are sometimes hairy, and often sport a gigantic abyssal mouth that can engulf prey as large as themselves in milliseconds. These fishes come from the family Antennariidae and are commonly called anglerfishes because they use an anatomical lure to catch their prey. There are 46 species of frogfishes described so far, spread throughout 12 genera. They are all benthic except one: *Histrio histrio*, which lives to depths of about 6 feet, floating along with patches of *Sargassum* algae.

Frogfishes generally patrol a small territory by walking on their thick, rounded pectoral and pelvic fins. Antennariidae can inflate themselves (engulfing a large quantity of water in an instant) as a defense mechanism when confronted by


Antennarius sanguineus

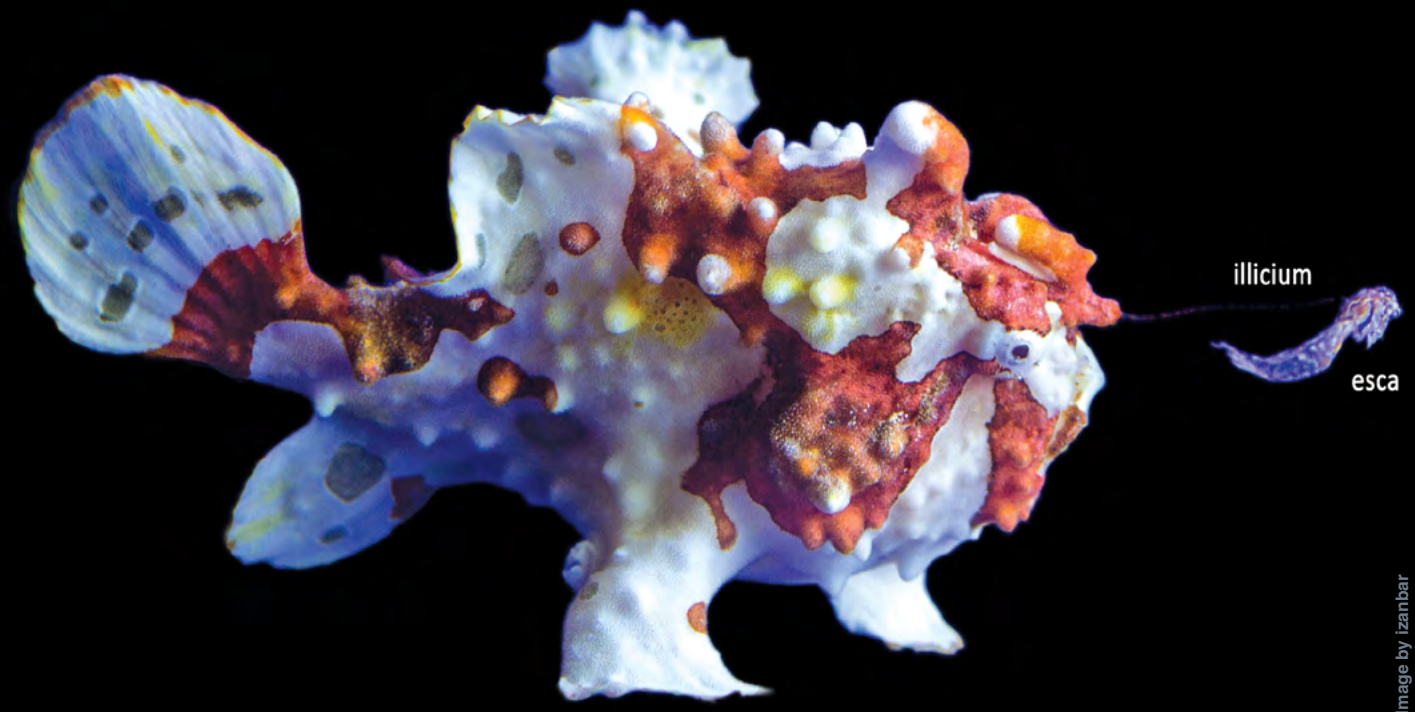
a predator and often in the presence of other frogfishes—cannibalism is quite common, especially toward smaller males approaching in an attempt to mate.

Speaking of reproduction, courtship and mating are well documented in the different genera. For most species, after an elaborate parade scheme including a vibrating approach, coded dance, and gentle touch, the pair will rise in the water column. Quickly, the female releases thousands of eggs glued together as a gelatinous, ribbon-shaped mass that the male rapidly fertilizes. The eggs then float away to begin the pelagic stage of the new generation.

For the *Histiophryne* spp., the female lays a clutch of larger but fewer eggs and has been known to carry them on her body until they hatch. Some others, like *Echinophryne* spp., lay demersal eggs that are fiercely defended.

Antennariidae are distributed throughout the tropics, with the exception of the Mediterranean. They live on sand or rubble sea floors, weedy patches, coral patches, and sometimes in estuaries and muddy waters. Their colors and markings offer clues about their habitat: brightly colored species are found amongst corals, sponges, and coralline-covered rocks, while yellow/greenish species and hairy species are more common in weedy or muddy environments, such as estuaries, protected bays, and damaged reefs. Some species can withstand depths down to 950 feet, but most species are found at less than 120 feet.

The first dorsal spine of frogfishes has evolved into a highly efficient fishing rod called an illicium. The illicium terminates in a highly specialized lure called the esca. This small lump of flesh mimics various animals: worms, fish larvae, shrimp, or even featherdusters, depending on the anglerfish species and its preferred prey. A damaged or lost esca grows back in 3 to 6 months. When at rest, the illicium remains still, usually along the second dorsal spine. But when prey approaches, the hunt begins. The illicium erects just above the mouth



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Antennarius maculatus | Image by Vincent Chalias

and begins to move. The esca wiggles as if the bait was a real worm, shrimp, or fish. As the prey approaches, the fish remains totally still until the unfortunate victim comes close enough. Suddenly, the frogfish opens its mouth, creating a powerful suction that pulls the prey in. This action, one of the fastest in the animal world, is so quick that the prey doesn't seem to notice nor show any reaction until it is caught.

In the aquarium hobby, the most commonly found species are from the genus *Antennarius*. Here is a list of the fishes you are likely to encounter:

- *Antennarius pictus*: found in areas such as lagoons, protected slopes, and wrecks, often on the quiet sides of the reef. Esca mimics a featherduster.

- *A. maculatus*: up to 3.93 inches in size and lives among richly covered coral patches. Esca mimics a small fish. (pictured left)

- *A. coccineus*: smaller size with esca shaped like a small tassel that attracts shrimp.

- *A. hispidus*: to 8 inches with esca like a tassel. (pictured right)

- *A. striatus*: averages 4 to 5 inches but can grow to 8 inches. Esca mimics a worm.

In captivity, you can house a single small-sized species (perhaps

A. coccineus or *A. maculatus*) in a tank of about 25 gallons. Larger species should be kept in tanks of 40 gallons or more. Conspecifics of a smaller size and other small- or similar-sized fish that might be considered snacks should not be housed in the same tank. Additionally, the cleanup crew must be chosen with care: hermits and snails are considered safe, but avoid shrimps.

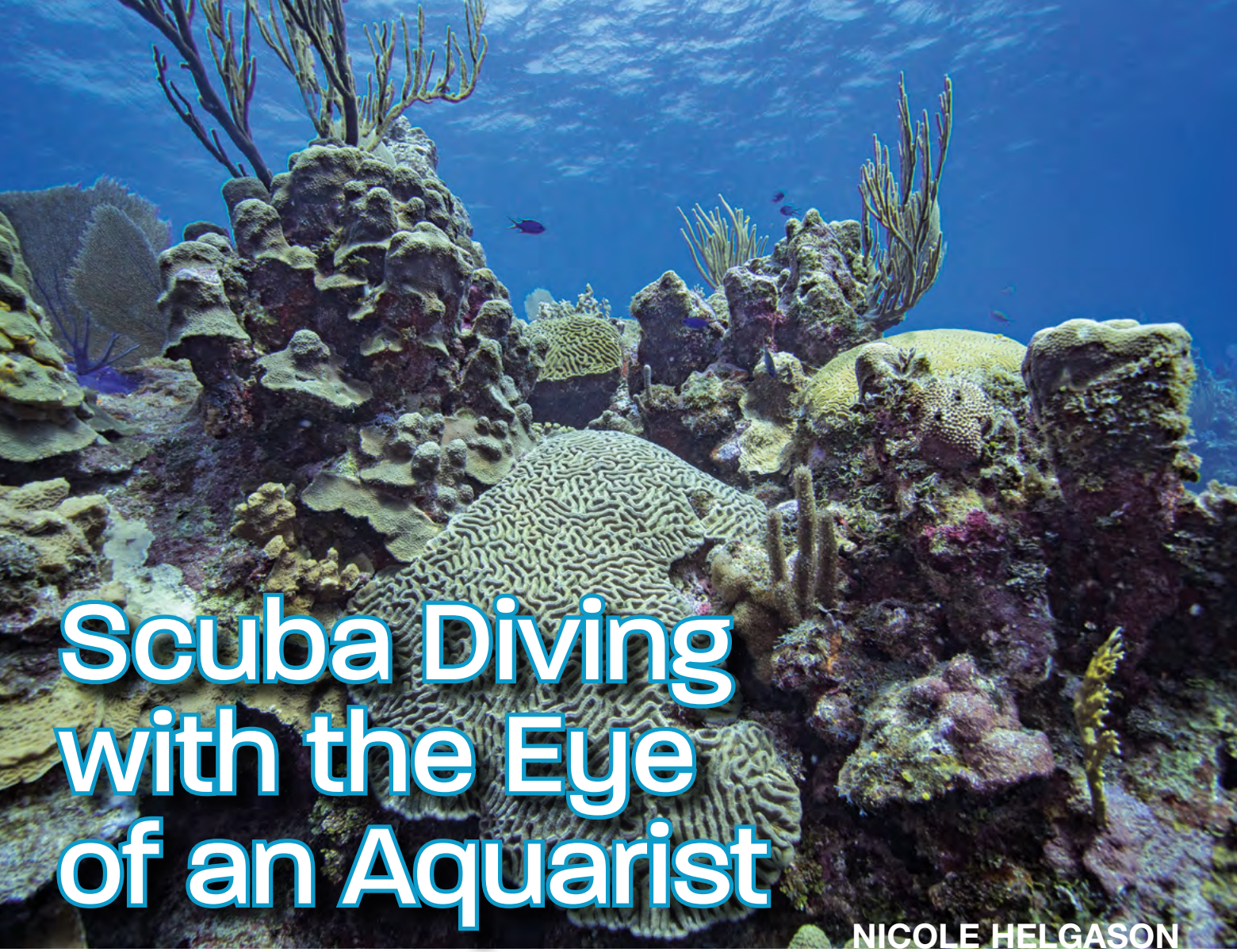
Water flow should be gentle, and water quality should be kept as high as possible since frogfishes are quite sensitive and prone to skin disease and fungal and bacterial infection.

Frogfishes have a slow metabolism. Juveniles should be fed no more than three times a week, and adults should be fed only once or twice a week. Feeding smaller portions more frequently is always better. I suggest not offering food more than 1/3 the size of the frogfish.

Antennarius hispidus

One must be careful to ensure the fish completely digests the previous meal before feeding again. In normal conditions, digestion takes 2 to 3 days. Don't feed freshwater fish and shrimp to frogfishes; these can damage the liver. Stick to marine animals such as grass or ghost shrimp and small fish. Most frogfishes can adapt to frozen foods (silversides, shrimp, krill, pieces of squid) quite fast if you know how to simulate live prey. Just hold the food item with a transparent stick and make it move in front of the fish.

A walking fish, a fishing fish…all in one creature! No, it isn't a psychedelic dream, it's a reality. Frogfishes are some of the most amazing fishes in existence.



Scuba Diving with the Eye of an Aquarist

NICOLE HELGASON

When I first learned to scuba dive 10 years ago, I knew absolutely nothing about corals. Reef aquariums and growing coral at home were the last things on my mind. I learned to dive in Punta Cana, Dominican Republic, and the location where I first learned to dive was a secluded coral reef with very few tourists.

The reef was in surprisingly good health for the Caribbean, as a local environmental foundation put emphasis on preserving nature. And perhaps this was all luck, but right in the center of our shallowest beginner dive area were six rebar frames covered in *Acropora cervicornis*. I had always been an avid terrestrial gardener, but this was my first introduction to coral gardening, and I was obsessed.

I went from knowing nothing about coral to knowing exactly what I wanted to do with my life: farm coral. For the next 8 years, I tried to learn everything I could about these animals. I left the Dominican Republic and went home to Canada to finish my bachelor's degree. I studied sea anemones in the coastal waters of British Columbia as a proxy, just to learn more about marine invertebrates. I studied the marine environment, scuba diving, and tourism, and I eventually started my own coral restoration project in Africa. It was at this point that I discovered Reef Builders and the reef aquarium hobby.

Growing up in Canada, I didn't get to experience the same reef culture we have in the United States. I volunteered at a local public aquarium that had a sizable reef tank, yet the thought of growing corals at home didn't occur to me. I already had a solid grasp of coral biology and some experience growing coral fragments in the wild, but it wasn't until I started keeping corals at home that my perception of corals was turned upside down.

Fast forward to today. I've had the opportunity to participate in every step of the reef aquarium trade—from visiting farms in Indonesia, working at a commercial coral wholesaler in California,

A coral restoration project in Punta Cana, Dominican Republic (*Acropora cervicornis*)

and organizing and attending reef shows, to growing my own corals at home.

BUILDING A CORAL CONNECTION

Aquarists have an unparalleled connection with coral. We see the tiny intricate details of their structure and marvel at their brightly colored polyps. We understand the difference between single-polyp corals and small-polyp corals, and we know, more or less, how to spot rare and unusual specimens.

Growing coral at home allows us to build a relationship of sorts with these animals. You can feed your corals and watch their tentacles emerge or peek at your tanks in the dead of night when corals can shrink to a bare shadow of their daytime splendor. As aquarists, we know our corals are living animals and that it is our job to give them the best possible habitat to thrive.

If you add up all the hours spent looking at your tank, it amounts to days, weeks, or months of experience getting to know and appreciate coral. And the hands-on time spent fragging and dipping coral serves to deepen our connection.

CORALS IN THE WILD

Being an aquarist has given me a completely new perspective on coral reefs in the wild. Now, when I dive, I can't help but notice tiny zoanthids or clusters of brightly colored mushrooms. I spend my dive looking for unique coral growth forms, brightly colored growth margins, or rare and unusual species. And the more time I spend diving, the more I realize just how important corals are and just how little attention they get from other divers.

As a dive instructor, I hardly knew the names of any corals, and there weren't many divers interested in this specific knowledge. Ask most divers to name a handful of coral species and chances are you will be met with a blank stare. Corals are simply background in the search for macro critters like fish and shrimp or mega fauna like sharks and whales.

Aquarists, on the other hand, can name dozens of corals, and I wonder if it all comes down to the way we photograph corals and the unique relationship we build with them at home. Aquarium photography brings out tiny details that are almost invisible to the naked eye. This experience allows us to appreciate the diversity and dynamics of corals in a way most divers will never experience.

A typical dive lasts 45 to 60 minutes, and most of that dive is spent swimming along the ocean floor in search of critters big and small. Before becoming an aquarist, I never once spent an entire 60-minute dive watching a single colony or getting up close to inspect tiny polyps. You might think that divers immersed in the reef, surrounded by colossal coral colonies, would want to learn more. But in the wild, many of these corals lose much of their impact.

As a diver, it is far easier to make a connection with a fish than it is with a lump of coral. A deeper appreciation for coral can only

Wall covered in encrusting corals

Yellow Tube Sponge and Grooved Brain Coral

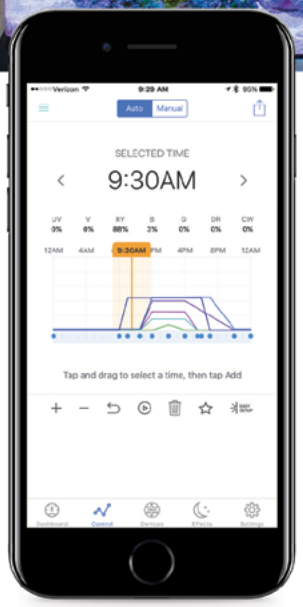
come from spending time observing them day and night as they expand and contract, as tentacles emerge and new branches start to form. Observing corals in our home brings corals to life, something a diver's passing glance could never do.

In the wild, corals look quite different than in our tanks, both in size and color. The only factor limiting a coral's growth in the wild is competition with neighbors, and a single colony can grow to the size of a person or larger. Corals take on a new scale in the wild that draws our eye away from the small details. Having an aquarist's eye allows me not only to spot small details but also to draw inspiration from the natural aquascape.

IT'S ALL IN THE DETAILS

For corals in the reef aquarium hobby, it's about the details. The corals we buy are sometimes an inch or smaller in size, and the photos we use to document them are taken with high-resolution lenses for up-close macro detail. Without even trying, aquarists are trained to see the finer details in a coral that sets it apart from the crowd. Take zoanthids, for example. These colorful polyps garner an almost cult-like following, with hundreds of named varieties and groups dedicated to correctly identifying each subtle variation. Most aquarists can name a handful of different types or at least recognize that there are too many varieties to keep track of.

On the reef, it's difficult to spot zoa colonies that hobbyists would consider ultra-rare; many of these colonies are started from a single polyp and propagated within the hobby. Instead, you are more likely to find nondescript varieties like the colony on page 48 from the Cayman Islands. The bright orange tentacles and minty green centers really stand out, but I found it difficult to communicate my excitement to divers who had no prior appreciation for the possibilities of zoa varieties.



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On the reef, these tiny polyps can disappear or be over shadowed by colossal coral colonies. Their colors may not be as exquisite as they would be under actinic light. However, finding these little gems still brings me excitement every time I dive.

WHAT STANDS OUT IN THE WILD

At home, the corals that stand out are ones with an almost radioactive glow under actinic lighting. Switch the light to white and the same corals appear drab and unassuming. Aquarists are perhaps more concerned with how their corals look under actinic light than how big they can grow. In fact, when a coral gets too big and starts outgrowing its designated tank space, we trim and chisel it down, trading or selling the leftovers to buy more coral.

But in the wild, it's not the intricate details or lustrous glow that sets a coral apart. Instead, we focus more on the size and shape of each colony and the natural aquascape created by neighboring corals. Aside from a few clumsy turtles or grazing fish scattering fragments, corals in the wild are left to grow and compete to survive. This competition creates unique arrangements and forces corals to adapt to whichever habitat in which they settle.

The natural underwater landscape also leads to microhabitats, such as low-light conditions under ledges or low-flow environments between ridges. These micro reef zones often draw my attention while diving, especially to compare corals growing inside and outside of shady or turbulent environments. It's interesting to see how corals adapt to these dynamic environments by growing flat to capture more light or focusing energy on creating a strong, steady base in high flow.

As an aquarist, these environments remind me that in a home tank, there is no one-size-fits-all guide for light or flow conditions for any coral. Within reason, corals will grow and adapt to their

This colony of zoas was spotted in the Cayman Islands.

environment, even if they don't find the conditions optimal. How a coral looks in the wild varies day by day. With only the sun to power the reef, corals of the same species can look different at 80 feet versus 20 feet. To some degree, drop-off aquariums attempt to recreate this vertical zonation.

On a recent trip to the Cayman Islands, I noticed three colonies of *Montastrea* covering the seafloor like a flat carpet. In comparison, colonies in the shallows formed large domes to catch light from all angles as the sun traverses overhead.

What really catches my attention when scuba diving is how all the corals interact with each other, and that when I swim back and take

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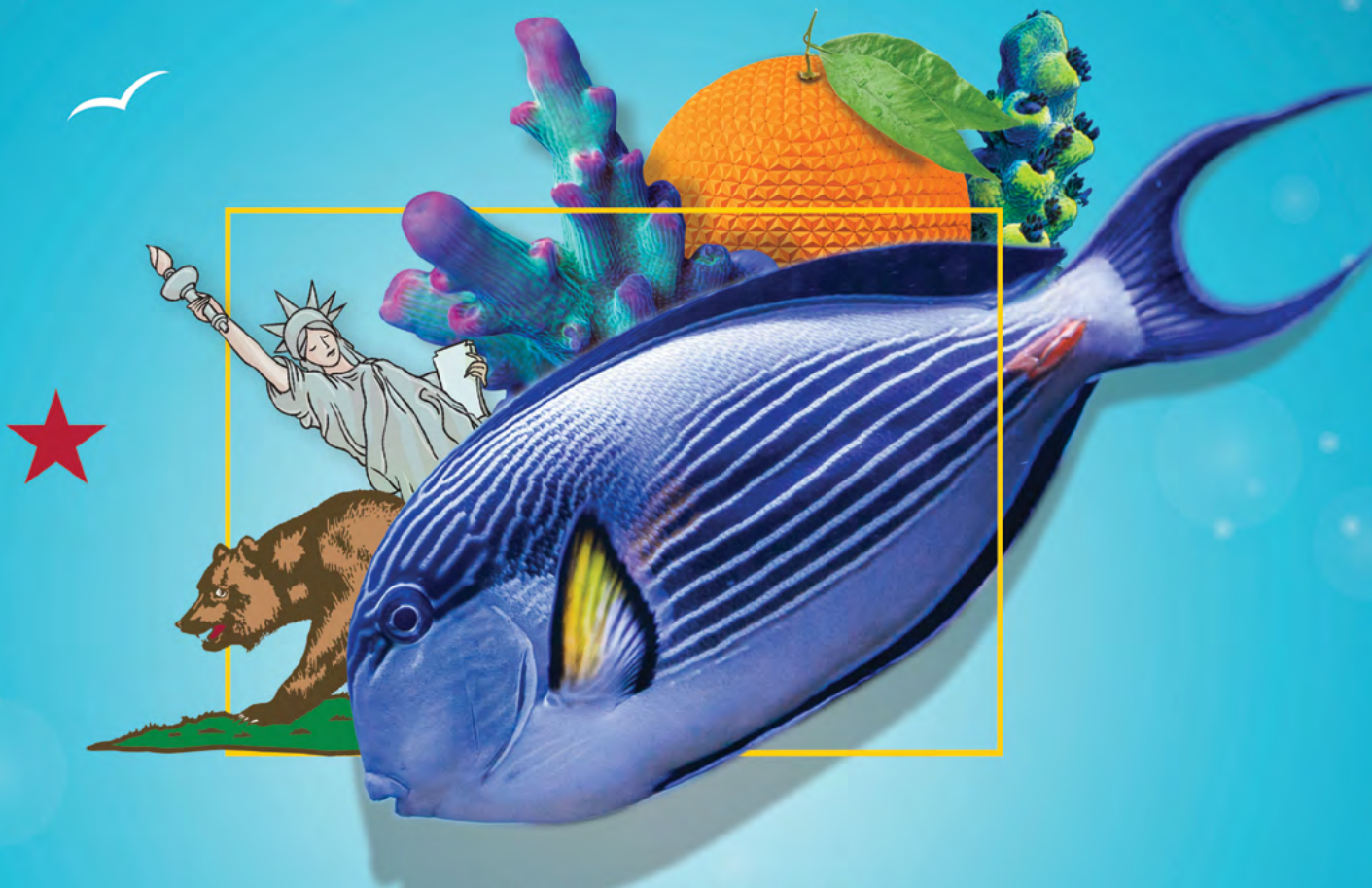

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This balanced arrangement of soft and hard corals was photographed in the Cayman Islands.

a snapshot of the reef, the clusters of large coral colonies create an aquarium-like aquascape. Although I couldn't fit these corals in my home, the wild reef still gives me inspiration to bring back to my tank.

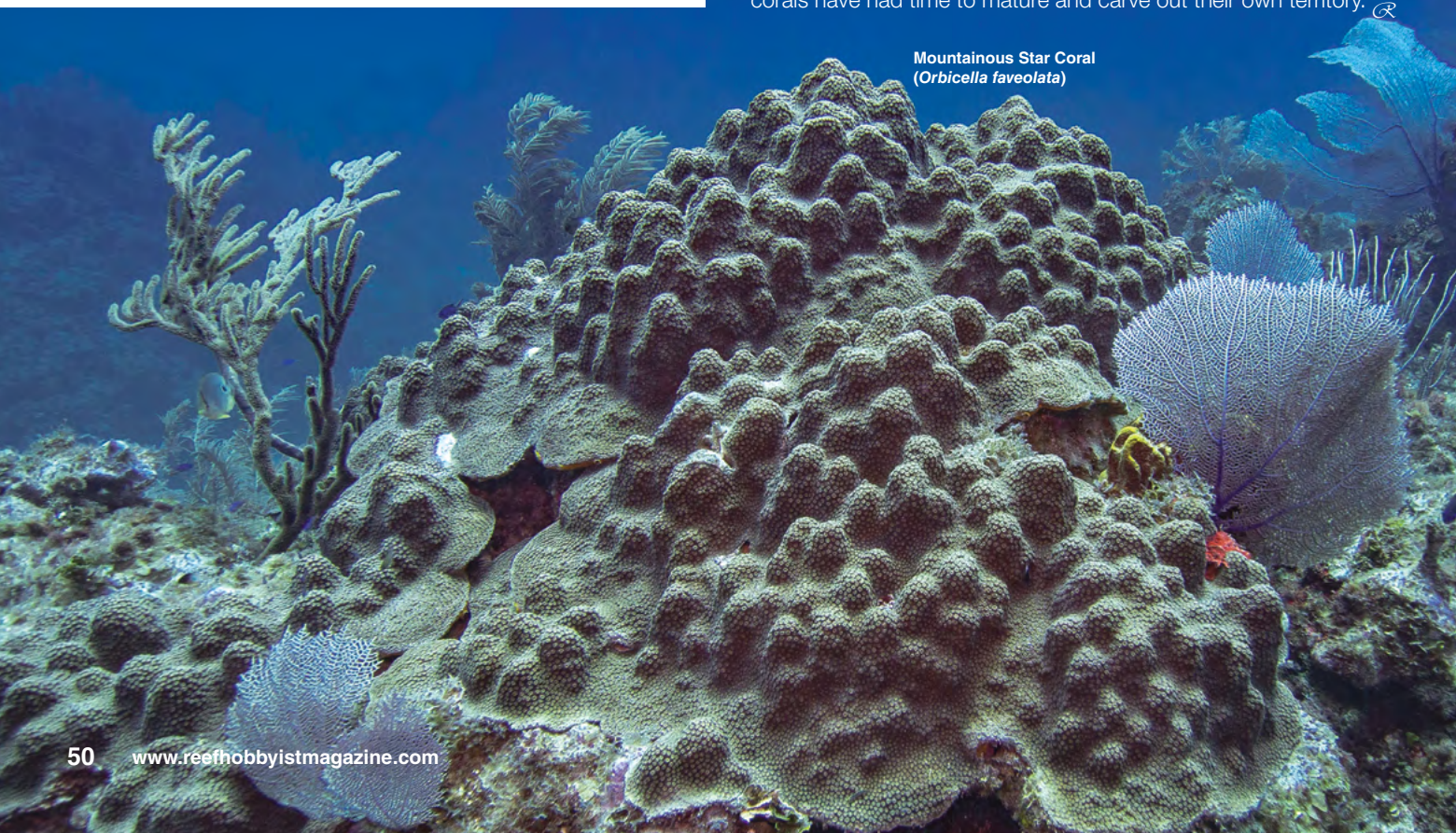
I would highly recommend aquarists take a trip to the reef to observe corals in the wild. Being an aquarist heightens a scuba diving experience, and aquarists can connect with corals on a deeper level. The only trouble with scuba diving is wanting to bring all the corals home!

BIOTOPE AQUARIUMS

It's not often we find saltwater biotope aquariums designed to emulate the natural environment. Instead, we mix corals from around the world, selected for their rainbow palette or ever-expanding vesicles.

The idea of a biotope aquarium is to use fish and coral from a particular region and habitat to recreate a representation of the wild. This interests me the most in the aquarium hobby, the idea that we can have a window in our home that transports us to the reef of a specific region. Classic mixed reefs with corals from around the world, while beautiful to look at, have a degree of artificiality when you know they could not be found that way in the wild.

Looking at corals in the wild with an aquarist's eye gives us inspiration to attempt to recreate a slice of the natural reef. We can better visualize how our rock work can include arches and overhangs for low-light corals or areas of low flow behind rocks as nature intended. While we can never fully recreate wild reefs, corals in the wild show us how simple design can be beautiful when the corals have had time to mature and carve out their own territory.



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